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INSPECTION GÉNÉRALE DE L'ENVIRONNEMENT ET DU DÉVELOPPEMENT DURABLE

Évaluation environnementale du soutien public au transport combiné et au transport public électrique

Report for the Green OAT Evaluation Council

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Summary

The report provides an environmental assessment of budgetary expenditure over the period 2016-2022 under the "Aid for Combined Transport" line financed by the Green OAT.

This budget line, managed by the Minister for Transport, now provides funding for three aid schemes, of which only one, the smallest in terms of financial volume, concerns combined transport *in the strict sense of the term.* These three schemes are independent, even though they all mainly or exclusively concern rail transport. Their priority is to mitigate climate change, with the additional objective of reducing air pollution.

The largest of these, with annual expenditure of around €200m, is aid for electric transport. This is a tax expense, resulting from a rebate granted unconditionally to public passenger transport operators and rail transport operators for the traction electricity consumed by their engines.

In terms of technically sustainable transport, this expenditure is 99% in line with the European taxonomy, with the only transport aided that is not sustainable because of its destination being that of products in the fossil fuel chain.

This rebate, which was introduced in 2004, before the creation of the Green OAT programme, initially to compensate the most energy-intensive transport operators for the effects of making electricity subject to the European carbon quota, and which is explicitly provided for in European legislation on energy taxation, has changed little since then. In practice, it is granted by electricity suppliers, who manage all the similar schemes from which other activities benefit, without any monitoring of the beneficiaries of the aid and the transport services concerned beyond the overall expenditure.

The breakdown of expenditure by type of beneficiary and service was estimated directly, making it possible to quantify the GHG issues, which vary according to market segment and transport mode. As all the carriers concerned, with the exception of long-distance passenger rail transport, receive much greater public support for their operations than this specific aid, the effect was estimated using an elasticity model for each segment.

The overall effect is an annual saving of around 200 $ktCO_2$ e, with the "abatement cost" varying widely between activities: from around €450/tCO_2 e for rail freight to more than €2,000 for public transport in the Île-de-France region.

The second scheme, which is the oldest since it was created in 1994, also before the creation of the green OAT programme, is support for combined transport, known since 2003 as "clamp aid", designed to compensate for the additional cost of transhipment to or from a train or river barge. This is an operating subsidy to combined transport operators, who carry out the transhipment operations and organise the train or barge services. It is granted after appraisal by the authorities for services that meet the conditions of openness to all, minimum length and location of transhipments. Since 2016, the allocation rules have been stable. Each year, the amount available in the budget is divided between the operators in proportion to the eligible services of the previous year; however, the amount has increased between 2016 and 2022 by between €15m and €47m.

Through the files, the authorities have a great deal of data on the traffic and costs of each of the services, and on their central link, but they know neither the characteristics of the convoys nor the origins and destinations of the loads, which determine the end road routes.

This is the case for electrified rail transport, but not *a priori* for inland waterway transport, because

of the requirement to comply with emission standards for the most recent engines, of which there are very few in France. Expenditure is therefore 68% in line with the European taxonomy.

The calculation of the savings in energy consumption and emissions made possible by a subsidised service was carried out directly on the basis of actual data, including costs, for a wide range of services actually provided, making it possible to model the effects in terms of GHGs and particles, which vary in particular according to the type of service.

The specific effect of the aid, which is to be distinguished from the "systemic" gain of combined transport compared with road haulage, is estimated as an annual gain of around 10 $ktCO_2$ e to 30 $ktCO_2$ e, depending on the year and the total volume of aid, although the "abatement cost" differs greatly between rail and river combined transport: from around €400/tCO_2 e for rail motorways to €1,500 for "conventional" combined rail transport and more than €6,000 for combined river transport.

The last scheme under the budget heading to be assessed is an aid scheme for "single wagonloads", which was not introduced until the very end of the review period, in 2021, and has no national precedent. Granting operating subsidies to railway undertakings operating services on particular sidings, the scheme, with an annual budget of €70m, appears "massive" given the size of this particular market segment.

Aid is granted after examination by the authorities for terminal services using incomplete trains. Through the files, the authorities have access to a great deal of data on traffic, the number of wagons handled and how full they are, but they do not know the characteristics of the trains or the origins or final destinations upstream or downstream of the marshalling yard for this service.

As an incentive for the use of rail transport between private freight terminals, this aid is aligned with the European taxonomy as soon as such rail transport can be described as sustainable; the frequent use of diesel equipment for freight means that the overall rate of alignment with the taxonomy can be estimated at around 70%.

The absence of an *ex-ante* evaluation of the aid scheme, and of any data on the transport flows aided, combined with the economic situation of this complex market segment at the end of the Covid crisis, with the main player announcing considerable deficits, and even though its design appears to be perfectible, have led us to content ourselves with a heuristic evaluative approach directly proportioning the share of aid in the costs and the share of the effect in the overall gains brought about by the "fragile" "single wagon" services.

The effect of the aid is thus estimated at around 30 $ktCO_2$ e for an "abatement cost" of around €2,000/tCO e,$_2$

These three schemes encourage the use of less emissive and less polluting transport, which is reflected in a generally high rate of alignment with the European taxonomy (between 68% and 99%). If, in the future, the alignment of these aids with the European taxonomy were to be imposed, it would be easy to provide that, when applications are examined, services that do not directly meet the requirements of the taxonomy should be excluded from the benefit of these aids.

Introduction

This report is the environmental assessment of budgetary expenditure under the heading "Aid for Combined Transport" over the period 2016-2022, as provided for in the reference framework for the green OAT (Obligation assimilable du Trésor).

In practice, this budget line, managed by the Minister for Transport, provides funding for three separate aid schemes, only one of which concerns combined transport in the strict sense of the term.

After a reminder of the general framework and common methodological provisions, each of these systems is examined qualitatively, in particular with regard to the requirements of the European taxonomy, and then quantitatively with regard to the expected environmental objectives.

1 General assessment framework

1.1 The specific framework of green OATs

1.1.1 Transposition of the green bond framework

The financial framework for green bonds in general is likely to be used by all issuers, whatever their status, including sovereign issuers.

France wished to apply this concept of a green obligation to the financing of the State's budget , a budget which, far beyond the logic underlying these principles of financing expenditure on "projects", includes expenditure of all kinds, including for operating activities, covering a very wide range of objectives.

For example, on 10 January 2017[1] the French government adopted a "Green OAT Framework Document", a voluntary framework that it has undertaken to comply with when granting green OAT status to some of its sovereign bond issues.

This framework, established before the European Commission presented its "Action Plan: Financing Sustainable Growth" providing for a standard for European green bonds, finally adopted in November 2023, stems directly from the "*Green Bond Principles"*(GBP) voluntary adoption guidelines established by the *International Capital Market Association* (ICMA)[2] .

It has the following special features:

- **Use of funds :**

The use of OATs is geared towards just four national objectives: mitigating climate change, adapting to climate change, protecting biodiversity, and reducing air, soil and water pollution.

The concept of "eligible green projects" has been extended to include eligible green expenditure, with the framework providing for the eligibility of "fiscal expenditure, investment expenditure, operating expenditure and intervention expenditure".

The categories of "eligible green projects" are based on each item of expenditure being allocated to one of the six "green sectors", for each of which an objective is formulated for the principle of expenditure and a list of the main eligible items of expenditure is provided for information purposes.

- **Selection and evaluation of expenditure**

In addition to their ability to meet the four national objectives listed above and their connection to the six defined green sectors, the "eligible green expenditure" pre-identified by each ministry within its budget programmes, must strive to meet the requirements of the "*Greenfin* - France Finance verte" label concerning investment funds, whose reference framework and control and monitoring plan are approved by the amended decree of 10 March 2018.

The guidelines list eight categories of eligible "eco-activities": Energy, Buildings, Waste management and pollution control, Industry, Clean transport, Information and communication technologies, Agriculture and forestry, Adaptation to climate change.

What's more, the label's standards exclude all activities in the entire fossil fuel value chain and the

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[1] Supplemented in May 2022 by a technical appendix relating to the treatment of premiums and discounts and indexation supplements received for these issues.

[2] *International Capital Market Association* - Green Bond Principles - Voluntary Guidelines for the Issuance of Green Bonds - June 2018

entire nuclear industry.

This compliance with the benchmark requirements is verified *ex ante* by an *ad hoc* interministerial steering committee when the budget lines likely to be financed by a green OAT are selected.

- **Management of funds received**

In view of the budgetary nature of the expenditure, it is "earmarked" by the Ministry of Finance, which manages it in such a way as to give priority to recent "green" expenditure, or expenditure scheduled to be incurred in less than two years, as eligible expenditure, in order to ensure that, on average over a number of years, the expenditure incurred complies as closely as possible with the allocation decided.

- **Reporting**

As they are designed, green OATs do not carry a direct promise of the environmental impact of the expenditure financed when they are issued, but simply a promise to analyse the environmental impact of the eligible expenditure to which the green OAT is linked.

Compliance with the essential principle of the use of funds is therefore based on the completeness of the *ex-post* reporting and depends on its quality and, of course, the result (confirmation of the existence of a significant contribution to one of the environmental objectives).

Given the volume involved - of the order of €67bn between 2016 and 2022 - and the diversity of eligible green expenditure, this *reporting* on green OATs is not global but produced in stages, on the basis of three levels of reports published for investors:

- an annual report on the allocation of funds, reviewed by an independent third party;

- an annual report on the performance of green spending, using the existing performance indicators produced as part of the State's budgetary procedure (LOLF);

- *ex-post* reports on the environmental impact of green spending. These impact reports are carried out by action or group of actions so that they eventually cover all the expenditure backed by green OATs.

All the various evaluations produced are carried out under the supervision of the Green Bond Evaluation Council, which defines the terms of reference and programming,

The process described in this framework document is regularly subject to a "second opinion".

The latest "second opinion" report, dated 29 September 2023, was carried out as part of a *"moderate assurance*" assignment[3] on the allocation, as at 31 December 2022, of the funds raised under the Green OAT. The auditor "has not *identified any material misstatements that call into question the fact that the information has been prepared, in all material respects, in accordance with the Framework and* (the) *chapter '3. Methodological note' of the* (2022 Allocation and Performance) *Report".*

1.2 Methodological principles for environmental impact reports

In accordance with the Reference Framework Document, these assessments are part of the *reporting* framework set out in the GBP, supplemented by the requirements of the Green Bond Assessment Council, both general and specific to a particular assessment.

The GPG guidelines essentially comprise non-binding recommendations and refer to "good practice" guides.

[3] In accordance with the international standard ISAE 3000, this engagement, performed by KPMG, is based on less extensive procedures than those required for a reasonable assurance engagement.

The Council's requirements, for their part, must be considered to be mandatory, in application of the provisions of the framework document.

With regard to the process for selecting and assessing eligible projects (activities), both provide for the assessment of compliance with official or market-developed "taxonomies", even before estimating the contribution of activities to environmental objectives.

1.2.1 Taxonomy

The framework for green OATs provides for eligible activities to comply with the rules of the State label, "France finance verte" instituted by the Environment Code[4] without, however, providing for the labelling of green OATs *in the strict sense of the term*. This verification is carried out by the interministerial steering committee during the allocation phase, which defines, by reference to the budget nomenclature (LOLF programmes[5]), the actions, or even sub-actions, financed by green OATs.

Since the publication of the taxonomy regulation[6] , the Evaluation Council has been requesting that evaluation reports systematically present an analysis of the expenditure with regard to the European taxonomy of sustainable activities. It is also planned that the exclusion criteria set by the European taxonomy will be included in the "France finance verte" label, which will have to be updated.

Consequently, even if the texts relating to the taxonomy did not come into force until after the creation of the Green OAT, a first step in any impact assessment is to examine the alignment of the activities financed with the European taxonomy.

1.2.2 Valuation principles

The overall aim of the evaluation is to assess the impact of eligible budget expenditure in the light of the environmental objectives selected: combating climate change, adapting to climate change, protecting biodiversity and combating pollution.

The GPGs refer to other ICMA publications, in particular the *Climate Transition Finance Handbook* and the *Harmonised* Framework *for* Impact Reporting and its *Guidance Handbook* of good practice.

The Evaluation Council has stated that it would like the evaluation to be carried out using a quantitative approach, relying as far as possible on existing methodologies and taking into account the availability of data. It explicitly requests that the evaluation examine several criteria: the relevance, effectiveness, efficiency and additionality of the various instruments financed by eligible expenditure, specifying the breakdown of costs for the various activities concerned.

In fact, for all evaluation studies it is necessary to define the relevant indicators adapted to the nature of the objectives and activities financed, and to specify the mechanisms by which the sums spent lead to impacts.

1.3 Nature and amount of expenditure to be valued

The initial title of the evaluation refers to "support for combined transport". However, in addition to support for combined transport *in the strict sense of the term* (operating aid), expenditure between 2016 and 2022 on the budget headings taken into account also financed support for electric public transport and rail transport by single wagonload.

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[4] The "*Energy and ecological transition for the climate*" label, now "*France finance verte"* for mutual investment funds, was created in 2015 by articles D 128-1 to 128-19 of the Environment Code.
[5] LOLF: loi organique relative aux lois de finances, applied from the 2006 Finance Act.
[6] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on establishing a framework to stimulate sustainable investment and amending Regulation (EU) 2019/2088

Eligible expenditure comes under Programme 203 - Transport Infrastructure and Services - and falls under two separate headings covering a total of three different schemes:

- Tax expenditure (820204)

  Reduced TIFCE rate for electricity consumed by rail and road public transport (train, metro, tram, cable, plug-in hybrid and electric bus, trolleybus .

- Aid for combined transport (sub-actions 13-04 - Combined transport by rail and 14-02 - Combined transport by river and sea before 2019, sub-action 45-02 from 2019)

  This line covers two separate aid schemes:

  - the initial support scheme for the operation of regular combined rail and sea-river freight transport services;
  - in addition, from 2021, support for the operation of wagonload services.

The Table 1 below details the amounts paid over the period 2016-2022, as shown in the budget implementation documents (in payment appropriations). They represent a total of approximately €1.5 billion (current).

