



Ministerie van Infrastructuur
en Waterstaat

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

Background report

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Contents

| | | |
|----------|--|-----------|
| 1 | Introduction | 5 |
| 1.1 | Background | 5 |
| 1.2 | Objectives of this study | 8 |
| 1.3 | Structure of this report | 9 |
| 2 | Method | 10 |
| 2.1 | Methodology | 10 |
| 2.2 | Study scope | 10 |
| 2.3 | Scope, selection and methodology for analysis of example measures | 10 |
| 2.3.1 | Selection process | 11 |
| 2.3.2 | Classification of government roles and types of measures | 13 |
| 2.3.3 | Classification of measures by legal feasibility | 13 |
| 2.3.4 | Analysed aspects | 15 |
| 3 | Arguments for saving energy in the transport sector | 17 |
| 3.1 | Energy saving as an end in itself or as a means to an end? | 17 |
| 3.2 | Distinction by energy carrier and mode of transport | 18 |
| 3.3 | Distinction between final and primary energy | 19 |
| 3.4 | Side effects of energy saving | 19 |
| 3.5 | Summary table | 20 |
| 4 | Energy demand for transport towards 2050 | 23 |
| 4.1 | Final energy demand for transport in 2024 and 2050 | 23 |
| 4.1.1 | Electricity demand for transport compared to other sectors | 25 |
| 4.2 | Primary energy demand for transport in 2023 and 2050 | 25 |
| 5 | Examples of avoid and shift measures to supplement existing policy | 27 |
| 5.1 | Passenger transport within the Netherlands | 27 |
| 5.1.1 | Measures with the government as regulator | 28 |
| 5.1.2 | Investment measure implemented by the government | 30 |
| 5.1.3 | Measure with the government as facilitator | 31 |
| 5.2 | Domestic freight transport | 31 |
| 5.3 | Aviation departing from the Netherlands | 38 |
| 5.4 | Considerations for maritime and inland waterway transport | 39 |
| 6 | Conclusions | 41 |
| 6.1 | Conclusions | 41 |
| 6.2 | Discussion | 44 |
| 6.2.1 | Limitations of the study | 45 |
| | References | 47 |
| | Bijlage A National policy within the EU legal framework | 52 |
| | Bijlage B Relevance of public support and public support surveys | 55 |
| | Bijlage C Energy carriers for transport in the Netherlands: a brief outlook | 57 |

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

Bijlage D Dutch policy documents on energy saving 62

Bijlage E Diminishing returns from measures as electrification increases 64

Bijlage F Energy demand projections by mode of transport (NPE) 66

Bijlage G Detailed examples of avoid and shift policy measures for energy savings in transport 69

1 Introduction

1.1 Background

The EU and the Netherlands aim to achieve a climate-neutral society, including a climate-neutral transport sector. This objective is linked to the public interest in combating climate change and creating a healthy living environment. For domestic transport in the Netherlands, this ambition is set out at climate neutrality by 2050¹, for shipping as well², and for aviation by 2070³. There are also European targets for energy saving (via the *Energy Efficiency Directive*, EED). All end-user sectors, including international aviation, are covered by this. Other societal goals and public interests include the affordability and reliability of the energy supply (EZK, 2023a; KGG, 2024; Uitbeijerse et al., 2024).

Carbon-neutral transport means that transport no longer causes CO₂ emissions. A distinction is often made between three strategies for achieving climate neutrality: the Trias Mobilica (VNG, 2022) or *avoid-shift-improve* approach (IPCC, 2022; Dalkmann and Brannigan, 2007). Each strategy focuses on one or more of four factors that together determine greenhouse gas emissions from transport (Figure 1.1)⁴:

- 1) *Avoid* focuses on reducing demand transport (*volume or activity*) in absolute terms or limiting growth,
- 2) *Shift* focuses on the *choice of transport mode*, i.e. the shift towards less energy-intensive modes of transport, such as cycling instead of driving,
- 3) *Improve* focuses on a) improving *the energy efficiency* of each mode of transport, for example through more fuel-efficient or electric engines, and b) reducing the *fossil carbon content* of energy sources, for example through the use of renewable electricity, biofuels or hydrogen.

¹ IenW (2022) Voortgangsbrief duurzame mobiliteit.

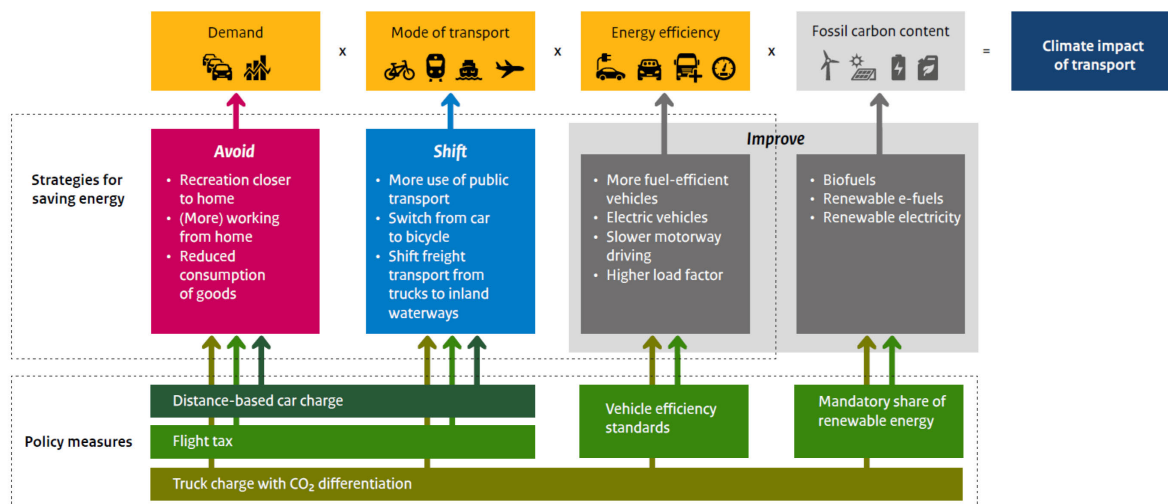
² RVO (2024) Roadmap for the fuel transition in maritime transport, <https://www.rvo.nl/onderwerpen/roadmap-brandstoftransitie-de-zeevaart>.

³ Aviation Policy Document 2020–2050.

⁴ In policy practice, however, the distinction between the *avoid*, *shift* and *improve* strategies cannot be drawn very strictly. Many policy measures fit within multiple strategies. For example, a truck charge with CO₂ differentiation can have an effect on the demand for transport (*avoid*), the choice of transport mode (*shift*) as well as vehicle efficiency (*improve*). For example, the charge encourages carriers to use other, more fuel-efficient modes of transport or to drive less, so that they have to pay as little as possible.

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

Figure 1.1 The four factors that determine the climate impact of transport, the *avoid–shift–improve* framework that addresses these four factors, and examples of policy measures that fit within these strategies. Together, the three yellow factors determine transport energy demand.



In theory, climate neutrality can be achieved through a single factor: the fossil carbon content of energy carriers. If we succeed in reducing the fossil carbon content of energy carriers to zero by using only renewable energy, transport will no longer produce CO₂ emissions. This is because CO₂ emissions are the *product* of the four factors, not their sum. However, if we leave the level of energy demand unchanged, we may at some point encounter physical limits in terms of the availability of space, raw materials and other resources needed to meet the demand for renewable energy (Bakker et al., 2022; PBL, 2024a). And all these factors also have consequences for the cost of energy to users. Furthermore, transport competes with other sectors such as industry and the built environment for renewable energy, and the Netherlands competes with other countries, as it is expected that not all renewable energy sources can be produced within the Netherlands and energy carriers are subject to international market forces.

The transition of energy supply from fossil fuels to renewables increases the risk of energy scarcity, in the sense that (latent) demand exceeds supply. For instance, in scenarios for a climate-neutral Netherlands by 2050, PBL (2024a) anticipates a shortage of renewable hydrogen and sustainable carbon carriers, such as bio- and e-fuels. The National Energy System Plan (NPE) (EZK, 2023a) anticipates a shortage of renewable electricity 'until around 2035'⁵ (NPE Main Document, p. 14). The NPE also expects the grid infrastructure to remain the 'bottleneck' for the pace of development of the electricity chain (NPE Annex 3).

In principle, this scarcity will drive up energy prices.⁶ That need not necessarily be a problem. After all, as energy prices rise, energy demand will fall in accordance with the market mechanism of supply and demand.⁷ However, energy price rises due to

⁵ The letter to Parliament on energy saving (EZK, 2024) states that there may be a shortage 'in any case' until 2035.

⁶ Whether and how an increase in energy prices is passed on to energy users depends on a variety of factors. For example, there may be long-term contracts or other dampening mechanisms that 'smooth out' price fluctuations, or other pricing arrangements. Consider, for example, the EU's Social Climate Fund, a fund expected to hold 87 billion euros for the period 2026–2032, which aims to compensate low-income households for price rises resulting from CO₂ emissions trading. See https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/social-climate-fund_en.

⁷ In emissions trading, rising energy prices are actually an intended effect: this is the internalisation of (currently still external) environmental costs and should lead to reduced

scarcity⁸ also entail risks. For example, they may lead to public resistance and increase pressure to weaken climate targets. This is also linked to the affordability of transport. Transport accounted for 12–16% of household expenditure in the Netherlands in 2015. Of the Dutch population, 10% report having difficulty paying for all their journeys, spending more on this than they can afford, or cutting back on other expenditure to cover these costs (Krabbenborg & Durand, 2024). A recent study shows that Dutch people relatively often experience problems relating to car use within the Netherlands, with the cost of the car being one such issue (Durand et al., 2025),

Instead of achieving energy savings through market mechanisms (rising prices), the government can implement targeted policies to promote energy savings, thereby minimising negative effects on affordability as much as possible.

Knowledge gap in the areas of avoid and shift policy measures

Energy savings can be achieved within the theoretical framework (Figure 1.1) through avoid, shift and part of improve. From a policy perspective, the improve strategy is already widely used. Examples include CO₂ emission standards for vehicles to improve efficiency. There is also generic policy such as the European Emissions Trading System (ETS), which addresses all four factors in the multiplication (Figure 1.1) and thus also leads to energy savings.

Much less attention is paid to energy savings via the avoid and shift strategies, both in policy and in literature.⁹ In a recent letter to the Dutch Parliament (KGG, 2025) on energy conservation, only the option of electrification is mentioned in the field of transport, which falls within the improve strategy. An earlier KiM study (Bakker et al., 2022) also focused primarily on vehicle efficiency and the carbon content of energy carriers.

As we have identified a knowledge gap in this area, this study aims to focus specifically on avoid and shift measures. What effects can be expected from avoid and shift policy measures, both in terms of energy savings and their impact on the public? To what extent can they help alleviate the pressure on the improve pathway?

A qualification is in order here. This study is not a cost-benefit analysis in which the societal impacts of avoid and shift policies are assessed and compared with other possible policies. This study is primarily intended as a thought experiment or first exploration of avoid and shift as complementary strategies alongside improve, and aims to expand the knowledge base regarding avoid and shift policies.

The decision to implement avoid and shift as policies to save energy is, of course, a matter for politicians. We have not assessed whether policies in this area align well with other government objectives, for example in the field of (international) connectivity and accessibility. We have, however, carried out a legal quick scan to assess whether measures could be compatible with current national, EU and/or international legislation if the primary objective of the measure is energy saving (see Appendix A). Measures that clearly do not fall within this scope are listed in Appendix A, but we have not analysed them further for potential energy-saving effects. This study also leaves unanswered the question of whether energy saving

demand for fossil fuels. Fossil fuels become more expensive because they must be purchased using increasingly scarce emission allowances.

⁸ Or due to an emissions cap with a scarcity of emissions allowances.

⁹ A few recent publications (Brand et al., 2025; TNO, 2025; Arnz et al., 2025) do address the potential of 'avoid and shift' in relation to energy saving, but provide limited policy implications. Similarly, in literature on transport decarbonisation, the potential contribution of avoid and shift *strategies* receives considerable attention, however how concrete *policy measures* contribute quantitatively to emission reduction is also a knowledge gap.

should be left to the market, or whether the government should adopt a strategy, for example to mitigate the undesirable effects of a potential shortage, such as reduced affordability for certain groups.

1.2 Objectives of this study

This study has two objectives.

Objective 1: To provide insights into energy saving in the transport sector in general. The first objective is to contribute to the discussion on energy saving in the transport sector. What are the arguments for (sustained) energy saving? And do those reasons differ between saving on final or primary energy? Energy saving is now often cited as a policy objective (for all sectors) but mainly in general terms, for example that it contributes to saving raw materials, space and investments in energy infrastructure, and contributes to security of energy supply. However, what energy saving can mean in concrete terms for transport, with its various modes of transport and mix of energy carriers, has yet to be fully explored. Where exactly can savings be made, and what benefits does this yield? For example, if the aim is to save primary energy, this may lead to different policy choices than saving energy at the end-user level, i.e. across the various modes of transport. This study provides insights that can contribute to this.

Objective 2: To increase knowledge of avoid and shift as a specific form of energy-saving policy. The second objective is to explore, as a thought experiment, the possibility for the Dutch government to save energy in the transport sector through avoid and shift. We are doing this on the basis that there is already considerable policy focus on improve¹⁰. The initial expectation is that avoid and shift offer opportunities to contribute to greater affordability and security of energy supply, as they help alleviate the pressure on the improve route; furthermore, avoid and shift could reduce the rebound effect¹¹ of improve policy. With this aim of gathering knowledge in mind, we analyse examples of avoid/shift measures mentioned in the literature. These may also be measures that are not yet being applied anywhere, but their implementation must be at least *conceivable* in the near future, the period 2030–2040, and the measures must then be capable of delivering substantial energy savings. It must also be assessed that the measures are legally tenable.¹²

Finally, we focus on the preferences of the Dutch public for specific avoid and shift measures. The latter can be seen as a starting point for research into public support (in which support for each measure is often assessed). Public support is important for political support, and therefore for the likelihood of implementation^{13,14} of a

¹⁰ Thus, policy aimed at reducing the carbon content of energy carriers and at energy efficiency (see Figure 1.1).

¹¹ This is also known as Jevons' Paradox. Applied to vehicles, for example, it means that motorists tend to use energy-efficient vehicles, which have lower energy costs per distance travelled, more frequently, thereby partially or entirely negating the efficiency gains.

¹² We would note here that an analysis of any adverse side effects – such as impacts on the business sector or international air links and transport network quality – falls outside the scope of this study.

¹³ Timing is also important here: a measure is best implemented when the problem, the policy measure and political events coincide in time (Kingdon, 2005). This is often an unpredictable process.

¹⁴ Although public support is an important factor in policy implementation, it is not always necessary. Measures for which there is little public support can still be taken, for example because (European) legislation requires it.

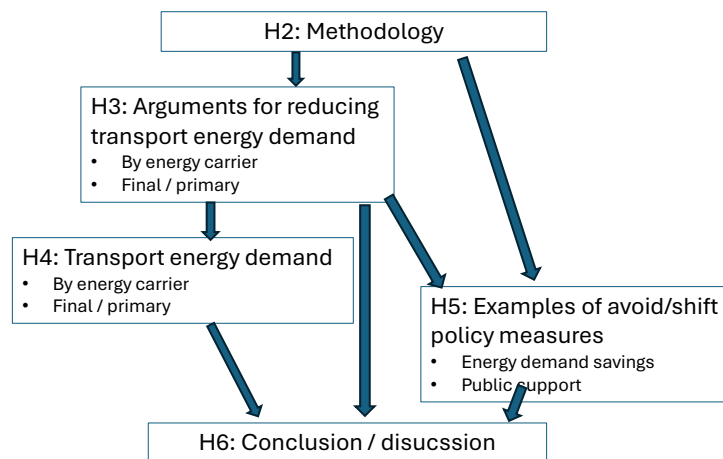
measure or package of measures. Appendix B examines the relevance of public support and public support research in greater depth.

The method we intend to use to achieve the objectives of this study is described in the following chapter.

1.3 Structure of this report

Chapter 2 discusses the methodology, including the scope and selection of example measures (for Chapter 5). Chapter 3 examines the specific arguments for energy savings by energy carrier. Chapter 4 examines the final and primary energy consumption of transport in the coming period according to existing scenarios. We break this down by energy carrier. Chapter 5 elaborates on examples of potential avoid and shift measures and their energy-saving effects, alongside aspects such as impacts on citizens, practical feasibility and public support. Chapter 6 is a concluding chapter, which also includes a discussion section. See the figure below for the relationship between the chapters.

Figure 1.2 Relationship between chapters



This report also includes the following appendices:

Appendix A: National policy within the EU legal framework

Appendix B: Relevance of public support and public support research

Appendix C: Characteristics of energy carriers for transport

Appendix D: Dutch (policy) documents on energy saving

Appendix E: Diminishing returns on measures with increasing electrification

Appendix F: Energy demand in 2050 by mode of transport (NPE)

Appendix G: Detailed examples of avoid and shift measures for energy saving

2 Method

This chapter discusses the methodology. In particular, we describe the method used to select the avoid/shift example measures discussed in more detail in Chapter 5.

2.1 Methodology

This study was conducted as follows:

KiM is responsible for the overall product.

The research into reasons for energy savings in the transport sector (Chapter 3) and the energy demand of transport (Chapter 4) was carried out by KiM based on a literature review and own expertise.

At our request, CE Delft analysed specific avoid and shift measures against a number of criteria. This analysis is included in Appendix G. KiM has used these analyses for the overarching narrative in Chapter 5.

The accompanying analysis of public preferences was carried out by Populytics (2025) as part of a participatory value evaluation (PVE). This report has been published as an accompanying document, and the main findings are summarised in Chapter 5.

The research was guided by a sounding board group comprising policy officers from various directorates within the Directorate-General for Transport (DGMo) and the Directorate-General for Aviation and Maritime Affairs (DGLM) of the Netherlands Ministry of Infrastructure and Water Management (IenW). The role of the sounding board group was to provide feedback on the initial ideas for potential avoid and shift measures and on the draft reports. KiM ultimately made the decisions regarding the example measures, the analysis and the formulation of the conclusions.

In addition, a review group, in which PBL and TNO were represented, reviewed draft results for scientific quality at various stages of the research process. An advisor from the Scientific Climate Council reviewed the design of the PVE.

2.2 Study scope

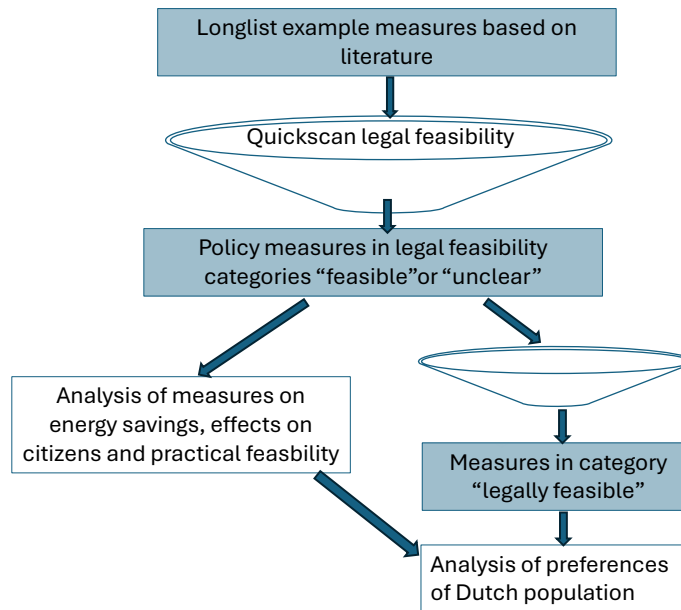
An assessment of individual measures for cost-effectiveness proved not possible within the scope of this study. The method we had in mind for this, the national cost methodology, proved unsuitable. For a genuine assessment from a societal perspective, the measures would need to be assessed using a cost-benefit analysis. This falls outside the scope of this study. Although affordability and security of supply may in themselves be important reasons for pursuing energy-saving policies, we have not assessed individual measures in this study against these broader aspects. However, we do examine the household costs of measures and, in a more general sense, the reasons why energy sources may become scarce (Appendix C).

2.3 Scope, selection and methodology for analysis of example measures

Chapter 5 examines specific measures that the central government can implement and which aim to save energy within the Netherlands through avoid and shift, i.e. a reduction in transport demand and/or a shift to other modes of transport (see Figure 1.1). The examples are limited to three sub-sectors: domestic passenger transport, domestic freight transport and international aviation. We do discuss international maritime and coastal shipping, but we have not developed any example measures for these modes (for an explanation, see the following section 'selection process').

In this section, we describe the method for the selection and analysis of the example measures. Figure 2.1 provides a simplified overview of this.

Figure 2.1. Selection and analysis of example measures



As the figure shows, legal viability is an important preliminary selection criterion. Much of the relevant policy is made at EU level, and the Netherlands is bound by European fundamental rights and specific European legislation and regulations. This limits the scope for action by national governments; Annex A deals with this specifically.

2.3.1 Selection process

The process of selecting examples of avoid and shift measures analysed by CE Delft involved the following considerations:

1. Measures must be described, or at least mentioned, in existing literature, so that we can build on them.
2. They must fall within the mandate of the national government.
3. They must be capable of saving at least 0.5% of energy consumption¹⁵ within a subsector.
4. They must achieve energy savings within the Netherlands; in other words, they must ensure that there is less refuelling and (electric) charging in the Netherlands, without the effect being achieved solely through a shift to refuelling and charging abroad (which would result in a net effect of zero). A particular consequence of this criterion was that we did not identify any measures in inland waterway or maritime shipping, as the measures we could devise would primarily result in a shift (see also 5.4).

We drew on the following sources for potential measures:

- Initially, we drew on Dutch studies focusing on a broad range of possible measures for the transport sector, such as Kansrijk Mobiliteitsbeleid (CBP/PBL,

¹⁵ This lower limit has been chosen somewhat arbitrarily, but is intended to give concrete form to the premise set out in section 1.2 that the measure must potentially be capable of achieving a *substantial* saving effect. In the selection process, we estimate whether a measure can meet this lower limit on the basis of simple assumptions.

2021), studies on behavioural measures (Ecorys, 2022; & Morgen, 2021), cost-benefit analyses of political party programmes (PBL, 2023a), climate policy options (IBO Klimaat, 2023) and visions on transport (CE Delft, 2023). These studies primarily describe options that build on existing policy, but sometimes also include more ambitious or innovative measures.

- We have also drawn on measures that already exist for crisis situations (such as the 'car-free Sunday' measure that can be implemented in the event of an oil crisis (EZK, 2023b)) or measures where energy saving is not the primary objective, but may be a co-benefit. Examples include environmental zones in cities, which are primarily aimed at improving air quality. Including this type of measure is a deliberate choice to facilitate discussion on whether or not these measures can also be used (outside of a crisis situation) for structural energy savings.
- In addition, we searched the international literature to broaden the range of examples.

We then carried out a quick assessment of all measures to gauge whether they are legally tenable (i.e. would stand up in court) based on structural energy saving as the main motive, see text box 'legal quick scan'. The measures that we did not initially assess as legally untenable have been further subdivided into 'appears to be legally feasible' and 'unclear whether it is legally feasible'. These two categories of measures have been further analysed by CE Delft against a number of criteria. The measures that appear to be legally feasible in any case have been used in the PVE.

Box: Legal quick scan

We have carried out a quick legal scan to filter out the legally complex measures. This is based on a quick scan carried out at our request by experts and policy officers within the Ministry of IenW, and on material regarding the rationale and justification for existing measures. This rapid legal assessment should not be regarded as a legally conclusive judgement; it is merely an initial assessment, intended to enable us to make a simple categorisation of measures.

We distinguish between three categories of legal viability (with energy saving as the main rationale):

- 1) No legal issues are expected; the measure 'is permissible',
- 2) It is unclear whether the measure is legally tenable, or under what conditions (for example, only in a crisis; measures must then be justifiable as such),
- 3) Legally unlikely to be tenable on the basis of European fundamental rights and current legislation in the Netherlands, the EU and/or internationally.

To be legally tenable, a measure must in any case be *proportionate*, defined as: suitable and necessary. In other words, the measure must be an effective means of achieving the stated policy objective, but must also be the least restrictive measure to do so. For further details on freedoms in the internal market, see Annex A.

The more a policy measure restricts freedom, the more the requirement of proportionality will come into conflict. Such a far-reaching measure is unlikely to be suitable for structural (permanent / long-term) implementation and therefore falls into category 2, 'unclear'. Such a measure may, however, serve a purpose (temporarily) in a crisis situation, when swift action is required.

Category 3 comprises measures that appear, a priori, to be in breach of European fundamental rights. These are measures that we believe are not feasible based on the current legal system. We will therefore not analyse them further. We do,

however, mention these measures to contribute to the discussion on the feasibility of measures.

2.3.2 *Classification of government roles and types of measures*

We distinguish between different roles that governments can play and the types of instruments that are appropriate for each, see Figure 2.2.

Figure 2.2 General classification of policy instruments according to the role of governments (Visser and Kansen, 2018)

| Regulator | Facilitator |
|--|---|
| <ul style="list-style-type: none"> • Allow or restrict • Norms or standards • Financial instruments (mandatory; disincentives or bonus/malus) | <ul style="list-style-type: none"> • Financial instrument (voluntary; incentives) • Voluntary agreements • Facilitating stakeholder interaction • Increase transparency |
| Implementer / investor | Communicator |
| <ul style="list-style-type: none"> • Tendering / procurement • Construction • Implementation | <ul style="list-style-type: none"> • Information • Benchmarking • Naming and faming • Promoting visions |

Note: translation by KiM

More specifically, we use the following general classification of types of instruments.

1. Permit/prohibit; for example, permitting certain types of vehicles on the road; permitting access to a zone/area;
2. Standardisation, setting a standard, lower or upper limit; this can be done at various levels, for example standardisation of a vehicle, a product, business activities;
3. Pricing measures (taxes and levies), for example on products, services or activities; examples: fuel duty, ticket tax;
4. Rationing measures such as a cap; where tradability is involved, this concerns cap-and-trade (a combination of standardisation and pricing measures); for example, the ETS;
5. Voluntary agreements and covenants, for example between central government and other authorities, or between central government and one or more companies; these may involve a best-efforts or performance obligation;
6. Incentives through subsidies and similar measures (voluntary), for example a purchase subsidy for a specific vehicle, or a subsidy on tickets
7. Public investment, for example, increasing or decreasing the budget for (certain types of) infrastructure, or direct procurement.

2.3.3 *Classification of measures by legal feasibility*

The table below contains the complete list of measures. Only the measures in columns 1 and 2 have been analysed in more detail in Appendix G for their energy-saving effects and other impacts, and those in column 1 have been used in the PVE. Appendix A discusses the reasoning behind the legal unfeasibility of the measures in column 3.

Table 2.1 Master list of example measures divided into three categories

| Measure that is/appears to be legally feasible | Unclear whether the measure is feasible with structural energy saving as the motivation, or only under certain conditions | Legally (probably) not tenable with structural energy saving as the motivation |
|---|--|---|
| Domestic passenger transport | | |
| Increase in fuel duty | Reduction of the speed limit on main roads to 80 km/h | Number plate restrictions |
| Making additional tax liability for company lease cars distance-dependent | Car-free Sundays | Mileage quota for passenger cars |
| Abolition of tax-free commuting allowance | Mandatory strict parking policy for employees | |
| Investment package for modal shift | | |
| Tax incentives for compact cars (bonus/malus scheme) | | |
| Introduction of road pricing | | |
| Incentives for working from home | | |
| Domestic freight transport | | |
| Increase and extension of the truck charge | Energy performance standards in freight transport | |
| Road access for Super EcoCombi (SEC) trucks | Reduction of the maximum speed limit for truckstrucks on motorways to 70 km/h | |
| Promoting zero-emission zones in cities and subsidies for LEFVs | Mandatory transparent delivery costs for consumers (e-commerce) | |
| Aviation departing from the Netherlands | | |
| Distance-based air passenger duty | | Excise duty on kerosene |
| | | Energy budget for airlines |
| | | Flight quota for individuals |
| | | Business flight quota |
| | | Lowering Schiphol's capacity ceiling |

The selected example measures in columns 1 and 2 fall within the roles of regulator, facilitator and implementer (see Figure 2.1). The fact that no 'communicator' measures have been selected does not mean that these are not important for supporting other measures; it is simply the assessment that they cannot, on their own, achieve significant energy savings.

2.3.4 *Analysed aspects*

Energy savings

The energy-saving effect of a measure will depend on its specific implementation or policy settings. For example: what is the level of any levy, what is the set standard value (lower or upper limit), what is the level of a ceiling, what is the degree of incentive/subsidy, and so on. We refer to these as the policy settings. These settings determine how much energy saving, in PJ, can be achieved at a given time.

Existing quantitative studies of policy in the Netherlands focused on *avoid* and *shift* usually define effectiveness as a change in passenger-kilometres or tonne-kilometres on the road, tonnes of CO₂ saved, or the percentage of energy savings compared to a scenario without the relevant policy option.

CE Delft has estimated the potential energy savings in 2040 for each of the measures in columns 1 and 2 of Table 2.1.¹⁶ This is based on the assumption that the measure will be introduced around 2030 and that it will take around ten years (2030–2040) for the full effect of a measure to be realised. At our request, both an optimistic and a pessimistic estimate have been made.

These relate to savings in *final* energy consumption, i.e. viewed from the perspective of the user or mode of transport. To avoid making the calculation too complex, no distinction has been made between energy carriers: savings on electricity and fuel have therefore been added together, despite the fact that they are not directly comparable and the reasons for making the savings also differ, as we show in Chapter 3.¹⁷ This is therefore a limitation of this study.

CE Delft has used various assumptions, literature and its own calculations to calculate the savings effect (Appendix G). The assumptions have been discussed with a experts in a review group.

¹⁶ The reference energy consumption in 2040, against which the avoid and shift measures achieve their savings, is set out in Appendix G. An assumption has been made regarding the composition of the fleet of vehicles with internal combustion engines (ICEs) and vehicles with electric motors (EVs) in 2040. If the ratio between the two vehicle types changes, the absolute savings effect of the measures changes, while the *relative* savings effect (% savings compared to the reference) remains unchanged. This applies to avoid measures. The relative energy saving therefore also applies to later years, for example 2050, if there are more EVs and fewer ICEs. A condition for the latter, however, is that the measure in question has an equally strong impact on both types of vehicle; for example, the measure leads to an x% reduction in the distance travelled per vehicle for both ICEs and EVs. For example: a measure that ensures all vehicles travel 10% less distance results in less energy saving in absolute terms for vehicles with electric motors, because those vehicles already use less energy per distance travelled than a vehicle with a combustion engine. However, the relative saving per vehicle is the same for both, namely 10%. Please note: for modal shift measures, the relative saving does depend to some extent on the ICE/EV ratio. For example, a modal shift from road to inland waterway transport yields a greater relative saving the higher the proportion of ICEs in road transport.

¹⁷ A vehicle with an electric motor is roughly three times more efficient than a vehicle with an internal combustion engine. With 1 PJ of electricity, you can therefore travel three times as far as with 1 PJ of fossil fuel. This also means that saving 1 PJ with electric vehicles requires a threefold reduction in the distance travelled compared to vehicles with an internal combustion engine.

Criteria other than effectiveness

In addition to effectiveness in terms of energy savings (PJ), the question also concerns what other aspects of the measure are involved. Specifically, these are:

1. Practical feasibility. This concerns the effort required to implement and enforce the measure. We have chosen this criterion because we are focusing on concrete policy measures, for which feasibility is an important aspect.
2. Impact on citizens. For example, what are the distributional effects, effects on freedom of choice and accessibility, the average household budget and consumer prices?
3. Preferences of the Dutch population. Which measures are preferred to a greater or lesser extent for achieving a specific level of energy demand reduction?

The effect on the (average) household budget has been estimated quantitatively, while other effects have been estimated more qualitatively. Here too, CE Delft has drawn on existing literature, and where this was not available, used its own calculations based on assumptions from the literature or expert estimates. See Appendix G for a more detailed discussion of the methodology. The cost-benefit ratio is also important when weighing up measures, but as indicated in 2.2, it proved impossible within this study to properly map out costs and benefits.

Preferences of the Dutch population

For the measures that appear to be legally feasible, we investigated the relative preferences (and the reasoning behind them) of the Dutch population regarding these measures – although the desirability of the measures is, of course, a matter for politicians.

After considering various methods used in public support surveys, we have chosen the Participatory Value Evaluation (PVE) (Bahamonde-Birke et al., 2024) as the most suitable. A PVE can be used for various purposes. Here, we are using the PVE as a tool to assess public support. The PVE measures people's preferences for different measures both quantitatively and qualitatively. It does so not by asking about public support for each measure, as is often done in public support surveys, but by asking respondents to select measures that, when combined, achieve a specific savings target.

Participants in the study enter an online environment that simulates the government's decision-making process. They gain insight into the pros and cons of the measures. In this way, they experience the complex dilemma the government may face in the event of an energy shortage, and can provide well-considered advice.

In the chosen research design, the respondent is encouraged to achieve the intended overall target, but the respondent is permitted to deviate from this and choose more or fewer measures than are necessary to achieve the intended overall target. This gives us insight not only into the ranking of the measures (how measures score in terms of preference relative to other measures) but also into the extent to which people express a preference for a measure at all.

The PVE conducted to support this study is a closed PVE, i.e. one in which participants were invited to take part. This is in contrast to an open PVE, in which, in principle, any Dutch citizen can participate. A total of 2,725 respondents took part. They are representative of the Dutch population in terms of age, gender and educational level. See also Populytics (2025).

3 Arguments for saving energy in the transport sector

In this chapter, we examine the various arguments for energy saving in the transport sector in greater depth. First in general terms (section 3.1) and then (section 3.2) more specifically for each energy carrier. The latter is because the reasons for saving energy can differ per energy carrier, depending on specific characteristics, such as the (im)possibility of storing an energy carrier (long-term) and the raw materials from which an energy carrier is made. After that, we examine in section 3.3 the difference between saving on a final or a primary energy carrier. We conclude with a summary table of arguments.

3.1 Energy saving as an end in itself or as a means to an end?

Under the European *Energy Efficiency Directive* (EED), the Netherlands has a legal obligation to save energy. The EED has thus created an incentive to save energy.

A logical argument for energy saving seems to be that it can ensure that fewer investments are needed on the supply side and that the space and raw materials required are reduced. For example, because fewer wind turbines need to be installed and less expansion of electricity grids is required. The transition to a climate-neutral energy system thus becomes more feasible and affordable. Dependence on energy imports from other countries is also reduced. Energy saving can also ensure that end users, such as households and businesses, incur lower costs. Whether this is the case, however, will also depend on how the energy saving is achieved: what costs are incurred by the energy-saving measure?

Energy saving is identified in the NPE as one of the five guiding choices for our future energy system and is therefore considered important. The first strategy is to focus fully on the supply side: increasing the production and distribution capacity of CO₂-neutral energy. The second strategy focuses on the demand side and seeks to reduce energy demand through energy savings (EZK, 2023a). Affordability and security of supply play a key role in this. As the NPE in-depth document on development pathways states: *"because sustainable carbon carriers are not expected to be abundantly available, it is important to limit the use of carbon carriers at the system level as much as possible. This is necessary to safeguard the affordability of the energy system as a whole and to guarantee the security of supply of sustainable carbon carriers for the applications for which they are indispensable. This can be achieved, on the one hand, by limiting demand as much as possible, for example by promoting energy efficiency and more sustainable consumption patterns [...]"* (p.71).

Other (policy) documents also refer – in fairly general terms – to the need for energy saving (for an analysis, see Appendix D). Arguments in favour of energy saving that are frequently cited include:

1. It results in CO₂ reduction (as long as energy sources remain fossil-based). As a result, energy saving contributes to reducing cumulative CO₂ emissions between now and 2050, and thus to keeping the carbon budget within reach for a 1.5 or 2-degree temperature rise;
2. The energy transition challenge becomes less daunting because fewer investments are required in production, large-scale transport and fine-mesh distribution of energy (affordability of the energy system);
3. It reduces the risk of future scarcity (and consequently rising prices) of energy carriers, particularly hydrogen (and e-fuels) and biofuels, which could make achieving climate neutrality substantially more expensive;

4. It reduces dependence on other countries, for example for imports of raw materials and fuels (energy security of supply);
5. It leads to lower energy bills for citizens and businesses (affordability);
6. It reduces land use as there is less need for raw materials and the production of energy carriers (quality of life).

The first argument in the above list relates to the goal of climate neutrality. Note that the other arguments remain valid even if climate neutrality is achieved – for example, through the use of renewable energy alone.

We would like to examine the arguments regarding the risk of scarcity and (consequently) rising energy prices in more detail here.

It is to be expected that scarcity, due to a lack of production or distribution capacity relative to existing energy demand, will lead to an increase in the prices that the transport sector must pay for the various CO₂-neutral energy carriers (electricity, hydrogen, e-fuels and biofuels).¹⁸ Rising energy prices need not necessarily be a problem. Rising energy prices will either reduce energy demand or make investments in expanding supply more profitable. This is the market mechanism of supply and demand. In emissions trading, rising energy prices¹⁹ are even an intended effect: this is the internalisation of (currently still external) environmental costs and should lead to reduced demand for fossil fuels.

However, energy price rises caused by scarcity or by emissions trading with limited emission allowances also entail risks. They make energy less affordable, which may hit some groups harder than others. In 2015, expenditure on transport accounted for 12–16% of household expenditure in the Netherlands (²⁰). Ten per cent of the Dutch population report having difficulty paying for all their journeys, spending more on this than they can afford, or cutting back on other expenditure to cover these costs (Krabbenborg & Durand, 2024). The price-increasing effect may also lead to public resistance and increase pressure to partially abandon climate targets. Energy affordability is considered a public interest according to the NPE (EZK, 2023a).

3.2 Distinction by energy carrier and mode of transport

When striving for energy savings, the distinction between different energy carriers is important, particularly electricity versus fuels.

For example, in the case of electricity, energy saving is particularly useful if it helps to prevent (excessively) high (temporary) peaks in demand, thereby smoothing out energy demand. Without smoothing out peak demand, more peak generation capacity or more storage capacity would be required, both of which entail costs. It may be sensible to focus policy on saving energy at specific times when there is (too) little supply from variable sources.²¹

With biofuels and e-fuels – which, compared to electricity, can be stored easily and cheaply for long periods – energy saving need not be targeted at specific peak times, but rather at saving (scarce) raw materials and space in general (if the

¹⁸ Assuming that fossil fuels do not provide an escape route, as their use is increasingly restricted or they are becoming increasingly expensive, given the goal of climate neutrality.

¹⁹ Emissions trading in the ETS1 and ETS2 makes fossil fuels more expensive because increasingly scarce emission allowances must be purchased.

²⁰ No more recent data available.

²¹ We have found one study (Arnz et al., 2024) that quantitatively examines the effects on the electricity system if ambitious efforts are made to *promote 'avoid and shift'* in transport. According to this study, substantially less (around 25%) electricity generation capacity would then be required.

biofuel is made from crops grown specifically for that purpose), and on reducing dependence on imports from high-risk countries.

In addition, there is another factor at play that makes the distinction between electricity and fuel relevant. The electrification of vehicles is in itself an energy-saving strategy²² (in this case as part of the improve strategy, see Figure 1.1). Any energy-saving measure taken in addition to electrification is automatically less effective. After all, energy consumption has already been significantly reduced by electrification, and there is less to save. The consequence is therefore that *avoid* and *shift* measures save less energy with electric vehicles than with combustion-engine cars; see the calculation example in Appendix E. The motivation for energy saving may still exist in the context of extensive electrification, but the focus may shift, for example, to limiting peak electricity demand (peak shaving and the like) and reducing grid congestion. Whether it makes sense to implement an energy-saving measure will, of course, also depend on the severity of the scarcity, which may vary by energy carrier. Sometimes it may be useful to implement an energy-saving measure, despite its low effectiveness in terms of petajoules. Table 3.2 sets out considerations for energy saving across the various energy carriers.

Electrification is primarily relevant to road transport and less so for other modes of transport. Compared to road transport, the path to climate neutrality for aviation is clearly different. Electric flight powered by batteries or hydrogen in combination with fuel cells is hardly an option by 2050. The energy-saving effect of electrification is therefore not present here. However, aviation is required to use 70% sustainable aviation fuel (SAF) by 2050, at least half of which must be e-fuels (under the ReFuelEU Aviation Regulation). The final energy consumption of aviation will then consist mainly of fuel, while primary energy consumption in 2050 will largely be electricity (see also Chapter 4). Producing sufficient SAFs may prove challenging (Peeters & Papp, 2024). Various sources therefore indicate that the path to climate-neutral aviation is difficult without energy savings, in the form of both improved energy efficiency and demand-side restrictions (Gössling et al., 2024; Peeters & Papp, 2024). Furthermore, the climate impacts of contrails – which are of the same order of magnitude as those of CO₂ – are not, or hardly, reduced by the use of alternative fuels. In shipping too, it is expected that electrification will not take off significantly by 2050 and that the sector will continue to use fuel in various forms (e.g. DNV, 2024).

3.3 Distinction between final and primary energy

When focusing on energy savings, it is important to distinguish between final and primary energy. This is because a different strategy may be required to save final energy than to save primary energy. Final energy is the energy used by end-users, such as vehicles or homes. Primary energy is the energy required throughout the entire chain to produce the final energy and deliver it to the end-user. This also includes energy losses that occur during the production process and distribution. These energy losses will be greater for some energy carriers than for others. For example, the energy losses involved in the production and distribution of e-fuels are much greater than those for the production and distribution of electricity for electric vehicles.

3.4 Side effects of energy saving

And, of course, there are other important objectives besides just energy saving and CO₂ reduction. Existing avoid and shift measures often have a different objective than energy saving anyway. Consider, for instance, encouraging cycling and walking

²² An electric car uses two to three times less final energy per unit of distance travelled than a car with a combustion engine. The difference in primary energy consumption is even greater.

for commuting to reduce congestion, alleviate hotspots with poor air quality, or improve public health. Or measures that promote active modes of transport (walking, cycling) from a public health perspective, or measures aimed at the efficient use of scarce infrastructure capacity (off-peak discounts). Similarly, the rationale for the 'capacity cap' at Schiphol is to reduce noise pollution for local residents, rather than energy savings or CO₂ reduction. Energy savings and CO₂ reduction are more of a by-product (a 'co-benefit') of these measures than the primary objective.

3.5 Summary table

In Table 3.2, we present arguments for energy savings for each energy carrier and which measures might be suitable for them. We only mention the argument of CO₂ reduction in relation to the energy carrier 'fossil fuel'. For the other energy carriers, we assume that they are (virtually) CO₂-neutral, so that by definition they already contribute to CO₂ reduction.

