

ELECTRONIC TOLLING

African Study

**FREE
ABSTRACT**

The reference
report on African ETC
and Road User Charging



Bridging the environmental gap

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PTOLEMUS Consulting Group

About PTOLEMUS Consulting Group



The first strategy consulting & research firm entirely focused on augmented mobility & automation

Strategy consulting services

Strategy
definition

Investment
assistance

Procurement
strategy

Innovation
management

Business
development

Project
management

Market research services

Off-the-shelf
reports

Subscription
services

Custom
market
research

Fields of expertise

Mobility services

Car pooling
Car sharing
MAAS

Micro-mobility
Ride hailing
Shared mobility

Smart parking
Tax refund

Vehicle services

bCall
eCall
FMS
SVT / SVR

Tracking
VRM
In-car Wi-Fi
Parking

Navigation
Speed cameras
Traffic information

New energies

BEV
EV charging
Fuel cards

Fuel cells
Hydrogen

PHEV
Vehicle-to-grid

Usage-based charging

Car As A Service
Electronic Toll
Collection

Mobility-as-a-
Service
RUC

UBI / PAYD
Vehicle rental
Vehicle leasing

Vehicle data & analytics

AI
CAN-bus
Crowd-sourcing
Data protection

Driving behaviour
OBD
Predictive
analytics

Remote
diagnostics
xFCD

Vehicle automation

ADAS
Autonomous cars

Autonomous
trucks

Robo-taxis
Shuttles

Enabling technologies

Positioning (GNSS
/ WiFi / cellular)
M2M /
connectivity

Smartphones
Sensors

Telematics
devices
V2X

We serve 320 clients across the mobility ecosystem

Analytics, maps & applications providers



Automotive manufacturers & suppliers



Telematics solution providers



Mobile telecom players



Fleet & fuel, ITS & regulators



Device & location suppliers



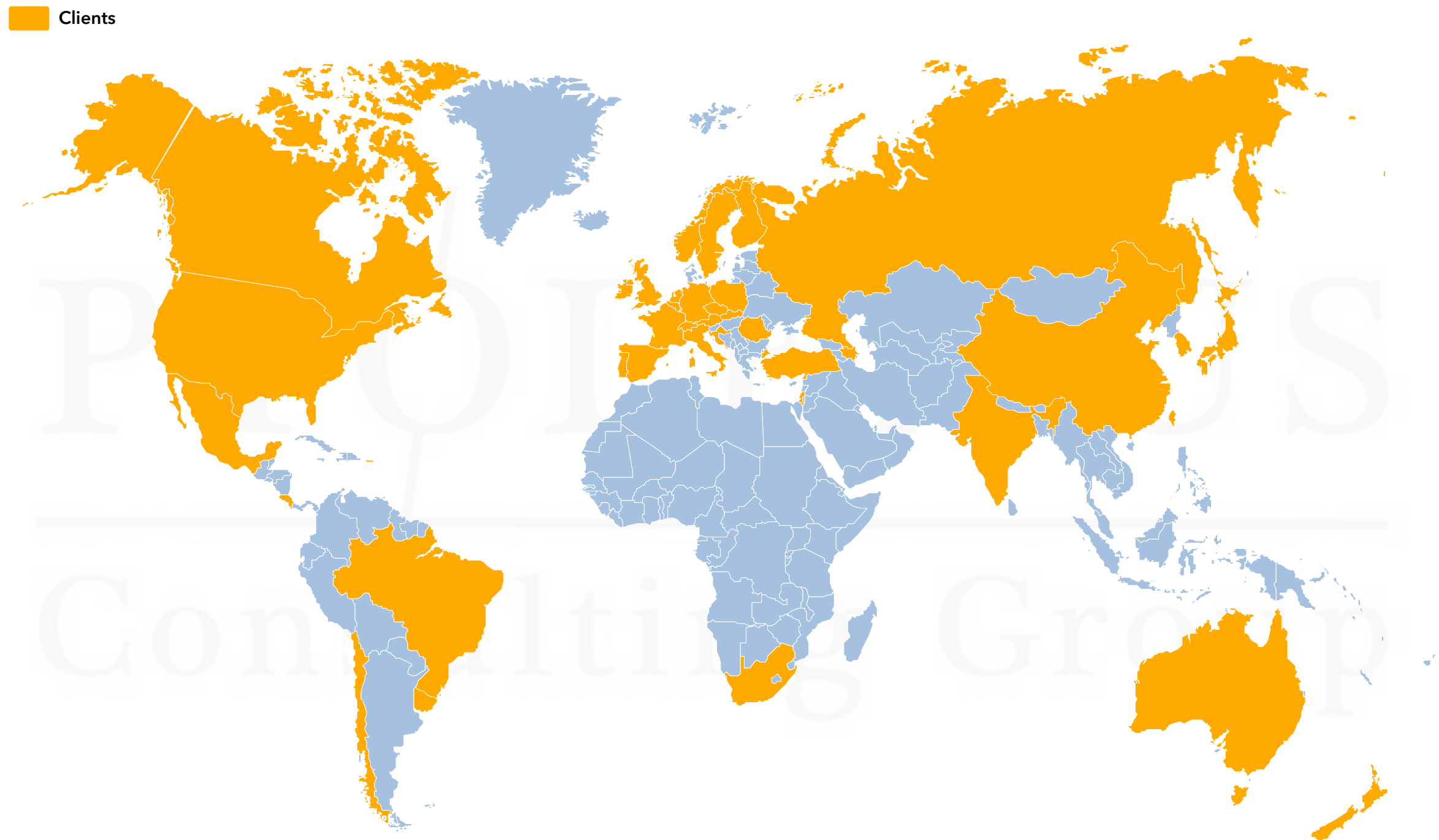
Insurers, aggregators & assistance providers



Banks & private equity investors



Our team of consultants, experts & analysts consisting of 10 nationalities helps our clients worldwide



35 assignments to help our clients define & implement their ETC and RUC strategies



For the Wallonian road operator, evaluated the feasibility of a shadow tolling scheme



Evaluated GNSS heavy vehicles tolling solutions and assessed building blocks and barriers

Major road operator



Defined & implemented its partnership strategy in the connected vehicle ecosystem

Future EETS provider



Identified market opportunities & defined strategic plan in connected mobility services

Road & infrastructure operator



Defined toll pricing strategy & marketing plan across Europe

Future EETS provider



Assisted the board of its technology unit in its strategy definition

Global motorway operator



Evaluated the technologies & business potential of the EU electronic tolling market



Defined its global data & analytics strategy to predict incidents

Major road operator



Helped a major EETS provider redefine its strategy and go-to-market plan

EETS provider



Conducted the strategic review of its mobility services business

Major road operator

We help all stakeholders define their e-tolling strategies...



Benchmarked the European market for ETC, fuel card & tax refund services

Major fuel card provider



Advised on the optimal structuring of the truck tolling scheme



Ministerie van Infrastructuur en Waterstaat



Defined its strategic positioning in the field of fleet connected vehicle services



Built company strategy, value proposition & go-to-market plan in fleet mobility services

Global electronic tolling supplier



Assisted in forging partnerships in EU connected vehicle ecosystem

Global ETC system provider



Understand the trends of the commercial road transport & payment markets

Group of energy companies



For a major European toll charger, forecast the tolling & ETC markets in 42 countries

Global ETC system provider



Detected opportunities from connected & autonomous vehicles for the space industry

Space agency



Defined its entry into the European ETC market

Automotive tier-1 supplier



Helped the fuel card business unit the impact of key mega-trends in fleet services on their strategy

European oil company

Our experience of due diligence, market sizing & business planning in ETC and fleet services



Led the technology due diligence of Arvento, the leading Turkish fleet management service provider

INVESTCORP



Conducted the due diligence of a major toll service provider

Private equity fund



For its fleet, evaluated the benefits of telematics and scheduling solutions

EUROMASTER



Assisted in the strategic & technology evaluation of an Irish fleet Telematics Service Provider

Motorway operator



Evaluated future changes in the European fleet services market

Fuel card services group



Helped evaluate European OBD market opportunities in fleet services

Major telematics device vendor



Defined our client's strategic plan in the field of connected fleet services

Major motorway operator



Defined the European pricing strategy for FMS, fuel card services, tolling & tax refund

Fleet services provider



Led commercial due diligence of ITmobile, a Belgian fleet TSP

FleetComplete



Led technology due diligence of Lytx, a US video-based fleet Telematics Service Provider

BainCapital



Define its 5-year US fleet services strategy & go-to-market plan

Global fuel card company



Helped define the insurance and fleet management specifications of its eCall on-board unit

Global automotive OEM

PTOLEMUS can help your organisation define and achieve its strategy in fast moving times

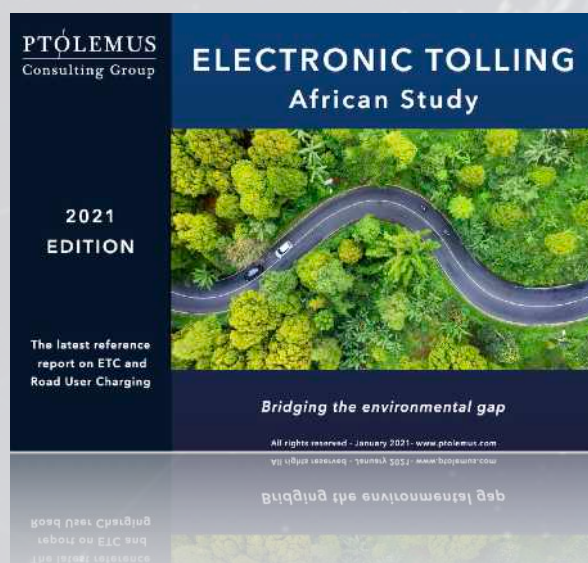
- 
- **Strategy definition**
 - Road policy strategy assistance
 - Market entry assistance
 - Data strategy and analysis
 - Mobile tolling strategy development
 - Multimodal mobility design and planning
 - Future vision of vehicle payments
 - Strategy orientation workshops
 - **Innovation strategy**
 - Vertical market assessments
 - Product definition
 - Consent management
 - Data analytics strategy
 - **Innovation delivery**
 - Proof of concept design & launch
 - Architecture definition
 - Project management
 - **Investment assistance**
 - M&A strategy
 - Commercial due diligence
 - Technology due diligence
 - Feasibility studies
 - Vehicle data market sizing
 - Business case development
 - Cost benefit analyses
 - Post-merger integration
 - **Procurement**
 - Definition of road charging schemes
 - Assistance to tenders
 - Selection and sourcing of ETC technology
 - **Business development**
 - Partnership strategy definition
 - Assistance to tender response
 - **Project management**
 - Assistance in management of road pricing projects
 - Congestion charge project management

PTÓLEMUS Consulting Group

About the African ETC report



The most comprehensive report on electronic tolling and road user charging



More than just market research.