M€	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Reduced rate for electricity consumed by public rail and road transport	186,0	199,0	198,0	232,0	158,0	196,0	21,0
Aid for the operation of regular combined freight transport services, including :	14,9	16,7	33,9	27,0	27,0	46,0	47,0
• *rail*	*10,0*	*11,1*	*23,5*	*18,2*	*18,2*	*33,7*	*34,5*
• *river and maritime*	*4,9*	*5,7*	*11,4*	*8,8*	*8,8*	*12,3*	*12,5*
Support for the operation of wagonload services						52,7	77,3
Total	**200,9**	**215,7**	**231,9**	**259,0**	**185,0**	**294,7**	**145,3**

Table 1- Amount of aid to be assessed

The values shown in this table are those recorded at the end of the year in the programme activity reports (RAP) submitted to Parliament. They correspond to the "payment appropriations" actually used on the budget line taken into account for the green OAT.

They may differ significantly from the forecasts, in particular because the traffic underlying the aid was not what was forecast, but also because of budget operations of all kinds - placing in reserve, transfer, top-up of aid - decided during the year.

1.4 Assessment

The environmental assessment concerns the French government's support expenditure for certain 'clean' forms of transport over the period 2016-2022. Its main objective is to measure the relevance and environmental effectiveness of the subsidies granted, using a quantitative rather than qualitative approach.

1.4.1 Objectives set out in the framework document

The expenditure to be evaluated comes under the "Transport" green sector of the Green OAT framework document, which lists as eligible expenditure in favour of actions aimed at "*Maintaining, improving and promoting public transport and supporting multimodal transport solutions. Reduce*

the use, improve the energy efficiency and reduce the carbon intensity of vehicles".

Similarly, among the categories of "Eligible Green Projects"*,* the GPG mentions *"Clean means of transport (in particular electric, hybrid, public, rail, non-motorised, multimodal transport, infrastructure for clean vehicles and the reduction of harmful emissions)".*

Three of the four environmental objectives targeted in the framework document are concerned:
- two main objectives: mitigation of climate change and adaptation to climate change;
- an additional objective: to reduce air pollution.

1.4.2 Specific assessment issues

The expenditure to be assessed is far from covering all the costs of the green transport service activities concerned; the aid represents a limited proportion of these costs, but its payment is conditional on these "green" activities actually being carried out.

What needs to be assessed is not the environmental impact of the services assisted, but the environmental impact of the "additional" services that the granting of aid has enabled to be maintained or created.

- **Alignment with taxonomy**

According to the "taxonomy" regulation, an activity in one of the lists annexed to its "Climate" delegated acts[7] or "Environment" delegated acts[8] ("eligible" activity) is "aligned" (i.e. sustainable) if it meets the three conditions of :

1. Substantial contribution to one of the six environmental objectives defined in Article 9 of the Regulation, determined by compliance with the technical criteria set out in the delegated acts corresponding to these objectives.
2. Absence of significant collateral effects on the other five objectives, verified by compliance with the conditions set out in these delegated acts.
3. Compliance with the minimum guarantees set out in Article 18.

The delegated act on the publication obligations of undertakings[9] provides that the alignment of their activities is assessed on the basis of three financial indicators: turnover (CA), investments (CAPEX) and operating expenses (OPEX). By assimilation, and although these provisions are not directly applicable to the administration, noting in particular that aid paid, even if not included in the accounts, is economically comparable to turnover, the rate of alignment of aid will be calculated as the proportion of aid allocated to aligned activities.

Some transport activities are listed in Annexes I or II of Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing the Taxonomy Regulation (known as the "Climate" delegated act) and are therefore likely to be able to make a substantial contribution to climate change mitigation or

[7] Delegated Commission Regulations (EU) 2021/2139 of 4 June 2021 *(...specifying)* the technical review criteria for determining under which conditions an economic activity may be considered to contribute substantially to climate change mitigation or adaptation and whether that economic activity does not cause significant harm to any of the other environmental objectives and (EU) 2023/2485 of 27 June 2023 amending it with additional technical review criteria.

[8] Commission Delegated Regulation (EU) 2023/2486 of 27 June 2023 *(...specifying*) the technical review criteria for determining under which conditions an economic activity may be considered to contribute substantially to the sustainable use and protection of aquatic and marine resources, the transition to a circular economy, pollution prevention and control, or the protection and restoration of biodiversity and ecosystems, and whether that economic activity does not cause significant harm to any of the other environmental objectives, and amending Commission Delegated Regulation (EU) 2021/2178 as regards the information to be published specifically for those economic activities

[9] Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021 *(...)* on the content and format of the information to be published by undertakings subject to Article 19a or Article 29a of Directive 2013/34/EU on their environmentally sustainable economic activities, and the method to be followed to comply with this information requirement

adaptation, respectively. However, no single transport activity is listed as being able to make a substantial contribution to any of the other four environmental objectives.

It should be noted that certain activities, which receive aid because they fall under budget headings selected during the allocation phase, may not meet these alignment criteria simply because the budget nomenclature is not drawn up with such criteria in mind, and is not fine enough to distinguish between them.

- **Identifying impact spending**

Since the expenditure to be assessed is aid for green activities, its environmental impact depends on whether it provides an effective incentive.

In other words, assessing the environmental impact of the aid means answering the question "*What is the environmental impact of creating or maintaining green transport services thanks to the aid? which* requires an answer to the preliminary question "*Which of the "green" transport services assisted would have been provided without the aid and which, having been provided in addition, can be considered as having been provided thanks to the aid*?

In most cases, it is therefore advisable to construct a counterfactual scenario, which will in fact depend on the nature of the aid and services, which leads us to envisage three evaluations in parallel.

In practice, the evaluation will distinguish between the three systems:

1. Partial exemption from TIFCE for electric transport ;
2. Aid for the operation of combined rail and sea-river transport services ;
3. Aid for the operation of wagonload services.

- **Confidentiality of business data**

The expenditure to be assessed relates to aid schemes for economic operators - transport companies and combined transport operators - operating in the passenger and freight transport market, which is limited in number (a few dozen, two hundred at most for public transport and cableway operators), sometimes with a de facto or de jure monopoly (regional or local passenger transport operators, ski area concessionaires, etc.) but also in competition (long-distance rail services, freight services, combined transport operators, *etc.*).

The granting of financial aid will improve the economic conditions under which they operate and enable them to attract new customers and offer new services; quantifying this effect in the counterfactual scenario, however, presupposes identifying the mechanisms involved and having access to sufficiently accurate market data.

However, the small number of players involved means that it is impossible to have a statistical approach, even though the precise data, which is a matter of business secrecy, does not have to be communicated.

In practice, it is the aid application files requiring the provision of supporting data or, in the case of tax expenditure, the exemption declarations that can provide the best knowledge of the activities studied, the activities assisted and the exemption declarations.

As an inspection service, Igedd can access and process these data, while being required to respect the confidentiality of the data of market players when publishing its work.

- **Relationship with other forms of assistance**

The aid assessed may have an incentive effect on modal shift - changing the mode of transport for a 'green' mode of transport. For example, rail freight services have benefited from a reduction in rail tolls since 2010, paid for by the State through the "freight compensation" paid to SNCF Réseau, while regional rail services benefit from a public contribution of around 70% of costs, and so on.

If, in practice, it is the combination of several aids that ensures the desired effect, the environmental impact measured will be divided between them.

- **Existing assessment TOOLS**

With the exception of the aid scheme for the operation of single wagonload services, all the aid schemes to be assessed pre-existed France's launch of the green OAT programme.

They have not been subject to an environmental impact assessment, but the aid provided is State aid subject to approval by the European Commission and is subject to specific scrutiny, with the exception of the aid for electricity transport directly provided for by Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity.

In this context, the "*Community guidelines on State aid for railway undertakings*"[10] relevant to the vast majority of actions (around 80% of expenditure in 2022 concerns rail transport) mean that aid can be authorised if its level is below a ceiling conventionally set at half the difference in external costs (accidents, atmospheric pollution, climate, noise, *etc.)* between road and rail transport, with the valuation of these externalities being carried out according to the values in the guide published by the European Commission, the "*Handbook on the external costs of transport*"[11] .

As the externalities taken into account include several environmental externalities, the studies carried out on this occasion by the authorities to justify the compatibility of this aid with the normal functioning of the market provide relevant quantitative data for this assessment.

In addition, the work commissioned by the European Commission from a consortium of consultants supported by *the Institute for Transport Studies* at the University of Leeds[12] to assist it in its project to revise these guidelines provides a wealth of data on the rail transport market in Europe, such as the costs and revenues associated with rail freight, and details examples of good practice from certain Member States in designing State aid for rail freight, which illustrate the complexity of these markets.

1.4.3 Choice of indicators

The aim of the aid to be assessed is to encourage transport services that emit less GHG and/or atmospheric pollutants by, for example, changing fuel or mode.

For transport, the indicators favoured by the green finance sector[13] have been selected for evaluation:

- the volume of transport services concerned: passenger-kilometres or tonne-kilometres and, more specifically, the volume of services transferred (or retained) on a clean transport mode as a result of the measure financed by the green OAT ;

the annual GHG emissions reduced (or avoided) as a result of these measures (in tCO_2 e);

-Similarly, the reduction in atmospheric pollutants, particularly particulate matter (PM), resulting from these measures;

in terms of expenditure efficiency: the average cost, in €, of the tCO_2 e thus avoided, taking into account the total volume contributed to eligible expenditure.

- **Value of climate action**

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[10] Communication from the Commission - Community guidelines on State aid to railway undertakings (2008/C 184/07) - Aid for the coordination of transport - Aid to reduce external costs

[11] *European Commission: Directorate-General for Mobility and Transport, Essen, H., Fiorello, D., El Beyrouty, K., Bieler, C. et al, Handbook on the external costs of transport - Version 2019,* 2020

[12] *European commission - Impact assessment support study for the review of the Community guidelines on State aid for railway undertakings - Final Report* - 2023

[13] Cf. *ICMA - Harmonised Framework for Impact Reporting - June 2022*

This latter indicator can be compared with the tuté laire carbon value, a criterion adopted to assess the coherence of public investments (see the section on the "Carbon footprint"). Sidebar 1) with France's climate commitments, and which was set by the so-called "Quinet II" report[14] according to a trajectory rising from €90_{2018} by 2020, to €250_{2018} in 2030, €500_{2018} in 2040 and €775_{2018} in 2050.

> The value of action for the climate (carbon trustee value) gives a monetary value to public or private decarbonisation actions.
>
> It has traditionally been used to evaluate and select public investments on the **basis of their socio-economic** (and not just financial) **value**.
>
> But its use must be extended to support the definition of public policy priorities. If the value of action for the climate is €250_{2018} by 2030, this means that all actions that cost less than €250_{2018} per tonne of CO_2 e avoided must be undertaken (a large number of thermal renovation measures for buildings, the deployment of certain renewable energies to produce heat, for example). Otherwise, there is a risk that the target will not be met.
>
> Conversely, actions costing more than €250 should only be implemented if, by the time they are fully deployed, **the trajectory of** guide values is greater than their cost.

Sidebar 1 - Use of the carbon reference value (Source: Quinet II Report)

The values of this trajectory can be compared with the value of €100 /tCO_{20162} e used to calculate the unit values of the *Handbook*[15] and compared with the level of $100/tCO e_2 put forward by the latest IPCC report as enabling the financing of mitigation actions capable of reducing global emissions in 2030 by more than half compared with 2019[16] .

- **Reference values for atmospheric pollution**

A precise quantitative approach to emissions of atmospheric pollutants, a relevant indicator in relation to the additional objective of reducing air pollution, is much less straightforward.

In principle, the impact of these emissions is assessed in three stages:

- calculating the quantities emitted into the ambient air, mainly through the combustion of fossil fuels in vehicle engines, but also, in the case of road transport, through tyre wear, particles and various gases (ammonia - NH_3 , non-methane volatile organic compounds - NMVOCs, sulphur dioxide - SO_2, nitrogen oxides - NO_x) which will diffuse into the atmosphere and affect people (health effects), activities (agriculture in particular) and the ecosystem;
- assessment, using diffusion models and concentration-response functions, of the risks, particularly health risks, associated with the exposure of populations and activities. These functions are derived from epidemiological data;
- the socio-economic valuation of these risks using various methods, in particular the valuation of human life, the value of lost harvests or the restoration of areas of biodiversity.

In practice, these calculations are much more complex than those relating to GHGs, which are derived mainly from energy consumption by transport, because to calculate them in a way other than the average we need :

- emissions from the engines of the vehicles concerned, which depend to a large extent on their

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[14] France Stratégie - La valeur de l'action pour le climat - Une valeur tutélaire du carbone pour évaluer les investissements et les politiques publiques - Report of the commission chaired by Alain Quinet - February 2019

[15] *Handbook, Climate change avoidance costs in €/tCO_2 equivalent*, pp. 77-78

[16] The significant difference with the "French" value, even though the national strategy target for 2019 (-30% compared with 2015) was significantly less ambitious, is explained by the higher cost of the actions and the already low level of GHGs per monetary unit of GDP in France.

generation in relation to the "Euro standards" which, since 1988[17] , have imposed limit values for pollutant emissions for the various machines and vehicles, whether road vehicles or not, put into service in Europe;
- the number of people, which varies significantly with the density of the areas crossed, and the occupation and use of the areas exposed;
- diffusion and concentration-response models adapted to the nature and concentration of emissions and to the populations and areas exposed;
- a robust assessment of their additivity, even when we are trying to combine the effects of the various pollutants.

The variability of these parameters has very significant effects. For example, the averages given by the European Commission for the social cost of one kg of particulate matter emitted range from €87_{2016} in "rural" areas to €407_{2016} in metropolitan areas (conurbations of 500,000 inhabitants or more), but there is a ratio of 1 to 30 between the emissions of a Euro VI urban diesel bus in a "rural" area and those of a Euro V bus in a conurbation[18] .

The guide stresses[19] the conventional and theoretical nature of monetary values by giving ranges, often very wide, due to the uncertainties surrounding their calculation, their more or less proven relevance for "marginal" evaluation, but also the methodological limitations of valuing certain effects (use of stated preference methods, uncertainties over the elimination of confounding factors, etc.).

In fact, in France as in Europe, the preferred public policy tool for dealing with this issue is vehicle engine standards, with a progressive effect depending on the rate of renewal[20] , rather than economic incentives through subsidies to encourage people to change their mode of transport.

