ALG

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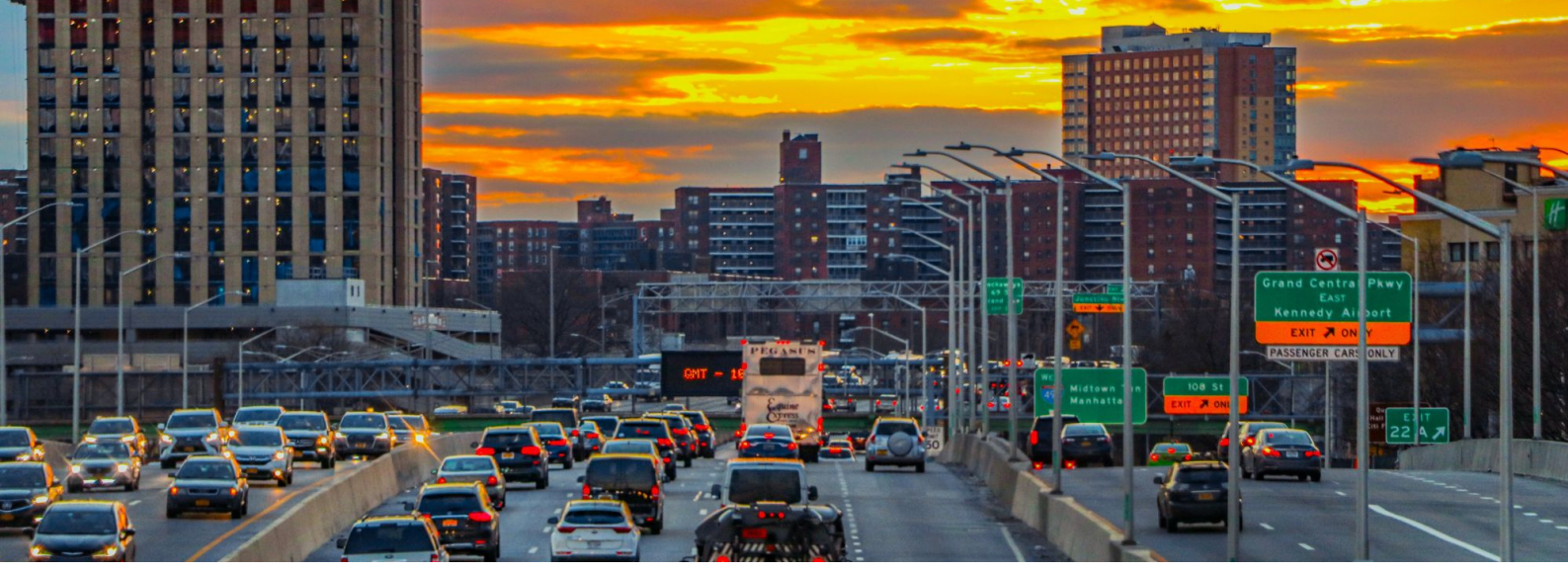
# What's coming with the Road User Charges?




# 1. When current Road User Charges (RUCs) are not enough

## 1.1 Brief introduction and types of RUCs

Governments finance the maintenance and development of the road network from the public budget, and also through specific charges to drivers, known as Road User Charges (RUCs). RUCs are founded on the "user pays principle", suggesting that drivers must bear the costs of maintaining the road network.

Fuel levies have traditionally been the main RUC, and they fund the maintenance of the roads, initiatives to mitigate its externalities (pollution, noise, accidents...) and, to a lesser extent, the promotion of sustainable mobility (public transport). Other RUCs include tolling systems, vehicle registration fees, licensing fees, congestion charges... The following is a brief description of the main traditional RUCs:

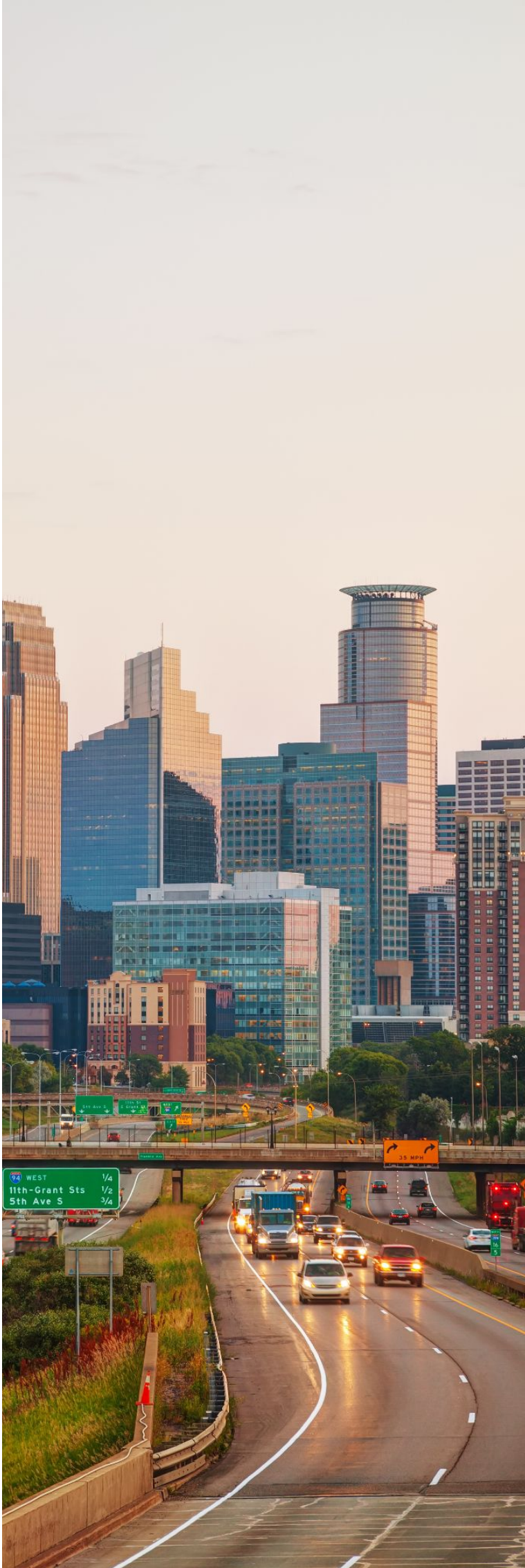
- **Fuel levies**, charged to drivers on every gallon used by vehicles.
- **Toll systems**, charging users for using a specific section of the infrastructure, based on distance, point of access, congestion of the corridor or type of road. These funds are commonly allocated to the construction and operation of the new infrastructure where the tolls operate.
- **Congestion and low emission fees**, intended to reduce traffic, and thus the congestion or pollution. They are oriented to fund public transportation and other mitigation initiatives.
- **Other RUCs with a much lower weight within the road budget**, including vehicle registration and licensing fees, carrier permits, abnormal load fees and tire taxes for heavy vehicles, insurances, vehicle sales taxes... In any case, they have a residual impact in terms of road funding.

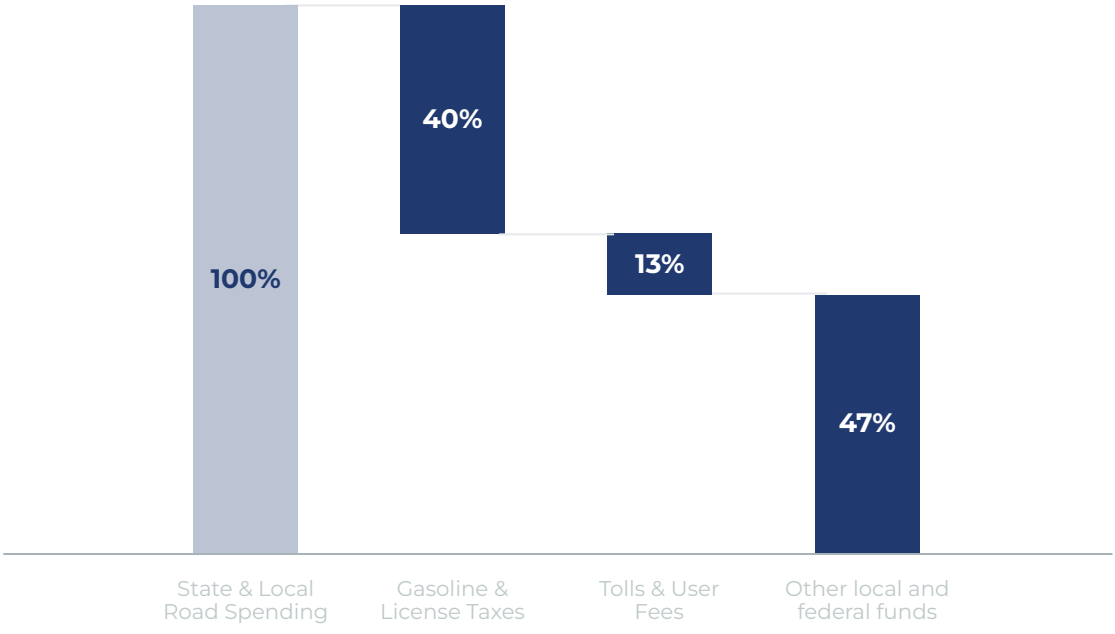
# 1.2 The gap between the costs and highway infrastructure funds in the US

