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**COMMISSION STAFF WORKING DOCUMENT**

**EVALUATION**

**of**

**Commission Implementing Regulation (EU) 2015/429 and the rules for noise  
differentiated track access charges**

{SWD(2021) 72 final}

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## Glossary

<i>Term or acronym</i>	<i>Meaning or definition</i>
BMVI	German Federal Ministry of Transport and Digital Infrastructure
Bonus for retrofitted wagons	A mandatory discount from the infrastructure-access charges for railway undertakings using retrofitted wagons (source: Implementing Regulation (EU) 2015/429)
Bonus for very quiet wagons or locomotives	An optional discount for railway undertakings for each very quiet wagon and locomotive (source: Implementing Regulation (EU) 2015/429)
CEF	Connecting Europe Facility, an EU funding instrument for infrastructure investment at European level
CER	Community of European Railways
DB Netz	Main German railway infrastructure manager
EIM	European rail infrastructure managers
ERA	European Union Railways Agency
IM	Infrastructure manager
K-block	Composite brake block with a higher friction coefficient than cast-iron blocks. Retrofitting with K-blocks requires an adaptation of the braking system.
LL-block	Composite brake block with a braking performance similar to a cast-iron brake block. Retrofitting with LL-blocks requires only minor adaptations of the braking system.
Malus	An optional surcharge to the infrastructure-access charges to be paid by railway undertakings for each noisy train (source: Implementing Regulation (EU) 2015/429)
NDTAC	Noise-differentiated track-access charges
Noisy train	A train composed of more than 10% noisy wagons (source: Implementing Regulation (EU) 2015/429)
Noisy wagon	A wagon not complying with relevant noise limit values set out in TSI Noise (source: Implementing Regulation (EU) 2015/429)
ÖBB Infra	Main Austrian railway infrastructure manager
ProRail	Main Dutch railway infrastructure manager
Quiet wagon	Silent wagon
Retrofitted wagon	An existing wagon retrofitted with composite brake blocks in accordance

	with the requirements set out in TSI Noise (source: Implementing Regulation (EU) 2015/429)
RMMS	Rail Market Monitoring Scheme, a report issued every 2 years by the Commission on developments in Member State rail markets
RU	Railway undertaking
SEP	Single entry point, a common contact point set up by the infrastructure managers of the Netherlands, Switzerland, Germany and Austria to apply bonuses and notify low-noise freight wagons
Silent train	A train composed of at least 90% silent wagons (source: Implementing Regulation (EU) 2015/429)
Silent wagon	New or existing wagon meeting relevant noise limit values set out in TSI Noise (source: Implementing Regulation (EU) 2015/429)
SWD	Silent-wagon database
Train bonus	An optional discount for railway undertakings for each silent train (source: Implementing Regulation (EU) 2015/429)
TSI	Technical specification for interoperability
UIP	International Union of Wagon Keepers
Very quiet wagons and locomotives	Wagons and locomotives with noise emissions at least 3 dB below the relevant values set out in TSI Noise (source: Implementing Regulation (EU) 2015/429)
WK	Wagon keeper

## 1. INTRODUCTION

### *1.1 Purpose and scope*

This Commission staff working document presents the findings of the evaluation of Implementing Regulation (EU) 2015/429 setting out the modalities to be followed for the application of the charging for the cost of noise effects. In particular, it focuses on the implementation of the existing noise-differentiated track-access charges (NDTAC) schemes.

Commission Implementing Regulation (EU) 2015/429 of 13 March 2015 "setting out the modalities to be followed for the application of the charging for the cost of noise effects"<sup>1</sup> (hereafter "the Implementing Regulation") gives Member States a legal framework for setting up an NDTAC scheme for their national railway infrastructure if they wish to set up such a scheme.

Article 10 of the Implementing Regulation requires the Commission to evaluate the Implementing Regulation. The key evaluation criteria originate from the 'better regulation' guidelines<sup>2</sup>. These criteria are:

- effectiveness;
- efficiency;
- relevance;
- sustainability;
- coherence;
- EU added value.

The evaluation analysed various data sources, including: (i) rail-fleet data; (ii) a survey and interviews among stakeholders (including railway undertakings (RUs), wagon keepers (WKs), infrastructure managers (IMs), national authorities, national rail regulators, rail-equipment manufacturers and citizens' associations); (iii) an open public consultation which attracted 1 290 unique responses; and (iv) written contributions from industry stakeholders.

The evaluation covers the period 2016-2018 and focuses on the Member States that have introduced a NDTAC scheme pursuant to the Implementing Regulation during this period. The evaluation therefore covers the schemes of Austria, Germany and the Netherlands. The Czech scheme started in December 2019 and is therefore not part of the evaluation. The first national scheme within the EU was introduced in Germany in December 2012, followed by the Netherlands in December 2013<sup>3</sup>. These initial German and Dutch schemes were aligned with the Implementing Regulation by December 2016. The latest schemes were introduced in Austria in December 2017 and in Czechia in December 2019. In accordance with Article 3(2) of the Implementing Regulation, the Dutch, Austrian and Czech schemes will run until December 2021. In accordance with Article 11(2) of the Implementing Regulation, Germany has decided that their scheme will run until December 2020. For comparison, the Swiss NDTAC scheme has also been analysed. The Swiss scheme has been operational since 2002.

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<sup>1</sup> OJ L 70, 14.3.2015, p. 36.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R0429&from=EN>

<sup>2</sup> [https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/evaluating-laws\\_en](https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/evaluating-laws_en)

<sup>3</sup> Pilot programmes started in the Netherlands in 2008.

The evaluation results will help the Commission to decide:

- whether to give Member States the opportunity to extend the validity of their NDTAC schemes beyond 31 December 2021 or to introduce a scheme after that date; and if so,
- whether to adapt certain provisions of the Implementing Regulation.

Article 10 of the Implementing Regulation also highlights the need to evaluate:

- the implementation of the schemes, in particular the progress made on retrofitting wagons;
- the balance between bonuses deducted and maluses already paid;
- the impact of the schemes put in place according to the Implementing Regulation on the overall competitiveness of the freight railway sector;
- how incentives induced through the scheme are passed from RUs to WKs.

## **2. BACKGROUND TO THE INTERVENTION**

### *2.1 Trends in rail noise*

According to the World Health Organization (WHO), environmental noise is an important public health issue. It has negative impacts on human health and well-being, and is one of the greatest environmental risks to health<sup>4</sup>. The economic costs of noise pollution include lower house prices and productivity losses from health-related impacts.

Figures from the European Environment Agency for 2017, presented in its 2020 report, show that railways are the second largest source of environmental noise in Europe after road transport. Railway noise affects nearly 22 million people (of which approximately 10.9 million people are exposed outside urban areas and approximately 10.7 million people are exposed in urban areas)<sup>5</sup>. In some European regions, noise is a major reason for public opposition to more rail transport.

The sustainable and smart mobility strategy (COM(2020)789 final) clearly addresses the role of rail as a sustainable mode of transport, the use of which should be promoted. Therefore, reducing rail noise would greatly help the further development of the rail sector, and the implementation of European rules on rail noise will help alleviate these noise-related concerns.

In December 2015, the Commission reviewed the existing measures to reduce noise from rail-freight wagons and published a staff working document on reducing noise from rail freight<sup>6</sup>.

The most significant source of rail noise is rolling noise, originating from the contact between the wheel and the rail. Traditionally, freight wagons were equipped with cast-iron brake blocks, which slightly roughen the wheel surface. Composite brake blocks do not have this roughening effect, and thus allow for a smoother wheel surface, reducing rolling noise. The first technical specification for interoperability – Noise ('TSI Noise')<sup>7</sup>, adopted in 2005, sets out noise limit values for new, upgraded and renewed freight wagons. These noise limit values cannot be achieved by the vast majority of freight wagons fitted with cast-iron brake blocks.