Table 3.2 Arguments for energy saving by energy carrier

| Energy source | Arguments for saving energy or problems that energy saving can help solve | How big is the problem? | What contributes to solving the problem | Which policy measures are appropriate | Co-benefits of these measures |
|----------------------|--|--|--|--|--|
| All (generic) | The energy transition challenge becomes less daunting You don't have to pay for energy you don't use (user costs); Less dependence and uncertainty for users regarding energy prices | This argument becomes more relevant as energy prices rise (and become more unpredictable) | Energy-saving options that are cost-effective at current energy prices; Long-term contracts that provide certainty | Avoid and shift policy ^a | Reduced use of raw materials; reduced congestion; less pressure on public space; reduced noise |
| Electricity | Grid congestion, connection issues, excessive peak demand relative to supply, supply-demand mismatch (local, temporal); to a lesser extent: shortage of generation capacity; land use for generation | Depends on the extent of the shortage of (fast) charging points and the problems these pose for the electricity grid. Domestic transport in the NPE climate-neutral scenario may account for 22% of all electricity consumption by 2050 ^b (see Chapter 4) | More charging points; peak management/smart charging; reducing imbalance; general reduction in demand may make a limited contribution (the supply-demand mismatch is mainly temporary and local) | Grid operators: Imbalance compensation, price incentives for smart charging; limited contributions from promoting smaller (= more efficient) vehicles and avoid/shift policies | Less investment required to expand generation and grid capacity |
| Hydrogen | Hydrogen production requires a relatively large amount of electricity generation capacity due to energy losses; security of supply for imports (dependence on other countries); limited supply | Less significant than for e-fuel; limited demand anticipated in road transport and inland waterway transport; potential long-term demand from aviation | A general reduction in demand could contribute to aviation | Avoid/shift in aviation | Less noise, NOx and particulate matter |

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

| | | | | | |
|-----------------------|---|--|---|---|--|
| Biofuel (sustainable) | There is limited availability of raw materials and production capacity, security of supply | Important for maritime transport/aviation; demand from inland waterway transport and possibly road transport is also significant | Demand reduction, in a way that may also reduce production capacity and imports | Avoidance/shift in aviation and maritime transport; electrification | Lower NOx and particulate matter, reduced land use (assumption: biofuel does not come solely from waste streams) |
| E-fuel | It requires significant electrical capacity (space, production resources), dependence on imports | High demand is expected, particularly from aviation and shipping | Limiting demand | Avoidance/shift in aviation and shipping; electrification | Less noise, NOx and particulate matter |
| Fossil | This results in CO ₂ reduction and thus a greater chance of staying within the carbon budget; it reduces dependence on imports from specific countries | High demand from shipping and aviation, lower (and declining) demand from road transport | Demand reduction | Avoid/shift; electrification | Less NOx, particulate matter and noise |

^a Improvement policies, such as encouraging the use of more fuel-efficient tyres, can also contribute.

^b If we include primary electricity consumption for the production of hydrogen and e-fuels, this figure could be even higher, but we will address that later.

4 Energy demand for transport towards 2050

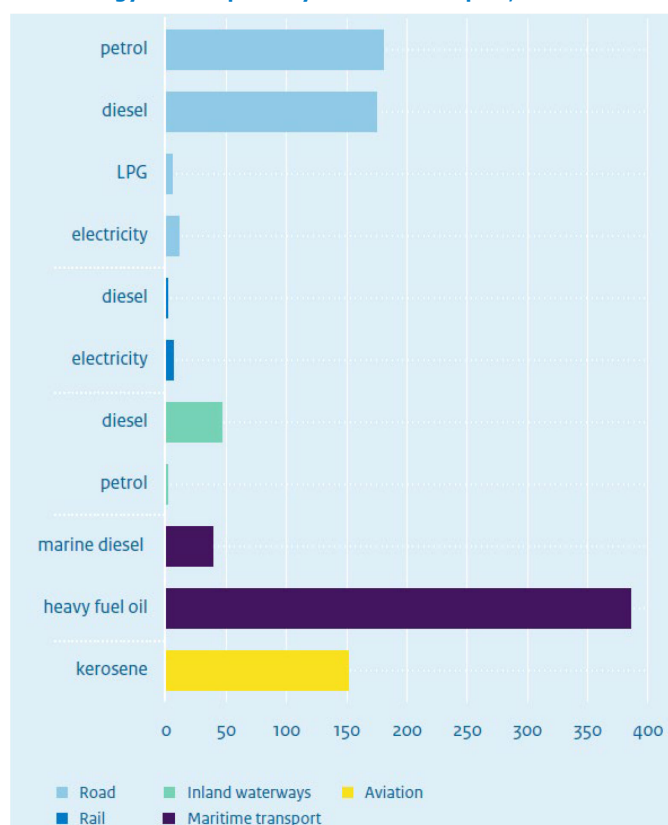
This chapter examines the energy demand of transport towards 2050 in the Netherlands, broken down across the various modes of transport and energy carriers. In this chapter, we demonstrate that in a future (2050) carbon-neutral scenario, the role of fuel in road transport will decline significantly in favour of electricity, thereby already leading to energy savings. In contrast, (primary) energy consumption in aviation is actually set to increase, partly due to the assumed growth in aviation volume and the use of e-fuels.

Section 4.1 examines the final (end-use) energy demand for transport in 2023, while Section 4.2 looks at the scenarios for 2050. Section 4.3 examines the primary energy demand for transport, which also includes, for example, the electricity required for the production of e-fuels.

4.1 Final energy demand for transport in 2024 and 2050

Energy demand from transport in the Netherlands amounted to approximately 1000 PJ in 2024. The breakdown across transport modes and energy carriers is shown in Figure 4.1.

Figure 4.1 Final energy consumption by mode of transport, broken down by energy carrier (2024)

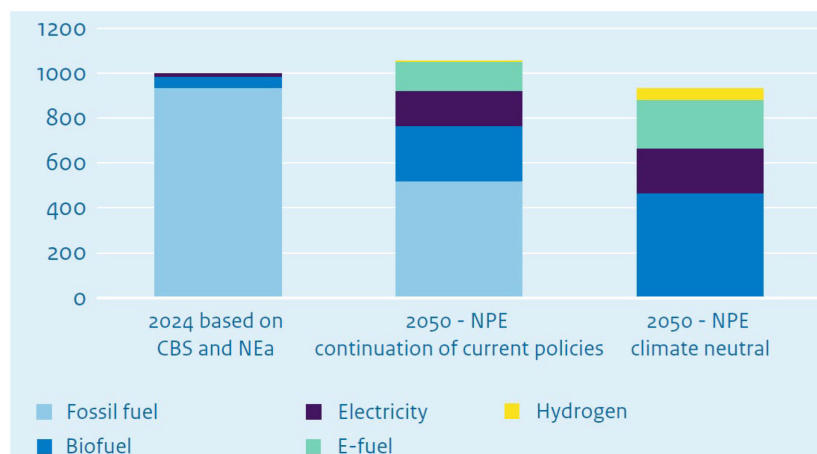


Source: 'Combustion values of motor fuels; energy carrier', 'Crude oil and petroleum products balance; supply and consumption', 'Energy balance; supply, conversion and consumption': CBS; calculation by KiM.

Note: energy consumption is based on refuelling and charging in the Netherlands, regardless of where the consumption takes place. It therefore does not relate solely to domestic transport.

For the final long-term transport energy demand (2050), we use the scenarios from the National Energy System Plan (NPE) (EZK, 2023) as our starting point. In the NPE, two scenarios have been developed for each mode of transport²³: a continuation of existing and planned policy²⁴ and a climate-neutral scenario, in which the remaining fossil fuel gap is filled with renewable energy. Figure 4.2 shows the total of the various energy carriers in 2023 and 2050.

Figure 4.2. Breakdown of final energy consumption across energy carriers, 2024 and 2050 according to two NPE scenarios (EZK, 2023)



Source: 2050: NPE (EZK, 2023); 2024: fossil fuels and electricity: CBS, adapted by KiM; biofuel: NEa (2025)

Note: energy consumption is based on refuelling and charging in the Netherlands, regardless of where the consumption takes place. It therefore does not relate solely to domestic transport.

Electricity plays a major role in both future scenarios, but biofuels and e-fuels are also important. In the 'current policy' scenario, fossil fuels still play a significant role (over 500 PJ) in 2050, with maritime transport accounting for just over half of this. However, fossil fuel consumption has been reduced by half compared to the current situation. Energy demand by mode of transport can be found in Appendix F.

Under the current policy scenario, energy consumption in 2050 is higher (+13%) than in the climate-neutral scenario due to the greater role of electricity in the latter.²⁵

For comparison, we also provide below the estimate made by the network operators in 2023 for the energy mix of climate-neutral transport in 2050. They have excluded energy demand from aviation and shipping and arrive at a total range of 234–302 PJ in 2050. The energy demand excluding aviation and shipping in the NPE climate-neutral scenario (246 PJ) falls within the grid operators' range.

²³ Passenger cars, vans, heavy goods vehicles, public transport, inland waterway transport, maritime transport (bunkers) and aviation (bunkers).

²⁴ Existing and planned policy consists primarily of ETS-1 (for the energy sector), ETS-2 (for transport and the built environment), RED, ReFuelEU Aviation, FuelEU Maritime, etc.

²⁵ As noted earlier in Chapter 3, electricity is used very efficiently in electric motors, meaning that electric vehicles require less energy to cover the same distances as vehicles with internal combustion engines.

Text box. II3050 estimate of a climate-neutral energy system in 2050.

The grid operators (Netbeheer Nederland et al., 2023) have also made an estimate – across four climate-neutral scenarios – of the energy demand for transport (excluding aviation and maritime bunkers) in 2050. This varies between 234 and 302 PJ; in none of the scenarios are fossil fuels still in use, see table below. In the first two scenarios, electrification takes off more quickly than in the other two, where fuel continues to play a role for longer.

Table 4.1 Energy demand for transport (excl. bunkers) in 2050 in 4 climate-neutral scenarios

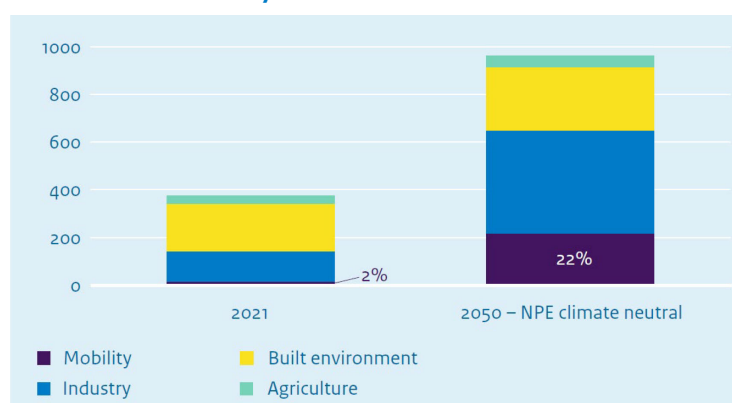
| PJ | 'Decentralised initiatives' scenario | 'National leadership' scenario | 'European integration' scenario | 'International trade' scenario |
|-------------|--------------------------------------|--------------------------------|---------------------------------|--------------------------------|
| Electricity | 173 | 202 | 166 | 126 |
| Hydrogen | 54 | 29 | 23 | 126 |
| Methane | 14 | 0 | 23 | 0 |
| Biofuel | 22 | 4 | 79 | 50 |
| Fossil | 0 | 0 | 0 | 0 |
| TOTAL | 263 | 235 | 291 | 302 |

Source: Netbeheer Nederland (2023)

4.1.1 Electricity demand for transport compared to other sectors

As electricity plays an increasingly significant role in the transport sector, competition for it with other sectors, such as industry and the built environment, will also intensify. In the NPE climate-neutral scenario, transport’s share of total electricity demand rises from 2% today to 22% in 2050 (EZK, 2023a). In absolute terms, electricity demand rises from approximately 400 to 1000 PJ (110 to 280 TWh), of which transport accounts for more than 200 PJ, see Figure 4.3.

Figure 4.3 Distribution of electricity demand across sectors in the NPE’s climate-neutral²⁶ scenario



Note: transport excludes mobile machinery but includes aviation and shipping

4.2 Primary energy demand for transport in 2023 and 2050

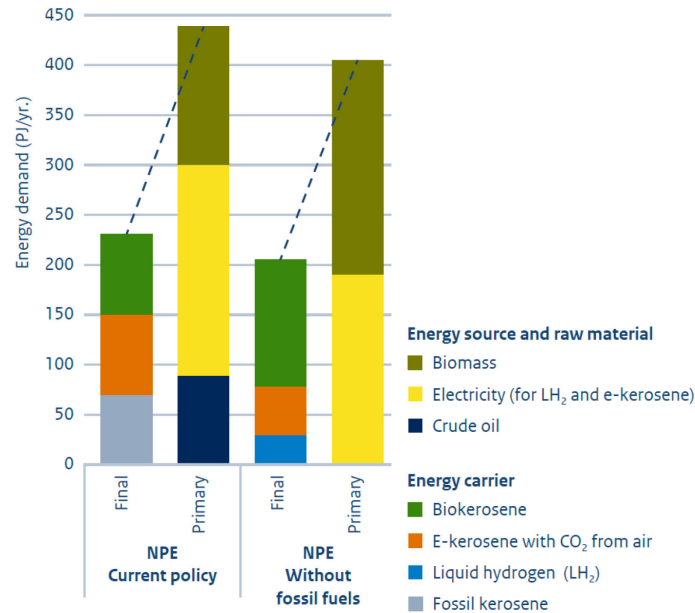
Due to energy losses in the supply chain, primary energy demand is greater than final energy demand. In Figure 4.4, we compare primary and final energy demand for aviation in 2050 across both NPE scenarios. It can be seen that primary energy for aviation consists largely of electricity. This is required for the production of e-kerosene (and, in the climate-neutral scenario, also for the production of e-

²⁶ This is the only scenario for which the NPE reflects the future electricity demand of all sectors.

hydrogen). The production of these e-fuels does not, of course, have to take place in the Netherlands itself; imports may also be involved.

Should the Netherlands do decide to produce the e-fuels for aviation itself, the electricity consumption for this will be reflected in the final electricity demand of the industry sector (as the producer of the e-fuels) and not in the transport sector.

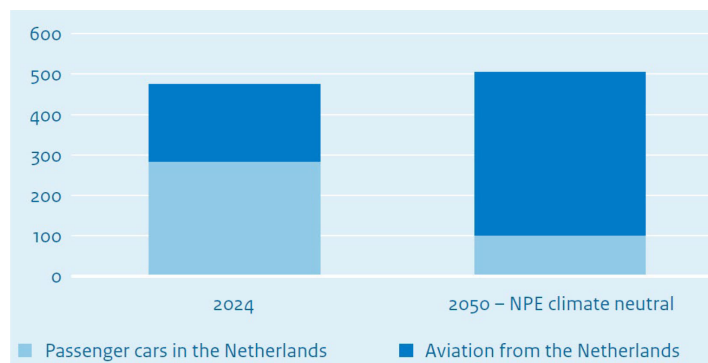
Figure 4.4 Primary energy demand for aviation associated with the final energy demand for aviation in 2050 in the two NPE scenarios (see Appendix F)



Source: Uitbeijerse et al. (2024)

Below, we compare the primary energy demand of passenger cars with that of aviation in 2023 and 2050; see Figure 4.5. This paints a striking picture: while the primary energy demand of passenger cars in the Netherlands is currently greater than that of aviation operating from Dutch airports, this will be reversed by 2050, mainly because aviation will then be using large quantities of e-fuels, which require significant amounts of primary energy. The comparison between aviation and passenger cars is the most illustrative, because passenger cars are becoming almost entirely electric, whereas aircraft are not.

Figure 4.5 Primary energy demand (PJ) of passenger cars versus aviation, in 2024 and in 2050 according to the NPE climate-neutral scenario



Note: final energy demand for passenger cars and aviation in 2024 based on the CBS petroleum balance; the breakdown of road traffic into different road transport modes is based on CO₂ emissions (CBS); conversion to primary energy demand is based on energy losses from Bakker et al. (2022) and, for fossil energy in 2024, based on co2emissiefactoren.nl.

5 Examples of avoid and shift measures to supplement existing policy

This chapter discusses examples of avoidance and shift measures, categorised according to the role played by the government (according to the classification of regulator, implementer/investor, facilitator and communicator; see section 2.3.2). Sections 5.1–5.3 provide concrete examples of measures applied to the three sub-sectors of road passenger transport, freight transport and aviation. These are based on the analysis by CE Delft (Appendix G) and additional literature. We examine both the energy-saving impacts and the impacts on citizens. Furthermore, in Box 5.1, for a selection of the example measures, we also discuss the relative preferences of the Dutch population that emerged from the PVE by Populytics (2025). The societal cost-effectiveness of measures falls outside the scope of this study.

5.1 Passenger transport within the Netherlands

This section deals with the example measures for passenger transport on Dutch roads. We do this on the basis of the analysis by CE Delft (Appendix G), supplemented by national and international literature. The measures are classified according to the role of governments: regulatory (5.1.1), implementing (5.1.2) and incentivising (5.1.3). An overview of the estimated level of energy savings that can be achieved through these measures is provided in Table 5.1.

Table 5.1. Examples of measures in domestic passenger transport by degree of energy saving in 2040 (as a share of total energy consumption in domestic passenger transport)

| Energy savings | Measure that is/appears to be legally feasible | Unclear whether the measure is feasible with energy savings as the motivation, or only under certain conditions |
|-----------------------|--|--|
| 0.5–2% | Incentive policy for working from home; Making the additional tax liability for lease cars distance-dependent | |
| 2–5% | Tax incentives for compact cars (bonus/malus scheme); Abolish tax-free commuting allowance | Mandatory strict parking policy for employees; Car-free Sundays |
| 5–10% | Increase in fuel excise duty | Speed limit on motorways to 80 km/h |
| >10% | Introduction of road pricing | |

Explanation: The energy saving is relative to the energy consumption in 2040 of passenger transport by road and rail; it is the average of an optimistic and a pessimistic estimate of the saving in 2040 derived from analyses of measures by CE Delft (see Appendix G).

For the sake of simplicity, this table shows only energy savings as a relevant factor for policy. Other relevant aspects include, for example, practical feasibility, costs, impacts on citizens (including accessibility) and public support (see box 5.1).

In practice, measures are often not taken individually but in combination to achieve greater effectiveness. The estimated effects of measures cannot simply be added together because some effects are comparable (for example, an increase in excise duty and a road pricing scheme both increase the variable costs of car use) or because they target the same group (for example, employees).

5.1.1 *Measures with the government as regulator*

Introduction of road pricing. Our first example is a system whereby users of passenger cars and vans pay a charge based on the distance travelled. Such a charge makes car use less attractive and leads to a reduction in the distance travelled and a (limited) shift towards other modes of transport. This type of measure has already been described frequently (CPB/PBL, 2020; MuConsult et al., 2022; PBL, 2023) and considered in policy programmes both in the Netherlands and other countries. Legally, this measure is feasible, but politically it has so far proved difficult to implement in the Netherlands. The last time it was attempted was under the name 'Pay-as-you-drive' (Betalen naar Gebruik).

In principle, the measure could be highly effective in saving energy. The costs for households naturally depend on the level of the levy, but in combination with the (partial) abolition of the motor vehicle tax, households that use their cars relatively little could also see a reduction in their transport expenditure. Implementation costs for the government depend on the chosen system. These could be substantial²⁷, but if the measure can be integrated with the current mileage registration system, the costs will be low. The societal cost-effectiveness of this measure falls outside the scope of this study.

Calculation example: A flat-rate charge of €0.15/km is estimated to yield energy savings of over 10% (11–13%) for passenger cars. By 2040, this would amount to around 17–20 PJ per year.²⁸ See the analysis of the road pricing in Appendix G.

Increase in fuel duty. An increase in fuel duty also falls into the category of price measures (CPB/PBL, 2020). Just like road pricing, an increase in fuel duty reduces demand for car travel and makes alternatives such as public transport and cycling more attractive. In addition, it encourages motorists to drive more fuel-efficiently (for example, at lower speeds), and may stimulate the switch to electric cars, which, after all, are not subject to fuel excise duty. Delivery vans and trucks are also affected by the measure, leading to changes in behaviour.

Calculation example: For petrol cars, a 25% increase in excise duty translates into a 12% rise in petrol prices. The resulting energy savings are estimated to be in the region of 2–8%. The cost increase per petrol car amounts to around 180 euros per year. Furthermore, freight transport will become more expensive due to higher fuel prices, causing consumer goods to rise slightly in price. See the analysis 'Increase in fuel excise duty' in Appendix G.

In terms of implementation, this measure appears feasible. However, it will lead to border effects, for example because motorists in border regions will increasingly fill up abroad, and it may have an impact on the competitive position of the Dutch logistics sector. The measure will also have the indirect effect of requiring the sector to pay more VAT (VAT is levied on the excise duty).

²⁷ A system with a GPS unit in every car that tracks the distance travelled is estimated to cost around 13 billion euros, approximately 240 million per year (CPB/PBL, 2015).

²⁸ Total energy consumption in the reference scenario for passenger transport in 2040 is 159 PJ.

Making the tax liability for company-leased cars distance-dependent.

Measures can also target a specific group, such as drivers of company-leased cars. For example, by making the tax benefit for company-leased cars distance-dependent, thereby reducing their use for private purposes. Currently, in many cases, using a company car is more cost-effective than using a private car. Legally, this measure appears feasible, but in practical terms it places significant demands on businesses; see Appendix G. A further condition is that the driver of a company lease car must keep track of which journeys are private and which are business-related, and changes to the tax authorities' systems are required.

Calculation example: If a distance-dependent tax incentive is introduced, whereby the additional tax liability doubles if the leased car is driven more than 17,500 km per year, the private use of leased cars is estimated to decrease by 3–8%. In terms of the total energy consumption of passenger cars, this represents an energy saving of 0.2–0.4%. The energy saving is relatively limited, partly because it is assumed that the business lease car fleet will be fully electric by 2040.

Abolition of the tax-free commuting allowance. Another example of a pricing measure targeting a specific group is the abolition of the tax-free commuting allowance for passenger cars. This abolition could save around 1–3% of energy across the total passenger car fleet. Households that use a car for commuting will face an average increase in costs of around 400–600 euros per year. This example is further elaborated in Annex G.

In implementing this measure, use could potentially be made of the mileage records that companies with more than 100 employees have been required to keep since 2024 to report on their employees' business and commuting journeys (reporting obligation under the Work-Related Personal Mobility Decree). Incidentally, distinguishing between business and commuting kilometres can sometimes be difficult, for example when travelling home from a business visit.

Tax incentives for compact cars (bonus/malus). Finally, we mention tax incentives for compact cars²⁹ as an example of a pricing measure. In this case, the aim is to encourage the shift towards fuel-efficient cars. This could be achieved, for example, via the MRB (monthly tax) or the BPM (purchase tax)³⁰.

Calculation example: Assuming that, as a result of the measure, the average car in the Dutch car fleet in 2040 will have the energy consumption of an A-segment car in 2030, this will yield energy savings of 2–5% for passenger cars.

Implementation appears straightforward, as the measure aligns with existing vehicle taxation. Households purchasing a compact car will save on both purchase costs and fuel costs. For details, see the analysis 'Tax incentives for compact cars (bonus/malus)' in Appendix G.

Reducing the speed limit on motorways. The statutory speed limit on motorways currently varies from 100 to 130 km/h, depending on the location and the time of day. In principle, the government can increase or decrease this by amending the 1990 Regulations on Traffic Rules and Traffic Signs (RVV 1990)³¹. However, passenger cars with internal combustion engines achieve their optimal

²⁹ Here we are arguably stretching the concept of *shift* somewhat: this does not refer to a shift to a different mode of transport but a shift from heavier to lighter or other types of cars (including light electric vehicles).

³⁰ Encouraging smaller vehicles, both small passenger cars and microcars, is also cited as having substantial energy-saving potential. This can be achieved, for example, through weight-based taxes (Winkler et al., 2024), subsidies for leasing small vehicles, reducing the size of parking bays, dedicated parking bays, speed management for all vehicles, and promoting charging infrastructure for small vehicles (ITF, 2023).

³¹ <https://wetten.overheid.nl/BWBR0004825/2024-07-01#HoofdstukII>

energy efficiency at speeds of 70–90 km/h. An additional effect is that journey times per car increase, which may lead to a reduction in demand for car travel or alternative route choices (as second-order effects). These effects are expected to be smaller than the first-order effect.

It is uncertain whether the speed limit on motorways can be significantly reduced (for example, to 80 km/h) with structural energy saving as the sole justification. The question is whether this is a proportionate measure: is it the least intrusive measure to achieve energy savings? If other objectives are also pursued, such as improved air quality, this may strengthen the argument. The measure is, however, already possible as an emergency measure, comparable to 'car-free Sundays' (see below).

Calculation example: A reduction in the statutory speed limit on motorways to 80 km/h is estimated to lead to a 7–10% reduction in energy consumption; see Appendix G.

The actual effect in practice naturally depends heavily on the enforcement of the measure. This also determines the feasibility of the measure.

Car-free Sunday. Another regulatory measure we have examined is the 'car-free Sunday'. In the event of a (looming) crisis in oil supplies, it is already possible to ban car use for one day a week (Sunday) at national level. This is based on the 'Regulation on Car-Free Sundays in the Event of an Oil Crisis' (Government Gazette 16 March 2001, No. 54/p. 8). The measure includes an exemption for emergency services and people in critical professions. However, as the name suggests, the measure can only be implemented if there is a crisis in the supply of (crude) oil.

From a legal perspective, however, it is unclear whether the measure can be applied on a structural basis, that is to say *every Sunday*, even outside a crisis situation. For the sole purpose of energy saving, the measure does not appear to be proportionate (both suitable and necessary). The same energy-saving objective can also be achieved through a less far-reaching measure, one that does not infringe upon various freedoms (freedom of movement of persons, workers, services, goods, undisturbed enjoyment of property, etc.). Furthermore, the measure does not take into account the difference between electric and fuel-powered vehicles, which have different motivations for saving energy and varying levels of effectiveness (see also Appendix E).

Moreover, even in the event of an actual crisis – such as large-scale sabotage of electricity cables, blockades of ports or similar – it is questionable whether a driving ban on a fixed day of the week is a proportionate measure. Suppose there is no electricity available for a week. As long as an electric car's battery is still (partially) charged, the car can continue to run, and it does not matter exactly which day that is. A rigid driving ban on Sundays does not help in this situation. If a large proportion of the vehicle fleet still runs on fuel, such a measure would be more proportionate (IEA, 2022). This is because, for fuel-powered cars, a car-free Sunday is primarily about fuel stock management. Fuel is generally distributed from stockpiles, meaning there won't be a fuel shortage within a few days, but driving less can help prevent stocks from running out too quickly. Choosing a fixed day for this can make the measure clearer and easier to enforce. With electricity, supply and demand must be in balance at all times (just-in-time), and reducing demand on a specific day does not really help.

5.1.2 *Investment measure implemented by the government*

Government investment in infrastructure. Specifically, this measure involves government investment in infrastructure for cycling and public transport, with the

aim of promoting a modal shift from cars to walking, cycling and public transport. Simply improving public transport without making the car less attractive leads only to a very limited shift, at relatively high costs (De Haas et al., 2022). That is why we are combining investments in cycling and public transport with measures that make car use relatively less attractive. This creates a 'push and pull' effect: making the car less attractive (push) and making the alternatives more attractive (pull).

Calculation example: A simple calculation of an investment package for modal shift, whereby, on the one hand, 6–12 billion euros is saved on car infrastructure³² and, on the other hand, an additional 32 billion euros is invested in public transport (both in rail infrastructure and in cheaper train tickets), would yield an estimated energy saving of around 1–2%. This includes increased energy consumption of public transport (see Appendix G).

5.1.3 Measure with the government as facilitator

Incentive policy for working from home. When a larger proportion of the working population works from home more often, there is less commuting. In this example measure, employees are encouraged to work from home more often for jobs where this is possible. Encouraging working from home can be implemented in various ways, for example through tax incentives by increasing the working-from-home allowance, or through behavioural campaigns. The government can also encourage the inclusion of agreements on working from home in employment contracts.

Calculation example: As a theoretical maximum, we assume that the incentive policy results in the section of the working population for whom working from home is possible doing so for 3 days a week. In The Netherlands, the current average number of days worked from home is 1.1 days per week (MuConsult, 2022). Around half of the working population works from home from time to time (CBS, 2024). If all these people were to work from home three days a week, the average number of days worked from home would rise to 1.6 per week. Taking into account the fact that 'freed-up' commuting time is partly used for travel for other purposes and that, in the longer term, employees may decide to live further away from their workplace (rebound effect), the energy saving in 2040 could be approximately 2–3% of total energy consumption from passenger transport. See Appendix G for details of the calculation. In reality, it will be difficult to achieve this theoretical maximum through incentive policies, and the savings are likely to be lower.

5.2 Domestic freight transport

This section discusses example measures in the field of domestic freight transport in The Netherlands. We do so on the basis of the analysis by CE Delft in Appendix G, supplemented by national and international literature.³³ An overview of the estimated level of energy savings in freight transport that can be achieved with the measures is given in Table 5.2.

³² A €2 billion reduction in the road construction budget leads to a 0.3% decrease in distances travelled by passenger cars, as car journeys become less attractive. This is offset by a 0.1% increase in distances travelled by public transport (CPB & PBL, 2020). As part of political parties' policy packages, PBL has also calculated savings on investment in road infrastructure of €6.3 billion by 2030 and €12 billion by 2040 (PBL, 2023a) (PBL, 2021a).

³³ In addition, there could also be measures aimed at reducing the consumption of goods, labelling the energy consumption of goods transport, or reducing transport distances through spatial coordination, encouraging local production or the clustering of businesses. However, we have not found any studies on the effectiveness of these measures.

Table 5.2. Examples of measures in domestic freight transport and estimated energy savings

| Energy savings | Measure that can/appears to be legally feasible | Unclear whether the measure can be implemented with energy savings as the motivation, or only under certain conditions |
|-----------------------|---|---|
| 0.5–2% | Allow Super Ecocombi trucks on the road; Encourage the establishment of zero-emission zones in local authorities and provide subsidies for LEFVs | Mandating transparent delivery costs for consumers (e-commerce) |
| 2–5% | | Reducing the maximum speed limit for trucks on motorways to 70 km/h |
| 5–10% | | |
| >10% | Increase and extension of the truck charge | Energy performance standards in freight transport |

Explanation: The energy saving is expressed relative to the energy consumption in 2040 of domestic freight transport (road, rail and inland waterways); it is the average of an optimistic and a pessimistic estimate of the saving in 2040 derived from analyses of measures by CE Delft (see Appendix G).

For the sake of simplicity, this table shows only energy savings as an effect. Other relevant aspects include, for example, practical feasibility, costs, impacts on citizens and public support (box 5.1). LEFV: light electric freight vehicle.

Increase and extension of the truck charge. A truck charge will be introduced on 1 July 2026. As an example measure, we are examining the effect of an increase (and scope extension) of the charge in 2030 or later.

The idea is that a (higher) truck charge will make road transport more expensive, leading to more efficient transport (with higher load factors), transport operators choosing different routes, and a modal shift from road to rail and inland waterways. Furthermore, by differentiating the charge according to emissions, there is an incentive for trucks with lower CO₂ emissions and thus lower (fossil) energy consumption (*improve*).

Calculation example: An increase in the planned truck charge from an average of €0.16/km to €0.42/km is estimated to yield additional energy savings (compared to the truck charge coming into effect on 1 July 2026) of 4–10% of the total energy consumption of freight transport within the Netherlands. This saving effect is achieved because the charge increases the costs of road transport, meaning that (via price elasticity) trucks will cover shorter distances (through alternative route choices, higher load factors and modal shift). See the analysis 'Increasing and extending the truck charge' in Appendix G.

As the measure is consistent with existing policy, it appears to be legally feasible and implementable. However, the expansion of the scope may incur additional costs, as the system will need to be upgraded for this purpose. As consumer goods become more expensive due to increased transport costs, average household costs will rise by several tens of euros per year; see Appendix G.

Admitting Super Ecocombi (SEC) vehicles to the roads. The SEC is an extra-long truck combination consisting of a tractor unit with two trailers, each 13.6 metres long. The combination is therefore twice the size of a standard tractor-trailer

and can carry 72 tonnes. This type of truck is currently not permitted in the Netherlands.

It could be argued this measure falls under a shift strategy as, although not a change to another mode of transport, it can be seen as a shift towards larger vehicles that are more energy-efficient (per tonne-kilometre). CE Delft estimates the total energy savings that can be achieved with this measure at approximately 1% (Appendix G). This takes into account a so-called 'reverse modal shift' because road transport becomes more attractive compared to rail and inland waterway transport, which negates part of the initial savings effect.

Reducing the speed limit on motorways for trucks. An example of an instrument of the 'standards and obligations' type (areas) is the statutory speed limit for trucks on motorways. In principle, the government can raise or lower this by amending the 1990 Regulations on Traffic Rules and Traffic Signs (RVV 1990)³⁴, although proportionality must be taken into account.

Whether a speed reduction is legally feasible will depend on the reasoning behind it. One of the aims of the Road Traffic Act is, in fact, 'to safeguard freedom of movement as much as possible' (Article 2.1.d). A speed limit may conflict with this. However, the Road Traffic Act also provides for the possibility of establishing rules aimed at "preventing or limiting nuisance, hindrance or damage caused by traffic, as well as the consequences for the environment" (Article 2.a) or "promoting efficient or economical energy use" (Article 3.a). It therefore comes down to providing a sound justification for why a speed reduction is necessary, despite the restriction on freedom of movement.

For acute crisis situations, the 1990 Regulations on Traffic Rules and Traffic Signs include the possibility of "a *temporary* reduction in the maximum speed in the event of a disruption to the oil supply" (Article 86a).³⁵ This article is less applicable here. Firstly, because it concerns oil and not energy in general, and secondly, because it refers to "temporary" and "a disruption".

How much energy this measure saves depends on the specific speed reduction. For example, with a reduction from 80 km/h to 70 km/h, a goods vehicle becomes more fuel-efficient.³⁶

Calculation example: with a reduction in the speed limit from 80 to 70 km/h, the energy saving is in the order of 2–5% of trucks' energy consumption, depending on the extent to which the measure is enforced. The effect on household expenditure is in the order of €11 per year. See the analysis 'Reducing the truck speed limit to 70 km/h' in Appendix G.

These direct energy savings fall within the improve strategy. However, the measure also fits within an avoid strategy, based on the idea that lower speeds reduce transport demand because carriers will choose different (shorter) routes and it becomes less attractive to transport goods (there are lower energy costs, but higher costs for drivers, and more trucks are needed to transport the same amount of goods in the same time). Furthermore, this measure could fit within a shift strategy, namely if, due to the increased road transport costs, carriers opt more frequently for inland waterways and rail. However, these avoid and shift effects are difficult to estimate.

Energy performance standards for transport companies. Another example is the establishment of energy performance standards for transport companies, both

³⁴ <https://wetten.overheid.nl/BWBR0004825/2024-07-01#HoofdstukII>

³⁵ This measure is also mentioned in the National Oil Crisis Plan (EZK, 2023).

³⁶ This applies in particular to electric trucks (which are expected to account for a substantial proportion of total transport performance by 2040 (PBL, 2024)).

domestic and foreign, operating in the Netherlands. This builds on policies such as the *Corporate Sustainability Reporting Directive* (CSRD) and the CountEmissionsEU methodology³⁷ for monitoring greenhouse gas emissions from freight transport in Europe. National policy aimed at monitoring and improving the CO₂ performance of the logistics sector is already under consideration³⁸, and CO₂ standardisation for transport companies has been examined as a measure in IBO Klimaat (2023).

However, designing an energy performance standard is complex (see Appendix G) and, from a legal perspective, it must be clearly demonstrated why energy standards are proportionate and additional to any CO₂ standards, given that, to a large extent, the same measures are being encouraged from transport operators.

Calculation example: The energy-saving effect can be substantial depending on the standard's level of ambition. If this standard is set based on savings potential, energy savings of around 10–30% could be achieved by transport companies.

In terms of feasibility, the measure is complex. Research is needed to identify an effective implementation with the least possible administrative burden for the businesses concerned. At the same time, there are many initiatives relating to CO₂ monitoring that can be joined.

Mandating transparent delivery charges for online shops. Another example of this type of regulation is requiring online shops to clearly pass on delivery charges to the consumer. The aim is to make consumers aware of delivery costs, so that they may choose not to opt for the fastest delivery, or do so less frequently. This could lead to some energy savings, assuming that slower delivery is more energy-efficient, as shippers and carriers would then have more time to optimise parcel deliveries (in terms of load factors and routing). If consumers do not themselves opt for slower delivery, parcel delivery services would not carry out this optimisation.

It is difficult to estimate the effect on consumers who are shown delivery costs, but it is known that a large proportion of consumers are willing to choose a more sustainable delivery option if it is offered.³⁹ This effect is probably not very large but also not negligible, amounting to around 1% of the energy consumption of domestic freight transport. Household costs will fall as a result. Express deliveries will, however, become more expensive because they are less energy-efficient due to lower load factors, and online retailers will have to pass on these costs. See the analysis 'Mandating transparent delivery costs' in Appendix G.

It is, however, unclear whether such a requirement is proportionate (EZK, 2023c) and also whether the measure is practically feasible, given both online retailers based abroad and the necessary enforcement capacity. An alternative that might be more feasible in legal and practical terms is to organise transparency of delivery costs through voluntary agreements (a covenant). The question then arises as to what this means for the effectiveness of the measure, as an obligation is likely to have a greater impact than a voluntary agreement with a sector. Furthermore, with a covenant, the question arises as to the scope of the measure and whether and how online shops based abroad might also fall under it.

³⁷ CountEmissions EU establishes a methodological framework, but does not regulate where it must be used. https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_3774

³⁸ Progress on sustainable transport and explanation of additional climate measures in the transport sector, Letter to Parliament IENW/BSK-2023/167252, 23 August 2023, <https://app.1848.nl/document/kamerbrief/57769>

³⁹ To improve the efficiency of online shopping deliveries, studies have been conducted into the extent to which consumers are open to slower deliveries with a lower environmental impact (Descartes, 2024) and how they can be encouraged to do so (Overkamp et al., 2023).

Promoting zero-emission zones in local authorities and subsidies for light electric vehicles. Zero-emission zones have now been introduced or are planned in a large number of Dutch cities. These zones are (initially) aimed at vans and trucks. In most municipalities, these cover the city centre and a few surrounding areas. As an example measure, the Government is encouraging the number of municipalities with a zero-emission zone to be expanded to the 44 largest municipalities (the G44) and for municipalities to extend the size of the environmental zones to what, in average-sized cities, corresponds to 'within the ring road'. The national government has no direct influence over environmental zones (as this is a matter of local policy), but it can provide support, for example through subsidies. ZE zones can potentially have various effects: 1) replacement of diesel vehicles with electric vehicles, 2) diesel vehicles taking alternative routes to avoid ZE zones, and 3) changes to transport concepts, for example towards LEFVs or cargo bikes, possibly in combination with ZE hubs. Points 1 and 3 are expected to result in a reduction in energy consumption, while point 2 leads to an increase in energy consumption.

Calculation example: The analysis assumes that the proportion of electric trucks will not increase by 2040 due to the expansion of ZE zones, but that there will be more smaller and more fuel-efficient vehicles and greater use of hubs (for the transshipment of goods). It is estimated that existing trucks and vans will travel 0.5% fewer kilometres by 2040 as a result of the expansion of ZE zones (in number and size). The energy saving is in the same range (0.5%). A subsidy scheme for light electric freight vehicles (LEFVs) could increase the savings potential, as LEFVs are more energy-efficient per unit of weight transported than the vehicles they replace. See Appendix G for further details.

Infrastructure investments and combinations with other measures. The national government, in its role as implementer, can invest directly in infrastructure, for example in improving waterways, ports, transshipment facilities and in constructing additional rail lines. These investments fit within a modal shift strategy if they are specifically aimed at shifting transport from road to water and rail. These investments have a limited effect on the modal split in their own right, but by combining them with other measures, they can have a greater impact: the theoretical potential is considerable (Jonkeren, 2023). Examples of measures with which government investments can be combined to achieve a greater modal shift effect (from road to rail and water) include the aforementioned truck charge, a government subsidy for every container transported by rail and water rather than by road, the deployment of so-called logistics brokers to support businesses, and the removal of regulatory barriers for transport operators, such as facilitating the digital consignment note and extending terminal opening hours (Bloemheuvel et al., 2020).

Overall picture

The measures discussed in this section on 'freight transport within the Netherlands' are each designed to reduce the distance travelled by road freight transport and to encourage a shift to other modes of transport. If the measures were to be introduced simultaneously, there would be a certain degree of overlap between them, resulting in less overall effectiveness than the combined effects of the individual measures. For example, when setting energy performance standards, there is a strong incentive to save energy by driving more slowly and using rail and inland waterway transport as much as possible. If a higher truck tax is introduced on top of this, the modal shift effect will be lower than if the energy standards were not in place. On the other hand, measures can also reinforce one another; for example, if the Super Ecocombi is permitted, the reverse modal shift towards road transport will be less pronounced if the truck charge is increased at the same time.

The legal feasibility of the measures discussed depends on sound justification. In any case, all the measures require substantiation based on their utility and necessity, as well as consideration in relation to other measures: which measure is the most proportionate and most appropriate for the desired effect or objective?

The impact on the public is varied, ranging from cost savings (in the case of the measure 'mandating transparent delivery costs for online shops') to price increases for products (because transport costs rise as a result of the measures). However, transport costs account for only a small proportion of consumer prices.

