



Market Assessment Report

Developing a National Framework for deploying and scaling up E-Mobility in Tanzania

The United Republic of Tanzania
Ministry of Transport



Project reference DE_id201139

Date 27 May 2024

Project implemented.
with the support of

SIEMENS



CTCN
UN Climate Technology Centre & Network
UNFCCC Technology Mechanism



Acknowledgements

This report is produced as part of the UN Climate Technology Centre and Network (CTCN) technical assistance entitled “Developing a National Framework for deploying and scaping up E-Mobility (EM) in Tanzania”. This project is requested by the Ministry of Transport of Tanzania through the Tanzania Commission of Science and Technology (COSTECH). The project is implemented by Siemens AG in collaboration with Innovex.

Mention of a commercial company or product in this document does not imply endorsement by the authors. The use of information from this document for resale, publicity or advertising is not permitted. Trademark names and symbols are used in an editorial fashion with no intention on infringement of trademark or copyright laws.

The authors of this report wish to express their gratitude to all colleagues who contributed to its development by sharing their experiences and expertise, insights, review comments and supporting materials.



Table of Contents

Acknowledgements	2
Table of Contents.....	3
List of Figures.....	3
List of Tables	6
1 Introduction and Context.....	7
1.1 Background and Problem Statement	7
1.2 Consultancy Engagement Objectives	8
1.3 Report Structure	10
2 Market Assessment.....	11
2.1 Global Context of Transport Electrification	11
2.2 Country Information	12
2.2.1 Transport sector	14
2.2.2 Energy sector	17
2.2.3 Education, Research and Local Workforce	19
2.3 Current EV Ecosystem in Tanzania	21
2.3.1 Government bodies and regulation.....	22
2.3.2 EV Value Chain Analysis	28
3 Gap Analysis	33
3.1 Prioritization of Tanzanian objectives and drivers.....	36
3.2 Gap Assessment results.....	36
3.2.1 E-Mobility Domain: Policy and Regulations	37
3.2.2 E-Mobility Domain: Electricity Grid.....	40
3.2.3 Business Domain: Socioeconomics Aspects	42
3.2.4 Business Domain: Stakeholder Engagement.....	45
3.2.5 Business Domain: Cross Domain Aspects.....	47
3.2.6 Gap-Recommendation	49
4 Works Cited.....	50



List of Figures

Figure 1-1	Challenges for E-Mobility in Tanzania, key driving questions of the assignment and Siemens tasks within the project. (Source: Siemens own figure).....	8
Figure 1-2	Implementation phases of the assignment. Highlighted phase-1 is the focus of this report. (Source: Siemens own figure).	9
Figure 2-1	New vehicle sales by type in 2050. (Source: Siemens own figure using publicly available information).....	12
Figure 2-2	Tanzania macroeconomic overview (Source: Siemens own figure using publicly available information).....	13
Figure 2-3	Annual % GDP per capita growth in Tanzania (Source: Siemens' own figure using publicly available information from the World Bank).	14
Figure 2-4	Tanzania transport sector overview (Source: Siemens own figure using publicly available information).....	15
Figure 2-5	Total vehicle stock and their share in Tanzania (Source: Siemens own figure based on available data from (Tanzania Ministry of Works and Transport, 2021)).....	16
Figure 2-6	Current EV stock in Tanzania. (Source: Siemens own figure based on available data from (Africa E-Mobility Alliance (AfEMA), 2023))... ..	17
Figure 2-7	Energy mix in the Tanzanian National grid in 2022 (Source: Siemens' own figure using publicly available data).....	17
Figure 2-8	Stakeholders and their levels of interaction in the Tanzanian electricity market. (Source: Siemens own figure).	19
Figure 2-9	DIT vehicle manufacturing facilities. (Source: Siemens).	20
Figure 2-10	Overall market players crucial to shape EV transition in Tanzania. (Source: Siemens own figure).	21
Figure 2-11	Clustering of the E-Mobility policy framework in Tanzania. (Source: Siemens analysis).....	24
Figure 2-12	Market players relevant for the Tanzanian E-Mobility value chain. (Source: Siemens)	29
Figure 3-1	Steps starting with the gap assessment framework towards the prioritization of the key initiatives on the short-, medium-, and long-term. (Source: Siemens)	33
Figure 3-2	Dimensions of the E-Mobility radar of the EV-IF framework. (Source: Siemens)	34



Figure 3-3	Capability Manage Strategy (Existing 4).....	37
Figure 3-4	Capability to manage policies (Existing 4).....	38
Figure 3-5	Capability Manage Regulations (Existing 4).....	39
Figure 3-6	Manage Grid Impact and Operation (Existing 4).....	40
Figure 3-7	Manage Grid Access Policy and Connection (Existing 4).....	41
Figure 3-8	Manage Economic Aspects (Existing 4).....	42
Figure 3-9	Manage Social Aspects (Existing 4).....	43
Figure 3-10	Manage Environmental Aspects (Existing 4).....	44
Figure 3-11	Manage Stakeholder Engagement (Existing 4).....	45
Figure 3-12	Manage customers (Existing 4).....	46
Figure 3-13	Manage sector-coupling (Existing 4).....	47
Figure 3-14	Manage Fossil Fuels (Existing 4).....	48



List of Tables

Table 2-1	Overview of key governmental bodies involved in Tanzania with regards to E-Mobility. (Source: Siemens own Analysis)22
Table 2-2	Overview of key polices and regulations in Tanzania with association to E-Mobility. (Source: Siemens own Analysis)25



1 Introduction and Context

1.1 Background and Problem Statement

1. Tanzania is largely dependent on imported fossil and unrefined biomass fuels for economic and transport activities. Due to its rapid urbanization and increasing individual motorization, traffic congestion and air pollution have increased alongside GHG emissions. **Dar es Salaam is the second-fastest growing city worldwide,¹ where public transport depends on a large fleet of privately-owned minibuses** that are often not well maintained to keep on the road. Electric mobility (E-Mobility) has been recognized as a viable and attractive option that can create jobs, reduce energy imports, and spur green growth. In line with its National Transport Policy,² which envisions improving the transport sector's efficiency, cost-effectiveness, accessibility and environmental degradation, **Tanzania sought seeking technical assistance (TA) for the development of an E-Mobility program and implementation framework.** The country has implemented policies and strategies to promote renewable energy technologies in various sectors of the economy. However, there has been no specific initiative or effort directly targeting E-Mobility, nor any accompanying standards, guidelines, or regulations.
2. To address those shortcomings, Tanzania Commission for Science and Technology (COSTECH)³, hereafter "**the National Designated Entity (NDE)**"⁴ in coordination with the main beneficiaries, Ministry of Energy, Ministry of Transport, and VPO sought technical assistance support from the UN Climate Technology Centre and Network (CTCN), hereafter, "**the Client**"⁵ in late 2021.⁶ The overall objective of the TA is to develop national E-Mobility program and its implementation framework for deployment and scaling-up of Electric transportation systems. The project proposal aims to cover benchmark analysis of international policy in E-Mobility as well as national market readiness and cost assessment for uptake. **The policy and the implementation framework are to be developed with technology roadmap, suitable investment plans, and detailed feasibility study** for the selected interventions and capacity development of the relevant stakeholders. Financing models and streams of finances will be identified.
3. A request for proposals (RfP) was launched in June 2022 by the United Nations Office at Nairobi (UNON),⁷ on behalf of CTCN, inviting qualified bidders to submit proposals for the solicitation for provision of TA. Siemens AG, hereafter, "**the Consultant**",⁸ was awarded the contract in June 2023 and began supporting the client and the beneficiary in the execution,

¹ <https://www.nationalgeographic.com/environment/article/tanzanian-city-may-soon-be-one-of-the-worlds-most-populous>

² <http://www.tzonline.org/pdf/nationaltransportpolicy2.pdf>

³ <https://www.costech.or.tz/>

⁴ https://www.ctc-n.org/sites/www.ctc-n.org/files/session_3_eng_ctcn_role_of_national_designated_entities_ndes.pdf

⁵ <https://www.ctc-n.org/>

⁶ <https://www.ctc-n.org/technical-assistance/requests/developing-national-framework-deploying-and-scaling-e-mobility-em>

⁷ <https://www.ungm.org/Public/Notice/176926>

⁸ <https://www.siemens.com/global/en/products/energy/grid-software/pti-consulting/energy-business-advisory.html>



1.2 Consultancy Engagement Objectives

4. This project aims at developing the national framework for deploying and scaling up E-Mobility in Tanzania. The project scope covers the development and adoption of national EV policies, regulations, and the delivery of awareness and capacity building activities that support market transformation through clear implementation frameworks adapted to three (3) cities. The cities under consideration are **(i) Dar es Salaam; (ii) Mwanza; and (iii) Dodoma**. These cities are chosen for their potential of fast growth as well as having large number of residents who mostly commute using road transport using commuter buses, 3- and 2-wheelers.
5. Figure 1-1 below provides summary the problem statement/ key challenges, and key questions to be answered in order to realize Tanzania’s E-Mobility potential, and consequently the Consultant’s scope of work.

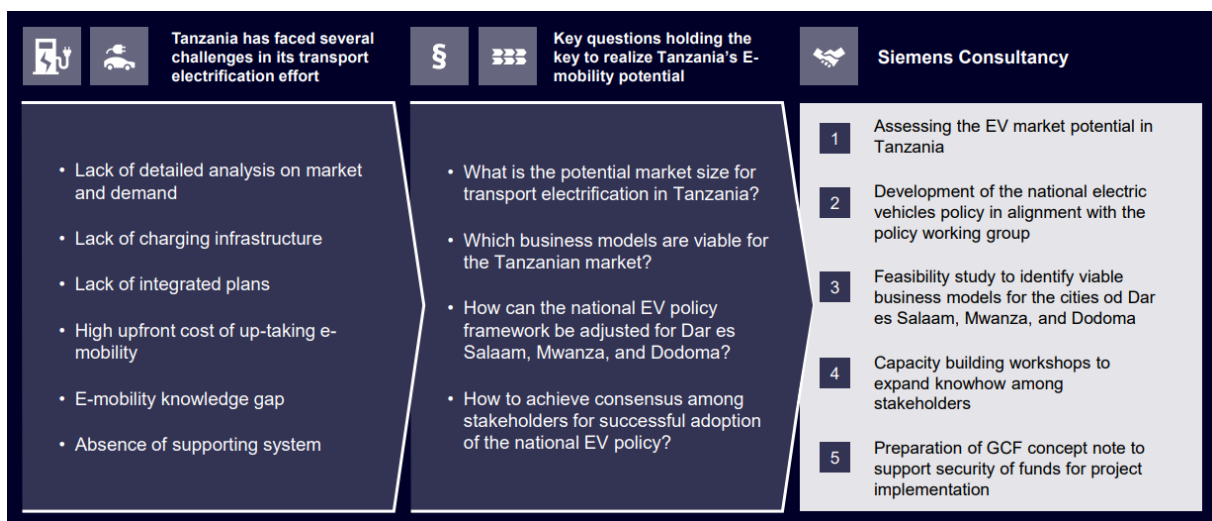
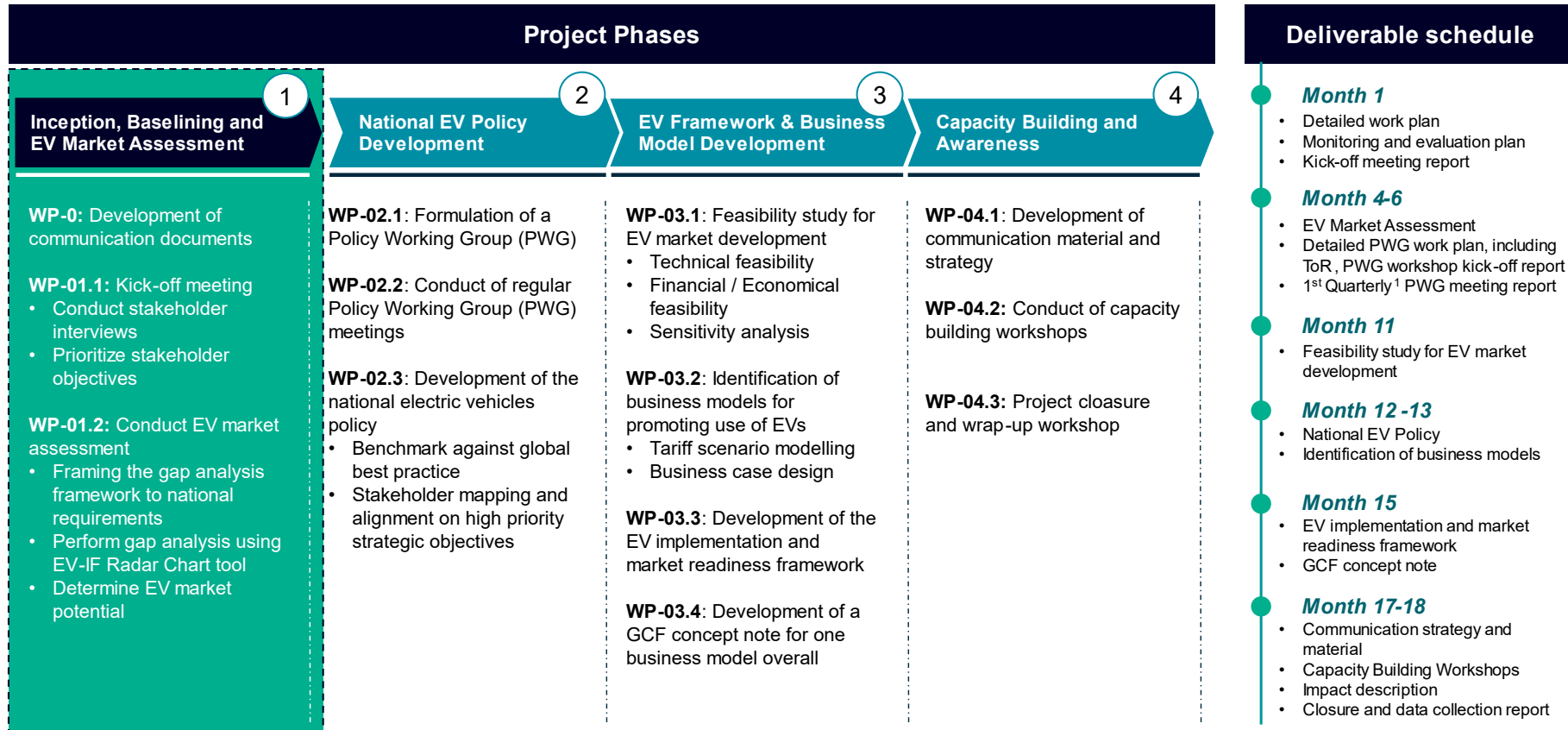


Figure 1-1 Challenges for E-Mobility in Tanzania, key driving questions of the assignment and Siemens tasks within the project. (Source: Siemens own figure).

