Tax revenue implications of decarbonising road transport – challenges and opportunities

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BETTER POLICIES FOR BETTER LIVES

Outline

1. Fuel tax revenues decline as the fleet electrifies
2. Potential alternative sources of revenue – the case of Slovenia
3. Sustaining revenues is not the only policy consideration

Decreasing fuel tax revenues are inevitable

- Countries levy energy and carbon taxes on fossil fuels used in road transport
- The increasing uptake of cleaner vehicles will lead to a drop in gasoline and diesel fuel consumption and their associated revenues

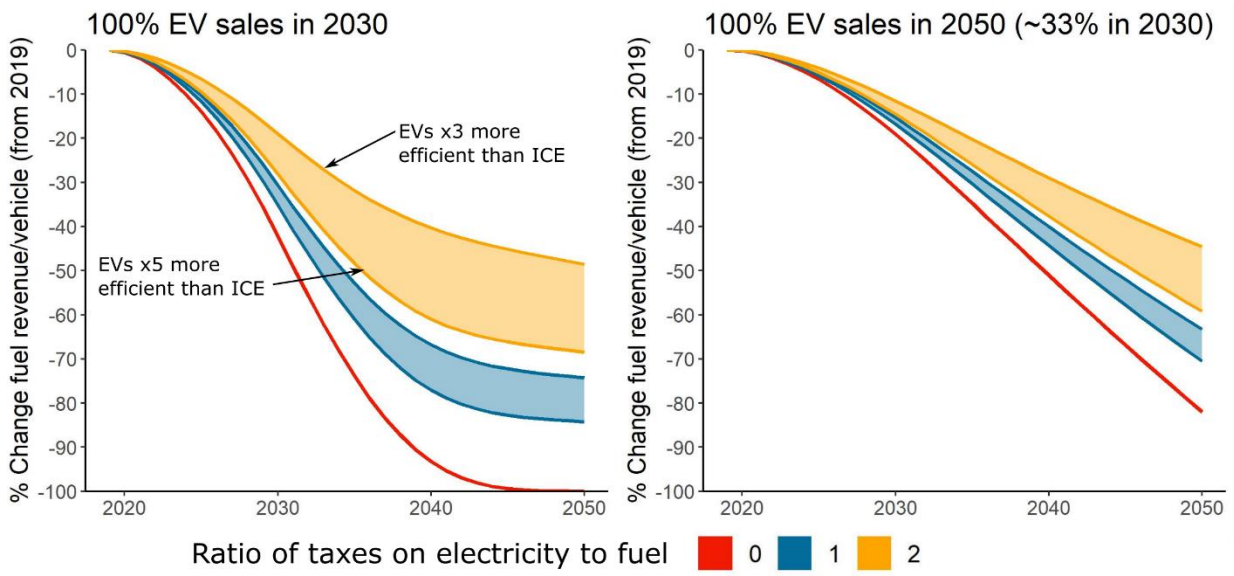
Government taxes and duties on electricity and fuel (USD cents/kWh)

	France	Germany	Italy	Japan	Korea	United Kingdom	United States
Excise tax							
Gasoline	8.34	7.90	8.79	5.59	6.90	7.97	1.30
Diesel	6.75	5.21	6.84	3.17	4.49	7.31	1.39
Electricity	4.02		6.09	0.34			
Sales tax							
Gasoline	3.03	2.78	3.43	1.34	1.50	2.86	0.26
Diesel	2.66	2.29	2.95	0.79	1.03	2.74	0.22
Electricity	2.86	2.29	2.46	1.74	0.88	1.11	
Tax ratio							
Electricity taxes/ Fuels taxes	0.66	0.25	0.78	0.38	0.13	0.11	

Source: ITF (2021), Cleaner Vehicles: Achieving a Resilient Technology Transition, International Transport Forum Policy Papers, No. 90, OECD Publishing, Paris; https://www.itf-oecd.org/cleaner-vehicles-achieving-resilient-technology-transition

Decreasing fuel tax revenues are inevitable (2)

- Magnitude of tax revenue shortfalls will largely depend on:
  - the share of EVs in new car sales,
  - how efficient electric vehicles are compared with existing conventional vehicles,
  - how much tax is collected per kWh of electricity vs. per kWh of fuel (ratio).



- For countries with relatively high fuel consumption vehicle fleets, EVs are around 4-5 times more efficient than conventional ICE vehicles.
- If no tax is collected on electricity (ratio=0) then the fuel efficiency difference between EVs and ICE has a negligible effect on revenue
- Countries with a growing vehicle fleet may face a lower total reduction in revenues

Source: ITF (2021), Cleaner Vehicles: Achieving a Resilient Technology Transition, International Transport Forum Policy Papers, No. 90, OECD Publishing, Paris; https://www.itf-oecd.org/cleaner-vehicles-achieving-resilient-technology-transition

Eroding tax bases will have multiple effects

- Eroding tax bases may put stress on government budgets
- Lower driving costs of electric vehicles, which are an important factor stimulating their adoption, risk inadvertently stimulating the use of private cars if substitutes for fuel duties are not found.

→ Governments need to find the right balance between avoiding increases in vehicle use driven by the lower travel costs of EVs, maintaining (or increasing) incentives to switch to EVs and limiting social equity impacts.