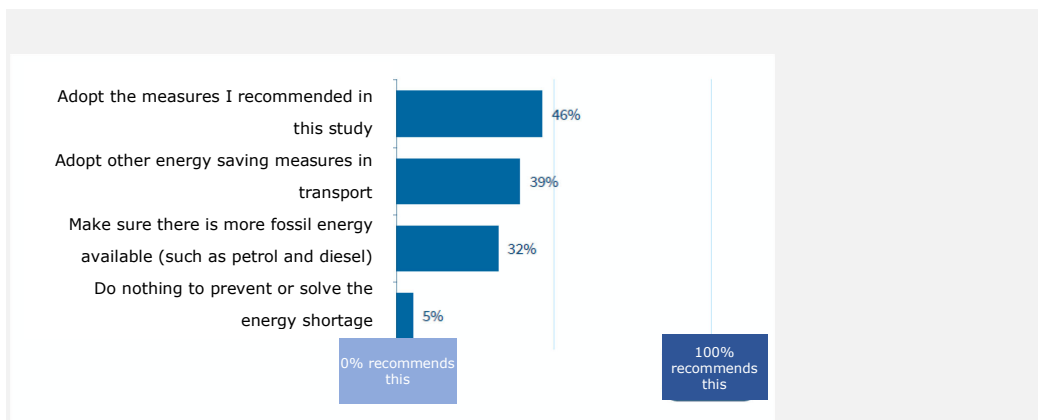
Box 5.1 Preferences of the Dutch population: key findings of the PVE

The participatory value evaluation (PVE) investigated which measures the PVE participants would advise the government to take (and why) in the event of an (long-term) energy shortage, given a choice from the 10 example measures for domestic transport deemed legally feasible (see Table 2.1). We summarise the key findings here. For the full report, see Populytics (2025).

Participants were first given a selection task and then open-ended questions to explain their choices. There were two studies. In Study 1, participants had a 'mandatory' energy-saving target. In Study 2, this target did not necessarily have to be met.

There is support for saving energy if the situation calls for it. This research was conducted to gain insight into residents' preferences regarding energy saving through transport (should a scenario ever arise in which this is necessary). The results show that if such a scenario were to arise, a large majority of people would be in favour of taking measures to reduce energy demand, using a selection of 10 transport measures offered in this study or other measures (Figure 5.1). In the study with the optional target (Study 2), 93% of participants still recommended measures, even though they were not obliged to do so. More than half (55%) of the participants in Study 2 achieved the optional savings target (Figure 5.2).

Figure 5.1 Results of the question asking what participants think the Dutch government should do in the event of a future energy shortage



Source: Populytics (2025)

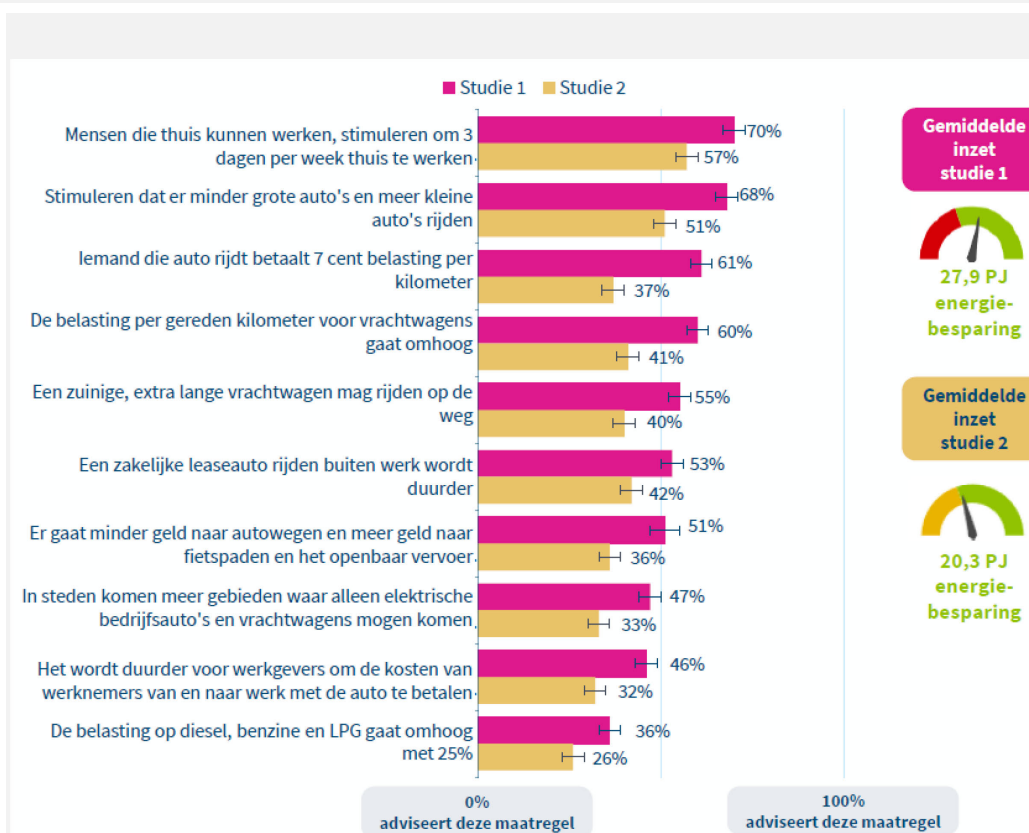
Although preferences regarding measures are divided among participants, the least support is given to increasing the tax on diesel, petrol and LPG by 25%. As with many other measures, effectiveness and costs play a role in participants' considerations regarding this measure. This measure raises concerns about affordability and is viewed by some participants as potentially ineffective.

When the energy saving target is mandatory, people are more likely to opt for broad measures that affect everyone. For example, a road pricing scheme is chosen

more often when the energy-saving target is mandatory (Study 1). When the target is not mandatory, there is a greater focus on measures that affect a specific group (namely: business travellers). It therefore appears that acceptance of measures affecting all motorists increases when energy saving is made mandatory. In the study with the optional target, only the incentive measures were chosen by more than half of the participants. This means that if the target is not mandatory, there is no majority in favour of eight of the measures. In the motivations, concerns about measures are expressed, and there are differences in attitude and expected effects between people who do and do not choose measures.

Participants opt for combinations of measures for passenger, freight and business transport. In the participants' recommendations, there is no clear preference for measures affecting one or more sectors. The in-depth analysis reveals different groups, all of whom also opt for measures that affect both everyone and specific groups (freight and business travel). In general, other arguments, such as additional positive effects and the overall effectiveness of measures, play a greater role in participants' choices.

Figure 5.2 Results of the choice task: share of respondents choosing a policy measure and prioritisation of measures



Note: Study 1: mandatory savings target; Study 2: optional savings target

Source: Populytics

Contradictions in the arguments for measures. In the motivations, we see contradictions between people who do or do not choose the measure. This suggests that there is either a vague understanding of the measure's effect, or a different attitude towards a particular issue. We see this, for example, regarding the necessity of a car: some participants point out that driving is optional and can be replaced by alternatives (public transport or cycling), while other participants state

that the car is necessary (for some). We also see contradictions when it comes to working from home: some view working from home as a positive thing, while others emphasise potential drawbacks such as mental health and productivity issues associated with working from home. Similarly, the aspect of 'fairness' emerges clearly in respondents' motivations, among both supporters and opponents. For instance, some respondents view the 'polluter pays' principle as fair, while others emphasise that a car may be essential for some people and that measures could disproportionately affect lower income groups.

Should the scenario ever arise where energy demand reduction is required through transport policy measures, residents of the Netherlands consider it important to contribute their ideas and express their views on the matter.

5.3 Aviation departing from the Netherlands

This section discusses an example of a pricing measure for aviation departing from the Netherlands.

Distance-dependent air travel tax. CE Delft (2025) has developed five variants of a distance-dependent air travel tax in the Netherlands, all of which will generate the same revenue (€257 million) in 2027. The variations include, for example, whether or not to tax transfer passengers, whether or not to impose a higher tax on flights shorter than 500 km than on medium-haul flights, and whether business class passengers pay an additional surcharge. The air passenger tax amounts to a maximum of 96 euros for the longest flights (>10,000 km). By way of comparison, the current air passenger duty is €29 for all flights, regardless of distance.

The impact on CO₂ emissions from current air travel departing from the Netherlands is 1–2%. We estimate a similar effect in terms of reducing energy demand, i.e. 1–2%. The capacity cap (maximum annual number departures and arrivals) at Schiphol ensures that the aviation tax does not lead to fewer flights. However, there will be a shift from long-haul to short-haul flights, and, if the tax on short-haul flights is higher, towards rail travel. The number of passengers at Dutch airports will fall slightly (0.1–0.7%) because smaller aircraft are used for shorter flights than for longer ones. There is a range of 0 to 57% of passengers switching to airports in neighbouring countries; the remainder consists of people who no longer travel or switch to car or train. Tickets become slightly more expensive (1–2% for flights longer than 2,500 km). The rise in ticket prices is limited because the measure reduces scarcity, which puts downward pressure on prices. For transfer passengers, the ticket price actually falls slightly in most scenarios.

In the National Climate Consultation (Populytics, 2023)⁴⁰, an air travel tax received strong public support among respondents. A key aspect of the measure was that part of the revenue would be spent on investments in international rail links. No research was conducted to determine whether the measure would have enjoyed the same level of support without this specific allocation of the revenue. It remains to be seen, however, whether investing in international rail links helps to reduce the energy consumption of flying: research shows that measures⁴¹ have modal shift potential primarily for cities such as London, Frankfurt and Paris, and other cities within a radius of approximately 800 km of Schiphol (Durand and Romijn, 2023). For longer distances, this potential for modal shift does not exist. If the slot capacity

⁴⁰ This research examined the level of support for approximately 20 climate mitigation measures across various sectors.

⁴¹ Such as: investing in rail links, promoting booking systems that make transfers easier and offer more travel options, better information and booking systems, more attractive prices and reduced journey times.

freed up at Schiphol by a modal shift to rail is filled with more long-haul flights, the energy-saving effect is smaller or even negative.

Another pricing measure is to specifically encourage frequent flyers to fly less often: the frequent flyer levy. Under this scheme, air passengers are subject to an increasingly higher levy for every additional flight they book in a year (ICCT, 2022; CE Delft, 2024a).⁴² We have not investigated this measure further.

5.4 Considerations for maritime and inland waterway transport

Around 90% of all goods used in the Netherlands are transported by sea. Maritime transport is an efficient way of transporting goods (Geilenkirchen et al., 2024), so a shift of freight transport to another mode will generally not result in energy savings. Certainly in the Netherlands, with the Port of Rotterdam, maritime shipping is a major fuel consumer: over 40% of fuel sales in the transport sector in the Netherlands go to maritime shipping (Bakker et al., 2026). Apart from the fact that maritime shipping itself is a major energy consumer, it also transports a great deal of energy, e.g. by oil and gas tankers. Under global climate policy, this transport will be less necessary in the future, but this could be (partially) offset by the transport of non-fossil fuels (biofuels, e-fuels, hydrogen) and raw and semi-finished materials.

The share of transport costs in the price of transported goods is low, and maritime transport is closely linked to international trade and globalisation. Because of this link to international trade, it is difficult to design clearly defined national level policy measures that will be effective.

How could avoid and shift *strategies* lead to energy savings in maritime, coastal and inland shipping?

Maritime shipping

Within the *avoid* category, the circular economy is mentioned (Geilenkirchen et al., 2024), but little is known about whether the circular economy has significant effects on the transport performance of maritime shipping and, consequently, on energy consumption.

Also under the heading of *avoid*, policies are conceivable to change Dutch economic structures, such as reducing livestock farming, which would, for example, reduce import flows of animal feed and fertiliser transported by seagoing vessels.

Furthermore, also within the context of *avoid*, encouraging local production (nearshoring) rather than globalisation is likely to have a limited effect on maritime transport movements.

A shift from air freight⁴³ to maritime shipping is likely to be only possible to a limited extent, as it is primarily time-critical goods and products with a high value per unit of weight that are transported by air. However, products such as clothing ('fast fashion') are also transported on a large scale by air.⁴⁴

More generally, a rise in fuel costs may affect maritime shipping, particularly in times of overcapacity (Geilenkirchen et al., 2024), although it is unclear whether

⁴² For context: a quarter of the Dutch population accounts for three-quarters of the distance flown (KIM, 2024). Globally, the distribution is even more skewed: 2–4% of the world's population flies internationally, and 1% of the population is responsible for 50% of aviation emissions (Gössling & Humpe, 2020).

⁴³ Air freight accounts for approximately a quarter of the energy consumption and CO₂ emissions of total aviation from the Netherlands (Visser et al., 2024).

⁴⁴ <https://www.publiceye.ch/en/topics/fashion/zara-fuels-climate-crisis-with-thousands-of-tons-of-airborne-fashion> and <https://www.reuters.com/business/retail-consumer/rise-fast-fashion-shein-temu-roils-global-air-cargo-industry-2024-02-21/>

the effect falls within the *avoid* or *shift* categories, or whether it is more of an *improve effect*.⁴⁵ Pricing of bunker fuels stocked in the Netherlands also seems possible in itself, but the border effect ('waterbed') is expected to be so strong that bunkering will simply be shifted to ports in other countries (CE Delft, 2021).

Coastal shipping

Short sea shipping is, in principle, already an efficient mode of transport, so it is 'already performing well'. Specifically in the context of *avoid* and *shift*, there appears to be potential for a modal shift from road transport to short sea shipping within the Netherlands and Europe for container and bulk transport (Panteia, 2023b).

Inland waterway transport

Inland waterway transport has been included in this study as a potential 'modal shift option' for road freight transport (section 5.2). It should be noted, however, that in the longer term, the difference in energy consumption per tkm between a truck and an inland waterway vessel will be much smaller than it is now, as there will be an increasing number of electric trucks.

Current Dutch policy focuses on the target of shifting 2,200 TEU per day to rail and inland waterway transport.⁴⁶

The previously discussed increase in the truck tax and energy efficiency standards are examples of measures that could, in principle, further stimulate inland waterway transport, alongside investments in infrastructure and the removal of barriers (see, for example, Bloemheuvel et al., 2022).

If the aim is to achieve even greater energy savings in inland waterway transport through a modal shift, the question arises as to whether it is possible to influence shippers' choices (and thus the mode of transport), for example by further encouraging shippers or carriers to use inland waterways and rail for distances exceeding, say, 100 km.

⁴⁵ Improving the energy efficiency of ships has potential (25–40%), but it takes time to realise this. Policies already exist for this, particularly at international level, such as the Energy Efficiency Index and the Carbon Intensity Index. The ETS also encourages energy efficiency. Sailing with wind assistance and at lower speeds may be achievable in the shorter term, but the question is what policy the government can implement for this, given that international policy already encourages this.

⁴⁶ Letter to Parliament IENW/BSK-2022/261732 of 15 November 2022 on the modal shift approach.

6 Conclusions

6.1 Conclusions

Arguments for reducing energy demand in transport are diverse; one of them is that it can help prevent certain energy carriers from becoming scarce during the energy transition

Policy aimed at making transport more sustainable focuses largely on electrification – particularly in road transport – and, in addition, on increased use of renewable fuels, such as biofuels and e-fuels (especially in aviation and shipping). Renewable energy sources must therefore be produced and distributed in ever-increasing volumes. To counteract future shortages of the various renewable energy sources for transport, saving energy is simultaneously an important strategy. Furthermore, under European policy, the Netherlands is legally obliged to save energy.

Rising energy prices due to scarcity entail risks

In principle, scarcity will have a price-increasing effect on energy. That need not necessarily be a problem in itself. After all, as energy prices rise, energy demand will fall in accordance with the market mechanism of supply and demand. However, energy price rises due to scarcity also entail risks. This is also linked to the affordability of transport, which is already a problem for some groups in society. Price rises can also lead to public resistance and increase the pressure to weaken climate targets.

Targeted policy on energy saving offers the government an opportunity to mitigate undesirable effects, for example regarding affordability

Instead of achieving energy savings through market mechanisms (rising prices leading to reduced demand), the government can use policy to focus specifically on energy savings, thereby minimising negative effects, for example in terms of affordability. See also the summary table of arguments in section 3.5.

The (renewable) electricity demand from transport is expected to rise sharply

In the NPE's climate-neutral scenario, electricity consumption across all sectors will increase by a factor of 2.5 by 2050 compared to current levels, with transport accounting for an ever-increasing share: from 2% today, this share may rise to 22% in 2050. The electricity that would be required if we were to produce e-fuels for use in transport in the Netherlands is not yet included in this figure. Given this expected ever-increasing electricity demand from transport, in both relative and absolute terms, transport will also contribute increasingly to problems in the electricity supply chain that are expected at least until 2035 (such as congestion and mismatches between supply and demand). At the same time, there are also opportunities for transport to be part of the solution, as electric vehicles can use their batteries to store electricity at times of high supply or low demand in other sectors of the economy.

Rising use of e-fuels by aviation and shipping further increases the electricity demand from transport; depending on the production location, this occurs in the Netherlands or abroad

Modes of transport (particularly aviation and shipping) that replace their fossil fuel consumption with e-fuels lead to a sharp increase in (primary) energy consumption, as there are significant energy losses in the production process of e-fuels. It is noteworthy, for example, that in the NPE climate-neutral scenario, the primary

energy demand of aviation (departing from the Netherlands) in 2050 will be greater than that of passenger cars in the Netherlands. At present, the situation is the reverse. This is mainly because, in that scenario, aviation uses large quantities of e-fuels that require significant amounts of primary energy.

Arguments for energy saving in transport vary by phase of the energy transition and by energy carrier

Arguments for energy saving vary by type of energy carrier. There are particularly significant differences between electricity on the one hand and fuels on the other.

Fuels: Whether sufficient biofuels and e-fuels will be available in the future (in the Netherlands) depends on whether the necessary production capacity – in the Netherlands and elsewhere – is scaled up and whether the required raw materials (biofeedstock, hydrogen and CO₂) are available in sufficient quantities at reasonable costs. Scaling up takes time and requires major investment from market players. These are arguments for limiting the use of renewable fuels as much as possible. In the case of e-fuels, which are produced from electricity, there is the additional argument that production consumes many times more energy than the energy the e-fuels themselves yield. The production of e-fuels is therefore not very energy-efficient.

Electricity: In the Netherlands, grid congestion could pose a problem for electric transport at least until 2035. This refers to the issue that the electricity grid cannot always keep pace with the growing demand for electricity, and new grid connections (for example, for (fast) charging points) are not always feasible. Furthermore, the Netherlands' electricity generation capacity may not be sufficient. For instance, according to the NPE's climate-neutral scenario, more electricity will be needed in 2035 than the Netherlands will produce according to the Climate and Energy Projections (PBL, 2024) if current policies continue. In that scenario, the Netherlands would have to either produce more (renewable) electricity or import more by 2035. Import is physically a possibility because the Netherlands has many interconnections with other countries. In both cases – grid congestion and insufficient generation capacity – it helps if transport limits its peak demand for electricity.

In the longer term, domestic electric road transport could account for a substantial share of total annual electricity demand (according to the NPE, approximately 22% in 2050 in a climate-neutral scenario). Competition with other sectors of the economy that also use (increasing amounts of) electricity is therefore growing. Should e-fuels be produced in the Netherlands in the future, electricity demand – which is indirectly attributable to transport – will increase even further.

Avoid and shift policies can complement improve policies...

Current policy on energy saving in road transport relies primarily on making vehicles more efficient; it consists mainly of policies that encourage electrification and CO₂ standards for new road vehicles. In aviation and shipping, too, there is a strong focus on energy efficiency, for example through the setting of standards.

In addition, avoid and *shift* measures can, in principle, also contribute to energy savings in transport. They encourage people and businesses to avoid certain forms of transport (*avoid*), for example by working from home or making logistical adjustments, or by switching to other (more energy-efficient) modes of transport, such as public transport instead of the car, or inland waterways/rail instead of road transport (*shift*).

... but the savings achieved depend on how the energy mix develops

The more road transport becomes electrified, the less *avoid* and *shift* contribute to energy savings in absolute terms (PJ). This is because electrification is in itself an energy-saving strategy, yielding significant benefits. For example, if someone driving an electric car starts working from home, the savings in petajoules are smaller than if someone driving a comparable petrol car were to do so.

The opposite effect occurs as maritime and aviation sectors start using more e-fuels. In that case, energy savings through avoid and shift actually yield greater returns, because every unit of final energy saved saves multiple units of primary energy (due to the significant energy losses in the production process of e-fuels).

The (legal) scope for 'avoid and shift' policy is limited

Our search for example policy measures to get a sense of what can be saved through *avoid* and *shift* and what effort and resources this requires did not yield usable material in all cases. A 'legal quick scan' revealed that some measures we did encounter in the literature appear to be legally untenable due to (disproportionate) restrictions on freedom. In any case, where (structural) energy saving is the primary objective, legal viability is highly questionable. This concerned, for example, a mileage quota for private cars and the introduction of personal flight quotas. Other examples from the literature, such as car-free Sundays and maximum speed reductions on motorways, are in principle already possible in the event of an (impending) crisis in oil supply, i.e. as temporary emergency measures. However, they seem less suitable for structural implementation, for example every Sunday. The measure may in particular conflict with the criterion of proportionality if it is taken solely on the grounds of energy saving.

For example, in the event of a crisis in the supply of electricity, if the scope of the measure were to be extended to cover this, a car-free Sunday would seem to make little sense. Sunday might, for instance, be precisely the day when there is an electricity supply (from variable sources such as solar and wind).

The energy-saving effects of measures depend heavily the policy settings

The example measures that appear to offer the greatest energy savings are the introduction of a road pricing scheme for passenger cars and an increase and extension of the truck toll. The energy-saving effect of these measures is relatively large due to the parameters chosen for the measures. They do not focus on a specific target group but on all users of motorised transport. In principle, both have a similar effect to rises in energy prices.

An example of a measure that could yield energy savings of a few per cent in road transport is the abolition of the tax-free commuting allowance. Tax incentives for compact cars via a bonus-malus scheme and the authorisation of the Super Ecocombi trucks for road use also yield savings of a few per cent each. Variants of a distance-based air travel tax, which CE Delft has modelled for the previous Dutch government, show savings of 1–2%. However, with the air travel tax, the net effect is smaller than the gross effect, as some travellers who would normally fly from a Dutch airport switch to a foreign airport.

Achieving substantial energy savings through *avoid* and *shift* is not straightforward

What the above examples show is that, from a policy perspective, it is not easy to achieve substantial energy savings through avoid and shift strategies.

- Pricing transport to reduce demand is possible, but if the aim is to achieve significant effects – such as the example measures 'introducing a road pricing

scheme' and 'increasing and extending the truck charge' – then substantial pricing appears to be necessary. The public support survey (Box 5.1) showed that incentive-based (non-mandatory) measures were actually preferred over measures that make driving more expensive.

- In addition to pricing policy, regulatory policy aimed at reducing transport demand can also have a substantial impact, such as a strict mandatory parking policy for employers. However, far-reaching restrictions, rationing and bans appear to be neither practically feasible nor proportionate in practice.
- Government investment in cycling and public transport infrastructure must be substantial (and investment in road infrastructure must decrease) in order to achieve significant savings.
- It is not easy to achieve significant energy savings through softer instruments, such as voluntary agreements and subsidies.

Another point is also important to mention. As we have seen, one of the arguments in favour of *avoid* and *shift* policy is that it offers the opportunity for targeted steering, in contrast to energy savings via market forces (where energy demand decreases 'automatically' as a result of high energy prices). At the same time, we see that transport actually becomes more expensive in a number of example measures (at the chosen policy settings). A point for consideration when designing any measures would be to ensure that they do not actually worsen the affordability of transport (for certain groups) rather than improving it.

In practice, energy savings are often a co-benefit of other policies

In practice, we see that *avoid* and *shift* policies already exist (for example, the truck charge, aviation tax or incentives for cycling) that are or have been implemented for reasons other than energy saving. These include arguments such as: reducing local environmental impacts and CO₂ emissions, road safety, security of energy supply or congestion reduction. In such situations, energy saving is more of a by-product (co-benefit) than the primary driver. A prime example of this is policy aimed at electrification, where CO₂ reduction is the primary driver, alongside improving air quality and energy security.

Support for 'avoid/shift' measures in the event of energy shortages is mainly for incentives and not for measures that make driving more expensive

The public acceptance survey for this study conducted by Populytics presents a mixed picture. Although energy saving within the transport sector is supported by a majority when the situation calls for it, few of the measures presented to respondents garner majority support. In general, respondents prefer incentive-based (non-mandatory) measures over measures that make driving more expensive. For every measure, we see that there is at least one group of participants who would like to implement the measure, but also at least one group who would rather not. The supporters of a measure see positive effects, while the opponents have objections to the same measure.

The aspect of 'fairness' emerges clearly in respondents' motivations, but this can be invoked by both supporters and opponents. For example, the 'polluter pays' principle is seen as fair by some respondents, while others emphasise that a car may be necessary for some people, and that measures could disproportionately affect those on lower incomes.

6.2 Discussion

Can sufficient energy demand reduction be achieved through electrification, on which current energy-saving policy in transport relies heavily, or is more needed?

This study should be viewed as a thought experiment in which we seek to gain an understanding of policy options in the avoid and shift domains for transport and their potential impacts, not only on energy savings but also more broadly. The detailed examples are generally not policy options currently under consideration, with the exception of permitting the Super EcoCombi and the distance-based air travel tax; however, some pricing options do build on previous policy intentions.

Through this exploration, this study aims to contribute to discussions on adaptive policy: when might the central government implement certain measures, and on what basis? What is proportionate and desirable? This is a discussion that goes beyond the scope of this report, and a wide range of questions are relevant here, for example:

- What constitutes energy scarcity and when does it become a problem?
- Which effects are undesirable – for example, an (excessive) dependence on foreign countries that could lead to supply uncertainty or significant price fluctuations, or indeed higher energy prices in the longer term?
- Which co-benefits – that is, policy objectives other than energy saving – do we consider important? Or is energy saving, in fact, a co-benefit of measures taken for other reasons (as is currently the case)?

We believe it would be useful to explore the possibilities and options for action in this area further. A growing realisation is that the importance of energy saving has increased based on the (current) perspective of resilience to geopolitical developments and with a view to energy security.

6.2.1 *Limitations of the study*

This study has limitations, four of which we wish to highlight.

Firstly, the analysis of energy savings: there are wide ranges for most measures, as various assumptions must be made for the year 2040 that are uncertain. This applies in particular to measures that have not yet been quantitatively analysed, for example because they are not yet being implemented anywhere, not even in a lighter form. For this reason, CE Delft's analysis provides an initial assessment for each measure of the knowledge base for energy savings (well or poorly researched), what the main uncertainties are, and what knowledge is still lacking (see Appendix G). We view this initial assessment as a contribution by this study to any further research.

Secondly, to avoid making the calculation of energy savings too complex, no distinction has been made between energy carriers and only savings on final energy – i.e. at the user level – have been considered. Savings on electricity and fuel have therefore been added together, despite the fact that they are not directly comparable and the reasons for seeking to save on them also differ, as we demonstrated in Chapter 3. Furthermore, we do not quantitatively address primary energy savings on a measure-by-measure basis.

Thirdly, estimating the cost-effectiveness of policy measures proved methodologically challenging. The national cost methodology (common in abatement cost calculations) we had intended to use proved more suitable for technical measures in the improve category (using biofuels instead of fossil petrol, for example) than for avoid and shift measures. Reasons for this include the fact that potentially relevant effects of a measure, such as an increase or decrease in travel time, as well as any effects on the business sector, are not taken into account in the national cost methodology. A social cost-benefit analysis is a better tool for incorporating these effects.

Finally, the maritime sector: in the Netherlands, this is the sector with the highest energy demand due to bunkering at Dutch seaports, and is therefore of great

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

importance in the event of a potential energy shortage. However, shipping is a sector that can easily switch to other ports for bunkering. As explained in section 2.3, it was therefore not possible to define specific national level policy measures that would generate an energy-saving effect of more than 0.5% in the Netherlands without significant spillover effects.

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Bijlage A National policy within the EU legal framework

A.1 Theory

In principle, a national measure must not conflict with the freedoms of the internal market and the EU Charter of Fundamental Rights (Charter). The freedoms of the internal market include, for example, the free movement of citizens, workers and services (see below). In addition to a number of exceptions already provided for in law,⁴⁷ 'overriding reasons of general interest' constitute a possible ground for exception; this may also include environmental and climate protection (Ministry of Foreign Affairs, 2025).

Furthermore, the measure must be non-discriminatory and proportionate.

1) Non-discriminatory means that the measure must not discriminate on the basis of nationality, thereby disproportionately affecting, for example, foreign companies.⁴⁸

2) Proportionality means that a) the measure is suitable for achieving the objective and b) the measure is necessary, as it is the least restrictive, effective measure for achieving the stated objective. More specifically, the following are assessed:

- Suitability: the measure must be suitable and thus, at the very least, a potentially effective means of achieving the stated policy objective. The coherence requirement also applies: the measure must pursue the achievement of the intended objective *in a coherent and systematic manner*. There must be no *contradictions or conflicting exceptions* within the policy. For example, if a measure applies exclusively to 'Dutch nationals' and not, for instance, to everyone who has their permanent residence in the Netherlands, it will need to be assessed whether this is in accordance with the coherence requirement.
- Necessity: the necessity of the measure must be substantiated by an appropriate analysis demonstrating that the measure is the least restrictive effective policy measure for achieving the objective.

Internal market freedoms

In the context of this study, some relevant freedoms of the internal market are:

- Free movement of persons. EU citizens have the right to move and reside freely within the territory of the Member States.⁴⁹ This concerns both the right of entry and the right of exit: the right to leave the territory of one Member State to travel to another. A restriction on the free movement of persons is any national measure that prohibits, hinders or makes the exercise of that freedom less attractive. The right of entry and exit may, however, be restricted under very specific conditions, such as public health or public safety.
- Free movement of workers. Workers have the right to move and reside freely within the territory of the EU for the purpose of carrying out work.⁵⁰ Any national measure that may hinder or make the exercise of this freedom by EU citizens within the territory of another Member State less attractive is

⁴⁷ Restrictions on the free movement of workers may, for example, be justified on grounds of public policy, public security and public health (Article 45(3) TFEU).

⁴⁸ There are two types of discrimination: in the case of direct discrimination, a national measure makes a direct distinction based on nationality; in the case of indirect discrimination, no formal distinction is made, but the measure has a particularly adverse effect on foreign service providers because it is more difficult for them to meet a specified requirement or condition.

⁴⁹ Article 20(2) and Article 21(1) TFEU.

⁵⁰ Article 45 TFEU.

prohibited. This prohibition also applies to any measure that prevents or discourages a country's own residents from leaving their country of origin.

- Free movement of goods.
- The right to (undisturbed enjoyment of) property.⁵¹
- Free movement of services. Freedom to provide services.⁵² Free movement in the field of transport services is not covered by this (see next point).
- Free movement of transport services.⁵³ This applies specifically to transport services.
- Freedom of establishment. Service providers have the freedom of establishment.⁵⁴ Any national measure that makes or may make establishment less attractive constitutes a restriction on the freedom of establishment that is, in principle, prohibited.

A.2 Application in the selection of illustrative measures

As discussed in Chapter 2, a number of measures on the long list of potential example measures were not selected for further analysis on the grounds that, based on current national, EU and/or international legislation, we consider them legally unfeasible if the primary motive of the measure is energy saving. We emphasise this is done based on a legal quick scan, not an in-depth analysis. These are mainly measures relating to norms or rationing. We illustrate this below using a number of measures.

Number plate restrictions. In a number of major cities, such as Mexico City, Athens, Beijing and other Chinese cities, number plate restrictions are implemented as a measure to improve air quality.⁵⁵ This measure imposes a partial ban on the use of private cars. One possible implementation of the measure is the *odd-even policy*: on certain days of the week, only cars with an even number as the last digit of their number plate are permitted on the road, and on other days only those with an odd number (Li & Guo, 2016). This measure has not yet been implemented for energy or climate objectives, but it has been included in studies (e.g. Roukouni & Cats, 2024). We did not analyse this measure further because, from the perspective of structural energy saving, it appears to have little legal merit, given the significant restriction of rights. Thus, not only the right to undisturbed enjoyment of property appears to be at stake, but also, for example, the free movement of persons and workers. Perhaps the measure could be applied to improve air quality, specifically in (urban) areas where there are air quality problems. Energy saving could then be a co-benefit.

Mileage quota for passenger cars. Various sources of literature explore the idea of individual budgets or quota, such as a mileage quota. The idea behind this is that citizens (or motorists) are given an annual mileage budget that they can spend on driving themselves or sell on. Through a trading system, participants can buy additional allowances or, conversely, sell any remaining allowances.⁵⁶ At its core, the concept resembles the European Union Emissions Trading Scheme (EU ETS), but without the possibility of utilising improved vehicle efficiency or lower carbon

⁵¹ Article 17 of the EU Charter in conjunction with the corresponding Article 1 of Protocol No. 1 to the ECHR.

⁵² Article 56 TFEU.

⁵³ Article 58 TFEU.

⁵⁴ Article 49 TFEU.

⁵⁵ In addition, there are cities, particularly in Asia, which strongly discourage car ownership through the auctioning of number plates or very high taxes on car purchases. As a result, car ownership in Singapore, for example, remains stable at around 100 cars per 1,000 inhabitants.

⁵⁶ With many possible design variants, such as the free provision of a starting budget, or whether all rights must be purchased immediately, a budget per household or per number of adults in the household, etc.

content in fuels. We assess such a mileage budget in advance as likely to be legally untenable when energy saving is the motive. It significantly infringes upon the freedom of (undisturbed enjoyment of) property (someone who owns a car that otherwise meets all requirements, such as emission standards, would no longer be allowed to use it as they see fit), and other freedoms, such as the free movement of persons and workers, are also at stake.

Excise duty on kerosene. This would make tickets more expensive, which could have an avoid and shift effect. We have not analysed this measure for its energy-saving effect, on the basis that, due to international treaties, the Netherlands cannot/may not levy excise duty on aviation fuel.

Reduction of Schiphol's capacity cap. A capacity cap (annual maximum number of flights) is an existing measure for Schiphol, but not with energy savings as its objective. When, in 2022, the Hoofdlijnenbesluit Schiphol proposed limiting the number of flights at Schiphol to reduce noise pollution for local residents, this met with, among other things, the legal objection that the Netherlands had not properly followed the applicable procedure (a Balanced Approach⁵⁷). This procedure is complex. It must be demonstrated that a reduction in the capacity ceiling is genuinely necessary (proportionate) to achieve the desired effect. If the Netherlands were to adopt this measure with the aim of saving energy, there is a real risk that the European Commission would initiate infringement proceedings. The IBO Climate (2023) also expressed doubts about this measure.⁵⁸

Tradable flight quota/budget or a cap on employees' business air travel mileage/energy budget for airlines. In 2018, the British newspaper The Guardian suggested the idea of giving citizens an annual flight quota, which could be tradable or not (Sodha, 2018). An idea building on this is to oblige employers to limit the number of business flights within their company. Another idea is to give airlines operating flights from the Netherlands an annual budget for the amount of energy they are permitted to refuel at a Dutch airport (whether or not via a system of energy rights that are tradable between airlines).

We have not analysed these ideas further, as they appear, a priori, to conflict with many freedoms of the internal market, such as the free movement of persons,⁵⁹ the free movement of workers who work across borders, the free movement of services, the freedom of establishment, the freedom of enterprise and the freedom for airlines to offer services to . If one nevertheless wishes to take such measures, this must be justified on the basis of a 'compelling reason of general interest', such as environmental or climate protection; the measures must not discriminate on the basis of nationality (for example, by disadvantaging foreign companies); and they must be proportionate (i.e. both *suitable* for achieving the objective and *necessary*, in that they are the least restrictive, effective measure for achieving the stated objective). It is difficult to see how the proposed measures, whose primary motive is energy saving, could meet these requirements.

⁵⁷ EU Regulation 598/2014 of 16 April 2014 laying down rules and procedures for the introduction of noise-related operating restrictions at Union airports within the framework of a balanced approach.

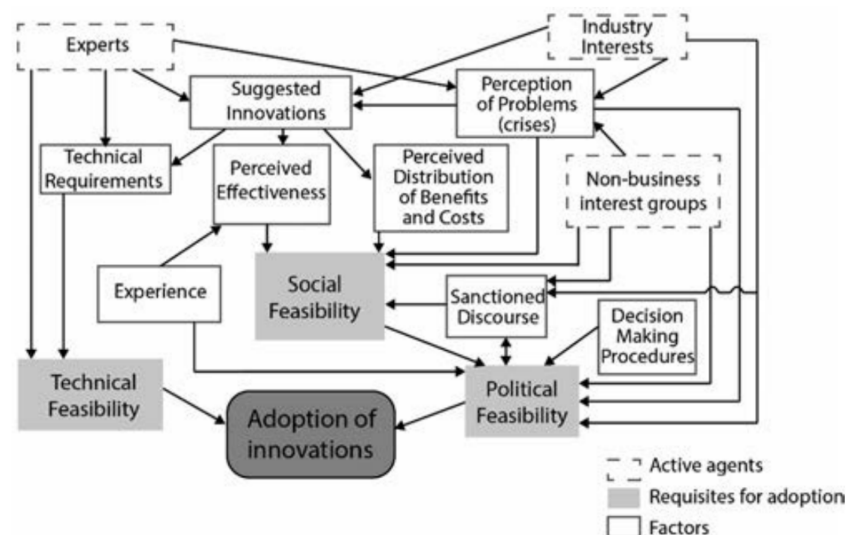
⁵⁸ The IBO Climate (2023) examined the measure for CO₂ reduction purposes, referring in the process to earlier studies. Although tightening the ceiling could achieve a certain degree of emission reduction, the IBO did not consider the measure to be effective due to high social costs and the unclear legal feasibility, as CO₂ emissions have a different environmental impact than noise. According to the IBO, there is a risk of claims from airlines.

⁵⁹ The measure constitutes an obstacle to the right to travel abroad and makes travelling by air less attractive; if no (additional) flight rights can be purchased, the measure effectively amounts to a *ban on travel abroad*, namely a ban on travelling by air from the Netherlands to countries within the EU.

Bijlage B Relevance of public support and public support surveys

By investigating public support for various measures, we gain insight into which measures receive the most support (and therefore have the greatest chance of successful implementation) and possibly also into how the measures can be adapted to gain greater public support.

Figure B.1 The role of social support ('social feasibility') in the implementation of measures (in this figure, "innovations")



Source: Feitelson and Salomon (2004)

Generally speaking, people tend to view a controversial measure more positively after its introduction than before. Van Wee et al. (2023) offer several explanations for this, including:

- The benefits of a measure turn out to be greater than people had expected (de Vos et al., 2016).
- Attitudes may have changed for the better as people gain more knowledge of the (positive) effects of a measure. For example, they may find that pricing measures allow them to drive more efficiently, or notice that air quality has improved due to stricter emission standards for vehicles.
- Loss aversion (Kahneman and Tversky, 1979) plays a role. People are more sensitive to loss than to a gain of the same magnitude. When faced with a new measure, they therefore focus more on the negative impact (such as having to pay more for parking) and less on the positive impact of the measure (such as there being more space for green areas). Another factor is that the disadvantages are often more visible than the advantages. For example, the disadvantages include a clearly visible increase in costs, while the advantages relate to cleaner air.
- Involving citizens in policy influences public support for that policy. The more positive people are about the process, the more positive they are about controversial measures (Pytlik-Zillig et al., 2018). This also supports the relevance of public support research. While it is not a participatory process, it does provide initial insights into what citizens consider important.

More general factors influencing public support for a proposed measure are 1) *effectiveness*; that people believe the measure works effectively as intended; 2) *fairness*; that people view the (re)distribution of the costs and benefits of the measure as fair; and 3) *necessity*; that people recognise the seriousness of the problem the measure is intended to address (Feitelson and Salomon, 2004).

In addition, public support for a specific measure depends on the (introduction of) other measures: the package of measures. Support for an unpopular measure may increase when it is combined with a measure that mitigates the adverse effects. For example, support for a measure that makes driving more expensive is higher if there is simultaneous investment in public transport. Support is therefore also influenced by how the government spends the revenue generated by a pricing measure (Ubbels, 2006).⁶⁰

⁶⁰ In addition, there are other factors that may influence public support for a measure. The media (Ardic et al. 2013; 2018) and other stakeholders such as lobby groups can influence public support for a measure by framing it in a particular (positive or negative) way. Another factor that can play a decisive role in creating sufficient public support is the presence of a strong leader. For example, the introduction of pricing policy in London was identified by the then mayor as a key factor leading to the implementation of the controversial measure (Vonk Noordegraaf et al., 2014).

Bijlage C Energy carriers for transport in the Netherlands: a brief outlook

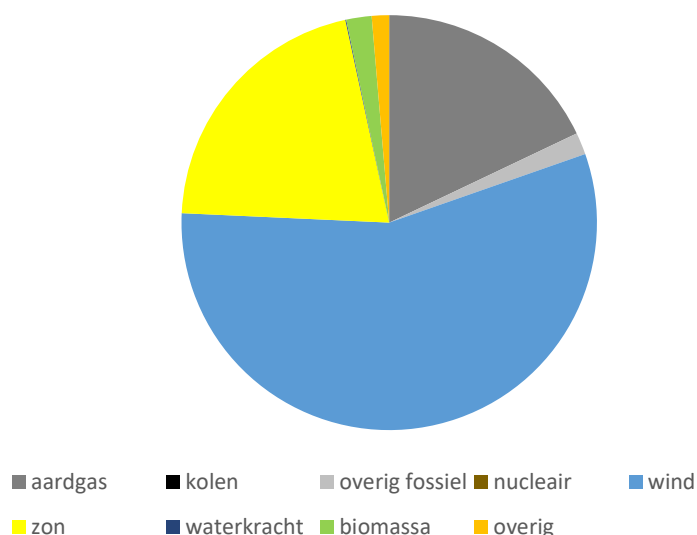
In this appendix, we outline potential developments for climate-neutral energy carriers for transport that may be relevant in motivating energy savings for that carrier, such as: expected scarcity, market dynamics and energy prices. For example, the higher future energy prices are, the more relevant the argument that energy savings reduce costs for businesses and citizens. We do not claim to be exhaustive here. We begin with electricity and then move on to fuels.

Electricity

The NPE (EZK, 2023a) expects renewable electricity to remain scarce until around 2035 and that the grid infrastructure will continue to be the limiting factor for the pace of development of the electricity sector.

Electricity supply: According to the KEV2024, the Netherlands is expected to produce a net 574 PJ of electricity in 2035⁽⁶¹⁾. Of this, 20% is of fossil origin, while 80% comes from solar and wind energy, see Figure C.1. This shift towards renewables is partly due to the European Emissions Trading System (ETS) and the Renewable Energy Directive (RED). Electricity supply will therefore also become highly dependent on seasonal and weather conditions. Temporary storage of electricity (for example in system batteries or in hydrogen) is possible, but costly.

Figure C.1 Electricity generation in the Netherlands in 2035 according to KEV2024 (PBL, 2024b, Table 23), based on adopted and proposed policy



Electricity demand: According to the KEV2024 projections, the Netherlands will be a net exporter of electricity in 2035: total Dutch electricity demand will then amount to 527 PJ, while domestic production will be 574 PJ (PBL, 2024b, Table 24b).