A strategic analysis on the future of road pricing and environmental standards

- An **update to our 2018 Electronic Toll Collection Global Study** providing an all-encompassing overview and outlook on the electronic tolling market in Africa
- A **250-page analysis of the African electronic tolling landscape** based on:
 - 9 years of constant market surveillance
 - 6 months of desk research by a team of 7 consultants
 - 35 strategy consulting assignments in the ETC domain
- An **in-depth review of the 4 countries that operate tolling in Africa** with traffic volumes, technology, model, size and revenues projections
- A **comparative assessment of all tolling technologies**:
 - Deployment models and impacting trends for ANPR, DSRC, Infrared, GNSS and RFID
 - Assessment of emerging technologies including fleet telematics devices, smartphones, and connected car payments
 - Forecast of the technology mix
- An **in-depth assessment of Africa including**:
 - Introduction to the market including legislation and major infrastructure campaigns
 - Forces and models shaping interoperability
 - Review of current and future projects
 - Value chain and presentation of major local players
 - Technology roadmap
 - Country profiles for the major tolling domains
- **2020-2030 bottom-up market forecast**
 - African scope: **4 countries investigated in detail**
 - **Projections** of the toll and electronic toll market in Africa: toll revenues, subscription volumes, share of ETC, key influencing factors
 - An Excel file with **subscription volumes by technology** and vehicle type, devices sold, total revenues collected and ETC-only revenues collected

The report was written by an international team of 7 experts



Frederic Bruneteau

Managing Director, Brussels

The **founder** of PTOLEMUS, Frederic has accumulated **25 years of experience of the mobility and transport domains** and 15 years of strategic and financial advisory.

He has become **one of the world's foremost experts of connected car services & automation** and is interviewed on the subject by publications such as the *Financial Times*, *Forbes*, the *Wall Street Journal* and *The Economist*. He has also spoken at over 40 conferences on the subject.

Within PTOLEMUS, Frederic has led 150 consulting projects and helped many world leaders define their strategy and implement it including:

- **Road operators and ETC solution providers** including Abertis, A-to-Be, Axxès, Brisa, Ferrovial, Egis, Kapsch, Sofico, Transurban, T-Systems / Satellic, Q-Free, etc.
- **Fleet services providers** including AGC, Arvento, Astrata, Bridgestone, BP, Danlaw, DKV Euroservice, Easytrip, ENI, Fleet Complete, Nationwide Insurance, OMV, Routex, TomTom and WEX.
- **Automotive OEMs and their tier-1 suppliers:** AAA Data, AGC Automotive,

Bridgestone, Allianz Partners, AXA Partners, Cihon, CNH Industrial, Coyote System, Europ Assistance, HERE Technologies, Michelin, Scania, Telit, TomTom, Toyota and wejo.

- **Some of the world's most prestigious telematics / analytics suppliers:** Alfa Evolution (UnipolSai), Arvento Mobile Systems, Danlaw, DriveFactor, Eliocity, Fleet Complete, LexisNexis / Wunelli, Mobile Devices, Movelo, Octo Telematics, Orion, Pioneer, Qualcomm, Sentiance and Vodafone Automotive.
- **Financial investors** including Advent International, Amadeus Capital Partners, Amundi, Apax Partners, Atlantis Vest, Bain Capital, Baupost Group, Capvis, Cinven, CIP Capital, Crédit Agricole, CVC Capital Partners, Disruptive Capital Partners, Hellman & Friedman, Hutton Collins, Intek Group, Investcorp, Leonardo & Co, Montezemolo & Partners, Pamplona, Renova Group, Rothschild Capital Partners, Silver Lake Partners, Tantalum and Time for Growth.

Frederic, who contributed to the 2 previous versions of this study, performed a complete review of this report.



Andrew Jackson

Research Director, London

With a career in market research spanning 12 years, **Andrew has over 8 years of experience working in the automotive and industrial sectors for companies** such as Datamonitor, EurotaxGlass and JATO Dynamics;

He has delivered **advisory services, custom projects, data and insights for some of the biggest names in the automotive OEM and OES sectors**, including: BCA, Continental, CNH Industrial, Delphi, Johnson Controls, Hyundai, LeasePlan, Mannheim, Mercedes Benz, Mobis, Philips Automotive Lighting, PSA, SEAT, Tenneco and Volkswagen.

Over the years, he has been sought to share his opinion via a variety of publications such as the *Financial Times*, the *Wall Street Journal* and *Automotive Industries*, *AMonline*, *Fleetworld* and *Fleet News* as well as a variety of national newspapers. He is also interviewed on global automotive events by Bloomberg, CNBC and Reuters.

A Certified Member of the Market Research Society (CMRS) Andrew directed the research and entirely reviewed this report.



Marissa Burkett

Consultant, Paris

Marissa has more than **5 years of experience** in management consulting for organisations such as Advent International, AGC Automotive, Apax Partners, Axxès, CIP Capital, Eagle Hill Consulting, GSGroup, Nationwide Insurance, the Netherlands' Department of Transport, OMV, Q-Free, Transurban, the United Nations, USAid, the US Federal Acquisition Service.

Marissa started at PTOLEMUS as a contributor to the previous ETC Global Study, with a focus on North America.

Since then, she has become the PTOLEMUS in-house ETC expert and led the research team for this report.

Marissa led the research, analysis and writing of this report.

The report was written by an international team of 7 experts



Nina Neubauer
Business Analyst, Brussels

An urban planning and transportation engineering graduate, Nina has developed expertise in **Autonomous Vehicles (AVs), Electronic Toll Collection, Smart Cities and connected cars** by assisting companies such as AXA Partners, Bain Capital, Advent International, Baumarc Project, kasko2go and Vodasun Energie.

She has completed several research projects related to **traffic management** and **engineering** for the AVL Motor Test Center AB in Gothenburg and within the TU Munich.

For a global roadside assistance operator, she helped defining a **connected car service**

strategy and built a **market forecast of 7 connected car services markets** in Europe.

For a private equity firm Nina conducted market research on the **European electronic tolling market** regarding global business and regulatory trends.

She has built our **2020-2030 global automotive market forecasts** and contributed to our **Connected Vehicle Payments Global Study**.

Nina built the market forecast model for this report.



Jacopo Scudellari
Research Analyst, Brussels

A graduate of urban and mobility planning from Politecnico di Torino, Jacopo has developed expertise in **Electronic Tolling Collection (ETC), congestion charging, and electric vehicles (EVs)** by assisting companies such as Advent International and Hitachi Automotive Systems.

He has gained knowledge of state of the art of the **European and Asia Pacific ETC market**, the main tolling systems currently adopted and the technologies in use while updating the third edition of the ETC Global Study.

He has also **appraised the US electric vehicle market** for a company engaged in the development, manufacture, sales and services of automotive components.

Before joining PTOLEMUS, Jacopo worked for the Politecnico di Torino, Turin, carrying out **research work about the spatial impacts of the diffusion of Autonomous Vehicles (AVs)**.

Jacopo worked on the European and Asia Pacific sections.



Victor Lerin
Business Analyst, Paris

A French-Japanese citizen, Victor obtained a MBA in Business Intelligence in 2018 specialising in open source intelligence, mapping business ecosystems and consultancy work. His final project consisted in producing an in depth study and analysis for a consortium of scientific research institutes (**CVT Allenvi**) to make recommendations on strategic positioning in the field of resilience and smart cities.

Furthermore, he also gained business knowledge by working as the Anti Illicit Trade Advocacy Officer at the **European Chamber of Commerce in Myanmar**

(**EuroCham**). Victor elaborated the strategy for the second edition of the Anti Illicit Trade Forum in held in the capital city of Nay Pyi Daw. His mission was to strengthen dialogue and cooperation between the Myanmar Government and European companies operating locally such as **Unilever, Heineken, Carlsberg, Pernod Ricard, British American Tobacco, Luther Law Firm and Metro**.

Victor worked on the African and Asia Pacific sections.



Solène Pinel
Business Analyst, Brussels

Solene completed her Grande École programme at **EDHEC Business School**. Her **MSc. in Strategy, Consulting and Digital Information** enabled her to acquire essential skills to succeed in the domain of strategy consulting in connected mobility markets.

Prior to joining PTOLEMUS, Solene was part of the SMB (Small & Medium Businesses) team within **Microsoft** France, where she provided guidance and made recommendations on the **strategic actions** required to drive customer acquisition. She also drafted a **detailed assessment of competitive the environment landscape**.

She then moved to **Singapore**, where she worked for a start-up specialised in 3D printing services. She was responsible for **delivering and executing the company's digital strategy**, with a specific focus on the **website revamping** and **marketing campaigns**.

Within PTOLEMUS, Solene has participated in the launch of the **Connected Vehicle Payments Global Study**.

She led our research into the North American market.

The study answers key strategic questions

What technology and model will be used in my geographical market in 2030?

Where are the main opportunities to invest in surface infrastructure?