Fuel taxes have been responsible for generating most of the funds for road infrastructure maintenance in most countries around the world. However, unitary fuel taxes revenues are decreasing in real terms over the last few years. This is mainly due to three factors: fuel levies are generally set in absolute value and are not automatically updated with the CPI or any other index; vehicle fuel efficiency is increasing, resulting in lower fuel consumption; and, more recently, there has been an increasing share of EVs.

This loss of revenues over time generates a gap between maintenance costs and available highway infrastructure funds. Although this funding gap occurs in almost all countries, USA is one of the countries to has begun to adopt a new approach to address it.

In 2019, fuel taxes, at a federal and state level, covered 40% of the state and local road spending, while tolls and other user fees explained 12.6% of that annual expenditure. The remaining 47% had to be derived from state and local general funds and federal funds. At a state level, the share of the total road spending covered by RUC revenues vary significantly by state: from 73% in Hawaii and Massachusetts, to 25% and 15% in Rhode Island and Alaska, respectively.






**Funding of the state & Local Road Spending (FY2019; US Census Bureau & Tax Foundation)**

State motor fuel tax receipts (inflation adjusted) in the US experienced practically no growth over the 2000-2016 period (stable at ~$46-47 B/year). Due to increasing pressure on highway funding, some states have recently increased state fuel levies to address maintenance needs, so fuel tax receipts have risen slightly in recent years (reaching 50 B in 2019).

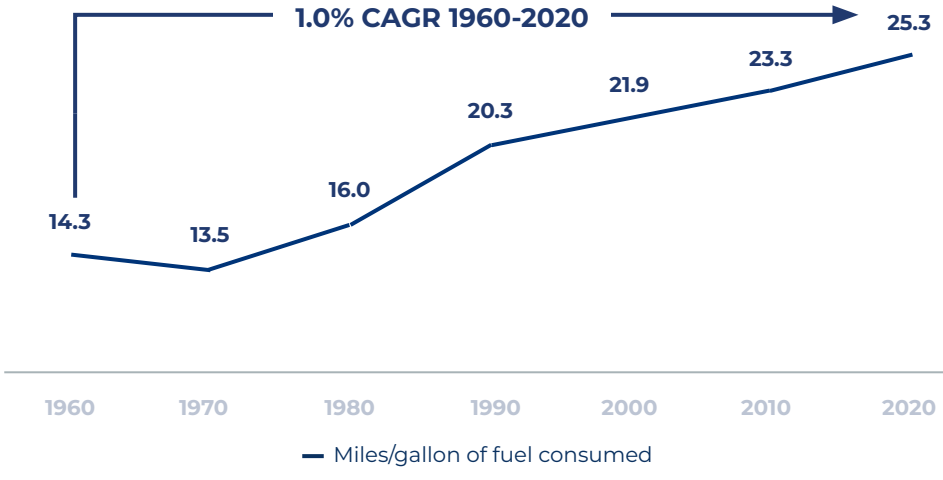
The federal gas tax in the US has been parked at 18.4c/gallon since 1993, so the increasing construction costs have progressively decreased its effectiveness as a road infrastructure-funding source. Only considering inflation, the revenue generated from federal fuel motor taxes now has lost about 52% of the purchasing capacity since 1993, as the tax should have been 38.6c/gallon in 2023.

## The federal fuel levy has not been updated in the last 30 years and has remained at a level of 18.4 cents per gallon

Most states have also not indexed state gas taxes with inflation, adding more pressure to road funding across the country. Only 22 states in the country have variable fuel tax rates, tied to inflation (e.g. California and Florida) or other metrics such as gasoline prices (e.g. New York and Kentucky), state population growth (North Carolina), fuel efficiency (Georgia), etc. Consequently, state gas taxes have evolved significantly different by state, ranging from 9 and 16 c/gallon in Alaska and Hawaii, respectively, to 58 and 63c/gallon in Pennsylvania and California, respectively (on top of the 18.4c/gallon from the federal gas tax).

Since fuel taxes are included in the price of fuel, there is a high political and social impact to increase this tax, as it could represent a significant percentage of the total price of fuel.

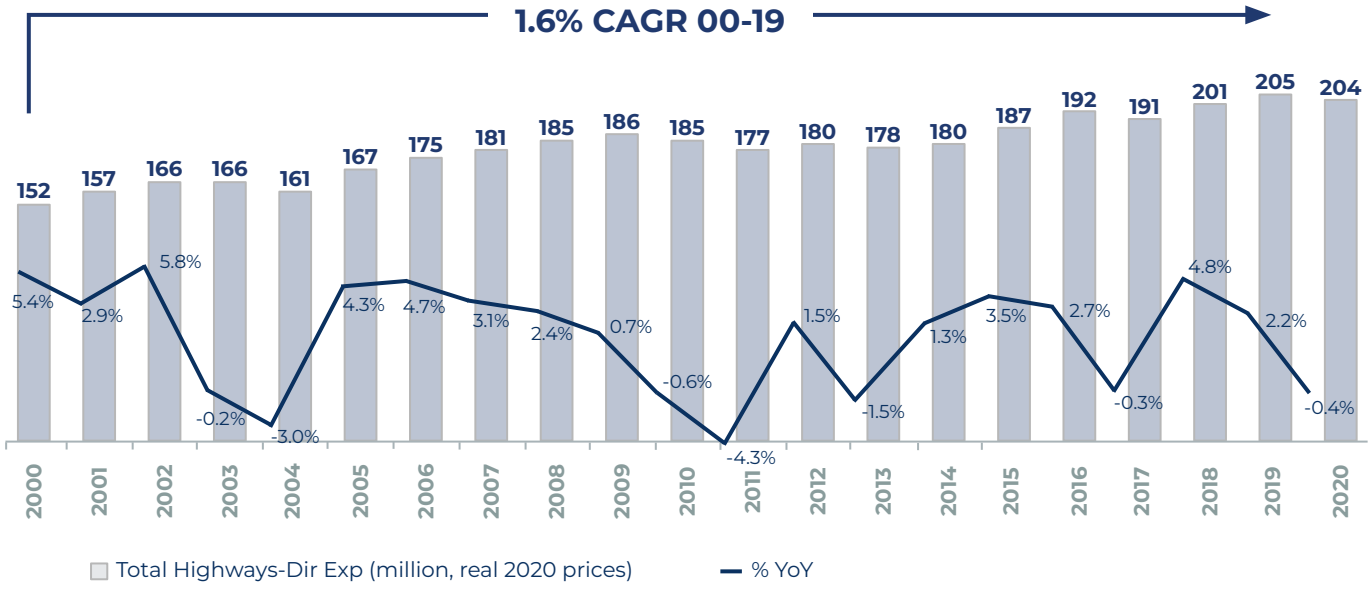
As mentioned earlier, the vehicle fleet is improving its fuel efficiency and therefore contributing less in fuel levies, which has accentuated this problem. The average fuel consumption has increased by 15.6% over the last 20 years (from 21.9 to 25.3 miles/gallon, at 0.7% CAGR). Consequently, highway use of gasoline has grown at a slower pace: at 0.3% CAGR 2000-2019, reaching 136.1 B gallons in 2019, creating a significant gap over time in fuel levy collections.




**Fuel efficiencies evolution in the US (1960-2020, FHWA)**

## Fuel efficiencies in the US in terms of miles travelled per gallon of fuel consumed have increased at 1.0% CAGR since 1960

On the other hand, road-funding requirements tend to increase as road networks expand due to the increasing traffic, rising quality standards (safety) and increasing cost of goods/services. Consequently, highway network direct expenditures grew at 1.6% CAGR since 2000.