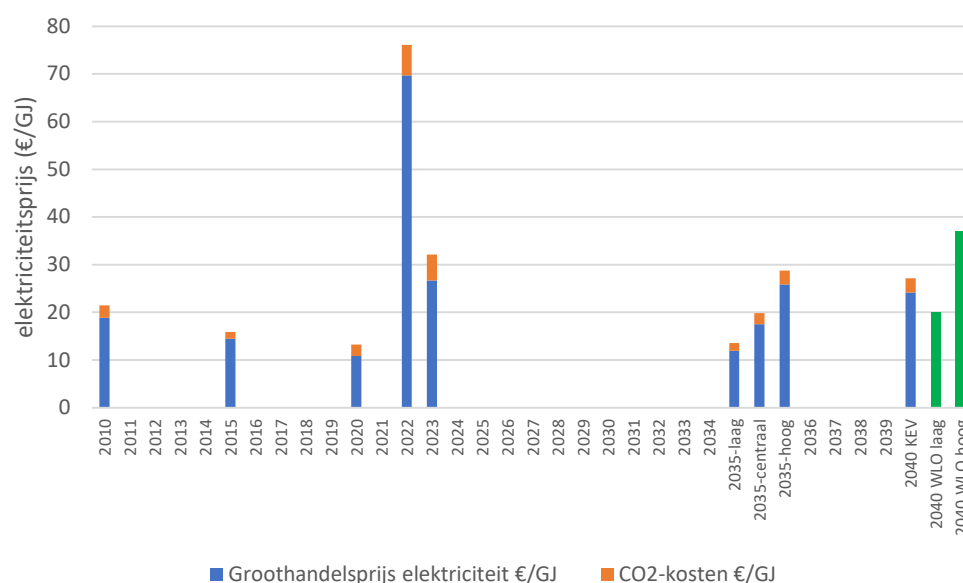
We note here that the KEV bases its projections on 'adopted and planned policy'. This is in line with the NPE scenario featuring a 'fossil-residual task' (see Chapter 4). In that scenario, electrification in the Netherlands is much less advanced than in the NPE climate-neutral scenario, in which the demand for (renewable) electricity,

⁶¹ After deducting the energy sector's own consumption and electricity for distribution.

across all sectors, amounts to 760 PJ in 2035 (see Figure 4.3). Electricity demand in a climate-neutral scenario is therefore considerably higher than the estimated supply in 2035 according to the KEV. To meet this higher demand, the Netherlands would therefore need to either produce more (renewable) electricity or import more than is currently planned by 2035.

Price forecast: The future price of electricity is highly uncertain. For 2035, the KEV does not expect a significant increase, or even a decrease, in the average price of electricity compared to 2023.⁶² However, 2023 was a year with a relatively high electricity price (although 2022 was even higher), see Figure C.2. The WLO scenarios (CPB/PBL, 2025) for 2040 paint a similar picture at 20–37 euros/GJ, see Figure C.2.

Figure C.2 Average wholesale electricity prices, historical (2010, 2015, 2020, 2022, 2023) and future projections under established and proposed policy (2035: KEV2024; 2040: KEV2022 and WLO (green bars))



Note: the wholesale price is the price excluding the supplier's mark-up.

Depending on how the electricity supply (domestic generation and imports) develops, the annual average electricity price in 2035 and subsequent years will fall or rise compared to the forecast in the KEV2024. In addition, there will be fluctuations throughout the year. There may be higher tariffs at times when electricity is scarce, and lower tariffs (or payments) at times when there is supply but no demand. The type of contract between buyer and supplier is also important: for example, has a fixed price been agreed?

Grid operators in the Netherlands are already implementing policies to reduce temporary imbalances between electricity supply and demand, such as imbalance charges (disconnecting businesses at peak times). In addition, efforts are being made to use smart charging to reduce peak electricity demand (peak shaving). In the future, electric vehicles could form part of the solution through their batteries, by charging when supply is high and, if necessary, feeding power back into the grid when supply is (too) low (vehicle-to-grid (V2G), bidirectional charging). The I13050 scenarios (Netbeheer Nederland, 2023), list various flexibility mechanisms, including some relating to electric vehicles.

⁶² According to KEV2024, there will be a small export surplus in 2035, and connections with other countries allow for significant buffering.

Grid congestion: The current grid congestion in the Netherlands is primarily a result of insufficient grid and connection capacity during peak periods, rather than insufficient electricity generation. For electric vehicles, a shortage of public charging facilities (fast charging) also plays a role.

Fuels

In its economy-wide scenarios for a climate-neutral Netherlands by 2050, PBL (2024a) anticipates a particular shortage of green hydrogen and bio- and e-fuels.

Biofuels: With regard to biofuels, there is uncertainty about the supply and demand for the various types of biofuels (Bakker et al., 2026), but the general expectation is that costs and prices will rise in the medium to long term (IEA, 2023). Biofuels for transport in the Netherlands in 2023 were mainly HVO (renewable diesel), FAME (biodiesel) and bioethanol (NEa, 2025), see Figure E.3. In 2024, 19% of the raw materials consisted of oils and fats, 68% of waste streams, 9% of conventional crops and 4% of other raw materials (NEa, 2025). The bio-feedstocks for the biofuel used in the Netherlands come largely from abroad. It is uncertain whether the current waste and residual streams from which HVO, HEFA and FAME are produced will still be available for the Dutch market in the future, as Asian countries – from which they currently originate for the most part – will want to utilise them more themselves in the future. The use of other waste and residual streams is possible, but these too will not be able to meet a rapidly growing demand. This growing demand applies in particular to aviation, given the requirements of the ReFuelEU Aviation Regulation, and possibly also to maritime transport.

Figure E.3 Breakdown of biofuels in the Netherlands by feedstock in 2024 (based on physical energy content, i.e. excluding double counting)



Note: Bioethanol is a petrol substitute; biokerosene, FAME and HVO are diesel substitutes.

Source: Knokke & Moorman (2025), based on NEa (2025), Annex III

Since January 2024, the international wholesale price of HVO has been approximately two to three times higher than the price of fossil diesel, with FAME falling roughly in between. The price of HVO also fluctuates more significantly than that of FAME and fossil diesel (COVA, 2025). However, unlike with electricity, the prices of bio-feedstocks are likely to be less dependent on seasonal influences. Although not every feedstock will be equally abundant in every season, unlike with electricity, the fluctuations are not primarily hourly or daily (although electricity also experiences seasonal fluctuations). The role of waste streams in total biofuel production will increase, but in the long run these waste streams will no longer be sufficient to meet the expected demand for biofuel. In that case, the cultivation of dedicated energy crops must also be considered. Price fluctuations will depend primarily on the size of the market (both supply and demand) for bio-based raw materials and whether alternatives are available. It is unlikely that the Netherlands itself will be a (major) producer of bio-based raw materials. The Netherlands will be heavily dependent on imports from other countries to secure sufficient bio-based raw materials and biofuels.

The sustainability requirements imposed by the EU also influence the price of biofuels. These sustainability requirements for bio-based raw materials that can be used are laid down in the RED.

Renewable hydrogen: Uncertainty regarding future market prices also applies to renewable hydrogen. Its production cost depends primarily on the price of renewable electricity (which is inherently highly variable) and, to a lesser extent, on investment costs in, for example, electrolyzers. In our report on energy supply chains (Bakker et al., 2022), we arrived at a range of €30–70/GJ in 2030, delivered to the pump for inland waterway transport. Another source estimates a hydrogen price of \$15/kg for road transport (Shafiee & Schrag, 2024), which translates to €111/GJ.⁶³ As a final energy carrier, hydrogen is likely to play only a minor role (Bakker et al., 2026), but it does have an important role as a feedstock for e-fuels. A recent study shows that investments in hydrogen production capacity are currently lagging behind the capacity needed to meet the expectations of climate-neutral scenarios (Odenweller & Ueckerdt, 2025); in principle, this could still be the case in 2040.

E-fuels: Derived from the uncertain price of hydrogen, the price of e-fuels, which use hydrogen as a feedstock, is also uncertain. Furthermore, carbon is also a necessary feedstock for e-fuels, the costs of which are also highly uncertain but which is unlikely to be cheap, certainly if this carbon has to be extracted using DAC (Direct Air Capture) (see, for example, Bakker et al., 2022).

E-fuels will be produced primarily for aviation due to the demand stimulus from the EU's ReFuelEU Aviation Regulation.⁶⁴ A characteristic of several e-fuels is that they are physically (almost) identical to their fossil fuel counterparts. They can therefore use the same infrastructure (storage, distribution). E-kerosene can be stored and transported over long distances in the same way as fossil and bio-kerosene.

In the event that e-fuels are produced in the Netherlands, the electricity required for this would be accounted for as final electricity demand from the industrial sector, rather than in the transport sector. Total electricity demand in the Netherlands would therefore increase.

⁶³ Exchange rate €1 = \$1.13.

⁶⁴ By 2050, 35% of the fuel supplied at EU airports must be an RFNBO; this includes not only e-fuels but also electricity and hydrogen, but the use of e-fuels does not require any modification of aircraft, whereas electricity and hydrogen do, making them less readily deployable.

Fossil fuels: In the scenario involving a continuation of current policy, fossil fuels such as petrol, diesel and kerosene will continue to play a role. These fuels will become increasingly expensive in the future due to CO₂ pricing via the ETS2. The KEV2024 forecasts a CO₂ price of €55–110 per tonne in the ETS2 by 2035 (PBL, 2024b). Converted, this means an increase in the pump price of petrol of €0.13–0.26 and of diesel of €0.15–0.29 per litre⁶⁵. The CO₂ price could, for example, be around €300/tonne in 2040 (Pahle et al., 2025), compared with €60–100/tonne in 2022–2025.

Overall effects of price increases

Energy price rises can have an effect on transport demand (which decreases; by how much depends on price elasticity) or result in a modal shift, and this is also partly a desired effect. Below, we look in more detail at the potential impact by mode of transport on transport modes, energy users and consumers.

Road transport: A change in the price of electricity will have a smaller impact on the distance travelled by electric vehicles than an equivalent change in fuel prices would have on the travel by vehicles with internal combustion engines. This is due to differences in cost structure: for electric vehicles, the proportion of fixed costs is higher and that of variable costs is lower than for vehicles with internal combustion engines.⁶⁶ In the case of electric vehicles, fixed costs mitigate the effect of price fluctuations in variable costs. At the same time, fluctuations in the price of electricity may be greater than fluctuations in the price of fuel (see above).⁶⁷ This high variability also presents an opportunity for electric vehicles if vehicle-to-grid proves successful. They could then serve as temporary electricity storage in return for a fee. It should be noted, however, that further research is needed, for example into the potential for faster battery wear and who will bear the cost of this.

Fuel for vehicles with internal combustion engines, both fossil and bio-based, is expected to become more expensive in the future. In freight transport, rising fuel prices could lead to higher consumer prices for goods.

Aviation

In principle, the cost of energy is passed on to passengers (though this is easier to do with business travellers in business class than in economy class). Depending on the price elasticity of different passenger segments (business, economy), higher ticket prices lead to a degree of decline in demand for air travel; see, for example, Kolkman et al. (2012). On the other hand, capacity constraints at Dutch airports ensure that latent demand for air travel absorbs part of the decline in demand.

Maritime and inland shipping

International maritime shipping will bunker less in the Netherlands if prices rise less elsewhere. The border effect in bunkering is strong because the choice of a bunkering location is highly price-sensitive (CE Delft, 2021). Inland waterway transport (using combustion engines) may face reduced competitiveness compared to electrified modes of transport (rail/road) if fuel prices rise.

⁶⁵ We have calculated using a CO₂ content of 2.377 kg/litre for petrol and 2.657 kg/litre for diesel (co2emissiefactoren.nl).

⁶⁶ The purchase price of an EV is, at least for the time being, higher than that of a comparable ICE (though this also depends on subsidies). The running costs of an EV are lower than those of an ICE.

⁶⁷ The price of electricity itself may fluctuate more at public fast chargers and charging points than when charging at home (depending on the type of contract).

Bijlage D Dutch policy documents on energy saving

In this annex we provide excerpts of recent Dutch policy documents and related publications that provide arguments and policy directions for energy saving in the transport sector. Translation of quotes from Dutch to English by KiM.

National Energy System Plan (NPE)

"The government has chosen to focus strongly on energy saving. Energy that we do not use does not need to be generated, paid for, imported or transported. Energy saving therefore contributes directly to *affordability*, reduces the need (and thus *the scarcity*) for renewable energy during the transition, reduces our *dependence on other countries* and limits *energy distribution challenges* such as grid congestion. As a result, energy saving ensures that the *challenge of the energy transition is reduced*, as is the impact of the energy system on the Netherlands (such as *land use*). This objective is in line with the European Energy Efficiency Directive." (NPE Main document, p. 18). A little further on, when discussing the policy instruments, it states: "in addition, this involves sector-specific energy-saving measures such as [...] reducing the demand for transport" (EZK, 2023a, p.18, italics added by KiM).

In the NPE in-depth document on development pathways, the principles arising from the development direction for sustainable carbon carriers state: "Reduce and make sustainable the continuing demand for carbon carriers for (bunker) fuels [...]. As sustainable carbon carriers are not expected to be abundantly available, it is important to limit the use of carbon carriers at system level as much as possible. This is necessary to *ensure the affordability of the energy system as a whole* and to guarantee the *security of supply* of sustainable carbon carriers for the applications for which they are indispensable. This can be achieved, on the one hand, by limiting demand as much as possible, for example by promoting energy efficiency and more sustainable consumption patterns [...]" (p.71, italics added by KiM).⁶⁸

The NPE in-depth document on transition pathways states the following regarding transport: "There is great potential in switching to the use of sustainable energy carriers to replace the fossil fuel variants currently used in the various modes of transport. In addition to this switch to sustainable energy carriers, it is also desirable to reduce energy consumption. This includes reducing energy consumption by travelling less (for example, by working from home more often) and travelling differently (for example, using transport that produces fewer emissions, such as lighter cars, public transport or cycling). The scope for applying other solutions will vary by mode of transport." (p.33).

Climate-Neutral Pathway Exploration 2050 (PBL, 2024a)

"If the supply of bio-based raw materials, green hydrogen and/or the capacity for CO₂ storage is not increased in time, achieving climate neutrality will become substantially more expensive due to the resulting scarcity. Climate neutrality may even become impossible given the assumed economic growth and economic structure. In that case, achieving climate neutrality may mean that it is necessary to adjust consumption levels, for example through a different lifestyle involving significantly lower energy and raw material use and fewer emissions." (pp. 8–9).

Energy Efficiency Directive (EU/2023/1791)

⁶⁸ Also: "It is important to prevent multiple sectors from overestimating their potential with the same limited supply of renewable energy sources"

The EU Energy Efficiency Directive (EED) is important for energy-saving policy. It sets out targets, at national level, for final and primary energy consumption in 2030. All end-use sectors, including international aviation, are covered by this. The KEV2024 (PBL, 2024b, p. 14) reports that the 2030 target is highly unlikely to be met. The transport sector (including aviation) will make a limited contribution to savings up to 2030, but after 2030, mainly due to electrification, the contribution will be greater (in contrast to, for example, industry).

“In addition to targets for reducing energy consumption by 2030, the EED includes an obligation for cumulative savings in final energy consumption through national policy for the period from 2021 to 2030 (EED Article 8)” (PBL, 2024b; 71). In this regard, national policy must be additional to European policy, such as the ETS and the CO₂ standards for new cars.

For the transport sector, governments are focusing in particular on measures that promote electrification, or more generally, zero-emission vehicles.⁶⁹

Letter to Parliament: Results of the study on the national target and indicative sectoral targets for energy savings (EZK, 2024)

“Energy saving therefore contributes to affordable energy bills and greater security of supply for citizens and businesses. By consuming less energy, we also require less space and fewer raw materials for energy generation and reduce grid congestion. [...] In the coming years – at least until 2035 – there may, however, be a shortage. This could result in higher prices and poses a risk to security of supply.”

“Under the current policy, TNO concludes, there is little chance that the EED targets (see below) for both final and primary energy consumption will be achieved. The target for final consumption falls only just within the range of the KEV 2023 estimate, while the target for primary consumption lies outside the range. The remaining challenge is approximately 83 PJ of savings in final energy consumption and approximately 202 PJ of savings in primary energy consumption, compared to the midpoint of the range from the KEV 2023. According to TNO, additional policy is expected to be needed to achieve the EED targets.” (Letter to Parliament from the Ministry of Economic Affairs and Climate Policy, 31 May 2024⁷⁰).

Report “A national energy-saving target and sectoral targets” (TNO, 2024)

This document serves to support the possible development of an energy-saving target for 2030 for the various sectors, including transport.⁷¹ In terms of the rationale for energy saving, this document aligns with the NPE. In terms of practical implementation for transport, TNO focuses primarily on technical (“improve”) strategies, but also on reducing the distance travelled by car, for example through road pricing schemes (see table below⁷²).

In addition, the report acknowledges that there is further potential for savings “through changes or reductions in activities [...] reducing energy consumption in transport by altering the modal split (greater use of bicycles instead of cars and trains instead of planes), rejuvenating the vehicle fleet, promoting lighter vehicles, maintaining a 100 km/h speed limit on motorways even in the evening and at night, and reducing the number of flights to cut energy consumption.” (p.14).

⁶⁹ <https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/energiebesparing>

⁷⁰ <https://www.rijksoverheid.nl/documenten/kamerstukken/2024/05/31/uitkomsten-onderzoek-nationaal-doel-en-indicatieve-sectorale-streefwaarden-voor-energiebesparing>

⁷¹ Under the current energy-saving policy in the Netherlands, the focus is solely on the national target, and no sectoral breakdown has been provided.

⁷² The TNO report does not clarify exactly what is meant by ‘more efficient’ vehicles, nor what proportion of the savings comes from electrification versus efficiency (and it is possible that this efficiency gain is a result of electrification).

Bijlage E Diminishing returns from measures as electrification increases

Final energy savings from an avoid or shift measure

Within the transport sector, road transport will be the mode of transport – apart from rail – that is most electrified by 2050. By 2050, well over half of road journeys are expected to be made by electric vehicles. Specifically, 71% and 94% respectively in the NPE scenarios ‘continuation of current policy’ and ‘climate-neutral’, see Appendix F. Table E.1 details the savings achieved by a (fictitious) avoidance measure in both scenarios in relation to transport volume, broken down by electric and internal combustion engine (ICE) vehicles.

Table E.1 Savings in 2050 per vehicle type (electric/fuel) in relation to transport volume, assuming a measure that reduces transport volume by 20% in road traffic (passenger cars, vans and trucks)

| | NPE “business as usual” | | NPE “climate-neutral” | |
|-------------------|---------------------------|------------------|---------------------------|------------------|
| | Share of transport volume | Share of savings | Share of transport volume | Share of savings |
| Electric vehicles | 71% | 25 PJ (45%) | 94% | 32 PJ (85%) |
| ICE vehicles | 29% | 30 PJ (55%) | 6% | 6 PJ (15%) |

1. Avoid measure applied in the NPE scenario ‘continuation of current policy’:

With the (fictitious) avoidance measure resulting in a 20% reduction in road traffic volume, 55 PJ is saved in this scenario, of which 25 PJ is electricity and 30 PJ is fuel. Electric vehicles, covering 71% of the distances, account for 45% of the energy savings, while fuel vehicles, covering 29% of the distances, account for 55% of the energy savings. Fuel vehicles therefore achieve greater energy savings overall than electric vehicles, even though they collectively cover fewer distances than electric vehicles (per vehicle, the figure is the same). In other words, this *avoid* measure is much more effective and efficient at saving fuel than at saving electrical energy.

2. The same avoid measure applied in the NPE climate-neutral scenario:

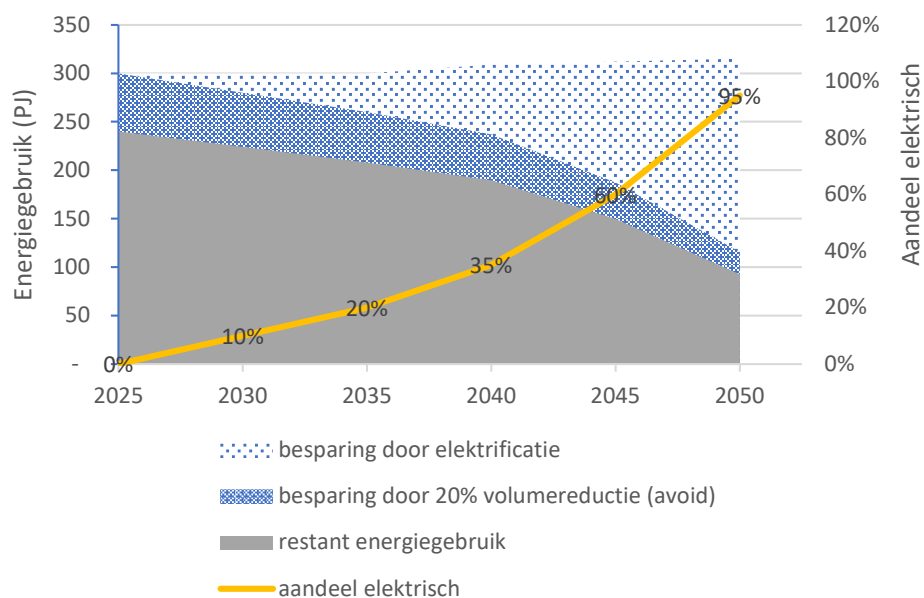
We now apply the same avoidance measure to the other NPE scenario, again resulting in a 20% reduction in distances travelled. This saves 38 PJ, of which 32 PJ is electricity and 6 PJ is fuel. Of the total energy savings, 85% therefore comes from electric vehicles and 15% from fuel-powered vehicles. However, the share of electric vehicles in the distances travelled is greater than 85%, namely 94%, compared to 6% travelled by fuel vehicles. In other words, a distance avoided by fuel vehicles yields greater energy savings than when the same distance is avoided by electric vehicles.

3. Calculation example with an increasing share of electric vehicles in the vehicle fleet.

If we apply an avoidance measure that achieves a 20% reduction in volume to a (fictitious) vehicle fleet that is becoming increasingly electrified, the energy-saving effect in PJs continues to decline. See the figure below, which shows a hypothetical increase in the share of electric vehicles to 95% by 2050. In this example, the absolute energy saving achieved annually through the avoidance measure

decreases from 60 PJ (20% of 300 PJ) in 2025 to 23 PJ in 2050. The relative saving remains – naturally – the same (20%), but the absolute saving decreases because the saving relates to an ever-smaller energy consumption. At the same time, the measure itself (which ensures a 20% reduction in volume for all road traffic) remains just as drastic. The measure therefore becomes increasingly less proportional over time.

Figure E.1 Illustration of diminishing savings from reduced transport demand (avoid) with increasing electrification



We can draw a few conclusions from these calculation examples.

1. A saving measure that focuses on reducing the distance travelled per vehicle without distinguishing between vehicle types becomes less effective (measured in PJ) as the proportion of electric vehicles increases. With ongoing electrification, a volume reduction measure therefore becomes increasingly less effective in saving energy.
2. To save a given amount of energy, the reduction in transport volume must be much greater for electric vehicles than for vehicles with internal combustion engines.

Bijlage F Energy demand projections by mode of transport (NPE)

Energy demand by mode of transport in 2050 (NPE)

Table F.1 NPE current policy scenario: final energy demand (PJ) in 2050 by mode of transport

| | Electricity | Hydrogen | Biofuel | E-fuel | Residual fossil fuel requirement | Total |
|---|-------------|----------|---------|--------|----------------------------------|-------|
| Passenger cars | 74 | | 16 | | 62 | 152 |
| Vans | 17 | | 2 | | 21 | 40 |
| Heavy goods vehicles | 33 | 6 | 14 | | 31 | 84 |
| Public transport | 13 | 0.3 | 0.1 | | 2 | 15.4 |
| Inland waterway transport | 1 | | 4 | | 47 | 52 |
| Maritime shipping (bunkers) | 17 | | 130 | 50 | 283 | 480 |
| Aviation (bunkers) | | | 81 | 81 | 69 | 231 |
| TOTAL | 155 | 6 | 247 | 131 | 515 | 1054 |
| Total excluding aviation and maritime bunkers | | | | | | 343 |

Note: energy consumption is based on refuelling and charging in the Netherlands, regardless of where the consumption takes place. It therefore does not relate solely to domestic transport.

Table F.2 NPE climate-neutral scenario: final energy demand (PJ) in 2050 by mode of transport

| | Electricity | Hydrogen | Biofuel | E-fuels | Remaining fossil fuel requirement | Total |
|---|-------------|----------|---------|---------|-----------------------------------|-------|
| Passenger cars | 99 | | | | | 99 |
| Delivery vans | 21 | | 7 | | | 28 |
| Heavy goods vehicles | 41 | 11 | 11 | | | 63 |
| Public transport | 14 | 1 | | | | 15 |
| Inland waterways | 8 | 12 | 11 | 10 | | 41 |
| Maritime (bunkers) | 17 | | 307 | 156 | | 480 |
| Aviation (bunkers) | | 30 | 126 | 49 | | 205 |
| TOTAL | 200 | 54 | 462 | 215 | 0 | 931 |
| Total excluding aviation and maritime bunkers | | | | | | 246 |

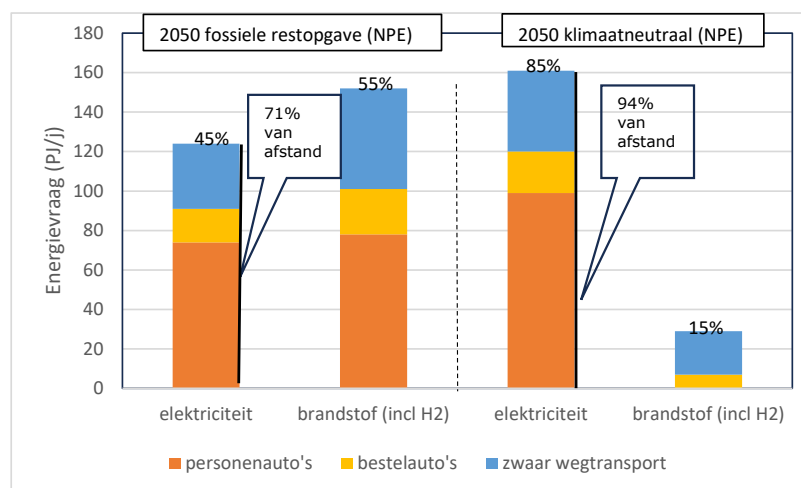
Note: energy consumption is based on refuelling and charging in the Netherlands, regardless of where the consumption takes place. It therefore does not relate solely to domestic transport.

Road transport: breakdown between electricity and fuel

Figure F.1 focuses on the energy consumption of road transport in both NPE scenarios (current policy and climate-neutral). Energy consumption is divided between passenger cars, vans and heavy goods vehicles. If current policy continues, road transport will use 45% electricity and 55% fuel in 2050; in the

climate-neutral scenario, the breakdown is 85%⁷³ electricity and 15% fuel, see Figure F.1.

Figure F.1 Breakdown of electricity and fuel demand in road transport in 2050, left: continuation of current policy (= situation with some fossil energy remaining) and right: climate-neutral



Source: NPE (EZK, 2023a)

What does this split between electricity and fuel mean for the distances travelled by each type of road vehicle? In the climate-neutral scenario, 94%⁷⁴ of the distances are covered by electric road vehicles; in the scenario with residual fossil fuel use, electric road vehicles cover 71%⁷⁵ of the distances. It is assumed here that an electric motor is three times as efficient as a combustion engine.

Electricity demand patterns for transport

When it comes to competition for electricity with other sectors, it is not just a question of how much electricity transport requires, but also of when that demand arises. Electricity is an energy carrier that is difficult (or costly) to store, and generated electricity should preferably be used immediately. Demand must therefore match supply – the production at that moment – as closely as possible. The supplier will try to ensure that demand coincides with the supply at that moment.

Here, in this appendix on energy demand, it is relevant to consider whether transport has a specific electricity demand pattern and, if so, what determines it. Electric vehicles have a battery in which electrical energy is stored. Are there specific times of the day or week when they charge, and what is the capacity of their battery? This will generally vary by mode of transport because usage patterns also differ. For passenger cars, the following applies: the greater the battery capacity (in kWh), the less frequently a vehicle needs to be charged (for example, just once a week instead of several times a week) and the better the charging time can be aligned with supply: charging during off-peak hours or on days when electricity is cheap. In the future, the battery may, potentially, serve as temporary storage for a fee by feeding electricity back into the grid after charging (vehicle-to-grid); so far, there have only been pilot projects for this.

Different considerations are likely to apply to electric trucks. A truck is a business asset. From a business economics perspective (a battery that is too heavy, which adds extra weight and reduces the payload capacity), it will probably be preferable

⁷³ Passenger cars use 100% electric energy, vans 75% and heavy goods vehicles 65%.

⁷⁴ 94% = $0.85 \times 3 / (0.85 \times 3 + 0.15)$.

⁷⁵ 71% = $0.45 \times 3 / (0.45 \times 3 + 0.55)$.

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

to optimise the battery to suit daily use. Transport companies prefer to charge trucks overnight at their own charging stations (ElaadNL, 2025). Should (some of) the trucks be able to use an electric road system on certain corridors in the future, the demand pattern will change again (dynamic charging) (TNO & TUD, 2025).

Energy demand in aviation

By 2050, aviation will use at least 35% e-fuel and 35% biofuel, in accordance with the obligation set out in the RefuelEU Aviation Regulation. In both NPE scenarios, aviation's energy demand increases compared to the current situation.

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

Bijlage G Detailed examples of avoid and shift policy measures for energy savings in transport

This appendix was written by:

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Delft, CE Delft, February 2025

Client: KiM Netherlands Institute for Transport Policy Analysis

G.1. Introduction

Objective

The Netherlands Institute for Transport Policy Analysis (KiM) has asked CE Delft to identify and assess effective policy measures that contribute to reducing energy demand in transport. The outcome of the assessment will be used to gauge public support for these measures. To determine this, KiM has set out three tasks, the results of which are presented in this report:

1. Calculate the expected energy savings (with a range) of the measures by 2040.
2. Provide an indication of the scale of the costs and benefits of the measures.
3. For each measure, indicate the impact on citizens, expressed in terms of the impact on household expenditure and a second, significant impact resulting from the measure.

Scope

In this study, 16 measures were examined and developed (see Chapter 5). The analysis drew on existing sources, and where these were not available, assumptions were made in consultation with KiM. In addition, experts from TNO and PBL reviewed the study critically and provided us with supplementary information. The study itself can be regarded as new research, as the potential and impact of so many measures taken together have not previously been mapped out. However, we did not conduct any new or additional research to substantiate the results.

For the scope of energy use, we have adopted the Tank-To-Wheel (Cooper et al.) , i.e. final energy use, which excludes the energy required for the production and transport of the fuel or electricity. In terms of geographical scope, only domestic energy consumption has been included for passenger and freight transport. For aviation, this concerns the energy consumption of all aircraft departing from the Netherlands (including energy consumption outside Dutch airspace). See also the Methodology chapter in this annex.

Measures are only fully developed if they are expected to yield at least a 0.5% energy saving compared to the baseline scenario in the relevant sub-sector. We assume the measures will be introduced from 2030, and the energy saving impact is calculated for 2040. The baseline scenario is described in the Methodology chapter.

Some of the measures developed may be regarded as drastic, and there may be doubts about public support for them. Public support has not been taken into account in this study and was not a factor in the selection of measures prior to their further elaboration.

The analysis takes into account, as far as possible, the most significant rebound effects on energy consumption. These are effects that partially offset the primary effect of a measure. Key mechanisms of how rebound effects work:

- A measure makes transport cheaper and/or more efficient (for example, the Super EcoCombi), which results in transport becoming more attractive and therefore increasing in volume.
- A measure saves time (e.g. working from home) and this freed-up time (or road space) is used for other journeys.
- If a measure makes a particular mode of transport less attractive, people will (partly) switch to other modes of transport.

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

In some cases, there are also secondary effects that reinforce the primary effect. For example, driving more slowly (depending on the speed) has the direct effect of reducing energy consumption per kilometre and the indirect effect of reducing the total distance driven, as journey times increase.

Significant rebound effects are included where sufficient information is available. If this is not the case, this is clearly stated in the fact sheets for the measures.

In the cost-benefit analysis, we use the national cost methodology (CE Delft, 2023b) . This means that we base our analysis on the monetary costs of a measure. Non-monetary costs, such as lost travel time, are not included in the cost-benefit analysis but, where relevant, are mentioned under 'other effects'.

G.2 Methodology

G2.1 Energy savings

Reference scenario for passenger and freight transport

For the reference scenario on energy consumption, we align with the Climate and Energy Outlook (KEV) for passenger and freight transport. The KEV includes a projection up to and including 2040 based on established and proposed policy (European and national). The KEV 2022 contains a comprehensive projection, of which we use the medium scenario as a starting point in this study. In the KEV 2023, the Netherlands Environmental Assessment Agency (PBL) has modelled the individual effects of measures based on the KEV 2022, but the PBL has indicated, via personal communication, that the medium scenario of the KEV 2022 remains valid. The only exception to this is heavy-duty road vehicles, for which the European Commission adopted stricter CO₂ emission standards for new heavy-duty commercial vehicles in 2024, which have been approved by the European Parliament and the European Council. These involve the following reduction percentages compared to 2019 levels:

- 45 per cent reduction in emissions from 2030;
- 65 per cent reduction in emissions from 2035;
- 90 per cent reduction in emissions from 2040.

The CO₂ reduction must be achieved at the tailpipe, meaning it is not possible to achieve the reduction using biofuels or alternative fuels. As a result, the reduction will most likely be achieved by battery-electric and hydrogen-powered vehicles. Based on estimates from PBL, we are therefore making a correction to the KEV 2022 to account for the higher uptake of zero-emission heavy commercial vehicles, assuming these will be battery-electric vehicles.

Compared to the KEV 2022, we have also made an adjustment within the scope of freight transport by inland waterway. While the KEV only includes inland waterway transport that remains within the Netherlands, in this study we also include the energy consumption of international voyages on Dutch territory. We do this by adjusting the figures based on the emissions reported by EmissieRegistratie⁷⁶ (Rijksoverheid, lopend-a) for inland waterway transport on Dutch territory, and the emissions and energy consumption reported in the KEV for domestic, non-cross-border inland waterway transport.

Reference scenario for energy consumption in 2040

Table G.1 shows the energy consumption in PJ in 2040 derived from the reference scenario. We have broken this down by mode of transport.

⁷⁶ 1.55 million tonnes of CO₂ emissions on Dutch territory in 2021.

Table G.1 Energy consumption reference scenario 2040

| Mode of transport | Energy carrier | Energy consumption 2040 (Oosterveer & Mol) |
|----------------------------|----------------|---|
| Passenger transport | Total | 158.8 |
| Passenger cars | Fuel | 87.1 |
| | Electric | 55.6 |
| Buses | Fuel | 1.6 |
| | Electric | 2.3 |
| Mopeds and motorcycles | Fuel | 5.2 |
| | Electric | 0.8 |
| Train | Fuel | 0.5 |
| | Electric | 5.8 |
| Freight transport | Total | 93.4 |
| Trucks | Fuel | 27.4 |
| | Electric | 30.6 |
| Vans | Fuel | 9.4 |
| | Electric | 7.3 |
| Inland waterway transport | Fuel | 17.5 |
| | Electric | - |
| Rail | Fuel | 0.4 |
| | Electric | 0.8 |
| Aviation | Total | 158.1 |

Assumptions for the analysis of measures

For the calculation of energy savings in relation to the measures studied, we apply the following assumptions in the analysis:

- We assume that, unless otherwise stated, the measures will be introduced in 2030 so that they can achieve their full effect by 2040. Many of the proposed measures present challenges in terms of practical feasibility. In this exploratory study, the practical feasibility of each measure is addressed, but these aspects have not been examined in detail.
- For passenger transport and freight transport, energy savings have been calculated for journeys and transport within the Netherlands. For cross-border transport, only the portion on Dutch territory has been included. For aviation, energy savings have been calculated for all flights departing from the Netherlands, covering the entire flight to the final destination.
- We estimate the savings effect of the measures realistically, i.e. not based on theoretical potential. To do this, we use a range, which we base on the key uncertainties associated with the measures. We therefore provide a specific estimate for each measure, meaning the extent of the range may vary. For the optimistic estimate, we assume that several, but not all, uncertainties turn out favourably. For the pessimistic estimate, conversely, a few, but not all, uncertainties turn out unfavourably.
- For all measures, we identify the most significant rebound effects on energy consumption. Where information is available on the magnitude of the rebound effects, we include this; where this is not known, we state this and indicate how large we estimate the effect to be.
- In terms of costs, we only include direct effects that we, based on the National Cost Methodology (CE Delft, 2023b), define as effects within the transport sector. This means, for example, that we do not include the effect of higher transport costs (and thus higher product costs) on the sales of products by industry.

G2.2 Costs and benefits

To identify the relevant costs and benefits, we apply the National Cost Methodology for most measures. According to the definition in the CE Delft guidenational costs concern:

'The national cost balance reflects the direct change in the domestic use of production factors.' (CE Delft, 2023b)

The following logic underlies this definition: the more factors of production that must be deployed to achieve a specific objective through a measure, the more costly the measure. The factors of production are labour (compensated via wages), entrepreneurship (compensated via profit), government costs (including administrative costs and enforcement), nature (compensated via rent) and capital (compensated via interest/rent).

By calculating the national costs, the effectiveness of a particular objective can be determined, such as the objective of energy saving in this study.

If, for example, a road pricing scheme leads to investment in more fuel-efficient vehicles, then the annual additional costs of the more fuel-efficient vehicles and the reduced energy costs constitute the national cost balance. If the cost balance of investment in vehicles and energy is positive, the Netherlands as a whole pays more for transport. However, this does result in energy savings. It is possible to assess how significant the net additional costs of purchasing and using the vehicles are in relation to the energy saved.

The national cost methodology therefore provides insight into the additional or reduced costs for the Netherlands as a whole to achieve a specific objective. The national cost methodology does not, therefore, take external costs into account (see methodological limitations), nor does it include benefits or costs in the form of changes in travel time.

Scope of the national cost methodology

The cost items included in the calculation are:

- policy and administrative costs/benefits for implementing the measure;
- capital costs/benefits for sector investments;
- difference in energy costs for the sector;
- difference in sector maintenance and management costs;
- difference in sector revenue.

Figure G.1 illustrates how the various cost items together determine the national cost balance.

Figure G.1 Calculation of national cost balance



National cost calculations only consider direct effects. This means that the financial effects within the market where the measure is implemented are examined. In this case, that refers to the transport market. Effects on, for example, industry or the energy market are therefore not included. In the case of working from home, we do therefore include the effects on other modes of transport (for example, the knock-on effect on other road users due to more space on the road), but not the effects on labour productivity or energy use at home. The fact that we do not include such effects is a limitation of the methodology (see also methodological limitations); this does not mean that the effects are not important. Expected indirect effects will, however, always be identified.

Limitations of the national cost methodology

The methodology focuses on the financial effects and does not take into account other societal costs and benefits. In the case of road pricing, these might include the societal benefits of reduced emissions of CO₂, nitrogen oxides (NO_x) and particulate matter (PM), as well as reduced noise levels.

For international sectors, the methodology is not easily applicable in any case, as the distinction between national and international elements is difficult to determine precisely for both costs and revenues. The national cost methodology is less suitable in this case, and a cost-benefit analysis (CBA) would provide a more complete picture.⁷⁷ Despite the limitations, a decision was made in this study to broadly follow the national cost methodology, as it provides clear frameworks and is feasible within the scope of the study. We identify non-financial effects, such as travel time and accidents, under 'other effects' if these play a significant role.

G2.3 Impact on citizens

For the effects on citizens, we focus on direct financial effects on the one hand and other effects on the other. For the other effects, we have only identified the most prominent effect per measure. In doing so, we have chosen from:

- freedom of choice;

⁷⁷ Where non-financial impacts, such as travel time and accidents, play a significant role, we include the results from CBAs in the 'other impacts' category, provided such analyses are available.

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

- accessibility;
- a group of citizens affected (e.g. frequent flyers);
- journey time;
- jobs;
- living environment (noise, air quality, road safety);
- public space (e.g. x fewer parking spaces).

As with determining energy savings and costs and benefits, we base our analysis as much as possible on studies previously carried out on various measures. Where these are not available, we attempt to make an estimate using reference points. Below, we briefly explain which general reference points we use.

Measures relating specifically to personal transport can have different outcomes for different groups of citizens. For example, the effect in rural areas may differ from that in the Randstad. We have noted this for the measures where this is the case.

For freight transport, we assume that costs and benefits are passed on to citizens and that these are indirectly reflected in household expenditure.⁷⁸ We identify the costs based on the following points:

- increase in transport costs/benefits per mode;
- average effect of transport costs on household expenditure(Arcadis, 2019) .

The share of transport costs can vary significantly by product group (Arcadis, 2019). The effect of a measure may also vary by consumer type or region. The estimates of the increase in product costs are therefore a broad indication.

⁷⁸ Except in the case of transparent delivery charges that have a direct impact on the public.

G.3 Illustrative policy measures: analysis and results

In this chapter, we have presented the analysis of the measures and outcomes in a uniform manner, in the form of factsheets. See Table G.2 for a brief explanation of these policy options.

These have been categorised by KiM according to legal feasibility. The factsheets for the legally feasible measures are in G.3.1 and those where legal feasibility is unclear are in G.3.2. For further explanation of legal feasibility, see the main report (section 2.3.3).