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<sup>4</sup> World Health Organization 2018, Regional Office for Europe, Environmental Noise Guidelines for the European Region, ISBN 978 92 890 5356 3.

<sup>5</sup> <https://www.eea.europa.eu/data-and-maps/figures/number-of-people-exposed-to>

<sup>6</sup> <https://ec.europa.eu/transport/sites/transport/files/modes/rail/doc/2016-01-05-cswc-rail-noise-reduction.pdf>

<sup>7</sup> Commission Decision 2006/66/EC.

The most effective way to mitigate rail noise is by tackling noise at its source, by replacing the cast-iron brake blocks of existing freight wagons with composite brake blocks<sup>8</sup>. This solution reduces rail noise by up to 10 dB, which is a 50% reduction in audible noise for humans. Therefore, the EU supports the retrofitting of freight wagons with the most economically viable, low-noise, braking technology available. This support consists of providing a legal basis for complementary instruments such as: (i) economic incentives through track-access charging schemes; (ii) financial support to railway operators; and (iii) the promulgation of technical standards. By the end of 2017, some 350 000 wagons still needed to be retrofitted in the EU-28 plus Norway and Switzerland<sup>9</sup>.

Article 31(5) of Directive 2012/34/EU<sup>10</sup> establishing a single European railway area (amended by Directive (EU) 2016/2370<sup>11</sup>) empowers the Commission to adopt ‘implementing measures setting out the modalities to be followed for the application of the charging for the cost of noise effects’. This includes deciding how long these measures will apply and enabling the differentiation of infrastructure charges to take into account, where appropriate: (i) the sensitivity of the area affected, in particular the number of people affected; and (ii) the train’s composition and how this affects the level of noise emissions.

On this basis, and following an impact assessment<sup>12</sup>, the Commission adopted Implementing Regulation (EU) 2015/429, which provides the legal framework for noise-differentiated track-access charges schemes within the EU. Member States are free to decide whether to introduce an NDTAC scheme, but if they choose to do so, they must follow the Implementing Regulation. The Implementing Regulation is based on the experience of some Member States and of Switzerland that had introduced such schemes before the adoption of an EU framework. The Implementing Regulation has therefore harmonised the NDTAC schemes across the Union.

## 2.2 *The intervention logic and objectives of the initiative*

The Implementing Regulation provides a way for Member States to incentivise the use of silent freight wagons. In a broader policy context, the general objectives of the Implementing Regulation are:

- to help mitigate the health risks related to rail-freight noise and improve the well-being of the general public in the EU;
- to reduce the risks to the competitiveness of the rail-freight sector by avoiding a fragmented legal framework within the Union.

These translate into the following operational objectives:

- to create an EU framework for NDTAC schemes;
- to incentivise the retrofitting of existing freight wagons;
- to incentivise the use of silent rolling stock.

<sup>8</sup> European Railways Agency, 006REC1072 Impact Assessment Revision of the NOI TSI Final, 2018.

<sup>9</sup> ERA, Full Impact Assessment, Revision of the NOI TSI: Application of NOI TSI requirements to existing freight wagons ([https://www.era.europa.eu/sites/default/files/library/docs/recommendation/006rec1072\\_full\\_impact\\_assessment\\_en.pdf](https://www.era.europa.eu/sites/default/files/library/docs/recommendation/006rec1072_full_impact_assessment_en.pdf)).

<sup>10</sup> <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32012L0034>

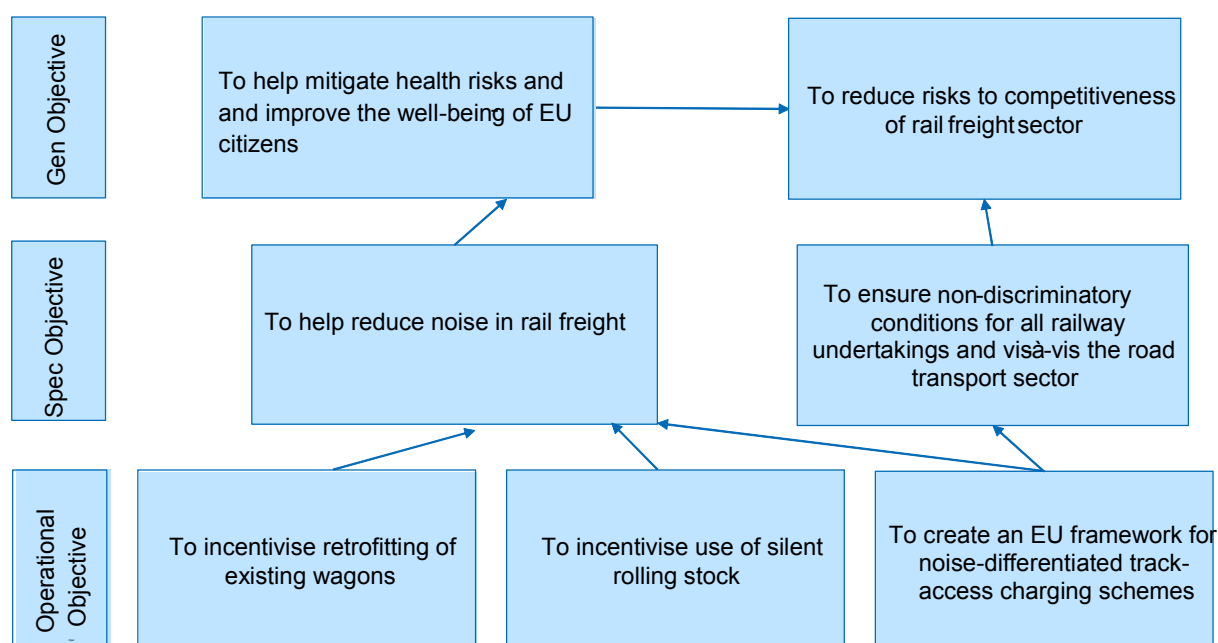
<sup>11</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588150650001&uri=CELEX:32016L2370>

<sup>12</sup> COWI and ProgTrans. (2014), *Impact Assessment Support Study: Effective Reduction of Noise generated by Rail Freight Wagons in the European Union*, Brussels: European Commission.



The intervention logic is presented in the figure below. The intervention logic for the operational objectives is presented in Annex 3.

### Intervention logic: Objectives



The intervention logic is shown above. It aims to:

- reduce the public's exposure to noise caused by freight trains (this noise has negative health impacts for the public);
- incentivise the retrofitting of existing wagons with silent brake blocks (because WKs and wagon owners would otherwise have no commercial incentive to retrofit);
- maintain the competitiveness of the rail-freight sector (because the investments and additional operation & maintenance costs of retrofitting would otherwise increase the costs of rail-freight transport).

One of the operational objectives of the Implementing Regulation is to avoid a patchwork of national schemes and maintain the single European railway area. A harmonised approach reduces transaction costs for RUs and guarantees equal treatment of RUs independent of their area of operations.

The Implementing Regulation is based on the experience of some Member States and of Switzerland that had introduced such schemes before the adoption of a EU framework. This legal framework should guarantee to RUs, WKs and other stakeholders legal security and incentives to retrofit their wagons. To this end, the arrangements set out by the Implementing Regulation cover the duration of the scheme, the level of incentives and the related arrangements.

The level of bonus must be the same on the IM's entire network and it must be applicable to each retrofitted wagon. The basis for calculating the level of bonus is the number of axles of a wagon and the number of kilometres run in a period determined by the IM. The minimum

bonus level was laid down in the Implementing Regulation at EUR 0.0035 per axle-km. A bonus of this amount should incentivise retrofitting a wagon running 45 000 km per year during a period of 6 years by covering 50% of relevant costs.

Running a wagon with composite brake blocks is thought to lead to higher operating costs, and a wagon may in practice run less than 45 000 km per year. The bonus could therefore be increased to take these facts into account. IMs may also decide to cancel or reduce the level of bonus by the value of retrofitting costs for those wagons that had already received bonus payments for retrofitting costs.