6. The assignment will be implemented through four phases with each phase building on another:
- Inception, Baseline and EV Market Assessment
 - National EV Policy Development
 - Development of EV implementation framework and business models
 - Capacity building and awareness creation on EVs

Figure 1-2 below illustrates the key tasks outlined above and their associated work packages that will serve as key activities for achieving the objectives of this assignment.



1) PWG meeting report to be given every quarter

Figure 1-2 Implementation phases of the assignment. Highlighted phase-1 is the focus of this report. (Source: Siemens own figure).



1.3 Report Structure

7. Based on the virtual kick-off mission on MS-Teams, the initial phase of this project was to deliver the first contractual milestone, the inception report.
8. The report is structured as follows:
 - **Part 1: Introduction and Context:** This section serves as an introductory part of the report, presenting an overview of the project and its background. It outlines the objectives, significance, and purpose of the project, providing the necessary context for the subsequent sections that delve into the specific aspects of the report.
 - **Part 2: Market Assessment:** This section aims to understand the as-is situation with regards to E-Mobility in Tanzania, by analyzing the global context, outlining country key information and assessing the EV value chain; and
 - **Part 3: Gap Analysis:** This section performs a gap analysis of the EV landscape using Siemens EV-IF radar chart tool which assesses five (5) different domains based on the inputs and insights captured during the physical mission.



2 Market Assessment

2.1 Global Context of Transport Electrification

9. The Electrification of transport fleets is radically transforming the transport sector and automotive industry, where it is set to continue growing until mass-market adoption is achieved. **In 2022, over 10 million EVs were sold, accounting for 14% of all new cars sold, up from 9% and 5% in 2021 and 2020 respectively.** The global market is driven mainly by China, Europe, and the United States of America. Currently, China accounts for more than half of EVs globally and already surpassed their 2025 target for new energy vehicle sales. Europe with an over 15% increase in electric car sales in 2022 is the second largest EV market, while the United States is the third largest EV market witnessing a 55% increase in EV sales in 2022 (International Energy Agency, IEA, 2023). The market is expected to continuously grow with EVs expected to overtake ICEs by 2047, see Figure 2-1.
10. The ambitious growth in the global EV market is driven by a combination of the following factors:
- **Strategic drivers:** Over the past decade, the increasing global awareness of climate change has created a spill-effect of increased interest in electric vehicles. Coupled with the combinations of pull measures in favour of EVs (e.g., purchase subsidies, vehicle purchases, and registration tax rebates) and push measures against ICE vehicles (e.g., tightened tailpipe CO₂ standards), world sales of EVs, especially in the United States, China, and Europe, have been boosted considerably (International Energy Agency, IEA, 2021);
 - **Technical drivers:** Continuing declines in battery costs and the widespread availability of electric vehicle models provide make the electric vehicle market increasingly attractive in the coming decades. According to BNEF's annual survey of battery prices, the weighted average cost of a car battery fell 13% in 2020 compared to 2019, currently holding at approximately 132 \$US / kWh.⁹ Examples can be found of battery prices reaching 100 \$US / kWh, at which point EV price parity with traditional combustion engine vehicles can be achieved¹⁰.
 - **Economic drivers:** The continued increase in electric vehicle range and more accessible charging infrastructure have combined to make the use of EVs more appealing. The average driving range of new BEVs per charging has reportedly increased from 200 km in 2015 to 350 km in the last five years, with even greater changes expected in the coming years due to further technological advances. Though regionally diverse, public infrastructure has also been increasing alongside EV uptake, with total charger units

⁹ <https://about.bnef.com/blog/lithium-ion-battery-pack-prices-hit-record-low-of-139-kwh>

¹⁰ BNEF (2020) Battery Pack Prices Cited Below \$100/kWh for the First Time in 2020, While Market Average Sits at \$137/kWh. Available at <https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/>



reaching 1.3 million in 2020, including approximately 30% classified as fast chargers (International Energy Agency, IEA, 2021).

11. Understanding the global impetus for E-Mobility integration is crucial, yet recognizing the local factors is paramount, as these are what will shape a country's EV adoption trajectory. While E-Mobility's journey commenced in various countries nearly a decade ago, the market remains nascent and open to newcomers. Adapting existing power and grid infrastructures to support EV and Electric Bus (EB) adoption demands significant technical and regulatory modifications. Effective coordination in network planning and regulatory alignment are essential. With a robust national strategy and comprehensive implementation plan, Tanzania has the potential to lead E-Mobility adoption across Africa.
12. Electrifying the transport and automotive sectors promises long-term benefits, including reduced carbon emissions, decreased pollution leading to better health outcomes, lower fuel costs, savings on fossil fuel imports, green job creation, and more.

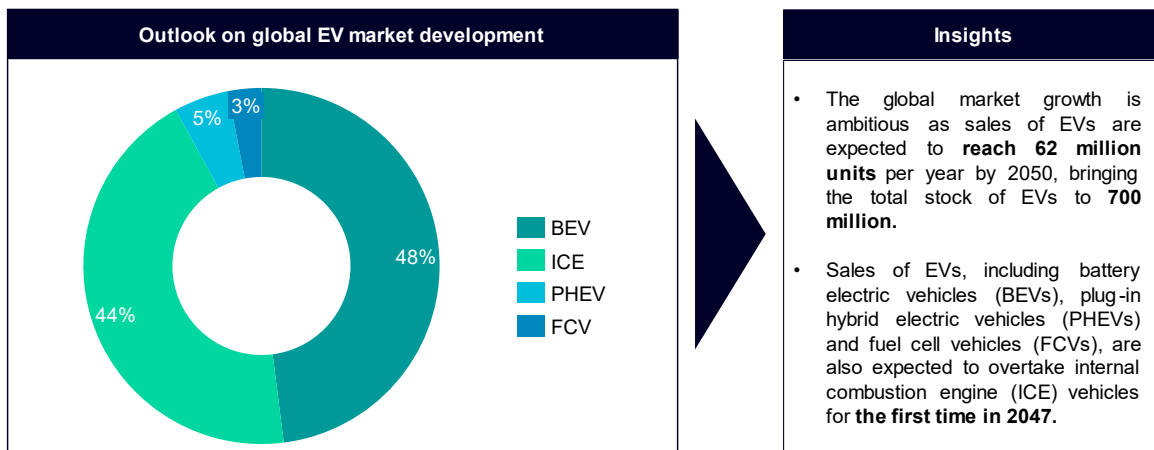


Figure 2-1 New vehicle sales by type in 2050. (Source: Siemens own figure using publicly available information).

2.2 Country Information

13. Tanzania is a country in Eastern Africa, bordered by Kenya and Uganda to the North, Rwanda, Burundi and the Democratic Republic of Congo to the West and Zambia, Malawi, and Mozambique to the South. The eastern border of Tanzania lies in the Indian Ocean, having a total coastline of 1,424 km. Tanzania is the 2nd most populated country in East Africa after Ethiopia in 2022 with an estimated population of 61.74 million and with a current population growth of 3.2% is projected to reach over 100 million people in 2040, see (Tanzania National Bureau of Statistics, 2022).
14. **About 97% of the population live in Tanzania mainland while the remaining 3% are in Zanzibar.** However, the population density varies significantly across the country, usually high in cities and low in rural communities.



- **Dodoma** region in which the capital city is located currently has over 3 million people and with a population growth of 3.9% in 2022, is projected to be over 4.6 million inhabitants in 2040.
- **Dar es Salaam** on the other hand is the major commercial and the most populated city with over 5 million inhabitants. With a population growth of 2.1% in 2022, the population of Dar es Salaam is projected to reach 7.6 million in 2040.
- With a population over 3.6 million inhabitants, **Mwanza** is currently the second largest urban settlement in Tanzania after the city of Dar es Salaam with a population growth of 2.9% in 2022. It is projected to be the most populated city in Tanzania in 2040 with an estimated population of 8.4 million people (Tanzania National Bureau of Statistics, 2022).

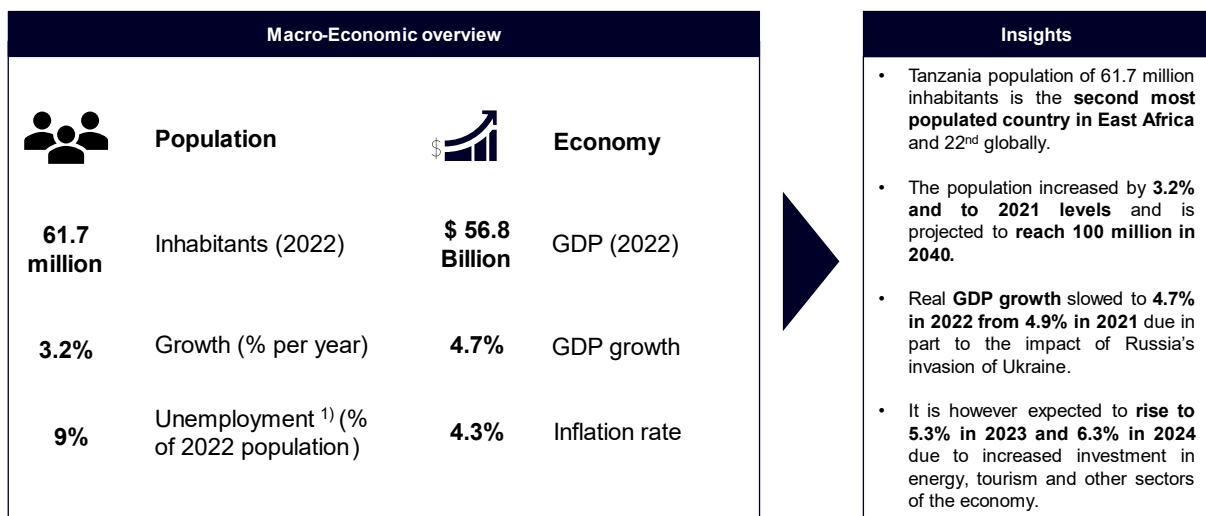


Figure 2-2 Tanzania macroeconomic overview (Source: Siemens own figure using publicly available information).

15. **The GDP of Tanzania witnessed a 4.7% increase in 2022 mainly driven by activities in Agriculture, mining of mineral deposits, construction, and manufacturing.** In absolute values, the country's GDP increased to 141.8 trillion shillings (\$US 56.8 billion¹¹) in 2022 from 135.5 trillion shillings (\$US 54.2 billion) in 2021. The GDP growth was a result of Government measures to contain the impact of the war in Ukraine through strategic investment in energy, water, health, education, roads, railways, and airports infrastructure; increased production of minerals particularly coal, gypsum, salt, diamonds, limestone, and copper; and increased tourism activities. Overall, the GDP per capita increased to \$US 1,229 in 2022 compared to \$US 1,173 in 2021 (Ministry of Finance, 2023). Figure 2-3 highlights the annual growth in the GDP per capita, showing a steady recovery from the devastating economic impact of the COVID-19 global pandemic.

¹¹ Assuming an exchange rate of 1 \$US equivalent to 2500 TZS.

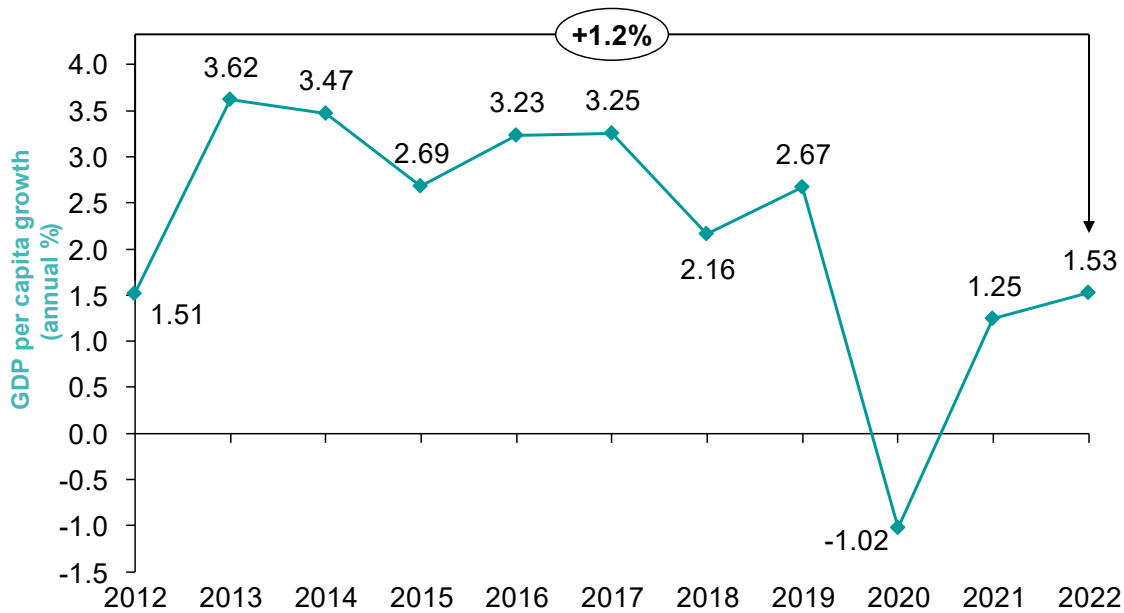


Figure 2-3 Annual % GDP per capita growth in Tanzania (Source: Siemens' own figure using publicly available information from the World Bank¹²)

16. With a growing economy projected to uplift many of its people from poverty, Tanzania is positioned well to adopt cleaner technologies in both energy and transportation.