- An increased taxation of electricity will not be the solution:
  - government taxation of electricity is typically significantly lower than transport fuel
  - electric vehicles are approximately four times more energy efficient than ICE vehicles
  - electricity is not only used for transport and has a range of other uses

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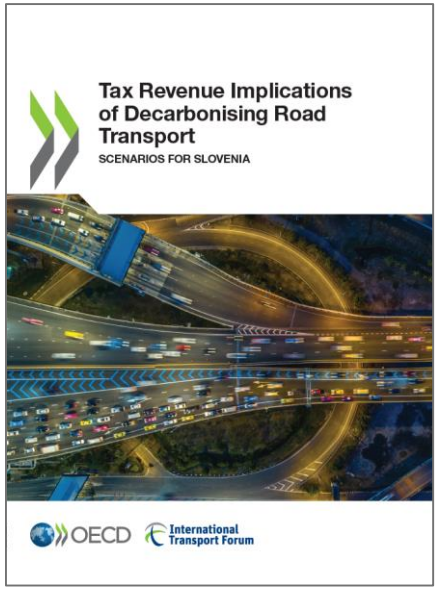
Revenue impacts from technology changes and potential tax policy responses

- OECD/ITF (2019) “Tax revenue implications of decarbonising road transport: Scenarios for Slovenia”
  - Analyses the revenue implications of potential reductions of fuel consumption in road transport, under specific technology scenarios
  - Develops a data-driven simulation tool to track the evolution of tax bases and revenues over time
  - Investigates potential tax policy responses



  - In-depth analysis for Slovenia
  - The tool was kept flexible to allow similar (or extended) analysis to a wider set of countries and regions.

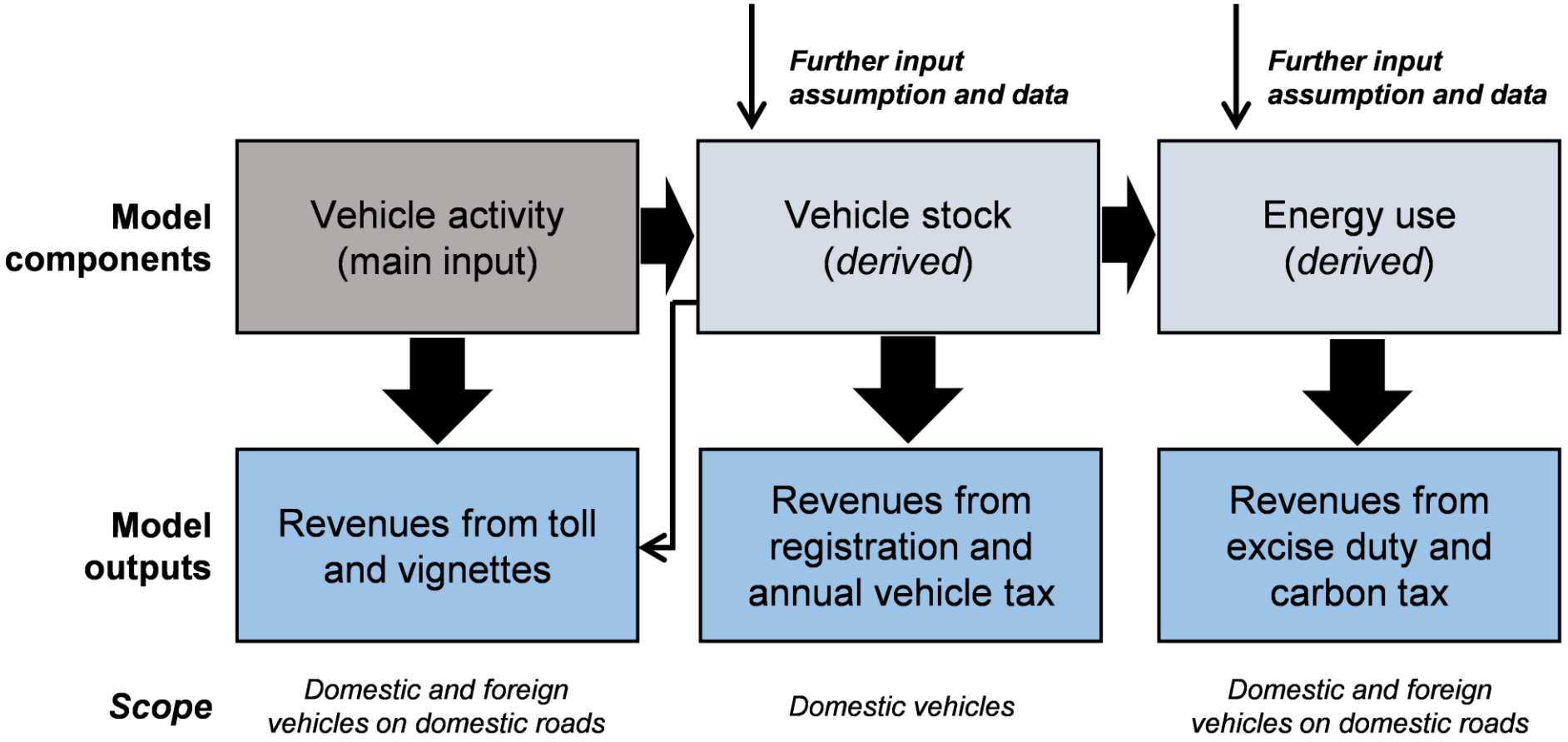
OECD/ITF (2019), *Tax revenue implications of decarbonising road transport: Scenarios for Slovenia*, OECD Publishing, Paris, https://doi.org/10.1787/87b39a2f-en.