One of the main aims of the Implementing Regulation is to provide incentives for fast retrofitting. For this reason, the duration of the bonus scheme has been limited in time, but at the same time set to last long enough to provide sufficient financial support. Therefore Article 3(2) of the Implementing Regulation stipulates that schemes must finish their application for support by December 2021.

### *2.3 Baseline and points of comparison*

The baseline for the evaluation is based on time-series data for retrofitted and silent wagons until 2015 (when the Implementing Regulation entered into force) to identify trends in retrofitting before the Implementing Regulation came into force. In June 2015, NDTAC schemes were already in place in two EU countries (Germany since 2012 and the Netherlands since 2013) and in Switzerland. Therefore, the analysis underpinning the ‘no EU intervention’ scenario takes into account these pre-existing schemes (and their influence on retrofitting trends until 2015). By extrapolating these trends to 2018, a situation without any EU intervention has been constructed, i.e. a situation without the Implementing Regulation in place. The difference between the observed retrofitting trends in the period 2016-2018 (when the Implementing Regulation was in place) and the projected trends of the ‘no Implementing Regulation’ scenario describe the impact of the Implementing Regulation on the retrofitting of the wagon fleet.

The introduction of the Implementing Regulation did not have a substantial impact on the key parts of the existing schemes in Germany and the Netherlands. For these two Member States, the no-policy and the policy scenarios are the same, leaving the developments in Austria as the basis for the evaluation.

## **3. IMPLEMENTATION/STATE OF PLAY**

### *3.1 Applicable, national, noise-differentiated, track-access, charging schemes*

Implementing Regulation (EU) 2015/429 was adopted on 13 March 2015 and came into force on 16 June 2015. As stated above, Member States are free to decide whether to introduce an NDTAC scheme. If they do introduce an NDTAC scheme, they must follow the Implementing Regulation.

Once a Member State has decided to introduce an NDTAC scheme, the IM must be the entity that implements it (Article 1) and that modifies the infrastructure charges in accordance with the Implementing Regulation. In an NDTAC scheme, the bonus for retrofitted wagons: (i) is mandatory (Article 4); (ii) must be applied to all RUs operating retrofitted wagons (Article 3); (iii) must be the same across the entire network (Article 4); and (iv) must apply to each retrofitted wagon (Article 4). Article 2 defines what retrofitted wagons are: ‘existing wagons retrofitted with composite brake blocks in accordance with the requirements set out in TSI Noise’. If, during a renewal or upgrading of a wagon, it is equipped with certified, composite

brake blocks and no noise sources are added, then it is assumed that the requirements of TSI Noise are met.

IMs may also decide to cancel or reduce the level of bonus for those wagons that had already received bonus payments to reimburse their retrofitting costs.

The optional parts of an NDTAC scheme are: a ‘silent train’ bonus (Article 5), a bonus for ‘very quiet wagons and locomotives’ (Article 6) and a ‘malus’ (Article 7).

A ‘malus’ is a surcharge on the infrastructure-access charges to be paid by RUs for each ‘noisy’ train (i.e. a train composed of more than 10% noisy wagons (Article 2)). The malus should be of limited value and never greater than the bonus.

Member States must notify the Commission when introducing an NDTAC scheme and subsequently report yearly on a number of key figures (Article 9).

As stipulated by the Implementing Regulation, the initial German and Dutch schemes were aligned with it by December 2016.

*Table 1: Main characteristics of the existing NDTAC schemes in the EU*

	<b>Germany</b>	<b>Netherlands</b>	<b>Austria</b>	<b>Czechia</b>
Year of introduction of an Implementing Regulation-compliant NDTAC scheme	2015	2016	2017	2019
Scheme in place before the adoption of the Implementing Regulation?	Yes, since December 2012	Yes, since December 2013	No	No
Type of system	Bonus/malus	Bonus only	Bonus only	Bonus only
Bonus	EUR 0.005/axle-km	EUR 0.01/axle-km (2016-2018) EUR 0.0035/axle-km (2019-2021)	EUR 0.01/axle-km	CZK 0.10 (EUR 0.00367)/axle-km
Bonus per silent train	None	EUR 0.00175 per wagon-km	None	None
Malus level	5.5% of track charges for 2019 and 7% of track charges for 2020	None	None	None
Maximum bonus (in total, until the end of the scheme)	EUR 221 per axle	EUR 4 800 per wagon	EUR 425 per axle	No maximum
Mechanisms for passing bonus between RU and WK	No mechanism in law: contractual agreements between the RU and the WK	No mechanism in law: contractual agreements between the RU and the WK	Reference in network statement. Industry agreement in preparation to stipulate mechanism for transfer of bonus from RU to WK	No mechanism in law: contractual agreements between the RU and the WK

Based on the Member State reports, submitted in accordance with Article 9 of the Implementing Regulation, the Commission analysed the level of use of the NDTAC schemes. For the Netherlands, 2017 was the first full year in which the Dutch scheme was fully compliant with the Implementing Regulation.

*Table 2: Use data for the German, Dutch and Austrian schemes*

Reporting requirement	Germany			Netherlands		Austria
	2016	2017	2018	2017	2018	2018
Number of wagons that were granted bonus referred to in Article 4	27 303	37 011		13 467 wagons applied for a bonus between 2012 and January 2018.  7 783 wagons received a bonus in 2017.	15 337 wagons applied for a bonus between 2012 and January 2019	27 616
Number of trains granted bonus referred to in Article 5	N/A	N/A	N/A	16 500	25 161	N/A
Number of trains that were subject to malus	1.2 million	1.1 million	1 million	N/A	N/A	N/A
Mileage run by retrofitted wagons	283.3 million wagon-km	435.8 million wagon-km		27.3 million wagon-km	51.5 million wagon-km	76.52 million wagon-km
Mileage run by silent and noisy trains	77% noisy trains (178.1 million train-km)	73% noisy trains (174.0 million train-km)	69% noisy trains (172.0 million train-km)	77% noisy trains (7.9 million train-km)	67% noisy trains (7.0 million train-km)	78% noisy trains (33.6 million train-km)
	23% silent trains (54.5 million train-km)	27% silent trains (65.8 million train-km)	31% silent trains (78 million train-km)	23% silent trains (2.3 million train-km)	33% silent trains (3.4 million train-km)	22% silent trains (9.4 million train-km)

Reporting requirement	Germany			Netherlands		Austria
	2016	2017	2018	2017	2018	2018
Total amount of bonuses granted for retrofitted wagons, silent trains, and very quiet wagons and locomotives	EUR 5.2 million	EUR 8.1 million		EUR 1.132 million for retrofitted wagons*  EUR 0.310 million for silent trains*	EUR 2.175 million for retrofitted wagons  EUR 0.631 million for silent trains	EUR 3.1 million
Total malus collected	EUR 13.9 million	EUR 16.7 million		N/A	N/A	N/A

Furthermore, national direct-support schemes for retrofitting existing freight wagons with silent brake blocks exist in Germany<sup>13</sup>, Poland<sup>14</sup>, Italy<sup>15</sup> and Switzerland<sup>16</sup>.

The German Federal Ministry of Transport and Digital Infrastructure (BMVI) has developed a parallel programme to the NDTAC scheme of the IM to incentivise retrofitting. Based on the BMVI scheme, for all freight wagons operating in Germany, and whatever their place of establishment, railway undertakings are entitled to receive the bonus through this specific funding channel.

Before approving the State Aid schemes, the Commission has checked the Polish and Italian schemes for compliance with the Implementing Regulation.