In the previous assessment, and also in view of the uncertainties, the quantitative assessment was limited to the mass of the particles, based on averages, without any systematic evaluation.

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[17] From Euro 0 at the outset to Euro VI on 1/1/2014, upgraded to Euro VId on 1/9/2019, then Euro Vie on 1/09/2021.

[18] *Handbook, Air pollution costs - Damage costs in €/tCO_2 equivalent*, pp. 56, 62

[19] *Handbook, Annex C - Detailed assessment air pollution costs,* pp 207-220

[20] Fast for long-haul HGVs, which have a lifespan of 6 to 7 years and 95% of the French fleet will meet the EuroVI standard by 2022, medium for lighter vehicles - 10 to 12 years - and slower for rail vehicles and boats, which reach 30 to 40 years, and whose engines are difficult to "clean up".

2 Aid for electric transport

2.1 Origin and development of the measure

This measure was taken in the wake of the European energy tax reform[21] , which introduced a charge for carbon emitted by electricity and heat production facilities through the Emissions Trading Scheme and brought about an initial harmonisation of excise duties on energy products and electricity, albeit with numerous possibilities for derogation or obligations to differentiate rates.

It was introduced in the 2004 budget, by article 118 of law no. 2004-1485 of 30 December 2004 amending the 2004 budget; during the parliamentary debate, it was expressly stated that the railways and the transport network in the Paris region would benefit from the partial exemption measures available to electro-intensive companies, even though these transport activities do not meet the electro-intensity criteria.

From 2017, its scope has been extended to include traction energy consumed by plug-in hybrid and electric buses, which did not exist on the market in 2004.

2.2 Precise description of the system

2.2.1 Type of measure

Until 2021, the measure was set out in article 266 quinquies C of the French Customs Code, which states that for "*persons engaged in the transport of people and goods by train, metro, tramway, cable, rechargeable hybrid or electric bus and trolleybus, the rate of domestic consumption tax applicable to final consumption of electricity for the purposes of these activities is set at €0.5 per megawatt-hour*".

The measure reduces the tariff to the minimum set out in the Energy Taxation Directive.

In 2004, the reduction concerned the Contribution to the Public Electricity Service (CSPE), later renamed TICFE (Taxe intérieure sur la consommation finale d'électricité).

In addition to traction, the uses eligible for the reduced rate include the operation of equipment and installations needed for the maintenance and repair of transport equipment, the operation of infrastructure and signalling, points and safety installations for the movement of equipment, excluding electricity used in the premises of stations and stations receiving passengers, and from 2017 the powering of batteries in rechargeable hybrid or electric buses[22] .

Since 1er January 2022, this tax, renamed "excise duty", has been governed by the Code of Taxes on Goods and Services; articles L312-50 and L.312-51 of this code provide for the same partial exemption for guided transport of people or goods and public road transport of people, confirming in law that electricity consumed for "the operation of equipment, installations and infrastructures intended for the circulation, repair and maintenance of guided vehicles" was indeed covered, but now excluding cable transport (transport by ski lift, cable car and chair lift).

Over the period 2016-2022, the level of this tax remained fixed at €22.5/MWh from 1er January 2016 to 1er February 2022, i.e. a tax advantage of €22/MWh for the beneficiaries; in the context of

[21] Council Directive 2003/06/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity.
[22] Circulars of 11 May 2016 and 9 October 2018 from the Minister of Finance and Public Accounts on the Domestic Tax on Final Electricity Consumption (TICFE)

a sharp rise in energy prices, the Finance Act for 2022 reduced it, in general, to a minimum of €0.5/MWh, effectively removing any special advantage for transport and cancelling all tax expenditure over the last 11 months of 2022.

2.2.2 Terms and conditions

The TIFCE was collected from electricity suppliers by the Customs and Indirect Rights Directorate (DGDI) until 2021, with the Public Finance Directorate (DGFIP) taking over on 1 January 2022.

In practice, it is up to the electricity supplier of a transmission company eligible for the reduced rate to apply it in its invoicing. To benefit from this reduced rate, the transport company must issue its supplier with a certificate proving its eligibility, specifying for each site the meters and delivery points concerned. In addition, at the end of each year it must draw up and send to the relevant customs office a summary statement[23] together with the invoices corresponding to electricity deliveries for the previous calendar year.

As each supplier entered the total volume of its sales covered by this reduced rate in its TICPE declaration ([24]) by ticking the *appropriate* box for "Transport of people and goods by train, metro, tramway, cable, plug-in hybrid or electric bus and trolleybus", the customs authorities were able to reconstitute the total annual consumption of eligible electricity.

2.2.3 Amount of expenditure and beneficiaries

- **Total expenditure**

Although included in programme 203, this tax expenditure is not directly monitored by the administration responsible for the programme, the Directorate General for Transport Infrastructure and Mobility (DGITM), nor by the tax administrations that collect the tax and apply the reduced rate, and which have no system for monitoring its consumption and use, either for their own purposes or for those of the programme manager.

The Table 2 below shows changes in subsidised electricity consumption over the period.

M€	2016	2017	2018	2019	2020	2021	2022
Reduced rate for electricity consumed by public rail and road transport	186,0	199,0	198,0	232,0	158,0	196,0	21,0
Supported electricity consumption (TWh)	**8,5**	**9,0**	**9,0**	**10,5**	**7,2**	**8,9**	**1,0**

Table 2 - Volume of traction electricity subsidised

This consumption of around 10 TWh represents just under 2% of total French consumption and around 10% of national "industrial" consumption; the significant drop in 2020 corresponds to the drop in traffic during the Covid period; the value for 2022 corresponds to just one month.

The budget reports state that the number of beneficiaries is "not determined", that the method of calculation is based on the reconstitution of the tax base from "non-tax" data and that, consequently, the published values are "orders of magnitude".

Thus, while 2019 did indeed see significant growth in rail and urban public transport supply and patronage compared with 2018, and constitutes a "reference year", this was of the order of 5%[25] and does not explain an increase in electricity consumption of more than 16%; on the other hand, the variations in subsequent values, with a sharp fall in 2020 due to the health crisis in 2020 caused

[23] See the circular of 11 May 2016 cited above and Appendix 4 of CERFA no. 14319.
[24] Monthly or quarterly declaration, depending on volumes - CERFA no. 15500 to 15503
[25] SDES - Annual transport review 2019

by Covid, followed by a gradual rise in 2021 and 2022 without reaching the 2019 level, appear to be consistent in order of magnitude with the variations in transport supply.

It should be noted that the values declared by the various players are figures derived from restatements and calculations, as the electricity consumption aided is rarely measured directly - the transport vehicles on the rail network are not yet equipped with the planned meters[26] - and must be considered as orders of magnitude. It should also be noted that the methods used have changed regularly between 2016 and 2022, which may explain some breaks in the series.

As the environmental impact of the measure depends on the nature and actual use of the transport services assisted, it is still necessary to have more detailed information on the services benefiting from the aid in order to assess both its alignment with the taxonomy and its quantitative aspects.

- **Difficulties accessing data**

In principle, as indicated above, the tax collection departments have the means to identify the beneficiaries; however, it appeared that the various supporting documents - not computerised - were still kept at the level of each customs office in the sub-regional districts and that, given the large volume of documents that these offices manage, they were destroyed at the end of the tax limitation period; consequently, only recent years were likely to be able to be studied.

However, the material work involved in extracting and assembling the relevant data *was* still very substantial; in fact, although the DGDI had initiated this data consolidation in order to make the list of beneficiaries of reduced TIFCE tariffs more reliable with a view to responding to the European Commission as part of an audit it was conducting on the State aid regime, it became apparent that the files concerned were unusable and the work could not be completed.

- **Estimated breakdown of assisted consumption**

In the absence of such data, it was necessary to turn to aggregated data, in particular that published under the aegis of the Commission de régulation de l'énergie (CRE)[27] and in the work of the Réseau de transport d'électricité (RTE)[28] , bearing in mind that the consumption recorded does not correspond to that eligible for aid.

According to RTE, annual electricity consumption on the national rail network was 7.4 TWh (5.6 TWh for passenger transport and 1.8 TWh for freight transport), to which should be added 0.5 TWh of consumption by "stationary installations". According to RTE, urban rail transport, including RATP, consumed 3.9 TWh over the same year.

On the other hand, recharging the batteries of hybrid or electric buses consumes negligible power[29] .

According to an SNCF communication on the CRE website, annual consumption represents 7.6 TWh, including 6.75 TWh for the railway companies using the network, 0.7 TWh for SNCF Réseau's consumption, essentially for losses - due to the Joule effect - in the distribution installations, and 0.15 TWh for installations supplied by SNCF Réseau, including certain stations.

Lastly, the consumption of cableways is not published globally; however, by comparison with Switzerland, where the ski lift sector has 2,400 cableways, fewer in number than the 3,600 operated in France but including many more heavy installations (cable cars and funiculars) and employing a similar number of people - 12,000 - reports an electrical consumption of traction energy of 150 GWh, we can estimate this consumption in France at 0.25 TWh per year.[30]

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[26] 95% of rolling stock will not be fitted with meters until 2026.
[27] CRE *Smartgrids* - Players and organisation of the electricity market for railways
[28] RTE - "Electricity consumption" working group - Transport 2019
[29] The emergence of electric buses has been slow in coming: at the beginning of 2022, fewer than 500 electric buses were operating in France, representing annual consumption of around 20 to 30 GWh.
[30] For "general public" publications, the total consumption of the sector, including that of artificial snowmaking, would be equivalent to the average domestic consumption of 100,000 French people, i.e. just under 250 GWh.

The "gross" total, including certain consumption not eligible for the reduced rate, would be 12.0 TWh, whereas in 2019 aid was provided for 10.5 TWh; this volume appears to be out of line with the figure of 9.5 TWh given by the SDES for total traction electricity consumption across all modes (including private vehicles and inland waterways).

The discrepancy appears to stem from the values used for "urban rail" transport, in principle RER, metro and tramway. Most of these lines belong to urban networks that also manage, in an integrated way, bus lines with numerous stops and other buildings - commercial agencies, bus depots, even administrative buildings; the separation of electricity consumption between activities does not always seem to have been carried out.

A direct examination of the RATP's activity report (which, with 600 km of RER lines, 200 km of metro lines and 120 km of tramway lines, compared with 0, 130 and 750 km respectively of lines of the various modes for the total of the other French networks, runs the majority of the heaviest and most frequent electric transport vehicles) shows that in 2018 or 2019, electricity consumption for rail traction represented barely one TWh[31] .

Using data from the Observatoire de la mobilité en Île-de-France (OMNIL) on the use of RATP services by mode and 'conventional' GHG emissions, which only take into account the direct electricity generated by passenger travel, we can reconstruct the volume of electricity consumed by RATP in one year (for example, in 2019: 976 GWh, including 386 and 465 GWh respectively for the RER and metro), which supports this analysis.

Similarly, the total electricity consumption - including buildings - of Lyon's urban network, which in terms of electric transport represents around ¼ of the rest of France, with 32 km of metro lines, 88 km of tramway lines and more than 120 trolleybuses, was announced in 2018[32] at around 75 GWh.

The evaluation was based on the principle of using 2019 as the reference year, the "current" year for which the greatest amount of data was available, and harmonising the other data to obtain a plausible breakdown. In particular, the values given by SNCF, which were considered more reliable[33] , but without a reference year, were attributed to 2018 and modified in proportion to traffic for 2019.

As a result of these treatments, the estimated values for eligible consumption presented in the Table 3 below.

Subsidised consumption of electricity transport in 2019 (TWh)	
Intercity passenger rail transport	7,3
Rail freight transport	1,7
Cable transport	0,25
Urban transport: RATP	1,0
Urban transport: other	0,25
Electric" transport	**10,5**

Table 3 - Breakdown of subsidised electricity consumption (Estimates)

[31] RATP Group - 2020 Financial and CSR Report, p.92: 39% of 2,418 or 2,504 GWh, i.e. between 0.94 and 0.98 TWh

[32] Greater Lyon - Energy master plan - 2019, p.39

[33] According to the SNCF group's 2021 business report, the traction electricity metering method applied from 2021 onwards is more reliable than before, although the restated figures do not vary much.

2.3 Alignment with taxonomy

The activities supported all use electricity; however, they are of different kinds and, before assessing their alignment, it is important to check that they are indeed "eligible".

The eligibility analysis is based on matching the activities supported with the sectors of activity listed in the annexes to the two "Climate" and "Environment" delegated acts supplementing the taxonomy regulation, based in particular on their NACE code.

2.3.1 Eligibility

The activities supported are operating activities that may fall under the following NACE codes:

- H49. 10Intercity passenger rail transport ;
- H49. 20Rail freight transport ;
- H49. 31Urban and suburban passenger transport ;
- H49.39 Other passenger land transport ;
- H52.21Services auxiliary to land transport ;

but also, aid for "small tourist trains"[34] and until 31 December 2021, cable transport (essentially ski lifts for winter sports - 300 resorts of all sizes in France), NACE code

- R93 Sporting, recreational and leisure activities.

If transport or infrastructure operation activities - as enabling activities - are, depending on whether or not they meet the required technical criteria, likely to make a substantial contribution to one of the two "Climate" objectives, this last code corresponds to activities that are not referenced as likely to make a substantial contribution to any of the six environmental objectives of the taxonomy regulation, and these activities are not eligible.

Of these, the consumption of electricity for the traction of ski lifts is the most preponderant; with the values adopted, it represents just over 2% of the aid granted before 2022, and is therefore ineligible.

2.3.2 Alignment

- **Criteria for a substantial contribution to climate change mitigation**

As the aid is provided for electricity consumption, expenditure on transport relates to the consumption of vehicles with "*zero tailpipe CO2 emissions*", which is a technical criterion common to the three categories of activity 6.1 - Intercity passenger rail transport, 6.2 - Rail freight transport and 6.3. - Urban and suburban passenger transport by road[35] , which is in principle sufficient for an activity to be considered as making a substantial contribution to mitigating climate change.

However, with regard to rail freight transport (6.2), the delegated act sets a second criterion: *"The trains and wagons are not intended for the transport of fossil fuels*"[36] . The proportion of aid granted to electrified rail transport of fossil fuels is therefore not aligned with the taxonomy.