More information at: https://www.oecd.org/fr/publications/tax-revenue-implications-of-decarbonising-road-transport-scenarios-for-slovenia-87b39a2f-en.htm

Case study: Scenarios for Slovenia

- Scope:
  - Republic of Slovenia (2017-2050) using micro- and administrative data
    - In 2016, 14.6% of total tax revenue collected at the central government level in Slovenia came from excise duties and carbon taxes levied on diesel and gasoline used in road transport
  - Three tax bases in the transport sector are considered: fuel use, vehicle stock, distances driven
    - Developments of tax bases are determined via a vehicle stock model tracing vehicles and their age over time.
    - E.g. accounting for varying vehicle use, varying vehicle efficiency, vehicle imports, new vehicle technologies
  - Main scenario for technology development: IEA "2°C Scenario for Europe"
    - Scenario analysis provides a plausible narrative about potential tax base developments; no predictive intent
  - Tax policy simulations:
    - Baseline: current fuel and carbon taxes, vehicle taxes, vignettes and tolls in Slovenia
    - Tax reform simulations: increasing fuel and carbon taxes, adapting vehicle taxation, extending and improving distance-based charging

Overview of model components and outputs

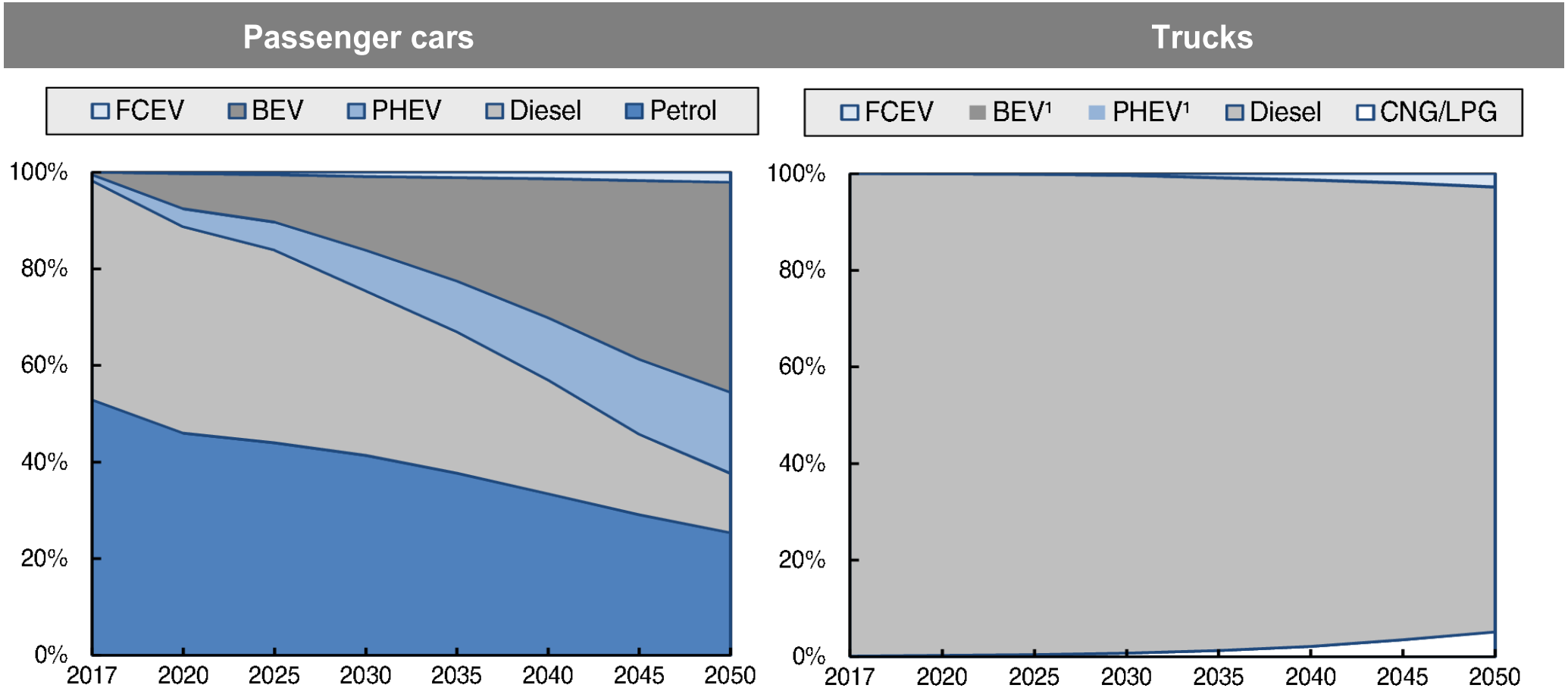


Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.

Main technology scenario (model input)