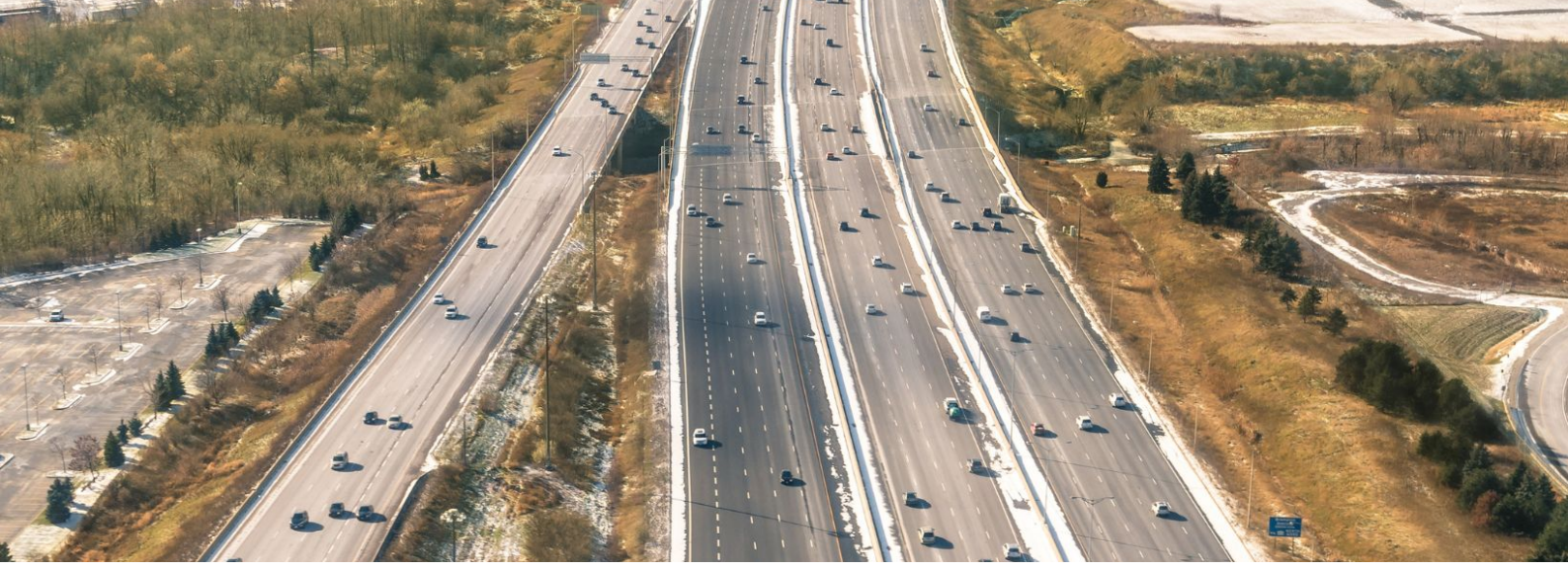



**Total highway network direct expenditures in the US (m 2020$; US Census Bureau)**

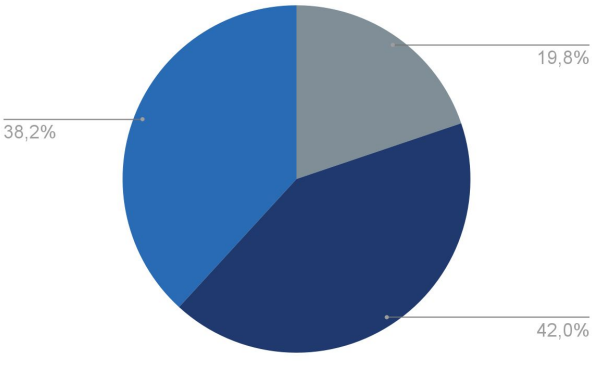
## While the highway network expenditure has grown by 1.6% CAGR over the past 20 years, highway fuel consumption has increased only by 0.3%

The decrease in fuel tax revenues versus the increase in network maintenance costs are generating a gap to keep an appropriate level of maintenance of the road network that is not sustainable in the short and medium term. The poor road maintenance is becoming a major problem across the country:

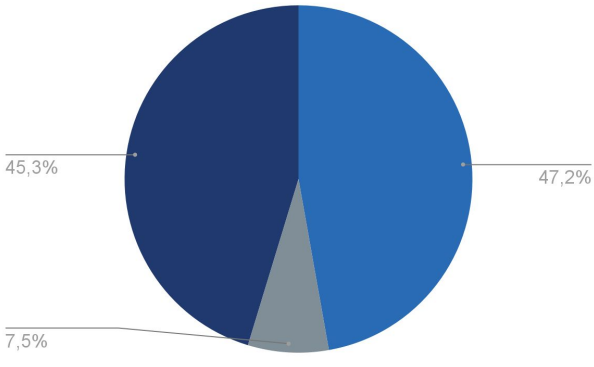
- About 20% of the network was below an acceptable level of maintenance condition (IRI>170 in/mi) and 38% in fair condition (IRI 95-170 in/mi).
- About 45,000 bridges are considered structurally deficient and over 220k bridges in the country need major repair work.



US Roads (820k miles)




US Bridges (#617k)

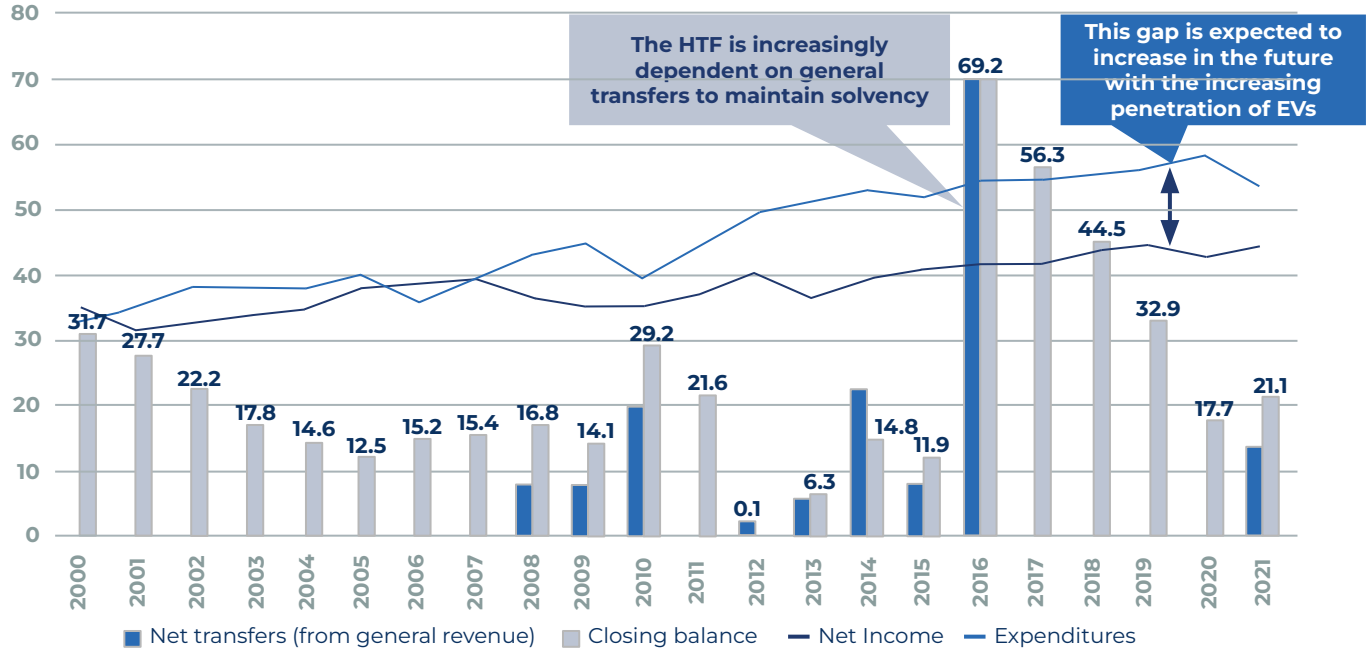




**Roadway and bridges condition index in the US (2019, FHWA)**

The Highway Trust Fund (HTF), in charge of most federal government spending for highways and mass transit through motor fuel taxes, has become increasingly dependent on general funds contributions.