2.2.1 Transport sector

17. The Tanzanian Transport sector is crucial to the socio-economic development of the country as it improves accessibility to market, strengthens market competition, promotes trade and export, tourism, increases government revenue and creates job opportunities especially for youths. **The transport sector systems in Tanzania consist of surface (roads and railways), air, sea, and inland waterways, contributing ~ 6.7% to the GDP in 2022.** Geographically, Tanzania occupies a total surface area of 947,300 Sq.km, comprising of 885,800 km² landmass and 61,500 km² of water bodies. Road transport is the most dominant mode of transport in the country and government at different levels have continued to invest in road infrastructure to drive socio-economic development in line with Tanzanian's Vision 2025.¹³

18. **The total road network has doubled in the last two decades, increasing from 85,000 km in 2003 to 181,191 km in 2022 of which 20% are national roads (trucks and regional) and the remaining 80% are classified as district roads (collector, feeder, and urban roads)** (Ministry of Finance, 2023). The development and maintenance of roads in Tanzania are undertaken by two major agencies:

- **Trunk and Regional Roads** - Tanzania National Roads Agency (TANROADS), under the Ministry of Works and Transport (Works).

¹² More information: <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG>

¹³ <http://www.tzonline.org/pdf/theTanzaniadevelopmentvision.pdf>



- **District Roads (Collector, Feeder and Community Roads)** - Tanzania Rural and Urban Roads Agency (TARURA), under the Ministry of Presidents’ Office, Regional Administration and Local Governments (PORALG).

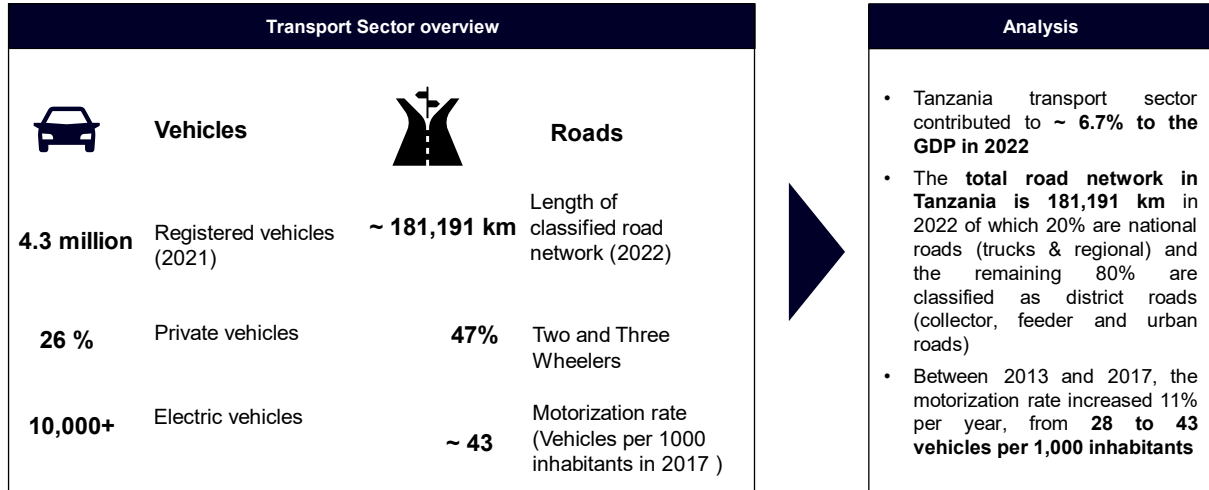


Figure 2-4 Tanzania transport sector overview (Source: Siemens own figure using publicly available information).

- The Tanzanian Ministry of Transport published the **National Transport Policy** in 2003, with the aim to enhance the supporting role of the transport sector in social and economic development of the public and private sectors (Ministry of Communications and Transport, 2003). It seeks to promote private sector involvement in infrastructure development and service provision under a regulated environment.
- The Tanzanian Revenue Authority (TRA),¹⁴ the agency responsible for registration of vehicles in Tanzania reports that the total vehicle stock has more than doubled in the last six years, growing from 1.9 million in 2015 to 4.3 million in 2021 and projected to reach 8 million in 2030. **The 2-wheelers (Motorcycles and Mopeds) account for ~45% of the total vehicle stock, followed by private passenger vehicles/cars (27.4%), Light passenger vehicles/Minibuses¹⁵ (17.25%) and three-wheelers at 3.15%** (Tanzania Ministry of Works and Transport, 2021). Boda bodas which account for majority of the motorcycles in Tanzania play critical roles in moving passengers and goods from downtown Dar es Salaam and other cities across Tanzania to remote villages given their ability to navigate through rough and muddy pathways and tight traffic jams. While majority of the motorcycles operate offline picking up passengers at loading stations (Kijiwe), others have joined hailing apps such as Uber, Bolt, Piki, Nibebe, etc. 3-wheelers (Bajajis and Guta) also play an important role in public transport across cities and communities in Tanzania. While Bajajis are designed to move up to four passengers and light goods at a time, Gutas are cargo tuktuks and typically have open truck beds in the back to carry a variety of goods from markets to end-use customers (Africa E-Mobility Alliance (AfEMA), 2023).
- Public transport with buses comprises mostly of privately owned Daladala and the state-owned bus rapid transit buses (BRT). The Dar es Salaam BRT system funded by the World Bank and the

¹⁴ <https://www.tra.go.tz/>

¹⁵ These set of vehicles have the capacity to convey less than 12 persons.



African Development Bank (ADB), is planned to be implemented in six phases which will be integrated as one system with a total of 154.4km¹⁶.

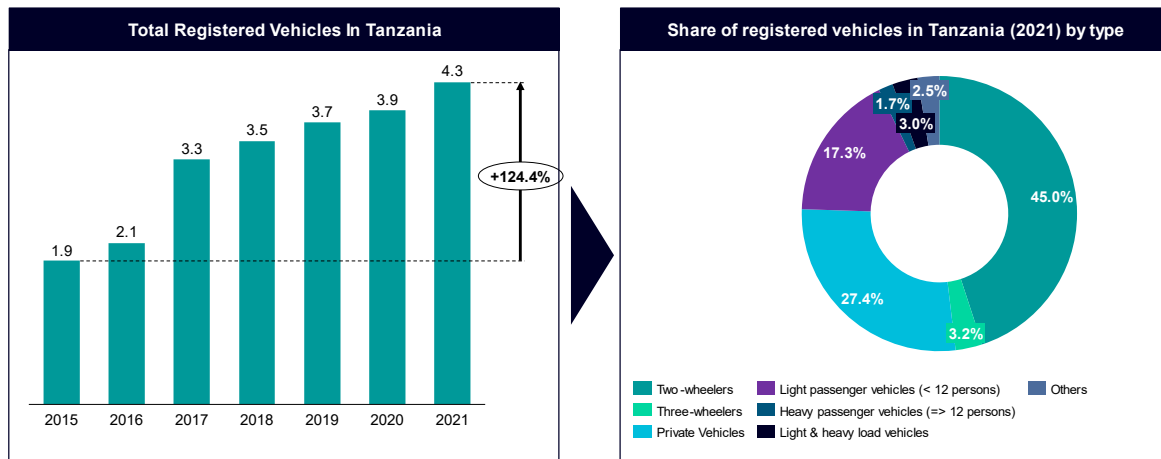


Figure 2-5 Total vehicle stock and their share in Tanzania (Source: Siemens own figure based on available data from (Tanzania Ministry of Works and Transport, 2021)).

22. EVs are not yet popular in Tanzania for residential car owners and there are currently no set targets or policies for the transport sector concerning the deployment of EVs. However, the research conducted by AfEMA¹⁷ suggests that current E-Mobility deployment is being driven by private companies ranging from two to three wheelers to four-wheelers for tourist activities.
23. For instance, about 10,000 2W/3Ws are currently operating in Tanzania for personal users and delivery drivers. Companies such as eMo, Boda-boda, Greenfoot, Sinoray and Linkall are providing e-2Ws, while Tri and Sinoray are in the 3W market with DIT Company, SESECOM and Elico on the edge of entering the market.
24. E-Motion Africa is a company that currently provides electric 4-Wheelers. About 30 four-wheelers are reported to be in operation in Tanzania with E-Motion focusing on open-top safari vehicles. Kaypee Motors is another company that prototyped a small electric flat-bed truck in Dar es Salaam in 2022 but is yet to offer their trucks commercially¹⁸. There are currently no known E-Bus providers in Tanzania even though E-motion Africa already indicated interest to retrofit ICE buses (Africa E-Mobility Alliance (AfEMA), 2023).
25. As far as the outlook for the EV market is concerned, insights from local stakeholders indicate a continued growth in the number of EVs in the country especially two- and three-wheelers as well as high-end safari 4-wheelers for the tourism sector in Tanzania¹⁹. A challenge that was noted during the physical mission in Tanzania was the fact that some EVs are already operating on the streets but are not regulated under the current traffic act. A coordinated E-Mobility

¹⁶ https://www.thegpsc.org/sites/gpsc/files/partnerdocs/dar_es_salaam_brt_system_and_improvements_through_tod_final-abidjan.pdf

¹⁷ <https://www.africaema.org/>

¹⁸ <https://newscentral.africa/tanzanian-cartoonist-unveils-locally-made-electric-car/>

¹⁹ Based on interview of private sector stakeholders during the physical mission in Dar es Salaam (23-25 January 2024).



strategy with action items covering different EV market segments is therefore crucial to drive the overall development of the EV ecosystem in the country.

EV category	Total stock	Annual sales
2 & 3-Wheelers 	10,000	3,000
4W / LDW 	30	2
Buses 	N/A	N/A

Figure 2-6 Current EV stock in Tanzania. (Source: Siemens own figure based on available data from (Africa E-Mobility Alliance (AfEMA), 2023)).

2.2.2 Energy sector

26. Tanzania currently has installed electricity generation capacity of 1.73 GW, generating 9 TWh in 2022. Out of the electricity generated, 8,907.6 GWh were produced through the national grid, 6.7 GWh from off-grid sources and 150.6 GWh imported from Uganda and Zambia. Figure 2-7 shows that electricity generation in Tanzania is majorly driven by hydro, gas, and biomass.

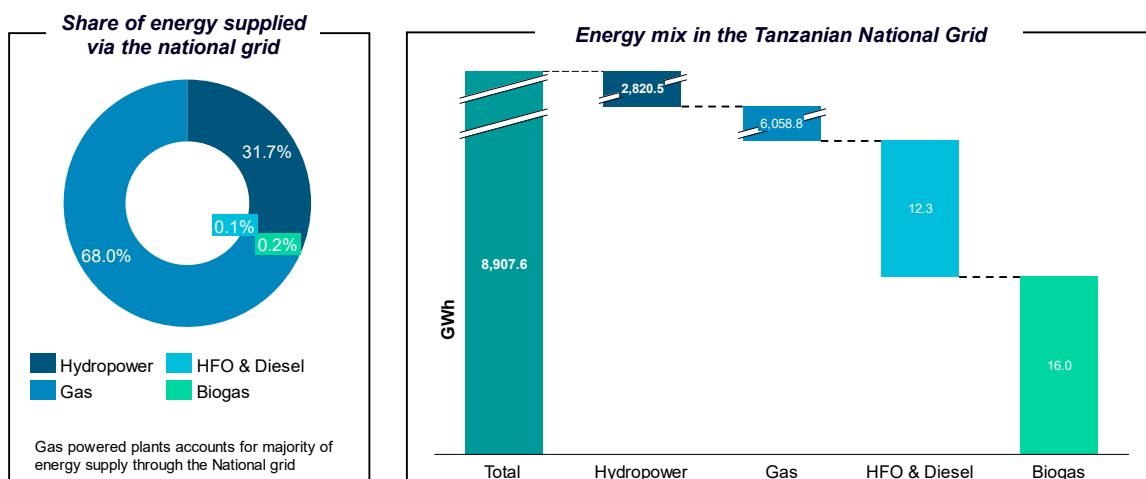


Figure 2-7 Energy mix in the Tanzanian National grid in 2022 (Source: Siemens’ own figure using publicly available data)



27. Despite increased investment in the power sector, the World Bank reports that only ~43% of Tanzanians currently have access to grid electricity²⁰. The country has set an ambitious target of connecting **50% of households to grid electricity in 2025** and **achieve 100% universal access to modern energy by 2030**. This implies a corresponding increase in the overall energy demand, with projected peak demand of 2,677MW and 12,854 MW in 2025 and 2040 respectively, up from 1,425 MW in 2020. To meet the forecasted demand, the country requires a total installed generation capacity of 3,966 MW in the short term, 12,257 MW in the medium and 20,200.6 MW in the long term. The Ministry of Energy published the **Power System Master Plan (PMSP) 2020**²¹ that evaluated the **short term** (2020 – 2024), **medium term** (2025 -2034) and **long term** (2035 - 2044) in terms of generation and transmission capacity expansion for Tanzania (Ministry of Energy, Tanzania , 2020).
28. With identified potentials of 670 MWp solar PV, 1GW of Wind power, 5 GW of Geothermal energy and 927.5 GWyr of Nuclear energy, Tanzania has the potential to meet majority of its energy needs while meetings its National Determined Contribution (NDC) targets.
29. The PMSP indicates power generation mix which varies over the planning period and by 2044 the generation mix consist of 5,690.4 MW (28.15%) of hydro; 6,700 MW (33.18%) of natural gas; 5,300 MW (26.24%) of coal; 800 MW (3.96%) of wind; 715MW (3.54%) of solar; and 995 MW (4.93%) of geothermal of power generation.
30. The Tanzanian energy sector involves different stakeholders with roles ranging from policy and regulatory framework to electricity generation, transmission, and distribution. Policy and regulatory frameworks such as **National Electricity Policy 2015**,²² **the Energy and Water Utilities Regulatory Authority Act 2001**,²³ **the Electricity Act 2008**,²⁴ and **Electricity (General) Regulations GN 63**²⁵ guide the Tanzanian power sector.
31. Figure 2-8 illustrates the stakeholder interaction in the Tanzanian power sector, where the Ministry of Energy formulates policy while the Energy and Water Utilities Regulatory Authority (EWURA)²⁶ is responsible for developing regulations and monitoring their effective implementation by all relevant stakeholders. Tanzania Electric Supply Company (TANESCO),²⁷ a vertically integrated company, owns and operates the main grid and has a monopoly over power transmission and distribution of electricity generated from its own facilities as well as from Independent Power Producers (IPPs). Additionally, the Rural Energy Agency (REA)²⁸ supports small power producers (SPPs) and stand-alone providers operating mostly in rural areas in Tanzania (International Renewable Energy Agency (IRENA), 2017).