Alternative fuel vehicles in new vehicle sales in Slovenia, 2017-2050

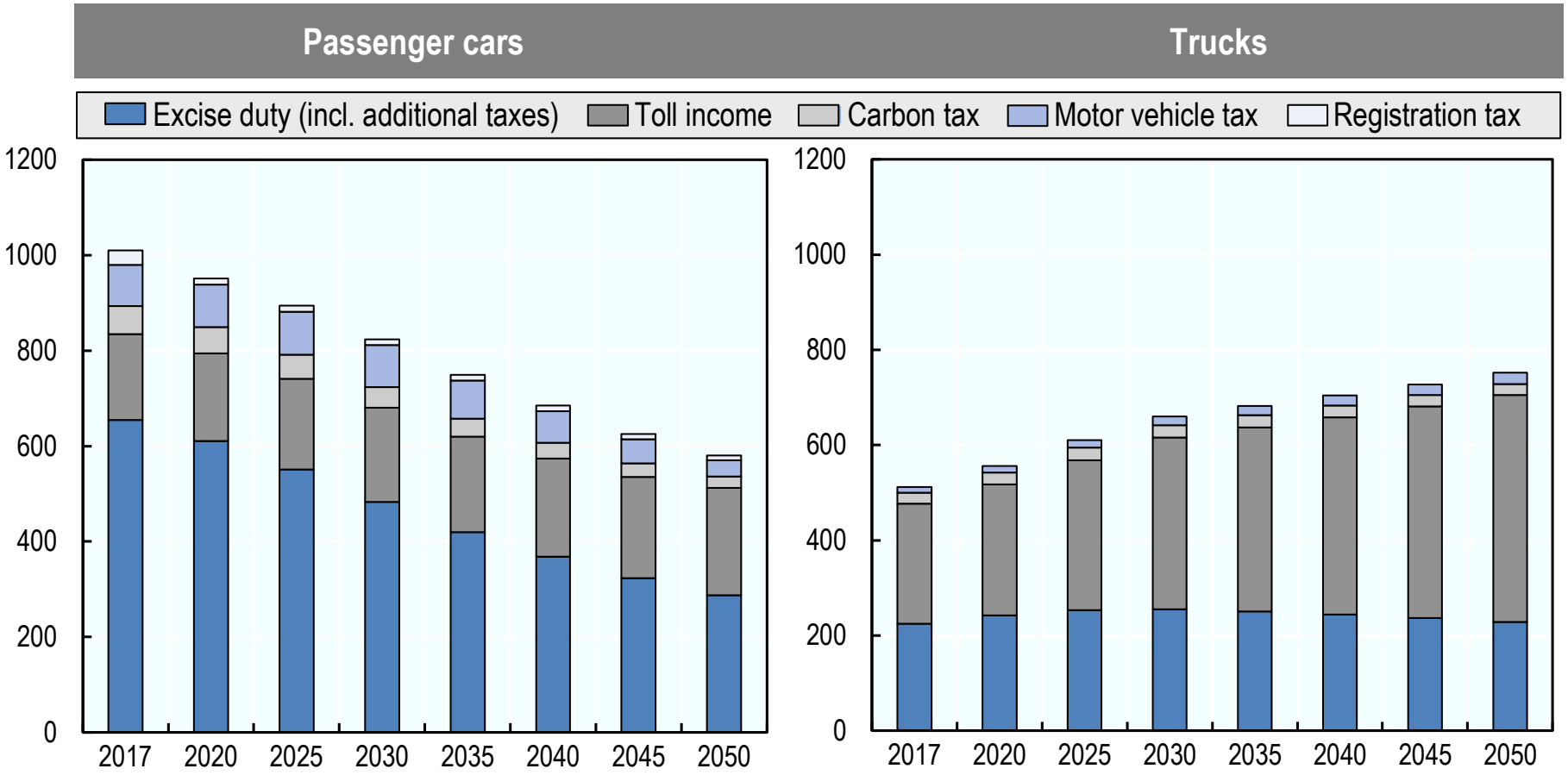
(Based on IEA 2°C Scenario for Europe)



Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris, .

Fuel tax revenue from passenger cars is expected to drop in Slovenia

Tax revenue from passenger cars and trucks for the baseline scenario, 2017-2050



Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.

Findings and policy recommendations (1)

Under current policies, tax revenues from diesel and gasoline use in private cars are likely to decline substantially in the coming decades in Slovenia.

- Total tax revenues from fuel used in passenger cars in Slovenia would drop by 56% between 2017 and 2050 if demand for cars and car use develops in line with the scenario.
  - This assumes that fuel-efficiency improves in line with European standards until 2030 and that alternative fuel technologies account for roughly 60% of new passenger car purchases in 2050 in line with the IEA 2°C scenario.
- The picture for trucks is different, with a less pronounced drop in fossil fuel use over the 2050 horizon (due to a slower expected take-up of alternative technologies).
  - Furthermore, Slovenia's current toll system for trucks provides an effective means to raise revenue independently of fuel use.

Findings and policy recommendations (2)

Gradually reforming the tax system, starting now, allows for a smooth adaptation to technological changes in the vehicle fleet and the timely implementation of accompanying measures.

- Fuel tax revenues from private cars erode gradually over time, which leaves leeway to adapt tax policy.
  - For example, a relatively modest charge on all kilometres driven on Slovenian motorways that gradually increases over time can cover the revenue loss from fuel taxes on passenger cars.
- Early preparation for tax reform and a gradual implementation will reduce the risk of disruption. It will also create room for carefully designing policies, tailoring communication and developing the necessary accompanying measures.
  - Accompanying measures could encourage the development of alternative travel modes, such as public transport, or take the form of support to those households that are affected disproportionally by the reform in the short run, but cannot easily adapt to the reform due to budget constraints.
- Transport tax reform a politically sensitive topic.

Tax reform simulation: distance-based charges

Kilometer tax equivalent to cover revenue loss from fuel and carbon taxes on passenger cars (2020-2050)

(No differentiation along vehicle dimensions; no behavioural effects)

	2020	2025	2030	2035	2040	2045	2050
Development of fuel and carbon tax revenue from cars relative to 2017 baseline (for IEA 2DS)	-7%	-16%	-26%	-36%	-44%	-51%	-56%
Km-equivalent; car and truck kilometres on motorway (Eurocent per vkm)	0.71	1.58	2.47	3.30	3.89	4.33	4.58

Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.

Findings and policy recommendations (3)

Shifting to taxes on distances driven can contribute to more sustainable tax policy over the long term, improving environmental and mobility outcomes at the same time.