In recent years, the HTF has required significant transfers of general revenues to remain solvent. This scenario is going to get much worse with the electrification that all governments are promoting.




**Highway Trust Fund Balance (B USD)**

## The increasing penetration of EVs will further widen the gap between network maintenance costs and revenues collected under the current RUC scheme

Vs.

## Motor fuel taxes revenues

## Road expenditure requirements

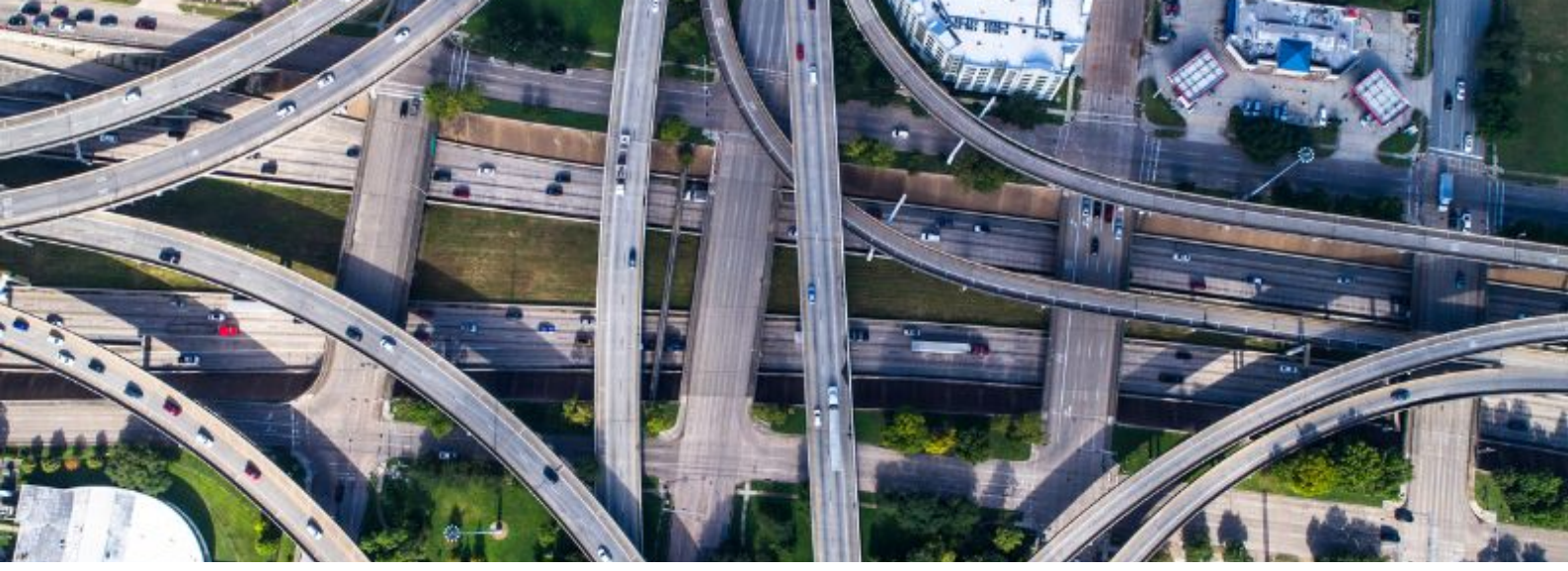
**Causes:**

- Unitary fuel tax decreasing in real terms (not tied to inflation)
- Increased fuel efficiencies
- EVs penetration

- Road traffic growth
- Increasing safety standards
- Increasing maintenance costs

## This imbalance leads to significant shortfalls in road financing

**The gap between the costs and available highway infrastructure funds**



# 2. The tendency toward new RUCs. US as a study case

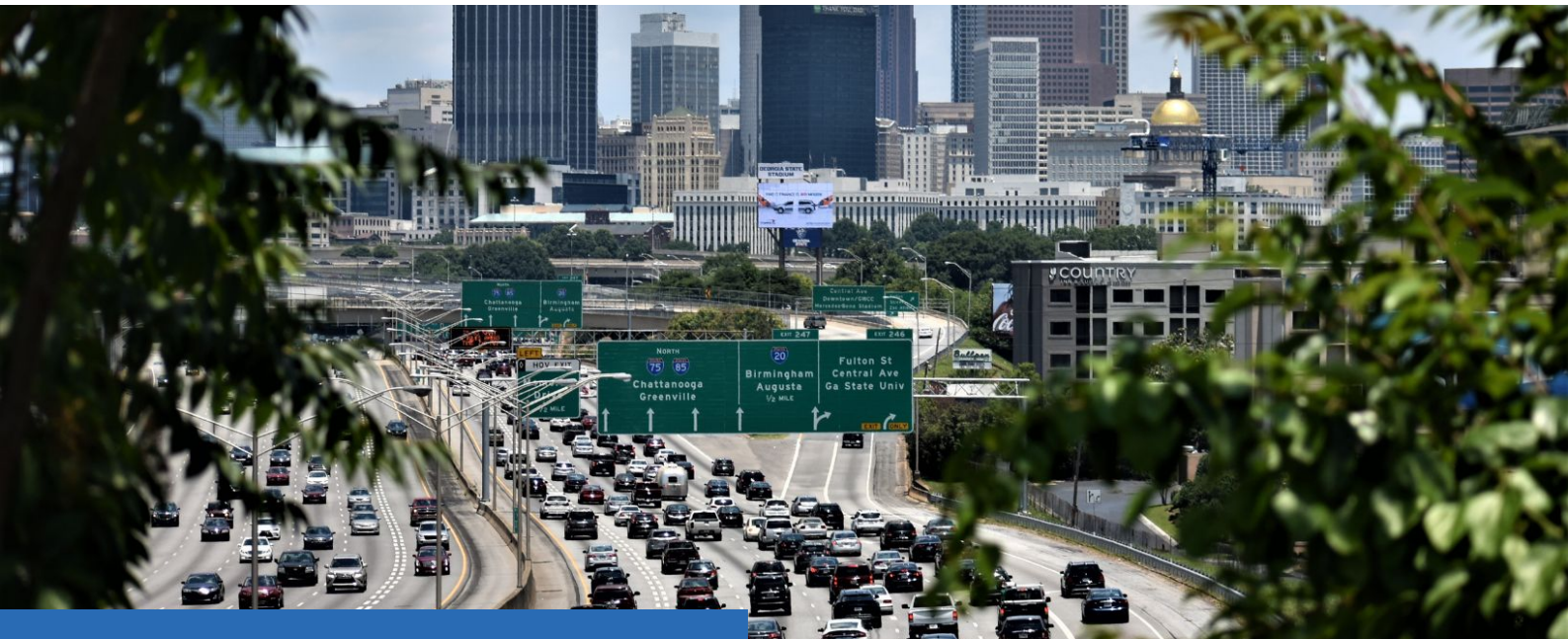
In order to address the strong deficit outlook and cope with the inevitable decline in motor fuel tax revenues, states have been studying and implementing alternatives to increase road funds, including:

- **Implementation of tolls in new infrastructure or managed lanes**, through PPP projects, such as Calcasieu river bridge and SR400 in Atlanta, or public investment
  Toll facilities in the US have grown significantly in the past, by 2.0% CAGR 09-20, extending 6,358 miles in total. Over the next decade, it is expected to increase the total tolled miles and could represent ~10% of the National Highway System's length.
- **Implementing tolls in existing roads**, such as I-5 Columbia river bridge replacement in Portland. The imposition of tolls on existing federal-aid highways is restricted under federal law, and states are only free to impose tolls on roads, bridges and tunnels that have been built and maintained without federal assistance. Due to the growing maintenance needs of the network, the federal government has authorized/is planning several exceptions.
- **Increase existing RUCs**, such as vehicle registration fees, user fees or sales taxes. However, their revenue-generating capacity is rather low compared to other RUC alternatives. Also, drivers are not charged proportionally to their use of the infrastructure, which is why they are also perceived as an unfair source for road funding.