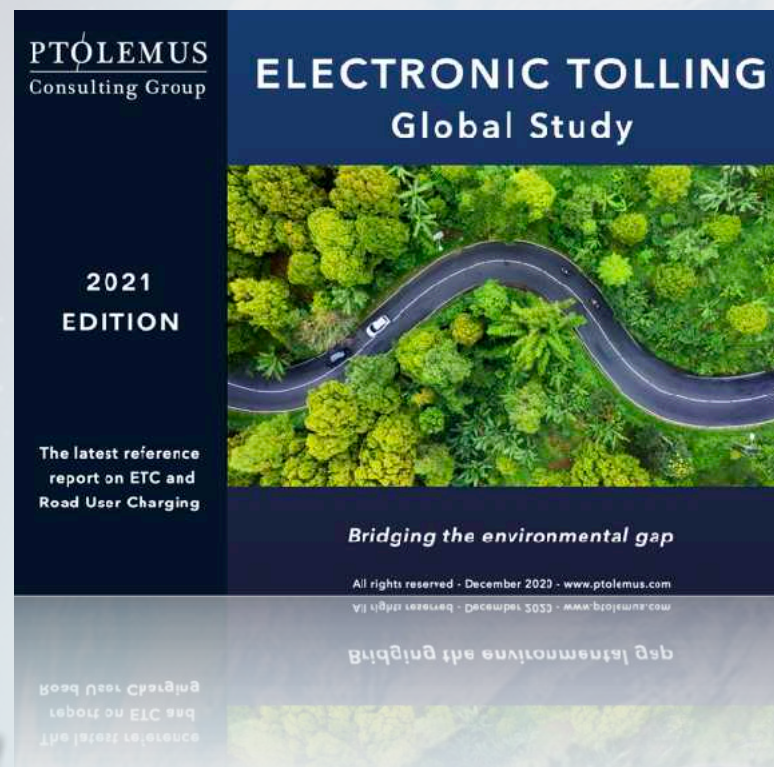
What will be the split between manual and electronic toll payments in 2030?

Is the US ready to implement road usage charging (RUC)?

Will new technologies help drivers accept tolling?

Will multi-lane free flow tolling become the new normal?

Will toll devices disappear?



What is the impact of interoperability programmes on toll chargers and service providers?

How does data help providers expand their service offerings?

Which OEMs are implementing connected toll payment?

How are toll service providers addressing the growth of smartphone use?

How can toll service providers protect their market share against new entrants?

1. Fundamentals of electronic tolling and road user charging

- History, definitions, applications and use cases
- Global overview of technologies and schemes

2. Trends impacting the ETC ecosystem

A. Major political, technological, and market drivers

- Political drivers overview and impact
- Technological drivers overview and impact
- Market drivers overview and impact
- Driver assessment by region

B. The impact of COVID-19

- Global COVID-19 response map
- Global traffic volumes and recovery
- Impact on ETC penetration

C. Tolling as a service within mobility payments

- Expansion of toll service offering
- Entrance of mobility service providers and navigation giants into tolling
- Services and payment use cases in the connected car

D. The alignment of road user charging and environmental policy

- The United States and road user charging
- Tolling types and their effects on emissions
- Europe and the green movement
- Congestion charges and Low Emission Zones (LEZ)

3. Traditional and emerging devices and technologies

E. Global technological overview

F. Technology in detail

- RFID
- DSRC
- GNSS
- ANPR
- Infrared
- Mobile
- Fleet telematics
- Embedded

4. The ETC value chain and power players

A. The ETC value chain explained

- Value chain integrators
- Device manufacturers
- Active toll chargers
- Service operators
- Systems specialists
- Active and passive smartphone platforms

B. ETC power players

- The traditional players
 - Road operators
 - Toll service providers
 - Fuel card issuers
 - Energy companies
 - Fleet management service providers
- The new entrants
 - Fleet telematics providers
 - OEMs
 - Navigation giants
 - Payment providers
 - Mobility service providers
- How new entrants will shake up the market

5. Expanding the value with dynamic data

- Data collection and its usage

6. Country-specific analysis

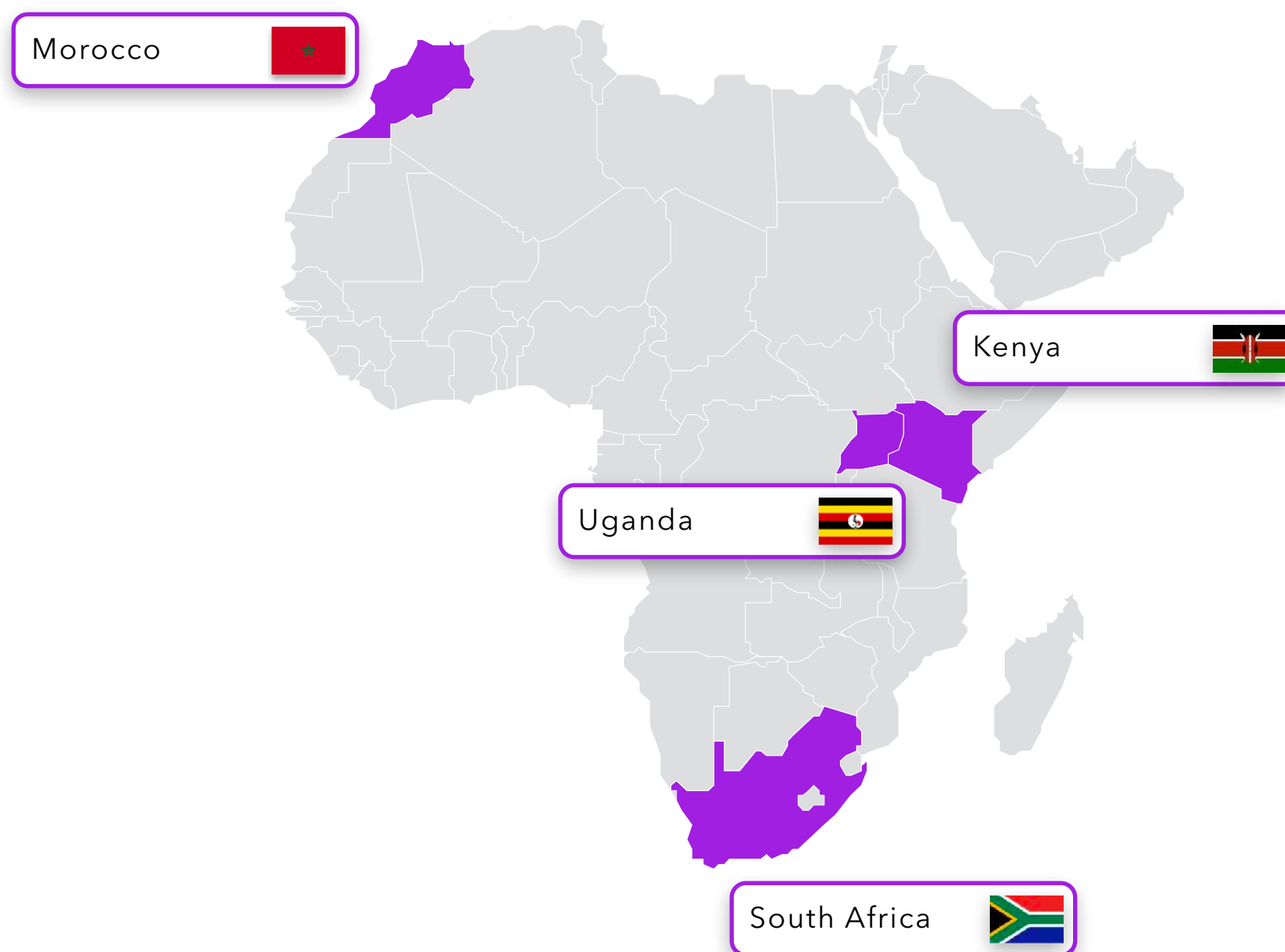
C. Africa

- Regional overview
 - Introduction to the region
 - Legislation
 - Potential areas for investment
 - Regional value chain
 - Major local players
 - Technology roadmap
 - Efforts at interoperability
 - Market forecast
- Country profiles
 - Kenya
 - Morocco
 - South Africa
 - Uganda

7. Global outlook: the future of ETC and RUC

Across the report, we deliver qualitative and quantitative insights into 4 key African countries...

Report coverage



...and contains profiles of 4 key African countries

North America	Belgium 	Ireland 	Sweden 	Malaysia 
Canada 	Bosnia & Herzegovina 	Italy 	Switzerland 	New Zealand 
USA 	Bulgaria 	Latvia 	The Netherland 	Philippines 
Latin America	Croatia 	Lithuania 	Turkey 	Singapore 
Argentina 	Czechia 	Norway 	UK 	South Korea 
Brasil 	Denmark 	Poland 	Ukraine 	Taiwan 
Chile 	Estonia 	Portugal 	Asia-Pacific	Thailand 
Colombia 	Finland 	Russia 	Australia 	Africa
Mexico 	France 	Serbia 	China 	Kenya 
Europe	Germany 	Slovakia 	India 	Morocco 
Austria 	Greece 	Slovenia 	Indonesia 	South Africa 
Belarus 	Hungary 	Spain 	Japan 	Uganda 