²⁰ <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=TZ>

²¹ <https://www.nishati.go.tz/uploads/documents/en-1638532283-PSMP%202020%20UPDATE%20FINAL%20signed.pdf>

²² [https://www.nishati.go.tz/uploads/documents/en-1622283004-National%20Energy%20Policy%20\(NEP\),%202015.pdf](https://www.nishati.go.tz/uploads/documents/en-1622283004-National%20Energy%20Policy%20(NEP),%202015.pdf)

²³ <https://www.maji.go.tz/uploads/publications/en1547639669-EWURA%20Act%20No.%2011-2001.pdf>

²⁴ <https://www.nishati.go.tz/uploads/documents/en-1622015360-Electricity Act 2008.pdf>

²⁵ <https://www.nishati.go.tz/uploads/documents/en-1622016435-The-Electricity-General-Regulations-2011.pdf>

²⁶ <https://www.ewura.go.tz/>

²⁷ <https://www.tanESCO.co.tz/>

²⁸ <https://rea.go.tz/>

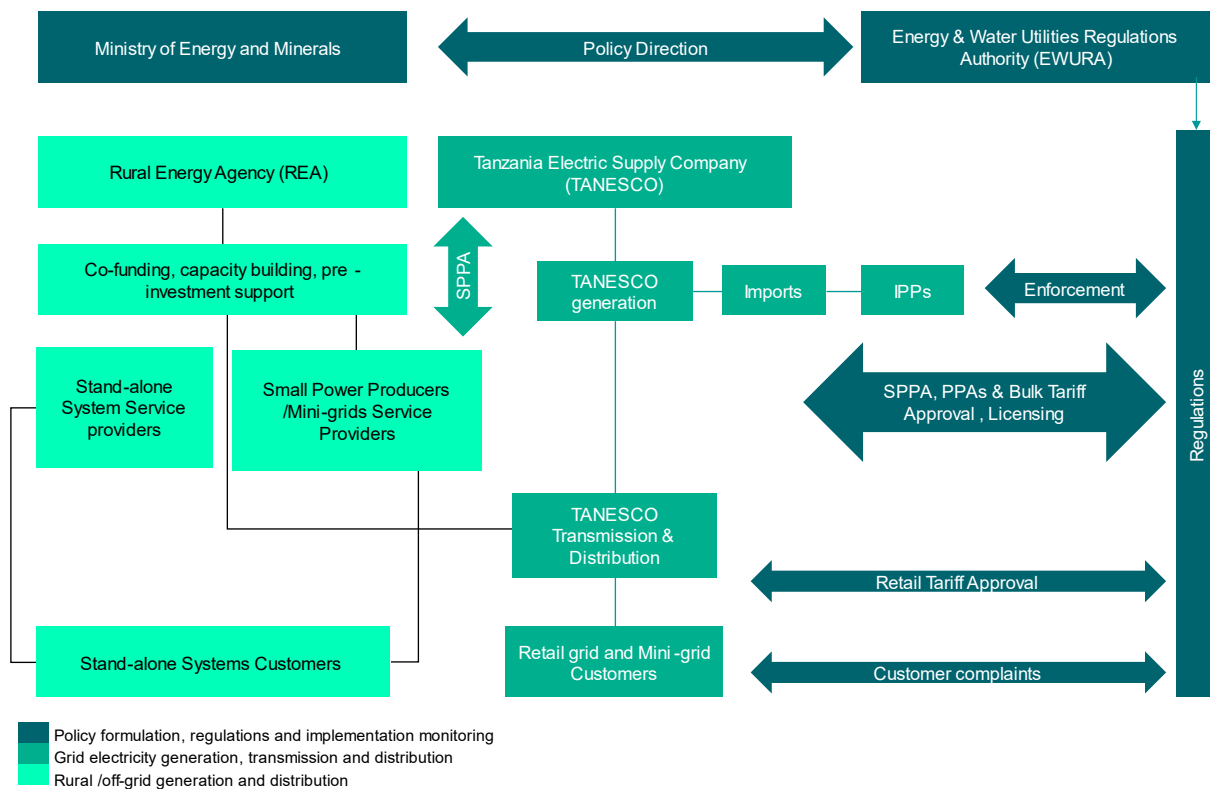


Figure 2-8 Stakeholders and their levels of interaction in the Tanzanian electricity market. (Source: Siemens own figure).

2.2.3 Education, Research and Local Workforce

32. To achieve its vision of human and social development, the second pillar of Tanzania Vision 2025,²⁹ the government has been investing in the advancement of its society's education and skillsets, with a specific focus on technical and vocational training.
33. In 2022 population aged 15-35 marked a share on the population of 34.4 percent and labor force population aged 15-64 years was around 53.4 percent. The unemployment rate in Tanzania was around 9 percent in 2021 over all ages and on 12.6 percent for the group aged 15-35 years. In this age group, the **unemployment rate for female youths is 16.7 percent and twice as much as for male youths (8.3 percent)**. Most of the women and girls working, operate as own account workers or contribute family workers, and therefore are in vulnerable employment relationships with insecure loans and dependency from men. **Women are also underrepresented in leadership and decision-making**. The reason for those gender gaps are institutional and structural constraints, gender-insensitive political parties, gender gaps in laws and policies and a lack of capacity and necessary skills among women, due to gender inequalities of the past (United Republic of Tanzania, 2021).
34. School enrollment in secondary education increased from 2015 to 2021 by 14.3 percent to 39 percent³⁰. **Despite this progress, Tanzania ranks rather low in the World Bank's Human**

²⁹ <http://www.tzonline.org/pdf/theTanzaniadevelopmentvision.pdf>

³⁰ <https://blogs.worldbank.org/opendata/latest-tanzanian-national-panel-survey-shows-progress-education>



Capital Index (HCI) with 0.39 and ranks in the so called “Bottom Group”³¹. Enrollment of boys and girls in secondary education has equalized - 2022 the number of girls (1,476,369) was even slightly higher than the number of boys (1,347,219) enrolled (Ministry of Finance, 2023).

35. Despite gaps in the overall education, based on findings of the first physical mission, it was evident from discussions and a visit to a private subsidiary of Dar es Salaam Institute of Technology (DIT)³², that **Tanzania is home to promising ventures for EV manufacturing**. The companies for 2- and 3-wheelers are currently in a start-up stage and have pilot vehicles in the fields. The manufacturing or retrofitting of 3-wheelers by TRi for example is done as one-by-one manufacturing in cooperation with DIT Company. Exemplary of the workshops of DIT in shown in figure below.
36. **Four (4) private sector companies are already active in or planning to enter the BEV manufacturing market**. These companies, i.e., TRi,³³ E-Motion (Hanspaul),³⁴ Ekoglobe³⁵ and AG Energies³⁶ were part of the physical mission 23-25 January 2024, which took place Dar Es Salam, and directly participated at the kick-off workshop of the policy working group.
37. The market for electric 2- and 3-wheelers in Tanzania as well as Africa seems to have high potential as motorization rates are increasing within Africa (UNCTAD, 2023). It is expected that those companies started in Tanzania face strong competition from China and other African countries. A fast increase of maturity is crucial in that stage. **A regulatory framework supporting the uptake of E-Mobility in Tanzania would support the development of the companies by reducing effort for licensing of vehicles and reducing legal risks for potential operators.**



Figure 2-9 DIT vehicle manufacturing facilities. (Source: Siemens).

³¹ <https://www.worldbank.org/en/publication/human-capital#Index>

³² <https://www.dit.ac.tz/>

³³ <https://www.growtri.io/>

³⁴ <https://e-motion.africa/about/>

³⁵ <https://ekoglobe.co.tz/>

³⁶ <https://agenergies.co.tz/>



2.3 Current EV Ecosystem in Tanzania

38. To fully understand the current situation of the EV market in Tanzania, we focus on the broader E-Mobility ecosystem that could influence the shape of the EV transition in the country. These include organizational and communication structures, vehicle composition, market size, and the involvement of third parties in the Tanzanian EV markets as outlined in Figure 2-10. These stakeholders which influence the attractiveness of EVs to the user in Tanzania are grouped into three (3) main categories: (i) Government bodies; (ii) Charging infrastructure value chain; and (iii) and EV value chain. Each of the above players / aspects will be covered in detail as follows.

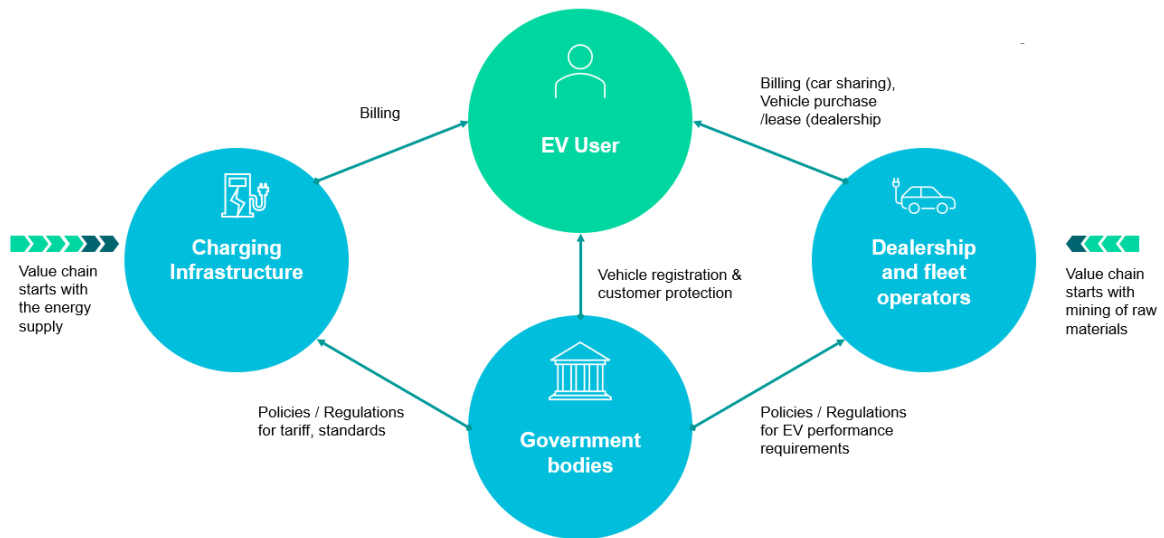


Figure 2-10 Overall market players crucial to shape EV transition in Tanzania. (Source: Siemens own figure).



2.3.1 Government bodies and regulation

39. The following sections list the authorities and regulations, which are affected by strategic market development of E-Mobility in Tanzania.

Table 2-1 Overview of key governmental bodies involved in Tanzania with regards to E-Mobility. (Source: Siemens own Analysis)

Government bodies - Environment	
Vice President's Office ³⁷	The Vice President's Office with its Environment Division provides overall policy guidance, coordination, expertise and services for sustainable environmental management and development .
Tanzania Commission for Science and Technology (COSTECH) ³⁸	COSTECH drives national innovation and technology development and transfer and is the nationally designated entity for climate topics .
Government bodies - Transport	
Ministry of Works and Transport ³⁹	The MoWT is among others responsible for the planning and realization of Transport in all spaces, on land, water and in the air.
Land Transport Regulatory Authority (LATRA) ⁴⁰	LATRA followed on Surface and Marine Transport Regulatory Authority (SUMATRA) and is responsible for licensing and regulating all land transport . Under its responsibility is the approval and licensing of new vehicle types and models for the Tanzanian market.
Tanzania National Road Agency (TANROADS) ⁴¹	TANROADS is the responsible road authority responsible for the management of <u>trunk</u> roads .
Tanzania Rural and Urban Roads Agency (TARURA) ⁴²	TARURA is the responsible road authority responsible for the management of <u>urban</u> and <u>rural</u> roads .
Dar Rapid Transit (DART) Agency ⁴³	The key role of the DART Agency is to establish and operate the Bus Rapid Transit (BRT) system for Dar es Salaam.
Government bodies - Energy	

³⁷ <https://www.vpo.go.tz>

³⁸ <https://www.costech.or.tz/>

³⁹ <https://www.mwt.go.tz/>

⁴⁰ <https://www.latra.go.tz/>

⁴¹ <https://www.tanroads.go.tz/>

⁴² <https://www.tarura.go.tz/>

⁴³ <https://www.dart.go.tz/>



Ministry of Energy ⁴⁴	The ministry describes its mission in providing reliable, affordable, safe, efficient and environment friendly modern energy services to all while ensuring effective participation of Tanzanians in the Energy Sector.
The Energy and Water Utilities Regulatory Authority (EWURA) ⁴⁵	The EWURA is an autonomous multi-sectoral regulatory authority responsible for technical and economic regulation of the electricity, petroleum, natural gas and water sectors in Tanzania.
Tanzania Electric Supply Company Limited (TANESCO) ⁴⁶	TANESCO is state-owned and operates power generation, transmission and distribution in Tanzania.
Government bodies - Finance and Investment	
Ministry of Finance ⁴⁷	The MoF is responsible for financial planning and the allocation of budgets to the different sectors.
Tanzania Revenue Authority (TRA) ⁴⁸	The Tanzania Revenue Authority is subordinate to the Ministry of Finance and responsible for the collection of taxes . Within this mission it is in charge to register vehicles and issue registration card and plate number.
Regional authorities	
Dar es Salaam City Council ⁴⁹	Dar es Salaam City Council intends to build the City with sustainable development managed on the principle of good governance , where residents do not live in poverty and have decent standards of living and a city with competitive environment which attract investors.
Dodoma City Council ⁵⁰	Dodoma Municipal Council shall continuously improve and deliver better and sustainable economic and social services, maintain peace and order, enhance environmental protection , facilitate decentralization and work towards poverty alleviation.
Mwanza City Council ⁵¹	Mwanza City Council intends to build capacity for its residents through provision of services that meet requirements of females and males and children by using the available resources and taking into account environmental issues and promoting good governance through community participation.