The activity thus excluded essentially concerns the distribution chain for refined petroleum products: when they are not directly connected to a pipeline or served by river, inland fuel depots are served by rail, with terminal distribution to service stations generally carried out by road. This transport is carried out using dedicated tank wagons, often owned by the oil companies themselves, which are dispatched from the production or import site by a full train to a marshalling yard, where they are integrated into subdivision, inter-sorting or terminal trains.

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[34] 1° of article L.312-51 of the Code of Taxes on Goods and Services
[35] Annex I to the Delegated Regulation: pages 101 to 103
[36] See recital 35 of the regulation, which states that "*assets, operations and infrastructure dedicated to the transport of fossil fuels"* should be excluded.

In France, this transport represents around 7%[37] of rail freight transport, measured in t.km. In the absence of precision on the exact composition of the trains, this ratio can be used to assess the proportion of aid to rail freight transport that has not been aligned.

The ancillary services activities assisted by the eligibility for aid of electricity consumption in infrastructure and equipment, essentially losses, in the electrical energy distribution system (substations, catenaries, *etc.*) come under category 6.14 - Rail transport infrastructure, in principle eligible, as concerning electrified infrastructure. However, when this electricity is consumed by a train carrying fossil fuels, the second criterion "*The infrastructure is not intended for the transport or storage of fossil fuels*" does not appear to be met.

- **Criteria for the absence of collateral effects** (not causing significant harm)

On this point, the annex sets the same criteria for the three categories of activities 6.1, 6.2 and 6.3 as for the other objectives, except for objective *5) Pollution prevention and control,* for which the criteria are differentiated according to technique:

- Adaptation to climate change: the requirement relates to the existence of a relevant adaptation plan. When it comes to electrified transport activities, there are in principle no significant difficulties for the carrier, whose equipment is in any case likely to be operated under a wide range of conditions; it is the infrastructure managers - for the structures, track and power supply - who are directly concerned. Whether it's SNCF Réseau, RATP or the public owners of urban networks, they are all involved in the strategy for adapting to climate change initiated by the French government in 2019, and for which, after two initial adaptation plans, a new policy is being drawn up.
- Sustainable use and protection of water and marine resources: there are no specific requirements in the annex.
- Transition to a circular economy: the implementation of waste management measures, in accordance with the waste hierarchy, is required both in the use phase (maintenance) and at the end of the fleet's life, in particular through the reuse and recycling of batteries and electronics (in particular the critical raw materials they contain). Generally speaking, all the maintainers of rail network traction equipment have for some years been committed to integrating the circular economy into their activities: SNCF Group - Standards (RA00274) on the main principles of waste management in accordance with the hierarchy of waste treatment methods, Certification process for rolling stock maintenance technical centres, RATP - Circular economy and eco-design roadmap, TRANSDEV - Waste sorting policy, etc. Bus manufacturers are organising the recycling of batteries used in electric and hybrid buses.
- Pollution prevention and control: the criteria are similar for rail and road transport: firstly, the engines of the vehicles must meet the emission limits set for combustion engines, which is automatically met for electric traction, and for road vehicles, their tyres must be low-noise and energy-efficient. Checking this last point would require knowledge of all the electric bus services that receive support. For example, the RATP states that, while by 2022 its entire electric fleet will meet the noise requirements, only the tyres on the most recent buses will meet the fuel efficiency criteria. Nevertheless, it should be noted that the precise definition of this requirement is recent and that the main manufacturers of tyres for electric vehicles claim to achieve the best levels of energy efficiency.
- Protection and restoration of biodiversity and ecosystems: there are no specific requirements in the appendix.

For activity category 6.14, the actual content of the activity is limited to the normal operation of fixed electrical installations designed for this purpose, without the production of waste, or any impact or emission outside the installations. The principle of no significant harm is therefore directly satisfied.

[37] Autorité de régulation des transports - The French rail freight transport market (2018) - share of Coke and refined products

In conclusion, with the possible exception of electric or hybrid bus transport, where consumption is in any case marginal, these criteria can be considered to have been met.

- **Compliance with minimum guarantees**

According to article 18 of the taxonomy regulation, minimum social safeguards refer to the procedures implemented by the various actors to ensure compliance with the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights, including the principles and rights set out in the eight fundamental conventions identified in the International Labour Organisation (ILO) Declaration on Fundamental Principles and Rights at Work and the UN International Bill of Human Rights.

As the transport activities assisted are by nature carried out in France, a country that has ratified the eight fundamental ILO conventions and where various laws and regulations lay down standards, presumed to be respected, that guarantee compliance with these minimum social standards, this criterion is met.

2.3.3 Alignment rate

As a result, for the years 2016 to 2021, just under 98% of the aid is eligible (approximately 10.25 Twh out of 10.5 Twh assisted), the rate of alignment of the aid can be estimated at 96%[38] , then 99% for the year 2022.

This rate is similar to that which could be calculated on the basis of the *Greenfin* label, whose standards exclude all activities in the fossil fuel value chain and whose category 5 (Transport) does not include the operation of passenger and goods transport by cable, nor, at least before its planned update, by plug-in hybrid or electric buses and trolleybuses.

2.4 Quantitative assessment

2.4.1 Valuation principle

The quantification of benefits is based on a comparison of two situations with and without a tax reduction, the latter having to be reconstituted.

- **Underlying mechanism**

In this case, the tax reduction benefits services which, apart from a few exceptions, would have used electric traction, either because there is no technical alternative: TGV, metro, tramway, trolleybus or cable transport, or because the alternative is more expensive: conventional trains, for which diesel traction is only required if electric traction cannot be used because the lines used are not electrified.

Only in the case of buses does the less environmentally-friendly alternative, the diesel bus, represent a significantly lower total cost of ownership (investment and operation, over its lifetime).

However, it is not possible to imagine that the tax reduction, which reduces the cost of producing the transport service but only represents a few per cent of operating costs, will in itself be enough to encourage the organising authorities (AO), who are responsible for choosing the technologies, to switch from a service using fossil fuels to investing in (recharging) infrastructure and electrified vehicles. In practice, it is the combination of a political choice by the elected executives of these AOs, regulatory constraints on the purchase of new public transport vehicles and investment subsidies for these vehicles, which structures the desired development of the electrified bus fleet, with the aid studied remaining complementary.

[38] With the values used: (10.25 - (7% x1.7)) /10.5 = 10.13/10.5 = 96.47%.

However, the reduction in the production cost of the transport service made possible by the aid can lead to an environmental gain through modal shift as follows:

1) The reduction in the cost of electricity transmission is passed on to users/customers, either through competition or by the choice of the organising authority, who benefit from a reduction in price for the equivalent volume.

2) This reduction in fares leads to additional traffic on 'green' transport, some of which comes from journeys previously made in another mode, using a less environmentally-friendly fossil fuel.

3) Assessing these shifts means that the various effects can be quantified by using appropriate environmental factors - emissions per traffic unit for the different modes (before/after) - applied to the volumes of traffic shifted.

In fact, the aim is to assess how the compulsory levy affected encourages a change in the consumption of transport services that is favourable to the environment.

In principle, the environmental impact of the transfer of other consumption should also be taken into account, whether it be, on the one hand, the uncovered part of the public expenditure that the aid marginally replaces or, on the other hand, the non-transport expenditure that the consumer[39] will make as a result of the savings on transport services that he benefits from thanks to the aid. We will nevertheless make the classic approximation that these marginal transfers of consumption, which partly offset each other, concern activities with a much lower impact than transport using fossil fuels, in particular that the marginal gain in purchasing power does not result in a "rebound effect" on undesirable activities, and can therefore be disregarded.

- **Marginal approach**

As the reduction in the cost of the service is in any case limited (a few % of the costs of a service, the level of aid being of the order of a third of the gross cost of electricity supply), the application of a price elasticity and a marginal rate of substitution is legitimate for determining the additional traffic using the electric mode and the volume of traffic carried over.

However, the intensity of this mechanism depends on the different markets concerned by the aid, i.e. long-distance passenger transport, regional transport (rail) and urban transport - normally every network with an underground or tramway line or using electric buses would be concerned - and long-distance freight transport, as only rail transport is concerned.

In a market open to competition, such as long-distance rail transport (passenger or freight), it can be considered that the transfer of aid to prices takes place at the level of each transport service; for services run by an organising authority that sets their fares - regional transport and urban public transport - and bears the vast majority of operating costs, competition takes place "for the market", and the fall in costs is passed on to the entire fare structure, so new users do not necessarily use "green" transport.

The levels of this price elasticity and of the marginal rate of substitution (share of modal shift versus share of induced traffic in new traffic) differ from one market segment to another, depending in particular on the actual choice available to end users/customers.

The environmental factors (GHGs and PM) depend essentially on the previous reference modes and fossil fuel consumption per unit.km.

- **Segmentation**

The calculations were carried out by distinguishing six distinct segments:

[39] Directly for users/customers of passenger transport, or indirectly for consumers of the products transported.

- Long-distance rail transport (average journey of around 500 km) not covered by an agreement, known as SLO (Freely Organised Service): this is the TGV (high-speed train), the fossil fuel mode of reference being the aeroplane;
- Long-distance rail transport (average journey of around 300 km) under agreement with the State, with the reference fossil fuel mode being the private car;
- Regional rail transport (average journey of around 80 km) under agreement with each region, with the reference fossil fuel mode being the private car;
- Urban rail transport in the Ile-de-France region under an agreement with Ile-de France Mobilités, with the reference fossil fuel mode being the private vehicle;
- Urban public transport in the rest of France, under agreement with each AO (conurbation), with the reference fossil fuel mode being the private vehicle;
- Rail freight transport (long distance) competing on the market with each AO (conurbation), the reference fossil mode being the private vehicle.

In the absence of a clearly identified modal shift and benefit from the aid, cable car transport, which is marginal (around €4m in aid compared with package revenue of €1,500m), not eligible for the taxonomy, and excluded from aid from 2022, has not been included in the evaluation: the impact of this exclusion is less than the uncertainties inherent in the imprecision of the other data and calculations.

The estimated electricity consumption corresponds to only part of the traction energy: only the TGV SLOs are entirely electric. Other forms of transport use diesel traction in varying proportions (from around 15% for public transport in the Paris region to 52% for public transport in the provinces).

2.4.2 Results and analysis

The * Freight: bn.t.km
Table 4 below shows the environmental indicators calculated for 2019 (values in current €) up to the calculation of the indicator for the cost of reducing tCO_2 e.

Year 2019	Traffic bn.p.km	Cons. GWh	Help M€	Rec. M€	Elast.	Ind. report	Δ Traf Md.p.km	Δ ktCO e2	€/ tCO e2	Δt PM_{10}
SLO	58,65	2 550	56,1	6 221	-0,8	0,7	0,423	59,7	940	11,5
Intercités	5,03	350	7,7	404	-0,8	0,7	0,077	5,7	1 340	2,1
TER Reg.	15,22	1 450	31,9	1 166	-0,5	0,5	0,208	23,1	1 381	7,8
TC IdF	33,76	3 950	86,9	3 959	-0,3	0,2	0,222	29,8	2 917	9,5
TC Prov	11,20	250	5,5	1 120	-0,3	0,2	0,017	2,2	2 488	0,7
Freight	*33,88	1 700	37,4	1 099	-0,8	1	*0,923	83,0	450	27,7

* Freight: bn.t.km

Table 4 - Environmental indicators

Price elasticities and substitution indices are given in a number of studies , often dating back a long

way in the field of public transport[40] , but may vary considerably from one author to another, particularly for short-distance transport. The values used are at the top end of the ranges quoted and therefore suggest a significant effect.

However, the raw results show a wide range of effects, with the cost of abatement still very high compared with the €250 $value_{2018}$ of the "Quinet report".

It should be noted that the conventional monetisation of the co-benefit of the reduction in pollution at a value of €100/kg[41] would result in amounts that are marginal in relation to the aid, except for rail freight and provincial CT, where it would represent between 8 and 12% of the aid.

The best results are obtained for rail freight, a mode for which the load-to-total mass ratio is equivalent to that of road freight transport (FTTR) and the efficiency of electric traction is much better than that of the combustion engine; until FTTR is significantly decarbonised, this gap is likely to remain. Electric transport also has an advantage in terms of pollutant emissions (particles, No_x).

For passenger transport, the advantages appear to be weaker, or even very weak for local public transport: for this mode, the choice to use a private vehicle is not based on the cost of use, which is generally higher than that of public transport - which is very heavily subsidised by the public authorities - but, at least for those who do not have a vehicle, on the actual possibility of using transport within a reasonable 'time budget' (generalised cost) and *at least* on the existence of a public transport service.

The principle of calculation makes these results inversely proportional to the value of elasticity adopted: even more favourable values - the literature envisages up to -1 - reduce this abatement cost but, except in the case of rail freight, it always remains well above €500.

[40]See in particular Goodwin, P.B. *A review of new demand elasticities with special reference to short and long run effects of price changes,* Journal of Transport Economics and Policy Vol.26 (1992) ; Bureau, Benjamin, *Opportunité socio-économique d'une hausse de prix des transports collectifs franciliens*, Cahiers - Documents de travail de la DG Trésor (2011) ; Jourquin, Bart ; Beuthe, Michel. *Cost, transit time and speed elasticity calculations for the European continental freight transport*. - *Transport Policy*, Vol. 83 (2019)

[41] See the average value of €87/kg given by the *Handbook* in "rural" areas.

3 Aid for combined transport

Principles of combined transport

Combined transport (CT) is a multimodal freight transport mode that combines road with rail (rail CT or road-rail CT) or river (river CT).