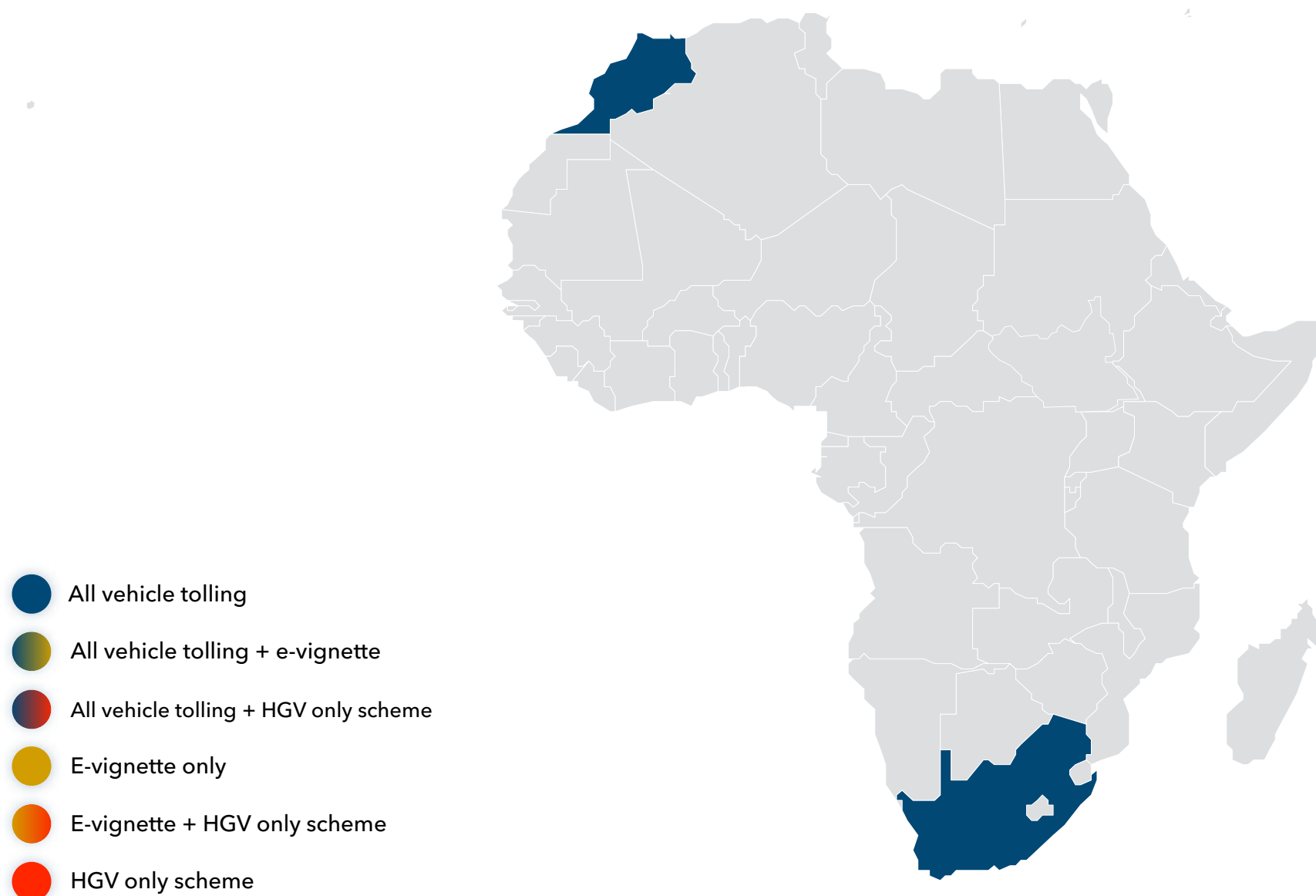
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Trends impacting the ETC ecosystem



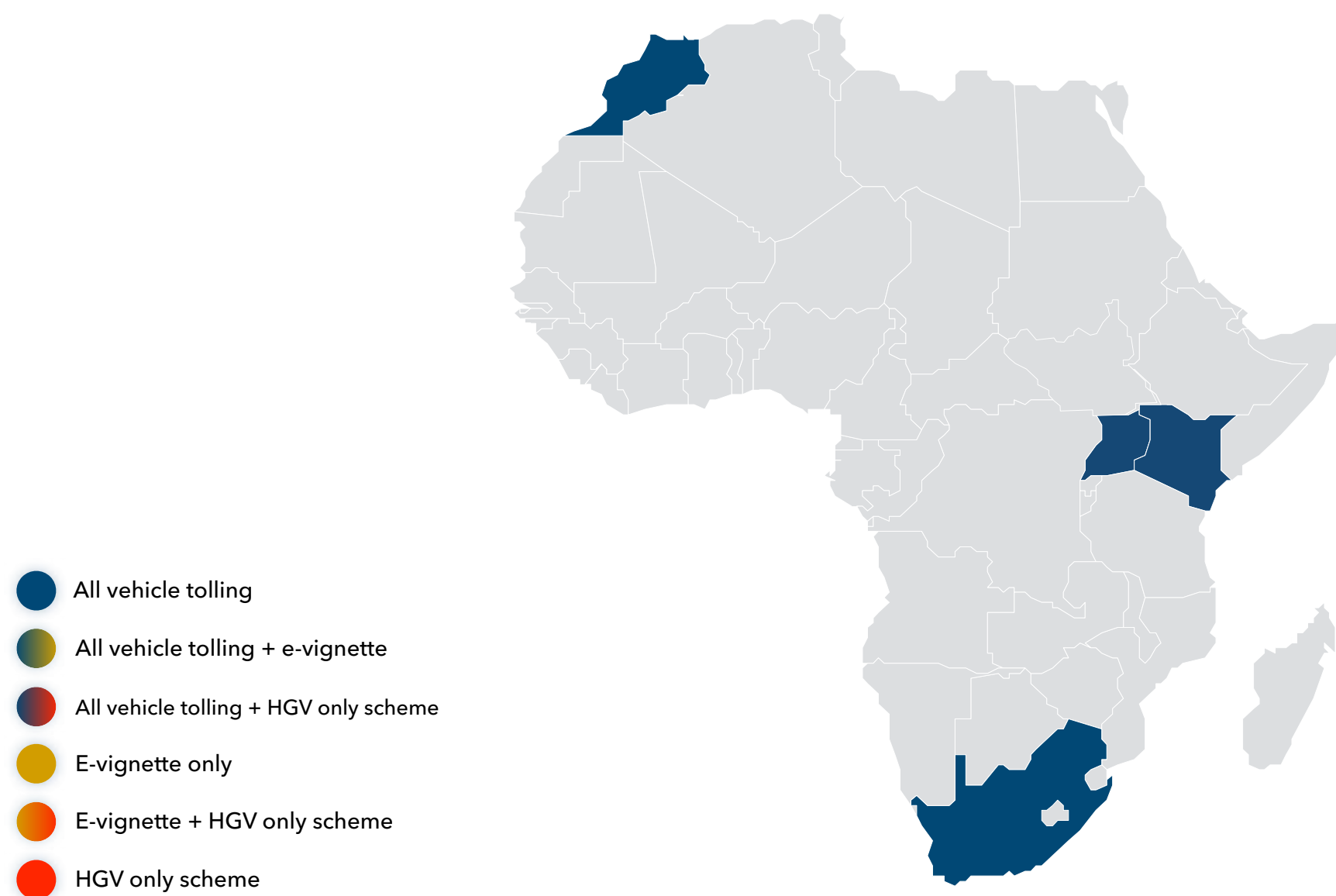
Electronic road tolls currently exist in 2 of the countries covered

Electronic tolling schemes in place, 2020



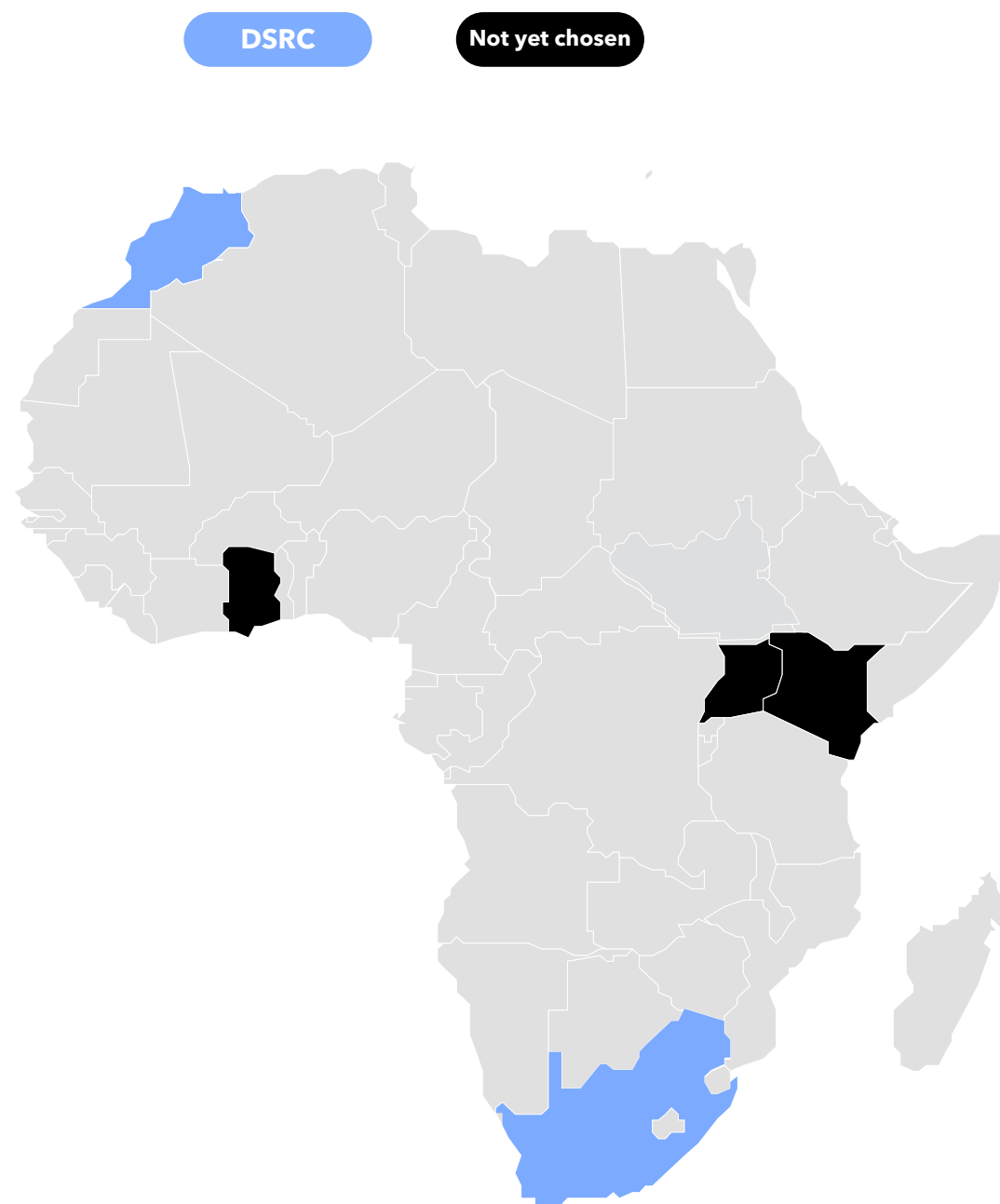
We expect electronic tolling schemes to be present in 2 additional countries in the next 5 years