⁴⁴ <https://www.nishati.go.tz/>

⁴⁵ <https://www.ewura.go.tz/>

⁴⁶ <https://www.tanESCO.co.tz/>

⁴⁷ <https://www.mof.go.tz/>

⁴⁸ <https://www.tra.go.tz/>

⁴⁹ <http://www.dcc.go.tz/>

⁵⁰ <https://dodomacc.go.tz/>

⁵¹ <https://mwanzacc.go.tz/>



40. The policy framework for E-Mobility in Tanzania and the three target cities - Dar es Salaam, Mwanza, and Dodoma - consists of different layers of a policy framework, as clustered by Siemens in Figure 2-11.



Figure 2-11 Clustering of the E-Mobility policy framework in Tanzania. (Source: Siemens analysis)

41. **Global Framework Agreements:** Tanzania signed the Paris Agreement in April 2016, and as results it introduced its Nationally Determined Contribution (NDC) in July 2021, allocating reductions of greenhouse gas (GHG) emissions to individual sectors, also the transport sector.⁵²
42. **African Vision and Framework:** On continental level, the African Union developed the Agenda 2063, which is a strategic framework for the continent's future and sustainable development for transformation. Based on this strategy, African leaders agreed on an own scenario for development – the Africa Case - which is significantly stronger over the next two decades than the scenario based on today's stated policies, though considering lower energy demand. These two scenarios - the Africa Case and the so-called Stated Policies Scenario - must be considered for strategic assumptions on the future (African Union Commission, 2015).

⁵² https://unfccc.int/sites/default/files/NDC/2022-06/TANZANIA_NDC_SUBMISSION_30%20JULY%202021.pdf



Table 2-2 Overview of key polices and regulations in Tanzania with association to E-Mobility. (Source: Siemens own Analysis)

National Policies - Environment	
Nationally Determined Contributions ⁵³	The Nationally Determined Contribution from July 2021 summarize the country’s climate change adaptation targets by 2030 according to Tanzania’s participation in the Paris Agreement.
Environmental Masterplan for Strategic Intervention (2022-2032) ⁵⁴	The Master Plan integrates aspirations from the national and international frameworks. In addition, the Plan will be an instrument to execute the NDC
Environmental Management Act (CAP. 191) ⁵⁵	The Environmental Management Act (CAP. 191) is about environmental practice and the qualification of certified experts
Carbon Trading Regulation 2022 ⁵⁶	The Carbon Trading Regulation 2022 within The Environmental Management Act frames carbon trading in terms of buying and selling of verified or certified of carbon emission , reductions and removals in accordance with the recognised international carbon standard
National Climate Change Response Strategy 2021-2026 ⁵⁷	National Climate Change Response Strategy guides the national climate change initiatives targeting adverse effects associated with extreme weather events affect agricultural production and food security, water resources, marine and coastal zones, public health, energy supply and demand, infrastructure, biodiversity, ecosystem services, and tourism.
National Policies – Transport	
National Transport Policy ⁵⁸	The National Transport Policy from 2003 was introduced by Ministry of Communications and Transport and had the purpose to point out problems within the transport sector and frame the development of safe, reliable, effective, and fully integrated transport infrastructure .

⁵³ https://unfccc.int/sites/default/files/NDC/2022-06/TANZANIA_NDC_SUBMISSION_30%20JULY%202021.pdf

⁵⁴ https://www.vpo.go.tz/uploads/files/MASTER%20PLAN-English_eBOOK_FINAL.pdf

⁵⁵ <https://www.nemc.or.tz/uploads/publications/sw-1696846053-Registration%20and%20Practice%20Env.%20Experts%20REGULATIONS,%202021.pdf>

⁵⁶ <https://www.vpo.go.tz/uploads/publications/en-1674038035-National%20Carbon%20Trade%20Guidelines.pdf>

⁵⁷ https://climate-laws.org/document/national-climate-change-strategy-2021-2026_50bb

⁵⁸ <https://www.mwt.go.tz/uploads/documents/sw-1631778532-NATIONAL%20TRANSPORT%20POLICY%20%202003.pdf>



The Road Traffic Act ⁵⁹	The Road Traffic Act was first introduced in 1973 and last amended 2021 . The act contains regulation on vehicles and traffic organization on public roads.
The Roads Act ⁶⁰	The Roads Act was first published 2007 and amended several times. The act contains regulations like Road Management Regulation, clarifying responsibilities for construction, maintenance, and financing and Road Use Regulation , determining access to different types of roads and behaviour on those.
National Policies – Energy	
Power System Master Plan ⁶¹	The Power System Masterplan is published by the Ministry of Energy and last revised in 2020. It elaborates latest issues in electricity supply in Tanzania and states solutions and future strategies for the development of the power system in Tanzania.
Tanzania’s SE4All Agenda 2015 ⁶²	Sustainable Energy for All is an initiative from the UN in 2011. Tanzania adopted the initiative in 2015 and derived a strategy to realize its objectives.
National Policies – Finance and Investment	
National Five-Year Development ⁶³	The Ministry of Finance and Planning publishes since 1999 a five-year plan to set focus on development goals and allocates respective budgets to them .
The Motor Vehicles Tax on Registration and Transfer Act ⁶⁴	The Motor Vehicles Act specifies taxes on motorized vehicles. It is published by the Tanzania Revenue Authority and had its last revision in 2019 .
Road and Fuel Toll Act ⁶⁵	Road and Fuel Toll Act is about the collection of tolls on the vehicular use of public roads , to be used for maintenance of classified roads.

⁵⁹ [https://trade.tanzania.go.tz/media/Road%20Traffic%20Act%201973%20\(1\)_2.pdf](https://trade.tanzania.go.tz/media/Road%20Traffic%20Act%201973%20(1)_2.pdf)

⁶⁰ <https://www.tanroads.go.tz/common/uploads/acts/z68d4318ced1a27694a9adb01e13a892.pdf>

⁶¹ <https://www.nishati.go.tz/uploads/documents/en-1638532283-PSMP%202020%20UPDATE%20FINAL%20signed.pdf>

⁶² https://www.seforall.org/sites/default/files/TANZANIA_AA-Final.pdf

⁶³ <https://www.tro.go.tz/wp-content/uploads/2021/06/FYDP-III-English.pdf>

⁶⁴ https://www.tra.go.tz/IMAGES/headers/CHAPTER_124-THE_MOTOR_VEHICLES_TAX_ON_REGISTRATION_-_01.pdf

⁶⁵ https://www.tra.go.tz/IMAGES/headers/CHAPTER_220-THE_ROAD_AND_FUELS_TOLLS_ACT2019-01.pdf



PPP Act and Strategy ⁶⁶	The objective of PPP Act and Strategy is to provide an environment that ensures sustainable recovery of costs and affordable prices and tariffs in order to foster investments in areas which are not economical feasible.
The Public Procurement Act ⁶⁷	An Act to make better provisions for the regulation of public procurement.
Regional Policies	
Dar es Salaam Masterplan ⁶⁸	The Dar es Salaam Masterplan assesses local and regional socioeconomic trends to establish a baseline and possible future growth scenarios. The report examines the interaction of supply and demand for transport, utilities, and housing. It is published by the Ministry of Lands, Housing and Human Settlement Development and focuses on the timeframe 2016-2036
Dar Es Salaam Urban Transport Master Plan ⁶⁹	Dar es Salaam Transport Master Plan was first introduced in 2008. A revised version was published in 2018. The Master Plan is about the strategic development of transport and focuses on roads, traffic, and public transport.
Dodoma National Capital City Masterplan (2019-2039) ⁷⁰	This master plan (2019-2039) provides a framework for the development of Dodoma National Capital for the time horizon of twenty years. It has been updated several times since 1976. The main driver for the current update was the declaration of Dodoma as new capital of Tanzania in 2018.

⁶⁶ <https://www.mof.go.tz/uploads/documents/en-1652604852-PPP%20Policy%202009.pdf>

⁶⁷ <https://www.parliament.go.tz/polis/uploads/bills/acts/1662104856-CHAPTER%20410-THE%20PUBLIC%20PROCUREMENT%20ACT.pdf>

⁶⁸ <https://www.thecitizen.co.tz/tanzania/news/national/new-master-plan-crucial-for-turning-dar-into-sustainable-city-2603696>

⁶⁹ <https://openjicareport.jica.go.jp/pdf/12319349.pdf>

⁷⁰ <https://dodomacc.go.tz/storage/app/media/uploaded-files/PROPOSED%20LAND%20USE%20PLAN%202019-2039.pdf>



2.3.2 EV Value Chain Analysis

43. Active and accessible markets are crucial to ensure that low-cost technologies and services with competitive features are available in Tanzania. In this category, we analyzed the different stakeholders that are involved in the installation, operationalization of EV charging infrastructure both for private and public users. They cover the electrical grid and asset operators, Electrical Vehicle Supply Equipment (EVSE), Installers of charging infrastructure components, owners of different sites where EV charging infrastructure can be installed, Charge Point Operators (CPOs) and Mobility Service Providers (MSPs).



44. **Error! Not a valid bookmark self-reference.** below illustrates these relationships in the context of the Tanzania E-Mobility market, with their associated local/regional players identified.

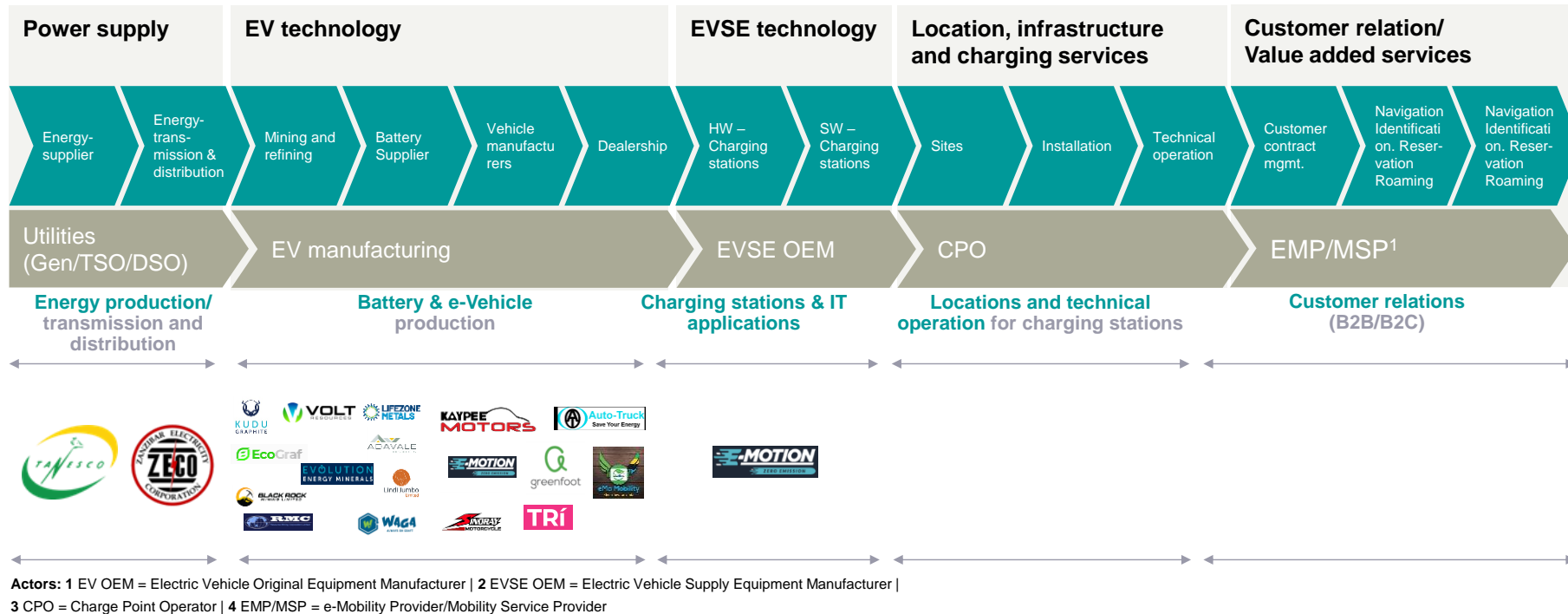


Figure 2-12 Market players relevant for the Tanzanian E-Mobility value chain. (Source: Siemens)**Error! Not a valid bookmark self-reference.** below illustrates these relationships in the context of the Tanzania E-Mobility market, with their associated local/regional players identified.

3 CPO = Charge Point Operator | 4 EMP/MSP = e-Mobility Provider/Mobility Service Provider

Figure 2-12 shows that majority of the EV market players in Tanzania are in the Electric Vehicle Original Equipment Manufacturers (EV OEM) focusing on mining of critical raw materials for onward global EV battery production. However, Tanzania still disposes many of the mined critical raw materials. There is a huge potential for Tanzania to optimize the available raw material for local EV battery production through targeted investment and capacity building of its workforce. A national EV strategy should define a clear pathway with support mechanisms



to attract relevant global market players especially in the EVSE technology, location, infrastructure and charging services, and EV customer relations.



2.3.2.1 Power supply

45. **On-grid charging:** The Tanzania Electric Supply Company (TANESCO) accordingly to Electricity Act No. 10 of 2008, and Zanzibar Electricity Corporation (ZECO) according to Act No.3 of 2006 are **exclusively in charge of establishing, managing, operating, maintaining, and owning** the public network, on the generation, transmission, and distribution levels in Mainland Tanzania and Tanzania Islands (Zanzibar) respectively.
46. **Grid capability:** In 2022, TANESCO has a supply generation capacity of 1.73 GW mainly from hydropower, oil and recently natural gas². Currently, **only 43% of the populations are connected to the grid**. The reliability of the power system is further impacted in times of drought, when hydropower generation is adversely affected, indicating a huge gap towards maintaining system reliability and capabilities for integration of more charging stations into the grid.
47. **Off-grid charging:** The integrated solution incorporates RE plant supplying electricity to a fast DC charger. The solution is beneficial in remote areas with no access to the grid. There are over six (6) players developing Mini-grids in Tanzania and either selling the power to TANESCO or distributing through their mini-grid networks, but none was reported to offer off-grid charging services in the country.