- In the long run, revenues can be sustained by
  - gradually increasing fuel or carbon taxes (to cover the external costs closely related with fossil fuel use)
  - by phasing-in distance-based charges for cars (to reflect external costs closely related with distances driven).
- The existing distance-based charging systems could raise revenue and manage external costs more efficiently
  - Passenger cars: by providing a direct link to the amount of kilometres driven, instead of charging an all-you-can-drive access via a vignette.
  - Trucks: by differentiating existing distance-based toll rates by time and place.
- Higher vehicle taxes may cover the shortfall in revenues, but their limited ability in managing external costs from driving reduces their appeal.

Contribution of different tax types to raising revenue fairly and efficiently in the long-run

Summary of impact evaluation by tax type

	Fuel or carbon tax	Vehicle tax	Distance-based charges
Long-run revenue stability	☹	☺	☺
External cost management • CO_2 emissions • Air pollution • Driving-related external costs (e.g., accidents, congestion, noise and air pollution exposure, road damage, use of public space)	☺ ☹ ☹	☹ ☹ ☹	☺ ☺ ☺
Administrative and implementation costs	☺	☺	☹

Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.
and
Van Dender, K. (2019), "Taxing vehicles, fuels, and road use: Opportunities for improving transport tax practice", OECD Taxation Working Papers, No. 44, OECD Publishing, Paris.

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Policy objectives in road transport are multiple

- Revenue raising
- Manage climate change, pollution, congestion, car-dependence
- Distributional concerns

→ Tax policy can contribute significantly to reaching these objectives.

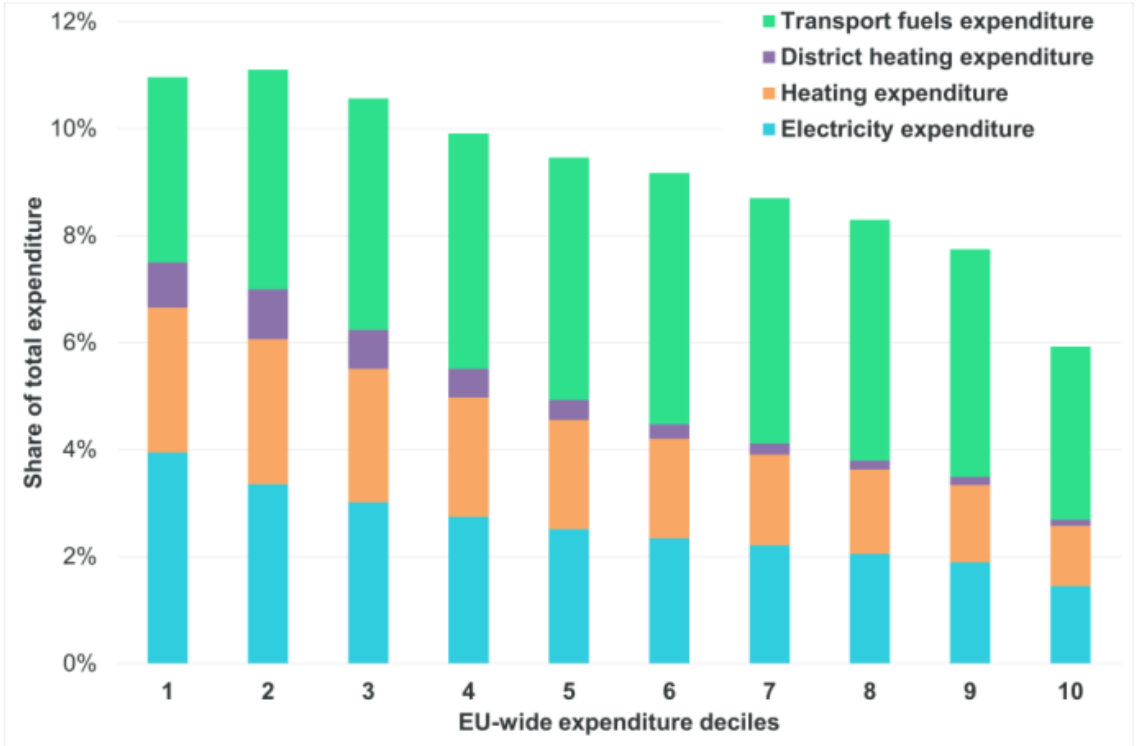
But

- Political economy considerations and **distributional consequences** are key
- Recent circumstances: how to **support households** during energy crisis?
- What **purpose of tax policy** in road transport in the long run?

Distributional impacts (1)

New evidence from a microsimulation model based on EU Household Budget Surveys (pre-crisis analysis)

Figure 1: Structure of household energy consumption (% total expenditure) across the EU-wide distribution