## 4. METHOD

### 4.1 Methodology and sources of information

Between January and September 2019, a support study was carried out by an external contractor<sup>17</sup> to provide input to this evaluation. The study was structured using the ‘better regulation’ evaluation criteria (effectiveness, efficiency, relevance, sustainability and EU added value). These criteria were operationalised through 19 evaluation questions which, in turn, were further refined using an evaluation matrix (presented in Annex 3b). The study was overseen by a Commission inter-service steering group. Relevant stakeholders, falling into seven main stakeholder groups<sup>18</sup>, were consulted by different means to ensure their opinions were collected. The following consultation tools were employed:

- Targeted interviews: At the beginning of the study, the contractor held a limited number of interviews with selected stakeholders. The purpose of these interviews was to better organise the issues to address – and better select – the people or organisations to be contacted.

<sup>13</sup> [https://www.bmvi.de/SharedDocs/DE/Anlage/E/foerderrichtlinie-trassenpreissystem.pdf?\\_\\_blob=publicationFile](https://www.bmvi.de/SharedDocs/DE/Anlage/E/foerderrichtlinie-trassenpreissystem.pdf?__blob=publicationFile)

<sup>14</sup> [https://ec.europa.eu/competition/elojade/isef/case\\_details.cfm?proc\\_code=3\\_SA\\_55443](https://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_55443)

<sup>15</sup> [https://ec.europa.eu/competition/elojade/isef/case\\_details.cfm?proc\\_code=3\\_SA\\_51229](https://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_51229)

<sup>16</sup> <https://www.bafu.admin.ch/bafu/de/home/themen/laerm/fachinformationen/massnahmen-gegen-laerm/massnahmen-gegen-eisenbahnlaerm/investitionshilfe-fuer-besonders-laermarme-gueterwagen.html>

<sup>17</sup> [https://ec.europa.eu/transport/modes/rail/environment\\_en](https://ec.europa.eu/transport/modes/rail/environment_en)

<sup>18</sup> Infrastructure managers, RUs, wagon owners/WKs, national authorities, regulatory bodies, rail equipment manufacturers, and citizens’ associations.

- An online survey, in which RUs and WKs from 12 Member States and Switzerland participated.
- A focus group with participants recruited from the Commission Group of Experts on Rail Market Opening (GERM, an expert group set up by the Commission).
- A stakeholder workshop with the focus-group and sector representatives.
- An open public consultation in the form of an online questionnaire held between 28 March 2018 and 20 June 2018, which included questions on respondents' familiarity with the Implementing Regulation.

Furthermore, to complement the study with factual information, the external contractor carried out desk research on several related issues. The support study identified evidence from literature to: (i) develop several of the indicators used for the evaluation questions; and (ii) subsequently identify key information to analyse the answers to the evaluation questions.

A list of references is given in Appendix H of the support study. It includes:

- European Commission legislation and policy papers;
- impact assessments used to prepare the revision of TSI Noise and the Implementing Regulation<sup>19 20</sup>;
- sector reports.

Rail-fleet data: The analysis of the wagon fleet is mainly based on data from the silent wagon database (SWD), the common database of the four countries of the single entry point (i.e. Austria, Switzerland, Germany and the Netherlands). Additional data collected from existing literature and data provided by stakeholders were used to complement the analysis.

Field research: Field research and consultation activities in the support study included interviews, surveys, an open public consultation (OPC) and expert-group meetings. The stakeholder consultation report is presented in Annex 2. Field research covered stakeholders from countries with NDTAC schemes (Germany, Austria, Netherlands and Switzerland), as well as stakeholders outside these countries. It also included a combination of surveys targeting the main group of stakeholders affected (RUs and WKs<sup>21</sup> and interviews with other types of organisations). Some RUs and WKs that responded to the survey were also interviewed. Authorities and IMs in the countries with NDTAC schemes were selected for interviews – rather than a survey – as a more effective tool for getting input on the specifics of the implementation of the scheme.

Interviews: In total, 50 stakeholders were contacted with requests for interviews during the study. 29 of these 50 stakeholders agreed to attend an interview. In total, 5 exploratory interviews and 24 other stakeholder interviews were carried out (Appendix E of the support study<sup>22</sup> contains the interview checklists).

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<sup>19</sup>

[https://www.era.europa.eu/sites/default/files/library/docs/recommendation/006rec1072\\_full\\_impact\\_assessment\\_en.pdf](https://www.era.europa.eu/sites/default/files/library/docs/recommendation/006rec1072_full_impact_assessment_en.pdf)

<sup>20</sup> COWI and ProgTrans. (2014). *Impact Assessment Support Study: Effective Reduction of Noise generated by Rail Freight Wagons in the European Union*, Brussels: European Commission.

<sup>21</sup> For simplicity, wagon keepers and wagon owners are referred to throughout the report just as wagon keepers/WKs.

<sup>22</sup> [https://ec.europa.eu/transport/modes/rail/environment\\_en](https://ec.europa.eu/transport/modes/rail/environment_en)

*Table 3: Number of stakeholders contacted with requests for interviews during the study*

Stakeholder type	Number invited to interview	Number of interviews completed
IMs	7	10 (2 exploratory)
RUs	13	11 (1 exploratory)
Wagon owners/keepers	6	5 (1 exploratory)
National authorities	9	6 (1 exploratory)
National authorities – regulatory bodies	4	1
Rail equipment manufacturers	7	3
Citizens' associations	4*	1
<b>Total</b>	<b>50</b>	<b>29 (including 5 exploratory)</b>

\* Emails/written responses were received from three citizens' associations.

Survey: In addition to the interview programme, an online survey targeting RUs and WKs was also used to obtain relevant input to support the analysis (Appendix F of the support study<sup>23</sup> presents the final survey).

*Table 4: Number of responses received to the survey*

Respondent type	Number of completed responses	Percentage respondent type
RU	22	51%
WK	21	49%
<b>TOTAL</b>	<b>43</b>	<b>100%</b>

*Note: the 'RU' category includes both respondents that identified as only an RU, and those who were both an RU and a WK.*

OPC: The OPC generated 1 290 unique responses, most of which (1 250) were from German stakeholders. Both open-ended and closed-ended questions were analysed – further details are provided in Annex 2.

Call for written contributions: A call was made to stakeholders for written contributions, and five position papers were received. The written contributions are discussed and analysed in Appendix G of the support study.

Expert-group meetings: As part of the support study, the Commission held two meetings in Brussels with Member State experts. The meetings followed a call for expressions of interest in GERM. Further details of the meetings are provided in Appendix G of the support study.

Case studies: The support study contains an in-depth analysis (in the form of case studies) on:

- the single entry point.
- the Swiss NDTAC experience and lessons learned.

The full case studies are presented in Appendices A and B (Sections 8.1 and 8.2, respectively) of the support study.

<sup>23</sup> [https://ec.europa.eu/transport/modes/rail/environment\\_en](https://ec.europa.eu/transport/modes/rail/environment_en)

## 4.2 *Research limitations/robustness of findings*

As explained above, the quantitative analysis of this evaluation is based on the developments of one Member State only: Austria. This limits the basis of the evaluation of quantitative aspects, and complicates any meaningful decision on whether to revise the Implementing Regulation with the evaluation as a basis.

Comparing data from the SWD with data from ERA's impact assessment study of the revision of TSI-Noise<sup>24</sup> shows that the SWD has good data coverage for the NDTAC countries which had a scheme in place during the evaluation period (i.e. Austria, Switzerland, Germany and the Netherlands). It also has good data coverage for France, and partial coverage for Czechia, Belgium and Luxembourg. This means that the available data make it possible to quantitatively analyse the impact of the Implementing Regulation on retrofitting for both the NDTAC countries and for a number of adjacent Member States. However, other Member States are not effectively covered. Data from the European Union Railway Agency Centralised Virtual Vehicle Register (ECVVR) do not contain the detailed technical information on time-series data needed for the analysis. The ECVVR could therefore not be used as an additional source of detailed data.

Because rail noise is a topic that draws great interest, there was a good overall level of participation in the surveys and interviews from both industry and public-sector stakeholders. This made it possible to develop a comprehensive understanding of the implementation of the NDTAC schemes. For the OPC, contributions were predominantly made by members of the public in Germany, one of the Member States where issues of rail noise generate widespread interest.