2.3.2.2 Mining and refining

48. **Raw materials mining and refining:** Tanzania is rich in critical raw materials for BEV's battery production, i.e., Nickel (Ni), Cobalt, and graphite (C) and other rare earth elements (REE). Several players are involved in the extraction and refining of graphite in Tanzania:
- **LINDI JUMBO LTD**, a Tanzanian registered exploration and mining company currently oversees the **Lindi Jumbo Graphite Mine**⁷¹ in the Lindi Region along the southern corridor of Tanzania;
 - **EcoGraf** signed a framework agreement with the Government of Tanzania in April 2023 for the **Epanko Graphite project**⁷² and the development of **the Merelani-Arusha Graphite Project**;
 - **Kudu Graphite**, a new company formed due to a joint venture (JV) between **Evolution Energy Minerals Ltd** (84%) and the **Government of Tanzania** (16%) to develop new high-grade mineralized zones – **Chilalo East and Chilalo E2**, aimed at mining and producing fine flake and Coarse flake graphite⁷³;
 - **Volt Resources** owns and operates the **Bunyu Graphite Project** in Tanzania that would produce up to 170,000 tpa flake graphite⁷⁴;

⁷¹ <https://lindijumbo.co.tz/index.php/lindi-jumbo-graphite-project/>

⁷² <https://www.ecograf.com.au/%20business/tanzgraphite/>

⁷³ <https://evolutionenergyminerals.com.au/chilalo-graphite-project/>

⁷⁴ <https://voltresources.com/assets/bunyu-graphite-project/>



- **Black Rock Mining Ltd** owns and operates the **Mahenge Project** in Tanzania which hosts a multi-generational graphite resource and is one of the largest JORC-compliant flake graphite resources globally⁷⁵.
49. Several players have also been identified in the Nickel and Cobalt extraction and refining value chain in Tanzania:
- **Lifexone Metals** acquired the **Kabanga Nickel** project in North-West Tanzania in 2021, a mine-to-metal mining operation producing battery-grade nickel, copper, and cobalt⁷⁶;
 - **Adavale Resources** has operational mining license for the **Kabanga Jirani Nickel Project**, aimed to explore nickel, copper and cobalt for industrial processes⁷⁷;
 - **Resource Mining Corporation (RMC) Limited**, operates the **Kabanga North Nickel Project**, **Kapalagulu Nickel (Copper+PGEs) Project**, and the **Kabulwanyele Nickel Project** in Tanzania⁷⁸.

2.3.2.3 Battery production

50. There are currently no companies that produce batteries for EV applications in Tanzania. While no company was reported to currently focus on operating recycling plant for end-of-life batteries from EVs, a few companies are already involved in recycling and reuse of batteries for other application:
- **WAGA**, a Tanzanian small-sized company with support from international partners currently focuses on the recycling and reusing of smaller packs of Li-ion batteries in Tanzania⁷⁹;
 - **Ok Plast Ltd** and **Gaia Eco-Solutions (T) Ltd** are also involved in recycling of 1,500 tons/year and 3,600 tons/year respectively of Lead acid batteries in Tanzania⁸⁰

2.3.2.4 EV Manufacturing

51. Leading EV manufactures, e.g., Tesla, VW, Toyota are stepping up efforts to enter the African EV market, no gigafactories have been announced yet in Tanzania. There are a few local players focusing on selling new, used, and retrofitted vehicles.
- **Kaypee Motors**, a Tanzanian based company is focused on the manufacturing of 4-wheelers for small cargos. The company piloted its KPA72, a small electric flat-bed truck in Dar es Salaam, but did not scale further;
 - **DIT Company Ltd** is currently involved in the retrofit of 3-wheelers (tuktuks) in Dar es Salaam⁸¹ in cooperation with **Auto - Truck E. A Ltd**, a Kenyan Engineering company;

⁷⁵ <https://blackrockmining.com.au/our-projects/>

⁷⁶ <https://lifexonemetals.com/what-we-do/kabanga-nickel/>

⁷⁷ <https://www.adavaleresources.com/projects/nickel-kabanga-jirani-tanzania/>

⁷⁸ <https://resmin.com.au/projects/tanzanian-projects/>

⁷⁹ <https://wagatanzania.com/>

⁸⁰ <https://www.ajol.info/index.php/tjet/article/view/240711>

⁸¹ *Final-final copy (africaema.org)



- **E-Motion** retrofits and manufactures electric versions for high-end safari 4-wheelers for the tourism sector in Tanzania, using previous experience from parent company Hans-paul Ltd⁸²;
- About five companies providing electric motorcycles for personal users and delivery drivers in Dar es Salaam and Arusha in Tanzania have been identified: **eMo, Bodaboda, Greenfoot, Sinoray and Linkall**;
- **Tri** and **Sinoray** are currently providing electric 3-Ws in Tanzania with **SESCOM** and **Elico** looking to enter the market soon.

2.3.2.5 Electric Vehicle Supply Equipment

52. **E-Motion** is being reported to offer one-phase AC chargers of maximum 3kW for retrofit 2- and 3-wheelers, and wall chargers with a capacity of 20 kWh for retrofit 4-wheelers. The company also plans to roll out 50 kW DC chargers in some cities in Tanzania⁸³.

⁸² <https://e-motion.africa/products/>

⁸³ <https://e-motion.africa/technology/>



3 Gap Analysis

53. This chapter builds on the assessment of the current EV ecosystem and market development in Tanzania, in addition to key insights captured during the physical mission in Dar Es Salam (23-25 January 2024). The overall approach and its steps is highlighted in Figure 3-1.

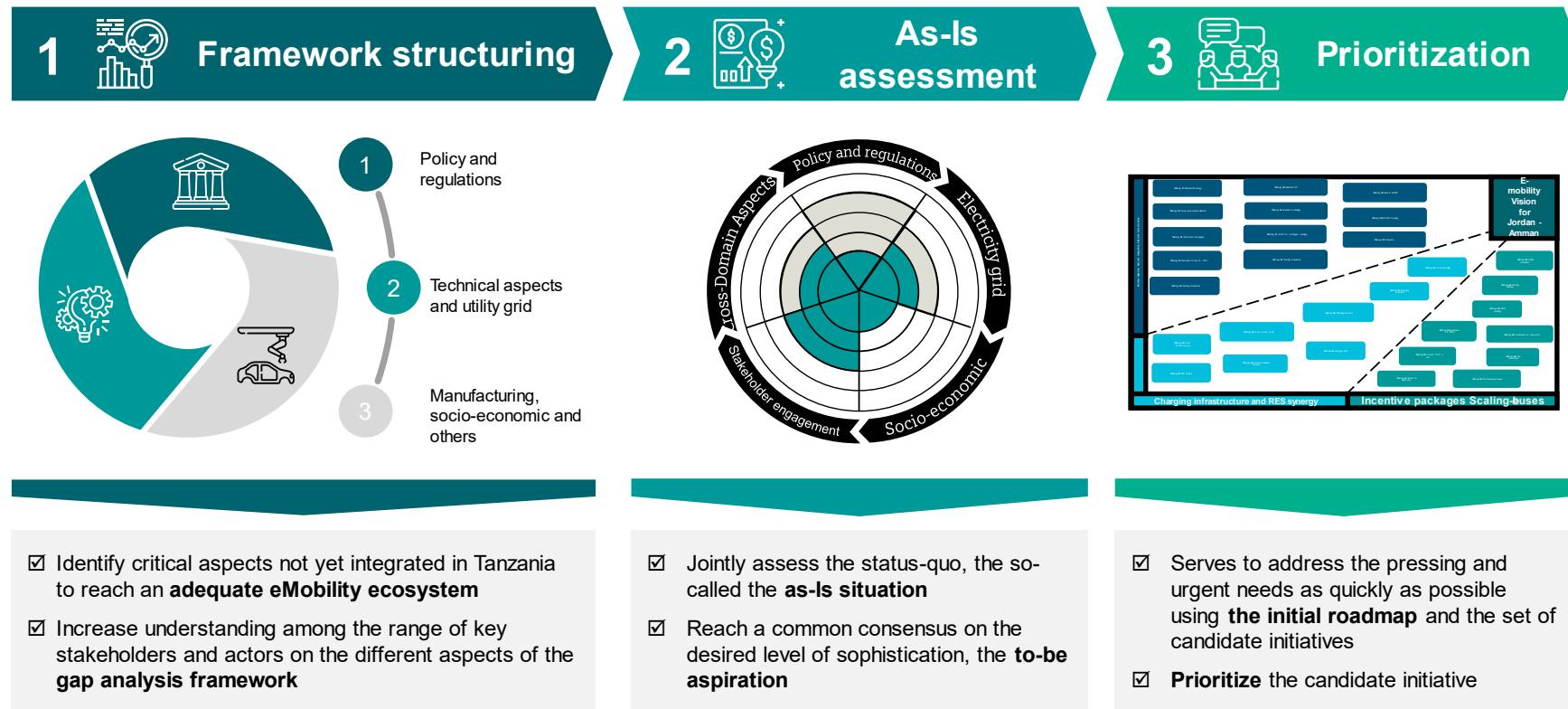


Figure 3-1 Steps starting with the gap assessment framework towards the prioritization of the key initiatives on the short-, medium-, and long-term. (Source: Siemens)



54. The objective of the gap assessment is to
- Identify **main and critical aspects not yet integrated** in Tanzania, however, are fundamental to reach an adequate technological level meeting basic requirement of an E-Mobility ecosystem;
 - Identify the business and strategic objectives (clarified shortly herein) according to the national needs and the level of **eMobility maturity and adequacy required**;
 - Increase understanding among the range of stakeholders and members of the steering committee about the conceptual nature, function, costs, and benefits of an E-Mobility market / ecosystem;
 - Develop a **target-operating model** in line with current technologies and functionalities commonly employed in markets similar to the Tanzanian sector; and
 - Consequently, position Tanzania on a timeline that highlights the gaps (*part of the next report*).

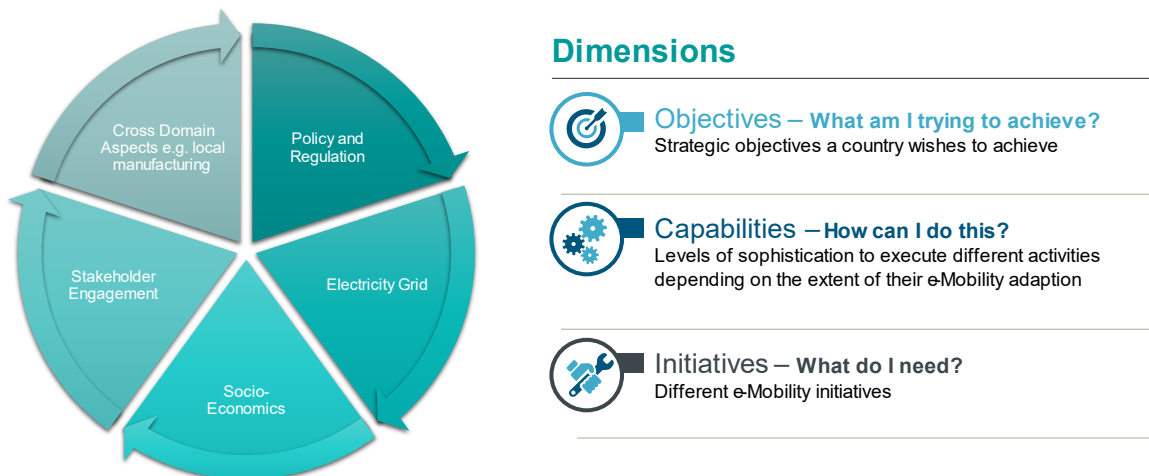


Figure 3-2 Dimensions of the E-Mobility radar of the EV-IF framework. (Source: Siemens)

55. Those business and strategic objectives considered in the gap analysis are based on the Siemens **EV-IF Radar Chart tool outlined in** Figure 3-2, which covers
- Policy and regulation** with the objective to stimulate E-Mobility transition and enable an innovation environment. Aspects of relevance under this pillar will include:
 - **Qualitative overview** on internationally deployed policy measures targeting e-Mobility per country serving as a **benchmark tool** for the As-Is situation of the gap analysis.
 - **How to establish the policy framework** by defining roles and responsibilities, setting recommended standards, and tariff structure
 - **Increasing vehicle demand** by decreasing electricity prices for EV charging, reducing, or removing tariffs for all imported EVs and associated charging



- infrastructure, increasing diesel and gasoline prices, funding for maintenance training, and funding of flagship electrification projects.
- **Guiding principles for tariff design** through a standardized methodology of understanding the key drivers, forming, and establishing the frame, and establishing own learning and best practices
 - **Increasing charging infrastructure deployment** by providing public funding and tax deduction
- ii. **Technical aspects** covering integrating E-Mobility into utility grids and its anticipated impact. This exercise to be covered will be through.
- Overview of **charging technologies**, services and arising business models
 - Requirements of the E-Mobility charging infrastructure and **technical challenges** to operate it.
 - Challenges in **planning, installation and operation** of charging infrastructure and the influence of market participants (DSO, charging point operator ...etc.)
 - The anticipation of basic population and modelling the **future load demand** for the grid
 - Assessing the **grid performance** depending on the level of EV integration and penetration levels
 - Determining **charging capacities** and allocation of loads
 - Improving grid performance through the evaluation of **possible target grids for technical and financial KPIs** incl. resilience, reliability, losses, and network development costs
- iii. **Manufacturing, Local workforce and job creation aspects** covering the socio-economical aspects as well.
- Showcasing **how E-Mobility safeguards and generates jobs**, as well as demanding requirements for education and qualification.
 - **Creating skilled jobs** within vehicle assembly, service, and maintenance as well as charging infrastructure installation and maintenance
 - The country **economic conditions** incl. inflation rate, GDP ratio, oil prices
 - Share of **research and development** funding in relevant components. For instance, in order to accelerate their maturity, or altering their pricing and marketing strategies towards lower emission powertrains.
- iv. **Stakeholder mapping**
- Understanding **roles and objectives** of the various E-Mobility actors within the governance structure and across the value chain