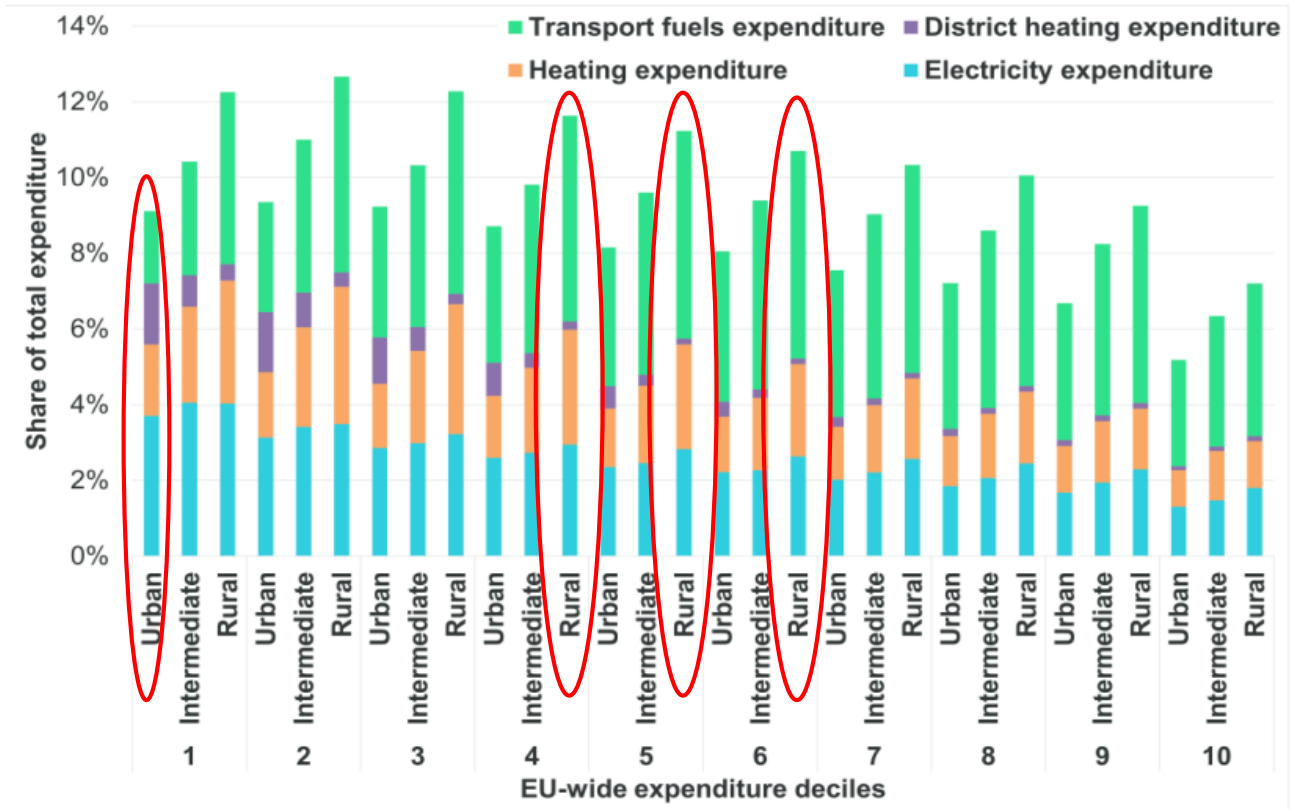
- Energy expenditure as a whole constitutes a significantly larger share of total expenditure of lower-income compared to higher-income households.
- Transport fuels constitute the biggest share of expenditure of middle-income households.

Gore, T. (2022) Can Polluter Pays policies in the buildings and transport sectors be progressive? Research report, Institute for European Environmental Policy (IEEP).

Distributional impacts (2)

Significant heterogeneity across member states and household types

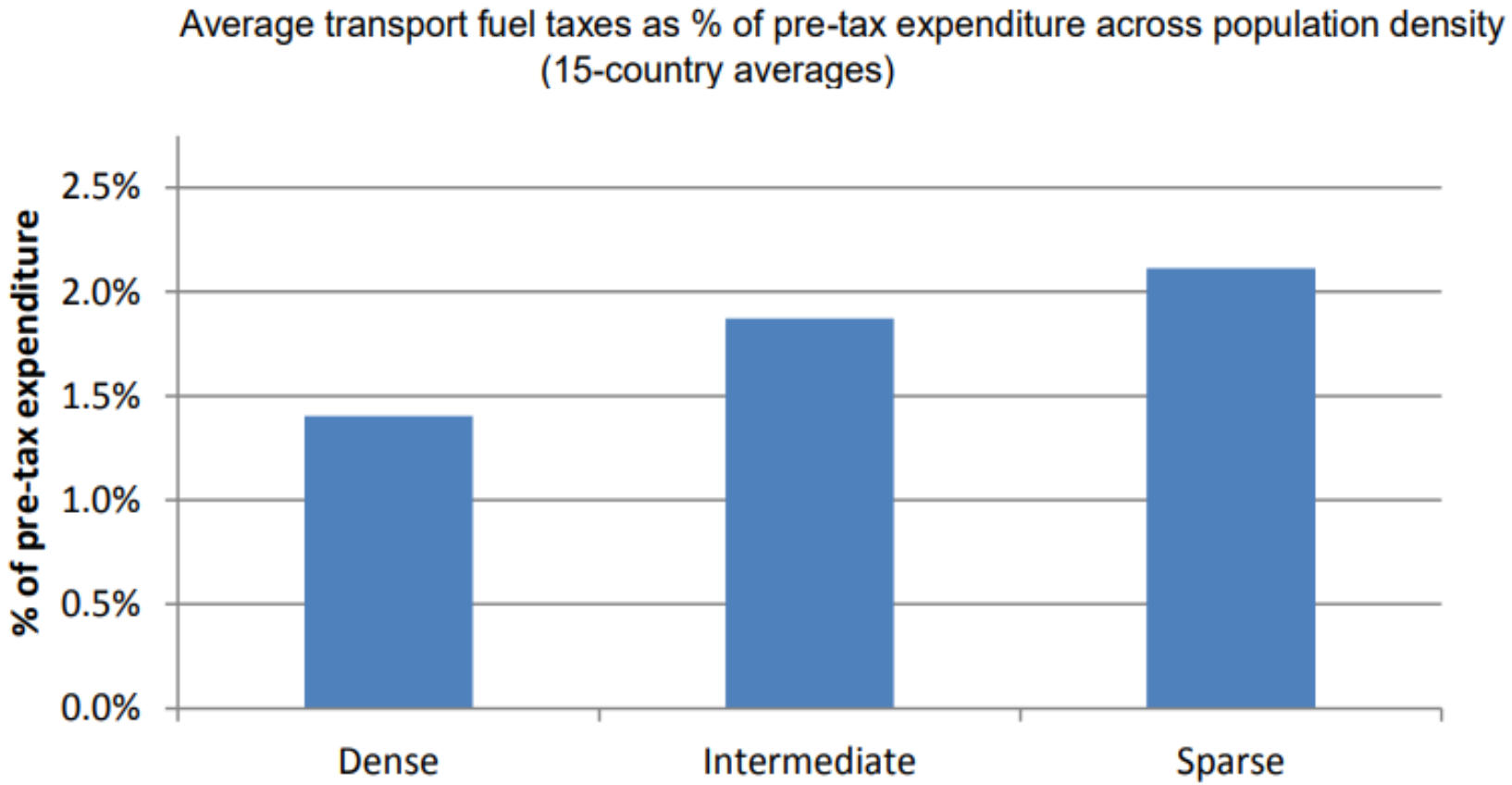
Figure 2: Structure of household energy consumption (% total expenditure)