Table G.2 Measures relating to passenger transport for which the effectiveness has been analysed

| Passenger transport | |
|----------------------------|--|
| 1 | <p>Car-free Sunday for passenger cars</p> <p>The measure prohibits car use for one day a week (Sunday) at national level. An exception applies to emergency services and people in essential roles.</p> |
| 2 | <p>Reduction of the speed limit on main roads for passenger cars and vans to 80 km/h</p> <p>The speed limit is being reduced from 100 to 130 kilometres per hour to 80 kilometres per hour, which will lead to lower energy consumption.</p> |
| 3 | <p>Introduction of a road pricing scheme</p> <p>This measure is based on the introduction of a charge of €0.15 per kilometre for passenger cars and vans.</p> |
| 4 | <p>Increase in fuel duty</p> <p>By increasing fuel excise duty by 25%, energy for transport becomes more expensive. A rise in price leads to a reduction in demand.</p> |
| 5 | <p>Mandatory strict parking policy for employees</p> <p>This measure prohibits employers from providing parking spaces for employees who live less than 15 or more than 30 kilometres from their workplace. This discourages car use and encourages working from home, cycling and public transport for journeys where modes other than the car offer a viable alternative.</p> |
| 6 | <p>Making the additional tax liability for lease-cars distance-based</p> <p>In many cases, using a company car is more cost-effective than using a private car. Under a mileage-based additional tax liability scheme, the tax liability is increased based on the number of private kilometres driven. The aim is to reduce the use of company cars for private purposes.</p> |
| 7 | <p>Abolition of the tax-free commuting allowance for passenger cars</p> <p>By abolishing the tax-free travel allowance for commuting in passenger cars, the use of cars for commuting is discouraged, while the use of public transport and cycling is encouraged. The travel allowance for business journeys remains unchanged under this scheme.</p> |
| 8 | <p>Investment package for modal shift</p> <p>To encourage the use of public transport and discourage car use, this measure consists of a reduction in expenditure on road infrastructure and increased expenditure on</p> |

| Passenger transport | |
|----------------------------|---|
| | public transport. The latter component is divided into investments in rail infrastructure, investments in bus/tram/metro infrastructure and a reduction in train fares. |
| 9 | <p>Tax incentives for compact cars (bonus-malus scheme)</p> <p>This measure consists of providing tax incentives for the purchase of more compact cars with lower energy consumption per distance travelled.</p> |
| 10 | <p>Incentive policy for working from home</p> <p>The section of the workforce for whom working from home is possible is encouraged through policy to work from home three days a week.</p> |
| Freight transport | |
| 1 | <p>Energy performance standards in freight transport</p> <p>Standards oblige companies to improve efficiency, but leave them free to determine how to achieve this. To make this auditable, the starting point is an efficiency improvement in MJ/tkm, with tonne-kilometres calculated on the basis of as-the-crow-flies distance in accordance with ISO 14083.</p> |
| 2 | <p>Increasing and extending the truck charge</p> <p>The amount of the planned distance-based charge for trucks from 2026 will be increased under this measure in 2030 and extended to the secondary road network, thereby creating a stronger price incentive to reduce mileage.</p> |
| 3 | <p>Promoting ZE zones and subsidies for LEFVs</p> <p>Zero-emission zones will be introduced in the 44 largest Dutch municipalities (G44) and the scope of the zone will be extended to the area within the ring road. The measures will be supported by a subsidy for LEFVs (Light Electric Goods Vehicles).</p> |
| 4 | <p>Reducing the speed limit to 70 km/h for trucks</p> <p>The maximum speed limit for trucks in the Netherlands will be reduced from 80 kilometres per hour to 70 kilometres per hour, thereby reducing energy consumption.</p> |
| 5 | <p>Mandatory transparency on delivery charges</p> <p>Online shops will be required to charge delivery costs transparently to consumers, giving consumers insight into the consequences of choosing fast delivery (less efficient) or slower delivery (better vehicle loading).</p> |
| 6 | <p>Allowing Super EcoCombi on Dutch roads</p> <p>The Super EcoCombi (SEC) is an extra-long truck combination consisting of a tractor unit with two 13.6-metre trailers. The combination is therefore twice the size of a standard tractor-trailer and can carry 72 tonnes. This allows road transport to be carried out more efficiently.</p> |

G.3.1 Measures with high legal feasibility

Road pricing

| Introduction of a road pricing scheme | |
|---|---|
| Description and definition of the measure | <p>This measure introduces a flat-rate road pricing charge of €0.15/km. We have assumed that car ownership remains unchanged, which implies that the motor vehicle tax (MRB) and/or the motor vehicle purchase tax (BPM) will be (partially) abolished or reduced.</p> <p>In this example, a road pricing scheme is a flat-rate charge that applies always and everywhere. This measure ensures that the direct variable costs of car use increase. This encourages people to use their cars less. For example, people may choose not to make the journey, use a different mode of transport, travel together, or, in the longer term, move house or change jobs (CPB & PBL, 2015). This measure is therefore more strongly focused on reducing energy consumption than a rush-hour charge.</p> |
| Mode of transport | Private car. |
| Measure focuses on | Avoid and shift. |
| Type of measure | Pricing. |
| Link to other policies | N/A |
| Expected behavioural effects/policy rationale | A road pricing scheme increases the cost of car use, leading to reduced car use. People may avoid travelling, for example by working from home in the case of commuting, or by using a different mode of transport (public transport, cycling), or, in the longer term, by moving house or changing jobs. |
| Feasibility | <p>In the recent past, a road pricing scheme (“Betalen naar gebruik”) was planned to come into force from 2030 (Rijksoverheid, 2022b). Its implementation has been extensively studied (KiM, 2022e; MuConsult et al., 2022; MuConsult et al., 2020).</p> <p>A road pricing scheme can be implemented in various ways. For example, a device with GPS functionality could be installed in every car to track the distance travelled (CPB & PBL, 2015). Another option is to determine the tax amount based on the car’s odometer reading. When considering technical solutions, issues such as privacy must also be taken into account.</p> |
| Energy saving | |
| | 2040 |
| Energy savings (PJ/yr) | This measure yields annual energy savings of 17–20 PJ, representing 11–13% of total energy consumption by passenger transport in 2040. |
| Explanation of energy savings | The energy savings result from the reduction in the distances travelled by car, which itself is a consequence of the additional costs of car use. |
| Calculation method | A road pricing scheme was analysed in 2015 in a study by the PBL and CPB (CPB & PBL, 2015). This study assumed a flat-rate road pricing charge of 7 euro cents per kilometre. The measure did not apply to freight traffic. According to this study, a flat-rate road pricing scheme leads to a reduction of approximately 12–14% in the distance travelled by private cars, depending on the economic scenario (CPB & PBL, 2015). The use of public transport increases by approximately 1% during peak hours and 5% outside peak hours. This is because car journeys made for non-work-related reasons are primarily avoided. |

| Introduction of a road pricing scheme | |
|--|--|
| | <p>We assume that the available capacity of public transport is sufficient to accommodate this growth, and that therefore no additional rolling stock is required. Energy consumption by public transport will then remain constant.</p> <p>Based on the expected fuel consumption in 2040, we can estimate the energy savings corresponding to the reduction in distances travelled by car (PBL, 2023b). The 12–14% decrease in distances travelled by car is expected to lead to a reduction of 17–20 PJ per year by 2040.</p> |
| Assumptions | <p>It is assumed that this reduction is uniform across all fuel types, and that the decrease in vehicle kilometres is proportional to the decrease in energy consumption.</p> <p>The effect of this measure is largely determined by the level of the charges. A recent study examined flat rates of 4.64–10.86 euro cents per kilometre, which would lead to a 6.9–15.8% reduction in vehicle kilometres in 2030 (MuConsult et al., 2022). Based on these results, the reduction in car mileage appears to follow a reasonably linear trend with the level of the charge.</p> |
| Marginal effects | <p>When the tax depends on the distance travelled, rather than fuel consumption, the marginal effects are small (KiM, 2022e). After all, it does not matter where one fills up. Similarly, it is irrelevant whether the journeys are made in the Netherlands or abroad.</p> |
| Knowledge base on energy saving | |
| Assessment of the knowledge base for the measure | <p>This measure has been thoroughly and repeatedly researched; see, for example (CPB & PBL, 2015).</p> |
| What knowledge is still lacking? | <p>Current studies mainly focus on the target year 2030. It is unknown how significant the differences between the results for 2030 and for 2040 are. Furthermore, an update of the economic scenarios could lead to a difference in results.</p> |
| Cost items: national costs | |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | <p>A road pricing scheme based on a device requires a one-off investment. In 2015, it was calculated that introducing the GPS device in cars would cost approximately €12.6 billion, over a 30-year period (CPB & PBL, 2015). That amounts to approximately €420 million per year. The costs might now be lower due to cheaper technology.</p> <p>We assume that the revenue from the road pricing scheme is equal to the revenue from the motor vehicle tax. The introduction of a road pricing scheme will therefore not lead to additional revenue.</p> |
| Annual capital costs/benefits for sector investments (€ million/year) | N/A |
| Difference in sector energy costs (€ million/year) | <p>The energy savings of 17–20 PJ result in a reduction in energy costs of €442–515 million per year, based on the energy price forecast for 2040 (PBL, 2023b).</p> |
| Difference in maintenance and management costs for the sector (€ million/year) | <p>Reduced use of the road network means lower costs for the maintenance of roads and engineering structures. We have not estimated the savings in these maintenance costs.</p> |

| Introduction of a road pricing scheme | |
|---|---|
| Difference in sector revenue (€ million/year) | The literature mainly provides information on revenues resulting from vehicle hours lost and travel time savings. These are not included in the study. Other revenues for the sector are not described. |
| Total annual costs | |
| Total national costs (€ million/year) | The introduction of the GPS unit in cars costs approximately €12.6 billion (GPS unit), over a 30-year period (CPB & PBL, 2015). This amounts to approximately €420 million per year. The energy savings are expected to yield 442–515 million euros per year by 2040 (see above). The costs of the measure (420 million euros) are therefore covered by the benefits from energy savings (442–515 million euros). It may be possible to use the existing mileage registration system at the RDW, in which case the costs would be very low. |
| Effects on citizens | |
| Impact on average household expenditure | The costs for households and businesses consist of the portion of the levy they are liable for, approximately €460 to €760 million per year (CPB & PBL, 2020). With 9 million households in 2040, this amounts to €51 to €84 per household per year. The total costs mentioned above for operating and replacing the systems that count kilometres amount to approximately €45 per year per car (CPB & PBL, 2015). The extent to which these costs are passed on to the public depends on how the measure is implemented. As an indication, the cost of installing the GPS unit (with an estimated lifespan of 7 years) is approximately 250 euros (CPB & PBL, 2015). The introduction of a road pricing scheme will likely be accompanied by a (partial) abolition of the motor vehicle tax, meaning that some car owners will see a net increase in their disposable income (CPB & PBL, 2015). In addition, there will be extra public transport costs if people make greater use of public transport. On the other hand, there will be a reduction in fuel costs due to reduced car use. The calculated reduction in energy costs is 442–515 million euros. |
| Other effects | According to the PBL and CPB, a flat-rate road toll reduces accessibility to work by around 3.9 to 7.0%. This is because, for the average employee, the shorter journey time does not outweigh the higher variable costs. This results in a substantial drop in demand, with negative effects on the labour market (CPB & PBL, 2020). The impact on noise pollution is negligible. The impact on road safety is unknown. Tracking the distance travelled may raise issues regarding privacy legislation. This applies in particular to technologies that use GPS or electronic systems to track the routes taken. Vehicle downtime is reduced significantly (by around 25%)(CPB & PBL, 2015). |

Increase in fuel excise duty

| Increase in fuel excise duty | |
|---|--|
| Description and definition of the measure | Increasing excise duty on fuels makes fuel more expensive. A rise in price leads to a reduction in demand. This limits fuel consumption. Although a general increase in fuel excise duty naturally also affects freight traffic, calculating the impact of this falls outside the scope of this factsheet. |
| Modality | Passenger car, truck, van. |
| Measure focuses on | Avoid. |
| Type of measure | Pricing. |
| Link to other policies | N/A |
| Expected behavioural effects/policy rationale | Expected behavioural mechanisms within the target group and, where applicable, how to implement measures. |
| Feasibility | Changes to fuel excise duty are a policy measure that has been implemented regularly in recent years (Rijksoverheid, 2025). As this does not involve new legislation but rather an adjustment to existing rates, implementation is straightforward. |
| Energy savings | |
| | 2040 |
| Energy savings (PJ/yr) | This measure will yield energy savings of 2.5–12.6 PJ per year in 2040. This represents 2–8% of total energy consumption by road traffic (including freight traffic) in 2040. |
| Explanation of energy savings | The energy savings result from a reduction in fuel consumption. In the long term, this is a consequence of a reduction in vehicle kilometres, but also of more efficient fuel use (for example, driving more slowly) and a reduction in the total number of cars (CE Delft & PBL, 2010). |
| Calculation method | Excise duty accounts for approximately 46% of the pump price for petrol and approximately 35% for diesel (Shell, 2024). Given that this proportion will remain roughly the same in the future without policy changes, a 25% increase in excise duty will lead to a price increase of 12% and 9% respectively. In the long term (5–10 years), the total price elasticity of fuel is -0.7 (CE Delft & PBL, 2010). The KIM estimates a price elasticity for distance travelled of approximately -0.2 in the long term (5–10 years)(KIM, 2012). By way of comparison, in 2020 the PBL and CPB predicted a 10% increase in excise duty would lead to a reduction in demand of 0.9 to 1.6% by 2030 (CPB & PBL, 2020). Converted, this corresponds to a price elasticity of -0.20 to -0.35 for petrol and -0.26 to -0.46 for diesel. In this measure, we use the averages of the above values: -0.25 for petrol and -0.3 for diesel. This means that a price increase of 12% and 9% leads to a 3% and 2% reduction in consumption respectively. This reduction is caused by lower vehicle usage, more efficient fuel consumption and a reduction in the number of vehicles. In the baseline scenario, the pump price (including all levies) of petrol in 2040 is €2.27 and that of diesel is €1.88. These values are based on the forecast from the KEV 2023 (PBL, 2023b). With the calculated excise duty increase, these figures become €2.54 and €2.04 respectively. |

| Increase in fuel excise duty | |
|-------------------------------------|---|
| | <p>This measure only leads to savings for fossil-fuel-powered vehicles. An excise duty increase on electricity is not effective, as it affects the entire energy supply rather than just electric cars. Furthermore, petrol and diesel cars consume on average two to three times as much energy per kilometre driven as electric cars (CE Delft, 2023a).</p> <p>In a conservative scenario, assuming no additional switch to electric cars, the energy reduction will result solely from the decrease in fossil-fueled vehicle kilometres. Based on the elasticities mentioned above, this amounts to 2.5 PJ per year, assuming the forecast for fuel consumption in 2040 (PBL, 2023b).</p> <p>The effects of this measure may be amplified because people are more likely to switch to an electric car when fuel prices are higher. A comprehensive forecast of the effect of an excise duty increase on the development of the Dutch vehicle fleet is beyond the scope of this factsheet. However, electric cars are likely to be cost-competitive with fuel-powered cars by 2030 (ElaadNL, 2024). We can therefore establish an optimistic scenario, in which the excise duty increase leads to exclusively electric new car sales from 2030 onwards. This would result in 9 million EVs by 2040, approximately 90% of the vehicle fleet (ElaadNL, 2024).</p> <p>In the baseline scenario (in line with the KEV 2023), 37% of car kilometres will be electric by 2040. In this calculation, the energy consumption of petrol is assumed to be 2.11 MJ/km, and that of electric vehicles 0.83 MJ/km (CE Delft, 2023a). When this reaches 90%, energy consumption from petrol will decrease by 63%, and that from electric vehicles will increase by 95%. Only on the remaining portion of petrol-driven kilometres will there then be a reduction in kilometres due to the increase in excise duty. The net effect is a reduction of 12.6 PJ per year in 2040.</p> |
| Assumptions | <p>Excise duty on fuels is increased by 25%.</p> <p>We assume that future fuel prices will not deviate significantly from current fuel prices.</p> |
| Border effects | <p>For motorists living in the border region, an increase in fuel prices may be a reason to fill up across the border (in Germany or Belgium), given that fuel prices are lower there. The extent of this effect depends on the difference between Dutch and foreign fuel prices, and is therefore difficult to predict. Other factors also play a role, such as the time required to make a detour via a foreign petrol station.</p> <p>For motorists who cross the border to refuel due to an excise duty increase, the price incentive of the excise duty increase has no effect on them. In other words, as fuel does not become more expensive for them, they are not motivated to consume less fuel. Around 13% of the population in 2040 will live in a municipality bordering Belgium or Germany (PBL & CBS, 2022) (Ministry of the Interior and Kingdom Relations, ongoing). This percentage can be taken as an indication of the maximum number of residents who could contribute to a border effect.</p> <p>Assuming that this 13% of the population did not refuel across the border before the excise duty increase, but does so after the increase, savings would amount to 2.2–10.9 PJ instead of 2.5–12.6 PJ (-13%). This also assumes that fuel prices abroad are indeed lower. This is not necessarily the case and depends on the levels of excise duty in neighbouring countries.</p> |

| Increase in fuel excise duty | |
|--|---|
| | <p>Furthermore, this cross-border refuelling results in a shift in fuel purchases: by refuelling across the border, less fuel is sold in the Netherlands, but on the other hand, that fuel is purchased abroad. Although, from an administrative perspective (by looking at the fuel sold), fuel consumption therefore decreases due to cross-border refuelling, actual energy consumption on Dutch territory does not decrease. However, the government does lose revenue from excise duties and taxes as a result.</p> <p>According to research by the Ministry of Finance, a difference in fuel prices between the Netherlands and Germany of approximately 5% (~10 cents) led to a 19.8–24.6% increase in petrol purchases in the region bordering Germany (Ministry of Finance, 2023). In the preceding period, petrol sales actually fell by 12.5–16.5%, because fuel in Germany was then approximately 5% (~10 cents) cheaper. However, these figures reflect two effects: Dutch people who may or may not refuel across the border, and Germans who may or may not refuel in the Netherlands.</p> |
| Knowledge base on energy saving | |
| Assessment of the knowledge base for the measure | The elasticity between fuel price and fuel consumption has been well researched, but results are not always clear-cut. (Rijkswaterstaat, 2024) provides the most recent insights into price elasticities. |
| What knowledge is still lacking? | The effect of this measure partly depends on crude oil prices, for which a reliable long-term forecast is not possible. In general, price elasticities are not linear: the additional effect of a further price increase is often relatively smaller. Little is known about price elasticity in extreme cases of price increases, as these rarely occur in practice. |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | An increase in excise duty does not entail any significant additional costs; the administration and legislation for excise duty collection are already in place. |
| Annual capital costs/benefits for investments (€ million/year) | There are no annual costs associated with an increase in excise duty. |
| Difference in energy costs (€ million/year) | The energy savings of 2.5–12.6 PJ result in a reduction in energy costs of €64–337 million per year, based on the predicted energy prices in 2040 (PBL, 2023b). |
| Difference in maintenance and management costs (€ million/year) | Less road traffic leads to lower maintenance costs for the road network. |

| Increase in fuel excise duty | |
|---|--|
| Difference in revenue (€ million/year) | Increased excise duties lead to a shift of capital from citizens and businesses to the government. However, this has no impact on net national costs. |
| Total annual costs | |
| Total national costs (€ million/year) | This measure results in national benefits due to energy savings and the reduction in infrastructure costs. |
| Effects on citizens | |
| Impact on average household expenditure | The rise in fuel prices is directly reflected in the marginal costs of car travel for a household. Additional fuel charges affect low-income households relatively harder than higher-income households. With a €0.27 increase in the price of petrol (as calculated above) and a distance travelled of 10,000 kilometres per year, the costs for the average petrol car will be €180 in 2040 (assuming 15 kilometres per litre). For households with an electric car, however, there are no additional costs. |
| Other effects | Higher fuel costs may limit car use financially. Furthermore, goods transport will become more expensive due to higher fuel prices, causing consumer goods to rise slightly in price. Congestion on the main road network is expected to decrease by 4% based on a 10% excise duty increase (CE Delft et al., 2022). This calculation factors in the effect of a 25% excise duty increase. |

Making the additional tax liability for lease-cars distance-based

| Making the additional tax liability for lease-cars distance-based | |
|--|--|
| Description and definition of the measure | The additional tax liability is a tax scheme applied in relation to the private use of a company car. This levy applies from a private mileage of more than 500 kilometres per year, and depends on the car's CO ₂ emissions. From 2026, the CO ₂ dependency will be abolished and the additional tax rate will be 22% for all types of cars. This means that the employee will pay income tax annually on 22% of the car's list price. In many cases, using a company car is more cost-effective than using a private car. The average annual mileage of a company car is higher than that of a privately owned car (CBS, 2023a). The aim of this measure is to reduce the use of company cars for private purposes. A distance-based additional tax liability scheme is a progressive tax, whereby the levy is increased based on the distance travelled privately in the company car. |
| Modality | Passenger cars (lease). |
| Measure focuses on | Avoid. |
| Type of measure | Pricing. |
| Link to other policies | N/A |
| Timeline for implementation | This scheme can be introduced from the start of a tax year. |
| Expected behavioural effects/policy rationale | By making the tax addition for lease cars and company cars distance-dependent, the scheme discourages the use of company cars for long-distance private journeys. |

| Making the additional tax liability for lease-cars distance-based | |
|--|---|
| Feasibility | <p>Under this measure, employees must keep track of which journeys are for business and which are private. This will be difficult to verify, and moreover, the distinction can sometimes be hard to make (for example, in the case of journeys with multiple destinations). Under the current scheme, employees are already required to keep a record of private journeys if they drive fewer than 500 kilometres for private purposes, as no additional tax liability is incurred in such cases. In addition, from 2024, companies with more than 100 employees will be required to report their employees' business and commuting journeys (reporting obligation for work-related personal transport). This system could be used to record the distance-based additional tax liability, for example by using the mileage to calculate the distance travelled for private purposes.</p> <p>Furthermore, this measure makes the current additional tax liability scheme more complex, which could pose a problem for its practical implementation by the tax authorities.</p> |
| Energy saving | |
| | 2040 |
| Energy savings (PJ/yr) | This measure will save 0.2–0.6 PJ per year in 2040. That is 0.1–0.4% of the total energy consumption of passenger transport in 2040 (PBL, 2023b). |
| Calculation method | <p>The business vehicle fleet accounts for approximately 21% of the total distance travelled by passenger cars (CBS, 2023a). Of the distance travelled by business cars, approximately 40% is for private use. The relationship between the additional tax liability paid and the distance driven for private purposes has been thoroughly researched (Ecorys, 2012). This reveals a slight positive correlation between the distance driven for private purposes and the level of the additional tax liability.</p> <p>In this calculation, it is assumed that the additional tax liability remains at 0 up to 500 km, and remains at the current rate up to 2,500 km per year. Thereafter, the rate is increased by 25% every 5,000 km, relative to the current rate, up to 200% for an annual mileage exceeding 17,500 km. There are therefore six bands in the additional tax liability scheme, as shown in the table below. In the four highest bands, where the rate is increased, this results in an approximate 30% increase in the cost per kilometre.</p> <p>In an optimistic scenario, we assume that the reduction in distance travelled corresponds to the price elasticity of fuel with respect to mileage, for which the maximum value of -0.25 has been taken, based on (CE Delft & PBL, 2010; KIM, 2012) and (CPB & PBL, 2020). In other words, we assume that the increase in additional tax liability per kilometre has the same behavioural effect as an increased fuel price per kilometre.</p> <p>In this scenario, private use of company cars falls by around 8%. This corresponds to 3% of the total use of company cars, and 1% of the use of the entire Dutch vehicle fleet. In a more pessimistic scenario, we estimate the behavioural effects to be lower, because drivers of company-leased cars have a higher-than-</p> |

| Making the additional tax liability for lease-cars distance-based | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|---|---|--------------------------|--|---|---|---|-------|---|------|---|---|-----------|-------|-------|----|-------|-------------|-------|--------|-----|-------|--------------|-------|--------|-----|-------|---------------|-------|--------|-----|--------|---------|-------|--------|------|--------|
| | <p>average income and are therefore less price-sensitive. Furthermore, households with higher incomes are more likely to own a second car (KIM, 2022d). Consequently, there is a risk of substitution behaviour, whereby people use their private car more, but do not necessarily reduce the number of kilometres driven. To account for both effects, we assume an elasticity of -0.1 in this scenario.</p> <p>In this scenario, private use of company cars decreases by around 3%. This corresponds to 1% of the total use of company cars, and to 0.3% of the use of the entire Dutch vehicle fleet. Under Fit For 55, no new petrol or diesel cars will be sold from 2035 onwards. As most company cars are less than five years old, the business leasing market is expected to be almost entirely electric by 2040.</p> <p>Due to the decline in car usage, this measure will yield around 0.2–0.6 PJ per year, given the fuel mix in 2040 (PBL, 2023b).</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assumptions | <p>The following distance-dependent additional tax liability is assumed:</p> <table border="1"> <thead> <tr> <th>Mileage (km/year)</th> <th>Current average additional tax liability (€/year)</th> <th>Proportion of private mileage with leased cars</th> <th>Increase in additional tax liability under the measure</th> <th>Additional tax liability after the measure</th> </tr> </thead> <tbody> <tr> <td>0–500</td> <td>0</td> <td>0.3%</td> <td>0</td> <td>-</td> </tr> <tr> <td>500–2,500</td> <td>4,446</td> <td>1.07%</td> <td>0%</td> <td>4,446</td> </tr> <tr> <td>2,500–7,500</td> <td>5,920</td> <td>17.34%</td> <td>25%</td> <td>7,400</td> </tr> <tr> <td>7,500–12,500</td> <td>6,085</td> <td>30.85%</td> <td>50%</td> <td>9,128</td> </tr> <tr> <td>12,500–17,500</td> <td>6,084</td> <td>27.02%</td> <td>75%</td> <td>10,647</td> </tr> <tr> <td>17,500+</td> <td>6,339</td> <td>23.20%</td> <td>100%</td> <td>12,678</td> </tr> </tbody> </table> <p>The current average additional tax liability is based on(Ecorys, 2012) .</p> <p>In addition, we assume that the proportion of business mileage in the total number of kilometres driven will remain roughly the same, and that the ratio between private and business mileage will remain constant in the future.</p> | | | | Mileage (km/year) | Current average additional tax liability (€/year) | Proportion of private mileage with leased cars | Increase in additional tax liability under the measure | Additional tax liability after the measure | 0–500 | 0 | 0.3% | 0 | - | 500–2,500 | 4,446 | 1.07% | 0% | 4,446 | 2,500–7,500 | 5,920 | 17.34% | 25% | 7,400 | 7,500–12,500 | 6,085 | 30.85% | 50% | 9,128 | 12,500–17,500 | 6,084 | 27.02% | 75% | 10,647 | 17,500+ | 6,339 | 23.20% | 100% | 12,678 |
| Mileage (km/year) | Current average additional tax liability (€/year) | Proportion of private mileage with leased cars | Increase in additional tax liability under the measure | Additional tax liability after the measure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0–500 | 0 | 0.3% | 0 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 500–2,500 | 4,446 | 1.07% | 0% | 4,446 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,500–7,500 | 5,920 | 17.34% | 25% | 7,400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7,500–12,500 | 6,085 | 30.85% | 50% | 9,128 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12,500–17,500 | 6,084 | 27.02% | 75% | 10,647 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17,500+ | 6,339 | 23.20% | 100% | 12,678 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Border effects | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge base for energy savings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assessment of the knowledge base for the measure | <p>The relationship between additional tax liability and annual mileage has been thoroughly researched (Ecorys, 2012). In addition, sufficient data is available on annual mileage and the</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Making the additional tax liability for lease-cars distance-based | |
|---|--|
| | business vehicle fleet. However, specific policy research is required to implement a mileage-dependent additional tax liability. |
| What knowledge is still lacking? | Further research is needed into the behavioural effects and resulting annual mileage of an increased additional tax liability. |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/ Government revenue from implementing the measure (€ million/year) | Making the additional tax liability mileage-dependent requires a change to the tax authorities' systems. The policy and administrative costs of this have not been estimated. |
| Annual capital costs/benefits for investments (€ million/year) | To levy the mileage-dependent additional tax liability, it is necessary to track how much company cars are used for private purposes. This is not currently done as a rule. The costs of this will be borne by the companies, but enforcement (inspection) may be necessary to prevent fraud. |
| Difference in energy costs (€ million/year) | The energy saving of 0.2–0.6 PJ results in a reduction in energy costs of €24–54 million per year, given the forecast for fuel prices in 2040 (PBL, 2023b). |
| Difference in maintenance and management costs (€ million/year) | Driving less leads to less strain on the road network and therefore less maintenance. However, given the small reduction in vehicle kilometres under this measure, this is not significant. |
| Difference in revenue (€ million/year) | A higher additional tax liability generates more revenue for the state. The increase in additional tax liability as proposed above could, depending on the behavioural effect, generate an estimated €2 billion per year in additional tax revenue, calculated on the basis of the difference in gross additional tax liability collected between this measure and the baseline scenario. However, this is funded by the public, meaning these are not net benefits. |
| Total annual costs | |
| Total national costs (€ million/year) | Apart from the revenue generated by energy savings, there are few to no costs associated with this measure. The administrative burden on businesses has not been quantified, but could potentially be significant. As the benefits from energy savings are small, we estimate the national costs to be neutral. |
| Effects on citizens | |
| Impact on average household expenditure | For households that use company cars for private transport, transport costs will increase as a result of this measure. In some cases, it may be more cost-effective to purchase a privately owned car rather than using a company car for private purposes. For an annual mileage of 7,500 to 12,500 kilometres, the additional tax liability following the measure would amount to an average of €761 per month, compared to €507 under the current scheme. The monthly costs of a private car range from €330 to |

| Making the additional tax liability for lease-cars distance-based | |
|--|---|
| | €670 (varying from mini to mid-range) according to (Nibud, 2023). |
| Other effects | - |

Abolition of the tax-free commuting allowance for passenger cars

| Abolition of the tax-free commuting allowance for passenger cars | |
|---|--|
| Description and definition of the measure | <p>The tax-free travel allowance is a scheme designed to limit employees' travel costs. The current structure of the tax-free travel allowance has been in place since 2004. The main principle of this scheme is that the employer may reimburse the employee a maximum of €0.22 per kilometre tax-free for the full distance of all business travel (including commuting) undertaken by the employee. For journeys by public transport, the employer may instead reimburse all costs incurred tax-free.</p> <p>By abolishing this scheme for private cars, the use of cars for commuting is discouraged, while the use of public transport and cycling is encouraged. The travel allowance for business journeys remains unchanged under this scheme.</p> <p>In addition to its direct impact on the modal split, this scheme also has many secondary effects, such as on labour supply and demand, employment, congestion and the housing market (CE Delft & Significance, 2023). These effects have not been quantified.</p> |
| Mode | Commuting, business travel. |
| The measure focuses on | Shift & avoid. |
| Type of measure | Pricing. |
| Link to other policies | Working from home, additional tax liability, rush-hour charge. |
| Expected behavioural effects/policy rationale | Expected behavioural mechanisms within the target group and, where applicable, how to implement measures. |
| Feasibility | <p>From 2024, companies with more than 100 employees will be required to report on their employees' business and commuting travel (reporting obligation for work-related passenger transport). It may be possible to use this system to monitor mileage records for travel expense allowances.</p> <p>Where travel allowances are differentiated by mode of transport, some degree of control is necessary to prevent fraud. Furthermore, distinguishing between business and home-to-work kilometres can sometimes be difficult, for example when travelling home from a business visit.</p> |
| Energy saving | |
| | 2040 |

| Abolition of the tax-free commuting allowance for passenger cars | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-------------------------------------|-------------------|-------------------------------------|-----------|-----|---|-----------|------------------|--------------------------|-----------|---------|----------|-----------------|-----|----------|-----------------|------------------|--------------------------|-----------------|---------|----------|
| Energy savings (PJ/yr) | This measure is expected to save 1.7–5.1 PJ per year by 2040 (1–3% of total energy consumption by passenger cars). | | | | | | | | | | | | | | | | | | | | | |
| Explanation of energy savings | As the travel allowance applies to public transport and cycling but not to the use of a car for commuting, this measure discourages car use. This modal shift results in fewer kilometres being travelled by car. This leads to a reduction in energy consumption by cars. | | | | | | | | | | | | | | | | | | | | | |
| Calculation method | <p>The reduction in energy consumption is derived from the reduction in commuting kilometres travelled when the travel allowance is fully taxed. We assume that only the travel allowance for car use is fully taxed, and that the travel allowance for public transport and cycling remains unchanged. The adjustment is based on the assumption that, in the reference scenario, the employer continues to provide the current allowance, but that this is now taxed, resulting in a lower net allowance for the traveller (assumed to be 40% lower). However, the travel allowance continues to apply for business journeys.</p> <p>The effect on the distance travelled has recently been examined in detail (CE Delft & Significance, 2023). While car use decreases by 2.3%, public transport use increases by 1.1% to 1.3% (depending on the specific mode of transport). We assume that these increases in public transport do not lead to the deployment of additional vehicles.</p> <p>Cycling and e-bike use are also increasing (by 0.8% and 1.2% respectively), and the number of passengers in cars by 1.1%. Neither of these leads to additional energy consumption.</p> <p>The calculated effect of tax on travel allowances on energy consumption depends heavily on the elasticity used. The results used are based on a price elasticity of -0.23 for car use (CE Delft & Significance, 2023). Furthermore, the cost sensitivity of travellers in that study is (indirectly) adjusted for income level, as travellers with higher incomes are less sensitive to an increase in travel costs.</p> <p>Nevertheless, the price elasticity of car use is a factor of uncertainty, particularly in the longer term. Literature values range from -0.1 to -0.4. To account for this uncertainty, we apply a margin of error of $\pm 50\%$ to the reduction in vehicle kilometres.</p> <p>Based on the expected fuel consumption in 2040, we can estimate the energy savings corresponding to the reduction in vehicle kilometres (PBL, 2023b). This measure is expected to save 1.7–5.1 PJ per year in 2040.</p> | | | | | | | | | | | | | | | | | | | | | |
| Assumptions | <p>Assumed tax-free travel allowance:</p> <table border="1"> <thead> <tr> <th>Type of journey</th> <th>Mode of transport</th> <th>Amount of tax-free travel allowance</th> </tr> </thead> <tbody> <tr> <td>Commuting</td> <td>Car</td> <td>-</td> </tr> <tr> <td>Commuting</td> <td>Public transport</td> <td>€0.22/km or actual costs</td> </tr> <tr> <td>Commuting</td> <td>Cycling</td> <td>€0.22/km</td> </tr> <tr> <td>Business travel</td> <td>Car</td> <td>€0.22/km</td> </tr> <tr> <td>Business travel</td> <td>Public transport</td> <td>€0.22/km or actual costs</td> </tr> <tr> <td>Business travel</td> <td>Cycling</td> <td>€0.22/km</td> </tr> </tbody> </table> | Type of journey | Mode of transport | Amount of tax-free travel allowance | Commuting | Car | - | Commuting | Public transport | €0.22/km or actual costs | Commuting | Cycling | €0.22/km | Business travel | Car | €0.22/km | Business travel | Public transport | €0.22/km or actual costs | Business travel | Cycling | €0.22/km |
| Type of journey | Mode of transport | Amount of tax-free travel allowance | | | | | | | | | | | | | | | | | | | | |
| Commuting | Car | - | | | | | | | | | | | | | | | | | | | | |
| Commuting | Public transport | €0.22/km or actual costs | | | | | | | | | | | | | | | | | | | | |
| Commuting | Cycling | €0.22/km | | | | | | | | | | | | | | | | | | | | |
| Business travel | Car | €0.22/km | | | | | | | | | | | | | | | | | | | | |
| Business travel | Public transport | €0.22/km or actual costs | | | | | | | | | | | | | | | | | | | | |
| Business travel | Cycling | €0.22/km | | | | | | | | | | | | | | | | | | | | |

| Abolition of the tax-free commuting allowance for passenger cars | |
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| | <p>This measure may lead to increased working from home. Changes in travel behaviour are, in principle, part of price elasticity, but the willingness to work from home may increase in the future. We expect this because working from home is becoming easier and more accessible to more employees. These future effects have not been factored into the price elasticity.</p> <p>The results used are based on a tax-free travel allowance at a rate of €0.22 per kilometre. In the current situation, this is €0.23 per kilometre. We have not explicitly taken this difference into account.</p> |
| Border effects | N/A |
| Knowledge base on energy saving | |
| Assessment of the knowledge base for the measure | The effects of this measure have been extensively researched; see (CE Delft & Significance, 2023; Motivaction, 2022). |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | The tax authorities' implementation costs will rise if the travel allowance for commuting is abolished, as this will make the scheme more complex. After all, a distinction must be made between commuting and business travel. Furthermore, in the proposed version, a distinction must be made between car use and public transport and cycling. |
| Difference in sector energy costs (€ million/year) | The energy savings of 1.7–5.1 PJ will result in a reduction in energy costs of €44–132 million per year, based on the forecast for energy prices in 2040 (PBL, 2023b). |
| Difference in sector maintenance and management costs (€ million/year) | A reduction in the number of vehicle kilometres on the road network means less maintenance is required. However, with an increase in the use of bicycles and public transport, maintenance costs for cycling infrastructure (and, to a lesser extent, public transport) may actually rise. |
| Difference in sector revenue (€ million/year) | Employees must keep a record of the mode of transport they use to travel to work, and employers must verify this. This increases the administrative burden for employers. Furthermore, the distinction that must be made between commuting and business journeys creates an administrative burden for both groups, as it is necessary to determine and verify whether a particular journey is for commuting or business purposes. For the self-employed, the administrative burden will decrease, as they will no longer be required to keep a record of journeys for car journeys made for commuting purposes. On balance, however, we expect the administrative burden to increase (given that the group of employees is much larger than the group of self-employed people) (CE Delft & Significance, 2023) |
| Total annual costs | |
| Total national costs (€ million/year) | Implementation and administrative costs will rise due to the more complex structure of the mileage allowance. However, these costs are |

| Abolition of the tax-free commuting allowance for passenger cars | |
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| | not expected to exceed the energy benefits, meaning the measure will result in negative national costs. |
| Effects on citizens | |
| Effect on average household expenditure | By taxing the travel allowance in full, the net allowance for the employee decreases, given that the gross allowance remains the same. This increases the employee's costs. Disposable income will therefore decrease by €550 for households with an income of more than twice the median (0.5% of €110,000) to €398 for households below the median (1.8% of €22,100)(CE Delft & Significance, 2023). |
| Other effects | <p>The reduction in car use leads to fewer traffic jams. This results in shorter journey times, amounting to around 10% on the main road network (motorways) and 4% on the secondary road network (regional roads) (CE Delft & Significance, 2023). At the same time, accessibility to the workplace by car will decrease by around 8.5% (determined on the basis of geographical accessibility indicators (Rijkswaterstaat, 2021). The labour supply will fall as a result of this measure, because the average net salary will decrease due to the tax on travel costs (CE Delft & Significance, 2023).</p> <p>The effects on the labour market are greater in more rural areas and/or for low-skilled work. The reason for this is that in these areas and for this type of work, employees often find it more difficult to travel to work by public transport (work location not easily accessible by public transport, irregular shifts meaning public transport is not always an option, etc.). These employees are more dependent on the car. It is therefore expected that this variant will have a greater impact on these parts of the labour market than on others.</p> |

Modal shift investment package

| Modal shift investment package | |
|---|---|
| Description and definition of the measure | <p>An investment package to promote modal shift can broadly be divided into two components: on the one hand, less money is invested in the further development of road infrastructure, and on the other hand, more money is spent on the development and promotion of the use of public transport and cycling. This involves funding to improve public transport and cycling infrastructure and a reduction in public transport fares. The combination of these two components should encourage travellers to choose public transport or cycling over the car.</p> <p>This could save around €12 billion on investments in the main road network by 2040. Expanding the Intercity++ network and building a major rail link, for example, will cost around €18.3 billion (PBL, 2023a). The incentive to encourage a modal shift has many points in common with other avoid and shift measures. In this measure, we look at the reduction in expenditure on road infrastructure and increased expenditure on public transport. This latter component is divided into investments in rail infrastructure, investments in bus/tram/metro infrastructure and the reduction of train fares.</p> |
| Modality | Passenger transport. |
| Measure focuses on | Avoid and shift. |
| Type of measure | Incentives, subsidies, cost-cutting. |
| Link to other policies | Additional tax liability, parking policy, speed limits, travel allowance, rush-hour charge, increase in excise duty, rationing of car mileage |
| Timeline for implementation | Encouraging a modal shift is a long-term measure requiring government commitment over several years. The effect of this policy on the modal shift will also be gradual and only become apparent in the longer term. |
| Expected behavioural effects/policy rationale | By actively promoting public transport and cycling and actively discouraging car use, travellers are encouraged to use their cars less. |
| Feasibility | <p>Investments in public transport infrastructure are, in principle, feasible, although the government is dependent on many parties for their (timely) success.</p> <p>In principle, the level of train fares is not a government decision, but is set by the railway companies. However, the government does have influence over this, as it is a shareholder in NS, currently the largest railway company in the Netherlands. Furthermore, the government has the ability to influence fares by subsidising railway companies (Rijksoverheid, 2023b).</p> |
| Energy saving | |
| | 2040 |
| Energy savings (PJ/yr) | This package of measures will save 1.6–2.9 PJ per year by 2040. That is 1–2% of the total energy consumption of passenger cars in 2040 (PBL, 2023b). |
| Explanation of energy savings | <p>Savings on road infrastructure: The PBL has calculated the impact of a one-off saving of 2 billion euros on the construction of the main road network. A reduction of €2 billion in the construction budget leads to a 0.3% decrease in car-kilometres, as car travel becomes less attractive. This is offset by a 0.1% increase in public transport kilometres (CPB & PBL, 2020). For a comparison of order of magnitude, as part of political</p> |

| Modal shift investment package | |
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| | <p>parties' packages, the PBL has also calculated savings of 6.3 billion euros by 2030 and 12 billion euros by 2040 on road infrastructure (PBL, 2023a) .</p> <p>Investment in rail infrastructure: An investment in the general improvement of the rail network in the Netherlands results in a 0.1% reduction in car kilometres (CPB & PBL, 2020). This is offset by a 4.5% increase in public transport kilometres.</p> <p>Investment in bus/metro/tram infrastructure: Investments in the general improvement of the bus/tram/metro network in the Netherlands result in a 0.1% reduction in car kilometres (CPB & PBL, 2020). This is offset by a 51.1% increase in metro and tram usage, but almost no increase in bus usage.</p> <p>Reduction in train fares: A 10% reduction in train ticket prices equates to a reduction of approximately 2 euro cents per kilometre and results in a 0.1% reduction in car kilometres (CPB & PBL, 2020). This is offset by a 6.1% increase in train kilometres, and this effect is accompanied by a 0.2% decrease in bus/tram/metro kilometres.</p> <p>Investing more in public transport not only leads to a modal shift, but also to an increase in passengers who would otherwise not have travelled, or would otherwise have walked or cycled (CPB & PBL, 2020) . The same applies to a reduction in public transport fares. This share accounts for approximately 83% of the new passenger-kilometres (KiM, 2022c). Consequently, a fare reduction that causes a 1% decrease in car use is responsible for a 25% increase in public transport use.</p> |
| Calculation method | <p>The above measures have been combined into a single package, in which savings of between 6 billion (conservative) and 12 billion (progressive) euros are made on road infrastructure, and 32 billion euros are spent on the development of public transport and a reduction in train ticket fares. Together, this results in a reduction of 1.2–2.1% in vehicle-kilometres for passenger cars. The number of passenger-kilometres by train will increase by approximately 11% and by tram and metro by 51%. For these latter modes, the increase is so significant that additional capacity will need to be deployed. We assume that this additional capacity will also be 51%.</p> <p>The reduction in car kilometres will save 1.7–3 PJ in 2040, based on energy prices in 2040 (PBL, 2023b). The additional deployment of trams and metros will offset a small portion of this saving, meaning that these measures together yield a net energy saving of 1.6–2.9 PJ. The additional train passenger-kilometres generated by the increase in public transport have not been included, as it is expected that current capacity will be sufficient to accommodate them.</p> |
| Border effects | N/A |
| Knowledge base for energy savings | |
| Assessment of the knowledge base for the measure | Various measures to encourage a modal shift, as described above, have been thoroughly researched on a regular basis. |
| What knowledge is still lacking? | Little knowledge is currently available regarding the interrelationship between various measures aimed at encouraging a modal shift. The synergy effects or, conversely, the compromising effects between different measures may be of great importance in a behavioural objective such as a modal shift. |

| Modal shift investment package | |
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| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | N/A |
| Annual capital costs/benefits for investments (€ million/year) | The savings on road infrastructure yield a one-off benefit equal to the savings themselves, namely €6–12 billion. Furthermore, additional structural costs are negligible(CPB & PBL, 2020) . Investments in public transport are direct costs for the government and, at 32 billion euros, are significantly higher than the savings on road infrastructure. |
| Difference in energy costs (€ million/year) | This measure generates €42–75 million per year through energy savings of 1.6–2.9 PJ, based on the forecast for energy prices in 2040 (PBL, 2023b). |
| Difference in maintenance and management costs (€ million/year) | N/A |
| Difference in revenue (€ million/year) | N/A |
| Total annual costs | |
| Total national costs (€ million/year) | The total costs are approximately €20–26 billion, and are dominated by the high investment costs in public transport. |
| Effects on citizens | |
| Impact on average household expenditure | This measure shifts a household’s travel costs from mainly fuel and vehicle costs to public transport fares. Depending on the extent of the fare reduction, this may be beneficial or detrimental. For more households (mainly in urban areas), a large-scale expansion of public transport could make it an option to give up the car entirely. This leads to savings on road tax and maintenance costs. |
| Other effects | Travel time by public transport is currently longer than by car in many cases (CPB & KIM, 2009). Job accessibility by car decreases by 0.6% with a one-off saving of 2 billion euros on road infrastructure (CPB & PBL, 2020). Furthermore, the capacity of the main roads will decrease (compared to the planned situation with investments), resulting in 3.5% more traffic jams (in 2030, compared to the planned situation with investments). However, job accessibility will increase due to investments in public transport (PBL, 2023a). Highly educated people and their employers benefit more from improvements in public transport infrastructure than those with lower levels of education (CPB & PBL, 2020). This is because highly educated |

| Modal shift investment package | |
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| | <p>people are more likely to live and work in cities, which are generally well connected by public transport.</p> <p>As a result of a generic 10% reduction in train fares, the number of jobs accessible by public transport will also increase by 7.6% by 2030 (CPB & PBL, 2020).</p> <p>With savings of €2 billion on road infrastructure, the resulting additional travel time losses in 2030 are estimated at approximately €110 million (CPB & PBL, 2020). However, this does not take into account the effect of improvements to public transport infrastructure. How this effect translates to 2040 has not been calculated.</p> |

