Africa Energy Efficiency Policy in Emerging Economies Training Week

Transport

Nairobi
18-21 March 2024

Introductory roundtable
Day 1, 18 March

Dr Alison Pridmore, Dr Ian Skinner

International Energy Agency

Introduction

Energy Efficiency of Vehicles: Overview of Day 1

DAY 1 AGENDA	
13:30 - 14:00	Introductory Roundtable
14:00 - 14:30	1. Where to Start: Energy use in Transport
14:30 - 15:00	2. Toolkit: Vehicle Energy Efficiency Policy Package
15:00 - 15:30	Coffee and Tea Break
15:30- 16:30	3. Making it Happen: The Role of Electric Mobility
16:30- 17:45	Group Exercise
18:00 - 21:45	Icebreaking activities and reception

Course objectives - approach taken

- The training is highly interactive and will provide you with an opportunity to share your experiences, to learn from the trainers, other participants and guest speakers.

- Design features include the use of case studies, a focus on multiple benefits, the application of practical tools and case studies as well as interactive activities.

Interactive activity

Meet the team

Alison Pridmore

Energy Efficiency Policy Analyst
International Energy Agency

Ian Skinner

Director *T*
ransport Environment Policy Research

Doris Agbevivi

Project Coordinator, Drive Electric Initiative, Ghana
Ghana Energy Commission

Remerdezai Joseph Kuhudzai

Founder
Electric Drive Africa

Jane Akumu

Programme Management Officer
United Nations Environment Programme

Alexander Koerner

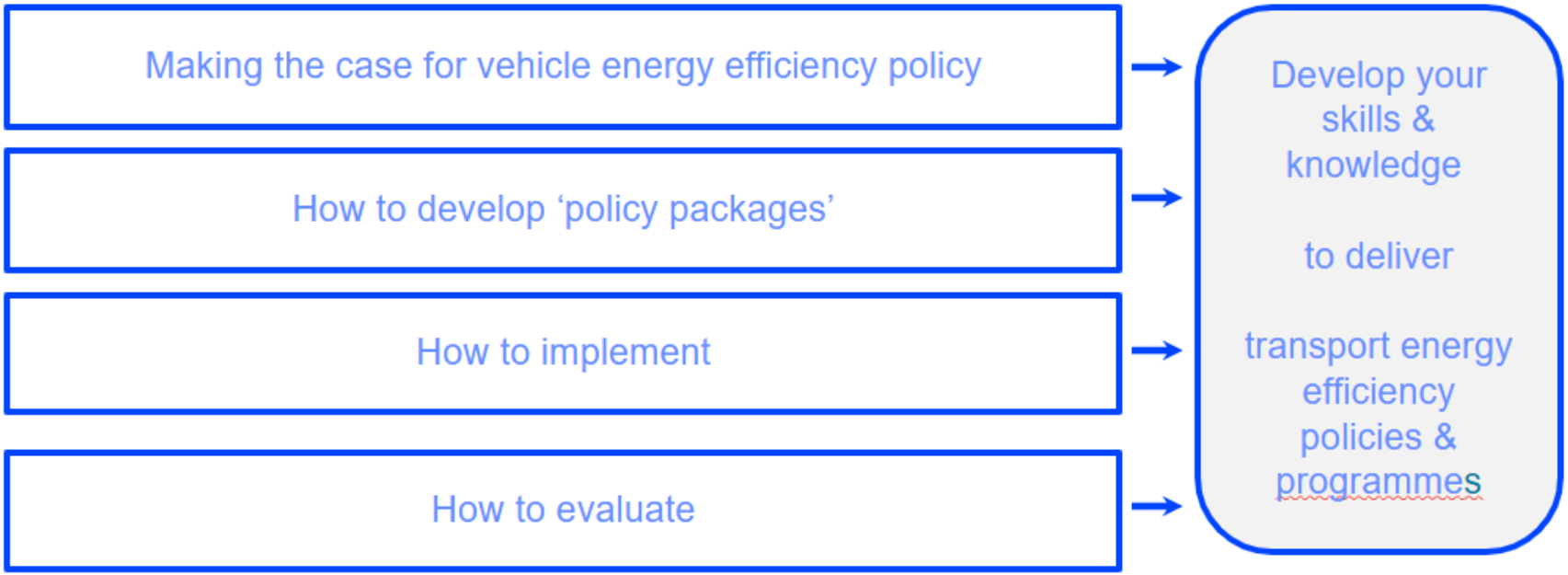
Programme Management Officer
United Nations Environment Programme

Training roadmap

Continuing your learning after this training

- We can’t cover everything in a few days and we will therefore point you in the direction of further support and resources

Course objectives – why are we here?



Introductions

Within your table please discuss:

- What is your role in energy efficiency?
- What policies/programmes are working on?
- What unique perspective and experience do you bring to this training and are keen to share with others?
- Describe one key challenge associated with your policies/programmes?

Interactive activity

Expertise in the room – learning from each other

- Policy design
- Policy development
- Policy implementation
- Energy auditing
- Training and capacity building
- Evaluation
- Energy management
- Other?

Interactive activity

Logistics

- Discussions and questions
- Interactive exercises
- Your role
- Presentations and etiquette
- Breaks (drinks at lunchtime)
- Prayer room
- Use of phones and computers
- Wi-fi access
- Access to materials
- Requirements for certificates

Questions

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Transport: Where to Start Transport Energy Use Day 1, 18 March

Dr Alison Pridmore, IEA

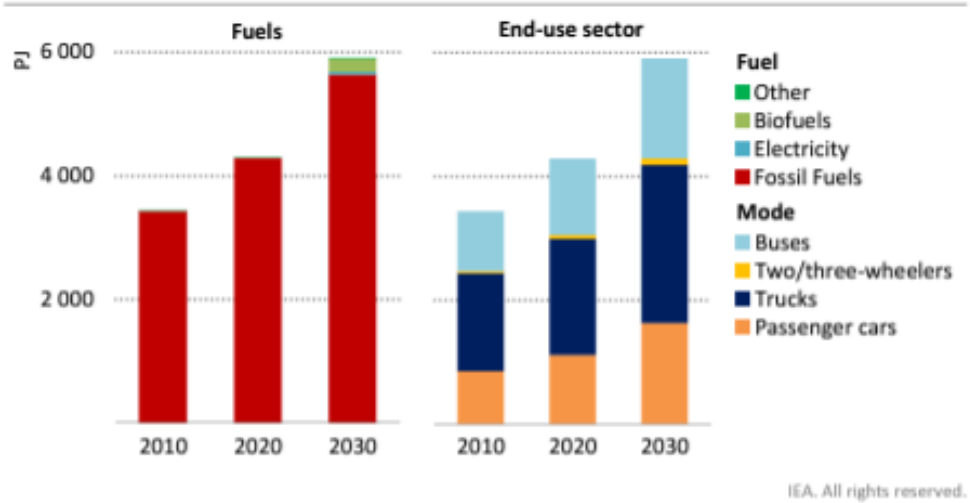
Training roadmap

Learning outcomes

- This session will focus on developing your capabilities to:
  - Understand current and future energy use from the road transport sector
  - Consider the modes which are the highest energy users
  - Examine different efficiency options – what do we mean by vehicle efficiency
  - Identify wider benefits and impacts from action
  - Look to future opportunities and challenges

Transport energy use is growing in Africa

Road transport energy demand by fuel and mode in the Sustainable Africa Scenario

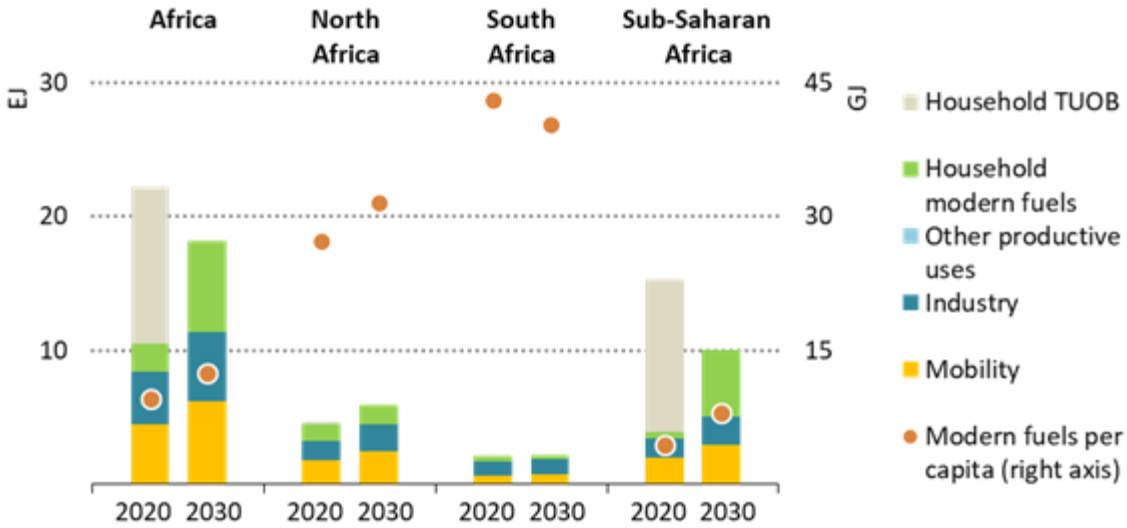


Source, IEA, 2022 Africa Energy Outlook

Rapid expansion of the fleet – especially cars and trucks –
drives up transport energy demand, with oil remaining the dominant fuel in 2030

Energy use by region

Total Final Energy Consumption by Sector and Modern Fuel Use per Capita by Region in the Sustainable Africa Scenario

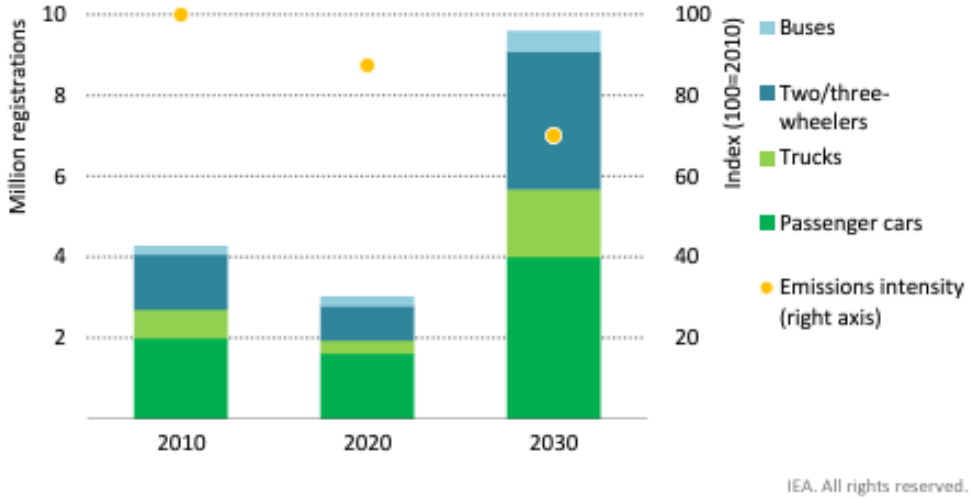


Source IEA, 2022 Africa Energy Outlook

Mobility energy use is increasing across regions

Reflecting growing transport demand

New road vehicle registrations and CO_2 emissions intensity by type in the SAS

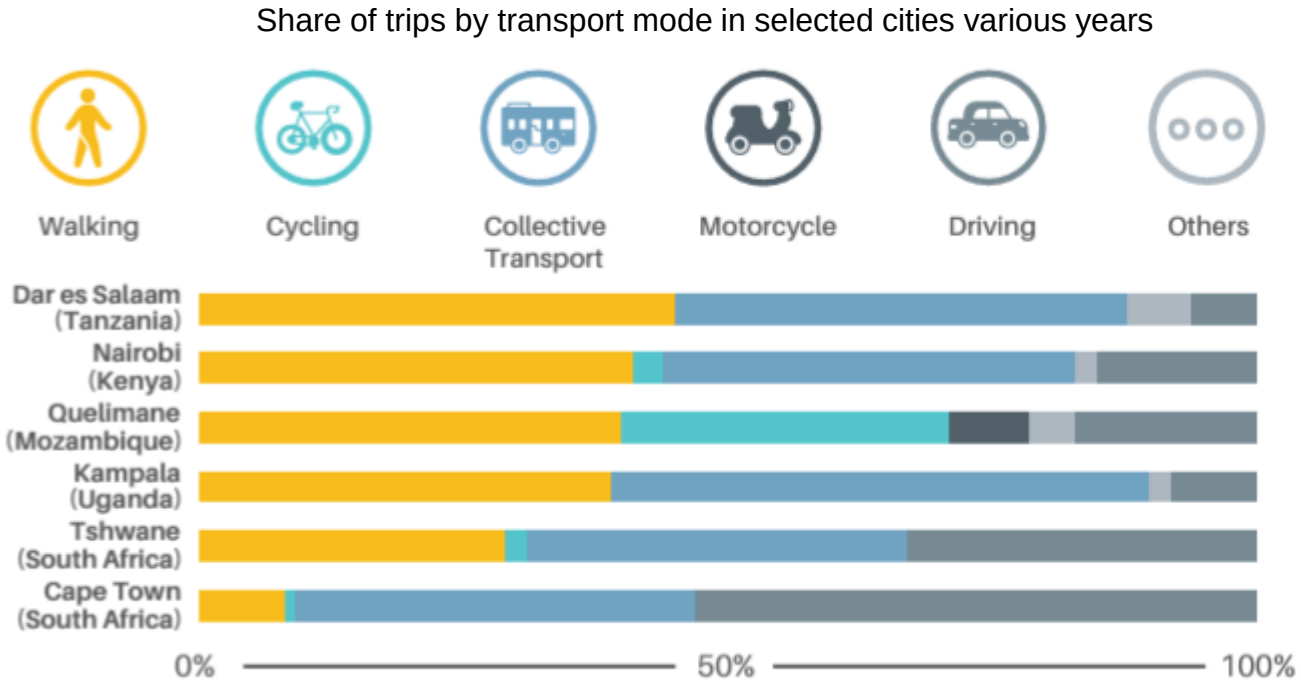


Source, IEA, 2022 Africa Energy Outlook

Source IEA, 2022 Africa Energy Outlook

Sales more than triple between 2020 and 2030, with vehicle emissions intensity improving by one-fifth thanks to fuel economy gains across all vehicle types