- In some cases, **household location** is shown to have an even greater impact on energy expenditure than household income.
- Energy consumption varies significantly according to the **size and composition** of households. These factors can be a more significant determinant of energy consumption than income

Gore, T. (2022) Can Polluter Pays policies in the buildings and transport sectors be progressive? Research report, Institute for European Environmental Policy (IEEP).

Distributional impacts (3)



Flues, F. and A. Thomas (2015), "The distributional effects of energy taxes", OECD Taxation Working Papers, No. 23, OECD Publishing, Paris.

How to support households during the energy crisis?

Pursuing the transition to carbon neutrality helps reduce dependence on fossil fuels, but can succeed only if policies ensure affordable access to low and zero carbon options

- Measures that act to lower the price of energy can be relatively simple to introduce and to communicate in general **BUT** are not targeted and weaken incentives to reduce energy use when supply is tight.
- Governments should shift to more targeted measures, including through the increased use of income support, e.g. cash payments or transfers to low-income households (may require improvements to existing transfer and social welfare systems).
- Targeting of support should use criteria beyond income to include other factors that determine the degree of a household's financial vulnerability, e.g. housing location and quality, and household composition.

OECD (2022) Why governments should target support amidst high energy prices, OECD Policy Responses on the Impacts of the War in Ukraine

What purpose of tax policy in road transport?

- Traditional view: Short-run marginal cost pricing and revenue raising considerations
- Alternative view: How can taxation support a change in the energy base

Support the electrification of the vehicle fleet

- What policy instrument to steer technology shift?
- Vehicle taxes that encourage full EVs only? EV tax credits?
- Going beyond tax: standards, investment in charging infrastructure, …

… while maintaining the revenue-raising function of the transport taxation system

- Fuel tax increases? Now?
- Distance based charges

… and complementing with price-based solutions for local congestion and pollution problems.

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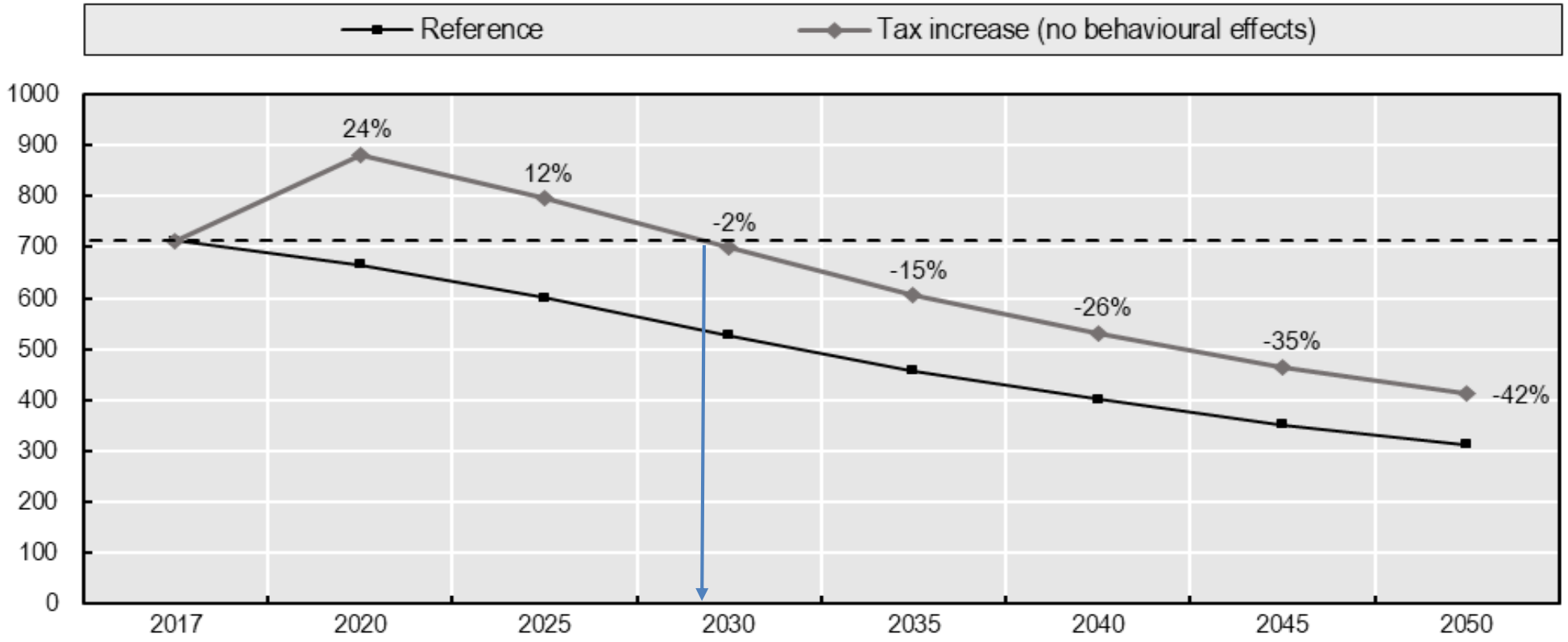
Backup – Main input assumptions (baseline scenario)