However, there was some attrition in the cases of both RUs and WKs while answering the survey. Although there were 43 survey responses, not all respondents answered all the questions, and some respondents submitted partially completed surveys. The reasons for this are unclear; the survey was not very time-consuming and no technical reasons have been found.

## 5. ANALYSIS OF AND ANSWERS TO THE EVALUATION CRITERIA

### 5.1 *Effectiveness*

The adoption of the Implementing Regulation has not led to substantial changes to the rules already in place in Germany and in the Netherlands. Therefore, the Implementing Regulation is not expected to influence the pace of retrofitting in these Member States. The analysis performed on time-series data on retrofitted wagons, and presented in Figure 1, confirms this. This conclusion is also supported by the interviews with the stakeholders.

During the period 2016 – 2018 Austria (starting in December 2017) is the only Member State to introduce an NDTAC scheme after the Implementing Regulation became operational. A representative of the Austrian government confirmed that the creation of a European legal framework favoured the introduction of the scheme in Austria. On this basis, it is assumed that the introduction of the Austrian scheme is an outcome of the Implementing Regulation.

A comparison between a projected baseline for 2018 and the observed trend of retrofitted wagons in Austria leads to an estimated increase of about 1 500 retrofitted freight wagons registered in Austria in 2018 as the difference between the observed development and the

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<sup>24</sup> ERA Impact Assessment on Revision of the Noise TSI: Application of NOI TSI requirements to existing freight wagons. 2018. Table 2, p.23.



baseline. For new wagons compliant with TSI Noise, the data on the number of these wagons registered in Germany and the Netherlands indicates that the trend has not changed since the adoption of the Implementing Regulation. For Austria, insufficient data are available to derive conclusions on whether there has been an increase or decrease in the number of these new wagons.

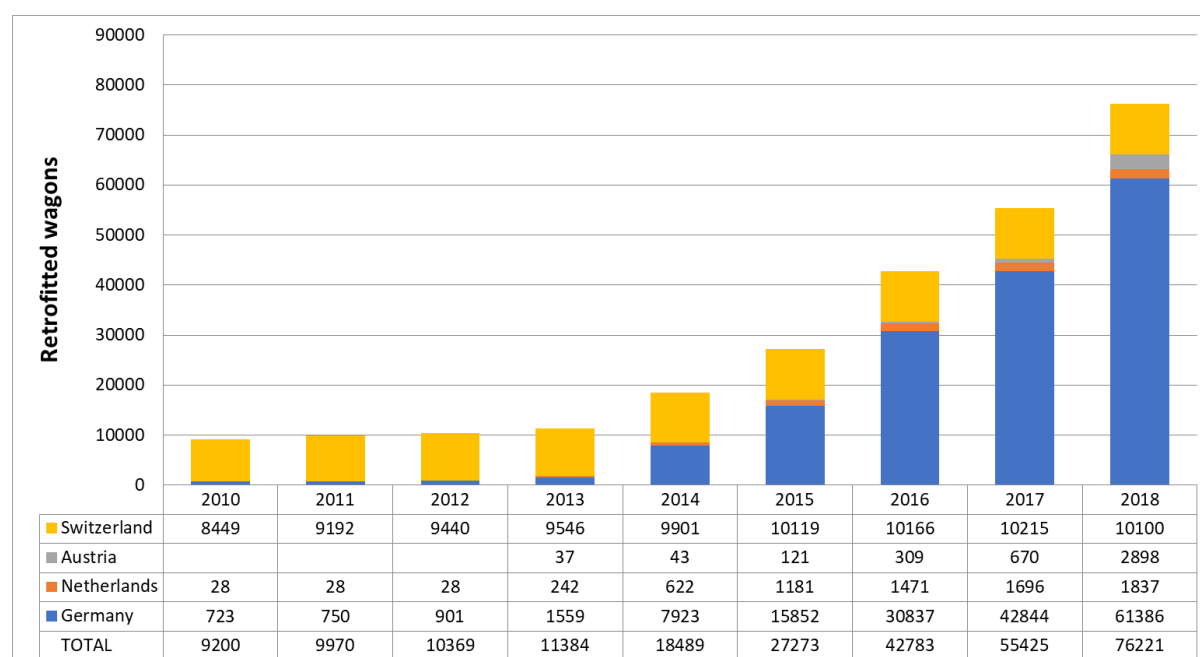
According to the three interviewed IMs, the pace of retrofitting of rail-freight wagons and the level of use of silent rolling stock would have been generally lower in the absence of the NDTAC schemes. On the use of silent rolling stock, Table 2 shows an increase in the mileage run by silent trains and a reduction in the mileage run by noisy trains both in Germany and Netherlands. However, given the assumed neutral impact of the Implementing Regulation on these schemes, this can be considered a result of ongoing national developments rather than of the Implementing Regulation.

Of the 38 RUs and WKs that responded to the consultation, 16 said that the NDTAC was not appropriate to incentivise the retrofitting of existing wagons, while 15 said that the NDTAC was an appropriate measure. There was a similar split in opinion over whether the NDTAC had encouraged the use of silent rolling stock. The stakeholders that considered NDTAC schemes as not appropriate referred to: (i) the limited passing on of the bonus payments from RUs to WKs; and (ii) the limited impact of NDTAC schemes on undertakings with low or no wagon-mileage in the countries with such schemes.

The analysis of data on retrofitted freight wagons registered in non-NDTAC Member States available from the SWD (France, Czechia (until December 2019), Belgium and Luxembourg) suggests there is no evidence of the NDTAC schemes having an impact outside the three countries where the schemes have been in place. In the Member States without an NDTAC scheme, the pace of retrofitting is slower than in the countries with an NDTAC scheme in place. For the small increase in the pace of retrofitting in 2017 and 2018 for France and Belgium, stakeholders' views suggest that these developments are more likely due to the ban on noisy freight wagons introduced in Switzerland in January 2020 and a planned ban in Germany from December 2020.

The analysis of time-series data from the SWD for 2010-2018 (Figure 1) shows that the introduction of the NDTAC schemes in Germany (in December 2012), the Netherlands (in December 2013) and Austria (in December 2017) resulted in a steep increase in the number of retrofitted wagons in the years immediately after introduction. This suggests that the national NDTAC schemes are themselves effective. By extension, it also suggests that any measure aimed at increasing the number or effectiveness of NDTAC schemes such as the Implementing Regulation will also be effective. However, it is not possible to fully separate the effect of the NDTAC schemes from the effect of the planned bans in Switzerland and Germany, for which the relevant legal provisions were adopted in 2015 and in 2017 respectively, or from other financial instruments, like CEF (available Union-wide) and national aid schemes that complement the NDTAC schemes.

Figure 1: SWD time-series data on the total number of retrofitted wagons registered in NDTAC countries and in Switzerland



Source: External consultant's elaborations on data from the SWD.

Table 5 summarises the changes in rail-wagon fleets in Germany, Austria and the Netherlands. It shows data on TSI-Noise-compliant freight wagons (both retrofitted and new) registered in the NDTAC countries after the introduction of the Implementing Regulation. It also shows how the retrofitting process has been significantly influenced by national NDTAC schemes. Overall, the number of retrofitted freight wagons has increased to around 112 000 units in 2018 (i.e. annual growth of 21% in 2016-2017 and 29% in 2017-2018). On the type of brake technology for retrofitting the freight wagons, the LL-type predominates across the three NDTAC countries. This can be explained by the higher retrofitting cost of K-type technology.