Tax incentives for compact cars (bonus-malus)

| Tax incentives for compact cars (bonus-malus) | |
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| Description and definition of the measure | <p>Larger and heavier cars use more energy per distance travelled than lighter and smaller cars. This applies to both fossil-fuel-powered vehicles and electric cars.</p> <p>This measure encourages the purchase of cars with lower energy consumption. In this way, energy consumption can be reduced without restricting car use itself. The energy consumption of an electric car is lower than that of a comparable fossil-fuel-powered car. We have therefore introduced a differentiation by drive type in this measure.</p> <p>Encouraging the use of cars with lower energy consumption can be achieved in various ways. One option is to increase the MRB, which is determined based on the car's weight, for higher weight categories. As smaller (lighter) cars are generally more fuel-efficient, taxing the car's mass provides an incentive to purchase more fuel-efficient cars. It is also possible to introduce, in addition to weight-based taxation, a direct link in the road tax to the WLTP test values for energy consumption. This would give cars with more efficient engines or better aerodynamics a relative advantage. The purchase tax (BPM) could also be made dependent on weight or energy consumption, in addition to the current emissions-based system, in order to encourage the purchase of energy-efficient cars.</p> <p>Discouraging energy-intensive cars might be possible, but it may yield fewer results than introducing standards for new cars (depending on how such a standard is implemented). Such a standard would be introduced at vehicle level (rather than at manufacturer level, as with CO₂ standards), so that large cars cannot be offset by small cars. A standard based on energy consumption per kilometre at vehicle level would likely be based on test values (WLTP) and would therefore relate to an (as yet to be defined) average usage. After all, a vehicle's energy consumption depends heavily on how it is used. Various factors play a role here, such as use in urban areas, on country roads or motorways, as well as driving speed and driving behaviour. The test must therefore be representative of average usage.</p> |

| Tax incentives for compact cars (bonus-malus) | |
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| | New metrics could also be introduced to define a car's 'compactness', such as definitions based on the vehicle's mass (possibly corrected for battery weight), or the space it occupies on the road (footprint). |
| Modality | Passenger car. |
| Measure focuses on | Avoid/shift. |
| Type of measure | Fiscal incentive. |
| Expected behavioural effects/ Policy rationale | This measure aims to promote compact cars through tax incentives. Increasing the road tax and/or car purchase tax will stimulate the sale of compact cars. |
| Feasibility | Legally, establishing actual standards is complex, as a ban on the sale of certain types of cars is not possible. This would then have to be regulated at European level. We therefore leave standards based on energy consumption out of consideration in this study. An adjustment to the MRB, possibly supported by non-regulatory measures to discourage the use of large cars, is, however, feasible. |
| Energy savings | |
| | 2040 |
| Energy savings (PJ/yr) | 3.4–7.5 PJ per year. |
| Explanation of energy savings | The energy savings result from reduced energy consumption by larger cars due to efficiency improvements, or from the switch from larger cars to more compact cars. |
| Calculation method | <p>When calculating the energy savings resulting from the purchase of more energy-efficient cars, we have applied the following assumptions:</p> <ul style="list-style-type: none"> – In the optimistic scenario, the average car in 2040 will have the energy consumption of a 2030 A-segment car. In the pessimistic scenario, this will be the energy consumption of a 2030 B-segment car (see <i>assumptions</i>). – The incentive is achieved by increasing the motor vehicle tax (MRB) and/or the private motor vehicle tax (BPM). We have not quantified the extent of this increase. <p>Based on approximately 300,000 new car sales per year between 2030 and 2040 (RVO & Revnext, 2023b), policy from 2030 onwards will affect around 3 million new car sales, or approximately 30% of the vehicle fleet in 2040 (ElaadNL, 2024).</p> <p>In the conservative scenario, energy consumption is expected to be 2.0 MJ per kilometre for fossil fuel cars and 0.8 MJ per kilometre for electric cars in practice. This is the expected energy consumption of cars in the B-segment in 2030 (CE Delft, 2023a).</p> <p>The energy savings come from cars in the C, D and E segments, which are being replaced by smaller cars or are becoming more efficient. We assume that the distribution of the vehicle fleet across segments will remain reasonably constant in the future (RVO & Revnext, 2023a). Around 46% of the vehicle fleet falls into the D or E segment, but only new sales from 2030 onwards are included (30%). As a result, this measure yields a reduction of approximately 2% for both petrol and electric cars.</p> <p>In a more progressive scenario, in which pricing policies steer consumers more strongly towards more energy-efficient vehicles, consumers will purchase smaller and more fuel-efficient cars. We assume that in this scenario, the energy consumption for petrol cars is on average 1.7 MJ</p> |

| Tax incentives for compact cars (bonus-malus) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|------|-----|-----|-----|-----|---|---|-----------------------------|----------|-----|-----|-----|-----|-----|--------|-----|-----|-----|-----|-----|---|-------------|-----|-----|-----|-----|----|-------------|------|----|----|----|----|--------------|-----|-----|----|----|----|
| | <p>per kilometre in practice and for electric cars 0.7 MJ per kilometre. This is the expected energy consumption of cars in the A-segment in 2030 (CE Delft, 2023a).</p> <p>Approximately 30% of cars fall into the C-segment. This share of the vehicle fleet is also included in this scenario, in addition to the 46% of the fleet in the conservative scenario. The latter share further reduces energy consumption in this scenario. As a result, this norm yields a reduction of approximately 5% for both petrol cars and electric cars.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assumptions | <p>Assumptions regarding energy consumption per kilometre per segment in the reference scenario and in the two scenarios</p> <table border="1"> <thead> <tr> <th></th> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Energy consumption (MJ/km)*</td> <td>Electric</td> <td>0.7</td> <td>0.8</td> <td>0.9</td> <td>0.9</td> <td>1.2</td> </tr> <tr> <td>Petrol</td> <td>1.7</td> <td>2.0</td> <td>2.3</td> <td>2.4</td> <td>3.0</td> </tr> <tr> <td rowspan="3">Breakdown of segments (Actienetwerk 15% GasTerug)</td> <td>Reference**</td> <td>24%</td> <td>31%</td> <td>33%</td> <td>10%</td> <td>4%</td> </tr> <tr> <td>Progressive</td> <td>100%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> </tr> <tr> <td>Conservative</td> <td>24%</td> <td>76%</td> <td>0%</td> <td>0%</td> <td>0%</td> </tr> </tbody> </table> <p>* Based on (CE Delft, 2023a). ** Based on (RVO & Revnext, 2023a).</p> <p>We assume that the distribution of the vehicle fleet across segments will remain reasonably constant in the future, and that the ratio of fuel efficiency across different segments in 2040 will be roughly the same as in 2030.</p> | | | A | B | C | D | E | Energy consumption (MJ/km)* | Electric | 0.7 | 0.8 | 0.9 | 0.9 | 1.2 | Petrol | 1.7 | 2.0 | 2.3 | 2.4 | 3.0 | Breakdown of segments (Actienetwerk 15% GasTerug) | Reference** | 24% | 31% | 33% | 10% | 4% | Progressive | 100% | 0% | 0% | 0% | 0% | Conservative | 24% | 76% | 0% | 0% | 0% |
| | | A | B | C | D | E | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Energy consumption (MJ/km)* | Electric | 0.7 | 0.8 | 0.9 | 0.9 | 1.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Petrol | 1.7 | 2.0 | 2.3 | 2.4 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Breakdown of segments (Actienetwerk 15% GasTerug) | Reference** | 24% | 31% | 33% | 10% | 4% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Progressive | 100% | 0% | 0% | 0% | 0% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Conservative | 24% | 76% | 0% | 0% | 0% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Border effects | <p>If larger cars are actively and effectively discouraged in the Netherlands, this could lead to increased exports of large cars. In other words: the large cars that are no longer used in the Netherlands will then be used abroad. The energy consumption of these cars is thus shifted abroad. In practice, this effect will be negligible, as larger cars are likely to be phased out gradually under this measure. The measure focuses more on preventing the influx of new large cars than on actively removing existing cars from the fleet.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge base on energy saving | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assessment of the knowledge base for the measure | <p>Much is known about the average energy consumption of cars. Although this is not sufficient for the implementation of this measure, it does allow for an estimate of the expected energy reduction.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| What knowledge is still lacking? | <p>Energy consumption per kilometre depends on driving behaviour, primarily the speed at which the vehicle is driven. This dependency must be properly mapped out, in combination with a method for assigning a figure for energy consumption to cars. Currently, the WLTP value is the most obvious candidate for this, but this method is known not to correspond well with real-world consumption (TNO, 2021b).</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cost items for national costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2040 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Policy and administrative costs/benefits to the government for implementing the | <p>The policy costs associated with this measure depend on the exact implementation. If the objective is achieved through an adjustment to the BPM or MRB, the total costs will be low. An actual standard would need to be regulated at European level and therefore falls outside the scope of national costs.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Tax incentives for compact cars (bonus-malus) | |
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| measure (€ million/year) | |
| Annual capital costs/benefits for investments (€ million/year) | Promoting compact cars via the MRB or BPM does not result in annual capital costs or benefits. If car energy consumption is subject to norms at European level, manufacturers will incur additional innovation costs to meet these standards. However, these manufacturers are based abroad and therefore this is not part of the national costs. These costs are, however, passed on to Dutch consumers; see also below (difference in revenues). |
| Difference in sector energy costs (€ million/year) | The energy savings of 3.4–7.5 PJ result in a reduction in energy costs of 88–193 million euros per year, based on the forecast for energy prices in 2040 (PBL, 2023b). |
| Difference in sector maintenance and management costs (€ million/year) | More compact cars are lighter and therefore place less strain on the road network and infrastructure. Maintenance costs are therefore expected to decrease. |
| Difference in revenue (€ million/year) | Assuming that a smaller or more fuel-efficient car can, in principle, be used for the same purposes as a heavier and larger car, there is a net benefit to buying a smaller car. The difference between a B-segment and a D-segment car, excluding taxes, will be around €15,000 in 2040, and between the A-segment and D-segment around €20,000 (figures based on CE Delft’s internal TCO model). Based on the above shares of the vehicle fleet and 300,000 new car sales per year, this will yield around €2–4.6 billion per year in 2040. It should be noted here that smaller cars are also expected to become more expensive if manufacturers are encouraged or compelled to produce more efficient vehicles. The costs of these innovations will then be passed on to the consumer. Furthermore, energy consumption per kilometre may also fall due to the improved efficiency of new cars, meaning that smaller cars will not necessarily be sold. This reduces the benefits outlined above. |
| Total annual costs | |
| Total national costs (€ million/year) | This measure delivers benefits through reduced energy consumption and because new car sales will generally be cheaper. |
| Effects on citizens | |
| Effect on average household expenditure | Smaller cars are generally cheaper. Buying a new car will therefore also be cheaper on average. A difference of up to €15,000 to €20,000 in new car sales (see above) corresponds to a difference of €750 to €1,000 per year, given an average lifespan of 20 years. However, this applies only to households buying a new car. This effect is unlikely to be present in the second-hand car market. Furthermore, there are fuel savings, as small cars are more fuel-efficient. As the total energy-saving costs are in the region of €100 million per year (see above), this will correspond to approximately €10 per car per year excluding taxes. We assume that, if the shift towards smaller cars is achieved through an increase in road tax and/or vehicle registration tax, the total tax revenue from these will remain constant. In other words, more efficient cars will benefit from a cost advantage, while less efficient cars will incur additional costs. For the average citizen, taxes will therefore remain the same, but for those who choose the more efficient car, this will result in a benefit. |

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

| Tax incentives for compact cars (bonus-malus) | |
|--|--|
| Other effects | If the average car in the Dutch vehicle fleet becomes smaller, this will yield a small benefit in terms of space usage. For example, parking spaces can be made smaller. |

Incentive policy for working from home

| Incentive policy for working from home | |
|---|---|
| Description and definition of the measure | <p>If a larger proportion of the working population works from home more often, there will be less commuting. This measure encourages employees to work from home more often for jobs where this is possible. Specifically, we assume that the section of the working population for whom working from home is possible will do so for 3 days a week. The current average number of days worked from home is 1.1 days per week (MuConsult, 2022). Around half of the working population works from home from time to time (CBS, 2024). If all these people were to work from home three days a week, the average number of days worked from home would be 1.6.</p> <p>However, the energy savings are not directly related to the reduction in commuting, as people will use the time saved to travel more for other reasons (R. Faber et al., 2023). Furthermore, in the longer term, people may decide to live further away from their workplace, as they will need to travel there less frequently. As a result, the number of commuting kilometres will increase again.</p> <p>Encouraging working from home can be achieved in various ways. This could be through tax incentives (e.g. increasing the working-from-home allowance) or through behavioural campaigns. Agreements regarding working from home can also be included in an employment contract.</p> |
| Modality | Passenger transport. |
| Type of measure | Fiscal. |
| Administrative level | National. |
| Link to other policies | Reduction or abolition of tax-free travel allowance. |
| Expected behavioural effects/policy rationale | Encouraging working from home will reduce commuting. |
| Feasibility | Depending on how this measure is implemented, its execution and monitoring may prove complex. Firstly, it is generally difficult to determine for which jobs working from home is possible, and which authority is responsible for making this determination. Secondly, the method of monitoring is also not immediately obvious, which is relevant for the payment of a working from home allowance. The reporting obligation for work-related travel may help in this regard, as it requires reporting on how much and in what way employees travel. Finally, many employers benefit from their employees being regularly present on site, both for social cohesion and for economic productivity. |
| Energy savings | |
| | 2040 |

| Incentive policy for working from home | |
|---|--|
| Energy savings (PJ/yr) | This measure is expected to lead to energy savings of 3.2–4.5 PJ per year by 2040 (2–3% of total energy consumption from passenger transport). |
| Explanation of energy savings | Working from home more often reduces commuting. This leads to energy savings across all modes of passenger transport. Public transport commuters work from home more than other commuters because it is easier for them to do so. In the calculation, we have assumed that the reduction in commuting is proportional across all modes based on (CBS, 2023e). |
| Calculation method | <p>The current average number of days worked from home is 1.1 days per week. On average, people travel 3.2 days per week (MuConsult, 2022). In the current labour market, 52% of employees occasionally work from home (CBS, 2024). We assume that the remaining employees do not have the option to work from home, either due to the nature of their work or for other reasons.</p> <p>We assume that by encouraging working from home, the proportion of the working population able to do so will do so three days a week. As the remaining proportion does not work from home, on average across the entire working population, 1.6 days a week are not spent travelling for commuting purposes. This results in a 14% reduction in total commuting. Commuting accounts for approximately 27% of the total annual kilometres travelled (CBS, 2023b). However, this varies by mode of transport. Commuting accounts for 16% of total travel time per person (CBS, 2023d).</p> <p>However, there are several rebound effects that reduce the effectiveness of this measure. According to Brever’s law (first introduced by Geurt Hupkes in 1981), the average travel time per person per day remains roughly the same, regardless of external circumstances. In the case of a reduction in commuting, this is due to at least two effects. Firstly, when people travel less for work, they will travel more for other purposes (CE Delft, 2020b; KiM, 2020; 2021). However, these journeys are more often made outside peak hours, which improves traffic flow (KiM, 2024). In the longer term, there is a second effect, namely that people are moving further away from their place of work because they need to travel less frequently (KiM, 2024). This reduces the effect of working from home on the total number of kilometres travelled. The magnitude of this effect has not been estimated. The migration effect during the coronavirus pandemic appeared to be caused more by the housing market itself (unaffordability in cities) than by working from home (PBL, 2021b).</p> <p>If Brever’s law applies strictly, a reduction in energy consumption is only possible if the same travel time is covered using a more energy-efficient mode of transport. In practice, this means that energy savings must mainly come from car use being replaced by other modes of transport, such as public transport, cycling and walking.</p> <p>Pessimistic scenario</p> <p>We can conservatively assume that all time saved by avoiding commuting is replaced by journeys made for other reasons. To do this, we compare the modal split for commuting with that of the average for all travel purposes (CBS, 2023d). The most significant difference in</p> |

| Incentive policy for working from home | |
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| | <p>terms of energy consumption is that, on average, the car is used for 29% of travel time, whereas for commuting this figure is 52% (data from 2022).</p> <p>Assuming that, according to Brever’s law, the gain in commuting time is distributed proportionally across the other travel motives, 2.1% less time is spent travelling by car (as a driver), but also 2.1% less time on the train. Conversely, there is actually a 2% increase in travel as a passenger in a car. In other words, people are travelling together relatively more. Finally, there is also a 2.5% increase in walking.</p> <p>A recent study has shown that working from home can actually have a negative effect on the number of kilometres travelled. The models in the study suggest that working from home may, in fact, lead to additional kilometres (R.M. Faber et al., 2023). The study used data from before the COVID-19 crisis and data from during the pandemic, and does not contain any information on post-COVID effects. In our calculation, we therefore use the Brever law, partly to ensure consistency with the calculations in the optimistic scenario. The results presented here may differ if (R.M. Faber et al., 2023) is applied.</p> <p>Optimistic scenario</p> <p>In a more optimistic scenario, we estimate that people do spend the same amount of time per day on travel, but that this consists mainly of recreational journeys. People use the car less frequently for this than for commuting(CBS, 2023d) . In this scenario, the travel time saved is divided equally between travel for sport and hobbies on the one hand, and touring and walking on the other. No increase is assumed for the other travel motives. In this scenario too, we calculate the change in kilometres travelled per mode based on the modal split per motive (CBS, 2023d).</p> <p>As leisure-related journeys are mostly made by bicycle and on foot, this scenario results in a net energy saving due to the reduction in net car use. In total, this scenario leads to a 3% reduction in car use and a 3% reduction in train use. Conversely, there is a 4% increase in walking and a 1.8% increase in travel as a passenger in a car.</p> <p>Energy consumption</p> <p>Based on fuel consumption per mode in 2040 (PBL, 2023b), we can convert the change in kilometres per mode into energy savings. In the conservative scenario, this measure leads to a 3.2 PJ reduction in 2040. In the optimistic scenario, this is 4.5 PJ.</p> |
| Assumptions | <p>The calculation for energy savings is based on the target outcome of the measure: that the proportion of the working population who are able to work from home do so three days a week. We have not calculated which policy measures correspond to this target. Instead, we have assumed that the incentive policy is such that this target will be achieved. The calculated energy savings should therefore be interpreted as a potential estimate, and not as an actual effect estimate.</p> <p>We assume that the proportion of the working population who can work from home will do so on average three days a week. We assume this proportion in 2040 will be the same as in 2023. This is likely an underestimate, as manufacturing jobs will become further automated and robotised.</p> |

| Incentive policy for working from home | |
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| | <p>Employees who have the option to work from home are more likely than average to be train commuters (KiM, 2020). This could reduce the reduction in energy consumption achieved by this measure.</p> <p>Furthermore, the long-term effect will be smaller if more car journeys are made as people move further away from their place of work. These two effects have not yet been quantified.</p> <p>We have assumed that for jobs where working from home is already an option, it is also possible to work from home even more frequently.</p> <p>We assume that the modal split in the baseline scenario (without incentives for working from home) in 2040 is the same as that in 2022. We also assume that the proportion of commuting in the total distance travelled remains roughly the same.</p> <p>For the sake of simplicity, we assume that a given percentage reduction in driving time corresponds to the same percentage reduction in kilometres driven. This is equivalent to the assumption that the average speed of car-based commuting is equal to the average speed of car use in general.</p> |
| Border effects | N/A |
| Cost items for national costs | |
| | 2040 |
| Government policy and administrative costs/benefits for implementing the measure (€ million/year) | <p>The government's policy costs depend on how the measure is implemented. Campaigns and tax schemes may lead to additional costs. Agreements between employers and employees do not, in principle, entail any costs, unless they are combined with one of the other ways of encouraging working from home.</p> <p>When increasing a working from home allowance, the amount of time spent working from home must be monitored. This is complex and may require the government to deploy more staff.</p> |
| Annual capital costs/benefits for sector investments (€ million/year) | <p>Although this measure will reduce the number of passenger-kilometres, it will not immediately lead to a reduction in public transport capacity or people giving up their own cars. In other words, we assume that the number of cars, buses, trains, etc. will remain the same under this measure.</p> |
| Difference in sector energy costs (€ million/year) | <p>The reduction in energy consumption leads to lower energy costs and therefore cost savings. We assume a proportional reduction for each energy source (petrol, diesel, electricity, etc.). In total, this results in cost savings of between 183 and 117 million euros per year. This is based on the expected fuel prices in 2040 (PBL, 2023b).</p> |
| Difference in sector maintenance and management costs (€ million/year) | <p>No additional maintenance and management costs are anticipated for this measure. The reduction in traffic and congestion leads to less traffic disruption and lower road maintenance costs.</p> |
| Difference in sector revenue (€ million/year) | <p>Working from home does not have a clear-cut effect on economic productivity. Generally speaking, employees are more productive at home, but working from home too much does not seem to be good for productivity (SCP, 2020). As we do not know exactly where this ceiling lies, we assume here that this measure will result in little to no change in total economic productivity.</p> <p>However, reduced use of public transport will lead to lower revenues for public transport services, just as the reduction in road traffic leads to a reduction in demand for fuel. This results in a cost saving for both the</p> |

| Incentive policy for working from home | |
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| | employer and the employee. Revenues therefore shift from transport-facilitating companies to the public and businesses. |
| Total annual costs | |
| Total national costs (€ million/year) | Due to the reduction in energy consumption, this measure generates national benefits. These benefits are expected to exceed the implementation and enforcement costs of this measure. |
| Effects on citizens | |
| Effect on average household expenditure | Less commuting will result in lower travel costs for citizens. On the other hand, there will be an increase in home-working costs. As people are at home more often on average, there will be higher costs for heating and electricity consumption. Depending on the citizen's specific situation, including the distance between home and work, travel expenses and home-working allowances, this may be advantageous or disadvantageous. |
| Other effects | Encouraging working from home may lead to negative social effects and may also result in a relative increase in health complaints (RIVM, 2023). Thanks to the time saved on travel, employees have more time for leisure activities such as hobbies and sport. |
| Knowledge base | |
| Assessment of the knowledge base for the measure | The potential energy savings can be accurately calculated based on the intended effect. The extent to which policy measures contribute to this intended effect is less clear. |
| What knowledge is still lacking? | The specific measures required to implement this policy are lacking. This makes it difficult to estimate the costs. |

Increasing and extending the truck charge

| Increasing and extending the truck charge | |
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| Description and definition of the measure | <p>Under this measure, the amount of the planned kilometre charge for trucks as of 2026 will be increased in 2030 to create a price incentive to reduce mileage.</p> <p>Planned distance-based charge</p> <p>With the introduction of the truck charge, domestic and foreign trucks will pay per kilometre driven for the use of Dutch motorways. The charge also applies to a number of N-roads and some local roads. The latter measure prevents freight traffic from diverting onto these roads. The rate averages 16.7 (€2023) euro cents per kilometre⁷⁹ and depends on the Euro emission class and the weight of the vehicle, as well as the CO₂ emission class differentiation introduced in 2023⁸⁰. Zero-emission vehicles, including electric ones, pay a lower rate, creating an incentive to switch to trucks with a more energy-efficient powertrain⁸¹. In addition, the truck charge leads to an increase in transport costs. This creates an incentive to transport goods more efficiently, but it may also lead to a reduction in demand for transport.</p> <p>Design</p> |

⁷⁹ <https://www.vrachtwagenheffing.nl/veelgestelde-vragen>

⁸⁰ The revised Eurovignette Directive stipulates five CO₂ emission classes. CO₂ emission class 5 applies to zero-emission vehicles. Vehicles in CO₂ emission classes 2–4 have different limit values for CO₂ emissions.

⁸¹ An electric motor has an efficiency of 90%, whereas for a diesel engine this is a maximum of 40%.

| Increasing and extending the truck charge | |
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| | <p>The introduction of the truck charge is scheduled for 2026; a proposal for rates has been put forward, but at the time of writing (January 2025) this still requires parliamentary approval. The effects, including differentiation based on CO₂ emissions, have been incorporated into the KEV 2023 for 2030. Existing studies (including (Revnex, 2023), (Arcadis, 2020)) focus on the period up to 2030, making it unclear what the measure and its effects will look like after 2030. It is therefore plausible that the measures may be amended and that the benefits for electric trucks will diminish over the years, as has also been the case, for example, with the additional tax liability for electric passenger cars.</p> <p>Increase as of 2030</p> <p>The following assumptions are used for the estimate:</p> <ul style="list-style-type: none"> – We assume that the doubling of the rate will be introduced in 2030. – The average charge for trucks will increase; this is the result of a combination of higher rates and a further expansion of the scheme to the secondary road network, where necessary, to prevent traffic diverting to secondary roads. – We assume that the benefits for low-emission vehicles will remain in place, with the cost difference per kilometre (€ per km) staying the same. There is therefore no additional incentive to switch to electric vehicles. – The truck toll rebate scheme will run until 2030. We assume that the rebate scheme will cease after 2030, as the additional costs of electric vehicles are expected to have fallen significantly by 2030. Consequently, the need for the investment fund has diminished, meaning that further support is not required. |
| Modality | Road freight transport. |
| The measure focuses on | Shift, improve and avoid. |
| Type of measure | Tax. |
| Link to other policies | There is a mechanism for channelling funds back to the sector to finance innovation and the sustainability of heavy goods transport. |
| Timeline for implementation | The truck charge is expected to start in 2026. We anticipate the increase will be introduced from 2030. |
| Expected behavioural effects/policy rationale | <p>By making domestic and international freight traffic pay for road use, the following behavioural effects are expected to offset the cost increase as much as possible:</p> <ul style="list-style-type: none"> – Increased transport efficiency through higher load factors, – Rerouting of road traffic (including goods transported over shorter distances from other suppliers) – A modal shift from road to rail and inland waterways. <p>These behavioural effects also reduce energy consumption. The introduction in 2026 will also increase the share of zero-emission (ZE) vehicles, due to CO₂ differentiation and the rebate scheme. As we will not apply any additional CO₂ differentiation with the 2030 increase, this will not result in any additional purchases of ZE vehicles compared to the baseline.</p> <p>We assume that the relative differences in charges between fossil-fuel and zero-emission vehicles will remain the same, meaning there is no additional incentive to switch to a zero-emission vehicle. Possible</p> |

| Increasing and extending the truck charge | | | |
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| | effects depend on the costs of zero-emission vehicles, which are highly uncertain, particularly in the long term. This makes it impossible to properly assess such effects without detailed background information on the assumptions used in the KEV. We therefore do not adjust the adoption trajectory for zero-emission vehicles. | | |
| Feasibility | The truck toll is expected to start in 2026. Consequently, relatively few adjustments will be required for the increase in 2030. However, the increase will create greater incentives to use secondary roads. To counter this, the toll could also be levied on more provincial roads. This would require additional investment. Feasibility is relatively straightforward, as it builds on an existing system. | | |
| Energy savings | | | |
| | 2040 | | |
| Energy savings (PJ/yr) | | Optimistic | Pessimistic |
| | Total | 9.6 | 3.7 |
| | Internal combustion engines | 4.9 | 1.9 |
| | Electric | 5.5 | 2.2 |
| | Modal shift | -0.7 | -0.4 |
| Explanation of energy savings | <p>The increase and expansion result in a cost rise of around 30%. This leads to a 7.3%⁸² reduction in vehicle kilometres or energy demand for road freight transport. This is due to:</p> <ul style="list-style-type: none"> – increased efficiency (load factor) of truck transport; – adjustment of freight transport routes; – a modal shift to rail and inland waterways. | | |
| Calculation method | <p>We base our calculations on estimates of higher charges from previous studies. We assume that an increase in 2030 will have a similar effect to an immediate introduction in 2026.</p> <p>We use results from (MuConsult, 2018) (Muconsult, 2019) which, using knowledge from (KiM, 2018) have developed a model to calculate the effects of price increases resulting from a truck charge on road transport. Various elasticities have been applied in this context:</p> <ul style="list-style-type: none"> – To account for improved efficiency, an elasticity of -0.3 has been assumed, based on a literature review (CE Delft & Significance, 2010). A 10% increase in costs therefore leads to a 3% reduction in vehicle-kilometres without any loss in tonnage transported, due to more efficient vehicle loading. <p>The final reduction in vehicle-kilometres is higher due to modal shift effects and changes in O-D relationships. A sensitivity analysis in which elasticity was varied from 0 to -0.3 (Muconsult, 2019) shows that elasticity has little influence on the results. This is partly because, if no efficiency improvements occur, greater gains are achieved by adjusting the O-D relationships for road traffic. As transport becomes more expensive, shippers are opting to shorten transport distances.</p> <ul style="list-style-type: none"> – The effect of the cost increase on the remaining vehicle-kilometres was then calculated using LMS and Basgoed, which factor in route | | |

⁸² 7.3% is 12% minus 4.7%. A charge of €0.42 on all roads leads to a 12% reduction compared to no charge. In the baseline scenario, there is a charge of €0.15 on motorways, which already leads to a 4.7% reduction.

| Increasing and extending the truck charge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----------|----------|-------|--|--------|-----------|----------|-----|-----------------|-------|-------|-------|-------|-----------------|-------|-------|-------|-----|-----------------|-------|-------|-------|-----|-----------------|-------|-------|-------|------|
| | adjustments and modal shift effects. This allows travel times to be compared with the monetary costs of transport via travel time valuation. Elasticities are also used for this, but the precise mechanism is unclear. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assumptions | <p>Initial studies(Muconsult, 2019) examined the effect on transport volumes, based on an average rate of 15 cents per km. This amounts to an average increase in costs per km of around 10% for trucks on Dutch roads.</p> <p>We assume that the relative effect⁸³ of an increase in 2030 is equal to the effect of the introduction in 2026. (MuConsult, 2018) investigated the effects of higher rates. They calculated two higher rates:</p> <ol style="list-style-type: none"> 1. €0.29 per km on average on motorways. 2. €0.42 per km on average on all roads. <p>The first variant is equivalent to doubling the proposed policy variant. (MuConsult, 2018) arrives at the following effects for WLO high⁸⁴ in 2030. The effects do not increase proportionally with a rise in rates, as modal split effects occur, particularly over long distances. We are basing our calculations on the second, highest variant.</p> <table border="1"> <thead> <tr> <th></th> <th>Tonnes</th> <th>Tonnes-km</th> <th>Journeys</th> <th>vkm</th> </tr> </thead> <tbody> <tr> <td>€0.15 motorways</td> <td>-0.5%</td> <td>-1.8%</td> <td>-0.4%</td> <td>-4.7%</td> </tr> <tr> <td>€0.15 all roads</td> <td>-0.7%</td> <td>-1.9%</td> <td>-0.7%</td> <td>-5%</td> </tr> <tr> <td>€0.29 motorways</td> <td>-1.2%</td> <td>-3.2%</td> <td>-1.1%</td> <td>-8%</td> </tr> <tr> <td>€0.42 all roads</td> <td>-2.1%</td> <td>-4.8%</td> <td>-2.5%</td> <td>-12%</td> </tr> </tbody> </table> <p>In addition, they estimate opposing effects of up to 3.2% growth in rail transport and up to 5.2% for waterborne transport at a rate of €0.42 on all roads. No percentages are presented for the other tariff structures. However, another study by Muconsult (Muconsult, 2019) that for the main variant (€0.15 on motorways and some major roads), the increase in kilometres via rail (+0.6% in WLO Low and 0.3% in WLO High in tonnes) and inland waterway transport (+1.5% in WLO Low and 1.7% in WLO High in tonnes) is significant. In addition, there is an increase in passenger transport by road⁸⁵. As a result, the total energy saving is lower.</p> <p>The underlying studies provide little guidance on the range of emission reductions. As this is a price-based measure, we base our assessment on the range of elasticity for freight transport in general. From CE Delft & Significance (2010), a range for tonne-kilometres⁸⁶ between -0.6 and -1.5 emerges, with the median value at -1. These elasticities cannot be directly compared with the aforementioned values.</p> | | | | | Tonnes | Tonnes-km | Journeys | vkm | €0.15 motorways | -0.5% | -1.8% | -0.4% | -4.7% | €0.15 all roads | -0.7% | -1.9% | -0.7% | -5% | €0.29 motorways | -1.2% | -3.2% | -1.1% | -8% | €0.42 all roads | -2.1% | -4.8% | -2.5% | -12% |
| | Tonnes | Tonnes-km | Journeys | vkm | | | | | | | | | | | | | | | | | | | | | | | | | |
| €0.15 motorways | -0.5% | -1.8% | -0.4% | -4.7% | | | | | | | | | | | | | | | | | | | | | | | | | |
| €0.15 all roads | -0.7% | -1.9% | -0.7% | -5% | | | | | | | | | | | | | | | | | | | | | | | | | |
| €0.29 motorways | -1.2% | -3.2% | -1.1% | -8% | | | | | | | | | | | | | | | | | | | | | | | | | |
| €0.42 all roads | -2.1% | -4.8% | -2.5% | -12% | | | | | | | | | | | | | | | | | | | | | | | | | |
| Border effects | For most road transport operations, the Netherlands is the country of origin or destination. For these shipments, there is no alternative route due to the higher toll rate. To a limited extent, there is also transit traffic on Dutch roads. This traffic may consider an alternative route to avoid Dutch motorways due to the higher toll rate. This mainly concerns freight flows travelling from Antwerp to the Ruhr region in Germany. However, this effect appears to be negligible. In 2016, Belgium introduced a truck toll. Depending on the weight class and | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

⁸³ Relative to the effect of the proposed rates for 2026

⁸⁴ The differences in the outcomes (expressed as a percentage relative change) between WLO Low and WLO High are minimal(Ecorys, 2018) .

⁸⁵ Rebound effect from reduced traffic congestion.