	Specification / Source
Vehicle activity projections	• *[vkm]; based on population and GDP forecasts **from national model***
Vehicle stock component • Vehicle use assumptions • Vehicle lifetime assumptions	• *[vkm per year]; by vehicle age and technology; 2017 data (assumed constant) from **National Statistics Office / Registration data*** • *Vehicle 'survivor' curves developed for **European Commission***
Energy use component • Vehicle technology uptake • Vehicle efficiency development	• *Future uptake of alternative fuel vehicles; different scenarios (e.g. International Energy Agency's **'2DS' for Europe**)* • *Future European targets are met; further (moderate) improvements in line with **IEA for Europe***
Tax revenue calculations • 2017 tax structure and rates	• *Assumed to be **constant for baseline scenario***

Backup – Tax reform simulation: fuel and carbon tax increase

Simulation of fuel and carbon tax revenue from passenger cars (2017-2050)

(Fuel tax at Italian level; tax revenue in million EUR)



Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.

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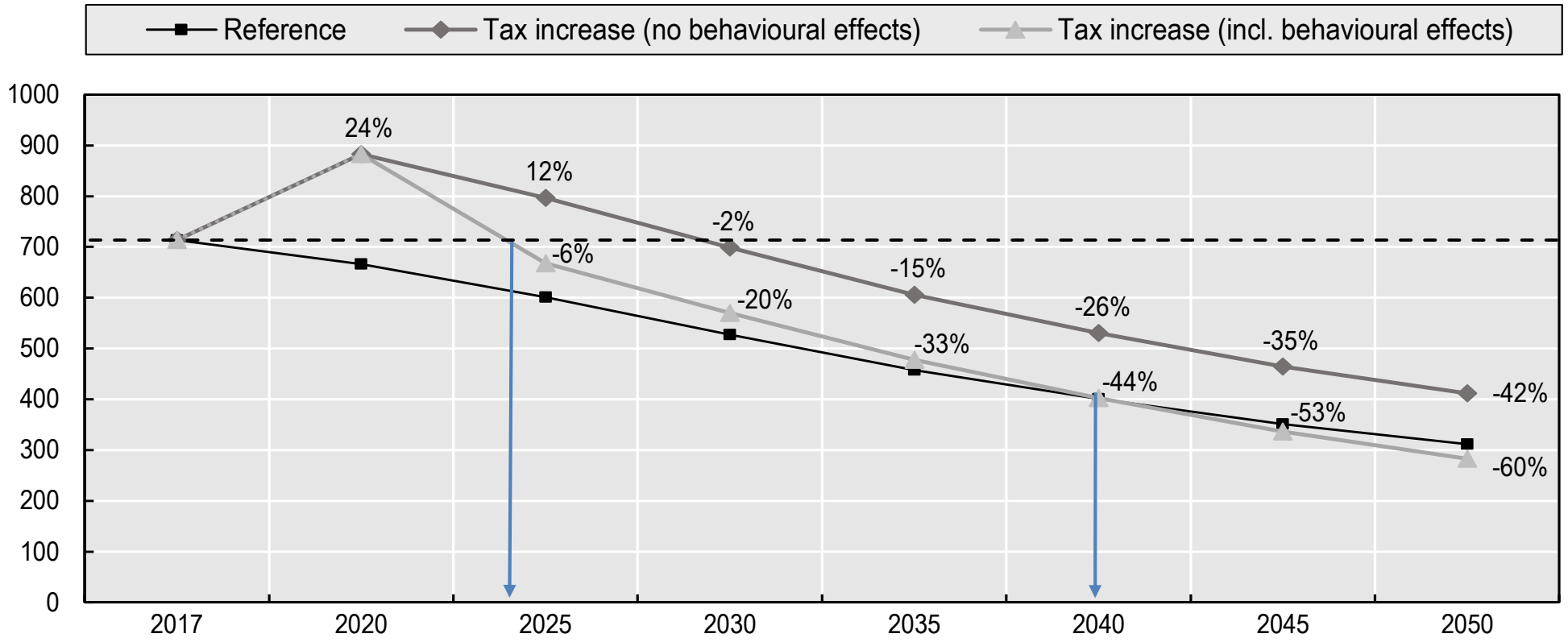

Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.

Backup – Tax reform simulation: vehicle tax reform

Annual vehicle tax equivalent to cover revenue loss from fuel and carbon taxes on cars, 2020-2050

(One vehicle tax per car; no differentiation along car dimensions; no behavioural effects)

	2020	2025	2030	2035	2040	2045	2050
Development of fuel and carbon tax revenue from cars relative to 2017 baseline (for IEA 2DS)	-7%	-16%	-26%	-36%	-44%	-51%	-56%
Annual vehicle tax equivalent (EUR per car)	39.6	93.4	150.0	202.2	243.1	279.6	306.0

Source: OECD/ITF (2019), Tax revenue implications of decarbonising road transport: Scenarios for Slovenia, OECD Publishing, Paris.