Table 5: Number of retrofitted rail and TSI-Noise-compliant new freight wagons registered in NDTAC countries

Country	Type of wagon	2016	2017	2018	Variation	
					2016-2017	2017-2018
Germany	Retrofitted	30 837	42 844	61 386	39%	43%
	<i>K</i>	2 002	2 092	2 260	4%	8%
	<i>LL</i>	28 835	40 752	59 126	41%	45%
	TSI-Noise-compliant new wagons	22 337	23 810	25 986	7%	9%
	<b>Total</b>	<b>53 174</b>	<b>66 654</b>	<b>87 372</b>	<b>25%</b>	<b>31%</b>
Netherlands	Retrofitted	1 471	1 696	1 837	15%	8%

Country	Type of wagon	2016	2017	2018	Variation	
					2016-2017	2017-2018
	<i>K</i>	32	43	44	34%	2%
	<i>LL</i>	1 439	1 653	1 793	15%	8%
	TSI-Noise-compliant new wagons	12 516	13 294	14 378	6%	8%
	<b>Total</b>	<b>13 987</b>	<b>14 990</b>	<b>16 215</b>	7%	8%
Austria	Retrofitted	309	670	2 898	117%	333%
	<i>K</i>	-	-	-	-	-
	<i>LL</i>	188	361	2 228	92%	517%
	TSI-Noise-compliant new wagons	4 137	4 511	5 103	9%	13%
	<b>Total</b>	<b>4 446</b>	<b>5 181</b>	<b>8 001</b>	17%	54%
	<b>Grand total</b>	<b>71 607</b>	<b>86 825</b>	<b>111 588</b>	21%	29%

For Germany, the number of retrofitted freight wagons is significantly higher than the fleet of TSI-Noise-compliant new wagons. The two parallel funding systems in place make it possible to at least partially compensate for the costs of retrofitting<sup>25</sup>. These two systems seem to be working as strong incentives for retrofitting compared to the option of purchasing new freight wagons.

For the Netherlands, there have been increases in both retrofitted and TSI-Noise-compliant new wagons, with the latter outnumbering the former. Due to budget constraints, the Dutch NDTAC bonus (in the form of a discount on the infrastructure-access charge) has been reduced to EUR0.0035 per axle-km for the 2019-2021 period (i.e. the minimum threshold of the Implementing Regulation). However, there is no sound evidence to conclude that there is a correlation between the observed variations of the pace of retrofitting and this change.

For Austria, the number of retrofitted freight wagons is smaller than the number of TSI-Noise-compliant new wagons. However, the annual variations are very different, with the pace of change increasing greatly in 2017-2018 compared to 2016-2017. This can be explained by the later implementation of the NDTAC scheme in 2018. However, it is worth observing that the number of retrofitted freight wagons increased from 670 to 2 898 units in 2017-2018 (i.e. by more than 333%), while the number of TSI-Noise-compliant new wagons only increased by 13% in the same period. Although this finding is not sufficient to corroborate sound conclusions, the level of the noise bonus (i.e. EUR 0.01 per axle-km limited to EUR 425 per retrofitted axle over the running time), is equal to that of the German scheme, and this seems to incentivise the retrofitting process.

<sup>25</sup> Only one-off costs are covered, but additional annual operating costs are excluded.

A key aspect identified by respondent stakeholders was that there is no effective mechanism for passing on the bonus from RUs to WKs and owners that incur the actual costs of retrofitting. Essentially, the passing on of the bonus relies on the willingness of the RUs to do so. This aspect was identified in Recital 14 of the Implementing Regulation, but has not been effectively addressed. Except for the Austrian NDTAC scheme<sup>26</sup>, there are no specific provisions in the German and Dutch NDTAC schemes that require the RUs to pass on part or all of the entire bonus<sup>27</sup>. Therefore, the effectiveness of NDTAC schemes as a financial incentive for WKs to retrofit wagons is deemed limited.

The interviewed WKs remarked that they have attempted to recover the costs by charging higher leasing prices. However, the RUs can bargain and offset an initially higher price. RUs that own (a large part of) their wagon fleet find themselves in an advantaged position compared to WKs. However, because renting silent wagons from WKs is economically beneficial for RUs, the increased demand is likely to induce a higher renting fee and would therefore indirectly incentivise WKs to retrofit their wagons.

As indicated further below, the bonus represents on average 5% of operational costs for freight trains, and is meant to compensate for retrofitting and increased operational costs. As indicated by respondents, the NDTAC schemes are not the largest source of subsidies for retrofitting. Other instruments, like the CEF (available EU-wide) and national aid schemes, complement the NDTAC schemes.

The general view of the consulted IMs is that intra-modal and inter-modal competition have been affected to only a negligible or small extent by the Implementing Regulation. On the level of transport-operating cost borne by the rail operators, the component related to the NDTAC schemes is only one of the many factors at play. The total operating cost of rail transport borne by a freight operator also depends on: (i) time-specific market contingencies; (ii) the type of goods transported; (iii) the availability of freight wagons at the time of submission of a rent request; and (iv) the actual infrastructure-access charge paid. According to the report of the European Court of Auditors (European Court of Auditors, 2016), infrastructure-access charges can account for 20-35% of the total operational costs borne by rail-freight operators. Based on figures from the relevant network statements and RMMS-data, the noise bonus is found to constitute around 20% of the infrastructure-access charge and therefore can be estimated as being around 5% of the total operating cost. The malus in the German NDTAC scheme was around 5.5% of the 2019 track-access charges.

## 5.2 *Efficiency*

### 5.2.1 *Costs*

IMs and authorities were asked to provide estimates of the initial (one-off) and ongoing costs of implementing and monitoring the schemes.

Initial one-off costs identified included:

- costs for familiarising with the new requirements of the Implementing Regulation;

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<sup>26</sup> ÖBB's network statement (ÖBB Infra, 2018) makes specific reference to Recital 14 of the Implementing Regulation, which stipulates that the incentive should be passed on to whoever bears the cost of retrofitting.

<sup>27</sup> DB Netz's network statement (DB Netz AG, 2018) generally states that the aim is to incentivise railway companies with a bonus to deploy upgraded freight wagons, but there is no specific reference to passing on the bonus. Likewise, ProRail's network statement (ProRail, 2018) states that it is the responsibility of the railway undertaking to provide information on the freight wagons participating in the scheme, but there is no reference to passing on the bonus to whoever bears the retrofitting cost.

- design and implementation of NDTAC schemes or adjustment of existing schemes to ensure compliance with the Implementing Regulation;
- development of monitoring procedures;
- initial costs to set up cooperation with other countries (if applicable);
- any one-off costs (or savings) associated with the use of the SEP<sup>28</sup>.

Potential ongoing implementation and monitoring costs included:

- costs of the bonus provided to RUs;
- administrative costs for calculating and disbursing bonus payments/malus charges;
- for silent/very quiet wagons and locomotives – application of the bonus and provision of additional proof;
- additional costs/savings from the operation of the SEP.

Table 6 shows the costs mentioned by three IMs and three ministries interviewed. The implementation costs are mostly modest.

In addition to the above costs, authorities must cover the costs for the actual bonuses provided to RUs. The Implementing Regulation stipulates that the bonus paid by national governments can be balanced by the malus paid by RUs, and that the latter cannot exceed the former except for in some specific conditions<sup>29</sup>.

IMs that are responsible for implementing the schemes may also incur costs for enforcing the NDTAC schemes. These costs may include:

- one-off costs for: (i) creating or adapting registers and databases; and (ii) training staff to support enforcement activities;
- ongoing annual costs, including:
  - costs for enforcing the schemes;
  - reviewing and verifying registrations of retrofitted wagons;
  - costs for auditing and random checks on retrofitting.

Table 7 presents the inputs from the three IMs and three ministries interviewed. For ministries, costs reported were, as is to be expected for the implementation phase, very limited. For IMs, one-off and ongoing costs reported by the Austrian and the Dutch IM were relatively small. In contrast, the German IM reported costs of over EUR 1 000 000 to develop a new database and IT facilities. However, it was clarified that this extra investment was not necessary to participate in the scheme. This suggests that this part of the costs could be considered as not being directly related to the scheme or the Implementing Regulation.