⁸⁶ We use tonne-kilometres as a benchmark because more research has been conducted on tonne-kilometres than on vehicle-kilometres.

| Increasing and extending the truck charge | |
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| | environmental class, the rates range from 7.4 to 29.2 cents per kilometre. This is comparable to the rates for the Dutch toll. According to TNO (TNO, 2017), the introduction of the charge in Belgium did not lead to any discernible differences in cross-border traffic. Based on these experiences in Belgium, we expect that an increase in the truck charge in the Netherlands will likewise not lead to demonstrable cross-border effects (TNO, 2017). |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | We assume that the truck charge will be introduced in 2026 and will still be in force in 2040. This means that the policy and associated administration are already in place. Adjusting the charge therefore has a significantly lower impact than setting up a completely new measure from scratch. (Revnext, 2023) has indicated that adjusting the tariff structure does not constitute a significant change for the government. However, it is expected that the scheme will need to be extended to the underlying road network to prevent traffic diversion. This will incur additional enforcement costs, which will, however, be covered by higher revenue from the levy. Adding additional roads takes approximately one year (Sweco, 2022). |
| Annual capital costs/benefits for sector investments (€ million/year) | No additional capital costs are initially anticipated for this measure. It is unclear whether the size of the inland waterway fleet and freight trains is sufficient to meet the additional demand. This is highly uncertain, as more efficient use of existing ships and trains could also be a solution to the additional demand. Due to the high level of uncertainty, we do not assume any additional investment costs. |
| Difference in sector energy costs (€ million/year) | The reduction in energy consumption leads to a decrease in energy costs. We assume a proportional reduction per energy carrier (diesel, biodiesel, electricity, etc.). In total, this results in a cost saving of 170 million euros per year. |
| Difference in sector maintenance and management costs (€ million/year) | No additional maintenance and management costs are anticipated for this measure. |
| Difference in sector revenue (€ million/year) | The measure will lead to shifts both within and outside the sector. Within the sector, transport will be reorganised, partly by concentrating journeys and reducing distances. In the long term, part of the transport demand will also shift to inland waterway and rail transport. As a result, revenue will shift from road to inland waterway and rail transport. No general reduction in demand is expected (Muconsult, 2019). Demand for the transport sector as a whole therefore remains the same. We therefore do not assume a difference in revenue. |
| Method | We base our analysis on existing estimates. |
| Assumptions | We do not expect any additional (significant) shifts from fossil-fuel to electric vehicles in the event of an increase in the truck charge. |
| Total annual costs | |

| Increasing and extending the truck charge | |
|--|---|
| Total national costs (€ million/year) | Cannot be determined precisely. |
| Effects on citizens | |
| Effect on household expenditure | Transport costs will largely be passed on (Muconsult estimates that around 70% will be passed on (Muconsult, 2019). This means that the costs will ultimately be borne by households. Arcadis Arcadis, 2019) shows that the levy to be introduced in 2026 will lead to a maximum cost increase of 0.08% for food and luxury goods. For other product prices, the proportion is smaller because road transport accounts for a lower share of the total costs. On an annual basis, a levy of 0.15 cents on main roads amounts to an increase of 7.60 euros (€2019) per household (Arcadis, 2019). The 0.42 euro per km variant amounts to around 20 euros in costs per household. |
| Other effects | <p>The reduction in truck-kilometres has a limited positive effect on traffic congestion and, consequently, on accessibility and average journey times for citizens. However, a truck charge does lead to higher costs for the production of goods, which has a negative, though generally limited, effect on the Dutch economy and competitive position (Arcadis, 2019).</p> <p>Various cost-benefit analyses have been carried out on the truck charge (Arcadis, 2020; Ecorys, 2018). These studies show that the costs outweigh the benefits. On balance, this amounts to around 1.7 to 2.3 billion in net present value. This is due to:</p> <ul style="list-style-type: none"> • higher costs and longer journey times for freight traffic; • investment and operating costs of the system; • a decline in government excise revenue. |
| Method | Based on arguments and estimates from existing studies. |
| Knowledge base | |
| Assessment of the knowledge base for the measure | The introduction of the measure has been well documented in existing studies. |
| What knowledge is still lacking? | <p>There are several aspects that warrant attention:</p> <ul style="list-style-type: none"> – It is uncertain whether the structure of the truck charge will remain constant in the long term. – Existing studies have often not assessed the effects on traffic volumes after 2030. – The studies focus on rates in the order of magnitude of the proposed rates. It is uncertain what effect a significant additional price increase will have. |

Promoting zero-emission zones and subsidies for LEFVs

| Promoting zero-emission zones and subsidies for LEFVs | |
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| Description and definition of the measure | 29 Dutch municipalities have decided to introduce a zero-emission zone. These zones are, initially, aimed at delivery vans and trucks. Implementation will take place between 2025 and 2030. In most municipalities, these zones cover the city centre and some surrounding areas. Under this measure, we are expanding the ZE zones. We assume that ZE zones will be introduced in the G44 and that the area will be extended to a size corresponding, in average cities, to 'within the ring road' ⁸⁷ or an area of comparable size. The measure is supported by a subsidy for LEFVs. |
| Modality | Trucks and vans. |
| The measure focuses on | Avoid, shift and improve. |
| Type of measure | Mandatory requirement and subsidy. |
| Timeline for implementation | This measure can only be implemented by local authorities, as they are responsible for local policy (IBO, 2023). However, central government can encourage the implementation of ZE zones through measures such as subsidies or an expert pool such as the 'Urban Logistics Expert Pool Collaboration Project' (SPES). Establishing and announcing new ZE zones takes at least four years (IBO, 2023), while an extension of an existing zone must be announced two years in advance. We therefore assume that the extension of the zones will come into effect in 2030, so that the effects will be significant by 2040. |
| Expected behavioural effects/policy rationale | <p>ZE zones have various effects:</p> <ol style="list-style-type: none"> 1. Replacement of diesel vehicles with electric vehicles. 2. Detours by diesel vehicles avoiding ZE zones. 3. Changes in transport concepts, for example towards LEFVs or cargo bikes, possibly in combination with ZE hubs. <p>Points 1 and 3 are expected to result in a reduction in energy consumption, while point 2 will lead to an increase in energy consumption.</p> <p>Specifically for LEFVs, we estimate that the additional potential is limited. For many journeys, particularly for heavy goods vehicles, LEFVs do not constitute a viable alternative. LEFVs compete primarily with delivery vans used for parcel delivery and deliveries by retailers themselves, as well as for service logistics (e.g. handymen) (RVO, 2024). It appears that around 70% to 80% of the distance covered by delivery vans for urban logistics in Rotterdam and Utrecht is for parcel delivery, delivery of fresh goods and service logistics (TNO, 2020). The deployment of LEFVs focuses primarily on the urban environment. Much remains unclear regarding the deployment potential of LEFVs(KiM, 2022b) compared to delivery vans. A percentage of between 10% and 15% of journeys in the city (Amsterdam University of Applied Sciences, 2018) is often cited as the potential for LEFVs, but this figure is highly uncertain (KiM, 2022b).</p> <p>The energy consumption per distance travelled by an LEFV delivery van (12 kWh per 100 km) is significantly lower than that of an electric delivery van (28 kWh per 100 km)(KiM, 2022b; Revnext, 2022). However, the load capacity of a LEFV delivery van is also smaller, meaning a one-to-one replacement is often not possible. The lower</p> |

⁸⁷ Based on a number of studies for individual municipalities, CE Delft estimates (CE Delft, ongoing) that 60% of municipal emissions occur within the ring road.

| Promoting zero-emission zones and subsidies for LEFVs | | | | | | | | | | | | | |
|--|--|--------------------|-------------------|--------------------|--------------|------------|----------|-----------------------------|-----|---|----------|-----|---|
| | energy consumption remains, however, when we apply a more realistic ratio of 1.5 LEFV delivery vans per delivery van (KiM, 2022b). In many cases, the use of LEFVs is more expensive because, due to the limited cargo space, a one-to-one replacement is often not possible, thereby placing a greater burden on staff. A subsidy could therefore be a good incentive to utilise a larger proportion of the potential. | | | | | | | | | | | | |
| Feasibility | Responsibility for ZE emission zones lies with local authorities, and central government cannot directly influence this (IBO, 2023). However, central government can encourage the implementation of ZE zones through measures such as subsidies, harmonised regulations or an expert pool such as SPES. Furthermore, the expansion of ZE zones could be made a condition for the granting of LEFV subsidies. However, it remains uncertain whether all local authorities will be willing to cooperate. This uncertainty is also reflected in our estimate of energy savings. For the local authorities, the measure is feasible, but the start-up phase in particular may be challenging. We do, however, expect that experience with the existing ZE zones will make upscaling easier. Cooperation between local authorities can also make the measure easier to implement. | | | | | | | | | | | | |
| Energy savings | | | | | | | | | | | | | |
| | 2040 | | | | | | | | | | | | |
| Energy savings (PJ/yr) | <table border="1"> <thead> <tr> <th></th> <th>Optimistic</th> <th>Pessimistic</th> </tr> </thead> <tbody> <tr> <td>Total</td> <td>0.4</td> <td>0</td> </tr> <tr> <td>Internal combustion engines</td> <td>0.2</td> <td>0</td> </tr> <tr> <td>Electric</td> <td>0.2</td> <td>0</td> </tr> </tbody> </table> <p>There are various uncertainties regarding energy savings:</p> <ul style="list-style-type: none"> – As local authorities are individually responsible, it is uncertain whether all 44 local authorities will implement the scheme. In the pessimistic scenario, we assume that only the 29 local authorities that have already announced a zone will do so. – According to (TNO, 2020), the way in which businesses comply – for example, through vehicle electrification or by using hubs and increasing the use of LEFVs – has a significant impact on the reduction in vehicle kilometres. In a scenario involving the use of hubs, vehicle kilometres for vans and trucks are reduced by more than three times as much. For the positive scenario, we assume a switch to a hub system. – The latest forecasts from PBL (PBL, 2024), which incorporate the effects of the CO₂ standards for trucks, show that there are sufficient electric vehicles (>60%) to meet demand (~20% electric kilometres). The degree of electrification therefore does not appear to be a factor of uncertainty. We therefore do not take potential spillover effects into account, as we do not assume that the expansion of ZE zones will lead to more electric trucks. | | Optimistic | Pessimistic | Total | 0.4 | 0 | Internal combustion engines | 0.2 | 0 | Electric | 0.2 | 0 |
| | Optimistic | Pessimistic | | | | | | | | | | | |
| Total | 0.4 | 0 | | | | | | | | | | | |
| Internal combustion engines | 0.2 | 0 | | | | | | | | | | | |
| Electric | 0.2 | 0 | | | | | | | | | | | |
| Explanation of energy savings | The potential has been calculated using the CEREM model managed by CE Delft. This model adapts estimates from existing studies to changes in vehicle kilometres, the electrification rate and the size of ZE zones. The | | | | | | | | | | | | |

| Promoting zero-emission zones and subsidies for LEFVs | |
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| | assumptions regarding the growth and composition of the vehicle fleet and the fuel mix in the CEREM model are consistent with the trends in the KEV. Traffic volumes in the base year are based on emissions data. This indicates that there will be more than enough electric vehicles by 2040. We therefore only apply estimates of the use of a hub system with smaller and more energy-efficient vehicles. Based on (TNO, 2020), this could lead to a reduction of 500,000 vehicle-kilometres per day for vans and trucks. If we translate this into an annual figure ⁸⁸ , it amounts to a reduction of 0.5% in vehicle kilometres. This reduction has been used to estimate the energy savings. |
| Assumptions | The hub system leads to a reduction in vehicle kilometres travelled by large vehicles of 500,000 km per day. |
| Border effects | The ZE zones are local measures. We do not expect any boundary effects from this measure. |
| Knowledge base for energy savings | |
| Assessment of the knowledge base for the measure | There is a reasonable knowledge base for the proposed ZE zones. Studies have been carried out at both national level and in individual municipalities. However, these are ex ante estimates, meaning it is uncertain how the effects will play out in practice. This creates additional uncertainty in the estimates for an expansion of the scope of ZE zones. In addition, larger ZE zones provide greater incentives for changes in transport concepts (ZE hubs) or greater uptake of electric vehicles, as the residual value of diesel vehicles is significantly reduced if travel to major cities is not possible. In this study, we assume a high level of electrification in the baseline scenario, meaning the additional incentive provided by ZE zones is negligible. If electrification in the baseline scenario falls short of expectations, ZE zones will act as an effective stimulus. |
| What knowledge is still lacking? | Ex ante estimates of the impact of currently planned ZE zones on the uptake of electric vehicles. Studies into the cumulative effects of (the expansion of) ZE zones across multiple municipalities |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | (Buck Consultants International & Royal HaskoningDHV, 2019) has estimated the costs incurred by municipalities. For the city centre alone, the costs amount to around €0.5 to €0.73 million (2019 prices), depending on the size of the municipality, and for a large zone, the figure is between €0.7 and €1.1 million (2019 prices). The annual operational costs amount to around one-third of the investment costs. |
| Annual capital costs/benefits for investments in the sector (€ million/year) | This measure compels businesses to switch to electric modes of transport at an early stage. By 2040, this will no longer be relevant as there will be sufficient electric vehicles available. The costs of other transport concepts, such as the use of electric cargo bikes, cannot be estimated due to a lack of reference points. |
| Difference in sector energy costs (€ million/year) | There are benefits to be gained from the use of more energy-efficient vehicles. This amounts to around 5 million euros per year. |

⁸⁸ Based on 250 working days and 30,000 million kilometres per year.

Energy saving in transport through avoid/shift policy measures: an exploratory study into dealing with scarcity

| Promoting zero-emission zones and subsidies for LEFVs | |
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| Difference in sector maintenance and management costs (€ million/year) | We expect a hub system to incur additional costs, as it is a solution that is currently used on a limited basis. There are also higher staffing costs because more drivers are required, as LEFVs have a smaller cargo space. |
| Difference in sector revenue (€ million/year) | We do not foresee any difference in revenue. |
| Method | We base our analysis on existing studies. |
| Assumptions | Kilometre savings based on TNO (2020). Energy costs and consumption based on KEV. |
| Total annual costs | |
| Total national costs (€ million/year) | The increase in labour costs is expected to be greater than the decrease in energy costs. As a result, we expect an increase in national costs. |
| Effects on citizens | |
| Impact on average household expenditure | This is highly uncertain, and particularly relevant for households in urban areas. |
| Other effects | ZE zones lead to a reduction in air pollutant emissions and noise levels. |
| Method | There were too few points of reference to make a quantitative estimate. |
| Assumptions | There were too few points of reference to make a quantitative estimate. |

Allowing Super EcoCombi vehicle on Dutch roads

| Permitting Super EcoCombi vehicle on Dutch roads | |
|---|---|
| Description and definition of the measure | <p>The Super EcoCombi (SEC) is an extra-long truck combination consisting of a tractor unit with two 13.6-metre trailers. The combination is therefore twice the size of a standard tractor-trailer and can carry 72 tonnes. The SEC is currently not permitted in the Netherlands, unlike the smaller EcoCombi⁸⁹. However, a process is underway to assess whether a specific configuration of the SEC can meet the requirements for road infrastructure and safety. The Ministry of Infrastructure and Water Management has plans in place to start deploying SECs in 2026, after which permits for transport using SECs can be granted in 2027. With this measure, we assume that the SEC can be integrated into the logistics system without incurring additional costs for society, for example in terms of infrastructure and safety.</p> <p>Allowing SECs will enable road transport to operate more efficiently. Compared to the LZV, an SEC has the major advantage of using standard units, as it comprises two standard semi-trailers. This allows, among other things, two containers to be carried, which increases its deployment potential.</p> |
| Modality | Road freight transport. |

⁸⁹ The EcoCombi, known in the Netherlands as the Longer and Heavier Lorry Combination (LZV), is approximately 1.5 times the size of a standard tractor-trailer.

| Permitting Super EcoCombi vehicle on Dutch roads | | | |
|---|--|-------------|-------------|
| Measure focuses on | Shift to more efficient vehicles | | |
| Type of measure | Regulation and funding. | | |
| Link to other policies | The use of Super EcoCombi may require additional investment in road infrastructure. | | |
| Timeline for implementation | For our calculations, we assume large-scale implementation in 2030, which should be well achievable given the plans from the Ministry of Infrastructure and Water Management. The full effect of the SEC will not be achieved immediately. It will take several years for the transport system to be adapted to the SEC, so the full potential will only be realised after some time. Assuming the measure is introduced in 2030, much of the potential will be realised by 2040. | | |
| Expected behavioural effects/policy rationale | By permitting SEC, existing road transport will be carried out more efficiently, thereby reducing energy demand. | | |
| Feasibility | Feasibility depends on the findings of ongoing research, which is examining whether different SEC configurations can meet road layout and safety requirements. If it turns out that few or no adjustments are needed, the measure is feasible. The SEC is already permitted in other countries, which may facilitate approval. However, the test phase may also reveal that further adjustments to road infrastructure, such as strengthening or widening, are required. This will reduce the feasibility and potential of the SEC. | | |
| Energy savings | | | |
| | | 2040 | |
| Energy savings (PJ/yr) | | Optimistic | Pessimistic |
| | Total | 1.6 | 0.6 |
| | Internal combustion engines | 1.1 | 0.5 |
| | Electric | 1.3 | 0.5 |
| | Reverse modal shift | -0.8 | -0.3 |
| Explanation of energy savings | <p>Energy savings depend on the deployment potential of the SEC and the reduction compared to conventional trucks. The deployment potential depends on Dutch policy, but also on that of neighbouring countries. Currently, the use of SECs is only permitted in a few sparsely populated European countries: Sweden, Finland, Denmark and Spain. The estimate does not take into account the use of SECs for international journeys. Furthermore, the estimate for electric variants is particularly uncertain because, in the absence of existing electric SECs, the savings are based on fossil-fuelled SECs.</p> <p>(Furthermore, the deployment potential depends on fixed cargo flows because SECs must meet certain preconditions, thereby limiting their deployment. According to projections by Buck Consultants International & CE Delft, 2020) , the SEC is also expected to replace the existing EcoCombi (LZV). The benefits at route/trip level can be substantial (20 to 40%), but as not all truck journeys are eligible for replacement by an SEC, savings at national level are more limited in scope.</p> | | |

| Permitting Super EcoCombi vehicle on Dutch roads | |
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| Calculation method | <p>In Buck Consultants International & CE Delft (2020), an extensive modelling of the potential of the SEC has been carried out. Based on experiences with the standard ECO-combi, experiences with the SEC from abroad, and route-based analyses using CBS⁹⁰ data, various potential markets (e.g. construction, floriculture) have been identified. For these potential markets, a number of journeys, with associated mileage, have been identified using CBS data on which the SEC could be deployed. Based on a realistic ramp-up scenario, the impact in 2030 has been determined assuming implementation in 2021.</p> <p>(Buck Consultants International & CE Delft, 2020) estimates that within a period of 9 years (2021–2030), around 3–9% of the kilometres travelled by regular trucks will be replaced by an SEC. The range is based on the rate at which the use of SECs is growing annually. The annual growth rates (15–30%) are based on experiences with LZVs across various sub-markets. Another study estimates the potential for long trucks in 2040 at 12% of all truck-kilometres in a scenario where the growth of long trucks is prioritized (Arcadis, 2023).</p> <p>It is uncertain to what extent the theoretical potential of the SEC will be utilised. This depends on the suitability of the Dutch road network, the choices made by neighbouring countries, and other factors such as the shortage of drivers. For the positive scenario, we assume 15% of truck-kilometres; for the pessimistic scenario, we assume 6%. These estimates are slightly higher than in the aforementioned studies because we assume that the deployment of SECs, due to the standardised units, can grow faster than has been achieved for LZVs. We therefore assume that greater potential will be reached more quickly.</p> <p>We assume that the powertrain of the SEC is the same as that of the tractor-trailer it replaces. We therefore assume that the proportion of battery-electric kilometres remains the same. From (Buck Consultants International & CE Delft, 2020), it appears that for container transport, the energy reduction is 25% lower when reverse modal shift is taken into account. In the absence of estimates for other markets, we apply this to all markets.</p> |
| Assumptions | <p>The key assumptions are:</p> <ul style="list-style-type: none"> – The expected uptake of SEC is slightly higher than the uptake observed following the introduction of the LZV. – The underlying studies assume that it is not possible to apply SEC to international journeys. This assumption has been adopted. |
| Border effects | <p>In principle, the introduction of the SEC does not lead to changes in transport and therefore does not lead to border effects. In the longer term, the fact that transport in the Netherlands becomes cheaper due to the SEC could lead to a slight increase in transport if distribution centres find it more attractive to establish themselves in the Netherlands as a result. We expect this effect to be very limited.</p> |
| Knowledge base on energy savings | |
| Assessment of the knowledge base for the measure | <p>The knowledge base for this measure is reasonable. A thorough ex ante study has been carried out, but as the measure has not yet been implemented, it is unclear to what extent the theoretical potential will be realised in practice.</p> |

⁹⁰ The use of the Super Eco-Combi requires journeys with fixed volumes on routes that do not enter city centres.

| Permitting Super EcoCombi vehicle on Dutch roads | |
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| What knowledge is still lacking? | <ul style="list-style-type: none"> - It is unclear to what extent SEC can be utilised in practice. - The impact of EU-wide implementation has not been investigated. - The effect of electrification on the energy consumption of an SEC is unknown, although this is expected to be positive due to the higher torque of electric vehicles. - The potential of international journeys has not been investigated. However, we do expect this to be positive due to the possibilities for interconnection. |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | Allowing SEC will not result in significant policy and administrative costs, as it primarily involves authorisation. However, some enforcement may be required to ensure that SEC is deployed only on suitable infrastructure. |
| Annual capital costs/benefits for sector investments (€ million/year) | <p>The measure results in benefits according to (Buck Consultants International & CE Delft, 2020).</p> <p>There are various cost items that have an impact:</p> <p>Investments in and costs of infrastructure increase due to heavier axle loads. The impact of the SEC is concentrated on road surfacing, engineering structures and road layout (e.g. roundabouts and acceleration lanes).</p> <p>Lower investment in vehicles because, on average, a single vehicle requires more trailers.</p> <p>Arcadis has examined the infrastructure costs for long-distance road transport (LZV and SEC) in a CBA (Arcadis, 2023). Allowing SECs on the entire motorway network will lead to higher investment costs because the road surface requires a thicker intermediate layer, as SECs may have higher axle loads. However, it is uncertain to what extent SECs actually have higher axle loads in practice, or whether this can be prevented in practice by well-designed measurement systems on SEC trailers. Studies (Panteia, 2022) (Verkeerskunde, 2018) show that overloaded trucks in particular cause significant damage to infrastructure. SECs may be equipped with sensors that measure axle loads, thereby preventing overloading.</p> <p>Should axle loads be higher – which is not immediately plausible – and should SECs be permitted on the entire motorway network, an additional investment of €990 million would be required. With an average lifespan of 20 years, annual costs would rise by €50 million per year. No research has been conducted into the underlying road network, but adjustments may prove necessary here too. Based on a few selected engineering structures, the impact on reduced service life appears to be limited. In general, RWS (TNO, 2008) expects that bridges and viaducts will need to be replaced earlier for other reasons, particularly overloading (RVO & Revnext, 2023a), rather than due to the increasing traffic load resulting from long and heavy goods vehicles.</p> <p>The measure could reduce the number of trucks required by 50%. This is because a SEC can carry twice the load of a single standard truck-trailer</p> |

| Permitting Super EcoCombi vehicle on Dutch roads | |
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| | combination. Based on an annual mileage of 100,000 km ⁹¹ per year, between 1,100 and 2,700 fewer trucks would be needed. Based on (TNO, 2022), we assume a purchase cost of €170,000 per tractor unit. This results in lower total investment costs of between €190 million and €500 million. With an average lifespan of ten years, this amounts to annual benefits of between €20 million and €50 million per year. |
| Difference in sector energy costs (€ million/year) | As the same transport is carried out more efficiently, energy costs fall. The benefits amount to €30 million per year for the medium scenario. |
| Difference in sector maintenance and management costs (€ million/year) | <ul style="list-style-type: none"> – Lower driver costs because one SEC transports the same amount as one regular truck. This results in a 50% reduction in labour costs. Based on labour costs excluding payroll tax per kilometre of (€0.52 per vkm⁹²), this results in annual savings of €60 to €140 million. – According to (Arcadis, 2023), no increase in maintenance and management costs is anticipated for the deployment of an SEC. However, it is noted that there is a lack of research on this subject. |
| Difference in sector revenue (€ million/year) | We assume equal revenues because the output is the same. |
| Method | The costs have been estimated based on existing studies. |
| Assumptions | Assumptions have been taken from the study below. |
| Total annual costs | |
| Total national costs (€ million/year) | The measure could lead to significant benefits (around €100 million per year), as also estimated by (Arcadis, 2023). However, there is (considerable) uncertainty regarding infrastructure investments and road safety impacts. |
| Effects on citizens | |
| Effect on average household expenditure | As transport becomes more efficient, the cost of transport falls to a limited extent. It is expected that transport costs for 9% of journeys on which the SEC is used will be around 40% lower, as fewer vehicles are required (Buck Consultants International & CE Delft, 2020). This represents a cost saving of 3.6%. This results in an annual saving of €14 per household ⁹³ . |
| Other effects | <p>The higher efficiency leads to a reduction in emissions of air pollutants. According to (Arcadis, 2023), LZVs can generate emission benefits of between 120 and 170 million euros per year. Furthermore, due to the reduction in truck-kilometres, there are accessibility benefits of between 9 and 80 million euros per year. We expect the effects with the SEC to be even greater than with the LZV, due to the SEC's 30% higher efficiency compared to the LZV.</p> <p>Permitting the SEC will lead to challenges in the area of road safety. Based on a literature review, SWOV (2021) has written an advisory report on the effects of SECs on road safety. This report specifically examined a route between Rotterdam and Venlo. In summary, it is stated that the use</p> |

⁹¹ Source: CBS Traffic performance of goods vehicles; kilometres, weight 2001–2020 for tractor-trailers in use.

⁹² Source: (KiM, 2023b) with inflation adjustment.

⁹³ Based on (Arcadis, 2019) where a 2% increase in transport costs (based on a lorry charge of 0.15 cents on main roads) results in an annual increase in household expenditure of 7.60 euros.

| Permitting Super EcoCombi vehicle on Dutch roads | |
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| | of existing infrastructure by SECs is problematic, and that little can be done about this for the time being. The sections outside the motorways pose the greatest safety risks. However, the Ministry's plans focus primarily on the deployment of the SEC on the main road network. However, it is not possible to quantify the effects on road safety on the basis of existing studies. |
| Method | Determined on the basis of the cost-effectiveness of transport and the CBA (Arcadis, 2023) |
| Assumptions | We expect that lower transport costs will be passed on and ultimately partly benefit households. |

G.3.2 Measures with unclear legal feasibility (with structural energy saving as the motivation)

Car-free Sundays for passenger cars

| Car-free Sundays for passenger cars | |
|---|--|
| Description and definition of the measure | Car-free Sundays have been introduced on several occasions in the past in response to fuel shortages. In recent decades, car-free days have also been organised for environmental and climate reasons, which local authorities could join on a voluntary basis. The measure currently under consideration prohibits car use for one day a week (Sunday) at national level. An exception applies to emergency services and people in essential roles. |
| Modality | Passenger transport. |
| Measure focuses on | Avoid & shift. |
| Type of measure | Obligation. |
| Link to other policies | |
| Timeline for implementation | This measure can be introduced at any time. As the legislation already exists, the implementation timeframe is short. |
| Expected behavioural effects/policy rationale | Weekend journeys are less often work-related than journeys during the working week. This makes it easier to avoid these journeys. On the other hand, this also creates a potentially greater diversion effect: we expect the number of journeys on Fridays and Saturdays to increase significantly. |
| Feasibility | The possibility of a car-free Sunday is currently only legally established for situations where there is an (imminent) disruption to the supply of petroleum (BWBR0012319). In the event of a disruption to the supply of other energy sources, this option does not exist and would still need to be legally regulated. However, even then, the feasibility and effectiveness of the measure are likely to be problematic. Firstly, the exemption for essential workers is difficult to enforce: one would have to prove that a journey is genuinely for commuting purposes. If this is not checked, a large proportion of drivers could still drive on Sundays; 27% of car drivers have an essential job (see below). Secondly, this measure is primarily aimed at reducing car journeys for social and recreational |

| Car-free Sundays for passenger cars | |
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| | <p>purposes. These are often the more flexible journeys, in the sense that they can also be made on another day. These diversion effects could be significant. Nevertheless, the total time available for recreational car journeys is reduced, so a certain reduction in car journeys is to be expected.</p> |
| Energy savings | |
| | 2040 |
| Energy savings (PJ/yr) | This measure is expected to save 2.7–5.8 PJ per year by 2040 (2–3% of total energy consumption from passenger transport). |
| Explanation of energy savings | The energy savings from this measure are the net sum of the reduction in car use on Sundays, on the one hand, and the increase in public transport use and car use on other days, on the other. |
| Calculation method | <p>The maximum energy saving from this measure is the share of road traffic on a weekend day. This is 7% lower than on a weekday (IPLO, Iopend-a). Consequently, energy consumption on Sundays accounts for 13.6% of the total energy consumption of passenger cars.</p> <p>A large proportion of journeys may be made on a different day, which does not result in any net energy savings. The remainder can either be avoided or undertaken using other modes of transport, such as cycling and public transport.</p> <p>In addition, approximately one in three occupations is classified as a 'essential profession' (CBS, ongoing). Around three in four car owners are part of the working population (CBS, 2021a). This means that approximately 27% of car owners have a critical occupation. However, not all of them work on Sundays. As it is difficult in practice to verify whether these individuals actually have to work on Sundays, we assume that they all have the option of driving on Sundays.</p> <p>Assumptions have been made regarding the expected behavioural effects for each travel motive in an optimistic and pessimistic scenario. These scenarios represent extreme situations; actual behaviour will lie somewhere in between. Furthermore, behaviour is influenced by the level of regulation, enforcement and provision of information:</p> <ul style="list-style-type: none"> – For work-related travel (commuting and business), the optimistic scenario assumes that half of those in essential roles must work on Sundays and use their usual mode of transport for this. Other commuting journeys are not made. In the pessimistic scenario, we assume that half of the remaining work-related journeys will continue to be made by car. – In the optimistic scenario, we assume that 40% of shopping trips can be avoided, 30% are made on a different day, and the remaining trips are made using other modes of transport. In the pessimistic scenario, 20% of trips are not made, 15% are made using other modes of transport, and 65% are made on a different day. – Journeys for social and recreational purposes (visiting friends and family, going out, sport/hobbies, other) are expected to be partly cancelled, partly made using other modes of transport, and partly rescheduled to other days. Certainly in the long term, sports competitions and other regular appointments will be rescheduled to |

| Car-free Sundays for passenger cars | |
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| | <p>other days. Therefore, in the optimistic scenario, we assume that 50% of journeys will be rescheduled to another day, and that the remaining journeys will either not be made (25%) or will be made using other modes of transport (25%). In the pessimistic scenario, we assume that 75% of journeys will be rescheduled to other days, and that the remaining journeys will either not take place (12.5%) or will be made using other modes of transport (12.5%).</p> <ul style="list-style-type: none"> – In the optimistic scenario, leisure travel is almost entirely abandoned (80%). The remainder is shifted to other days. In the pessimistic scenario, 60% of these journeys are no longer made, and the rest are shifted to other days. <p>By weighting these assumptions against passenger-kilometres by purpose on Sundays (not differentiated by mode), we can estimate the expected behaviour (CBS, 2023c). In the optimistic scenario, this results in a 36% reduction in journeys, a 21% modal shift and a 43% shift to other days and permitted journeys. In the pessimistic scenario, 18% of journeys are avoided, there is a 10% modal shift and 71% of journeys are shifted to other days or involve a breach of the ban.</p> <p>Taking diversion effects and exceptions into account, the car-free Sunday will, according to this calculation, lead to a 2–4% reduction in car kilometres. This is offset by a 1–2% increase in public transport passenger kilometres. It is expected that this increase will not result in an increase in public transport vehicle kilometres, as current capacity is sufficient to accommodate a small increase (spread throughout the day).</p> <p>Energy consumption in 2040 for passenger cars is estimated at 143 PJ (PBL, 2023b). This measure will result in an energy reduction of 2.7–5.4 PJ in 2040.</p> |
| Border effects | <p>A ban on cars on the road also applies to foreign cars. This discourages foreign travel to the Netherlands on Sundays. Conversely, Dutch cars will also be unable to travel abroad on Sundays, as this will not be possible until they reach the border. It is possible that some of these journeys will be made on another day. We expect the border effect to be negligible in terms of energy, as travel to and from the Netherlands on Sundays will cancel each other out. Furthermore, this concerns a small group of travellers.</p> |
| Knowledge base on energy savings | |
| Assessment of the knowledge base for the measure | <p>Although Car-Free Sundays have been introduced several times in the Netherlands, little is known about the effect on energy consumption. The greatest uncertainty lies in the behavioural effects, which are crucial for determining the effectiveness of the measure.</p> |
| What knowledge is still lacking? | <p>The extent of displacement effects (travel on other days) and the degree of switching to other modes of transport need to be better mapped out in order to properly assess the effectiveness of this measure.</p> |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the | N/A |

| Car-free Sundays for passenger cars | |
|--|---|
| government for implementing the measure (€ million/year) | |
| Annual capital costs/benefits for sector investments (€ million/year) | <p>No investments are required for this measure. The main costs of this measure are enforcement costs. The costs depend on the level of enforcement. Enforcement may involve increased police presence on the roads, but may also utilise existing traffic monitoring systems.</p> <p>Installing number plate recognition systems is not a straightforward solution if this measure is to apply for just one day a week. The costs are too high for this purpose, amounting to around 1.4–1.7 billion euros (CPB, 2015). Existing number plate recognition systems could potentially be used as an alternative.</p> |
| Difference in sector energy costs (€ million/year) | The energy savings of 2.7–5.4 PJ result in a reduction in energy costs of 70–140 million euros per year, based on the forecast for energy prices in 2040 (PBL, 2023b). |
| Difference in sector maintenance and management costs (€ million/year) | This measure does not lead to additional maintenance costs. Where possible, routine infrastructure works could be carried out on car-free Sundays, thereby reducing the costs of these projects. |
| Difference in sector revenue (€ million/year) | N/A |
| Total annual costs | |
| Total national costs (€ million/year) | The total national costs are negative, as savings are made on energy costs and potentially on infrastructure costs. |
| Effects on citizens | |
| Effect on average household expenditure | Household expenditure may fall or rise as a result of this measure, depending on behavioural effects. Travelling less leads to savings in transport costs, while travelling differently (for example, by public transport) may also incur additional costs. Rescheduling journeys to other days does not result in any additional costs. |
| Other effects | <p>This measure restricts citizens' accessibility on Sundays. Accessibility may also be reduced on other (weekend) days if diversion effects lead to increased traffic and congestion on the roads.</p> <p>At the same time, this measure has a positive effect on the quality of life, air quality and noise levels in the built environment.</p> |

Reduction of the speed limit on main roads to 80 km/h

| Reduction of the speed limit on main roads to 80 km/h | |
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| Description and definition of the measure | <p>On motorways, the speed limit varies from 100 to 130 kilometres per hour, depending on the location and the time of day. On dual carriageways and N-roads (national roads), the maximum speed is 100 or 80 kilometres per hour.</p> <p>However, passenger cars with internal combustion engines achieve their optimum efficiency between 70 and 90 kilometres per hour (CE Delft, 2009). Reducing the maximum speed to 80 kilometres per hour on these roads will therefore lead to lower energy consumption.</p> <p>Reducing the speed limit will increase journey times on these roads. In the long term, longer journey times will encourage people to travel less, live closer to work or make greater use of public transport.</p> |
| Modality | Road traffic. |
| Measure focuses on | Improve, avoid, shift. |
| Type of measure | Obligation. |
| Link to other policies | N/A |
| Feasibility | <p>Adjusting speed limits on motorways is a measure that is readily feasible. In recent years, the speed limit on (parts of) the motorway has been changed (Rijksoverheid, 2024) (Rijkswaterstaat, 2020). In some cases, increasing the speed limit is not possible due to environmental impacts such as nitrogen emissions and noise pollution. This is not an issue when reducing the speed limit, as these negative environmental impacts are generally reduced at a lower speed limit.</p> |
| Energy savings | |
| | 2040 |
| Energy savings (PJ/yr) | In the long term, this measure could save 10.7–15.2 PJ of energy, representing 7–10% of total energy consumption from passenger transport. |
| Explanation of energy savings | Reducing the speed limit to 80 kilometres per hour will result in lower energy consumption per kilometre. As journey times increase, traffic volumes will also decrease in the long term, partly due to a modal shift. |
| Calculation method | <p>Energy savings per distance travelled</p> <p>If the speed limit is reduced to 80 kilometres per hour, the average speed will only be 80 kilometres per hour in the most optimistic scenario. In more pessimistic scenarios, drivers pay less attention to the speed reduction or are insufficiently aware of it. This partly depends on the level of enforcement, such as additional average speed checks and speed cameras.</p> <p>In line with KiM (2023a), we assume a range in the average speed driven of 80–94 km/h at a maximum speed of 80 km/h. According to this study, this corresponds to a 6–14% reduction in energy consumption per kilometre travelled. We apply these percentages to all types of powertrain (petrol, diesel, electric, etc.), although in reality there are minor differences between the fuel types. Electric cars also show a relatively similar reduction in energy consumption when the speed is reduced from 100 to 80 km/h (Mamala et al., 2023).</p> <p>To estimate the effect of this measure, we assume that the current speed limit on all motorways is 100 kilometres per hour. 44% of passenger car energy consumption is attributable to motorway kilometres (Rijksoverheid, 2022a). In addition, 10% of motorway</p> |

| Reduction of the speed limit on main roads to 80 km/h | |
|---|--|
| | <p>kilometres are already travelled at speeds below 80 km/h, so we exclude these (KiM, 2023a).</p> <p>Consequently, the energy savings from the measure on the motorway for passenger cars are 2–6%. On the secondary road network and urban roads, the speed is already 80 kilometres per hour or lower. This measure therefore has no direct effect here.</p> <p>Long-term reduction in traffic</p> <p>In addition, there are various secondary effects that occur in the longer term. The most important is that the average journey time increases, causing the total traffic volume to decrease according to the Brever law (Conservation of Travel Time and Trips)(CE Delft, 2009). This law implies a travel time elasticity of -1, which is also in line with the average car travel time elasticity in the LMS (TNO et al., 2012). For example, people will travel less, live closer to work or make greater use of public transport.</p> <p>With a 20% reduction in speed (from 100 to 80 km/h), journey time is 25% longer. However, this applies only to motorways, where on average 24% of journey time is spent.⁹⁴ The total journey time would therefore increase by 6% (24% × 25%). This effect is partly offset because routes via regional roads (where the speed limit is also 80 km/h) are sometimes a faster option than the motorway route due to the shorter distance. In addition, increased traffic on minor roads may lead to higher energy consumption due to braking and acceleration. However, these two effects are difficult to quantify.</p> <p>Assuming an average increase of 5% in journey time for passenger cars and vans, traffic volume would therefore decrease by 5% in the long term. This corresponds to an additional energy reduction of 5%, amounting to around 7 PJ in 2040.</p> <p>Increase in public transport</p> <p>According to CE Delft (2009), the cross-elasticity between car journey time and the number of public transport journeys is -0.51. This means that a 5% increase in journey time results in 2.5% more public transport journeys. We do not expect this increase to lead to a significant rise in energy consumption by public transport. We have therefore not quantified this effect.</p> <p>Other effects</p> <p>The speed reduction also has an effect on road congestion. On the secondary road network, this is expected to increase, as it will be used more frequently. On the main road network, this reduces pressure, resulting in less congestion.</p> <p>Net long-term effect</p> <p>In the long term, this measure could save 10.7–15.2 PJ of energy, representing 7–10% of the total energy consumption of passenger cars and vans. The direct effect from energy efficiency accounts for 4–9 PJ of this; 8 PJ is due to the long-term effect of reduced traffic volumes.</p> |
| Border effects | <p>There are no significant border effects associated with this measure. Motorists in the border region may opt for an alternative route via a neighbouring country in order to reach their destination more quickly. However, taking a detour also takes time, meaning that the time saved</p> |

⁹⁴ This has been calculated using the mileage figures by road type(CE Delft, 2024b) and the assumption that the average speed on motorways is 100 km/h(KiM, 2023a) , on urban roads 30 km/h and on rural roads 60 km/h(IPLO, Iopend-b) .

| Reduction of the speed limit on main roads to 80 km/h | |
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| | will be limited in many cases. We therefore expect this effect to be negligible. |
| Knowledge base on energy savings | |
| Assessment of the knowledge base for the measure | The energy savings resulting from speed reduction have been well researched. |
| What knowledge is still lacking? | Behavioural effects resulting from a speed reduction should be better identified to enable an accurate assessment of the impact of this measure. |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | Enforcement costs depend on the level of monitoring. According to (CE Delft, 2018b), the operational costs and implementation costs are both €2.6 million per year. |
| Annual capital costs/benefits for investments in the sector (€ million/year) | For reference: the implementation costs incurred by Rijkswaterstaat for the speed reduction in 2020 from 120 to 100 km/h amounted to approximately €19 million (NOS, 2020). |
| Difference in sector energy costs (€ million/year) | The energy savings of 10–15 PJ for passenger cars result in a reduction in energy costs of 276–393 million euros per year, based on expected energy consumption and energy costs in 2040 (PBL, 2023b). |
| Difference in sector maintenance and management costs (€ million/year) | Unknown. |
| Difference in sector revenue (€ million/year) | N/A |
| Total annual costs | |
| Total national costs (€ million/year) | According to(CE Delft et al., 2022) , the national costs are €85 million per year for a speed reduction from 100 to 80 km/h and from 120/130 to 100 km/h (CE Delft et al., 2022). |
| Effects on citizens | |
| Effect on average household expenditure | <p>The energy savings resulting from more efficient fuel use are directly related to the amount of fuel required and thus to the marginal costs of car use. In the long term, car use may decrease as people move closer to their place of work and/or make greater use of public transport(CE Delft, 2009) . Depending on future public transport fares, this may result in additional costs compared to car use.</p> <p>Of the energy-saving benefits mentioned above, €276–393 million per year is attributable to energy consumption by passenger cars. With 9</p> |

| Reduction of the speed limit on main roads to 80 km/h | |
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| | million households in 2040, this amounts to €30 to €44 per year per household (CBS, 2021b). |
| Other effects | <p>Travel time by car will increase due to a reduction in speed (CE Delft et al., 2022). This applies in particular to longer journeys. Travel time on the motorway will increase by around 25% as a result of this measure, leading on average to a 6% longer journey time by car.</p> <p>As the speed limit on the motorway is the same as on regional roads in this scenario, there may be a shift in congestion from motorways to regional roads. However, traffic will be more evenly distributed through greater use of the underlying road network.</p> <p>This measure makes a positive contribution to air quality (particulate matter, nitrogen) but has a negative effect on accessibility.</p> |