Electronic tolling schemes in place, 2025



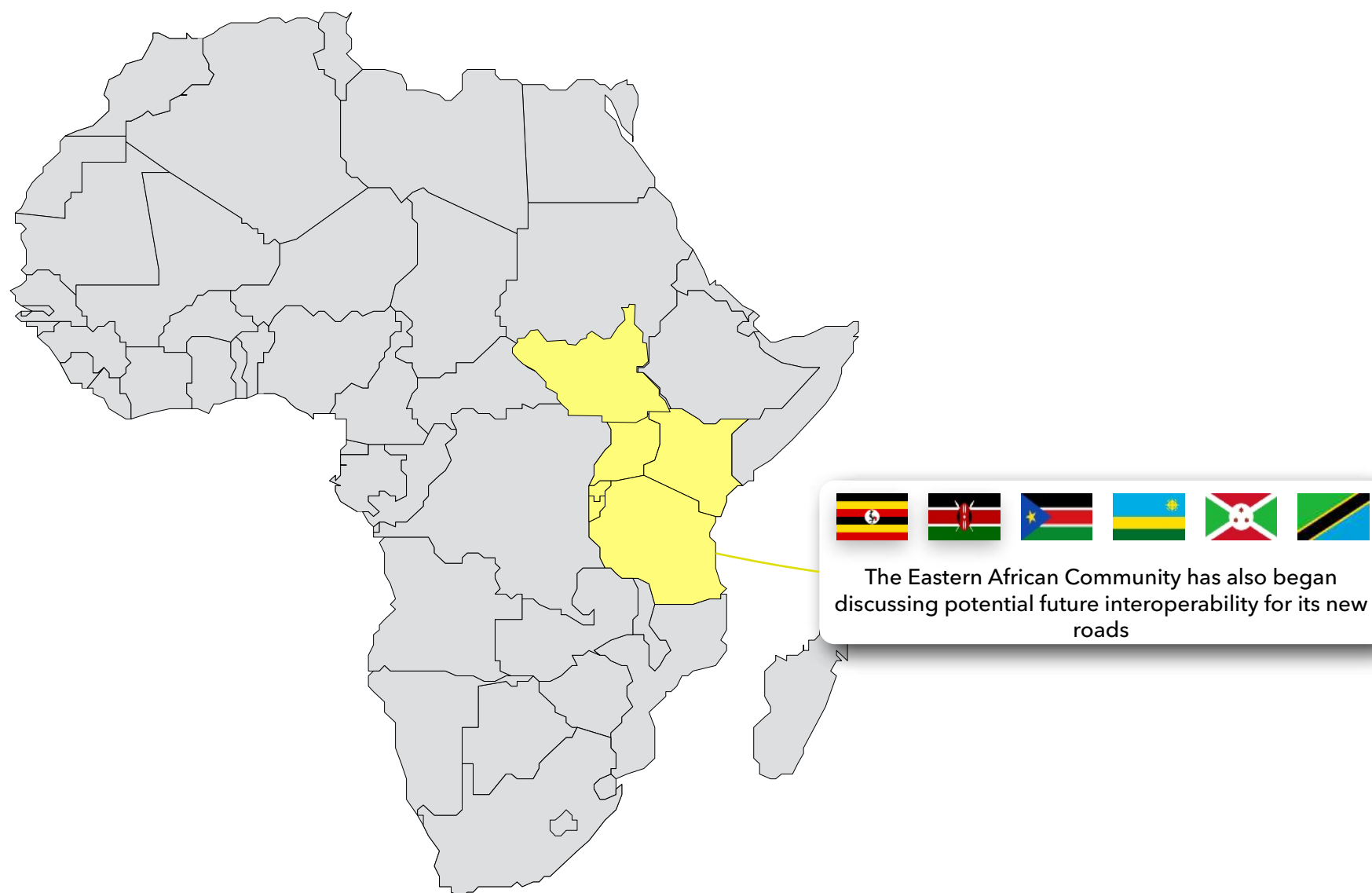
Currently DSRC is the prevalent tolling technology with some countries choosing the technology to use

Global technology landscape, 2020



Some countries have launched interoperability initiatives

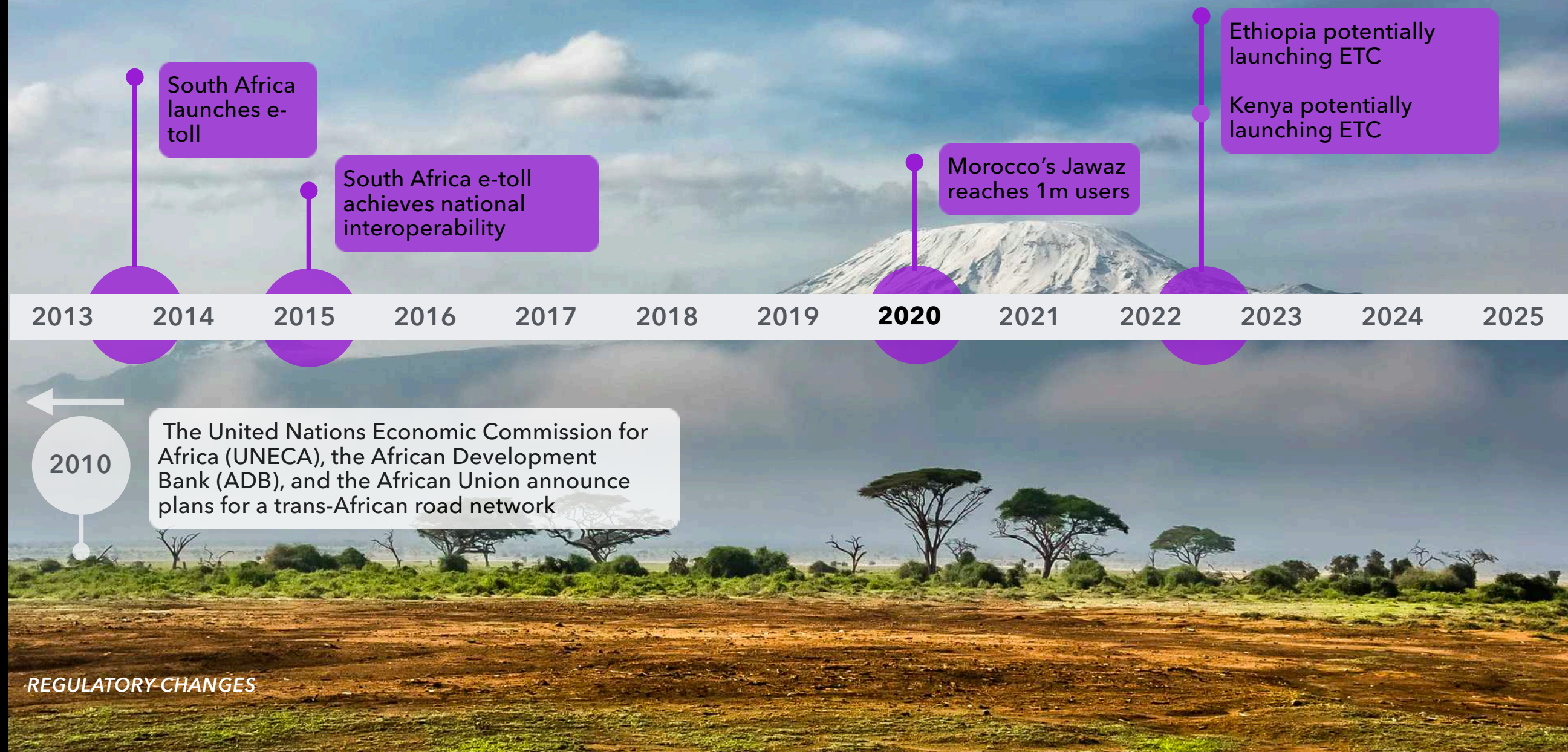
Interoperability initiatives in Africa











Africa has limited electronic tolling, but several countries are considering future schemes

Summary of key changes in Africa

NEW IMPLEMENTATIONS



Traditional solutions will face stiff competition from new technologies, as demand for value-added services grows

Technology	DSRC	GNSS/Hybrid	ANPR/ALPR	RFID	Infrared	Fleet telematics	Smartphone	Embedded
Devices								
Implementation	<ul style="list-style-type: none"> E-Toll (China) Libert-T (France) Telepass (Italy) ETC 2.0 (Japan) 	<ul style="list-style-type: none"> Toll Collect (Germany) ERP (Singapore 2020) Platon (Russia) Viapass (Belgium) 	<ul style="list-style-type: none"> HGV charge (New Zealand) London congestion charge Colorado turnpike (USA) 	<ul style="list-style-type: none"> FASTag (India) E-Toll (Vietnam) E-ZPass (USA) HGS (Turkey) 	<ul style="list-style-type: none"> E-Toll (Indonesia) Westerschelde Tunnel (Netherlands) 	<ul style="list-style-type: none"> Hu-Go (Hungary) Bulgaria 	<ul style="list-style-type: none"> AmberOne (Poland) Autuma (Spain) 	<ul style="list-style-type: none"> Audi's Integrated Toll Module in the US
Device cost	€5 - 15	€70 - 150	n.a.	€0.20 - 20	€10 - 20	€15-50	€0	n.a.
Opportunity for VAS	Medium	High	Low	Medium	Low/Medium	High	High	High
Read rate	>99%	Device dependent	90-98%	>99%	>99%	>99%	90-98%	n.a.