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<sup>28</sup> The costs associated with the SEP are not directly attributable to the Implementing Regulation, as it is an independent programme set up by the participating Member States. More on the SEP can be found in the respective case study in Appendix A of the support study.

<sup>29</sup> According to Article 7 (4) the total sum of maluses can exceed the total sum of bonuses if similar charging of noise costs is applied to road freight transport.

Table 6: Estimates for costs to implement and monitor NDTAC schemes provided by ministries and IMs

	<b>Austria</b>		<b>Germany</b>		<b>Netherlands</b>	
<b>Cost</b>	<b>Ministry</b>	<b>IM</b>	<b>Ministry</b>	<b>IM</b>	<b>Ministry</b>	<b>IM</b>
<b>Initial one-off costs</b>						
Familiarising with new requirements of the Implementing Regulation	Do not know	EUR 1 000-10 000	No costs reported	Do not know	EUR 1-1 000	EUR 1-1 000
Design and implementation of NDTAC schemes or adjustment of existing schemes to ensure compliance with the Implementing Regulation	Do not know	EUR 10 000-100 000	No costs reported	EUR 10 000 – 100 000	EUR 1-1 000	EUR 1-1 000
Initial costs to set up cooperation with other countries	<i>Not relevant to the organisation</i>	-	No costs reported	-	EUR 1 000-10 000(costs)	EUR 1 000-10 000 (costs)
Adopting procedures for monitoring	<i>Not relevant to the organisation</i>	No costs	No costs reported	Do not know	EUR 1 000-10 000	Cost incurred, no estimate provided
Adoption of single entry point	-	EUR 1 000-10 000	-	-	EUR 1-1 000	EUR 1-1 000
<b>Ongoing/annual costs</b>						
Calculation and disbursement of bonus payments/malus charges	<i>Not relevant to the organisation</i>	EUR 10 000-100 000	No costs reported	-	EUR 1 000-10 000	EUR 1 000-10 000
Application of the bonus for silent/very quiet wagons and locomotives	<i>Not relevant to the organisation</i>	No costs	No costs reported	EUR 100 000 – 1 000 000	<i>Not relevant to the organisation</i>	<i>Not relevant to the organisation</i>
Use of single entry point (costs or savings)	<i>Not relevant to the organisation</i>	Both costs and savings, but not quantifiable	-	No costs	EUR 1 000-10 000 (savings)	EUR 1 000-10 000 (savings)

Source: Interviews with ministries and IMs.

Table 7: Enforcement costs for ministries and IMs

Cost	Austria		Netherlands		Germany	
	Ministry	IM	Ministry	IM	Ministry	IM
<b>One-off</b>						
Creating or adapting registers and databases	Not relevant to the organisation	EUR 10 000-100 000	EUR 1 000-10 000	EUR 1 000-10 000	No costs reported	>EUR 1 000 000
Training of staff	Not relevant to the organisation	Cost incurred, but no figure given	EUR 1 000-10 000	EUR 1 000-10 000	No costs reported	Do not know
<b>Annual</b>						
Costs related to enforcement of the scheme	Not relevant to the organisation	EUR 1 000-10 000	No costs	No costs	No costs reported	>EUR 1 000 000
Reviewing and verifying registrations of retrofitted wagons	Not relevant to the organisation	EUR 1 000-10 000	EUR 1 000-10 000	EUR 1 000-10 000	No costs reported	EUR 100 000 - 1 000 000
Auditing/random checks on the retrofitting	Not relevant to the organisation	EUR 1 000-10 000	EUR 1 000-10 000	EUR 1 000-10 000	No costs reported	Not relevant to the organisation

Source: Interviews with ministries and IMs.

Besides the costs for ministries and IMs, the support study also examined possible costs for other authorities. These other authorities included rail-regulatory bodies that may have been involved in the design of the scheme or that may have been asked to provide input on its implementation. The three rail-regulatory bodies concerned have not reported significant costs.

Table 8 contains a summary of costs to different authorities and IMs, using the mid-point of the ranges supplied in their responses. The total figures shown include the three Member States where NDTAC schemes were implemented in 2016-2018. All annual figures are for 2018. The annual costs for IMs amount to 9% of the bonus payment. However, the German IM reported significantly higher enforcement costs than the other two ministries, but clarified that these costs were not directly incurred as a consequence of implementing the Implementing Regulation. This implies that annual costs for IMs were around 4-5% of the bonus payments. The costs for the remaining organisations are low: national ministries' costs are equivalent to 0.16% of the bonuses distributed, while all rail-regulatory bodies indicated that they incurred negligible costs.

Table 8: Total costs for authorities for the three NDTAC schemes

	National ministries	IMs	Regulatory bodies	Total
Implementation and monitoring costs – one-off	EUR 11 000	EUR 127 501	<i>Negligible</i>	<b>EUR 138 501</b>
Implementation and monitoring costs – annual	EUR 12 000	EUR 121 000	N/A	<b>EUR 133 001</b>
Enforcement costs – one-off	EUR 11 000	EUR 1 066 000	N/A	<b>EUR 1 077 000</b>
Enforcement costs – annual	EUR 11 000	EUR 1 082 500	N/A	<b>EUR 1 093 500</b>
<b>Total initial one-off costs for adaptation/ implementation</b>	<b>EUR 22 000</b>	<b>EUR 1 193 501</b>	<i>N/A</i>	<b>EUR 1 215 501</b>
<b>Total annual costs (2018)</b>	<b>EUR 23 000</b>	<b>EUR 1 203 500</b>	<i>N/A</i>	<b>EUR 1 226 501</b>
<b>Bonus payment (2018 or most recent year)</b>	<b>EUR 14 000 000</b>		<i>N/A</i>	<b>EUR 14 000 000</b>

Source: Interviews and written submissions from national authorities, IMs and rail-regulatory bodies.

Two of the NDTAC schemes (in Germany and the Netherlands) were already in place before the Implementing Regulation was adopted, and the Implementing Regulation therefore only brought some small changes in these countries. For this reason, the costs identified above probably cannot be associated with the Implementing Regulation in their entirety. Under the assumption that the German and Dutch schemes would continue to exist regardless of the existence of the Implementing Regulation, it would be reasonable to assume that the only costs associated with the Regulation are those incurred by the Austrian authorities. As indicated in Table 9, for Austria, the annual costs for the IM amount to 2% of the bonus payment.

Table 9: Total costs for authorities and the IM in Austria

	National ministries	IMs	Regulatory bodies
Implementation and monitoring costs – one-off	N/A	EUR 60 500	<i>Negligible</i>
Implementation and monitoring costs – annual	N/A	EUR 55 000	N/A
Enforcement costs – one-off	N/A	EUR 55 000	N/A
Enforcement costs – annual	N/A	EUR 16 500	N/A
<b>Total initial one-off costs for adaptation/ implementation</b>	N/A	<b>EUR 115 500</b>	<i>N/A</i>
<b>Total annual costs (2018)</b>	N/A	<b>EUR 71 500</b>	<i>N/A</i>
<b>Bonus payment (2018)</b>	<b>EUR 3 100 000</b>		<i>N/A</i>

Source: Interviews and written submissions from national authorities, IMs and rail-regulatory bodies.



RUs and Wks must also bear administrative costs for collecting, processing and organising the necessary information to apply for the bonus from the IMs. The costs of this include one-off costs to organise participation in the NDTAC scheme, and ongoing annual costs to both manage the retrofitting process and collect data to be sent to IMs. In surveys, RUs and Wks were asked to indicate the magnitude of the one-off costs and ongoing costs associated with participating in the scheme<sup>30</sup>. The resulting median values of their estimates are presented in Table 10. It suggests a total of around EUR 13 540 in annual costs and an initial cost of EUR 13 500 to organise participation in the scheme. These values are based on a small sample size (6 RUs and 3 Wks) and may not be fully representative.