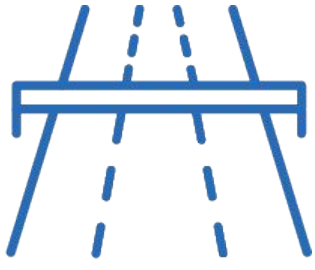
- **New RUCs**
  - **Special registration fees on electric vehicles**, which is generally a fixed fee payable annually, with different values depending on the State. These EV fees have already been recently implemented in 32 states, with a simple implementation process and little public controversy.
  - **Vehicle miles travelled tax (VMT)**, charging drivers for each mile travelled (also known as mileage based user fees). This RUC works in a similar way to motor fuel taxes, as users would pay proportionally to their use of the infrastructure, but regardless of the fuel-efficiency of new vehicles.

These two new RUCs can be compatible and many states are studying VMT rates for fuel vehicles while charging annual special registration fees for electric and hybrid vehicles.

**In anticipation of declining revenues from fuel taxes, states started to explore new RUC schemes for road funding, mainly focused around registration fees for EVs and VMT fees**



# 2.1 Special registration fees on EVs and plug-in hybrid vehicles



Several states have recently introduced a special registration fee on EV owners to support road funding, which is applied in addition to traditional motor vehicle registration fees.

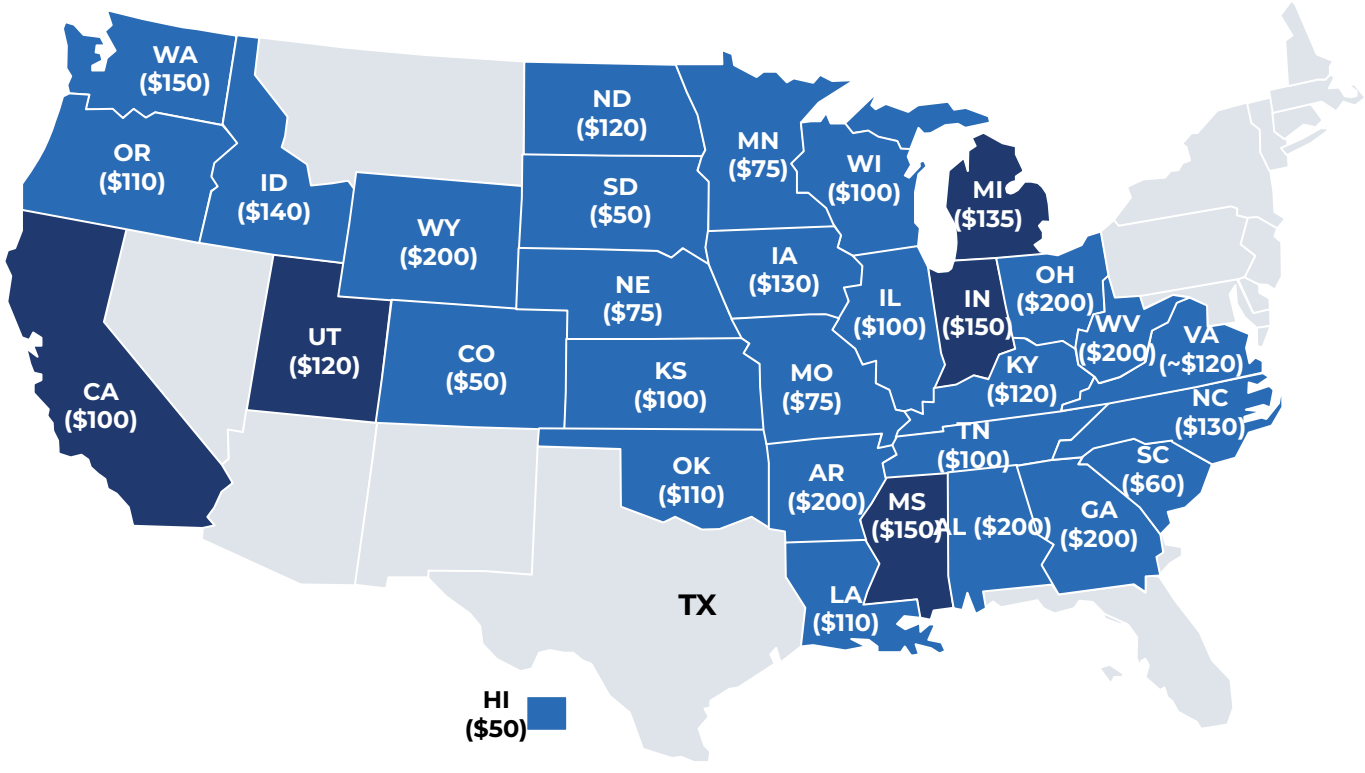
As of today, a special registration fee for EVs is required in at least 32 states, 19 of which also enforce a fee on plug-in hybrid vehicles at a lower rate. Annual fees for EVs range from $50 in Colorado, South Dakota and Hawaii to $200 in Alabama, Arkansas, Georgia, Ohio, West Virginia and Wyoming. Fees for hybrid vehicles are typically half those of electric vehicles. Five of these states (California, Indiana, Michigan, Mississippi and Utah) index special registration fees for EVs to inflation, in order to counter the declining purchasing power of static motor fuel taxes.

**Special registration fees on EVs are currently in place in 32 states, to cover the gap in road financing generated by the boom in electric vehicles**

Revenues from these additional fees are typically directed toward a state transportation fund to support road finance. However, some states also allocate part of these revenues to support EV infrastructure (charging stations) as well as local transportation and infrastructure funds.

Currently, this EV fee contributes 54.4% less than comparable fuel levies for drivers with combustion engines [1], which highlights the ineffectiveness of this new RUC in itself to sustain road funding in the mid/long term, but allows a step forward towards a new model.

[1] Considering the states average special registration fee of $123/year, an average annual mileage of 13,500 miles/year, and an average fuel consumption of 25 MPG, miles per gallon




Special registration fees for EVs in the US (annual fees; USD)

# 2.2 Vehicle miles travelled fees (VMT)

VMT-fees are being deployed with three technological methodologies: manual odometer readings and on-board units (OBUs) without/with GPS technology:

- **Odometer based.** The mileage calculation is derived from manual odometer readings at the time of annual vehicle registration. Authorities could also obtain odometer reading remotely through the installation of vehicle data hubs (VDH).
- **OBU without GPS.** An OBU equipped on the vehicle (connected to the on-board diagnostics port) records miles driven from sensors and monitoring devices installed without monitoring location. The main advantage of this methodology is that, since it does not collect the location of the car, users do not need to worry about data privacy.
- **OBU with GPS.** An OBU records miles-travelled using GPS technology. This technology allows to manage a more flexible fee structure based on a more specific use of the road network:
  - Type of road: private, rural, urban or high capacity.
  - Commuting conditions: time of day, day of the week or congestion conditions.
  - Vehicle fuel consumption, replicating the fuel tax with higher rates for vehicles with higher consumption.

| Technology | Functioning | Pros | Cons |
|---|---|---|---|
| **Non-GPS based VMT fees** (odometer or OBUs w/o GPS) | Non-GPS mileage reporting through odometer readings at vehicle inspections or in-vehicle devices to estimate mileage | - **Simple implementation** (no/little technology required)<br>- **Easy to monitor** (simple operation) | - **Low flexibility** as charges cannot differentiate by location or time of day<br>- **High operational costs** as it is a rather manual process (lower OPEX with on-board devices) |
| **GPS-based VMT fees** (OBUs with GPS) | Vehicle location tracked via GNSS technology and integrated on-board units (OBUs) equipped on vehicles recording time and position data | - **High flexibility,** as the mileage fee can vary according to the type of road, time of day, level of congestion...<br>- **Ease to widen the network** | - **Data privacy issues**<br>- **Difficult interoperability** between states and countries<br>-**Technology is not mature** |

**Technology to manage and monitor vehicle mileage fees**

On the other hand, this technology implies a higher cost (cost of the OBU and its installation) and some legislativeand data-privacy management issues remain to be solved.