TRADITIONAL TECHNOLOGIES

EMERGING TECHNOLOGIES

New forces are impacting the growth and penetration of ETC

POLITICAL TRENDS

- P1** Infrastructure funding crises
- P2** Environmental movement
- P3** Use of road charging as congestion management tool
- P4** Introduction of free flow tolling
- P5** Growing acceptance of public-private funding models
- P6** Cross-border transport movement
- P7** Nationalisation trends
- P8** Merger between infrastructure and environmental goals

TECHNOLOGICAL TRENDS

- T1** Advancements in mobile technologies
- T2** Growth of cashless payments
- T3** Growth of connected payments
- T4** Shift towards centralised map matching
- T5** Introduction of V2X
- T6** Introduction of autonomous vehicles

MARKET TRENDS

- M1** Integration into mobility services
- M2** Entry of new mass market providers
- M3** Shift in stakeholder business models

The number of players competing to deliver tolling payments and services continues to increase

10 groups are now positioned as toll service providers



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Country analysis example





Asia Pacific

Australia



New Zealand



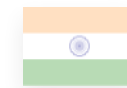
China



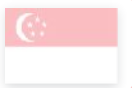
Philippines



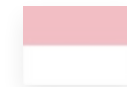
India



Singapore



Indonesia



South Korea



Japan



Taiwan



Malaysia

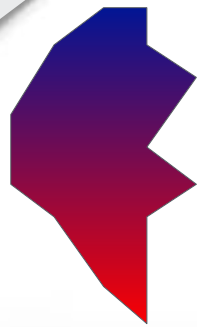


Thailand



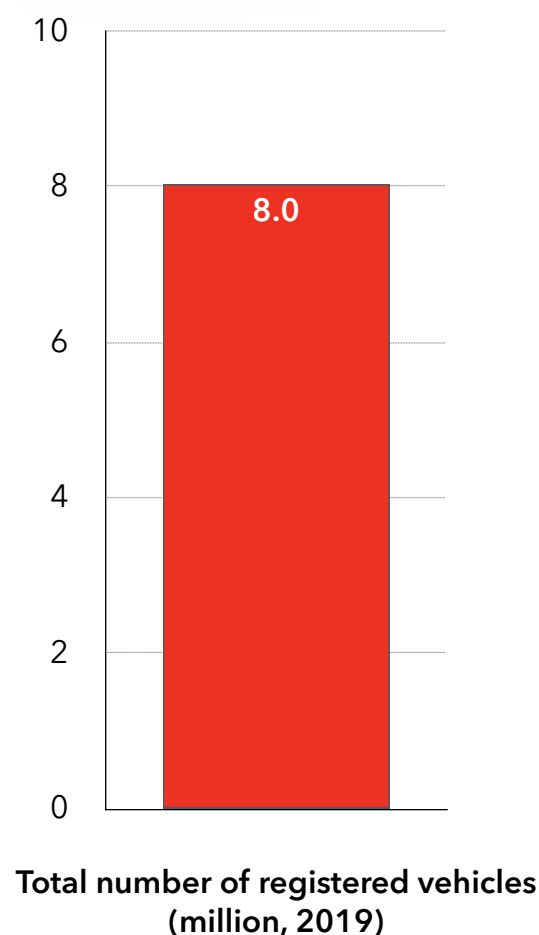


Taiwan's successful ETC scheme has reached almost 90% penetration

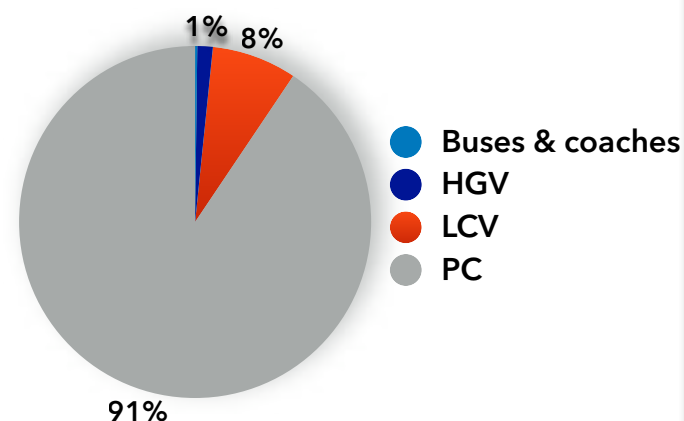


Taiwan

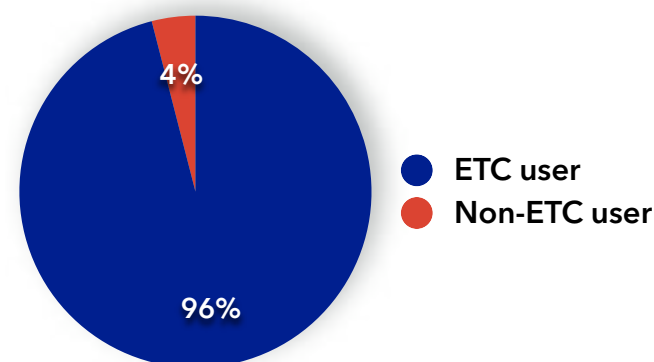
- **Population:** 23.8 million
- **Total road network:** 43,133 km
- **Total toll road network:** 926 km
- **Current tolling schemes:** RFID Tag one concessionaire in charge of building and operating all electronic toll roads
- **Future schemes:** Continue with the current free flow tolling until concession contract end in 2024



Domestic vehicle split



ETC penetration rate



Qualitative analysis

- In 2013, Taiwan became the first country to **switch from manual tolling to all ETC, multi-lane free flow tolling** on all freeways
 - **Taiwan Area National Freeway Bureau (TANFB)** is responsible for motorway maintenance, expansion, traffic management, tolls travel services
 - **Far Eastern Electronic Toll Collection Co. (FETC)** is responsible ETC system, including front-end and back-end as well as business model, from planning, building, and operation
- The distance-based ETC system is a milestone in Taiwan's transportation industry and is setting a model for neighbouring countries to learn from
- Since the introduction of this ETC system, an estimated **\$67 millions** is saved annually in fuel savings; shortened travel time; less congestion resulting in reduced CO2 emission level; cost of printing toll ticket
- Since its inception in 2005, Taiwan ETC proved efficiency resulting major achievements, as of 2019:
 - ETC Customer with RFID Tag 6.7 million ETC daily Transactions
 - Daily average: 16 million eTag Usage Rate 94%
 - Successful Tolling Rate 99.98%
- The **concession contract lasts for 20 years** and is **expected to expire by 2024** and the tolling operating will be transferred back to the TANFB
- eTag, the RFID sticker, was launched in 2012 and still in use today
 - **eTag users have a 10% discount** on toll charges
 - **Non-eTag users** can pay by **plate number recognition** without discounts
- eTag has a **wide application** in **daily payments, parking, fuelling, and smart city management**

Far Eastern Group is the only concessionnaire appointed to build and operate ETC roads

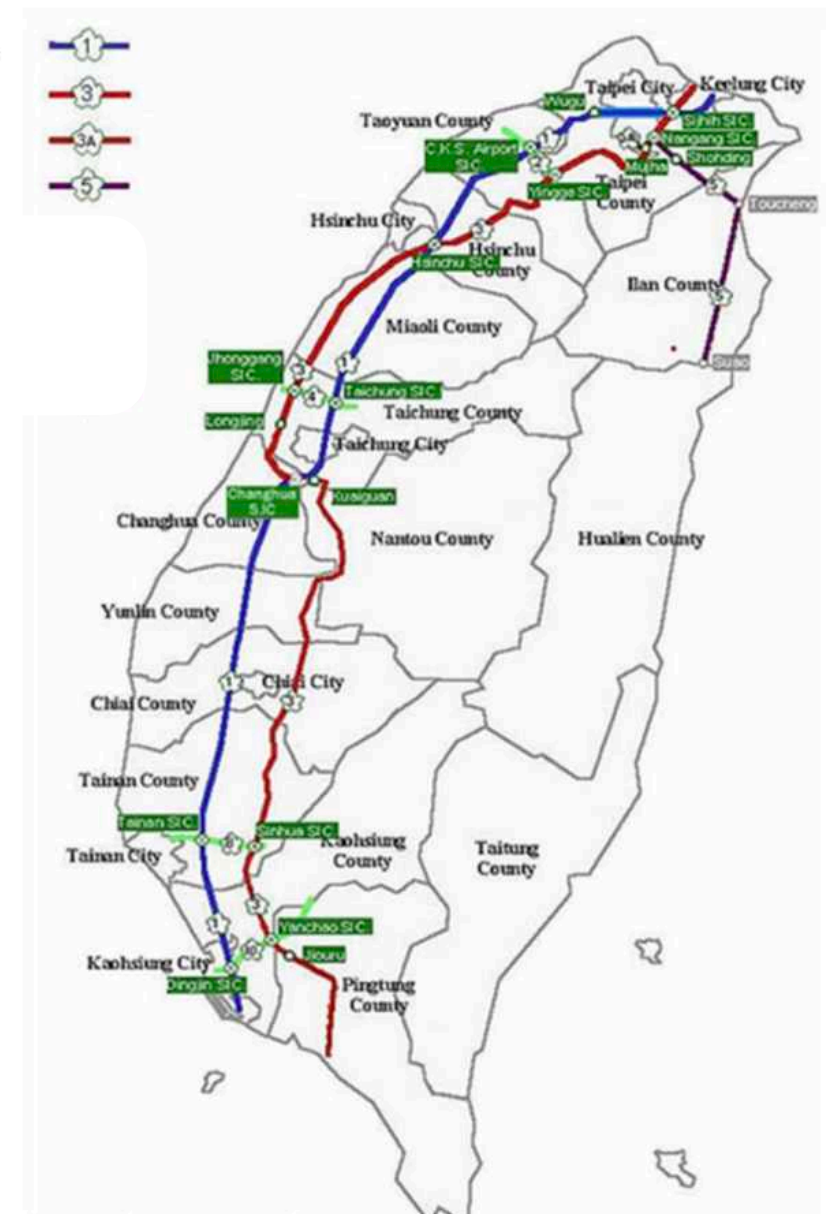
Concession comparison

Concession	Network length (km)	No. of tolling transactions (m)	No. of ETC tags	ETC payment penetration
Far East ETC	1.050	76 million	7 million	93%