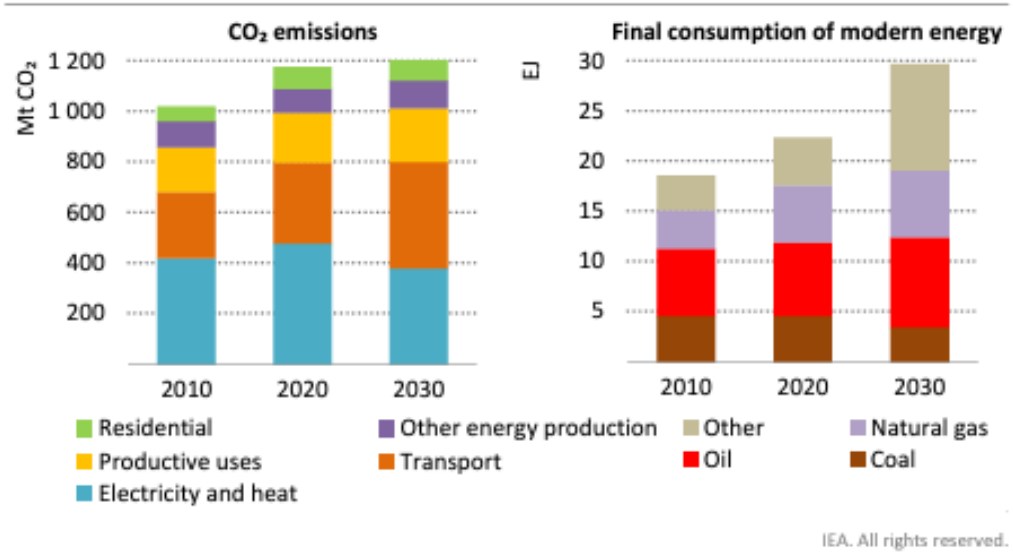
Importance of walk and collective transport modes



Slocat, 2022 Africa infographic

Increasing role of transport in CO_2 emissions

Energy-related CO_2 emissions and energy consumption in Africa by sector in the SAS

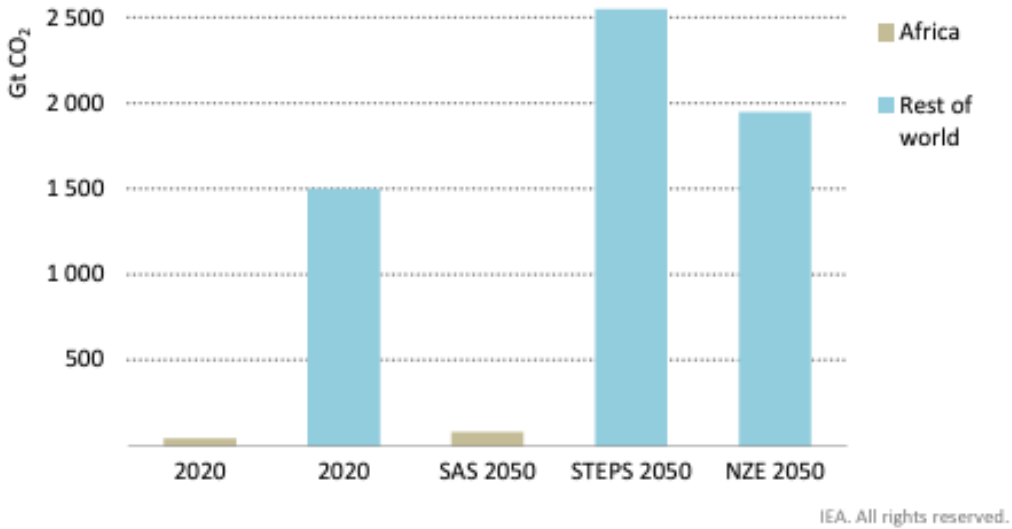


Source IEA, 2022 Africa Energy Outlook

The transport sector has an increasing contribution to CO_2 emissions

Importance of global context to this

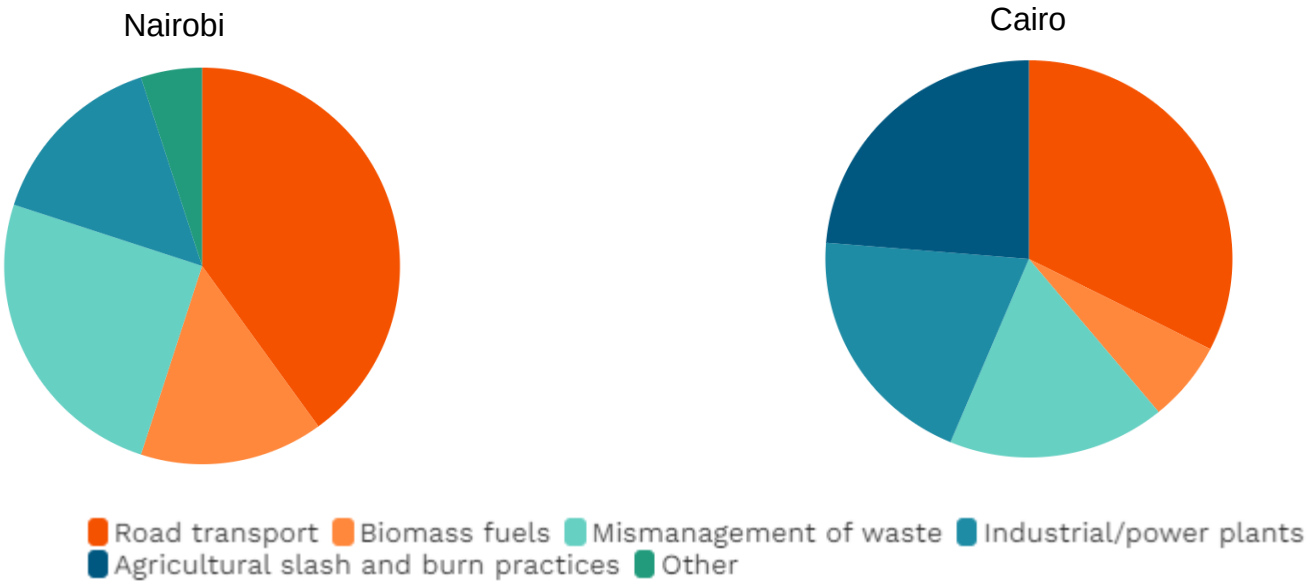
Global cumulative energy-related CO_2 emissions and African share since 1890 by scenario



Source IEA, 2022 Africa Energy Outlook

Africa has contributed less than 3% of global cumulative emissions since 1890, a share that rises only marginally to 2050 in the SAS regardless of emissions trends in the rest of the world

Air pollution impacts of road transport



Source: McDuffie et al., PM2.5 Exposure Estimates, Sectoral Source Contributions, Total Attributable Mortality Estimates, and Fractional Disease Contributions, 2021 in Nairobi and air pollution - Clean Air Fund

Source: World Bank, Egypt cost of environmental degradation – Air and water pollution, 2019 in Cairo and Air Pollution Clean Air Fund

An estimated **40% of Nairobi's and 33% of Cairo's $PM_{2.5}$ air pollution concentrations** are attributable to **road transport**

Transport congestion impacts

Rank by filter	World rank ▼	City	Average travel time per 10 km ▼	Change from 2022 ▼	Congestion level % ▼	Time lost per year at rush hours ▼	Average speed in rush hour ▼
1	74	Cairo Egypt	20 min 20 s	- 1 min	40	72 hours	26 km/h
2	196	Pretoria South Africa	16 min	no change	28	49 hours	32 km/h
3	205	Cape Town South Africa	15 min 50 s	+ 20 s	32	49 hours	33 km/h
4	239	Bloemfontein South Africa	14 min 50 s	+ 10 s	20	41 hours	34 km/h
5	243	Durban South Africa	14 min 50 s	no change	29	44 hours	35 km/h
6	286	Johannesburg South Africa	13 min 30 s	- 10 s	25	43 hours	36 km/h

Source: Traffic Index ranking | TomTom Traffic Index

In Lagos, Nigeria, it is estimated that commuters spend approximately 30 hours in traffic every weeky

What do we mean by efficiency in this context?

Reduce
or **avoid**
travel

Avoiding transport activity through policies influencing urban structures and driving