The transport mode uses a UTI (cf.Figure 1 - The CT chain (Source: GNTC) Figure 1), generally an ISO maritime container[42] or a swap body (a load carrier similar to a container, but dedicated to road CT and calibrated to the dimensions of the pallets), for a door-to-door service with qualitative characteristics similar to road transport (cf. Figure 1) :

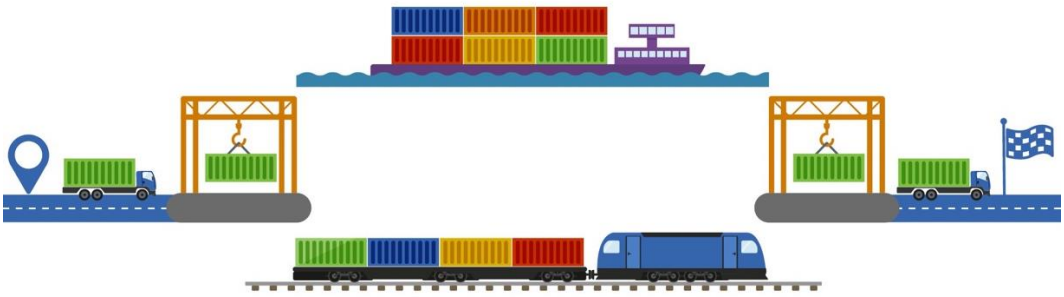

Figure 1 - The CT chain (Source: GNTC)

1 - It first travels by road for a short distance (pre-routing) from the loading point to a combined transport platform (terminal).
2 - Once the UTI has been handled for transhipment, the goods are transported by rail or inland waterway on their main journey to a second terminal.
3- After further handling, the goods are sent on their way again over a short distance (post-carriage) to be delivered to their final destination.

Intermodal transport unit (ITU): Loading unit: container, swap body, semi-trailer or accompanied road vehicle.

Intermodal terminal: Facility where ITUs are transferred between modes of transport. This is done by handling, using specialised fixed or mobile equipment (gantry cranes or self-propelled cranes). A terminal includes waiting areas (parking for road vehicles) and transhipment areas.

Combined transport: Transport of ITUs in a ***transport chain*** comprising pre-carriage between the departure site and the intermodal terminal of origin, a main part of the journey between terminals using rail or inland waterway and post-carriage by road from the intermodal terminal of destination to the final destination site.

Rail or inland waterway service between a terminal A and a terminal B: Transport, including transhipment operations in the terminals, where the total rail or inland waterway journey enables UTI loaded in the originating terminal A to be routed to the final destination terminal B for the UTI.

Combined transport operator: Company ***organising and marketing*** the complete service (rail, river, etc.) in a combined transport chain.

Sidebar 2 - Definitions of combined transport

In CT, all the components involved in producing the service are important, but it is the road haulier who holds the shipper's freight at origin and when it is delivered to the final consignee. For its part,

[42] These containers meet the specifications of ISO 668, which prescribes fixed dimensions.

the CT operator, when it does not provide the road transport itself, at least offers the terminal-to-terminal service: it organises the transport between the terminals, handles the transhipment operations and the administrative management of the required transport documents.

Motorway rail services (cf. Figure 2), which carry road semi-trailers on specialised wagons - the train can also include wagons for transporting maritime containers or swap bodies - are a segment of road-rail CT, in direct competition with road haulage over most of their route.

Figure 2 - A rail motorway train (*Credit: MTCET*)

Contrary to the first-order approach, which tends to see the use of CT as bringing a gain on the main link at the sole cost of handling the ITUs, all other things being equal, the impact of the two end journeys is far from negligible, due to the logistics of the ITUs. In fact, the CT sector considers that the main link of a conventional rail CT service must be longer than 500 km to find its equilibrium, which is confirmed by the content of the published transport plan, which only presents a small proportion of services of lesser length, generally moreover as a "stopover" of a longer service.

CT is long-distance freight transport.

3.1 Origin and development of the measure

This measure originated in 1994 with the desire, expressed in a parliamentary report, to curb the growth of "all-road" traffic, which was seen as harmful in terms of the environment, safety, congestion and the deterioration of infrastructure.

At the time, the government had set itself the target of doubling the volume of combined transport by 2002. In addition to its infrastructure aid policy (subsidies for the construction of terminals), it had decided to provide exceptional aid of FF 300 million (€46 million) for 1995, experimental aid having been paid since 1994 in order to make prices competitive on a few routes.

Until 2002, this operating subsidy was paid to the SNCF, which had a monopoly at the time, to enable combined transport operators to benefit from a reduced price for rail traction. The amount of this subsidy rose from €20 million in 1995 to €80 million in 2000 and 2001, before falling back to €17 million in 2002. In addition, during this period, combined transport trains benefited from a 40% reduction in tolls, representing approximately €8 million per year in additional aid.

Until 2002, Voies Navigables de France (VNF) provided operators with transitional financial assistance to launch regular inland waterway container transport services.

The nature of this aid has been modified by the creation in 2003[43] of a scheme managed by the State and aimed directly at all operators of combined transport as an alternative to road transport, in the form of so-called "clamp aid" paid per UTI transhipped.

Since 2003, this aid scheme has been regularly adjusted, both in terms of scope and level.

It was raised to the legislative level by the "Grenelle de l'environnement" law[44] , which once again set the objective of "*increasing the modal share of non-road and non-air transport (for goods transport) from 14% to 25% by 2022*". To this end, Article 11 states that "*State budget allocations will encourage the use of combined transport by compensating operators for their fares, through agreements between the State and operators who commit to development and organisation objectives*".

3.2 Precise description of the system

3.2.1 Type of measure

The aid is an operating subsidy.

It is aimed at combined transport operators (or freight forwarders) offering a regular service, i.e. one whose frequency and timetables are known in advance and published, and which is commercially open to any customer who requests it, with the price of the services negotiated freely between the operator and the customer.

A lump sum is awarded for each ITU (container, swap body, semi-trailer) transhipped in an inland or port terminal located in mainland France and integrated into a transport chain including pre- and post-carriage by road at the ends of the main non-road link.

Intended for economic operators operating on a market open to competition, it falls into the category of State aid. Administratively, it falls into the category of aid to reduce external costs by being intended to encourage a shift from road to modes that have a lesser impact, particularly on the environment.

It is therefore governed by the conditions set out in the European Commission's decisions of 19 June 2014 and 29 October 2019 relating to this aid scheme for the operation of regular CT freight services for the periods 2013 - 2017 and 2018 - 2022 respectively, corresponding to aid budgeted between 2014 and 2023.

3.2.2 Terms and conditions of award

Eligible CT services must have a main route between terminals of at least 80 km, with the exception of waste services and urban distribution. Only UTI transhipments carried out at a terminal open to any combined transport operator will be taken into account.

The mechanism means that only one flat-rate grant is awarded to an ITU crossing the border by non-road means (international service), compared with two for a service whose two end terminals are located entirely within mainland France.

In addition, aided transhipment must provide an alternative to a significant road journey on French territory; therefore, in addition to pure transit services, excluded for lack of transhipment on French territory, services organised from a terminal very close to the North- East border to or from a neighbouring country (Belgium, Luxembourg, Germany, Switzerland) or beyond, such as those for

[43] Cf. State aid no. 623/2002 - State aid for the operation of regular combined freight transport services as an alternative to road transport.
[44] Law no. 2009-967 of 3 August 2009 on the implementation of the Grenelle Environmental Summit

the sole sea crossing between France and the United Kingdom, are also excluded[45] .

To qualify for the aid, combined transport operators must respond at the beginning of each year to a call for expressions of interest (AMI), published in the Official Journal of the European Union (OJEU), the purpose of which is to list eligible traffic from the previous year,

In addition to the financial and economic data relating to the services for which the aid is requested and to the operator itself, the required file includes a commitment[46] from the beneficiary on development objectives (growth in the number of ITUs transported over the following years) and organisational objectives, asks the beneficiary to explain the "*strategy implemented in the short and medium term to improve its economic and financial model in order to free itself from public aid*", to specify the methods used to count the ITUs assisted and to accept any controls.

After examination, applications are subject to an annual agreement covering the eligible services and setting out the beneficiary's commitments and the terms and conditions of the financial support provided by the State. In particular, handling operations relating to scheduled services that have ceased to operate, generally due to the loss of their main customers during the year, are excluded as they cannot meet the traffic development objective.

In practice, after the payment of any advance, the rate of aid included in the year's expenditure is determined in the light of the total budget available after the various budget adjustment operations and the total volume of eligible handling for the previous year, as determined by the examination of the applications, the agreements being signed and the balance paid at the end of the year.

3.2.3 Amount of expenditure and beneficiaries

The Table 5 shows the annual amounts of aid, broken down between rail and waterborne CT.

Budget years	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Aid for the operation of regular rail CT services (€M)	10,0	11,1	23,5	18,2	18,2	33,7	34,5
• Number of beneficiaries	15	20	15	17	18	18	16
• Volume of ITUs assisted (thousands)		982	1033	1011	1012	1 070	1 179
Aid for the operation of regular inland waterway CT services (€M) :	4,9	5,7	11,4	8,8	8,8	12,3	12,5
• Number of beneficiaries	15	15	13	14	14	13	12
• Volume of ITUs assisted (thousands)		498	489	489	490	390	427
Rate of aid (€/UTI)	**10,15**	**11,44**	**17,20**	**18,00**	**17,10**	**31,50**	**29,30**

Table 5 - Recipients of clamp assistance

These amounts do not include sums paid under the Special Energy Transition Envelope, a fund created in 2015 by the Energy Transition Act[47] , managed by the Caisse des Dépôts et Consignations, which has been able to top up the State budget and pay additional aid, particularly in 2017 for 2015 traffic (2016 aid).

Nor do they include start-up aid paid to rail motorways commissioned at the beginning of the period.

The amounts taken into account are those disbursed during the budget year in question (payment appropriations); they may differ slightly from the volumes committed, due to the administrative delay in payment.

[45] This restriction applies in particular to CT services by waterway organised from Rhine ports.
[46] Part D of the application - Signed undertakings by the beneficiary
[47] Law 2015-992 of 17 August 2015 on the energy transition for green growth - article 10

3.3 Alignment with taxonomy

The main share of assisted activities concerns the non-road link. For rail CT, the analysis carried out in the previous section is directly applicable; on the other hand, eligibility and alignment with the taxonomy of the waterway link must be examined.

3.3.1 Eligibility

The activities supported are operating activities that may fall under the following NACE codes:

- H49. 20Rail freight transport ;
- H50.20Maritime and coastal freight transport ;
- H50.40 River freight transport

The latter two transport activities are listed under categories *6.8 - Inland waterway freight transport* and *6.10 - Sea and coastal freight transport, vessels required for port operations and ancillary activities* in the annexes to the "Climate" delegated regulation, and are eligible, as they are likely to make a substantial contribution to one of the two "Climate" objectives.

However, over the period 2015-2021, corresponding to the subsidies paid over the period 2016-2022, the eligible regular CT services, excluding rail CT, only concerned river services[48] , limited to a few routes: on the Rhône between Marseille and Chalon-sur-Saône, on the Seine between Le Havre and the ports of the Île-de-France region, and in the North between Dunkirk and Dourges.

3.3.2 Alignment

- **Criteria for a substantial contribution to climate change mitigation**

The second technical criterion common to categories *6.2. Rail freight transport* and *6.8. Inland waterway freight transport* is to exclude the *"transport of fossil fuels"*; however, the logistics chain for petroleum products is based on depots housing the successive loading and unloading operations, up to the final distribution to service stations by road, and does not make use of combined transport.

For its part, the first criterion for category 6.2 requires that, if the train is not electric, it must be "bimodal", in other words, the use of an emitting engine on non-electrified lines is possible if emissions are zero for journeys made under catenary. In practice, however, the first bimodal freight locomotive did not run in France until 2021, for conventional freight; on the contrary, in practice, when freight transport requires a diesel locomotive, it provides traction over the entire route, including on electrified track, as the cost of changing locomotive is prohibitive. This criterion is not met for non-electric CT services.

[48] Seaports are served by waterways on routes subject to inland navigation rules.

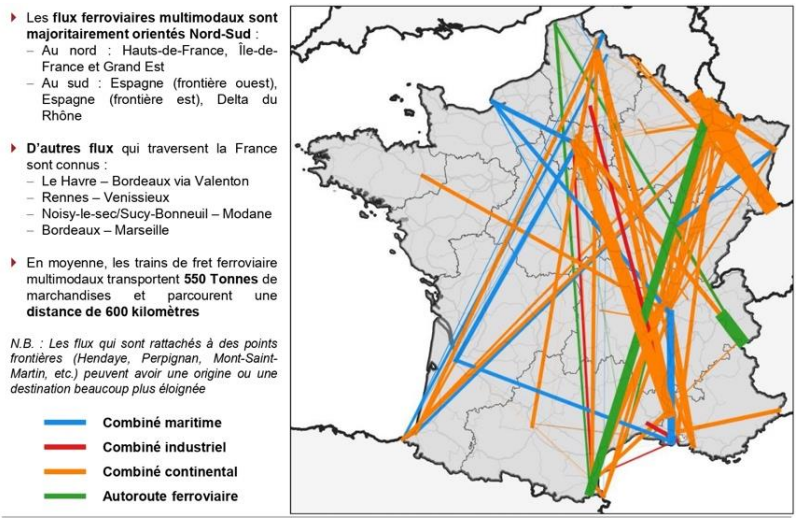

Figure 3 - Combined rail transport flows in 2019 - Source: GNTC

Over the period under review, and in general, rail combined transport offered services (cf. Figure 3) on a network concentrated on a few routes: Dunkerque / Lille / Paris, Paris / Dijon / Lyon / Marseille-Fos / Perpignan, Paris / Bordeaux / Hendaye and transverse: Bordeaux / Toulouse / Narbonne and Rennes / Lyon, Le Havre / Strasbourg. According to SNCF Réseau, around 98% of rail CT traffic uses electric traction.

For category 6.8, the first technical criterion is the use of low-emission boats, either with zero direct CO_2 (exhaust) emissions or, until 31 December 2025 only, as a transitional measure, with "*CO2 emissions* (per t.km) *50% below the reference value"* corresponding to heavy commercial vehicles[49] .

Although the AMI does not set any specific conditions or request information on emissions, the much greater energy efficiency of the river mode means that this "transitional" criterion of low emissions per kilometre can be considered to be met *a priori*[50] .

- **Criteria for the absence of collateral effects** (not causing significant harm)

On this point, for eligible rail CT, which is a special case of electric rail freight transport, the conclusions developed in 2.3.2 above apply.