- **Presentation and interaction** between different stakeholders at the state, civil society, private sector, and funding agencies levels.
- Developing strategies for establishing **cooperation** between relevant stakeholders and agreeing on one vision

3.1 Prioritization of Tanzanian objectives and drivers

56. A key driver behind this TA comes from the realization of the National Determined Contribution of Tanzania.⁸⁴ There, Tanzania targets to reduce 30 - 35% greenhouse gases relative to the Business-As-Usual (BAU) scenario by 2030, which leads to a reduction of 138 - 153 million tons of Carbon dioxide equivalent (MtCO₂e)-gross emissions over all sectors, in which **the transport sector is declared as a priority mitigation sector**. Next to this objective, are the supporting objectives from the society, the economy, and the administration of Tanzania, wherein E-Mobility typically contributes.
57. Objectives for society can mainly be categorized into health, prosperity, and equality. E-Mobility can reduce emissions which directly affect health, e.g., SO_x and NO_x. A further impact on the society is affordability. **If EVs or electric transport led to a reduction of costs for mobility and transport, an increasing share of the population will be able to use mobility and improve their access on education, jobs, medical treatment, goods and authorities**, which should further result in the increase of prosperity and equality within society.
58. The **economic impact** is expressed mainly in a reduction of costs for transport and mobility. Further, it is targeted, that some parts of the E-Mobility value chain can be stimulated, e.g., the mining of regional available raw materials like graphite, copper and nickel and other parts of the value chain can be localised in the future, e.g., battery manufacturing and vehicle assembly. Both expectations on the value chain would also directly contribute to objectives of the society by increasing income and prosperity. **Further economic impact could be achieved by decreasing dependencies of fuel imports by charging EVs with electricity from local renewable energies.**
59. Last, the administration aspects follow certain objectives with the implementation of E-Mobility. As there are constraints in public spendings, investments and incentives for E-Mobility and the required infrastructure must be affordable. **New regulations, which come with the implementation needs to be compatible with existing strategies and regulation.**

3.2 Gap Assessment results

60. The discussion within the first onsite workshop with the PWGs will be highlighted as assessed via the Siemens Radar Chart as shown hereafter. The results presented below were complemented by the feedback from relevant stakeholders during the onsite engagement in the country.

⁸⁴ [Nationally Determined Contribution](#)



3.2.1 E-Mobility Domain: Policy and Regulations

3.2.1.1 Manage Strategy

Description	Capability Level		Existence
<p>In order to establish a successful e-Mobility strategy, understanding the drivers is key. Well thought-out vision, planning, governance, stakeholder collaboration addressing specific national objectives coupled with the right penetration timing enables stakeholder guidance, sets clear expectations and provided market opportunities.</p>	5	Capitalize on e-mobility as a foundation for the introduction of new services and product offering, in addition to business activities that provide sufficient financial resources to enable continued investment in sustainable mobility	<input type="radio"/>
	4	Aiming towards its optimization, the e-mobility strategy is communicated and revised collaboratively on a regional level with external stakeholders	<input type="radio"/>
	3	E-mobility is becoming core directive throughout the country supporting in the achievement of other overarching strategic objectives (e.g. enablement of renewable infeed, emission reduction targets, highway/location-based coverage, economic growth, etc.	<input type="radio"/>
	2	The e-mobility strategy is incorporated within the national strategy and includes a governance model for e-mobility management /leadership and decision-making roles, processes and tools. The approved strategy business plan budget acquired and secured authorizations for investments from stakeholders e.g. regulators, ministries, taxpayers, etc.	<input type="radio"/>
	1	An initial / draft strategy and preliminary roadmap, along with the expected budget is developed and currently in the approval stage by the Cabinet / executive management (private public sector). The draft strategy has been developed as a joint effort between different entities involved in the sector.	<input type="radio"/>
	0	There are no national strategies dedicated exclusively towards e-mobility.	<input checked="" type="radio"/>

Figure 3-3 Capability Manage Strategy (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. There is neither a publicly available national E-Mobility strategy for Tanzania nor an official information on a national E-Mobility under development.



3.2.1.2 Manage Policies

Description	Capability Level	Existence
<p>In order to establish successful e-Mobility programs and eco-systems, developing the right policies is key. Well thought-out policies addressing specific national objectives and strategies coupled with the right penetration and timing enables stakeholder guidance, sets clear expectations and provides market opportunities.</p>	<p>5 Establishment of expert platform and regional / international exchange with other relevant e-Mobility policy developers / authorities in order to proactively design policies to benefit the overall national e-Mobility eco-system.</p>	<p>○</p>
	<p>4 Coupling policies with innovation management to establish policy release / initiatives that can be applied if specific thresholds and patterns are triggered or achieved (total share of renewables: 20%, electrical vehicles share: 40%, funding pool targets, etc.).</p>	<p>○</p>
	<p>3 Specific e-Mobility policies are in places, detailed and individually selected in order to control e-Mobility adaption to support the achievement of selected overarching strategic objectives (e.g. enablement of renewable infeed, emission reduction targets, highway / location-based coverage, economic growth, etc.).</p>	<p>○</p>
	<p>2 General policies (e.g. supporting programs, subsidies to acquire / establish charging infrastructure, private and commercial EV sales) are in place to favour initial e-Mobility adaption and ramp up. Policies are not tight to any specific guiding principles or strategic objectives.</p>	<p>○</p>
	<p>1 Basic understanding (first studies, situation awareness, road map development, strategic planning concept) regarding e-Mobility policies and international best practices is available, however, no specific policies are in place.</p>	<p>○</p>
	<p>0 There are no relevant policies in place regarding any e-Mobility schemes. There no or low levels of electric vehicles (e-2W / 3Ws, e-Cars, e-Trucks, e-Buses) present.</p>	<p>●</p>

Figure 3-4 Capability to manage policies (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. There are no publicly available national policies for EVs in Tanzania. However, Tanzania has introduced a set of tax incentives by exempting electric four wheelers (E4W) and e-buses from excise duty. The incentives exclude E2Ws despite their popularity with an estimated 10,000 units in use, while E4Ws are rare, and e-buses don't have a presence yet.



3.2.1.3 Manage Regulations

Description	Capability Level		Existence
<p>Regulations help to establish common relevant fundamental technical standards and requirements for a safe, integrated and interoperable system that mutually benefit all stakeholders creating a resilient and future e-Mobility ecosystem (e.g. technical safety, protocols for interoperability, requirements for barrier-free applications).</p> <p>Selecting suitable regulations to current ecosystem (as-is) will help to excel further e-Mobility adoption and avoid sunk costs.</p>	5	Innovative regulations to create a supporting environment for new applications and policies including aims to achieve specific targets, thresholds, and patterns (e.g. country-specific /new regulations)	<input type="radio"/>
	4	Establish feedback loop, stakeholder communication, and KPI measurements in order to identify opportunities for further tailored regulations based on need (alignment with power utilities, safety and consumer right agencies, environmental protection agencies, manufacturers, etc.	<input type="radio"/>
	3	Detailed and specific e-Mobility regulations to control and to achieve a standardized e-Mobility implementation and installation. This covers aspects around zoning, charging / parking sites (multi-vendor) roaming, clearing-house (EVCO-ID, EVSE-ID,) data privacy, environmental and technical standards, operation and maintenance, etc.	<input type="radio"/>
	2	Basic and general e-Mobility regulations are in place and centrally orchestrated from regulatory authorities to favour an initial ramp-up and provide basic interoperability	<input type="radio"/>
	1	Basic understanding of necessary e-Mobility regulations and awareness of international best practice regulations.	<input type="radio"/>
	0	There are no relevant regulations in place regarding e-Mobility schemes. No or low share of e-Mobility is present	<input checked="" type="radio"/>

Figure 3-5 Capability Manage Regulations (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. There are currently no national regulations defining the technical standards and requirements for E-Mobility.



3.2.2 E-Mobility Domain: Electricity Grid

3.2.2.1 Manage Grid Impact and Operation

Description	Capability Level		Existence
<p>The charging of a huge number of electric vehicles has a significant impact on the grid. Measures to manage and control the impact are necessary to ensure a sound ramp-up and implementation while maintaining grid availability and reliability. With active data management capabilities and real-time load management, the impact of increasing EV penetration on the electricity grid can be optimized and managed effectively.</p>	5	Electric vehicles charging is configured, scheduled or dispatched (centralized or decentralized) based on an optimum match between intermittent renewable generation, micro-grid requirements, mobility patterns, and charging load profiles.	○
	4	Smart charging (DSM, load limiting,, CPP/TOU tariffs, etc) and charging management platforms / operation centres are introduced to manage, configure, schedule and dispatch electric vehicles supply equipment and load to optimize network operations. This also includes the offering of further market services (e.g. virtual power plants VPP, aggregated load, ancillary services such as spinning and regulating reserves.	○
	3	Advanced forecast (e.g. correlation, regressions) and grid impact analysis are available. This further includes real-time visibility of charging activity. Data is used to proactively understand charging patterns, develop charging programs and optimize and control grid operation.	○
	2	Distribution utilities and CPO are collecting charging activity information to predict upcoming trends (basic extrapolation). Partially near real-time visibility of charging activity is available and information is used to optimize market activity (e. EV sales /charging infrastructure incentives, smart charging, etc.)	○
	1	Gathering data of charging activity to improve understanding of electric vehicles charging impacts (e.g. e-Mobility impact /stress test studies). No active grid control measurements for e-Mobility are in place.	○
	0	No Transparency or low levels of electric vehicle charging impact on the distribution grid. No active charging management capabilities in place	●

Figure 3-6 Manage Grid Impact and Operation (Existing 4).

Existence related annotation

Level 0 exists in Tanzania. The EV charging infrastructure in Tanzania is not yet established or planned so there is no impact on the distribution grid and thus no charging management capabilities are in place.



3.2.2.2 Manage grid Access Policy and Connection

Description	Capability Level		Existence
<p>In certain regions, grid access policies and connection guidelines help to ensure an efficient establishment of charging infrastructure and provide opportunities for further awareness and control</p>	5	Charging infrastructure acts as extension in order to integrate EV load into an overarching energy platform that comprehensively optimizes renewable generation capacity and load profiles	○
	4	Based on EVSE registers, real-time visibility and charging activities the distribution of charging assets are actively influenced, including optimal grid operation and planning with e-Mobility as design paradigm. This also included standards and programs for smart /controlled charging.	○
	3	Advanced e-Mobility grid access policies /guidelines (tied to government policies, utility programs, based on vehicle type) and comprehensive charging registers are in place. Based on near real-time visibility of charging activities, the grid access policies or guidelines are constantly adapted, controlled, and maintained.	○
	2	Awareness and understanding of charging activities. An active management of basic grid access policies / guidelines are in place (distribution utility). A register of charging posts is maintained (incl. location, charging levels, maximum capacity, etc.)	○
	1	Levels of electric vehicle charging activity impact the grid. First guidelines and recommendations are formed by utilities or regulators bodies	○
	0	No Transparency or low levels of electric vehicle charging impact on the distribution grid. No access policies or grid connection guidelines in place	●

Figure 3-7 Manage Grid Access Policy and Connection (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. The EV charging infrastructure in Tanzania is not yet established or planned, i.e., there is no grid connection policy in place yet.



3.2.3 Business Domain: Socioeconomics Aspects

3.2.3.1 Manage Economic Aspects

Description	Capability Level		Existence
<p>The introduction of electric vehicles show not only increasing economic benefits to manufacturers and suppliers, but also to EV drivers, utilities, and overall economy. Considering economic aspects help to pro-actively influence the adaption of certain technologies and programs that are in alignment with the nation's strategic goals.</p>	5	Pro-actively shaping the development of the international e-Mobility industry and economy	<input type="radio"/>
	4	Establishing independent capabilities to build advanced solutions. Scaling for regional and international coverage and multiple elements throughout the e-Mobility value chain. Working in international partnerships.	<input type="radio"/>
	3	Establishing independent capabilities to develop a minimal viable solution for certain elements in the e-Mobility value chain. Scaling to address national demand, working together across relevant (national) stakeholders	<input type="radio"/>
	2	Clear awareness and detailed projections how a new assembled e-Mobility economy will impact the existing countrywide economy. Setting up a countrywide development plan / roadmap like focus on importing vehicles, hardware, manufacturing capabilities or capacity building	<input type="radio"/>
	1	Basic awareness of first studies are conducted on the influence of new assembled e-Mobility economy to the existing countrywide economy (e.g. job opportunities, shift of skill set, export /import EV and infrastructure.	<input type="radio"/>
	0	No economic aspects for e-Mobility are considered or relevant (low or no adoption)	<input checked="" type="radio"/>

Figure 3-8 Manage Economic Aspects (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. Though Tanzania published its **National Five-Year Development Plan 2021/22 - 2025/26** (Ministry of Finance and Planning Tanzania, 2021), the economic benefits of introducing E-Mobility in the country were not considered.



3.2.3.2 Manage Social Aspect

Description	Capability Level	Existence
<p>The introduction of electric vehicles needs to go along with considerations of social justice, opportunities and programs. This will help increase its acceptance and adoption. Considering social aspects help to establish an information basis to understand, analyse and pro-actively shape initiatives to enable application of the technology on all social levels and in alignment with the nation's strategic goals.</p>	<p>5 Pro-actively participating and shaping the development of international social standards for the e-Mobility industry</p>	<input type="radio"/>
	<p>4 Countrywide social mobility concept including financial evaluations, data modelling and informed decision making while acting as national and regional role model and social think-tank, incl. best-practice sharing, labour integration programs, etc.</p>	<input type="radio"/>
	<p>3 Establish a clear social program with a defined roadmap, incl. clear actions and milestones to comprehensively address different stakeholder groups (e.g. social initiatives, placement of charging stations at / close high-frequently visited places, strategically placed stations along highways or less developed areas, explore social EV import mechanisms, educational programs, etc.</p>	<input type="radio"/>
	<p>2 Clear awareness and detailed projections how a new assembled e-Mobility economy will impact the existing countrywide social aspects. Setting up a countrywide development plan / roadmap like focus on social injustice / job opportunities, establishing a platform for the benefit of all stakeholders, knowledge exchange or infrastructure, e.g. electrifying major roadways or charging infrastructure network</p>	<input type="radio"/>
	<p>1 Basic awareness or fist studies are conducted on the social impact and influence of a new assembled e-Mobility economy (e.g. equitable distribution of charging infrastructure in different neighbourhoods of varying social class, free-riders/upper-class that benefit from funding programs, intentional inclusion of women in capacity building programs, etc.</p>	<input type="radio"/>
	<p>0 No social aspects for e-Mobility are considered or relevant (low or no adoption)</p>	<input checked="" type="radio"/>

Figure 3-9 Manage Social Aspects (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. There is no nationally published document evaluating the social aspects of the introduction of an E-Mobility market in Tanzania.