Local access

City layout

Compact

Density

Shift

Walk

Metro

Shifting mobility towards less carbon intensive modes

Cycle

Bus

Infrastructure

Improve

Lightweight

Improve vehicle efficiency and reduce the carbon intensity of fuels

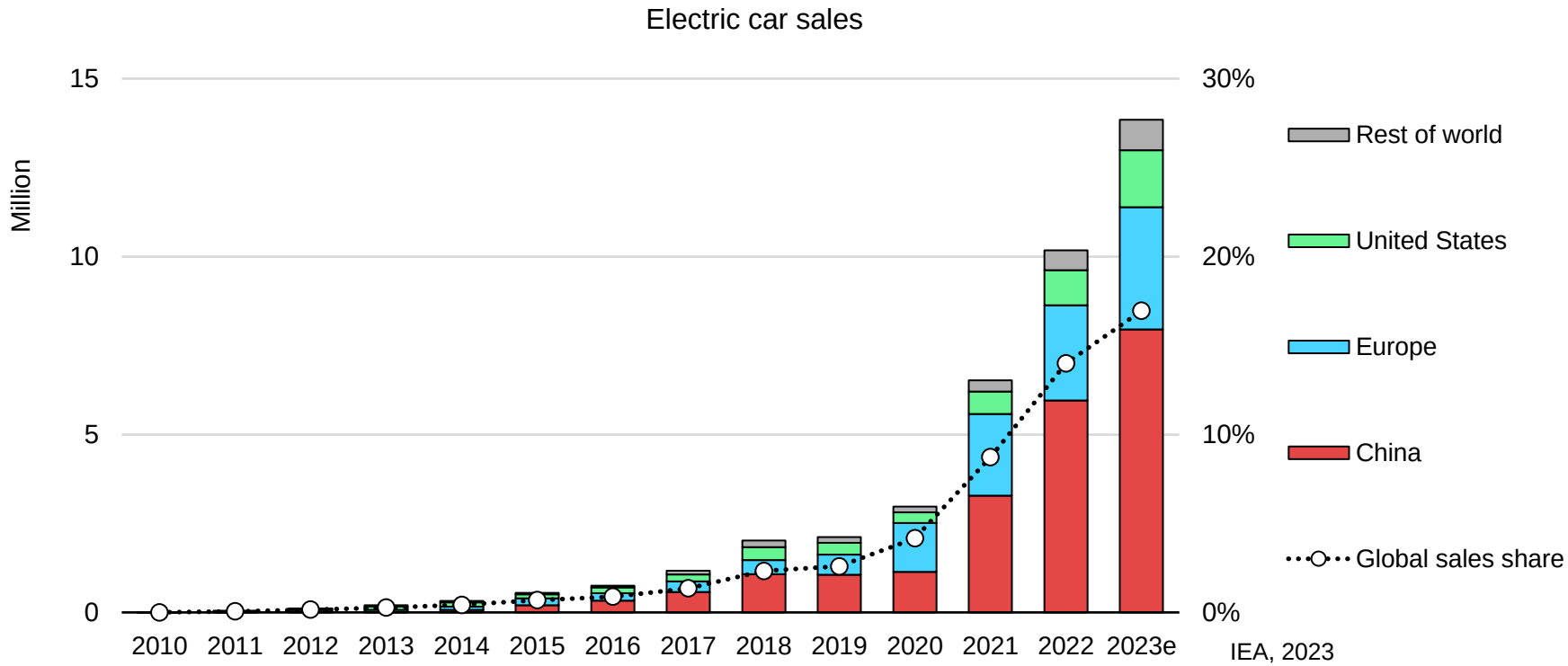
Electric

Engine efficiency

Biofuels

Two key trends – electrification and suvisation

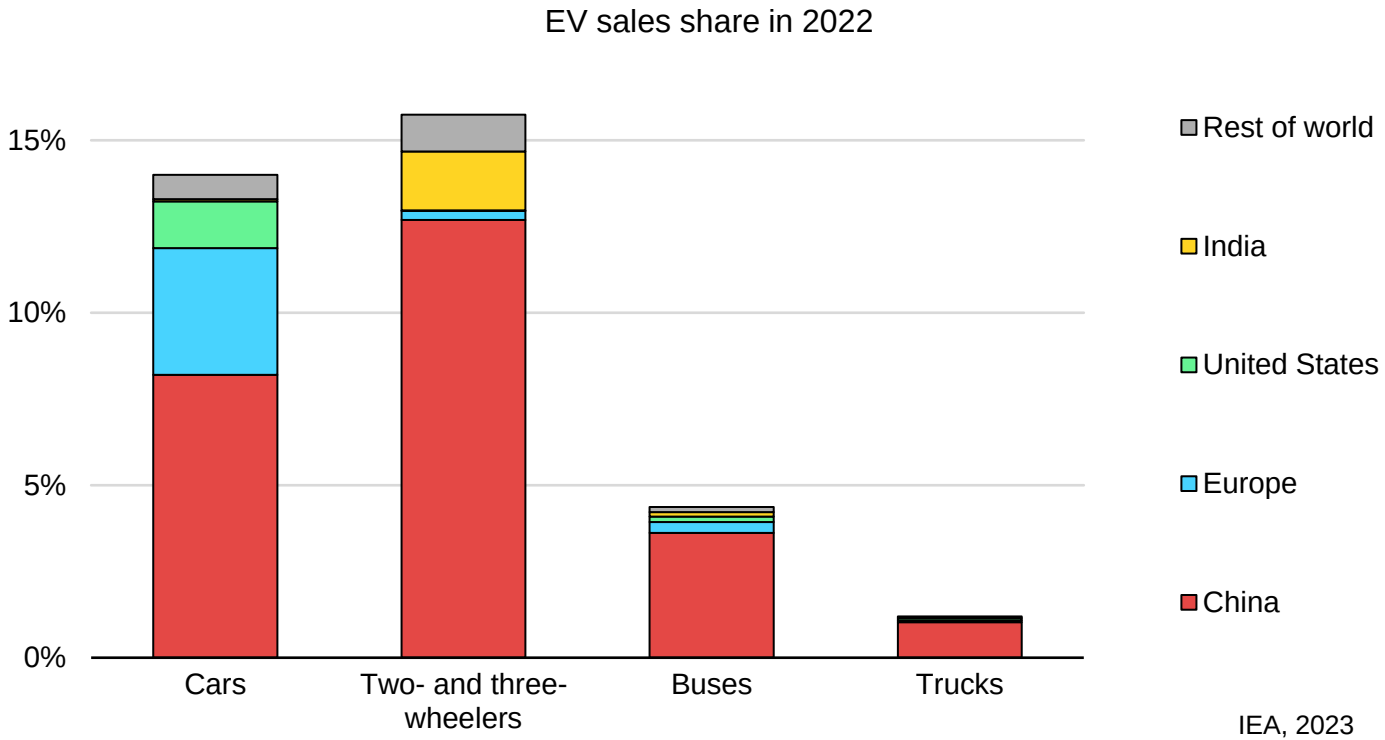
Electric car sales exceeded 10 million in 2022



IEA, 2023
Global Electric Vehicle Outlook 2023

Sales of electric cars were up 55% in 2022, led by China, Europe and the United States. 2023 is set to be another record year.

Transport electrification covers all modes

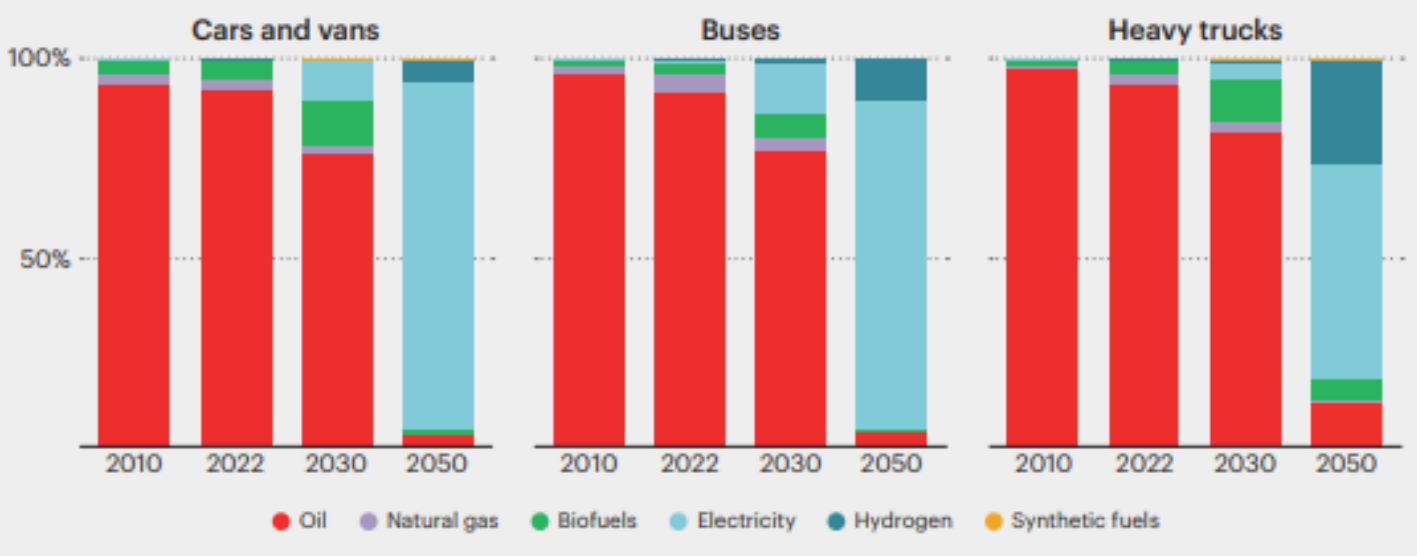


IEA, 2023
Global Electric Vehicle Outlook 2023

Electrification is already widespread among two-/three-wheelers.
Sales of electric buses are picking up; trucks are the next frontier for electrification.

Electrification differs by vehicle type

Fuel shares of road energy consumption

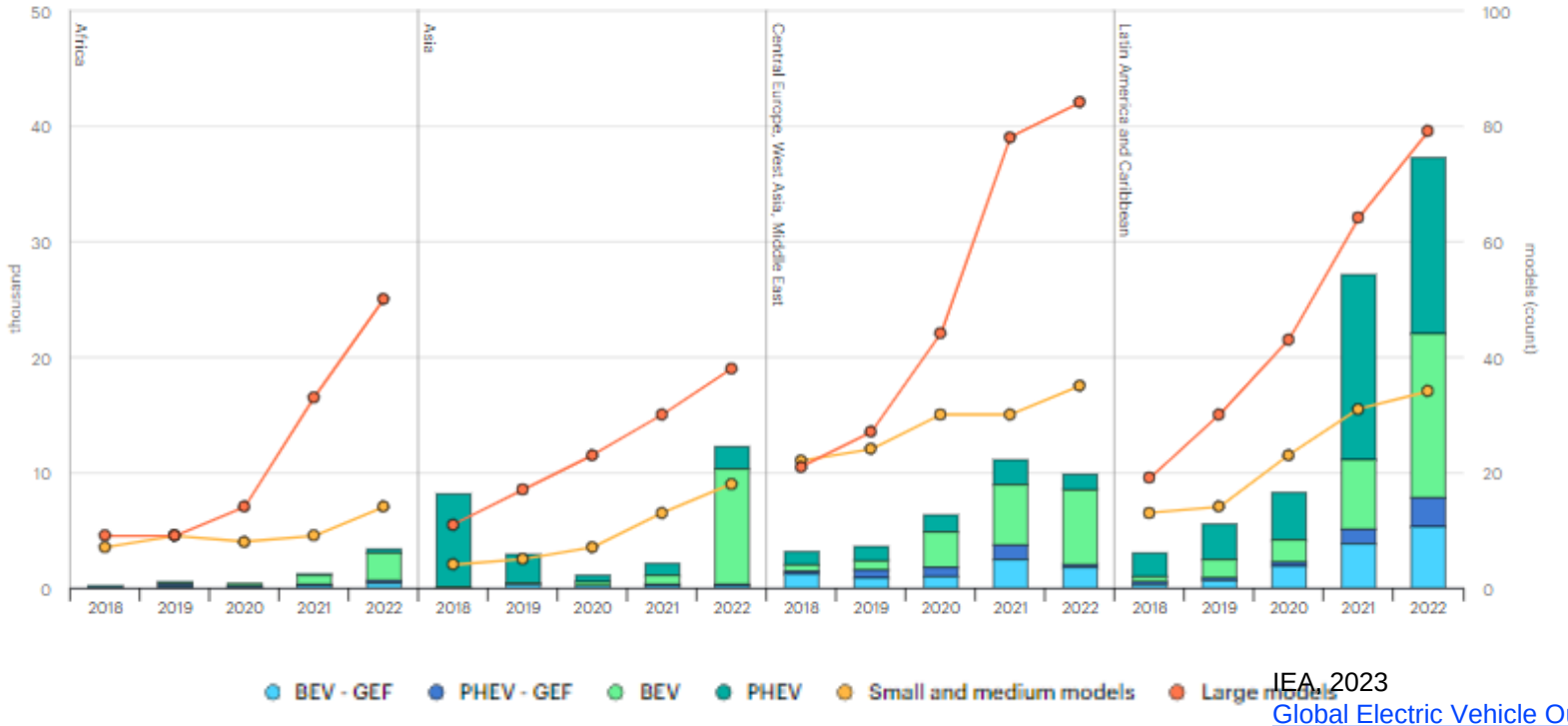


Source, IEA, 2023, Net Zero Roadmap, 2023 Update

Globally electricity represents three-quarters of energy consumption in road transport in 2050.

Increasing adoption and availability

Electric car sales by powertrain and available models by car size in selected regions, 2018-2022

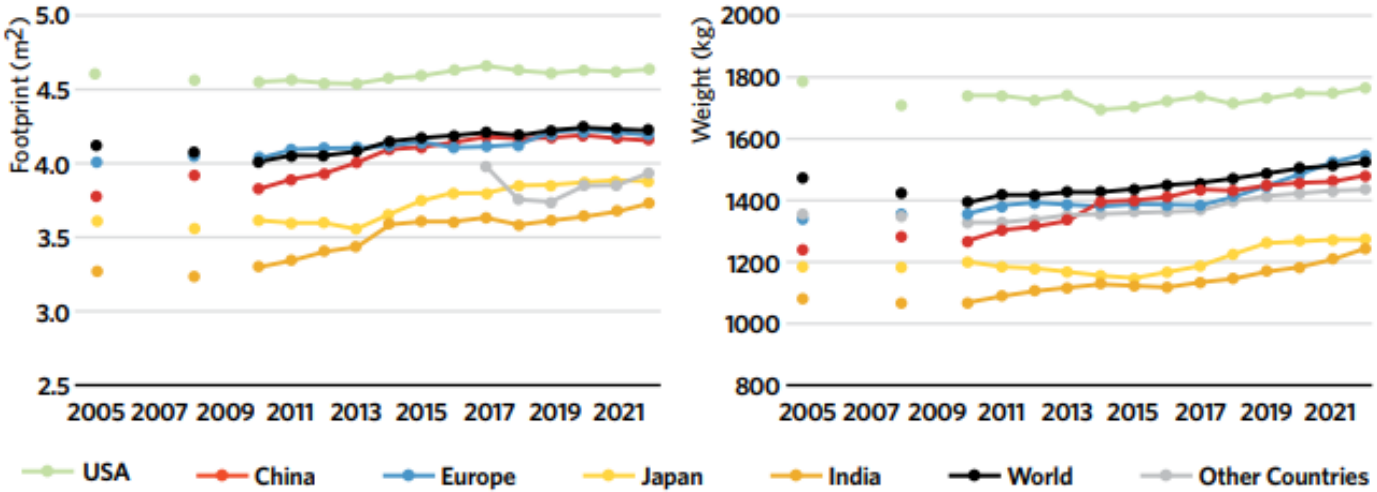


IEA, 2023
Global Electric Vehicle Outlook 2023

In Africa, the best-selling electric car model in 2022 was the Hyundai Kona, a crossover BEV

Increasing weight and size of fleet

Footprint and weight trends across major LDV markets

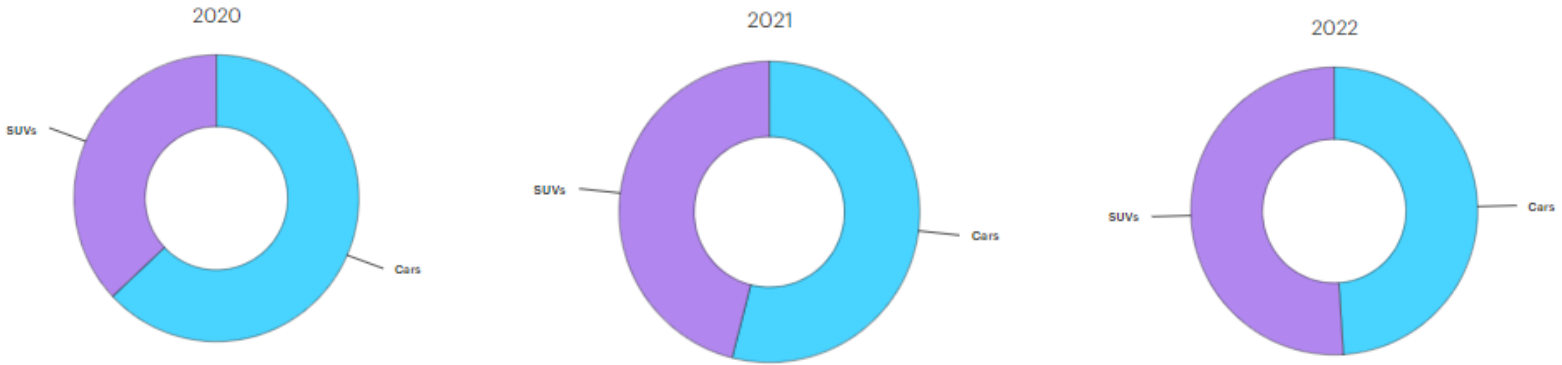


Source: GFEI, 2023 Trends in the Global Vehicle Fleet 2023
Based on Sources: IEA, 2019; IEA, 2021; EEA, 2023a; EEA, 2023b and Marklines data