For river freight, while there are generally framework documents adopted by the industry, guaranteeing an evolutionary approach, such as :

- The commitments for green growth (ECV) for the river sector, signed on 6 July 2021 between the State, port and river infrastructure managers and economic operators in the sector. The aim is to facilitate the greening of fleets and the sector's energy transition. The signatories are mutually committed to reducing greenhouse gas emissions from inland waterway transport by 20% over the next 10 years and to testing alternative low-emission or innovative motorisation solutions;
- The Central Commission for Navigation on the Rhine's (CCNR) roadmap for reducing emissions from inland navigation (March 2022) ;
- The 2018-2022 aid plan for modernisation and innovation (PAMI) implemented by Voies Navigables de France (VNF) to promote the adaptation of the river freight transport fleet to environmental and logistical requirements ;

precise information on the environmental practices of the shipowners and craftsmen operating the river service, the central link in the CT service, is not available in the AMI files. In particular, it is not

[49] Vehicle sub-group 5-LH, corresponding to the most efficient road assemblies
[50] Cf. SDES - The environmental costs of domestic maritime freight transport - October 2022

possible to comment on whether they comply with requirements that are more restrictive than the strict applicable regulations.

More detailed information on each of the objectives:

- Adaptation to climate change: the requirement relates to the existence of a relevant adaptation plan. This mainly concerns river infrastructure managers. Whether it is VNF, the major river ports or the local authorities managing other ports, they are all involved in the climate change adaptation strategy launched by the French government in 2019, and for which, after two initial adaptation plans, a new policy is currently being drawn up.
- Sustainable use and protection of water and marine resources: the requirement relates to the existence of a management plan for the use and protection of water, drawn up in accordance with European directives. The aid relates to transport carried out in France, where the regulations provide for such plans, taking into account the various uses of water.
- Transition to a circular economy: the implementation of waste management measures, in line with the waste hierarchy, is required both during the use phase (maintenance) and at the end of the fleet's life.
- Pollution prevention and control: boat engines must comply with the emission standards set for phase V of the so-called EMNR regulation[51] applicable, initially from 1er January 2019[52] , only to new engines, with no obligation to upgrade existing boats; over the 2015-2021 boat operating period, this is highly unlikely, as the first French "EMNR boat" (a VNF work boat) was launched in October 2020 and such boats are still rare.
- Protection and restoration of biodiversity and ecosystems: there are no specific requirements in the appendix.

In conclusion, this criterion is not met for inland waterway CT because of the requirement for emission standards that are not met by the engines of the vessels used. In principle, with the renewal of the fleet and the adaptation of engines on existing vessels, from 2022 onwards, this criterion should be met to a significant degree. However, from 1er January 2026, transport by non-electric vessels will no longer be eligible.

- **Compliance with minimum guarantees**

For this criterion, the analysis in 2.3.2 above applies and allows us to conclude that it has been met.

3.3.3 Alignment rate

Consequently, if we adopt the convention of calculating the rate of alignment of aid as the proportion of aid allocated to aligned activities, we obtain a rate of 68% resulting from the weighted average between the rate of 98% for rail CT and the zero rate resulting from the non-alignment of aid to inland waterway CT.

This rate is similar to the one that could be calculated using the *Greenfin* label, which excludes all activities in the fossil fuel value chain and whose category 5 (Transport) does not include river transport.

[51] Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements concerning emission limits for gaseous and particulate pollutants and the type-approval of internal combustion engines to be installed in non-road mobile machinery

[52] Due to the late arrival on the market of engines that comply with the standards and the health crisis, this obligation has been postponed for a transitional period until 30 June 2021.

3.4 Quantitative assessment

3.4.1 Valuation principles

The quantification of benefits is based on a comparison of two situations with and without aid, the latter being reconstructed.

- **A first approach through the conventional evaluation of externalities**

Information on the socio-economic benefits of CT can be found in the State aid dossier, which quantifies a number of environmental benefits, summarised in the

(M€)	TC rail-route	TC fluvial
Volume Md t.km	7,310	0,622
Coût des services	365,8	92,5
Montant aide	18,0	9,0
Avantages totaux	178,4	15,6
Insécurité	54,8	4,7
CO_2	16,1	0,9
Pollution	78,2	6,5
Bruit	9,5	1,7
Congestion	19,7	1,9

Valuing the positive externalities of combined transport
(Situation 2018)

In a socio-economic approach, the file requested by the European Commission presents the monetisation of the advantages of using combined transport rather than end-to-end road transport for the services supported.

Valuation of the gains on five externalities: insecurity, CO emissions$_2$, air pollution, noise and congestion using the prescribed values *(Handbook on the external costs of transport - 2019*) leads to total social benefits estimated at €178.4m and €15.6m respectively for rail and inland waterway CT.

As the amount of aid is well below 50% of this total, it is presumed to be compatible.

Sidebar 3 - Calculation of fringe benefits linked to toehold assistance (according to EC methodology)

This calculation, which is systematically carried out for all State aid to reduce external costs[53] , is based on the conventional costs given in the European Commission's guide. -These have been calculated using average physical factors (payload, energy consumption, fuel emission factors, etc.) and then quantifying and valuing the various impacts using conventional monetary values resulting from academic research. For example, the €17m socio-economic benefit in terms of CO_2 corresponds to an annual gain of 170,000 tCO_2 e from the services supported.

This figure seems a long way from the order of magnitude of 1.3 Mt estimated by the Groupement national du transport combiné (GNTC), even taking into account differences in scope (some CT services are not subsidised). However, the simple multiplicative accumulation of uncertainties induced by the use of average values per traffic unit (t.km) at all stages of the calculation could not explain such discrepancies.

- **The need for a more direct approach**

Carrying out the assessment involves dealing with two very distinct issues:

1. Evaluate the concrete effect of the aid on modal shift, which results from the reduction in the cost of CT services for shippers on the end-to-end market,
2. Evaluate the environmental benefits of this transfer: these derive from the variations in

[53] It has been requested by the European Commission since 2008 - see the section on "aid to meet the needs of transport coordination - aid to reduce external costs in the Community guidelines" on State aid to railway undertakings.

physical emissions between CT and TRM on the same complete journey.

In concrete terms, it is at the level of a regular service ("CT line"), the basic economic unit receiving the aid, whose geographical location and the technical characteristics of the offer determine the accessible market and the gains in emissions, which are not necessarily proportional to the volume of traffic transferred, that the assessment must be carried out.

- **Mechanism for modal shift through aid**

In principle, support for public transport services, by making them more competitive with road transport, should encourage the creation of regular routes, attract traffic to them, make them easier to use, and therefore encourage their development.

However, an examination of the market shows a long-term growth trend, especially in rail traffic (cf. Table 6), for which the growth observed in freight is solely due to that of CT, overcompensating for the erosion of conventional freight traffic, with in recent years the rise of rail motorways, the volume of which alone represents several times that of river CT, shows little creation of services *ex nihilo.*

Traffic (bn.tkm)	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Rail freight	32,23	32,60	34,25	32,57	33,44	32,04	33,91	31,30	35,77	35,28
Rail CT	8,42	9,11	9,87	9,05	9,16	10,16	11,21	11,70	13,84	14,31
Public transport share (%)	*26,1*	*28,0*	*28,8*	*27,8*	*27,4*	*31,7*	*33*	*37,4*	*38,7*	*40,5*
Non-transit	ND	ND	ND	ND	ND	ND	8,19	8,67	10,85	11,63
Tr. trailers	ND	ND	ND	ND	ND	ND	0,67	1,33	1,65	2,06
River transport	0,8	0,8	0,8	0,7	0,7	0,6	0,6	0,5	0,5	0,5

Table 6 - Trends in rail freight and inland CT (Source SDES)[54]
t.km net, excluding the weight of the train and containers

The creation of new CT services generally appears to be the consequence of the creation of a multimodal terminal (e.g. Dourges opened in 2004, Le Havre in 2015, Bettembourg in 2017) supported by substantial public funding, as well as - particularly for rail motorways - specific support schemes for the launch of regular services, including subsidies for the necessary equipment.

Apart from these cases, the changes to the transport plan observed consist of limited changes to the existing offer - reconfigurations or extensions of services or strengthening of trains or the timetable - in line with the shippers' market. Insofar as the aid is directly proportional to traffic and, even revalued since 2021 for 2020 traffic, represents around 5 to 10% (cf. Sidebar 3) of the announced costs only - excluding the costs of the final road legs - it provides only limited support when a line is launched.

In fact, the concept of the aid scheme does not seem perfectly clear: "*Freight activity is, in principle, governed solely by the commercial relations between shippers and carriers*"[55] and in this sense an operator responding to the AMI must indicate, as part of its commitments, how it intends to eventually free itself from the aid it is applying for[56] , which seems to place the aid in the category of "start-up aid", but its amount is not known until after the service has been provided - which weakens its incentive nature, This weakens its incentive effect, as the operator has to assume the risk of a cash flow shortfall, and is dependent on future annual budget decisions, which are difficult

[54] The statistical series have been adjusted by the SDES, which only publishes very rounded figures for inland waterway transport.
[55] Community guidelines on State aid to railway undertakings - cited above
[56] However, the commitment requested in the application does not appear to be included in the agreements signed.

to predict. In 2006[57] , the representative of the Freight Transport Users' Association described the aid as *"a sprinkling of* aid*, a (timid) fare corrector with uncertain renewal".*

Similarly, granting the same level of aid to all eligible services, whatever their characteristics and customer base, raises doubts as to whether the aid is indeed "*strictly limited to compensating for the opportunity costs associated with using rail transport rather than a more polluting mode of transport"*[58] *.* When, particularly on long-distance corridors with heavy traffic, CT transport is the most competitive, the aid is not really necessary and is only a very marginal incentive to transfer: only the competition that exists on these corridors between CT operators can *ultimately* benefit their customers.

In fact, the mechanism used amounts to distributing a budgetary envelope to the operators present on the French CT market in proportion to their activity in the previous year, and seems more designed to cushion the consequences of variations in activity linked to external factors, in particular changes in the price of heavy goods vehicles and industrial action in the rail sector, with a view to maintaining existing services rather than encouraging the start-up of new services.

Under these conditions, the application of a price elasticity to the cost of the complete journey (including pre and post road haulage) by CT, making it possible to evaluate, all other things being equal, the additional traffic using CT as a result of the aid and to deduce from this the volume of traffic shifted from MRT, seems legitimate for assessing its effect, the reduction in the cost of the complete service being in any case limited to a few %[59] .

It should be noted that this mechanism is not relevant if the choice of CT is constrained by the regulations, for transport which the regulations exclude from road routes, either because they are prohibited or because the specific requirements to which they would be subject are economically prohibitive: for example, a CT service reserved for chemical products running only at weekends, when the road transport of dangerous goods is prohibited, will not see the level of aid have a significant influence on its traffic. This is notably the case for the French-Italian Alpine rail motorway- with regard to the transport of dangerous goods, but as it has its own aid scheme, it is excluded from the scope of the assessment; beyond this particular case, such services appear to be marginal.

- **Available data**

In addition to the characteristics of the offer, which are public by definition, the administration has detailed data for each subsidised service in the responses to the annual call for tenders. This data is covered by business confidentiality and includes the annual tonnage and number of the various categories of ITU actually transported, the distance covered by the trains/boats, the volume of traffic and their overall operating cost; however, apart from general information on the service's hinterland, the costs of transporting swap bodies/containers on the road segments are not specified.

For example, for the year 2021 (Budget Expenditure 2022), 128 different rail CT services were recorded, having transported a total of around 730,000 ITUs, and 42 river CT services for around 255,000 ITUs. These services vary greatly in intensity, from around twenty (one weekly seasonal service) to more than 1,000 A-R services a year (3 daily services throughout the year), with volumes ranging from a few hundred to more than 80,000 ITUs transported. These services include in particular the two rail motorways Perpignan - Luxembourg and Perpignan - Calais, which came into operation in 2007 and 2016.

- **Segmentation**

The assessment is based on a comparison, from a shipper's point of view, of the two transport chains from the origin of the goods to their point of delivery, one comprising pre-carriage and post-

[57] Economic and Social Council - A new dynamic for intermodal transport - November 2006
[58] Community guidelines on State aid to railway undertakings - cited above
[59] At least in the case of rail CT, which is very dominant, increasing from 92% to 97% of the t.km aided over the period.

carriage by road to and from the CT terminals linking the main link in river or rail transport, and the other direct in road transport.

Road journeys are generally shorter than combined transport journeys, which are constrained by the layout of railway lines or rivers, and have to be diverted to terminals for pre- and post-transport road journeys.

However, a distinction must also be made between :

- Conventional CT, which handles swap bodies or containers on specialised lorries, which therefore need to return to the terminal; these returns are generally empty, which means that on the end sections the lorries' journey requires almost twice as much energy as MRT, with the corresponding emissions;

- the rail motorway, which handles "classic" road semi-trailers that will be taken over from the terminal's fleet by standard tractors that can therefore be integrated into HGV services.

The environmental benefits expected from a rail motorway are significantly higher than those expected from a conventional CT service.

- **Calculation of environmental benefits**

It was decided to use the *EcoTransIT World* tool, which calculates energy consumption, greenhouse gas emissions and pollutant emissions for intermodal transport chains, including transhipment; the tool has a database that can be used to calculate, for each mode of transport, the most suitable route for the journey between two geographical points[60] on the European networks (road, rail and inland waterway) and to calculate energy consumption for a typical load (in principle 100 t) as a function of the type of vehicle and the load factor of the convoy.

The physical factors (vehicle mass, load factor, traction mode, load rate, UTI mass, etc.) of the convoys used by the various services must be entered on the basis of known data, when the use of default values (statistical averages) does not appear to be relevant. Emissions are determined using a bottom-up analytical approach based on the energy required for each stage of the journey, the fuel used and the emission class of the transport equipment used.

The calculations are carried out from well to wheel, and consequently the emissions linked to the production and distribution processes are taken into account; in particular, the emission factors for electricity are differentiated by country. In particular, the emission factors for electricity are differentiated by country. In fact, the low emission factor for electricity produced in France leads to a gain in GHG emissions linked to the transfer of electricity that is higher than the European average.

The tool enables two transport chains to be compared directly between an origin and a destination. In order to make the assessment as realistic as possible, this comparison has been carried out on almost a hundred CT links (those for which the raw data available was complete, including costs) with traffic in 2021 (Help 2022); representing more than 95% of the volumes (in t.km or in UTI). The model could be applied to previous years, taking into account the services and values known for those years.

The Table 7 below provides, for a number of significant routes, both in terms of their volume of business and their representative nature, elements for evaluating the gains made by the transfer from MRT to CT.