- Freeway Bureau has adopted a public-private-partnership (PPP) to design and operate the ETC system through granting build-operate-transfer (BOT) concession right of 20 years
 - In 2004 Far Eastern Electronic Toll Collection, owned by the Far Eastern Group, **was awarded the rights to build and operate the ETC systems until 2024**
 - In 2006, a flat-rate pay-per-use DSRC system was introduced
 - In 2012/2014, the tolling system migrated to RFID technology
 - By the end of the concession the motorway is expected to return the operation to the **Freeway Bureau of Taiwan**
 - The concessionnaire **collects tolls on behalf of the Freeway Bureau** and gets a **commission fee based** on the contract terms
- All toll roads are free flow ETC roads** include National Freeway 1, 3, 3A and 5

Map of the Taiwan toll road network

National Freeway

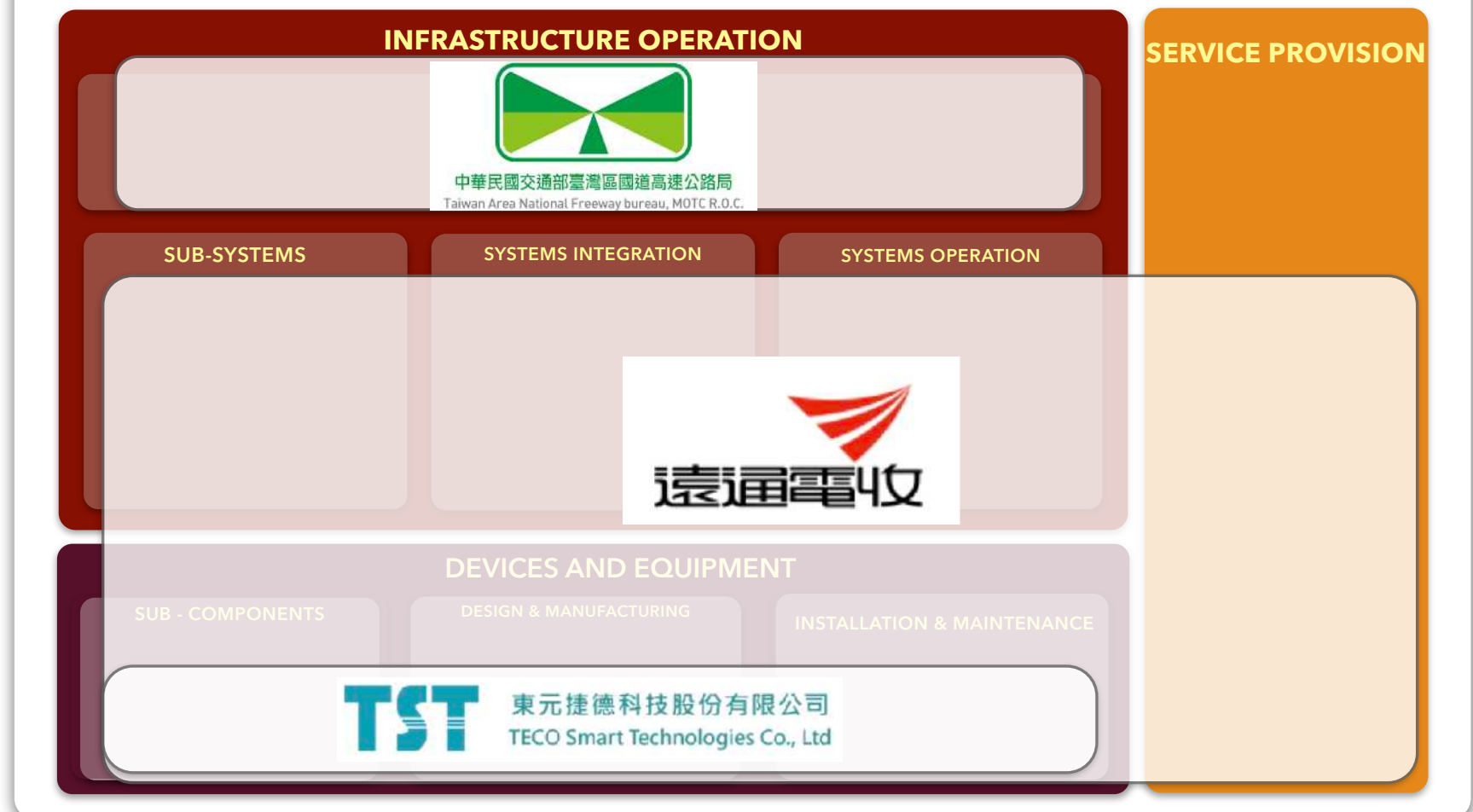


TECO Smart Technologies is in charge of the design & manufacturing of the eTag device



- **Launch date:** 2012
- **Total tolled network:** 926 km
- **Device:** RFID tag + video tolling
- **Scope:** All vehicles, all toll roads
- **No. of vehicles equipped:** 7.7 million
- **Total tolls collected (2020):** € 7.2 billion

Value chain structure



- The ETC system also includes an **ANPR solution** to recognise non-eTag users with plate numbers by the cameras on the gantries
- Drivers can register for service of **automatic toll deduction by linking bank cards** or pay later
- **eTag card is a small sized card** for users to top-up their accounts offline at convenience stores, fuel stations, or service points of Far Eastern ETC
- By showing the eTag card, users can get discounts from a wide range of service providers such as restaurants, hotels, and vehicle services

FETC offers value-added services via its app in partnership with several service providers

FETC Application



遠通電收ETC

- **App name:** Far Eastern ETC
- **Launch date:** April 2014
- **No. of installation:** 1 million+ (Android)
- **Main functions:** Account top-up, payment history, parking location, access to VAS, traffic information

Key Partners & Value Added Services



Taiwan Designated Driver

• Designated driver service:

- The service includes calling a designated driver to drive for the customer, often to avoid drunk driving

eTag GO 停車懶人包

• Vehicle services:

- Services include **car repair, maintenance, diagnostics, windshield replacement, roadside assistance**, etc.
- eTag users are offered approximately **10% off** selected services and **free vehicle diagnostics service**



Bo's restaurant



• Discounts at local commerce and fast food companies:

- Local businesses are increasingly joining to provide eTag users with discounts

Services

• ELECTRONIC TOLLING COLLECTION

- eTag users always get **10% off** of the standard toll fee
- The toll fee is automatically deducted and drivers are notified via a **SMS or the ETC app**
- Drivers can check **payment history** on the app

• SMART TRAFFIC

- The public authority **syncs traffic information with Far Eastern ETC** so that they are able to **notify drivers with important traffic updates** via SMS or the ETC app including **traffic accidents, congestion, extreme weather, construction**, etc.

• SMART PAYMENT

- With eTag on the vehicle, payments can be completed automatically including **payment for fuel and at drive-through restaurants**

• SMART PARKING

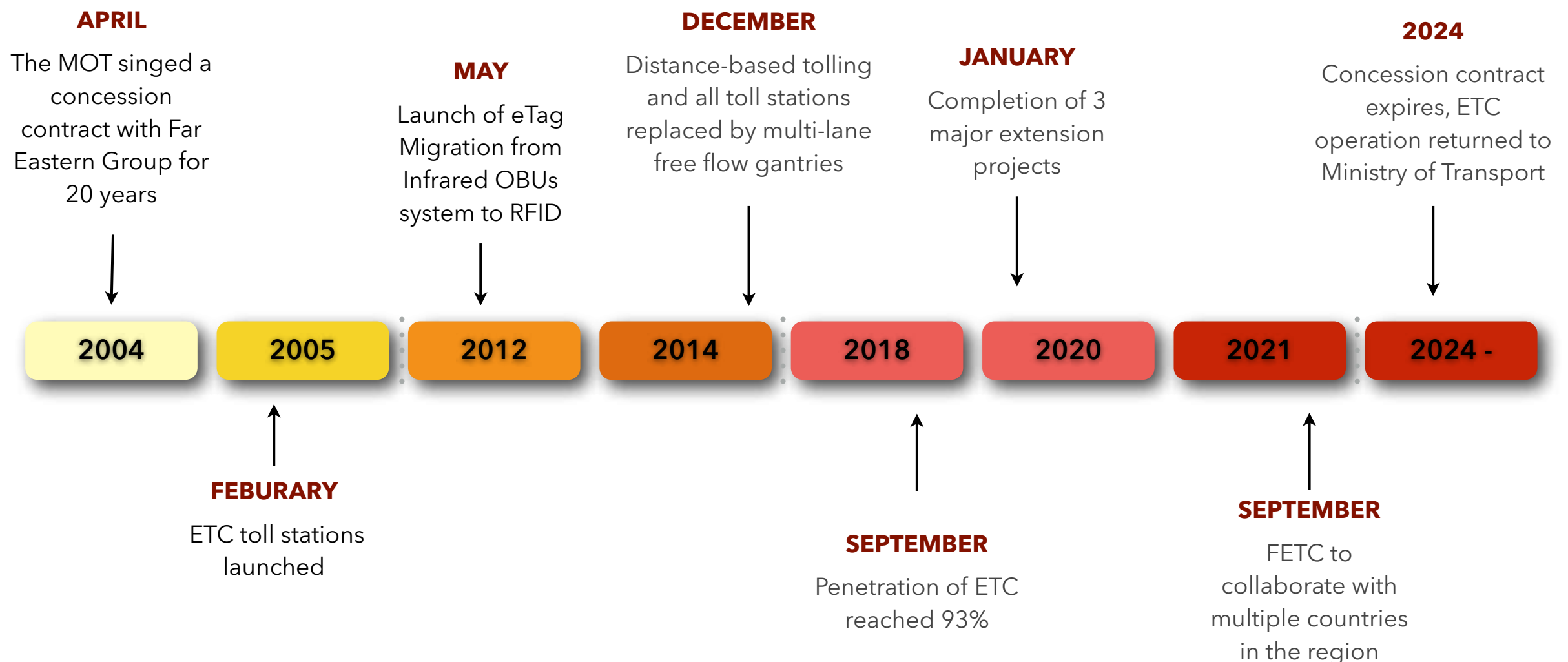
- eTag can be **recognised at the entry of the parking lots** and parking **fees will be automatically deducted**
- The **parking location is recorded** and can be checked on the app or be sent to the driver via SMS
- In October 2019, the eTag system parking solution was enabled for roadside parking in Taipei