Weight and footprint have been on the rise since 2010

Suvisation of the (electric) vehicle fleet

Electric car sales by segment

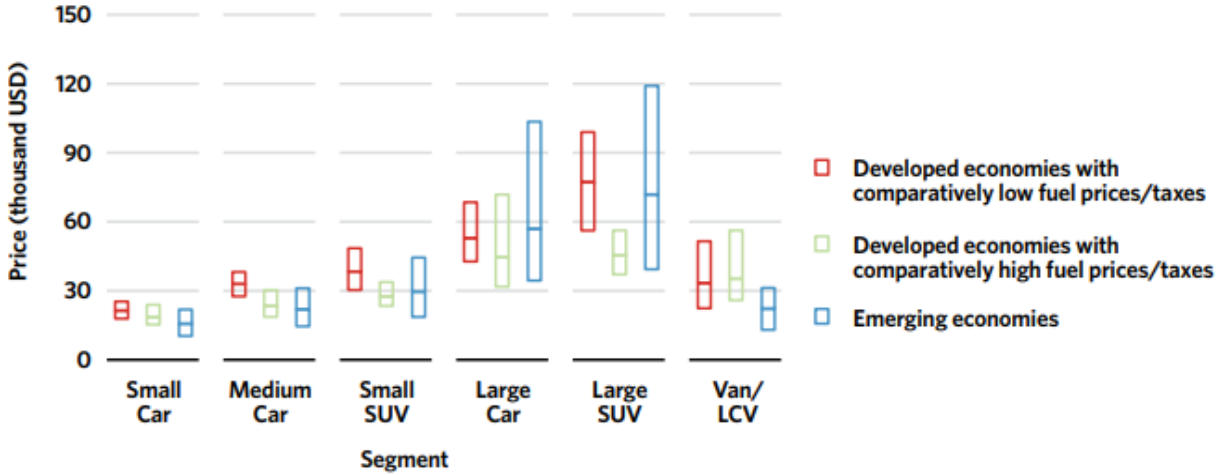


IEA, 2023 SUV Commentary

Globally over 50% of electric cars sales are now SUVS

Equity concerns

Evolution of vehicle prices, by segment and economic cluster, for the year 2017

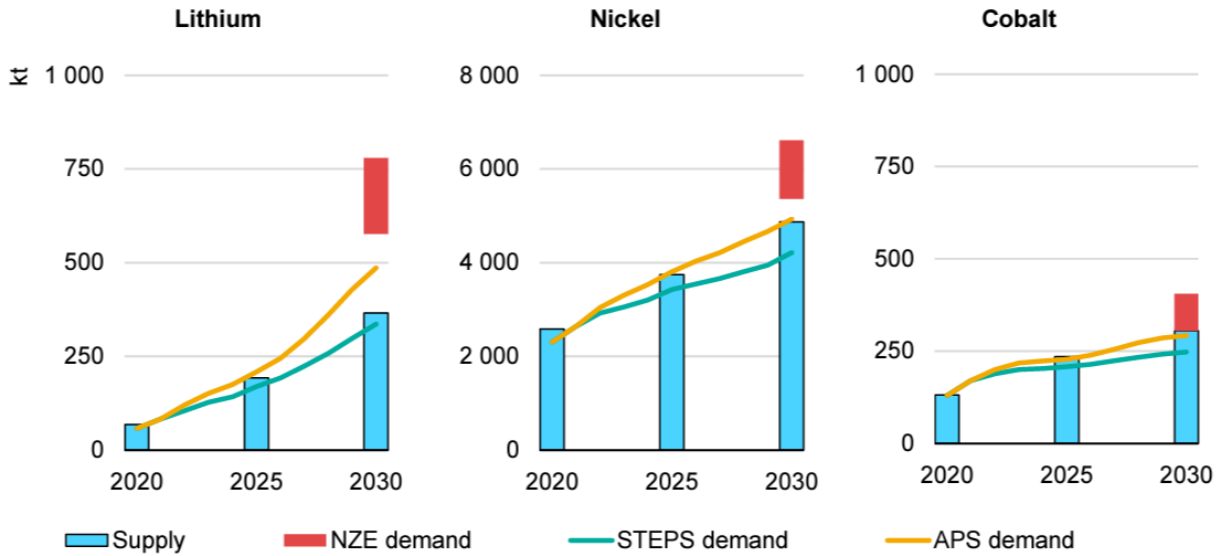


Source: GFEI, 2023 Trends in the Global Vehicle Fleet 2023 Adapted from IEA, 2019

Taking central estimates, for all regions, the gap between a medium car and a small SUV price is on the order of 10% to 20%, and 25% to 60% between a small car and a small SUV

EV batteries and demand for critical minerals

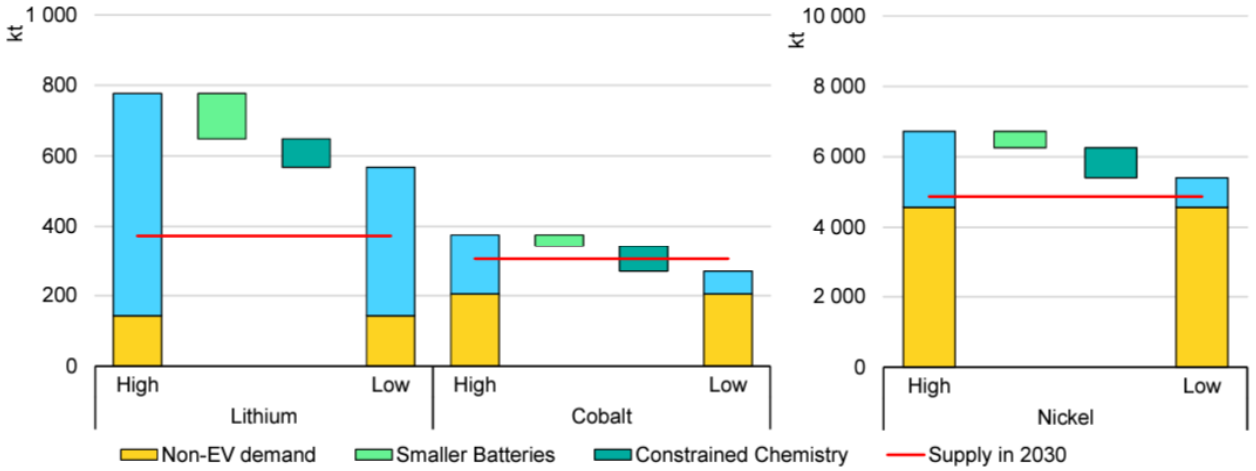
Total demand and supply for lithium, nickel and cobalt 2020 to 2030



IEA 2022 Global Electric Vehicle Outlook 2022

Role of measures

Measures to lower metal demand in 2030 in the Net Zero Scenario



Notes: NZE = Net Zero Emissions by 2050 Scenario; STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario.
Sources: IEA analysis based on Benchmark Mineral Intelligence for supply capacity.

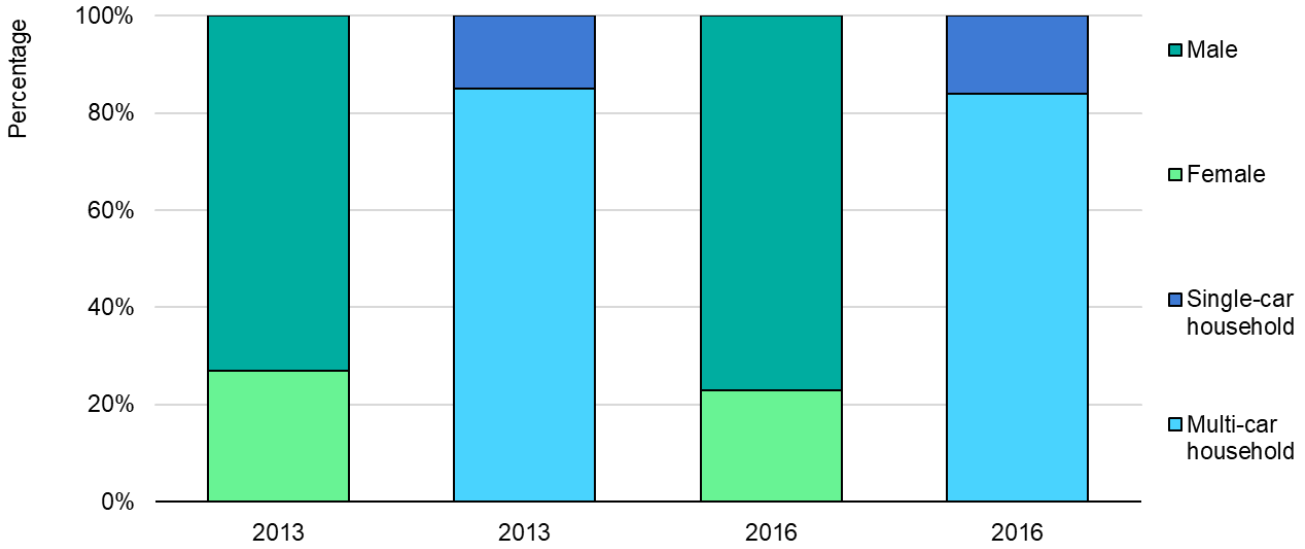
IEA 2022 Global Electric Vehicle Outlook 2022

Demand side measures such as limiting the growth of battery size can help bridge the gap

Gender

Gender and energy consumption

EV car ownership in Norway by gender and household type, 2013 compared to 2016



International Energy Agency (2018), Tracking Gender and the Clean Energy Transition, IEA, Paris
Source: Norsk Elbilforening, 2013 & Norsk Elbilforening, 2016

Early adopters of electric vehicles are primarily male

Interactive session

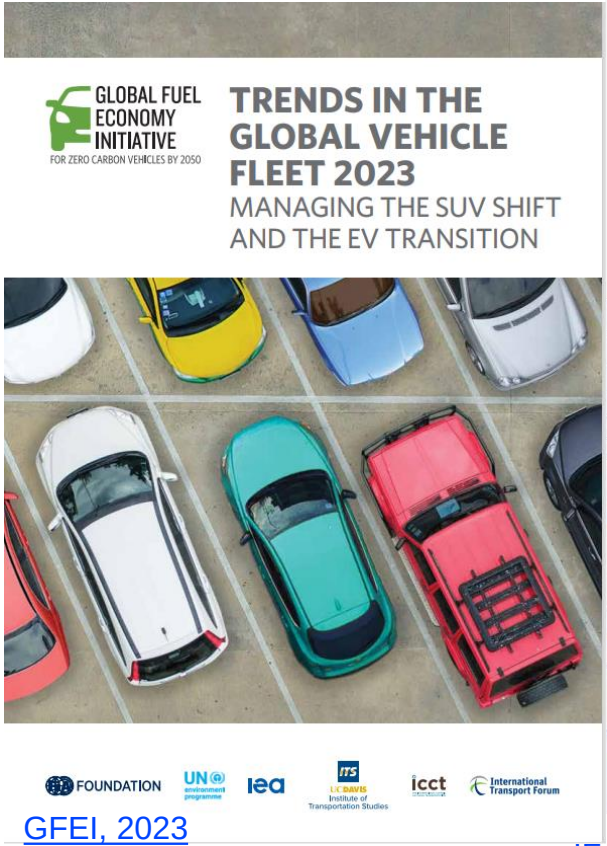
- What are the key drivers for vehicle energy efficiency improvements in your country / region?

  - Air quality
  - Climate change
  - Energy Security
  - Congestion reduction
  - Other

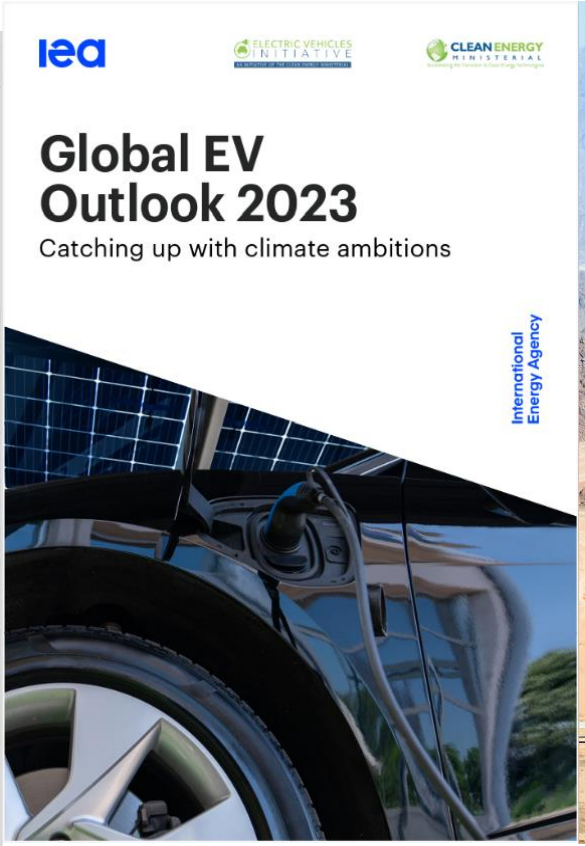
Interactive activity

- How can efficiency solutions differ by mode, what does this mean for your country / region?
- What do you see as key barriers and opportunities in relation to increasing efficiency?