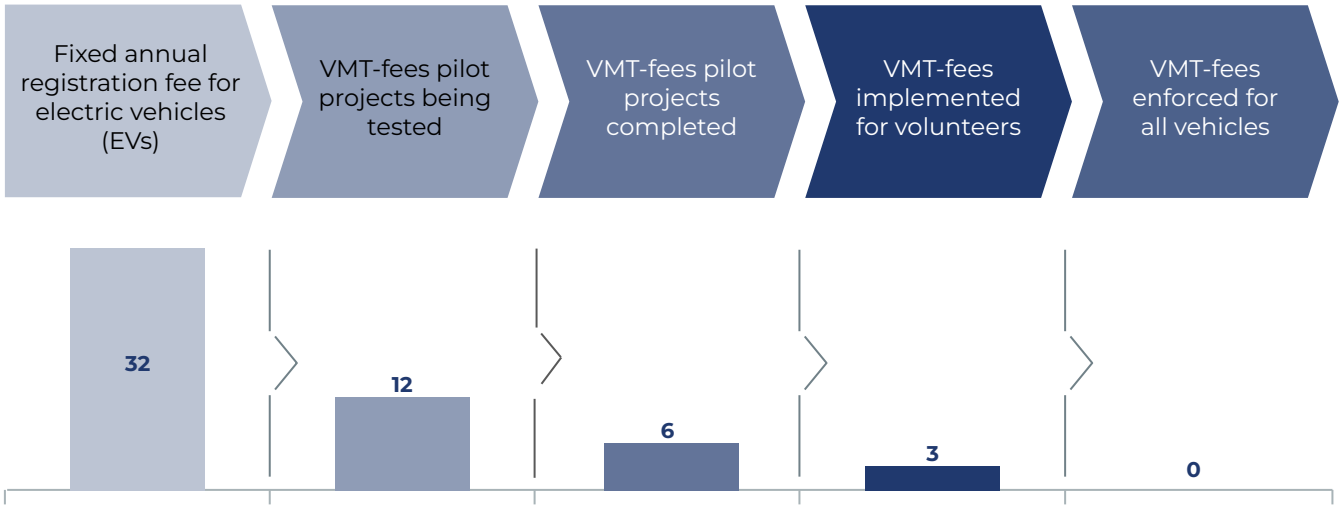
**GPS technology offers a greater degree of flexibility in charging VMT fees (by road type, congestion...), but comes with important data privacy, technology and legislative issues**

# 2.3 Pilot programs in the US implementing new RUCs

The federal government has awarded tens of millions of dollars in grants to explore VMT-fees pilots at the state level, with the ultimate goal of implementing a nationwide program.

The process for the implementation of the new VMT-fee, which could replace the fuel levy in the midterm, still has a long way to go and is at different stages of maturity within the US. The first step has begun with the implementation of a special registration fee for EVs, acknowledging that these vehicles pay nothing for the use of the roads and that there are already other economic aids to promote EVs.

The next steps, already in place, are the development of 18 pilot projects (6 completed and 12 ongoing tests) for the VMT-fees program, and its implementation to volunteer users (3 states (Oregon, Utah and Virginia).




**Level of maturity of VMT-fees in the US by state (#states per phase)**

Citizens of Oregon, Utah and Virginia can voluntarily join the VMT fee program, paying for the mileage driven and being compensated for state motor fuel taxes (estimated of fuel consumption) or the annual registration fee for EVs. The current VMT-fees are set to conduct the pilot program and to engage the highest number of volunteers:

| State | Vehicles eligible to enroll in the program | VMT fee | Comparison vs. state motor fuel tax** | Mileage reporting technology |
|---|---|---|---|---|
| **Oregon** | Combustion engine and Electric vehicles | - 1.9c/mile<br>- Fuel tax paid is credited back (estimated with Combined Fuel Economy Rating)<br>- EVs are exempt from the annual special registration fee for EVs ($110/yr) | - 25.0% higher (1.90 vs. 1.52 c/mile, resp.) | - Manual odometer readings<br>- On-board vehicle recorders |
| **Utah** | Combustion engine and Electric vehicles | - 1.0c/mile<br>- Charges are limited to the annual special registration fee for Evs ($120/yr | - 31.3% lower (1.00 vs. 1.46 c/mile, resp.) | - On-board vehicle recorders (with GPS and without GPS technology) |
| **Virginia** | Electric and fuel efficient vehicles (fuel economy >25 MPG) | - 1.0c/mile *<br>- Charges are limited to the annual highway use fee for Evs (~$120/yr) | - 10.7% lower (1.00 vs. 1.12 c/mile, resp.) | - On-board vehicle recorders (with GPS and without GPS technology) |

* Calculated by dividing the highway use fee by the avg. number of miles traveled by a passenger car in the Commonwealth

** Assuming an average fuel consumption of 25 MPG

**Summary of active VMT-fees programs in the US**

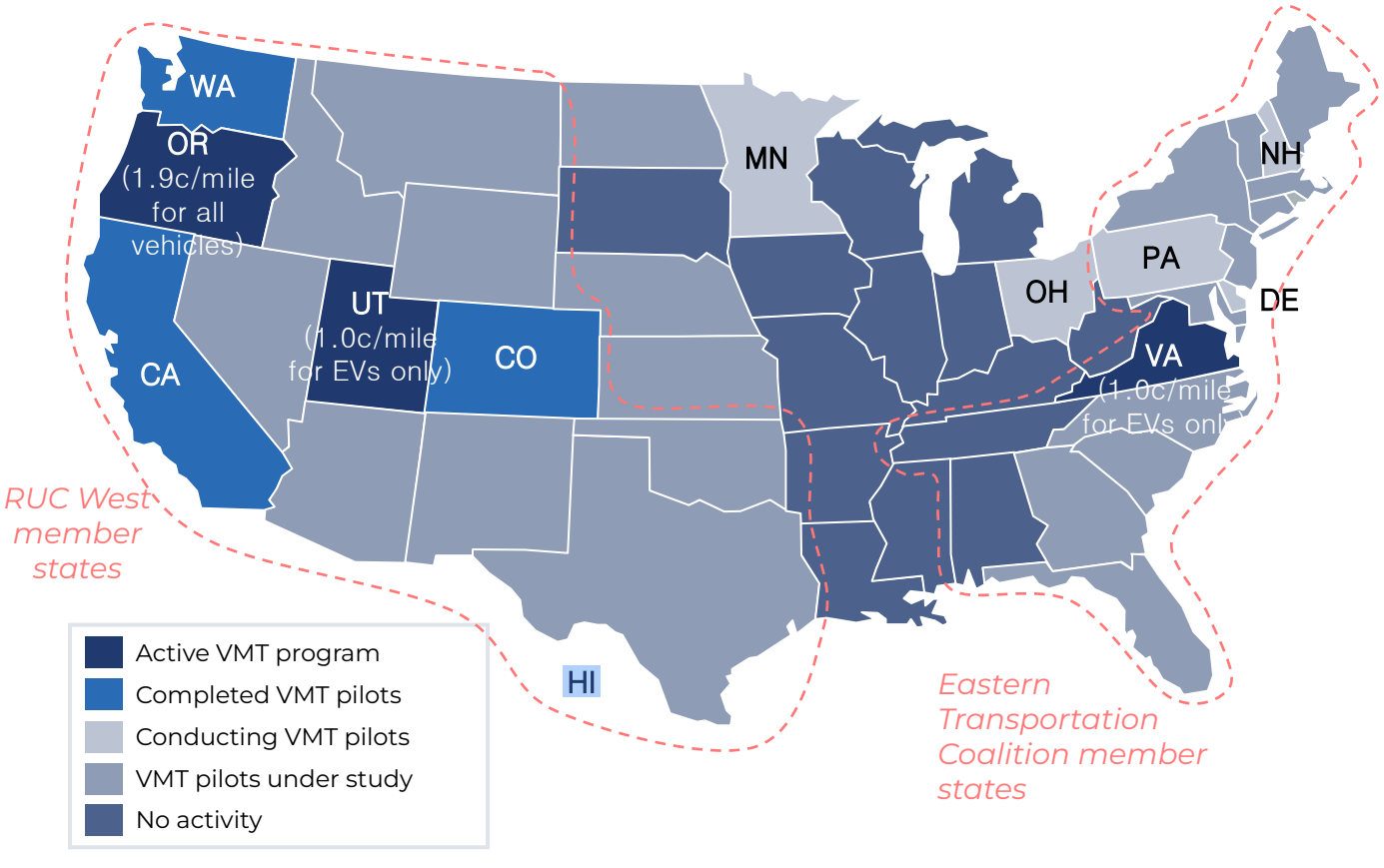
Other nine states are running VMT pilots at different stages testing the technology and driver's acceptance:

- California, Washington and Colorado have successfully completed RUC pilot projects at a state level.
- Hawaii, Minnesota, Pennsylvania, Delaware, New Hampshire and Ohio are actively conducting RUC pilots, although at a lesser stage of maturity.