• VALUE ADDED SERVICES

- Value-added services are accessible on the app including vehicle accessory **e-shop, roadside assistance, designated driver service**, etc.

The Taiwanese ETC system is fully Multi-Lane Free Flow since 2014

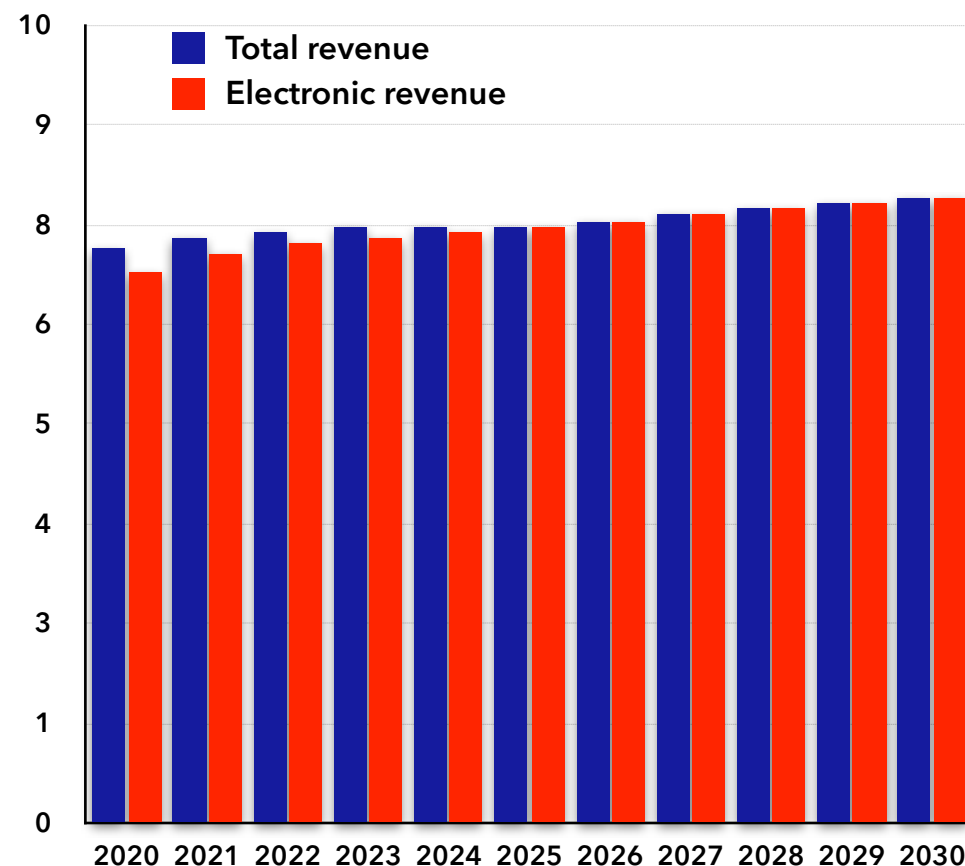
Taiwan tolling timeline



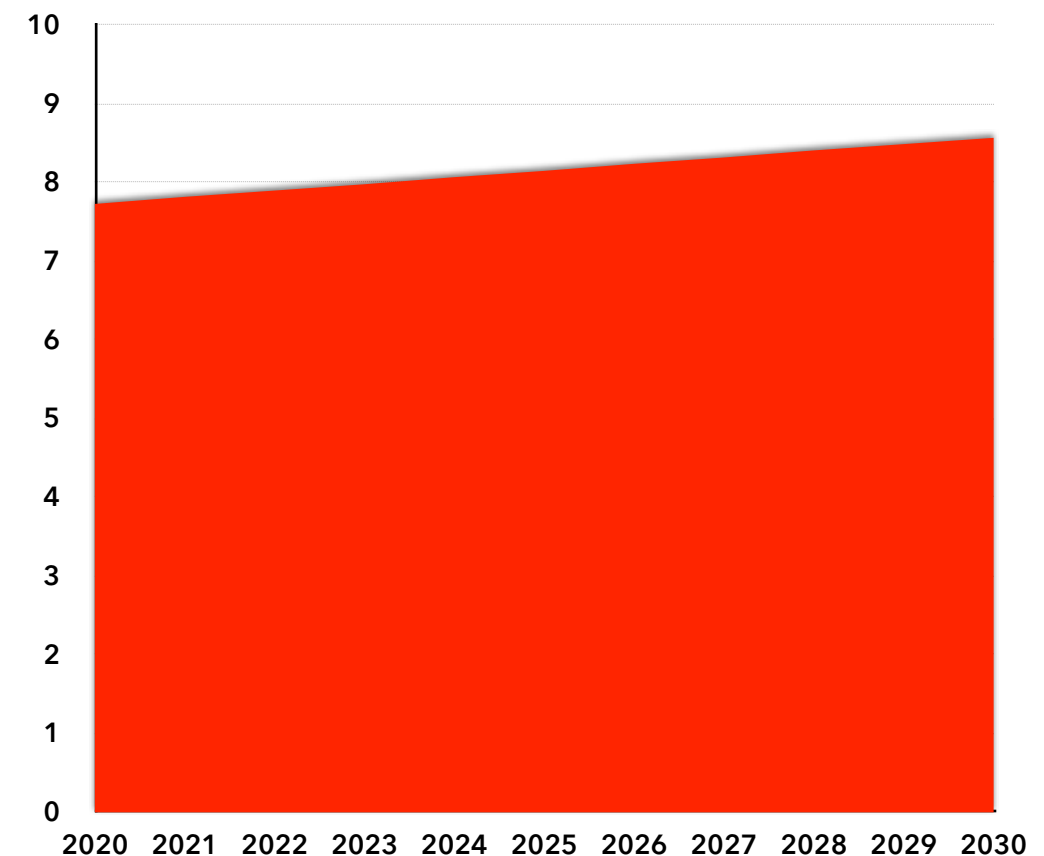
Tolls will be 100 % electronic from 2025 on

Total volumes and revenues in Taiwan

Total tolling revenue (€ million)



Number of registered OBUs (million)



- An increasing growth in tolling revenues is driven by countrywide multi-lane free flow tolling schemes
- The use of ETC is supposed to increase further in Taiwan and we expect a 100 % penetration will be reached until 2025

Taiwan's success in implementing ETC and smart city technology is a model for the world

Taiwan ETC & a smart city solution

- Taiwan is one of the few countries in the world that **did not implement a lockdown** during the COVID-19 pandemic; on the contrary, inland tourism rose resulting in a rise in toll road usage
- Taiwan's **success in implementing free flow ETC** was praised has become a model of success:
 - Nominated for the R&D 100 Awards
 - Received a US IBTTA (International Bridge, Tunnel and Turnpike Association) Toll Excellence Award
 - ITS (Intelligent Transport System) World Congress Industry Award.
- The eTag solution is now going beyond ETC and increasingly expanding into **smart city eTag payment**
 - There is wide application in parking, fuelling, and in daily purchases
- Taiwan is extending its highway network; 3 projects were completed in 2020, totalling approximately **€4 billion**:
 - Suhua Expressway Improvement Project on Highway No. 9 aiming to enhance tourism in the region
 - Extension the width of the South Link Highway (part of Highway No. 9)
 - The Sibin Expressway (Highway No. 61), also known as the "freeway for the poor," was completed after 20 years of construction

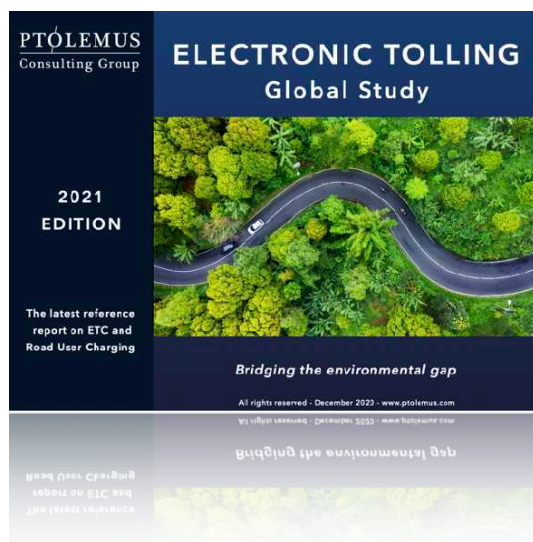


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The study comes with a single, worldwide company licence



The global reference report on ETC and road user charging

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