Sources



GFEI, 2023



IEA, 2023

IEA, 2022

Sources

Link

31 Aug 2023 15:00—17:00 Paris Time
Workshop — Online, Zoom

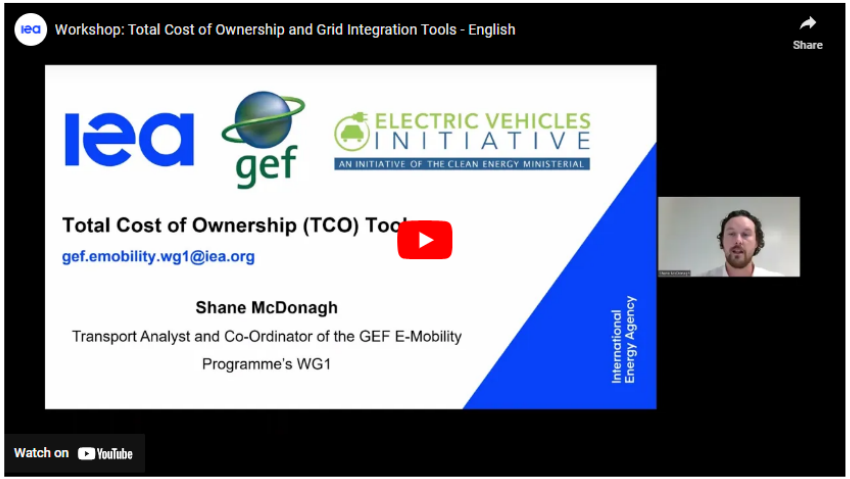
EV Total Cost of Ownership and Grid Integration Tools: Workshop for the Africa Support and Investment Platform for E-mobility

Organiser

International Energy Agency (IEA)
Global Environment Facility (GEF)
United Nations Environment Programme (UNEP)

Contact

gef.emobility.wg4@iea.org



IEA, 2023

Questions

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Transport: Transport Policy Package
Day 1, 18 March

Dr Alison Pridmore, IEA

Training roadmap

Learning outcomes

- This session will focus on developing your capabilities to:
  - Establish the reasons for and benefits of developing ‘policy packages’
  - Identify the three broad types of policies that can be incorporated into a ‘policy package'
  - Set the scene for the other sessions, where policy options and approaches will be discussed in depth
  - Start to consider how different options can help enable the evolution of vehicle efficiency policy

Policy Packages for Energy Efficiency

In all sectors the greatest efficiency gains are achieved by a package of policies that combine three main types of mechanisms: Regulation, information and incentives. Careful design and implementation will deliver efficiency's full potential to enhance energy security, create jobs, increase living standards, cut energy bills and reduce emissions.

Targets

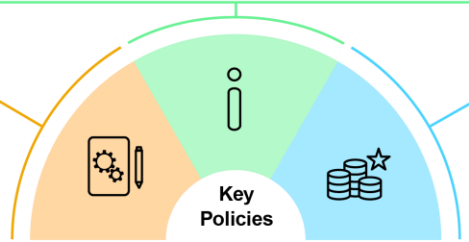
Policies are more effective when they are set in the context of clear strategies and targets.

Essential elements

Regulation is essential to exclude the worst performing equipment and practices from the market, to drive average efficiency levels up, and to set rules for measurement of performance.

Information helps people make more efficient choices in what they buy and how they use energy.

Incentives make efficient options more attractive and speed up the upgrade and replacement of appliances, buildings and vehicles. They also encourage the use of new technologies and practices.



Implementation is as important as policy design.

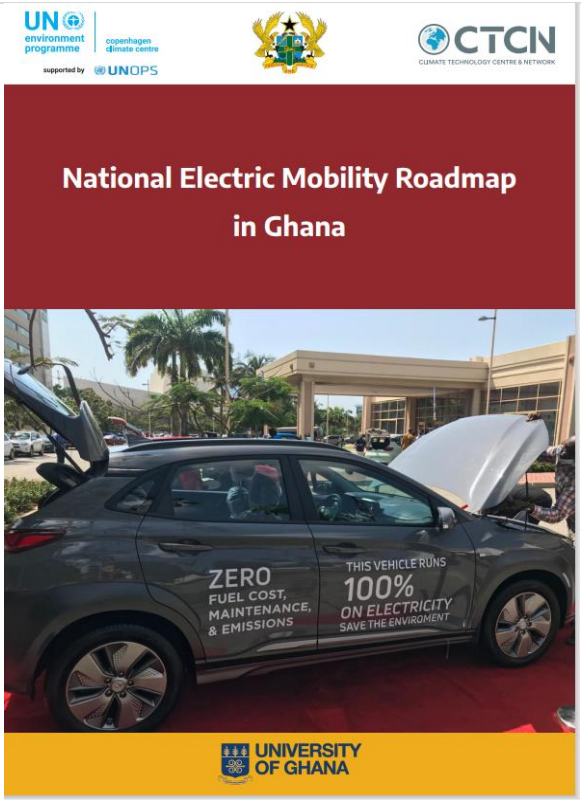
Ensuring that the **resources** are in place to put policies into action.

Address **vital elements** such as capacity building, enforcement, monitoring.

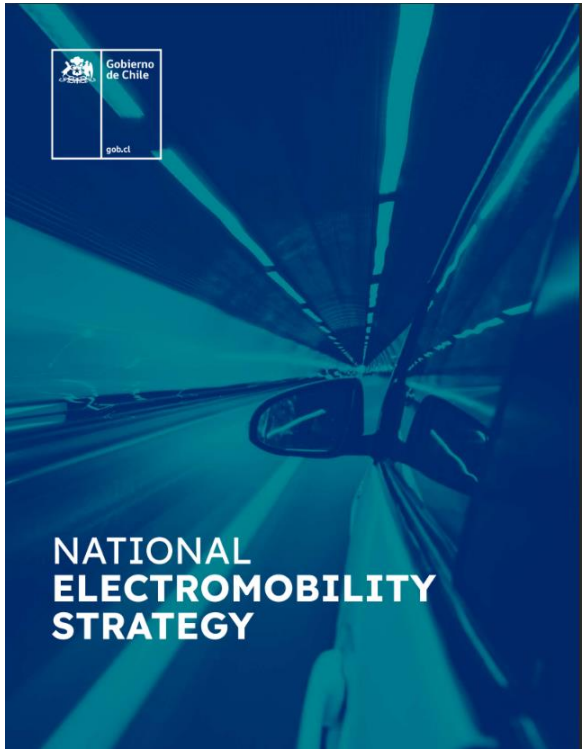
It is important to continually assess **policies and programmes** so as to keep up to date with technology developments.

IEA, 2023 Energy Efficiency Policy toolkit

Role of strategy



national-electric-mobility-roadmap-upload-25072022.pdf (unepccc.org)



Government of Chile, 2021

Mayor of London 2018/22

Strategy is key

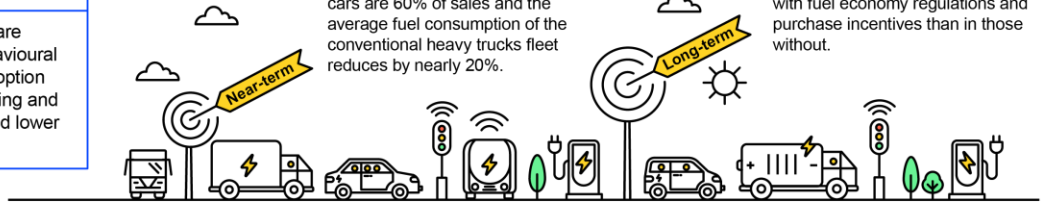
Policy Package – Vehicle Energy efficiency

Immediate opportunities

Significant fuel savings are achievable through behavioural actions including the adoption of best practices for driving and vehicle maintenance, and lower speeds.

In the IEA Net Zero Scenario milestones for 2030, electric cars are 60% of sales and the average fuel consumption of the conventional heavy trucks fleet reduces by nearly 20%.

Efficiency improvement rates for cars are 60% faster in countries with fuel economy regulations and purchase incentives than in those without.



REGULATION

- **Vehicle fuel economy standards** result in greatly reduced fuel use provided they are kept up to date, well monitored and properly enforced.
- **Regulating the import and export of used vehicles** can help improve fleet fuel economy and ensure road safety and air quality benefits.
- **Regulatory and market signals**, such as through stringent standards and target setting, help bring electric vehicles to the market, by providing an impetus to manufacturers to develop these technologies.
- **Regulation** can also help ensure the required infrastructure, for example standardised charging, is in place.

INFORMATION

- **Information campaigns** on carsharing practices and more fuel-efficient driving help people take informed action relating to energy and cost savings. Campaigns are more effective when based on behavioural insights and targeted strategies.
- **Labels inform consumers**, identifying the most efficient vehicles allowing people to choose vehicles that cost less to run. Labels for new and used vehicles help ensure benefits for all vehicle purchasers.

INCENTIVES

- **Incentives** can make vehicle costs cheaper at point of purchase, such as through grants or lower registration fees. They can also reduce on-going costs, through for example free parking and exemptions from congestion tolls.
- **Government grants** for strategic charging infrastructure, such as charging stations in homes and workplaces or fast charging along expressways, encourage the adoption of electric vehicles reflecting that purchase decisions are influenced by the availability of infrastructure.
- **Such incentives** facilitate the early adoption of electric vehicles and can be phased out as uptake grows.
- **Vehicle taxation and duties**, can be structured to incentivise the purchase of more efficient vehicles.

IEA, 2023 Energy Efficiency Policy toolkit

Policy Package – Energy Efficient Cities

National policy makers play an important role in accelerating urban energy transitions. Cities connect directly with communities and people to enhance implementation and better inform policy. National and city-level alignment in energy efficiency policy is a key dimension of clean energy transitions. Energy Efficient cities can use digital tools to make smarter, better-informed decisions and improve quality of life for all.

REGULATION

- **National Governments help create the environment** for cities to take action through setting an overall vision including plans and targets.
- **Local regulations and codes** incorporating solutions such as smart data and metering help unlock system wide efficiencies.
- **Planning** should be integrated and cross sectoral, taking a long term view.
- **International standards and benchmarks** are important in enabling seamless communication across technologies and applications, critical for efficient urban energy systems.
- **National action that facilitates business models** for clean urban energy services, such as Public Private Partnerships and ESCOs, unlock new sources of finance.

INFORMATION

- **National initiatives can be used to build energy efficiency capacity in cities** through creating training opportunities and partnerships, informed by international best practice.
- **Digitalisation creates new sources of data** e.g. on air quality, energy consumption and traffic. Analysis and communication of this data can improve the operation of urban energy systems.
- **Digital solutions for energy efficiency in cities,** require open, transparent access to data, with privacy protected. National governments can facilitate by developing guidelines and mechanisms to enable data use and sharing across sectors and levels of government.
- **Sharing information on energy efficiency best practice** and proven cost effective technologies can help cities better understand and implement efficiency opportunities to improve performance.

INCENTIVES

- **Investing in city level action and enabling funding to flow** from national to local level, through targeted funding models, can give the best return on investment and accelerate inclusive clean energy transitions.
- **National governments can use their influence to leverage international programmes** aimed at cities, for example by creating innovation areas to attract digital and clean energy technology talent.
- **Seed funding and complementary finance from national government**, can mobilise and help scale up private capital for investment in energy efficient cities.
- **Green procurement** for example through the incorporation of energy efficiency performance criteria into municipal tenders, mobilises the purchase power of public bodies, acting as a major driver for market deployment of efficient products.

IEA, 2023 Energy Efficiency Policy toolkit

What benefits do a mixture of policies bring?

UNEP case study analysis indicates in Kenya the average efficiency of vehicles is **up to 25% better** compared to other relevant countries

Globally, road freight efficiency can be **doubled** with a combined policy approach. Fuel economy standards plus logistical (information) approaches

Countries with regulations and/or efficiency-based purchase incentives in place improved **on average 60% faster** than countries without such policies

In Norway **nearly 80%** of vehicle sales are electric reflecting the use of broad range of incentives alongside regulatory and information approaches.

Regulation

- **Vehicles**
  - **Fuel economy standards**. Regulate the fuel economy of new vehicles and help facilitate the development of advanced technologies. Most appropriate in countries with large markets and vehicle manufacturing.
  - **Import restrictions.** Restricts imports of used and/or new vehicles. Can be an effective way of improving the average fuel economy. Examples include:
    - Ban on used vehicles
    - Age limit based restrictions
    - Requirement to meet certain standards
  - **Electric vehicle target setting** including zero emission vehicle mandates and targets for EV adoption.