At a multi-state level, there are two initiatives seeking to achieve interoperability amongst member states to implement a common RUC system based on mileage fees, funded by STSFA grants:

- Eastern Corridor Coalition (led by Delaware), a multi-state interoperability program for implementing mileage-based fees in a multi-state region.
- RUC West (lead by Oregon), a multi-state pilot focused on consistency, interoperability and compatibility to accommodate varying tax rates and jurisdictional types.

## VMT fees are in place for volunteers in 3 states, demonstrating the readiness of the technology and its potential to replace fuel taxes as the main source of road funding



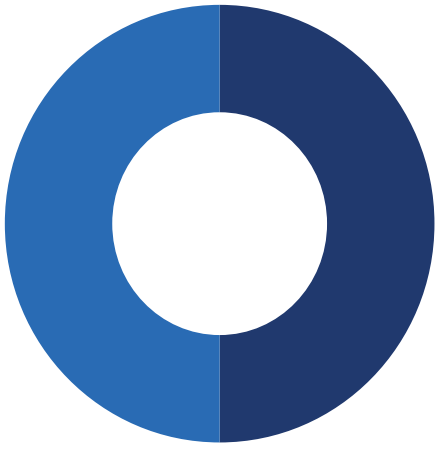

**New Vehicle Miles Travelled (VMT) fees initiatives in the US**

# 2.4 Our vision for the design of the VMT-fee

A proper design of the VMT-fee should focus on four main objectives: (i) ensuring the sustainability of road network maintenance, (ii) guaranteeing a fair level of fees for all users, (iii) ensuring proper management of the collection of these fees and data privacy, and (iv) achieving the highest user acceptance.

### Management

- **Collection**, structuring a private or public operator to collect fees
- **Safety**, guaranteeing data-privacy of all users
- **Technology**, defining an open system to be chosen by the user, or one system for all



### Fee definition

- **Clarity**, charging schemes must be clear and understandable to all users
- **Equity**, adjusting rates to infrastructure use, fuel consumption and population

**Challenges for the VMT-fee definition**

While the fuel tax was very easy to collect through few players and not directly from the user, the VMT-fee would come directly from the user, which means more complexity, more expensive and more sensitive.
Some pilots have shown that users prefer a private entity to manage the program.

Data privacy security is the main concern for users. While more data would allow for more tailored rates to be defined for the driver, the vehicle, and the road, it would also lead to greater concerns. Technology should help to address data security issues, but alternative solutions could involve providing users with different choices regarding how they prefer to be charged.

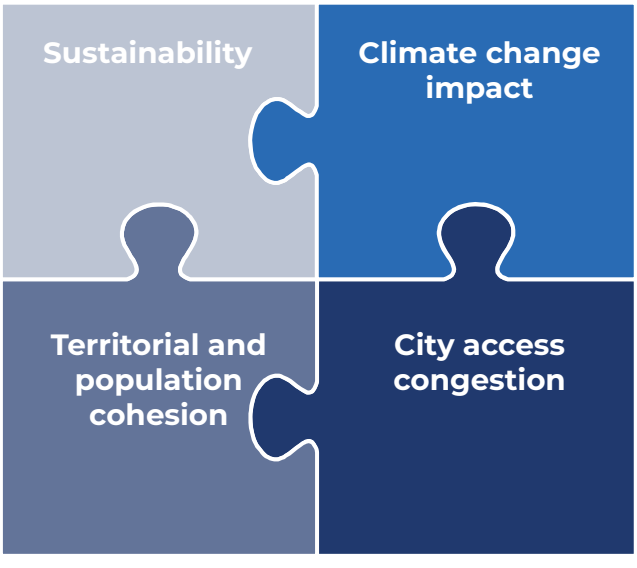
The definition of the fee structure should balance two principles. Introducing many criteria in the fee regime would make it more difficult to communicate to the user:

- Clarity, easy to understand and monitor by the user.
- Equity, including multi-criteria to adjust fares to infrastructure use, vehicle fuel consumption and population characteristics.

The VMT-fee represents an excellent opportunity to design a fair and sustainable fee structure for drivers, taking into account the costs and financing of the infrastructure they use, the environmental impact, and the equitable distribution among different regions and income levels of the population.

**Decoupled from fuel costs**, which gives more freedom to update it according to the actual financing requirements

Integrated in the territory differentiating by the **type of road** (rural, urban or high capacity) ...
... and in the **population** with a low-income segment




Adjusted to the **vehicles' consumption**, even for EVs and hybrid vehicles

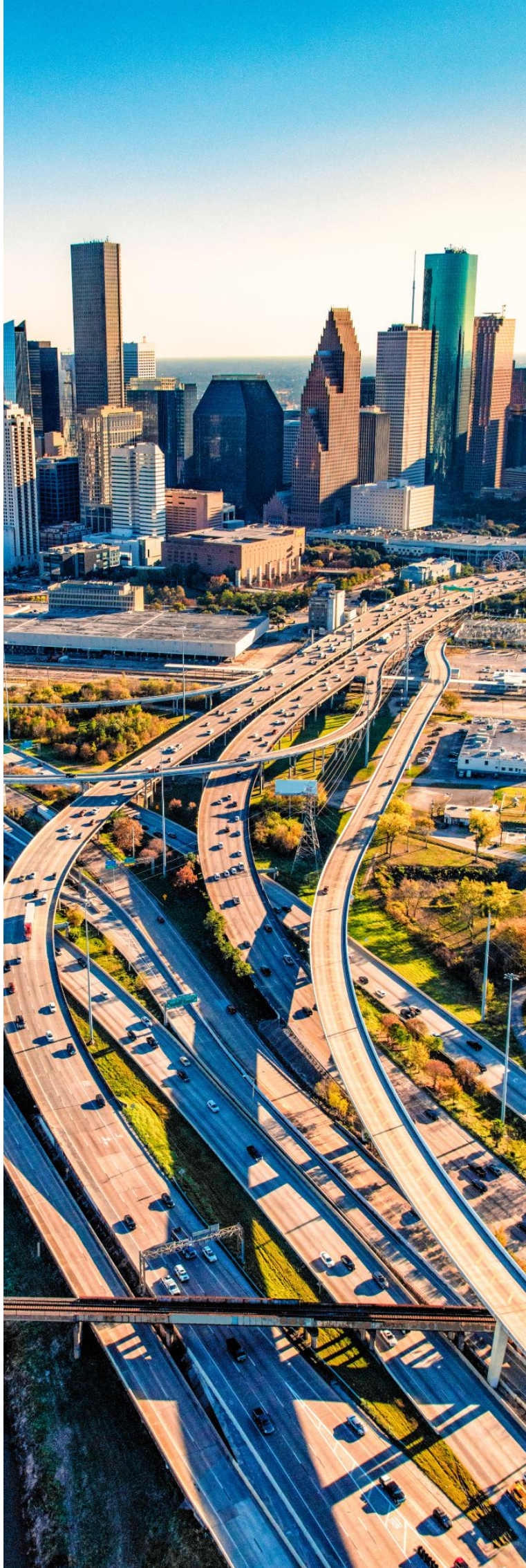
Promoting **alternative modes** of transport or **other access times** to the city to reduce congestion

**Potential criteria to ensure equity in the VMT-fee structure design**

Decoupling the VMT-fee from fuel prices would make easier and accepted to be systematically updated with CPI or other metrics. Increasing the price of fuel by raising the fuel tax has proven to be significantly difficult from a political standpoint. Additionally, this approach would allow a better adjustment of roaduser-charges to the road financing needs, while minimizing the political impact.

Some environmentalists oppose this new tax, arguing that it benefits vehicles with higher fuel consumption. However, this issue could be resolved by adjusting the VMT fee on vehicles based on their MPG. In addition, this scheme would also charge heavier vehicles more, in line with the greater infrastructure degradation they cause compared to light traffic.

Congestion on access roads to cities remains one of the most important commuting problems. Traditionally, it has been addressed by constructing more infrastructure, which is becoming increasingly expensive. However, it was only a matter of time before the new infrastructure became congested again due to increasing traffic. Recently, managed lanes have shown that dynamic toll pricing can positively alter the traffic profile, and encourage carpooling and public transportation. A VMT-fee linked to road congestion, such as a higher fee during predefined peak hours, could further encourage sustainable mobility efforts while providing funding for the construction of more expensive commuting infrastructure.