3.2.3.3 Manage Environmental Aspects

Description	Capability Level	Existence
<p>The introduction of electric vehicles can benefit various environmental considerations to support the achievement of emission reduction targets. Suitable incentives and initiatives help increase e-Mobility adoption, transparency and impact on environmental KPIs and their pro-active influence. Establishing a clear platform with necessary environmental programs and regulations further help to support value added services off-setting fossil fuels and enabling the balance of intermittent renewable in-feed, load profile optimization and power grid reliability.</p>	<p>5 Pro-actively participating and shaping the development of international environmental standards for the e-Mobility industry . Establishing a national platform and sector coupling for sustainability and e-Mobility integration, e.g. renewable energy sources (e.g. solar PV, storage) with remote dispatching and scheduling of a green charging process /tariff)</p>	<input type="radio"/>
	<p>4 Countrywide environmental mobility concept including financial evaluations (carbon pricing), data modelling and informed decision making while acting as national and regional role model environmental think-thank, incl. best-practice sharing, green charging programs, etc.</p>	<input type="radio"/>
	<p>3 First attempts to integrate small share of renewable energy output with charging activities (e.g. first pilots and studies on installation of solar PV on parking roofs to cover local energy consumption for charging processes). Establishing a regional platform to identify environmental initiatives, analysis,</p>	<input type="radio"/>
	<p>2 Clear awareness and detailed projections how a new assembled e-Mobility economy will impact the existing countrywide environmental aspects. Setting up a countrywide development plan / roadmap with a focus on environmental considerations, e.g. sustainability targets, emission reduction, regional programs, sector-coupling, etc.)</p>	<input type="radio"/>
	<p>1 Basic awareness or first studies are conducted on the environmental impact and influence of a new assembled e-Mobility economy (e.g. CO2 reduction, change in load profile, management of energy surplus, green charging, environmental impact of e-Mobility vehicles or infrastructure, battery management, manufacturing, etc.)</p>	<input type="radio"/>
	<p>0 No environmental aspects for e-Mobility are considered or relevant (low or adoption)</p>	<input checked="" type="radio"/>

Figure 3-10 Manage Environmental Aspects (Existing 4).

Existence related annotation

Level 0 exists in Tanzania. Tanzania aims to reduce **GHG emissions by 30-35% in 2030** in its updated NDC. The country plans to invest in low-emission transport system but the focus topic as reported in the NDC are mass rapid and non-motorized transport system and did not include E-Mobility (United Republic of Tanzania, 2021).



3.2.4 Business Domain: Stakeholder Engagement

3.2.4.1 Manage Stakeholder Engagement

Description	Capability Level		Existence
The involvement of local stakeholders like municipalities, businesses and tourist industry enables a fast infrastructure roll-out	5	Continuous optimization of the action plan across the stakeholders incl. co-creation and new business opportunities evaluation	<input type="radio"/>
	4	Evaluation of the implemented action plan and monitoring of the operation by all parties to analyse whether the implemented measures have triggered expected results	<input type="radio"/>
	3	Definition of an “E-Mobility Action Plan” for local stakeholders in municipalities, businesses and the tourist industry which describes all e-Mobility related measures and activities for the next years to remain an attractive destination for customers, especially for tourist municipalities, and to remain a progressive and forward-thinking place to live for the inhabitants	<input type="radio"/>
	2	Defined preliminary roadmap on the short-, medium-, and long-term in line with the country’s strategy / vision with key initiatives defining roles, responsibilities, and interfaces of the stakeholders	<input type="radio"/>
	1	Defined vision and strategy development process to motivate and ensure the commitment of local stakeholders and main decision makers (e.g. via workshops). Aim to develop a common consensus between involved stakeholders incl. role definition and mandates in the value chain.	<input type="radio"/>
	0	No further involvement of other parties. Isolated e-Mobility applications	<input checked="" type="radio"/>

Figure 3-11 Manage Stakeholder Engagement (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. There is currently no coordination between stakeholders targeted on overall E-Mobility adoption.



3.2.4.2 Managing Customers

Description	Capability Level		Existence
The involvement with the end-customers covering aspects incl. pricing, customer participation & experience, and advanced customer services	5	Leadership role in industry-wide customer information sharing and standards development efforts for e-Mobility charging infrastructure	<input type="radio"/>
	4	Research on how to use e-Mobility technologies e.g., V2X, home charging to enhance customer's experience, benefits and participation. Consequently, investigating the security and privacy implications of new technologies and business functions that enable customer participation in the V2X ecosystem	<input type="radio"/>
	3	Collecting residential customer usage data more frequently than monthly for use in operational analytics and planning. Assessing the impact on customers of new services and delivery processes such as dynamic pricing, and/or turning power on/off remotely	<input type="radio"/>
	2	Clear residential customer segmentation that can enable more tailored customer programs. Implementation of a common customer experience (e.g., look and feel, consistency of messages, available information) across customer interface channels. Support to customers to help them analyse and compare their actual usage against all available pricing program	<input type="radio"/>
	1	Communicating and explaining to the customers, the vision for the electrification of the transport sector (e-Mobility), the electricity tariff, differences between public and private charging	<input type="radio"/>
	0	No involvement with the customers given the non-existent market	<input checked="" type="radio"/>

Figure 3-12 Manage customers (Existing 4).

Existence related annotation

- **Level 0** exists in Tanzania. There is no developed customer communication strategy since the EV market is yet to be established.



3.2.5 Business Domain: Cross Domain Aspects

3.2.5.1 Manage Sector-Coupling

Description	Capability Level	Existence
<p>Plan and operate in a co-optimized manner several mutually interacting systems, which can also co-exist and reinforce each other. The rationales analysed, are decarbonisation and improving system flexibility/reliability</p>	<p>5 Decarbonization and carbon-free electrification is becoming the pillars of the government sector integration strategy. A wide portfolio of cost-effective and efficient carbon-free alternatives for each GHG-emitting activity in combination with enhanced sector coupling, digitalization and system integration</p>	<p>○</p>
	<p>4 Smooth deployment of sector integration with properly articulated regulations that foster cross-sector interaction, incentivizing power-to-X solutions (e.g., gas, district heating, hydrogen generated from RES, and new flexibility solutions such as demand-side response including V2G models and beyond)</p>	<p>○</p>
	<p>3 Developed sector coupling strategy via a Use Case approach with a (i) stated scope (What?), in terms of coupled sectors, technologies, location in the value chain, and impacted markets; (ii) Objective (Why?): rationale aiming to decarbonization, energy optimization, infrastructure optimization, flexibility provision, KPI, targets, expected outcome; and (iii) Business model</p>	<p>○</p>
	<p>2 Linking innovation and R&D in the energy and transportation sectors to the change intrinsic to the new paradigms (e-mobility). Intense research in air, water and heavy truck transport with local vehicle manufacturers (OEM) focusing on battery concepts to increase battery capacities and ranges while reducing costs.</p>	<p>○</p>
	<p>1 Initial interest in a sector coupling approach is adopted by the cabinet, emphasising on the role of transport sector integration and resources efficiency when integrated in the energy planning.</p>	<p>○</p>
	<p>0 The potential of sector coupling coordinating planning and strategies for all energy carriers such as electricity, gas, and liquid fuels with each other and with transportation, buildings, water, and other industries is not explored</p>	<p>●</p>

Figure 3-13 Manage sector-coupling (Existing 4).

Existence related annotation

- **Level 1** exists in Tanzania. Tanzania in their updated NDC (United Republic of Tanzania, 2021) aims to promote the use of renewable (clean) energy in transportation systems.



3.2.5.2 Manage Fossil Fuels

Description	Capability Level		Existence
Shift to e-mobility will help reduce the national dependency on fossil fuels imports including the exposure to intermittent and rising fuel prices in the global market	5	Regional excellence hub aiming to phase out fossil fuel imports/dependency and provide alternative strategies and scenarios to ensure sector transformation	<input type="radio"/>
	4	Forecast substitutions of alternative transport fuels, which are locally produced or imported such as bio-fuels, hydrogen and renewable energy	<input type="radio"/>
	3	Establish and institutionalize management and control systems for sound execution and implementation of the strategy action plan which describes all related measures and activities for the next years aiming to lower on fossil fuel imports	<input type="radio"/>
	2	Development of a preliminary strategy aiming to reduce and offset fossil fuel imports based on different scenarios and measures enabled by the adoption and ramp-up of e-mobility technologies	<input checked="" type="radio"/>
	1	Attempts to understand the market through initial projection via simulations and analysis, to quantify the exact dependency of the market on fossil fuel, incl. the understanding of the associated benefits related to the electrification of the transport fleet	<input checked="" type="radio"/>
	0	No motivation and awareness regarding the dependency on fossil fuels	<input checked="" type="radio"/>

Figure 3-14 Manage Fossil Fuels (Existing 4).

Existence related annotation

- **Level 3** exists in Tanzania. Tanzania in their updated NDC (United Republic of Tanzania, 2021) and Power System Master Plan (PMSP) 2020 (Ministry of Energy, Tanzania , 2020) aims to promote the use of renewable (clean) energy aimed at curbing the increasing dependent on imported fossil fuels.



3.2.6 Gap-Recommendation

61. To accelerate the transition towards a sustainable E-Mobility landscape in Tanzania, a strategic, multi-faceted approach is essential. Our recommendations focus on developing a comprehensive E-Mobility strategy, **enhancing policy frameworks to support technology localization and job creation, upgrading infrastructure to accommodate EVs, establishing technical and market standards for EV integration, and promoting EV adoption through incentives and targeted marketing.**
62. These steps are designed to build a robust E-Mobility ecosystem, fostering innovation, sustainability, and economic growth in the energy sector.
- Develop and publish the eMobility strategy with clear pillars and strategic targets;
 - Design the policy interventions / action items around the job creation and localization of the technology:
 - Investment in the upgrade of existing TANESCO grid to accommodate update of EVs;
 - Implement technical standards on EVs, EVSE and EVSE installation and grid integration;
 - Define market rules for EVSE operation and EV electricity supply to secure sufficient charging infrastructure;
 - Develop incentives for the procurement and/or operation of EVs;
 - Set up marketing for the communication of advantages of EVs for potential drivers;
 - Foster availability of EVs preferable by local manufacturing or import;
 - Introduce communicational environment to foster communication between stakeholder of E-Mobility.



4 Works Cited

- Africa E-Mobility Alliance (AfEMA). (2023). *Tanzania Country Report - Barriers to e-Mobility*. Nairobi . Retrieved from https://africaema.org/resources/AfEMA_country_report_2023_Tanzania.pdf
- African Union Commission. (2015). *Agenda 2063- The Africa We Want*. Addis Ababa. Retrieved from https://au.int/sites/default/files/documents/36204-doc-agenda2063_popular_version_en.pdf
- International Energy Agency, IEA. (2021). *Global EV Outlook 2021 - Accelerating ambitions despite the pandemic*. Paris: IEA Publications. Retrieved from <https://iea.blob.core.windows.net/assets/ed5f4484-f556-4110-8c5c-4ede8bcba637/GlobalEVO Outlook2021.pdf>
- International Energy Agency, IEA. (2023). *Global EV Outlook 2023: Catching up with climate ambitions*. Paris: International Energy Agency (IEA). Retrieved from <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf>
- International Renewable Energy Agency (IRENA). (2017). *United Republic of Tanzania - Renewables Readiness Assessment*. Abu Dhabi. Retrieved from https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/May/IRENA_RRA_UR_Tanzania_2017.pdf
- Ministry of Communications and Transport. (2003). *National Transport Policy*. Dodoma. Retrieved from <https://www.mwt.go.tz/uploads/documents/en-1631778532-NATIONAL%20TRANSPORT%20POLICY%20%202003.pdf>
- Ministry of Energy, Tanzania . (2020). *Power System Master Plan 2020 Update*. Dodoma. Retrieved from <https://www.nishati.go.tz/uploads/documents/en-1638532283-PSMP%202020%20UPDATE%20FINAL%20signed.pdf>
- Ministry of Finance. (2023). *The Economic Survey 2022*. Dodoma. Retrieved from https://www.nbs.go.tz/nbs/takwimu/na/THE_ECONOMIC_SURVEY_2022.pdf
- Ministry of Finance and Planning Tanzania. (2021). *National Five Year Development Plan 2021/22 - 2025/26*. Dodoma. Retrieved from <https://www.tro.go.tz/wp-content/uploads/2021/06/FYDP-III-English.pdf>
- Tanzania Ministry of Works and Transport. (2021). *Transport and Meteorology Sector Statistics*. Dodoma. Retrieved from <https://www.mwt.go.tz/uploads/documents/sw-1689069736-TRANSPORT%20AND%20METEOROLOGY%20SECTOR%20STATISTICS%20-%202021%20FINAL.pdf>
- Tanzania National Bureau of Statistics. (2022). *2022 Tanzania in Figures*. Dodoma: National Bureau of Statistics. Retrieved from https://www.nbs.go.tz/nbs/takwimu/references/2022_Tanzania_in_Figure_English.pdf
- UNCTAD. (2023). *Identifying African countries' potential in the African automotive industry – A continental supply chain mapping approach* . UNCTAD.
- United Republic of Tanzania. (2021). *Nationally Determined Contribution (NDC)*. Dodoma. Retrieved from https://unfccc.int/sites/default/files/NDC/2022-06/TANZANIA_NDC_SUBMISSION_30%20JULY%202021.pdf
- United Republic of Tanzania. (2021). *United Nations Sustainable Development Cooperation Framework 2022 - 2027*. United Nations.