- **Infrastructure**
  - **Electric vehicle charging**
  - **Vehicle testing**

- **Data collection**
  - **Baseline setting**
  - **Monitoring and verification**

- **Awareness**
  - **Labelling.** Energy efficiency labels help inform consumers to identify the most efficient vehicles allowing people to choose vehicles which cost less to run.
  - Fuel efficient driving and car sharing can be encouraged through information campaigns.

- **Role of digitilisation**
  - Access to electric mobility can be enhanced through digitilisation including apps
  - Digitilisation can play a key role in information sharing to improve fleet operations**.**

Vehicles

- **Impact on upfront vehicle costs**:
  - Age based taxes
  - Purchase subsidies/ scrappage schemes, help reduce the upfront price
  - Feebate schemes. A fee (or tax) on inefficient technology combined with a rebate (or subsidy) on a more efficient vehicle.
  - Vehicle taxation with lower rates for more efficient vehicles.

- **Reduce on-going costs**
  - Free parking for electric vehicles
  - Exemption from congestion charging / tolls

Infrastructure

- Grants and subsidies for EV charging infrastructure

Chile case study

Chile was the first country in Latin America to adopt fuel economy vehicle labelling in 2013.

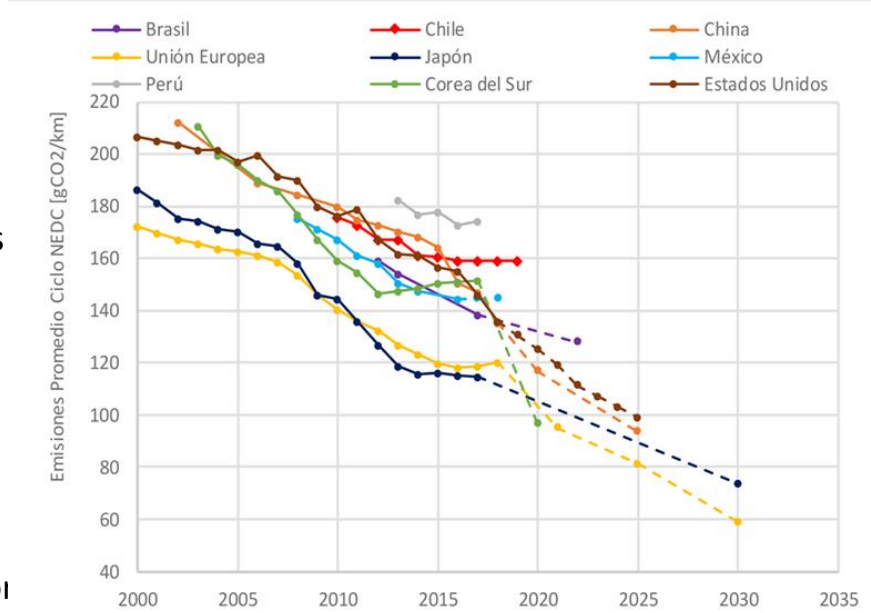
In 2014, the government introduced progressive fees on vehicles that do not meet specific fuel economy and pollutant emissions thresholds. Electric vehicles are offered exemptions from environmental tax and traffic restrictions.

In 2017, the National Electromobility Strategy outlined actions to ensure that 40% of private vehicles in Chile are electric by 2050.

Chile released its first Energy Efficiency Law in 2021, which mandates the setting of energy efficiency standards for LDVs within 12 months.

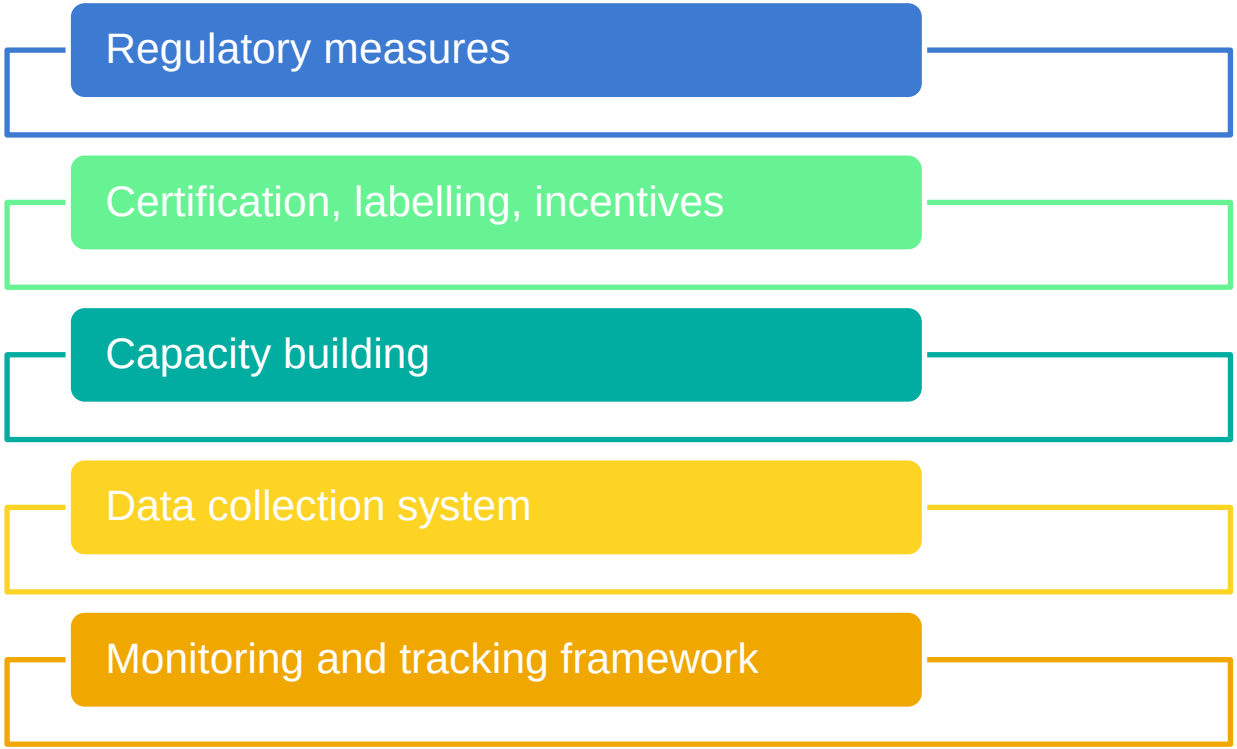
The Energy Efficiency Law also seeks to establish multipliers for electric and hybrid vehicles in the calculation of the sales average car efficiency.

CO_2 emission reductions have levelled off in recent years highlighting the importance of the energy efficiency law



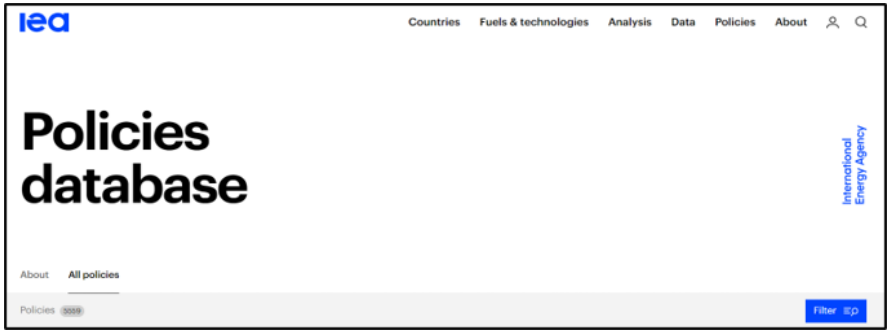
GFEI, 2021

Recommendations for policy package development

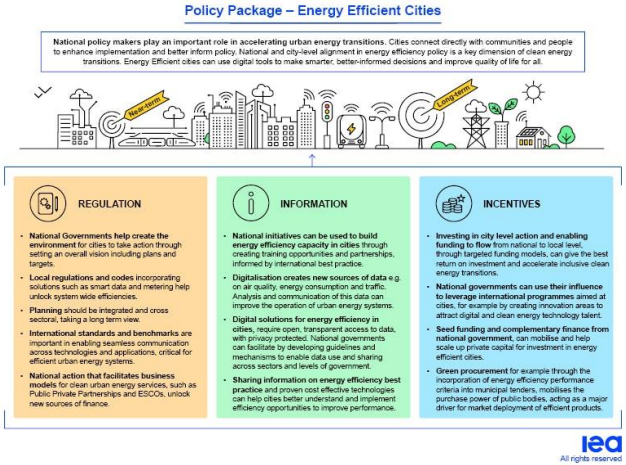


Resources

IEA, 2023a



IEA, 2023ab



IEA, 2023a

ENERGY COMMISSION
Securing Ghana's Energy Future Today

THE ROLE OF ELECTRIC MOBILITY IN AFRICA

OPPORTUNITIES AND CHALLENGES

Doris Edem Agbevivi

Project Coordinator (Drive Electric Initiative)

18th March, 2024

Current E-mobility Environment in Africa

2&3 Wheelers

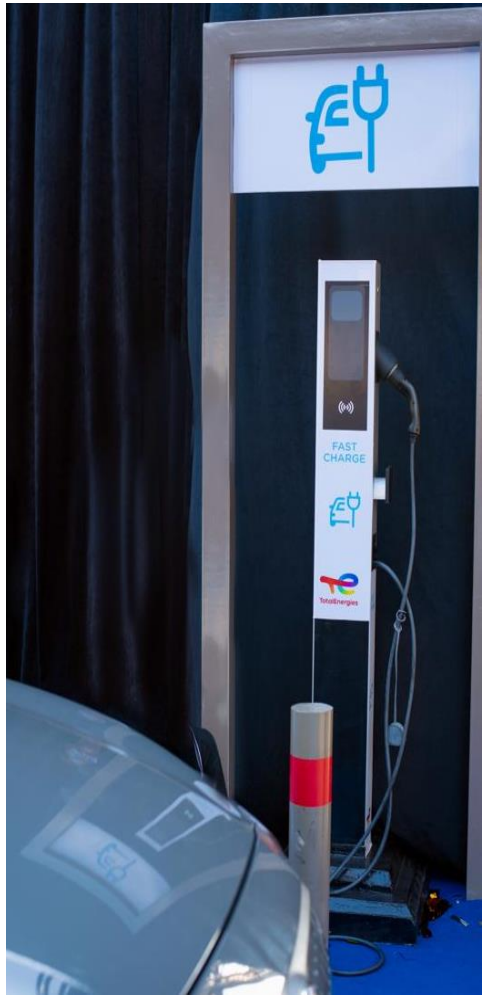
- Ghana
- Ethiopia
- Togo
- Kenya
- Rwanda
- Uganda
- Burundi
- Madagascar
- Sierra Leone
- Tanzania
- Nigeria

E-Bus
- Senegal
- South Africa
- Tanzania

Policy and standards
- Ghana
- South Africa
- Rwanda
- Kenya
- Uganda

Manufacturing and assembling Infrastructure
- Ghana
- South Africa
- Uganda
- Kenya

Current E-mobility Environment in Africa



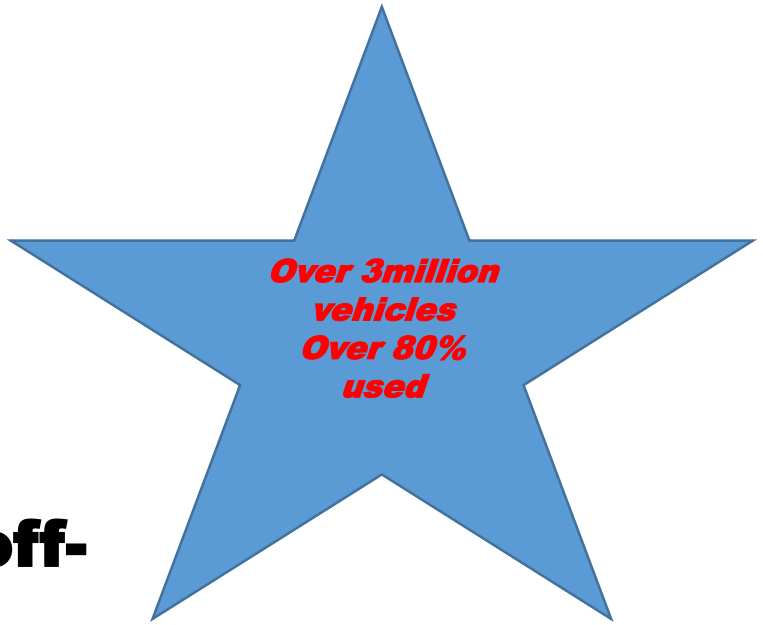
Opportunities and success stories

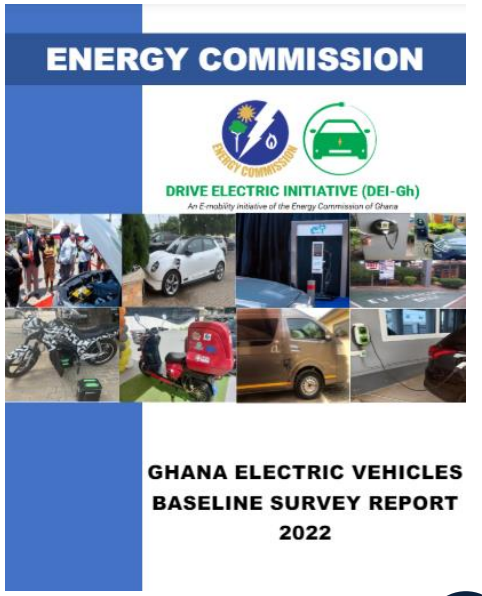
Opportunity	Example countries	Action
Electric shared mobility (buses and taxis fleet transition)	South Africa	E-buses, 3W taxis, ride-hailing taxi service
	Ghana	Transition to e-buses by 2050; solar powered taxi service
	Nairobi, Kenya	Ride hailing company operates 30 Nissan Leafs
Electric 2&3W (low-cost e-mobility option)	Uganda	Manufacturing/assembling e-motorcycles and battery packs
	Uganda, Rwanda	Retrofitting existing ICE motorcycles to electric
	South Africa	Startup company manufactures and operates e-3W taxis
	Ghana, Kenya	Manufacturing/Assembling e-2&3W
Manufacturing (several countries have raw material sources)	Morocco, Tunisia	Building EV/EV component manufacturing capacity
	South Africa	Li-ion battery precursor pilot plant
	Rwanda	Corporate income tax incentive