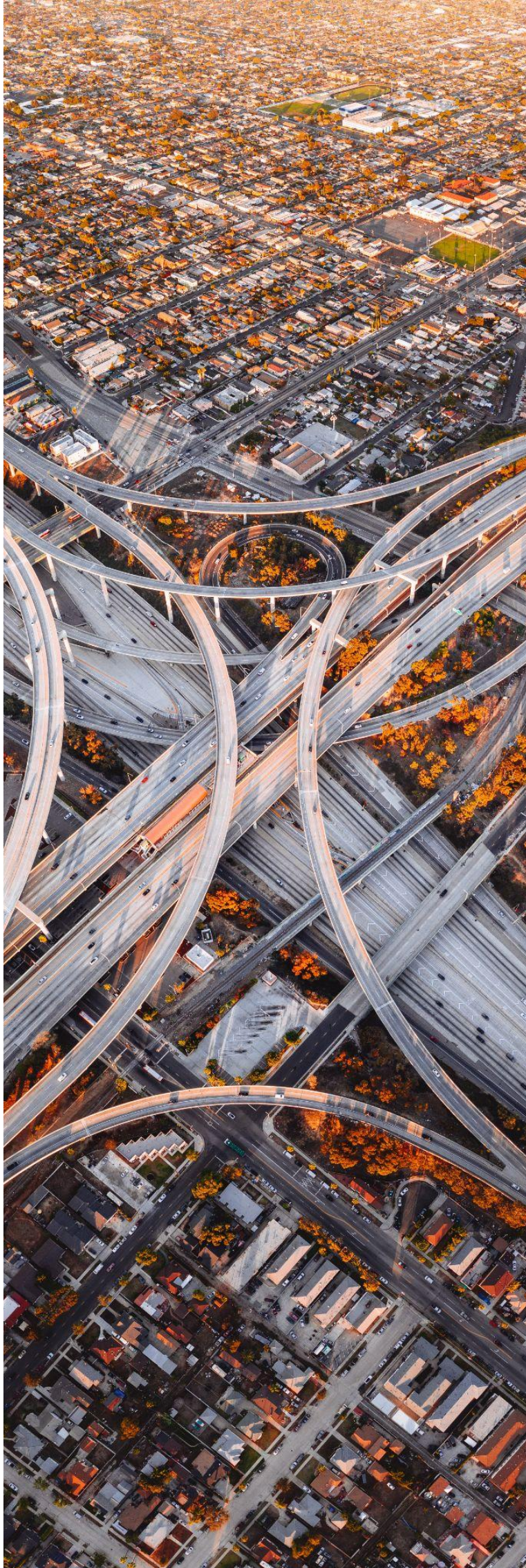


Another relevant discussion is which type of roads should be included in the program and whether the same level of charge should apply to them. Rural roads help territorial cohesion, but their users could be penalized with same level of VMT-fees, as people living in rural areas are required to drive more miles. On the other hand, the maintenance of urban roads, without considering beltways or other high capacity roads, are highly funded with local taxes and so, they would be overfunded with VMT-fees.

The low-income segment of the population or disadvantaged communities would be another segment severely affected by this new fee. This could be adjusted by reducing the fee under certain conditions to be defined. The New York City Transit Authority (MTA) is already adopting this approach in the design of the fee scale for congestion pricing in the city.

**The design of VMT rates should be tailored to the needs of the infrastructure, population and the environment, guaranteeing a fair level of tariffs for all users**

The design of the VMT-fee scale, along with appropriate technology and data-privacy measures, allows for flexible tailoring to address key environmental, congestion and road quality concerns, while adhering to the basic principles of “user-pays”, “polluter-pays”, and mitigating the impact on disadvantaged communities and other penalized user segments.



| Contribution to road fund | | Impact of VMT-fee | |
|---|---|---|---|
| **Type of vehicle** | EV | **Lower** | ↘ |
| | High MPG vehicles | **Higher** | ↗ |
| **Time** | Congestion peak | **Higher** | ↗ |
| **Type of road** | Rural roads | **Lower** | ↘ |
| | Urban roads | **Lower** | ↘ |
| | High capacity roads | **Higher** | ↗ |
| | Commuting roads | **Higher** | ↗ |
| **Population** | Low income population | **Lower** | ↘ |

**Illustrative drivers to design the VMT-fee scale**

# 3. Key conclusions

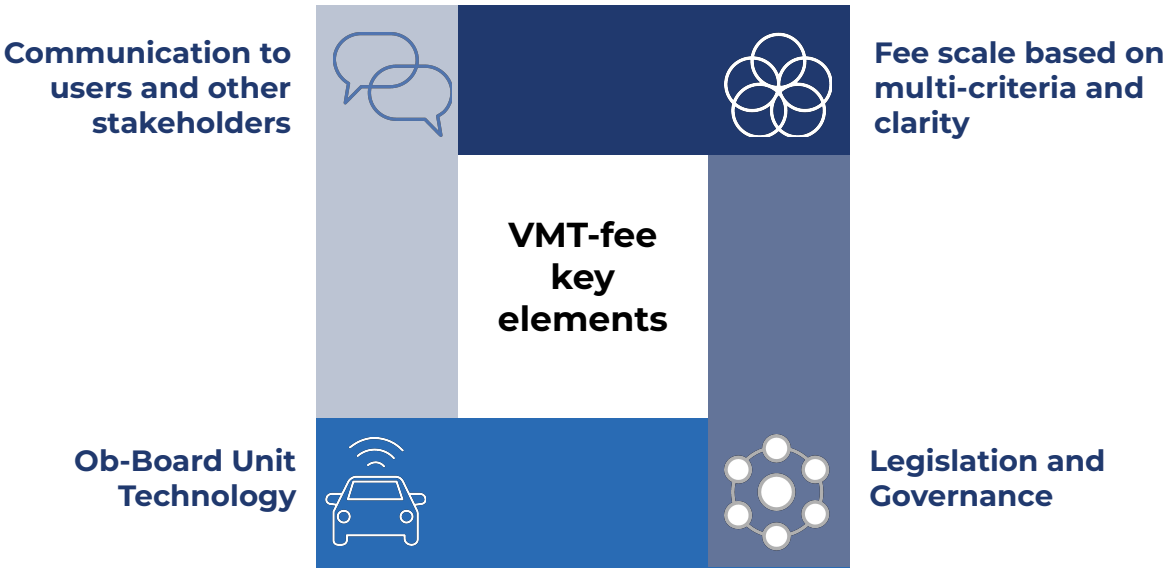
Historically, Governments have financed the maintenance of their road infrastructure mainly through fuel taxes. This system has worked quite effectively in the past, but there is a growing funding gap due to the lack of indexation of fuel tax rates to inflation, improved vehicle-fuel efficiencies and the rise of EVs.

This shortfall is expected to increase significantly in the mid/long-term with the growing penetration of EVs, so Governments are studying new RUCs to offset this anticipated decrease in fuel tax revenues.

Some US states have begun to introduce a special registration fees for electric vehicles (EV fees), followed by Vehicle-Mileage-Travelled fees (VMT fees), although the latter is still at a very early stage.

The VMT-fee would ensure sustainable funding of the road network in the long term, with an equitable approach for all users. The design of a flexible scale of VMT charges could address key environmental, congestion, and road quality concerns, along with the principles of “user-pays” and “polluter-pays”. Flexible VMT fees can also mitigate the impact on disadvantaged communities and other penalized user segments.

Although some pilot programs already exist, there is still a long way to go and some hurdles to overcome before launching the new system: implementing communication to users and other stakeholders; defining a fee scale based on socio-economic criteria (taking into account clarity to users); designing the legislation and the governance to collect the fee; and developing the technology adapted to these requirements.




Key elements to consider in the VMT-fee implementation strategy

**VMT fees stands as the only RUC form that can provide financial sustainability in line with the user-pays principle in the mid/long-term, offering flexible charges to users**

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# What's coming with the Road user charges?


- **Cesar Valero**
  MSc. in Civil Engineering and an MBA, Partner at ALG.
  cvalero@alg-global.com
- **Pau Boix**
  BSc in Civil Engineering and MSc in Civil Engineering (Transport & Business Management). Senior Consultant at ALG.
  pboix@alg-global.com

alg@alg-global.com