Standard links	**Route** (km)	**Energy** (kWh/t.km)	**GHG** (g.eqCO_2 /t.km)	**Particulate matter** (µg./t.km)

[60] Specified by their UIC or UN codes for rail or port facilities, their postcode or their GPS coordinates.

	TRM	CT *dt road*		TRM	TC	*gain*	TRM	TC	*gain*	TRM	TC	*gain*
AF Bettembourg-Le Boulou	974	1 024	*4*	0,339	0,082	*-76%*	73,7	2,0	*-97%*	6,7	1,2	*-83%*
Dourges-Vénissieux rail CT	757	751	*119*	0,392	0,185	*-53%*	83,6	21,4	*-74%*	7,6	3,1	*-59%*
TC fer Mouguerre-Candiolo	1 153	1 316	*174*	0,331	0,134	*-60%*	72,2	13,2	*-82%*	6,5	2,2	*-66%*
TC fl. Fos-Lyon	307	375	*64*	0,410	0,181	*-56%*	87,2	40,6	*-53%*	8,0	7,1	*-12%*
TC fl. Le Havre-Gennevilliers.	217	370	*39*	0,480	0,279	*-42%*	102,1	64,2	*-37%*	9,5	13,7	***+45%***

Table 7 - Gains in CT emissions (Ecotransit calculations based on 2021 traffic)

The rail motorway, for which the final road haulage is no different from conventional road haulage, is proving to be highly efficient from an energy point of view (consumption needs are cut by a factor of 4) and even more so, thanks to electric traction, in terms of greenhouse gas and particle emissions.

Although rail is a highly energy-efficient mode of transport, it has to take account of pre- and post-transportation, even if the total journey on the route under consideration is shorter than that on the motorway, and the occupancy rate is *a priori* lower. In any case, the GHG reduction rate remains high, at over 70%[61] .

Inland waterway CT is in a different situation: it offers very good energy efficiency, but as it uses fossil fuels, the gain in emissions comes solely from this improved efficiency, and on the contrary, the emission performance of its engines is mediocre.[62]

3.4.2 Results and analysis

With a price elasticity of 0.8[63] , the level of aid granted in 2022 for 2021 traffic of €29.3 (i.e. around 2/3 of the invoiced price of handling, of the order of €40 to €50, in the terminals) represents around 5% of the estimated costs of transport by CT.

The Table 8 below shows the environmental indicators calculated for 2021 (values in current €, as the aid was paid in 2022) up to the calculation of the indicator of the cost of reducing the tCO e_2.

The values given are raw results whose apparent precision should not be misleading; the figures are orders of magnitude, depending on the assumptions made.

Year 2021	Traffic bn.t.km	UTI	Gripper aids (nb)	Cost €m	Support €m	Gain	Δ Traf M.t.km	Δ t.CO_2	€/t.CO_2	Δkg.PM
Autor. ferr.	2 458	107 787	129 625	58	3,8	6,6 %	129,8	9 086	418	649
Rail CT	7 940	623 701	967 063	607	28,3	4,7 %	296,7	17 804	1 591	1 484

[61] However, in a very specific case of short-distance rail CT (130 km) using diesel traction for 20% of its journey, the EcoTransit calculation concluded that the GHG emissions were higher than those of MRT.

[62] However, the calculations are based on the assumption that the boats will be powered after 2006.

[63] See *European Commission - Impact assessment support study for the review of the Community guidelines on State aid for railway undertakings - Final Report - 2023* - pp. 141 and 142.

River transport	636	254 606	509 212	134	14,9	11,1 %	56,6	2 264	6 591	283
Package	***11 034**	**986 094**	**1 605 900**	**799**	**47,0**	***5,9 %***	**483,1**	**29 155**	***1 612***	**2 416**

*Including international traffic

Table 8 - Gross environmental indicators for clamp assistance

The raw results show a wide range of effects, with the cost of abatement always higher than the €250 value$_{2018}$ of the "Quinet report", the best results being obtained for rail motorways.

The Table 9 shows the total estimated GHG savings (in tCO_2 e) resulting from the amounts of aid over the period.

GHG savings	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Autor. ferr.		1 100	1 600	1 000	1 200	7 200	9 100
Rail CT		6 400	11 200	9 200	9 000	18 700	15 400
River transport		1 900	2 200	3 300	1 700	2 600	2400
Package	***8 500***	**9 400**	**15 000**	**13 400**	**11 900**	**28 500**	**26 900**

Table 9 - Estimated GHG gains over the period

The main explanation for the large increase in GHG savings (threefold) calculated is the increase in subsidies, which, because of the model used, has a directly proportional effect on the transfer. However, we can also see the effect of the shift in combined transport supply towards the modes that decarbonise most intensively: development of rail motorways, stagnation, or even regression, of river CT. We can also see the effects of better train capacity utilisation, particularly in 2021 (corresponding to 2020 traffic).

It should be noted that running a more heavily loaded CT train and/or more CT trains will automatically mobilise the mechanisms for partial tax exemption for electrical traction energy and partial coverage (currently 50%) by the State of the fees owed by freight operators to SNCF Réseau[64] .

Taken together, these two schemes represented around €25m a year for public transport services in 2022. In theory, the - small - proportion of this aid paid automatically as a result of new traffic triggered by clamp assistance should be transferred to it.

[64] A medium-term approach could also take into account the substantial financing provided by the EEC mechanism for the acquisition of a UTI dedicated to combined rail-road transport.

4 Aid for single wagonload services

Principles of wagonload transport

Originally, the railway was essentially a means of transporting goods. These were brought ("brouettées") by horse-drawn transport to freight halls adjacent to stations, where employees were responsible for sorting them according to their final destination and loading them onto wagons, then integrating these wagons, known as individual wagons, into trains, known as allotment trains, as far as a marshalling yard where trains, known as inter-triage trains, were formed, grouping together wagons with similar destinations.

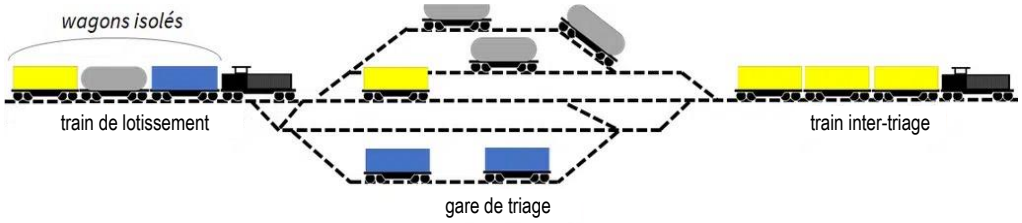

Figure 4 - Isolated wagons and housing estate

The biggest users of the railways (industrial sites, quarries, warehouses, etc.) were then given the right, in order to avoid this costly intermediate transport and transhipment, to be connected directly to the railway via "private" sidings (known as branch line terminals - STEs), with the responsibility for handing over not goods, but already loaded wagons; trains, known as service trains, would collect them (and in return distribute empty wagons) running regularly according to pre-established timetables.

Today, rail freight no longer manages goods directly, and although the management unit is still the wagon, its market is concentrated, alongside the massive trains dedicated to a single shipper, on traffic between terminals. In fact, inter-sorting trains have to handle both the large flows from these major hubs and the diffuse traffic from ITEs, the number of which has fallen significantly[65] in France.

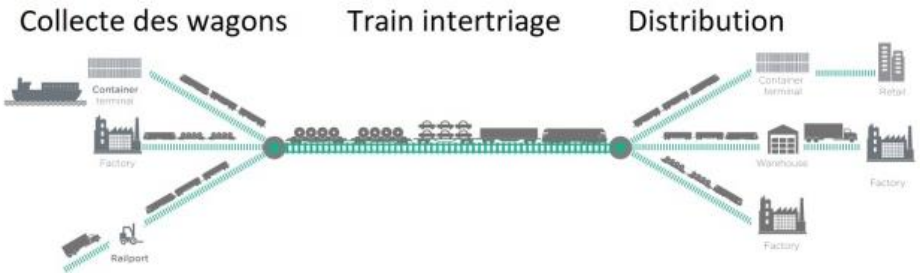

Figure 5 - Single wagon diagram *Note: a long-distance journey will use several successive inter-triage trains.*

[65] Of the 2,800 or so ITEs in France, only a third are still served by train, with ¼ of them running one train a day or more (CEREMA ITE 3000 database).

4.1 Origin and development of the measure

The aim of the single wagonload aid scheme is to support and promote the use by shippers of "single wagonload" services serving French territory, by providing direct aid to railway undertakings providing such services on the basis of their actual performance.

The creation of this type of aid, which is completely new, was one of a number of proposals. requested of the government by the Alliance *Fret Ferroviaire Français du Futur* (known as Alliance 4F), which brings together shippers through the Association des Utilisateurs de Transport de Fret (AUTF) and the main rail freight transport companies, including local rail operators (OFPs)[66] , the main CT operators and their trade unions and numerous sectoral associations[67] , in its report "Rail freight to reconcile economic recovery and ecology" published in June 2020[68] .

Included in the "National Strategy for the Development of Rail Freight" (SNDFF)[69] , which aims to achieve a modal share of 18% by 2030 and 25% by 2050, and of which it is measure no. 40, this aid scheme was developed and launched in March 2021, when it was pre-notified to the European Commission, before being officially launched in August 2021.

It is authorised for an initial period of 5 years (traffic from 2021 to 2025) and has been renewed after 2022.

4.2 Precise description of the system

The stated aim of the aid is to make it possible to offer competitive wagonload services and thus encourage the development of direct rail services to economic activities.

4.2.1 Type of measure

The aid is a direct operating subsidy.

It is aimed at Railway Undertakings (RUs) providing a terminal service to an ITE to bring (or collect) a batch of wagons (one or more wagons), at least one of which is carrying goods - with the exception of any container or swap body - whose origin or final destination is the ITE site.

A flat-rate amount of aid, identical for all services, is allocated for each eligible service, irrespective of the length and traffic of the service; insofar as this aid is intended to compensate for the fixed costs associated with taking over wagonloads for a complete rail service, it is not compatible with clamping aid, and excludes combined transport trains.

Provided for in article 178 of the law on the orientation of mobility[70] which prescribed the establishment of the SNDFF, this type of aid measure for modal transfer, being intended for economic operators acting on a market open to competition, falls into the category of State aid. Administratively, it falls into the category of aid to reduce external costs by being intended to encourage a shift from road to modes that have a lesser impact, particularly on the environment.

It is therefore governed by the conditions set out in the European Commission's decision of 10 October 2022 on this aid scheme for the operation of wagonload services for the period 2021-2025,

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[66] In France, an OFP is a small or medium-sized railway company that handles local freight traffic and/or the maintenance of local freight railways (known as "freight capillaries").

[67] These include the Union des Transports Publics et ferroviaires (UTP), the Association française des détenteurs de wagons (AFWP), the Fédération des industries ferroviaires (FIF) and the Syndicat des Entrepreneurs de Travaux de Voies Ferrées de France (SETVF), as well as the Association Française du rail (AFRA), the Groupement National des Transports Combinés (GNTC), the Association française des gestionnaires d'infrastructures ferroviaires indépendants (AFGIFI) and the Comité pour la liaison européenne Transalpine.

[68] Report - Alliance 4F's proposals for doubling rail freight's market share by 2030 - 23/06/20

[69] Strategy published on 13 September 2021, approved by decree no. 2022-399 of 18 March 2022.

[70] Law no. 2019-1428 of 24 December 2019 on the orientation of mobility

corresponding to aid budgeted between 2021 and 2026.

4.2.2 Terms and conditions of award

In addition to the geographical requirement for the ITE to be located in mainland France, it is also required that the grouping/ungrouping of batches between the inter-sorting train and the terminal train be carried out at a listed marshalling site, where wagon sorting is carried out on a regular basis and is accessible to all RUs.

The mechanism allows aid to be granted to an international service serving an ITE on national territory, provided that the yard is located in mainland France.

In order to be eligible for aid, RUs must respond, generally during the second quarter of the year, to a call for expressions of interest (AMI), published in the Official Journal of the European Union (OJEU), with the aim of identifying RUs applying for aid and estimating the number of eligible services for the current year.

In addition to data on the composition, origins and destinations of each of the services for which aid is requested, and more general cost data, the required application must include a commitment from the beneficiary to specify the methods used to count the aided services and to accept any checks.

After examination, applications are subject to an annual agreement covering the services provided and setting out the beneficiary's commitments and the terms and conditions of the financial support provided by the State. In particular, services for which the applicant cannot provide proof of the grouping/deconsolidation of consignments dispatched/received are excluded.

In practice, after making an advance payment in the year in which the services are carried out, and examining the final applications at the beginning of the year to show that the services have actually been carried out, the administration sets the final rate of aid in the light of the total budget available after the various budget reserve operations and the total volume of eligible services recorded, with the agreements being updated and the balance paid at the end of the year.

4.2.3 Amount of expenditure and beneficiaries

The Table 10 shows the amounts of aid granted for 2021 and 2022, and the number of services considered.

Budget years	**2021**	**2022**	**2023**
Aid for operating wagonload services (€M)	-	70,0	70,0
• ***Advance***	*52,3*	*60,0*	
• Number of beneficiaries		8	8
• Volume of services assisted		42 384	40 790
Rate of aid (€/eligible service)*		**1 704**	**1 758**

*Theoretical rate, as aid is capped for certain RUs

Table 10 - Recipients of single wagonload aid

It should be noted that, although calibrated by the number of eligible terminal services, the aid is indeed intended to encourage end-to-end rail freight transport by "isolated wagon" (in practice by individual wagon or "coupon" - group of wagons). Fret SNCF, the incumbent operator, was obliged until the end of 2009, when the domestic rail freight market was liberalised, to transport any wagon between two "freight stations" on the network. Of the 8 companies receiving aid, Fret SNCF is still the main railway company to offer this solution. However, they are all seeking to fill their inter-triage trains as full as possible, regardless of whether the wagons are loaded or empty, by pooling volumes with dedicated trains or combined transport trains.

4.3 Alignment with taxonomy

4.3.1 Eligibility

The activities assisted (NACE code H49.20Rail freight transport) are listed in point *6.2. Rail transport* in Annex I of the "Climate" delegated regulation and are therefore eligible.