Source: International Council for Clean Transportation (ICCT)

CHALLENGES

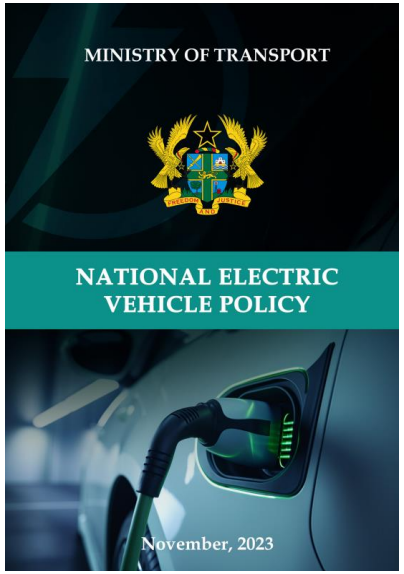
- Price of vehicles
- unavailability of incentives for EV buyers
- Importation of used ICE Vehicles
- Unreliable power supply to some parts and off-grid communities
- Technical expertise for local assembling, manufacturing for standard product quality
- Lack of public awareness
- limited charging infrastructure
- Concerns about battery life and replacement costs





OPPORTUNITIES & POLICY COLLABORATION

- Standards, certification and regulations for the EV market (battery, vehicles)
- Collaboration with international EV manufacturers
- Prioritise electric buses to ensure deep cuts
- Prioritise local assembly and manufacturing of EVs
- Clear Policy on used vehicles
- Trade Agreements
- International financing
- Mandates for ZEV purchase
- Battery Policy
- PPP in deployment of charging stations
- Incentivize the market to endure deep penetration
- Technical support and research opportunities on EVs
- Fleet conversion
- Investment



CHARGING STANDARDS

- The TC had a total of twelve (12) meetings to review and adopt (either identified or modified) forty-eight (48) standards which were mainly IEC standards and some ISO and IEEE standards.

- **CHARGING CABLES FOR ELECTRIC VEHICLES FOR RATED VOLTAGES UP TO AD INCLUDING 0,6/1 KV**

- **ELECTRIC VEHICLE CONDUCTIVE CHARGING SYSTEM:**
  - GS IEC 61851-1: 2023
  - GS IEC 61851-21-1: 2023
  - GS IEC 61851-21-2: 2023
  - GS IEC 61851-23: 2023
  - GS IEC 61851-24: 2023
  - GS IEC 61851-25: 2023

- **ELECTRIC VEHICLE WIRELESS POWER TRANSFER (WPT) SYSTEMS**
  - GS IEC 61980-1: 2023
  - GS IEC 61980-2: 2023
  - GS IEC 61980-3: 2023

- **INFORMATION EXCHANGE FOR ELECTRIC VEHICLE CHARGING ROAMING SERVICE**
  - GS IEC 63119-1: 2023
  - GS IEC 63119-2: 2023

THANK YOU

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Project Coordinator, DEI

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Africa Energy Efficiency Policy in Emerging Economies Training Week

Transport

Nairobi
18-21 March 2024

International Energy Agency

The Role of Electric Mobility
Day 1, 18 March

Dr Alison Pridmore, IEA

Training roadmap

Learning outcomes

- This session will focus on challenges and opportunities for electric mobility in Africa:
  - Identify the key drivers for electric mobility in Africa
  - Look to explore key opportunities for uptake
  - Identify challenges and barriers and examine ways in which they have been overcome
  - Garner your expertise and insights
  - Set the scene for the other sessions, where electric mobility will be discussed in depth

Doris Agbevivi
Challenges and opportunities for e-mobility

Remeredzai Joseph Kuhudzai
challenges and opportunities for e-mobility

Discussion

Group exercise

Group exercise

You and your team wish to develop have been put in charge of developing an electric mobility strategy for your country. A key part of the strategy will be to understand challenges and opportunities for implementation. The strategy can focus on any or multiple transport modes

Please take twenty minutes to consider:

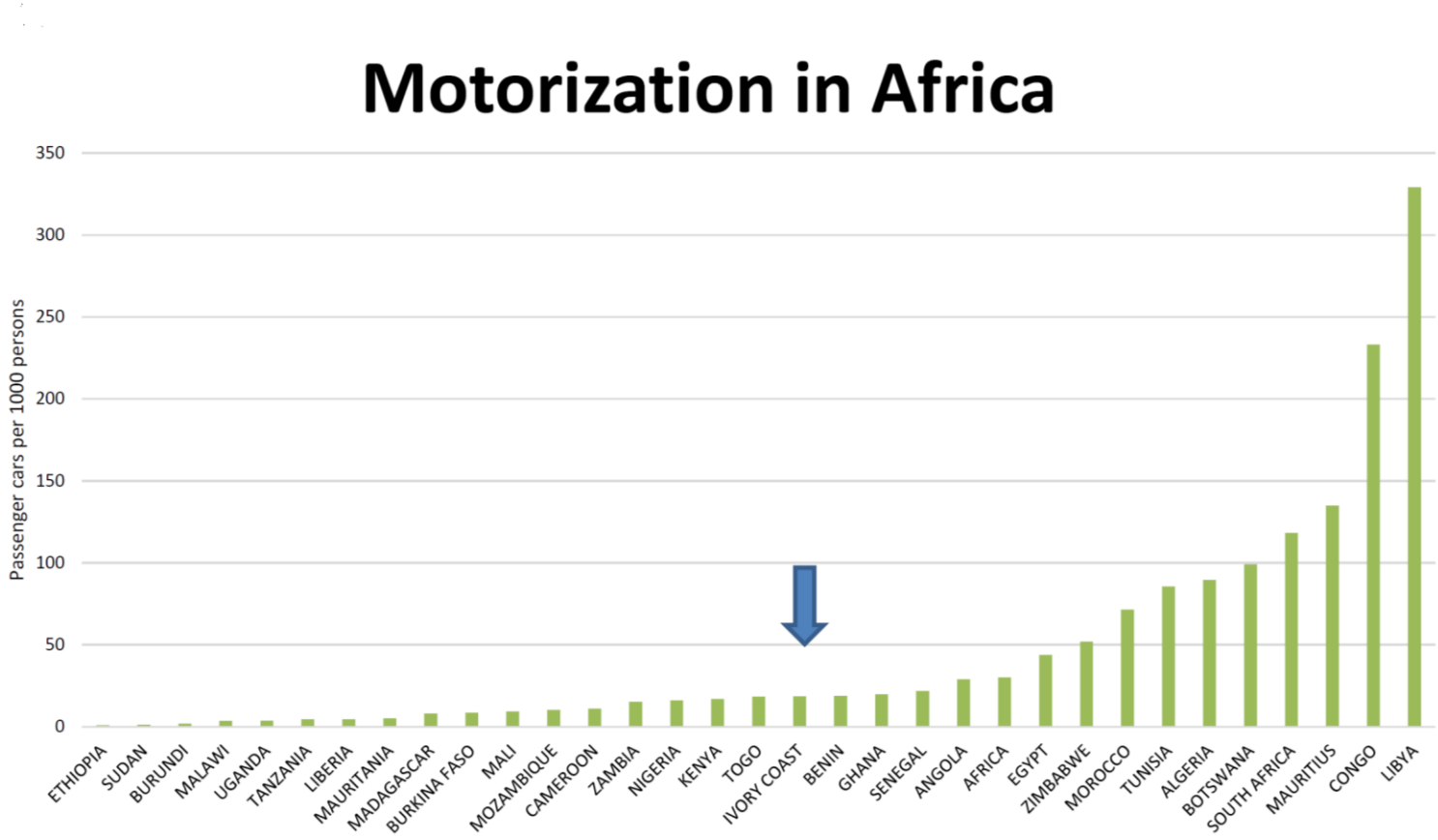
- which mode(s) you would focus on and why?
- what the key challenges are and how these could be addressed in the short and longer term?
- what insights could be provided into the role of regulation, information and incentives in maximising opportunities?
- how would the strategy fit with energy system more broadly?

We recognise that a mixture of countries will be working together and we are keen to hear from a range of options.

The Role of Electric Mobility-An African Perspective

ELECTRIC DRIVE AFRICA

The Big Opportunity- Africa Has Very Low levels of Motorisation



1	San Marino	1,263
2	Monaco	899
3	New Zealand	837
4	Iceland	866
5	United States	816

ELECTRIC DRIVE AFRICA

The Big Opportunity- Why Is This Important

Siemens Stiftung's *"Testing E-Mobility Business Models at WE Hub Victoria Limited in Kenya"* report aptly highlights the importance of mobility in the introduction section of the report by stating that

"Mobility is the basis for the overall development of a society: it gives the population access to jobs, markets, social facilities, and health care. In addition, mobility itself creates jobs and plays an important role in environmental protection as the mobility sector is one of the main contributors to CO2 emissions."

A dysfunctional public transport system therefore slows down or inhibits the development of a society. A dysfunctional transport system in an already struggling economy will only add to the issues and delay recovery.

ELECTRIC DRIVE AFRICA

Electric Mobility Presents Another Opportunity For Africa To Leapfrog

ELECTRIC DRIVE AFRICA

- In 2019, just under 100 million new vehicles were sold Worldwide. In Africa, just over 1 million were sold, just about 100th!
- Energy efficient electric vehicles which are cheaper to operate present an opportunity for people on the continent to Leapfrog straight into this new technology
- We have seen it before with the Telecommunications and Fintech industries.
- People bypassed the fixed line era and brick & mortar banking when superior technology and services became available before the traditional telecoms and banking services had reached them.

Itel

ELECTRIC DRIVE AFRICA

Empower Rural Communities –Djibouti Example

Liquidstar's Waypoint Swapping, and Charging Station in Djibouti

More Productive Use of Energy

ELECTRIC DRIVE AFRICA

Kofa's 2.3 kWh batteries being used for mobility and stationary storage applications in Ghana

ELECTRIC DRIVE AFRICA

Rural and Urban Last Mile Transport- Both Cargo and Passenger

Mobility For Africa's Cargo 3 Wheelers in Zimbabwe (Left) and Tri Passenger 3 Wheeler in Tanzania (Right)