Mandatory strict parking policy for employees

| Mandatory strict parking policy for employees | |
|--|---|
| Description and definition of the measure | <p>This measure prohibits employers from providing a parking space for employees who live less than 15 or more than 30 kilometres from their workplace. This discourages car use and encourages working from home and the use of public transport. This measure can be combined with an employer-led approach, such as setting up a financial scheme to subsidise the purchase of an (electric) bicycle or speed pedelec. Such incentive measures help to mitigate the impact of the ban.</p> <p>An important variable for calculating the impact of this measure is how many employees who travel by car currently park on their employer's premises. For employees who park off-site, such as in the local area or in a public car park, this measure will naturally have little to no effect. However, no data is available on this parking behaviour.</p> <p>Municipal policies such as parking standards or parking charges are not part of this policy.</p> |
| Modality | Road traffic, public transport. |
| Measure focuses on | Shift/avoid. |
| Type of measure | Subsidy, agreement, obligation, incentives for local authorities (lower levels of government). |
| Coherence with other policies | N/A |
| Feasibility | Enforcing this measure is difficult. It should be clear which of the cars parked at an employer's premises belong to which employee (even if the employee does not come in their own car, but uses a shared car, for example), and how far from work that employee lives. If this is not monitored, the result will be that employees will still come by car, even though this is not permitted. Furthermore, it seems likely that employees will park their cars at other locations near their workplace. This effect is even more difficult to monitor and, moreover, falls outside the employer's control. Monitoring by officials (police, special investigating |

| Mandatory strict parking policy for employees | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|----------|-----------|----------|---------|-------|-----|-----|-----|-----|-----|-----|------------------|----|----|-----|-----|----|-------|-----|-----|-----|----|-----|---------|----|----|----|----|----|-------|----|----|----|----|----|
| | officers) would require more personal data to be linked to the number plate. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Energy savings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2040 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Energy savings (PJ/yr) | Based on energy consumption in 2040 (PBL, 2023b), this measure will deliver a reduction of 3.3–5.3 PJ per year in 2040. That is a 2–3% reduction in total energy consumption from passenger transport. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Explanation of energy savings | If employees are no longer permitted to park at their workplace, some of them will work from home more often and/or use alternative modes of transport (such as public transport or cycling) to get to work. This will result in a reduction in energy consumption due to the decrease in car use. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calculation method | <p>According to the National Travel Survey, 40% of employees live within 7.5 kilometres of their workplace, 16% between 7.5 and 15 kilometres, and 24% more than 30 kilometres (MuConsult, 2022). Furthermore, this survey also provides the modal split for each of these categories; see the table below.</p> <table border="1" data-bbox="660 1014 1362 1435"> <thead> <tr> <th>Modal split (trip level) for commuting</th> <th>< 7.5 km</th> <th>7.5–15 km</th> <th>15–30 km</th> <th>> 30 km</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Car</td> <td>44%</td> <td>62%</td> <td>77%</td> <td>80%</td> <td>62%</td> </tr> <tr> <td>Public transport</td> <td>5%</td> <td>8%</td> <td>10%</td> <td>14%</td> <td>8%</td> </tr> <tr> <td>Cycle</td> <td>40%</td> <td>25%</td> <td>10%</td> <td>4%</td> <td>24%</td> </tr> <tr> <td>Walking</td> <td>6%</td> <td>1%</td> <td>0%</td> <td>0%</td> <td>3%</td> </tr> <tr> <td>Other</td> <td>4%</td> <td>5%</td> <td>3%</td> <td>3%</td> <td>4%</td> </tr> </tbody> </table> <p>If the employee is not allocated a parking space, they can park near their workplace at their own expense. The alternative is to travel by public transport or bicycle, or to work from home more often. The average choice depends heavily on the distance between home and work. In general, the shorter the distance, the longer the public transport journey time compared to the car journey time (CPB & KiM, 2009). For journeys under 15 kilometres, this is 2 to 4 times higher.</p> <p>The behavioural effects of a parking ban have not been properly researched. Furthermore, it is not known what proportion of employees who travel by car park on the employer’s premises. In the calculation, we therefore assume a minimum and maximum scenario to estimate the effect. These scenarios are intended as extremes, within which the actual effect is highly likely to fall.</p> <p>The assumptions for both scenarios are shown in the tables below. To clarify: in the pessimistic scenario, for example, 80% of employees who drive to work (with a commute of over 30 km) use a parking space outside the employer’s premises, or will do so after the ban. 10% travel by other modes of transport and 10% do not travel. In the optimistic scenario, only 20% of these employees use a parking space outside the</p> | Modal split (trip level) for commuting | < 7.5 km | 7.5–15 km | 15–30 km | > 30 km | Total | Car | 44% | 62% | 77% | 80% | 62% | Public transport | 5% | 8% | 10% | 14% | 8% | Cycle | 40% | 25% | 10% | 4% | 24% | Walking | 6% | 1% | 0% | 0% | 3% | Other | 4% | 5% | 3% | 3% | 4% |
| Modal split (trip level) for commuting | < 7.5 km | 7.5–15 km | 15–30 km | > 30 km | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Car | 44% | 62% | 77% | 80% | 62% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Public transport | 5% | 8% | 10% | 14% | 8% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cycle | 40% | 25% | 10% | 4% | 24% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Walking | 6% | 1% | 0% | 0% | 3% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | 4% | 5% | 3% | 3% | 4% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Mandatory strict parking policy for employees | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------|----------|-----------|----------|---------|-------------------------------------|-----|-----|-----|-----|-----------------------|-----|-----|-----|-----|----------------|-----|-----|-----|-----|--|----------|-----------|----------|---------|-------------------------------------|-----|-----|-----|-----|-----------------------|-----|-----|-----|-----|----------------|-----|-----|-----|-----|
| | <p>employer's premises, resulting in more people travelling by other means and working from home more often.</p> <p>For employees who travel by other means, it is assumed that they distribute themselves across transport modes according to the current modal split (excluding cars).</p> <p>The change in the number of commuting kilometres travelled per mode has been converted into a change in total energy consumption based on the total transport performance per mode (CBS, 2023b). The measure results in a total reduction of 2–4% in energy consumption by passenger cars. On the other hand, there is a 25–44% increase in public transport and cycling kilometres for commuting. For the total transport performance, this means a 5–10% increase in cycling kilometres and an 8–14% increase in the use of public transport. We estimate that this will lead to a 2–3% increase in energy consumption by trains and buses due to the additional capacity required.</p> <p>Based on the energy consumption of cars, trains and buses in 2040, this leads to a net reduction of 3.3–5.3 PJ per year in 2040 (PBL, 2023b).</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assumptions | <p>Assumed behavioural effects: pessimistic scenario.</p> <table border="1"> <thead> <tr> <th></th> <th>< 7.5 km</th> <th>7.5–15 km</th> <th>15–30 km</th> <th>> 30 km</th> </tr> </thead> <tbody> <tr> <td>Parking outside employer's premises</td> <td>50%</td> <td>60%</td> <td>N/A</td> <td>80%</td> </tr> <tr> <td>Other means of travel</td> <td>40%</td> <td>30%</td> <td>N/A</td> <td>10%</td> </tr> <tr> <td>Not travelling</td> <td>10%</td> <td>10%</td> <td>N/A</td> <td>10%</td> </tr> </tbody> </table> <p>Assumed behavioural effects: optimistic scenario</p> <table border="1"> <thead> <tr> <th></th> <th>< 7.5 km</th> <th>7.5–15 km</th> <th>15–30 km</th> <th>> 30 km</th> </tr> </thead> <tbody> <tr> <td>Parking outside employer's premises</td> <td>10%</td> <td>20%</td> <td>N/A</td> <td>30%</td> </tr> <tr> <td>Other means of travel</td> <td>80%</td> <td>60%</td> <td>N/A</td> <td>50%</td> </tr> <tr> <td>Not travelling</td> <td>10%</td> <td>20%</td> <td>N/A</td> <td>20%</td> </tr> </tbody> </table> | | < 7.5 km | 7.5–15 km | 15–30 km | > 30 km | Parking outside employer's premises | 50% | 60% | N/A | 80% | Other means of travel | 40% | 30% | N/A | 10% | Not travelling | 10% | 10% | N/A | 10% | | < 7.5 km | 7.5–15 km | 15–30 km | > 30 km | Parking outside employer's premises | 10% | 20% | N/A | 30% | Other means of travel | 80% | 60% | N/A | 50% | Not travelling | 10% | 20% | N/A | 20% |
| | < 7.5 km | 7.5–15 km | 15–30 km | > 30 km | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parking outside employer's premises | 50% | 60% | N/A | 80% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other means of travel | 40% | 30% | N/A | 10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not travelling | 10% | 10% | N/A | 10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | < 7.5 km | 7.5–15 km | 15–30 km | > 30 km | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parking outside employer's premises | 10% | 20% | N/A | 30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other means of travel | 80% | 60% | N/A | 50% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not travelling | 10% | 20% | N/A | 20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Border effects | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge base on energy saving | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assessment of the knowledge base for the measure | There is a wealth of knowledge and data available on the modal split and journey distances for commuting. However, to properly assess the impact of this measure, the behavioural impact of a parking ban is also required. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| What knowledge is still lacking? | The behavioural effects on employees under a parking ban are missing. Of particular importance is the proportion of employees who still use their cars despite the parking ban. In addition, secondary effects, such | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Mandatory strict parking policy for employees | |
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| | as moving closer to work, are important for providing an accurate assessment. |
| Cost items: national costs | |
| | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | A ban on parking at the employer's premises does not, apart from legislation, entail significant implementation costs. However, enforcement costs could become significant if the ban is strictly monitored. Police officers and special investigating officers (BOAs), for example, could be deployed for this purpose. |
| Annual capital costs/benefits for investments (€ million/year) | A large-scale modal shift towards public transport for commuting will increase rush-hour congestion. This will require additional investment in public transport, such as more trains and buses or the construction of new tracks. Part of these costs will be borne by the government. However, it must be borne in mind that an improved public transport infrastructure also attracts passengers who would otherwise not have travelled or would have cycled or walked (CPB & PBL, 2020). Public parking spaces are more likely to be occupied by commuters as a result of this measure. Municipalities may adjust their parking policies to retain sufficient parking space for other travel purposes. Consequently, some municipalities may create more parking spaces. |
| Difference in energy costs (€ million/year) | The energy savings of 3.3–5.3 PJ result in a reduction in energy costs of 85–138 million euros per year, based on the forecast for energy prices in 2040 (PBL, 2023b). |
| Difference in maintenance and management costs (€ million/year) | N/A |
| Difference in revenue (€ million/year) | N/A |
| Total annual costs | |
| Total national costs (€ million/year) | The total costs of this measure will be determined primarily by enforcement costs and the potential costs of installing more public parking spaces. These costs have not been estimated and are highly dependent on compliance (behavioural impact) with the measure. |
| Effects on citizens | |
| Impact on average household expenditure | Depending on the employee's commuting allowance scheme, this measure may be financially advantageous or disadvantageous. |
| Other effects | In the vast majority of cases, travel time by public transport or bicycle is longer than by car (CPB & KiM, 2009). The average employee will therefore have to spend more time travelling to work, or work from home more often. In the longer term, this measure may encourage people to move house in order to reduce their commute. |

| Mandatory strict parking policy for employees | |
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| | As this measure inadvertently encourages employees to park their cars in public car parks, car parks in certain parts of the built environment will be structurally busier. This may cause inconvenience to local residents and others wishing to park for other reasons. Furthermore, the local authority may decide to allocate more space to car parks. |

Energy performance standards in freight transport

| Energy performance standards in freight transport | |
|--|--|
| Description and definition of the measure | <p>It is becoming increasingly common to monitor transport emissions. For example, as part of the refund scheme for the truck tax, vouchers are also made available to monitor_{CO₂}. In addition, policy (CSRD, PEF, OEF) is also driving an increase in carbon footprinting. Initiatives such as CountEmissions, ISO 14803 and Lean&Green also ensure that monitoring is carried out in a consistent manner. To ensure relative comparability, emissions are related to transport performance (CO₂/tkm). A next step could be the mandatory monitoring of energy performance, with standards applied to this. Companies would thus be obliged to remain below an annually decreasing standard.</p> <p>The energy standards in this measure oblige transport companies to improve efficiency, but leave companies free to determine how they can achieve this. This can be done through more fuel-efficient vehicles, more efficient engines, better loading, more efficient route profiles, but also by being more selective about the customers you include in your network. We assume that the performance standard will be imposed on individual companies, with distinctions made where necessary between different types of transport within the company (for example, distribution and long-haul). For the distinction by type of transport, reference can be made to ISO 14083, which refers to different types of transport using the term 'transport operation category' (TOC), whereby transport within a TOC must have comparable logistical characteristics. Each company is tasked with achieving an improvement within each TOC compared to a specific base year. The design of a performance standard is complex; decisions will need to be made regarding the reference year to be used, the definition of a valid TOC, the definition of transport performance (tonne-km, pallet-km, container-km, etc.), the definition of energy consumption (including scope WTT, WTW), reporting and verification rules, possible exceptions, requirements for new entrants, and legal factors. In terms of design, we are working on the basis of the following conditions:</p> <ul style="list-style-type: none"> – The standard applies to transport operators active in the Netherlands and thus also to all international transport operations to and from the Netherlands, including those carried out by foreign transport operators. Carriers have primary data (energy consumption and deliveries) from their own operations so that energy performance can be properly monitored. Alternatively, it may also be applied to shippers, i.e. the parties wishing to have goods transported, in which case carriers are obliged to supply the data to the shippers. – We assume that the standard applies to all modes of transport based on MJ/tkm (tonne-kilometres based on as-the-crow-flies distance in accordance with ISO 14083, so that the results can be legally audited) and that improvements in vehicle loading, more economical |

Energy performance standards in freight transport

driving, better route planning and more fuel-efficient vehicles can all contribute. Depending on the type of transport, alternatives to the tonne-kilometre, such as container-kilometres or pallet-kilometres, may also be used (ISO 14083 also permits this).

- Introduction in 2030, focused on energy consumption. With 2030 as the baseline year and 2040 as the target date for achieving the standard (MJ/tkm).
- Different targets per type of goods and logistical characteristics, or with tradable rights for energy consumption.

The effectiveness of a performance standard is closely linked to targets. Standards that fall too rapidly may be unachievable for companies,

Table 9: Energy consumption for the various vehicle configurations and drivetrain combinations as modelled with TNO's ADVANCE model (tank-to-wheel / charger-to-wheel).

| Configuration | Drivetrain | Unit | 2020 | 2030 | 2040 |
|--------------------------|------------|-------------|-------|-------|-------|
| Rigid urban | Diesel | l / 100km | 30.8 | 26.9 | 26.9 |
| | BEV medium | kWh / 100km | 62.5 | 58.6 | 56.4 |
| | BEV large | kWh / 100km | 61.9 | 56.1 | 55.0 |
| Articulated regional | Diesel | l / 100km | 35.2 | 29.6 | 29.6 |
| | BEV medium | kWh / 100km | 116.9 | 98.9 | 97.2 |
| | BEV large | kWh / 100km | 116.9 | 99.2 | 97.2 |
| Articulated long haul | Diesel | l / 100km | 33.7 | 27.5 | 27.5 |
| | BEV medium | kWh / 100km | 129.4 | 107.5 | 105.8 |
| | BEV large | kWh / 100km | 130.6 | 105.6 | 102.8 |
| | FCEV | kg / 100km | 7.4 | 6.3 | 6.2 |
| Articulated construction | Diesel | l / 100km | 47.1 | 40.9 | 40.9 |
| | BEV medium | kWh / 100km | 143.3 | 130.8 | 129.7 |
| | BEV large | kWh / 100km | 141.4 | 126.1 | 123.1 |
| | FCEV | kg / 100km | 8.7 | 7.9 | 7.8 |

causing investment to stagnate, while standards that are too lenient provide no incentive to improve. There are no studies or policy documents proposing targets for an energy performance standard. We have therefore made our own assessment of an average performance standard that is challenging yet achievable.

We have identified the following points of reference:

- The reference scenario in the KEV assumes a relative improvement in energy consumption (MJ/tkm) of 3.5% per year between 2030 and 2040. Of this, approximately 3% will be achieved through the electrification of the vehicle fleet and approximately 0.5% per year through efficiency improvements in vehicles and logistics. PBL's estimates for the KEV assume significant electrification of the vehicle fleet by 2040. In the reference scenario, there remains a (maximum) potential for electrification in 2040 covering 28% of vehicle-kilometres, which, expressed in PJ, represents a reduction of 16%.
- TNO (2022) provides an estimate of the improvements expected to be achieved by new trucks. These are shown in the table below. The results indicate that there is little potential for reduction through the early purchase of more fuel-efficient vehicles (approx. 2% over 10 years). These insights have been incorporated into the KEV baseline.
- (Ecorys, 2021) has produced an estimate of the potential for improving logistics efficiency – that is, efficiency gains unrelated to technological progress – for the purpose of the truck toll revenue recycling scheme. They estimate this potential improvement by

| Energy performance standards in freight transport | |
|---|---|
| | <p>assessing the currently unused capacity, based on expert group sessions and a literature review. To do this, they adjusted the theoretical maximum effect (122%⁹⁵ of current utilisation) for journeys where volume, rather than weight, is the limiting factor (-30%) and for uneven spatial distribution of supply and demand (-40%). This leaves a potential improvement of 52%, of which, according to Ecorys, a portion is expected to be achieved autonomously (10%). Ecorys estimates that with seven measures⁹⁶, 11% to 16% of the remaining potential could potentially be utilised. This amounts to a reduction in vehicle-kilometres of 9% to 14% compared to the baseline. For information, the theoretical maximum corresponds to a reduction in vehicle-kilometres of 34%.⁹⁷</p> <ul style="list-style-type: none"> – More efficient driving can also make a contribution. Driving more slowly, for example, can yield a reduction of 5% (see factsheet on 70 km/h speed limit). – Measures such as a zero-emission zone, speed limits and a truck charge can help to meet the target (see other factsheets). <p>The improvement that is theoretically possible through electrification and improved logistics efficiency between 2030 and 2040 is around 65%, or 55 PJ (full electrification + 34% reduction in vehicle-kilometres). However, the KEV already assumes an improvement of 25 PJ. In addition to the KEV, there therefore remains a residual potential of 30 PJ. However, it is unlikely that this theoretical maximum can be fully achieved. This is due to market failure (resulting in efficiency not being utilised), costs, and barriers to electrification.</p> <p>For this study, we make a rough and uncertain estimate. We assume a pessimistic scenario in which compliance with the standard is less stringent and there is less supportive policy, such as speed reductions and low-emission zones, and an optimistic scenario with strict compliance with the standard and more supportive policy. We assume the following standards:</p> <ul style="list-style-type: none"> – For the optimistic scenario, we assume an energy reduction in 2040 compared to 2030 of 60%⁹⁸. Of this, 30% is expected to be achieved autonomously through electrification (~25%) and efficiency improvements (~5%). We expect the remaining target to be met, in conjunction with other policies, through efficiency improvements (potential 15%), electrification (potential approx. 16%) and other measures (see, for example, SEC (3%), slower driving (potential approx. 7%)). There is also sufficient potential for inland waterway transport. In addition to the KEV, this involves 30% via electrification and fuel cells in an innovative scenario (CCNR, 2022). Furthermore, there is potential via slower sailing (CE Delft, 2022a) and improving loading efficiency. – For the pessimistic scenario, we assume an efficiency improvement of 40% for road transport and 0% for other modes. We assume that |

⁹⁵ Based on measurement data, trucks appear to be loaded to an average of 45% of their maximum weight. $122\% = 1/45\%$.

⁹⁶ This concerns: Valorisation of existing projects, Digitalisation, disruptive developments (AI & blockchain), collaboration, data on transport movements, CO₂ registration and LZV.

⁹⁷ $45\% / (1.52 * 45\%) = 66\%$, corresponding to a 34% reduction.

⁹⁸ This means that the 65% potential is almost fully utilised.

| Energy performance standards in freight transport | |
|--|--|
| | <p>the performance standard of 60% will not be achieved. There are several significant uncertainties that may contribute to this:</p> <ul style="list-style-type: none"> • The implementation date proves unfeasible. If implemented later, less of the potential can be realised. • There are so many businesses failing to meet the targets that the measure is watered down. • Monitoring small businesses proves administratively unfeasible, meaning small businesses are exempted from monitoring. • For inland waterway transport, the Mannheim Convention means it is not possible to levy a charge on transport in the Rhine basin. |
| Modality | Road, water and rail freight. |
| The measure focuses on | Avoid, Shift, Improve |
| Type of measure | Standardisation. |
| Link to other policies | There is a strong link with other measures that improve transport load efficiency, such as digitalisation and innovation. This also includes policy on improving energy efficiency (HD CO ₂ standards) and carbon footprinting (including CSRD). Such measures ensure that the standardisation is also supported by other measures. |
| Timeline for implementation | Communication from IenW ⁹⁹ indicates that, from a policy perspective, implementation is expected to take two years. From a practical perspective, there are still many issues that need to be resolved. Consider, for example, issues such as the difference in energy efficiency between combustion engines and electric motors, and the allocation of subcontractors. In addition, many companies will need to implement more and better record-keeping. As a result, it is uncertain whether implementation by 2030 is feasible. For the optimistic estimate, we assume implementation in 2030. |
| Feasibility | <p>Firstly, a suitable energy performance indicator will need to be defined. The Top Sector Logistics is currently working on this, and we can align with their efforts. Subsequently, the monitoring and verification requirements will need to be defined, and the target group (carriers, owner-drivers, shippers, SMEs) identified. It will need to be investigated to what extent the obligation can also be imposed on SMEs and whether the administrative burden will not become too high for SMEs. Feasibility will be easier as initiatives such as CountEmission gain traction and can be aligned with the monitoring and verification methods of these initiatives.</p> <p>In addition, it will need to be investigated to what extent foreign carriers can be included in monitoring. Can this be done directly via the foreign carriers, or would it be more practical, for example, to do so via Dutch shippers?</p> <p>It is not straightforward to implement standards for freight transport. Research is needed to identify how the standards can be effectively introduced while ensuring that the administrative burden remains manageable for the businesses. At the same time, there are many initiatives relating to CO₂ monitoring that can be integrated.</p> |
| Energy saving | |

⁹⁹ <https://www.ttm.nl/fleet/brandstoffen/kabinet-wil-goederenvervoer-wettelijke-co2-prestatiernorm-opleggen/155233/>

| Energy performance standards in freight transport | | | |
|--|--|-------------------|--------------------|
| | | | 2040 |
| Energy savings (PJ/year) | | Optimistic | Pessimistic |
| | Total | 28.2 | 7.5 |
| | Internal combustion engines | 16.6 | 3.7 |
| | Electric | 11.6 | 3.8 |
| Explanation of energy savings | Energy savings can be achieved in various ways. This is possible through electrification (potential approx. 16%) and other measures (see, for example, SEC (3%), driving more slowly (potential approx. 7%)) and improvements in logistics efficiency (Actienetwerk 15% GasTerug). The final savings depend on the choices made by businesses as well as by policymakers. | | |
| Calculation method | We assume that, in the positive scenario, the target will be met. We allocate the reduction percentage proportionally across powertrains. In a pessimistic scenario, we assume that a lower reduction will be achieved in practice. | | |
| Assumptions | <p>A performance standard is a new concept. Consequently, its design has not yet been finalised. As a result, we have made several assumptions:</p> <ul style="list-style-type: none"> – We assume that all companies that consume energy for freight transport are covered by the measures. – For the positive scenario, we assume that enforcement is effective, meaning that companies will meet the standards. – We assume that the design of the performance standard takes into account the different characteristics of companies in the various sub-markets, meaning that targets may vary per company depending on their capabilities. | | |
| Border effects | As the standards apply to both Dutch and foreign transport operators, no border effects are expected. | | |
| Knowledge base on energy saving | | | |
| Assessment of the knowledge base for the measure | Limited. Little research has been conducted on this topic. | | |
| What knowledge is still lacking? | Cost estimates, achievable reduction percentages, practical examples. | | |
| Cost items: national costs | | | |
| | | | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | Potentially substantial (hundreds of millions); there are a large number of individual companies operating in various sectors. Enforcement of the reduction entails significant administrative burdens. This will be partly offset by the fact that companies are also required to report under the CSRD. | | |
| Annual capital costs/benefits for sector investments (€ million/year) | This is difficult to estimate, as there are various options available to businesses. Early electrification leads to additional investment costs, and investments are also likely to be required to improve logistical efficiency. However, the use of SEC can, in turn, yield cost benefits. In theory, | | |

| Energy performance standards in freight transport | |
|--|---|
| | abatement cost curves are not linear, meaning that more expensive measures must be taken to achieve a greater reduction. A 30% reduction (which is significant) also requires more expensive measures to be taken. We therefore expect an increase in costs, also based on the other measures. |
| Difference in sector energy costs (€ million/year) | These fall due to lower energy consumption. In the medium scenario, this amounts to around 400 million euros per year. |
| Difference in sector maintenance and management costs (€ million/year) | This depends on the measures companies take to improve their energy efficiency. However, companies do incur costs to monitor and report on their own consumption (and that of subcontractors). It is necessary to audit the figures annually. In addition, extra staff may be needed to improve logistical efficiency. This also applies to driving more slowly. The use of SEC actually leads to a reduction in the number of drivers, but the potential for deploying SEC is limited. On balance, we expect an increase in costs. |
| Difference in sector revenue (€ million/year) | No difference |
| Method | The costs of energy consumption have been estimated based on energy prices from the KEV (excl. tax) and the reduction in PJ compared to the KEV. We have also examined the factsheets for the other freight transport measures and the literature. |
| Total annual costs | |
| Total national costs (€ million/year) | Cannot be quantified; this is because the costs of meeting the standards are closely linked to other measures. Generally speaking, the costs of the measure itself are limited, but the costs of meeting the standards are high. |
| Effects on citizens | |
| Impact on average household expenditure | Cannot be quantified. This depends on the precise measures that businesses take to comply with the measure. It will lead to an increase in household expenditure, as businesses' costs generally rise when complying with standards. However, we cannot estimate by how much costs will increase. |
| Other effects | Cannot be estimated. This depends on the specific measures companies take to comply with the measure. |

Reduce the speed limit for trucks to 70 km/h

| Reduce the speed limit for trucks to 70 km/h | |
|---|--|
| Description and definition of the measure | The measure involves reducing the maximum speed of trucks in the Netherlands from 80 to 70 km/h. The rationale behind this is that a lower speed leads to lower energy consumption. Trucks are required to be fitted with a speed limiter. However, as the maximum speed in a number of European countries is 90 km/h, the mandatory speed limiters in trucks are set to 90 km/h in accordance with the European directive. If a truck does not leave the Netherlands, it must be limited to 80 km/h. |
| Modality | Road freight transport. |

| Reduce the speed limit for trucks to 70 km/h | | | | | | | | | | | | | |
|---|--|--------------------|-------------------|--------------------|--------------|------------|------------|-----------------------------|---|---|----------|-----|-----|
| Measure focuses on | Improve, Shift and Avoid | | | | | | | | | | | | |
| Type of measure | Obligation. | | | | | | | | | | | | |
| Link to other policy | It is linked to enforcement and European policy on mandatory speed limiters for trucks. | | | | | | | | | | | | |
| Timeline for implementation | Implementation can be swift. The speed limit increase from 120 km/h to 130 km/h was implemented within a few years. A speed reduction for trucks is expected to be implemented more quickly as fewer road signs need to be replaced. We are assuming implementation in 2030. | | | | | | | | | | | | |
| Expected behavioural effects/policy rationale | Effective enforcement is important because the majority of trucks are limited to 90 km/h. This applies in particular to foreign trucks, as many Dutch trucks have a speed limiter set at 80 km/h in line with the Dutch speed limit. If a truck does not leave the Netherlands, it must be limited to 80 km/h (Veilig verkeer Nederland, 2022). | | | | | | | | | | | | |
| Feasibility | <p>The feasibility of the speed reduction is reasonable to good. Compared to passenger cars, there are far fewer signs indicating the speed limit for trucks. As a result, the infrastructure costs are manageable. However, the speed differences with neighbouring countries and passenger cars will increase, which may lead to frustration and speeding offences.</p> <p>Enforcement is possible in various ways. The most significant are:</p> <ul style="list-style-type: none"> - Modifying Dutch on-board computers so that Dutch trucks maintain a lower speed. - Speed checks, both mobile and via fixed speed cameras. - Reading data from on-board computers to detect offences. | | | | | | | | | | | | |
| Energy saving | | | | | | | | | | | | | |
| | 2040 | | | | | | | | | | | | |
| Energy savings (PJ/yr) | <table border="1"> <thead> <tr> <th></th> <th>Optimistic</th> <th>Pessimistic</th> </tr> </thead> <tbody> <tr> <td>Total</td> <td>2.7</td> <td>1.2</td> </tr> <tr> <td>Internal combustion engines</td> <td>0</td> <td>0</td> </tr> <tr> <td>Electric</td> <td>2.7</td> <td>1.2</td> </tr> </tbody> </table> | | Optimistic | Pessimistic | Total | 2.7 | 1.2 | Internal combustion engines | 0 | 0 | Electric | 2.7 | 1.2 |
| | Optimistic | Pessimistic | | | | | | | | | | | |
| Total | 2.7 | 1.2 | | | | | | | | | | | |
| Internal combustion engines | 0 | 0 | | | | | | | | | | | |
| Electric | 2.7 | 1.2 | | | | | | | | | | | |
| Explanation of energy savings | <p>In principle, a lower speed leads to lower energy consumption. However, in addition to speed, engine revs also play an important role¹⁰⁰. In lower gears at higher revs, the engine is less efficient, and therefore the truck does not operate within the ideal consumption range at lower speeds. According to (Ligterink & Van Zyl, 2015), fuel consumption is optimal at 70 km/h for light trucks. A heavily laden truck (with a combustion engine) has optimal fuel consumption at a speed of 85 km/h.</p> <p>In practice, the effect of reducing speed on the fuel consumption of trucks also depends heavily on the load factor, i.e. the weight of the vehicle combination on the road. Finally, reducing speed also affects driving behaviour in practice and traffic flow.</p> <p>There are a number of sources that have investigated this: The Flemish Government (Roads and Traffic Agency, 2020) has investigated the effect of reducing the speed limit to 70 km/h on certain motorways and ring roads. This revealed that there was no reduction in CO2 emissions for trucks. However, this study focused on diesel vehicles. The HBEFA emissions model (HBEFA, currently in progress) provides emission factors for different speed limits on different road types. HBEFA</p> | | | | | | | | | | | | |

¹⁰⁰ At low and high revs, combustion is not optimal.

| Reduce the speed limit for trucks to 70 km/h | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------------|--|--------------------|-------------------|--|----|----|---|-----|-----|--------------------------|-----|-----|-------------------------------|------|------|----------------|-----|------|--|-----------|-----------|
| | <p>assumes a lower practical speed than the speed limit for each road type. For many vehicles and road types, there is no advantage in fuel consumption between 70 km/h and 80 km/h. Electric vehicles are an exception; as the efficiency of an electric motor does not depend on engine speed, energy consumption is around 8% lower at 70 km/h than at 80 km/h.</p> <p>For this study, TNO examined whether a correlation could be drawn from the practical data available to them. Usable data was available for 33 vehicles. Based on the measurement data, TNO could not conclude that there is a significant difference in fuel consumption between situations at 70 km/h and those at 80 km/h. The lower energy demand at the wheels at lower speeds appears to be offset by poorer engine efficiency. There is also (inevitable) noise in the measurements due to factors that are not always known, such as load, gradients, weather conditions, etc.</p> <p>As there will be many electric vehicles in 2040 (expected to be around 70%), a speed reduction will have an effect. HBEFA (HBEFA, currently) shows that reducing the speed limit from 80 km/h to 70 km/h causes the average speed of trucks to drop from 76 km/h to 68 km/h¹⁰¹. This results in an 8% reduction in energy consumption per kilometre. We assume that electric trucks on motorways and A-roads have 8% lower energy consumption. For diesel-powered trucks, which will account for 28% of the fleet in 2040, we do not assume lower energy consumption. Based on (Geilenkirchen et al., 2024), we assume that 90% of truck-kilometres are driven on motorways and main roads. We apply a correction for traffic jams, which prevent the maximum speed from being reached. In the pessimistic scenario, we assume this applies to 20% of the kilometres; for the optimistic scenario, we assume 10% of the kilometres.</p> <p>We estimate that the effect of the measure is linked to the extent to which it is enforced. For the positive scenario, we assume effective enforcement, meaning all trucks adhere to the speed limit. In the event of poor enforcement, trucks with higher speed limits will not adhere to the speed limit. These are trucks with foreign number plates, or Dutch trucks operating internationally (Veilig verkeer Nederland, 2022). Based on CBS¹⁰², we assume for the pessimistic scenario that approximately 50% of trucks operate mainly domestically and adhere to the speed limit.</p> <p>Combining the above points results in the following calculation:</p> <table border="1"> <thead> <tr> <th></th> <th>Pessimistic</th> <th>Optimistic</th> </tr> </thead> <tbody> <tr> <td>Reduction in energy consumption of electric vehicles at lower speed limits</td> <td>8%</td> <td>8%</td> </tr> <tr> <td>Proportion of vehicle-kilometres travelled by electric vehicles</td> <td>72%</td> <td>72%</td> </tr> <tr> <td>Proportion of road types</td> <td>90%</td> <td>90%</td> </tr> <tr> <td>Traffic congestion correction</td> <td>-20%</td> <td>-10%</td> </tr> <tr> <td>Follow-up rate</td> <td>50%</td> <td>100%</td> </tr> <tr> <td>Reduction in energy consumption per truck kilometre</td> <td>2%</td> <td>5%</td> </tr> </tbody> </table> | | | Pessimistic | Optimistic | Reduction in energy consumption of electric vehicles at lower speed limits | 8% | 8% | Proportion of vehicle-kilometres travelled by electric vehicles | 72% | 72% | Proportion of road types | 90% | 90% | Traffic congestion correction | -20% | -10% | Follow-up rate | 50% | 100% | Reduction in energy consumption per truck kilometre | 2% | 5% |
| | Pessimistic | Optimistic | | | | | | | | | | | | | | | | | | | | | |
| Reduction in energy consumption of electric vehicles at lower speed limits | 8% | 8% | | | | | | | | | | | | | | | | | | | | | |
| Proportion of vehicle-kilometres travelled by electric vehicles | 72% | 72% | | | | | | | | | | | | | | | | | | | | | |
| Proportion of road types | 90% | 90% | | | | | | | | | | | | | | | | | | | | | |
| Traffic congestion correction | -20% | -10% | | | | | | | | | | | | | | | | | | | | | |
| Follow-up rate | 50% | 100% | | | | | | | | | | | | | | | | | | | | | |
| Reduction in energy consumption per truck kilometre | 2% | 5% | | | | | | | | | | | | | | | | | | | | | |

¹⁰² Traffic performance of goods vehicles and freight transport; modes of transport, transport flows to and from the Netherlands.

| Reduce the speed limit for trucks to 70 km/h | |
|---|---|
| | <p>It is also important to consider the extent to which the speed limit is actually adhered to in practice. This depends on the amount of stop-start traffic, which in turn depends on how busy the road is. A lower speed limit can also have a negative effect on traffic congestion. This is because a lower speed limit results in longer delivery times. In total, this amounts to a 6% increase in delivery time¹⁰³.</p> <p>At the macro level, therefore, more vehicles may be needed to deliver the same volume of goods within the same time frame. If trucks are in use for longer periods for the same load, you may need more trucks to transport all the cargo. This can lead to increased congestion and, ultimately, a reduction in efficiency due to a lower speed limit. In addition, the longer delivery times lead to modal shift effects and changes in transport patterns, as road transport becomes less attractive. We have not estimated these effects at the macro level.</p> |
| Calculation method | Derived on the basis of lower energy consumption per kilometre of road. |
| Assumptions | <ul style="list-style-type: none"> – An 8% reduction in energy consumption by electric trucks when the speed limit is reduced from 80 km/h to 70 km/h – We assume that trucks can also travel at the speed limit for the majority of the time (80–90% of the kilometres). When roads are busy (10–20% of the kilometres), the speed limit cannot always be reached, and the effect is therefore lower. – We assume that, in a positive scenario, the speed limit is not exceeded due to effective enforcement. In a pessimistic scenario, 50% of drivers adhere to the speed limit. – We do not take into account modal shift effects resulting from longer journey times for road traffic. |
| Border effects | <p>For most road transport journeys, the Netherlands is the country of origin or destination. The measure will have no effect on these journeys, as there is no alternative route available for them. To a limited extent, there is also transit traffic through the Netherlands. This mainly concerns flows travelling from Antwerp to the Ruhr region in Germany. Research by CE Delft (CE Delft et al., 2020) and TNO (TNO, 2017) shows that only a limited proportion of these through routes pass through the Netherlands. The lower speed makes routes through the Netherlands less attractive because they take a few minutes longer for through traffic. As congestion is also common, the additional time taken by through journeys will be limited. We do not expect alternative routes through other countries to become much more attractive. We therefore expect no or very limited border effects.</p> |
| Knowledge base for energy savings | |
| Assessment of the knowledge base for the measure | Limited research has been conducted into the effects of lower speeds in practice. |
| What knowledge is still lacking? | This applies in particular to the effects on traffic flow, congestion and modal shift in real-world situations. |
| Cost items: national costs | |
| | 2040 |

¹⁰³ 10 km/h slower for around 60% of the time.

| Reduce the speed limit for trucks to 70 km/h | |
|--|---|
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | There are costs associated with adapting road infrastructure. In addition, costs will need to be incurred for enforcement to ensure proper monitoring. |
| Annual capital costs/benefits for sector investments (€ million/year) | Additional trucks may be required to meet transport demand. It is also possible that existing trucks will be used for more hours per day; this is an uncertainty. If the increase in journey time is fully offset by additional trucks, an investment of €380 million will be required. With a lifespan of 10 years per truck, this amounts to around €38 million per year. |
| Difference in sector energy costs (€ million/year) | These fall because energy consumption per kilometre is lower. This yields around 50 million euros per year (excl. excise duty) |
| Difference in sector maintenance and management costs (€ million/year) | These may increase because additional trucks are required. Due to the lower driving speed, the distance trucks can cover annually decreases. As a result, kilometre-dependent costs will fall. There will also be additional driver costs due to the lower average speed. A 6% increase in journey time, and consequently a 6% increase in driver costs ¹⁰⁴ , results in costs of 865 million euros per year. |
| Difference in sector revenue (€ million/year) | We assume these will remain the same, as the output is unchanged. |
| Method | Capital costs are determined on the basis of investment costs from(TNO, 2022) . Energy costs are based on reductions in energy consumption and energy prices from the KEV. Driver costs are determined on the basis of(KiM, 2023b) with an adjustment for the share of taxes. |
| Assumptions | <ul style="list-style-type: none"> – We assume that trucks can also travel at the maximum speed to a large extent. When roads are busy, the maximum speed cannot always be reached, and the effect is then lower. Lower speeds can also lead to increased congestion due to the rising number of trucks. We have not estimated this effect. – We do not take into account modal shift effects resulting from longer journey times for road traffic. |
| Total annual costs | |
| Total national costs (€ million/year) | 850. |
| Impact on citizens | |
| Impact on average household expenditure | The costs of freight transport are rising. Labour costs account for around 50% of the total costs of road freight transport (Panteia, 2020). A 6% increase in journey time therefore leads to a 3% rise in road transport costs. This amounts to around 11 euros per year ¹⁰⁵ . |

¹⁰⁴ Labour costs excluding tax of 0.33 cents per km.

¹⁰⁵ Based on (Arcadis, 2019) where a 2% increase in transport costs (based on a lorry charge of 0.15 cents on main roads) results in an annual increase in household expenditure of 7.60 euros (€2019).

| Reduce the speed limit for trucks to 70 km/h | |
|---|---|
| Other effects | The lower speed of trucks can have a negative effect on traffic flow if other traffic is not also travelling at a lower speed. However, there are also benefits, as road safety may improve due to the lower speed. |
| Method | The costs have been determined based on the increase in freight transport costs and the share of household expenditure from (Arcadis, 2019). |
| Assumptions | We assume that the increase in transport costs is comparable across different product groups. |

Mandatory transparent delivery charges

| Mandatory transparent delivery charges | |
|---|--|
| Description and definition of the measure | The measure requires (online) shops to pass on energy costs to consumers in a transparent manner. This also involves offering multiple options so that consumers can choose an energy-efficient option. The aim is to create a cost differentiation between fast delivery (less efficient) and slower delivery (better vehicle loading) and to ensure that transport costs are as transparent as possible for the consumer. The government therefore requires (online) shops to always state at least the actual transport costs alongside the delivery options. If, for example, fast delivery within one day (to be defined) is possible, the provider must also offer an option for slower delivery (e.g. 3 days). Consideration could be given to allowing certain sustainable delivery methods, if these are relatively expensive (e.g. bicycle courier), to offer delivery costs at a lower price. The Netherlands makes this mandatory for online shops operating in the Dutch market. ¹⁰⁶ |
| Modality | Road transport of post and parcels. |
| Measure focuses on | Avoidance/improvement. |
| Type of measure | Obligation. |
| Link to other policies | The policy is linked to other policies in the field of last-mile deliveries, such as ZE zones. Carbon footprinting is also relevant. |
| Timeline for implementation | This measure can be implemented relatively quickly. |
| Expected behavioural effects / policy rationale | The measure primarily affects the last-mile delivery of goods by delivery vans. A proportion of the total number of delivery vans is used for the transport of goods. (CE Delft, 2024a) shows that around 40% of vehicles are used for the transport of parcels, general cargo and foodstuffs. The remaining 60% are used for service and construction. Delivery charges are often not passed on to the consumer in a transparent manner. For example, return deliveries are often free, and delivery charges are waived if a certain minimum amount is reached. This provides no incentive for the consumer to order efficiently or to choose the more efficient delivery option. This measure makes it mandatory to charge actual delivery costs, thereby making it impossible to offer free delivery as a service. In this way, it becomes clear to the consumer what the actual delivery costs are, and the consumer must pay for them. If the actual transport costs |

¹⁰⁶ We have not investigated whether this is possible under EU regulations.

| Mandatory transparent delivery charges | | | |
|---|---|--------------------|-------------------|
| | have to be paid, express deliveries will also become more expensive, as vehicles will be less fully loaded. | | |
| Feasibility | The feasibility of this measure will need to be assessed against EU regulations. The question is whether it is possible to set these requirements specifically for deliveries in the Netherlands, or whether this would, for example, be seen as an obstacle to the free movement of goods. A contributing factor here is that the delivery distance is longer when products are delivered directly from the producer, which makes transport costs appear to be higher. Certain calculation rules may be required regarding how delivery costs should be calculated and which distance should be used. | | |
| Energy saving | | | |
| | 2040 | | |
| Energy savings (PJ/yr) | | Pessimistic | Optimistic |
| | Total | 0.15 | 1.32 |
| | Internal combustion engines | 0.08 | 0.74 |
| | Electric | 0.07 | 0.58 |
| Explanation of energy savings | <p>In the current situation, companies often offer free delivery as a service. The costs of delivery are still incurred, and are indirectly passed on to consumers. However, the costs are spread across all customers, rather than being borne by the customers who incur them.</p> <p>On the one hand, the measure leads to transparency regarding delivery costs; on the other, it introduces a differentiation in delivery charges for faster (less fully loaded) and slower (better loaded) deliveries. To estimate the impact, we assume that consumers will become more conscious of their ordering behaviour and will opt more often for slower (consolidated) delivery. According to Thuiswinkel.org, 68% of consumers are willing to choose a more sustainable option. According to Thuiswinkel.org's calculation tool, the more sustainable option yields a saving of approximately 33% (nos.nl). By way of comparison: in the Commercial Waste Outlook (another form of distribution), a saving of 35% is also cited when stop density increases by a factor of 3 (CE Delft, 2020a).</p> <p>For the pessimistic scenario, we assume that only post and parcel delivery falls under the measure; this accounts for 15% of delivery vans transporting goods (CE Delft, 2024c). For the optimistic scenario, we assume that more sub-markets fall under the measure. We assume 50% of delivery vans transporting goods. We apply a correction for services that already offer sustainable delivery. In the absence of available sources, we have made our own assumptions: 50% for the pessimistic scenario and 20% for the optimistic scenario.</p> | | |
| Calculation method | We assume an improvement of 33%, to which we apply various adjustments. The table below outlines the steps. Ultimately, we arrive at a potential reduction of between 1% and 8% compared to the energy consumption of delivery vans transporting goods. | | |

| Mandatory transparent delivery charges | | | |
|--|---|--------------------|-------------------|
| | | Pessimistic | Optimistic |
| | Energy reduction potential (% MJ/km) | 33% | 33 |
| | Market share under the measure | 15% | 50% |
| | Correction: wants to make a sustainable choice | 68% | 68% |
| | Correction: already offers sustainable delivery | - 50% | - 20% |
| | Energy reduction potential after correction(Action Network 15% GasTerug) | 1% | 8% |
| Assumptions | <p>Only limited research has been conducted into the impact of sustainable delivery. As we are unable to conduct our own research in this study, we rely on the limited information available. The assumptions are highly uncertain. We assume:</p> <ul style="list-style-type: none"> – a 33% reduction in energy consumption through the choice of a sustainable delivery option; – 15 to 50% of the market is covered by the measure; – 68% of consumers opt for the sustainable option; – 20 to 50% of current delivery providers already offer a sustainable option. | | |
| Border effects | No border effects are expected for these measures. Transport will not shift to other countries or from other countries to the Netherlands. | | |
| Knowledge base on energy saving | | | |
| Assessment of the knowledge base for the measure | The knowledge base for this measure is low. Limited research has been carried out. | | |
| What knowledge is still lacking? | In-depth studies into consumer choice behaviour and the effects on emissions and energy consumption. | | |
| Cost items: national costs | | | |
| | | | 2040 |
| Policy and administrative costs/benefits to the government for implementing the measure (€ million/year) | The policy and administrative costs appear to be limited. However, enforcement may incur costs. | | |
| Annual capital costs/benefits for sector investments (€ million/year) | We do not expect a significant investment to be required. As vehicles will be driven empty less often and utilised more efficiently, fewer vehicles may be needed. | | |
| Difference in sector energy costs (€ million/year) | These will fall by around €20 million per year due to lower energy consumption. | | |
| Difference in sector maintenance and | We do not expect any significant changes here. | | |

| Mandatory transparent delivery charges | |
|---|--|
| management costs (€ million/year) | |
| Difference in sector revenue (€ million/year) | This remains the same because the output is the same. |
| Method | We follow the national cost methodology. Energy costs are based on energy consumption and the energy costs from the KEV, in combination with the previously discussed reduction in energy consumption. |
| Total annual costs | |
| Total national costs (€ million/year) | -19. |
| Impact on citizens | |
| Impact on average household expenditure | These will fall. Based on the current cost differences (~€1)(DHL, 2025) for sustainable delivery options, we expect this to be around €70 per year per household. This is based on 575 million deliveries (source (ACM, 2023) and the aforementioned corrections) and 8.4 million households (Source: CBS). |
| Other effects | The consequence of choosing a more sustainable delivery option is that the consumer has to wait longer for the delivery of the ordered product. |
| Method | ACM states that around 650 million parcels were delivered in 2022. If we take other sectors into account, based on vkm we arrive at 1,200 parcels. Of these, 68% opt for the sustainable option and 35% are already delivered sustainably. After correction, this leaves 575 million parcels. |
| Assumptions | <ul style="list-style-type: none"> • The sustainable delivery option saves €1 per parcel. • Transport distance is proportional for parcels, general cargo and food. • Households that opt for sustainable delivery order just as much as households that do not opt for sustainable delivery. |

G.4 Sources

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