4.3.2 Alignment

As the aid is aimed at rail transport companies, the analysis carried out in the previous sections applies directly.

The two technical criteria set out for these activities must be taken into account when deciding on the alignment of transport services with a subsidised terminal.

- **Exclusion of fossil fuel transport**

The file that beneficiaries must submit does not ask for the nature of the goods transported by the terminal trains; only information on the shipper/consignee and the ITE concerned is required. If the terminal service to an oil depot is part of the fossil fuel logistics chain, other shipments of fossil fuel or products from their production chain that are part of this logistics chain, particularly those to ITEs with sub-connections, cannot be identified.

In the absence of explicit data, it was considered that the rate of 7% of rail freight transport, or, taking into account the fact that combined transport is little used for this type of product, around 10% of conventional freight transport[71] , devoted to the transport of products in the fossil fuel chain was valid for this transport by single wagonload,

- **Exclusion of diesel traction**

According to the Autorité de régulation des transports (ART), although the non-electrified rail network represents a significant proportion of the French network (almost 30%)[72] , only 4% of freight trains.km are operated on these non-electrified tracks, and in the absence of dual-mode freight equipment, the use of thermal equipment on electrified tracks represents an additional 19% of trains.km of freight services, i.e. a total of 23% of freight traffic operated in thermal mode.

Since ITEs themselves are rarely electrified, using this rate for transport involving a terminal service seems appropriate.

- **Alignment rate**

Consequently, by combining the two exclusion conditions, which are *a priori* independent, we obtain an overall alignment rate of 70% by multiplying the two rates.

The *Greenfin* label, whose standards exclude all activities in the fossil fuel value chain but whose category 5 (Transport) does not exclude diesel equipment, has been announced as having to be modified to take account of the criteria of the European taxonomy.

4.4 Quantitative assessment

4.4.1 Particular evaluation difficulties

In principle, the quantification of benefits is based on a comparison of two situations with and without aid.

[71] Since it only represents around 70% of total rail freight transport.
[72] Autorité de régulation des transports - The French rail transport market in 2022 p.27

In this case, this counterfactual scenario appears particularly difficult to conceive:

- the aid was put in place in the very special period of the end of the Covid crisis;
- the single wagon business is balanced by the pooling of trains with other forms of rail transport, and is poorly known in quantitative terms and is not subject to separate statistical monitoring;
- all the players agree that "*wagonload transport is structurally loss-making* (due to) *additional fixed costs*"[73] of sorting, collecting and redistributing wagons to end customers;
- in particular, Fret SNCF, by far the main player on this market, estimates that it has accumulated €2.5 billion in "analytical debt" since 2003[74] due to the deficit on single wagonload services; moreover, in January 2023, while it had been investigating suspected illegal State aid since 2007, the European Commission opened a formal procedure which led to a "discontinuation plan" for the company;
- the design of the aid scheme, which is new, has not been the subject of detailed studies and evaluation.

Although a significant part of the aid was paid during 2021, reinforcing its incentive nature, and its amount represents a new contribution of around 15% of the cost of assisted transport[75] , the change in the number of ITEs served, down by 3.8% between 2021 and 2022, at a much higher level than the slight decline (- 1.4%) seen at the same time in rail freight transport in general, shows the difficulty, in such a volatile environment, of reasoning "all other things being equal".

- **Available data**

Through the responses to the AMI, the administration has data on each of the eligible services, in particular its location, the related tonnage and volume (t.km), and the number of wagons, full or empty, dispatched or delivered. However, this information is insufficient to assess the overall volume of traffic concerned; to do this, it would be necessary to identify the loads on each route, in order to know the length of the inter-triage journeys and understand whether they were served locally at origin, destination, or both.

- **Initial findings**

Single wagonload services have lost the public service status conferred on them until 2006 by the obligation to serve (designated stations) instituted by international treaties, and the organisation of their production has had to adapt to widespread competition on the freight market, first international and then domestic, and the network of services has not only been considerably reduced but is less well known, since it is the sole commercial initiative of the companies.

The Table 11 below summarises the main data from the call for expressions of interest for traffic in 2021; it highlights the continuing predominance of Fret SNCF, which had a de facto monopoly until 2010 on this particular historic[76] market, even though its market share is now only around 50% of the total French rail freight market.

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[73] See European Commission letter *C (2022) 7213 final* of 10 October 2022 - Aid for the operation of single wagonload services for the period 2021-2025, Recital (6).

[74] Assemblée Nationale - Committee of Inquiry into the liberalisation of rail freight and its consequences for the future - Hearing of Mr Frédéric Delorme, Chairman of *Rail Logistics Europe* and Mr Jérôme Leborgne, Managing Director of Fret SNCF - 18 September 2023

[75] The total amount of costs declared by the beneficiaries of the aid is around €480 million.

[76] The values given do not consolidate the activity of its subsidiaries, which may be carried out either on behalf of Fret SNCF, on terminal services, or directly for shippers, or even in partnership with other RUs.

Year 2021	Eligible services	No. of wagons	*of which busy*	*of which empties*
All EF	42 834	492 000	*378 000*	*104 000*
of which single-car services	*4 300*	*4 300*	*3 900*	*400*
of which services with 15 wagons or less	*30 310*	*204 000*	*166 000*	*38 000*
of which Fret SNCF	76%	77%	-	-

Table 11 - Single wagonload services in 2021

The average load per wagon is almost 54 tonnes.

The number of wagons counted is around double that estimated in 2016 in the study carried out by AUTF, which then put it at around 200,000, to be supplemented by 25,000 empty wagons. This figure is a direct result of the definition of "single wagon" used for the scheme: it takes into account groups of wagons of all sizes, provided that they come from a marshalling yard and are not the result of full trains being split into batches.

If, with reference to the limit adopted in Germany (see *below*), only coupons of 15 wagons or less are taken into account, i.e. half of a train typically comprising 28 wagons, we return to the order of magnitude estimated in 2016.

In any case, the size of the flow of empty wagons (incomplete, as only those included in a train with at least one loaded wagon are counted) shows the importance of the logistical constraints linked to the availability of often specialised vehicles, the archetypal example being tank wagons for hazardous materials, subject to drastic product compatibility rules.

4.4.2 Assessment criteria

In the absence of hindsight and well-established multi-year data, the assessment remains global.

- **A first approach through the conventional evaluation of externalities**

The State aid scheme was approved on the basis of the socio-economic benefits provided by the "insulated" wagon. In application of the guidelines on State aid to rail transport, the conventional valuation of externalities is treated as an amount of "eligible costs", to be compared with the amount of aid, which must not exceed half. In addition to these generic advantages, the decision approving the scheme places special emphasis on the fact that wagonload transport also enables "safer transport of dangerous products" and points out that it is widely used by the chemical and petrochemical industry, without quantifying these advantages.

The conventional assessment takes into account environmental impacts (GHG emissions during transport, but also those linked to upstream energy "from well to reservoir", emissions of atmospheric pollutants, impact on the natural habitat) directly linked to the objectives of the ecological transition taken into account in the taxonomy regulation, as well as the externalities of road congestion, accidentology and noise.

The Table 12 presents the main results of the calculation, based on average values taken from the European Commission's *Handbook* (shown in the table).

All WI traffic (8.73 bn tkm)	**M€**	**Unit values (c€ /t.km)**	
Cost of services	462,3	5,296	Externalities

Amount of aid (maximum)	90,0	1,031	Rail freight	TRM
Totals	301,7	3,456	1,080	4,556
Accidents	134,6	1,542	0,029	1,571
Climate	46,2	0,529	0,001	0,530
Upstream energy	14,0	0,160	0,037	0,197
Atmospheric pollution	84,4	0,967	0,001	0,968
Noise	-30,0	-0,344	0,621	0,277
Congestion	69,6	0,797	0,000	0,797
Natural habitat	-17,0	-0,195	0,391	0,196

Table 12 - Single wagonload externalities (EC methodology)

It should be noted that these unit values, which show a strong disadvantage for road transport compared with rail transport in terms of noise and impact on the natural habitat, do not really seem appropriate for assessing the measure. The aid is essentially intended to develop or maintain rail traffic on existing rail infrastructures, firstly between marshalling yards and ITEs and, consequently, between these marshalling yards, traffic which tends to be carried out outside built-up areas as well as natural sectors; *a priori,* the externalities of this traffic are too dependent on the natural and human environment to be assessed by using values resulting, on the contrary, from the impacts, which are very preponderant for the calculation of these averages, of traffic carried out in these sectors.

On the other hand, the valuation of the climate benefits arising from a reduction in greenhouse gas emissions, regardless of where the emissions occur, would appear *to* be more robust.

However, the figure of around €60 million (by aggregating the "Climate" and "Upstream energy" headings, most of which are "climate") corresponding to 600,000 tCO e_2, calls for a number of comments:

- the volume of 600,000 tCO_2 e, corresponds to the estimated gain in GHG emissions brought about by all of the wagonload transport carried out in France compared with the emissions that would have been generated by MRT, even though the majority of this "wagonload" transport already exists, without the aid ;
- In particular, the possibility of a transfer from combined transport cannot be ruled out, since, by definition, inter-sorting rail services are deemed to exist; the gain in GHGs would then be limited to terminal sections;
- The monetary values used for climate impact and upstream energy of 0.001 and 0.029 c€/t.km do not seem consistent with an electric traction share of only 77%. Using a weighted average of the *Handbook*'s values for France (pp. 78 and 136) would lead to values of the order of 0.058 and 0.150 c€/t.km; the average gain of 69 g.eqCO_2 /t.km being reduced to 51 g.eqCO_2 /t.km, a level that seems more consistent with the results of direct simulations that could be carried out with EcoTransit.

- **Assessment of the useful effect of the aid**

In the absence of other credible indications and of any obvious model, it was decided, in response to the first comment, to estimate (and in fact to increase) the effect of the aid as the proportion of the environmental gains brought about by this transfer to the single wagon corresponding to its share in covering operating costs, while nevertheless attempting to respect the principle according to which legitimate aid is "*strictly limited to compensating for the costs associated with the use of rail transport rather than the use of a road mode"*.

In reality, the design of this first aid scheme for national single wagonloads does not appear to be

adapted to the structure of production costs: the lump sum granted is the same for a single wagonload service 100 km long, and a "last kilometre" service (more like 5 km in reality) by a train of 30 wagons, assembled from two coupons of different origin in the nearby marshalling yard.

In this respect, the aid scheme set up in Germany for the transport of goods by "wagon or group of wagons"[77] , presented as good practice by the impact study commissioned by the European Commission mentioned above, distinguishes between two terms for calculating aid:

- a term proportional to the length of the service road ;
- a fixed fee, decreasing according to the number of services per year for the same ITE: from €180 per service for an ITE receiving up to 2,000 wagons per year to €900 per service for a facility receiving less than 500 wagons per year, an amount that is in any case much lower than that paid in France (around €1,700).

The relative importance of the latter term seems more suited to the cost structure of "single wagonloads", which the sector agrees have high fixed costs (private terminal, but also specialised wagons) for shippers, while overall the level of German aid will remain, under stabilised conditions, below a ceiling of 0.23 c€/t.km, well below the level of aid granted in 2021 in France, of the order of 0.80 c€/t.km.

A remarkable feature of the German support system for services by "wagon or group of wagons" is the exclusion of service trains with more than 15 wagons, considered to be *"commercially* viable".

It is this criterion of a maximum of 15 wagons that has been used to assess the excess aid; in 2021, according to the agreement, since 70% of the service trains receiving aid are made up of no more than 15 wagons and represent around 49% of traffic, only this "fragile" share of traffic would have been likely to return to TRM without the aid.

Under these assumptions, we can therefore estimate the order of magnitude of the tCO_2 e of GHG emissions eliminated as a result of the aid at : 15% (49% ($8.73.10^9$ x 50.10^{-6}) $\approx$ 32,250 tCO e_2

Table 13 summarises these estimates, including the cost of reducing tCO_2 e.

Year 2021	Fragile" traffic Md.t.km	Δ Traf Md.t.km	Δ $t.CO_2$	€/$t.CO_2$	Δkg.PM
WI aid of €73m	4,30	0,65	32 250	2 280	2 300

Table 13 - Estimated environmental impact WI 2021

Strictly speaking, "captive" wagonload traffic should also be excluded for safety reasons (chemicals, oil), but the extent of this dependence is not known.

In fact, while the aid undeniably has a positive environmental impact, the cost of reducing CO_2 per tonne appears to be very high, without the co-benefits appearing to be systematically significant, due to the *a priori* frequent use of diesel traction to serve ITEs.

[77] *State Aid SA. 108800 (2024/N) - Germany Support for rail freight transport (single wagon load and wagon group transport trains*, p.6

Conclusion

Over the period 2016-2022, the "Aid for the operation of combined transport" budget line covered three different transport aid schemes. The first two - aid for electric transport and aid for combined transport *stricto sensu* - were established well before the creation of the green OAT; the aid scheme for single wagonloads, on the other hand, was only introduced at the very end of the review period, without having had any national precedent.

It should be noted that these three schemes are often superimposed on other public aid schemes for the same services: subsidies for rail, combined transport and public transport investment, aid for rail infrastructure operation, reductions in rail infrastructure tolls, *etc.*, and that in any case their effects remain - except for aid for single wagonloads, but this scheme still needs to be better calibrated - marginal compared with those of the variation in the costs of competing road transport, linked to the price of petroleum products.

However, each of them encourages the use of transport that emits fewer emissions and pollutes less, which is reflected in a generally high rate of alignment with the European taxonomy (between 68% and 99%). The lowest values are due to the strictly regulatory requirements, which had not been laid down when this aid was introduced, and which exclude, as a matter of principle, aid for certain types of transport if they do not use equipment that meets the most recent environmental standards, despite real gains in terms of greenhouse gases or polluting emissions compared with conventional road transport.

If in the future it becomes necessary to align aid with the European taxonomy in order for expenditure to be eligible for the green OAT, it would be easy to provide, without having to modify the aid system, that services that do not directly meet the requirements of the taxonomy should be excluded from the benefit of the taxonomy when applications are examined.

However, the ratio between the financial volume of the aid and the directly attributable GHG savings (abatement cost) appears high, with aid for rail freight and rail motorway activities showing a better ratio.

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