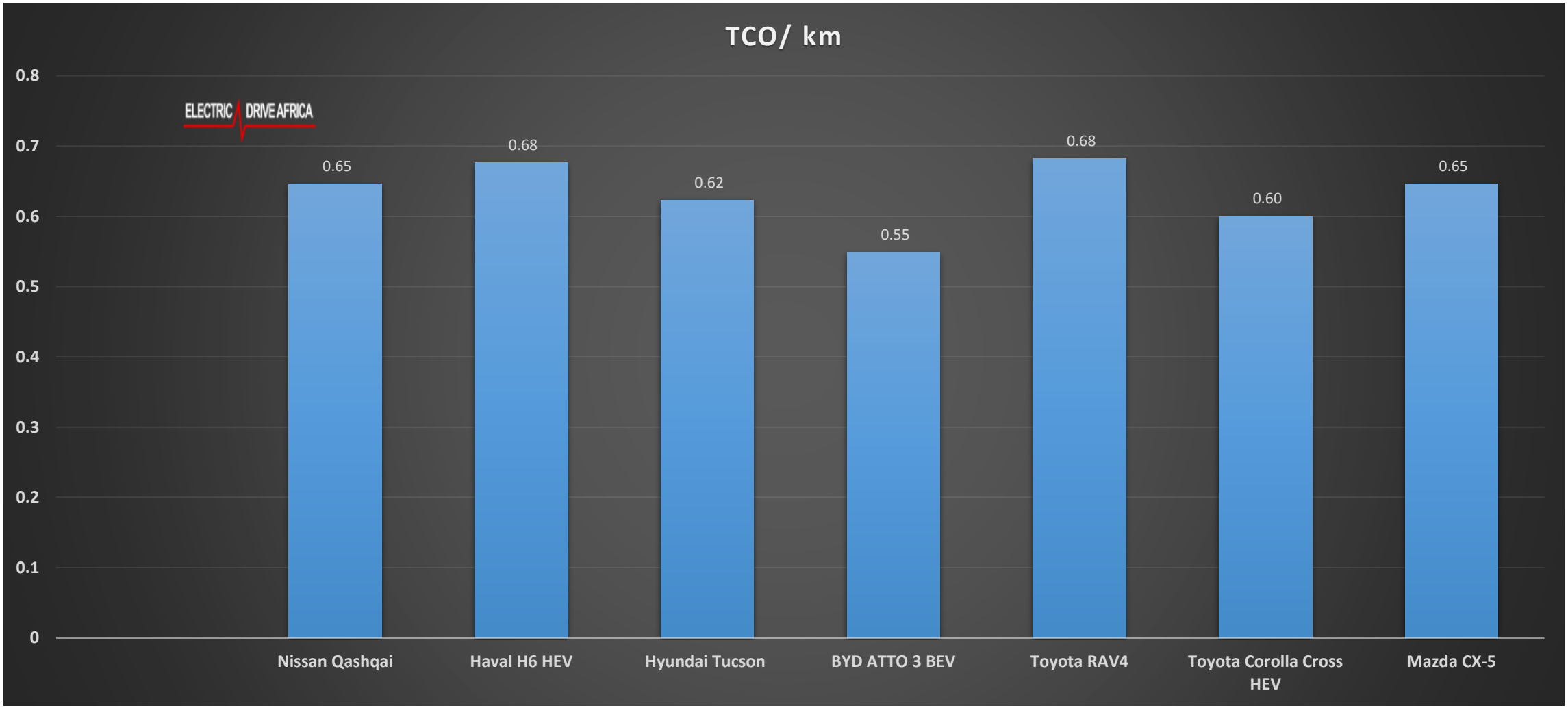
ELECTRIC DRIVE AFRICA

Passenger and Commercial EVs- Rwanda Example

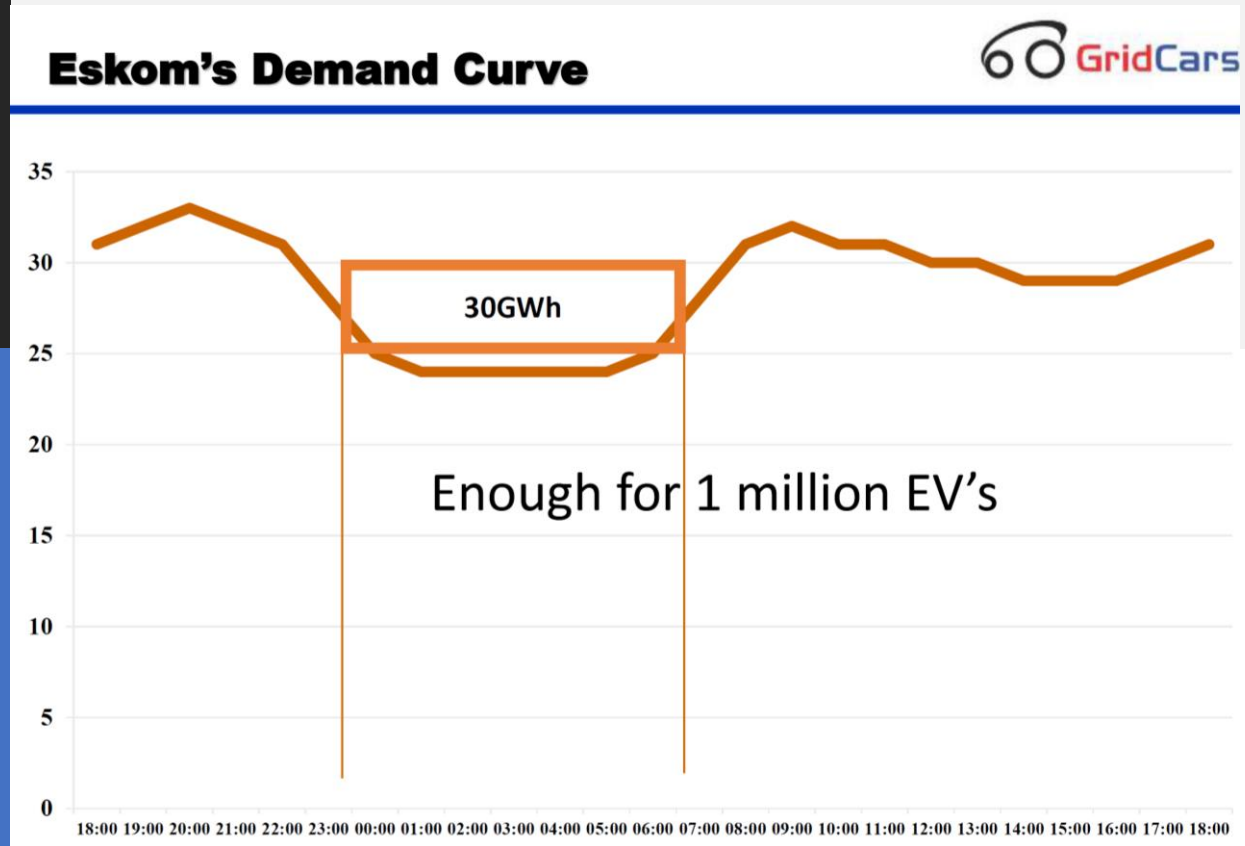
ELECTRIC DRIVE AFRICA

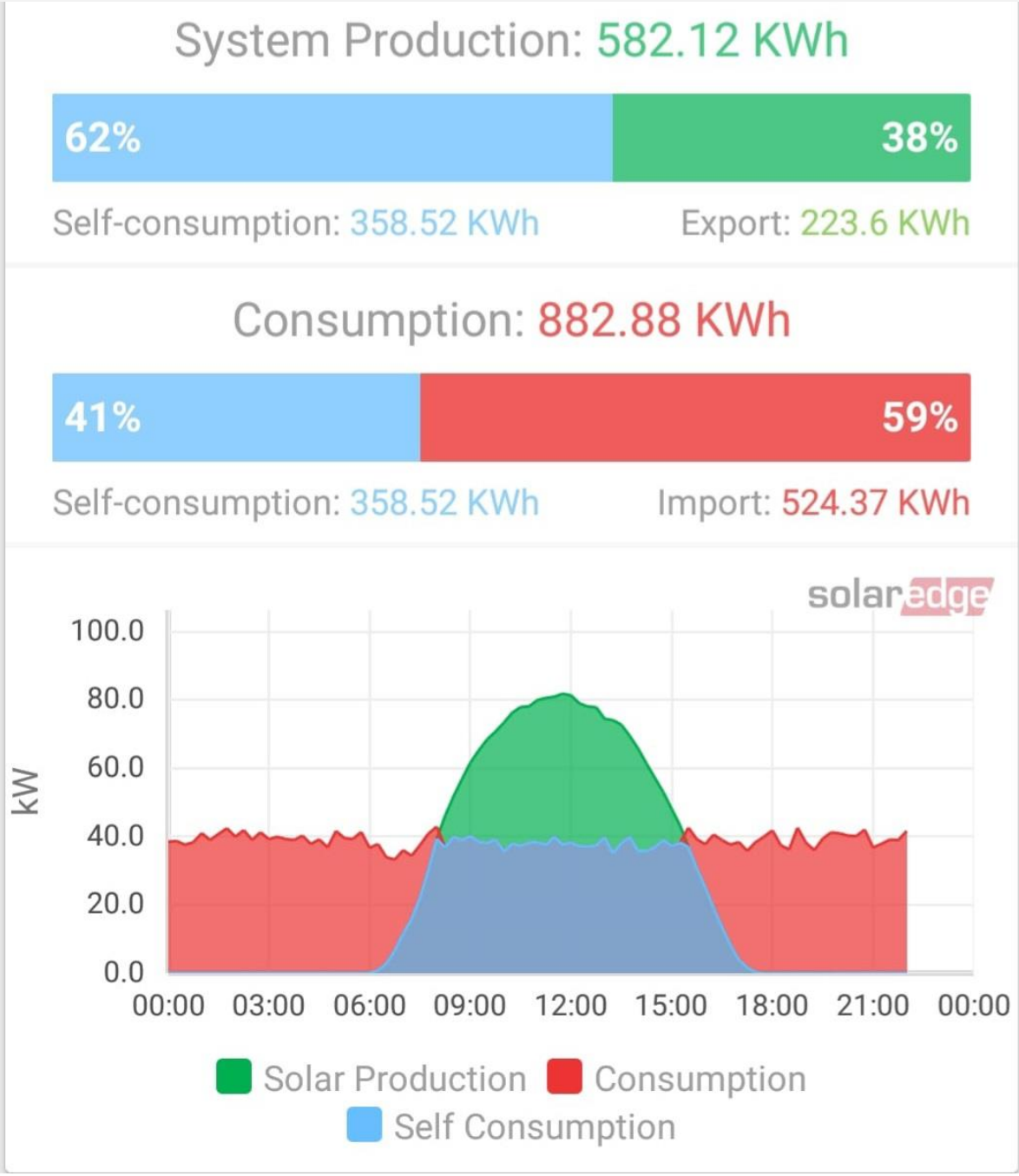
Passenger and Commercial EVs- Ethiopia Example

Small to Midsized SUV TCO- Zimbabwe Example

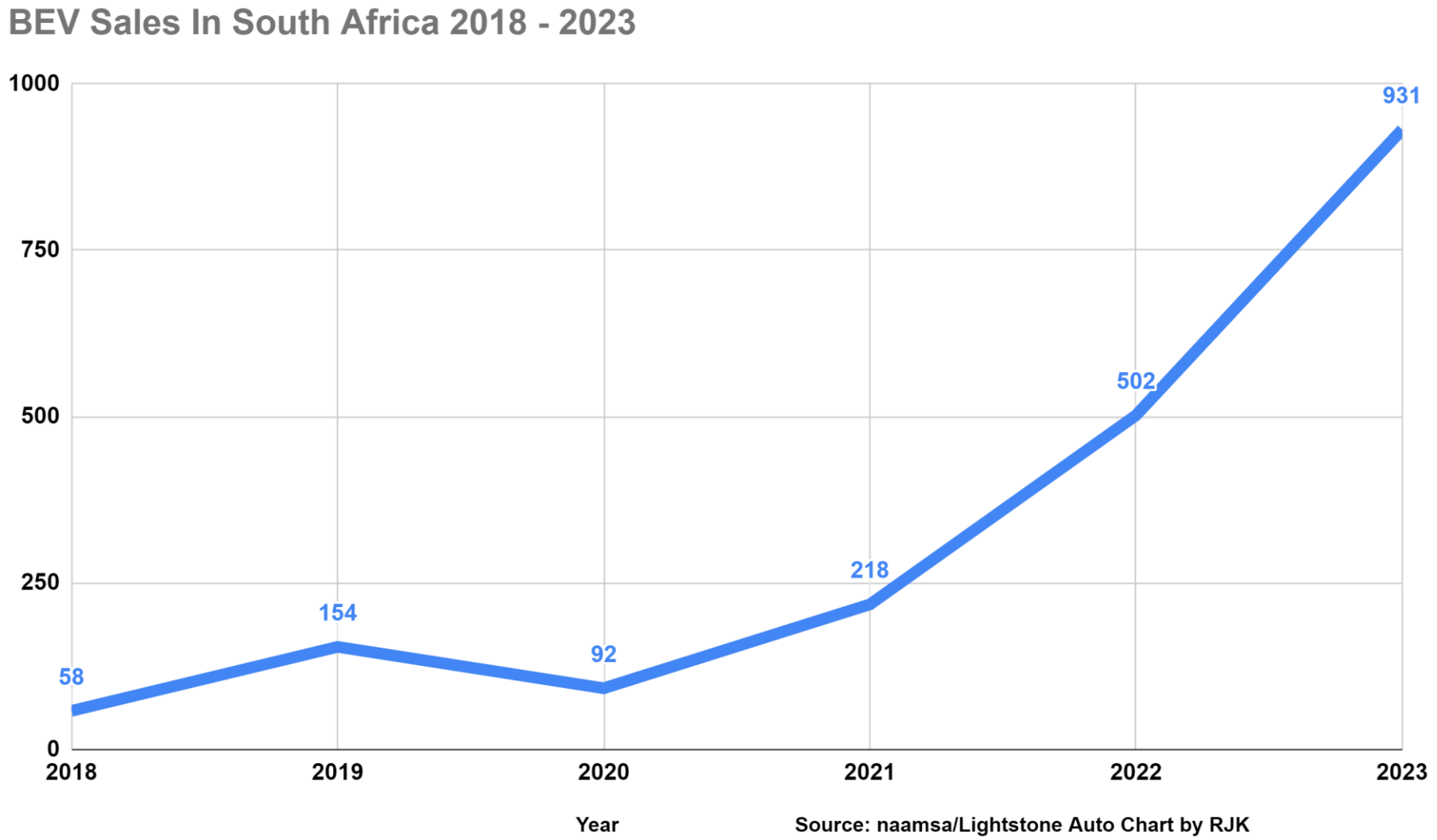


Loadshedding? No Problem - South Africa and Zimbabwe Examples





Loadshedding? No Problem - South Africa Example



Lessons from the Solar Industry-Financing

Decline in the cost of solar systems meant that it became viable to finance them

Several innovative financing models were implemented including:

- Private Power Power Purchase Agreements (PPA')
- Power Lease Agreements (PLA')
- Pay As You Go (PayGo) platforms
- Energy As A Service (EaaS)

Excluding South Africa and a few other places, vehicle financing is not available to the majority of citizens

As the costs of EVs fall new innovative financing models will be developed and will catalyse adoption

Similar to the solar industry, these new model will be driven by non traditional funding houses

The lower operating costs of EVs will make this more viable for the consumer compared with traditional internal combustion engine cars