*Table 10: Average administrative costs of NDTAC schemes for industry stakeholders*

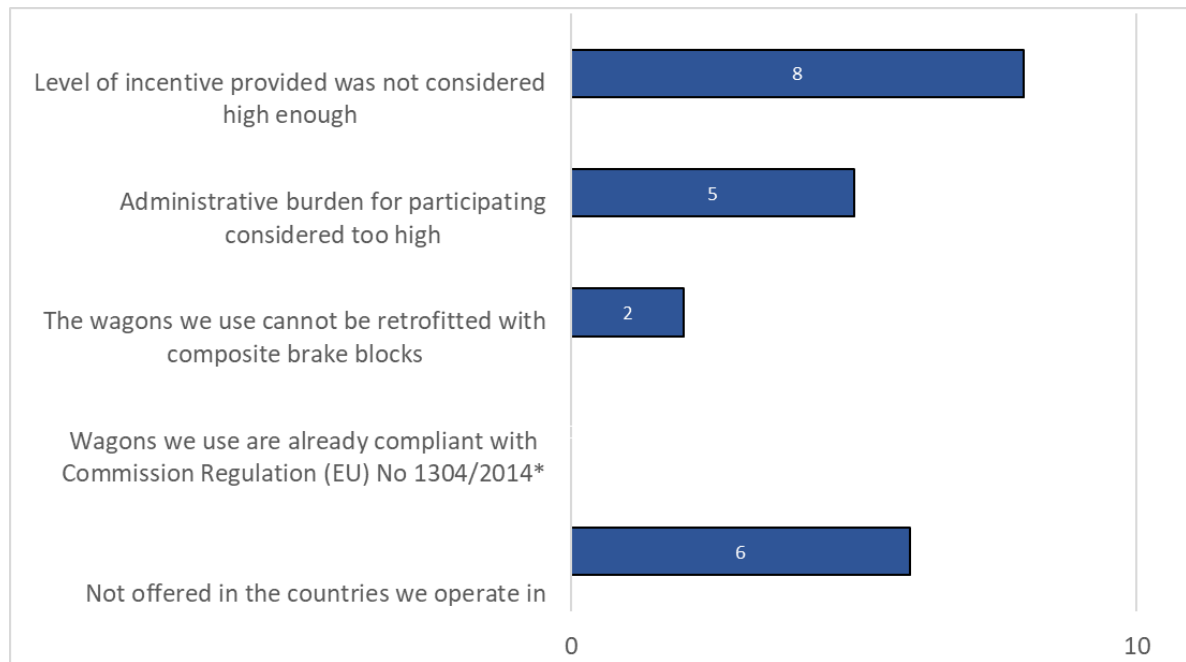
	<b>Total responses</b>	<b>Median value of answers received</b>	<b>'No costs'</b>	<b>No. of responses used</b>
Initial one-off costs to organise participation in NDTAC scheme, including the application	10	EUR 13 500	1	8
Ongoing annual costs to manage the retrofitting process	10	EUR 7 390	2	7
Ongoing annual costs, including collection of information sent to IMs	10	EUR 6 150	2	7
<b>Total ongoing costs</b>	-	<b>EUR 13 540</b>	-	-

*Source: Survey of RUs and Wks.*

As part of the survey, respondents were asked to indicate the reasons for not participating in an NDTAC scheme.

<sup>30</sup> There was a lot of uncertainty in administrative-cost estimates provided in the literature. Therefore, unlike with retrofitting costs, stakeholders were asked to indicate the range in which these costs fell, rather than indicating if they agreed/disagreed with a value sourced from literature.

Figure 2: What is the reason for not having participated in an NDTAC scheme? (n=17)



\*TSI Noise

Note: Respondents were able to select multiple options.

Source: Survey of RUs and WKs.

Table 11 shows the cumulative retrofitting and operational costs, the bonus payments, and the malus charges incurred for the years 2016-2018. This analysis is presented at EU level, because wagons registered in one Member State might receive bonuses in multiple Member States.

Table 11: Cumulative retrofitting costs (2018, euros) and bonus/malus payments for the period 2016-2018 in the three Member States with an NDTAC scheme

Retrofitting costs (million EUR)	Operational costs (million EUR)	Bonuses received (million EUR)	Maluses paid (million EUR)
44.9	27.8	28.4	46.6

Source: Article 9 reports and study-team estimates based on contributions from IMs.

Notes: Values estimated for Austria (2018), the Netherlands (2017 and 2018) and Germany (2016-2018) in the years where Implementing Regulation-compliant NDTAC schemes were in place. For Germany, only half of retrofitting costs incurred during the period were considered. This is because, as discussed earlier, the other 50% (up to EUR 211 per axle) are covered by direct subsidies.

Overall, analysing the results from the table shows that the bonus payments paid by the three NDTAC schemes represented 63% of the retrofitting costs in that period and 39% of both retrofitting and operational costs. This financial support provided to the rail industry has helped it to maintain its competitiveness in the face of public pressure to reduce rail-freight noise. These bonuses thus helped to achieve the general objective of the Implementing Regulation to reduce the risks to the competitiveness of the rail-freight sector. The annual administrative costs account for 4% of all costs incurred by industry stakeholders and are equivalent to 8% (excluding malus charges) of the total bonuses

provided. The analysis suggests that the initial estimate of the impact assessment that administrative costs for industry stakeholders would represent 1% of the bonus received (COWI and ProgTrans, 2014) underestimated the level of these costs.

The German and Dutch schemes would be operating regardless of the existence of the Implementing Regulation; only the Austrian scheme is a direct result of the Implementing Regulation. The costs incurred in Austria for the industry in 2018 (the only year where the NDTAC scheme was in place) are as follows:

- retrofitting costs: EUR 3.9 million;
- operational costs: EUR 0.4 million;
- bonuses received: EUR 3.1 million.

Costs for the industry that are not included in the analysis include the potential administrative costs that WKs might have borne (for example, to register their wagons in the databases).

On covering the retrofitting costs incurred by the industry, Recital 15 of the Implementing Regulation indicates that the bonus should be set at a minimum of EUR 0.0035 per axle-km to allow operators to recover 50% of the costs of retrofitting their wagons in 6 years, based on the assumption that the wagon travels 45 000 km per year. The validity of this assumption for a four-axle wagon was examined for Austria, Germany and the Netherlands by estimating the net present value (NPV) after 6 years of operation for a single wagon under each of the three NDTAC schemes.

*Table 12: Estimation of NPV and break-even point for wagons retrofitted in the three Member States with NDTAC schemes (retrofitting costs only)*

Country	Type of brake block	NPV after 6 years (EUR)	Break-even point: 50% of retrofit costs covered (km)	Number of years until 50% covered
DE	K-block	-EUR 2 946	178 150	4.0
	LL-block	EUR 3 026	22 900	0.5
NL – old bonus	K-block	EUR 1 772	99 625	2.2
	LL-block	EUR 7 744	22 000	0.5
NL – new bonus	K-block	-EUR 4 361	284 643	6.3
	LL-block	EUR 1 610	62 857	1.4
NL – old and new bonus	K-block	-EUR 1 114	-	-
	LL-block	EUR 4 857	-	-
AT	K-block	EUR 1 772	99 625	2.2
	LL-block	EUR 7 744	22 000	0.5

*Source: Study-team estimates.*

LL-blocks (retrofitting costs for which are lower than for K-blocks) account for most retrofits since they were approved for use<sup>31</sup>. Table 12 shows that the bonus provided by the different schemes for LL-block retrofitting are very generous, and allow 50% of retrofit costs to be recovered in as little as 6 months. Even if a wagon only travels in the Netherlands with the new bonus (which started in 2019 and is at the minimum level set in the Implementing Regulation), the wagon recovers 50% of its retrofitting costs in 1.4 years. As a result, it can be concluded that the minimum value of EUR 0.0035 per axle-km set in the Implementing Regulation is sufficient to cover 50% of the retrofitting costs in 6 years.

However, retrofitting costs are not the only costs incurred by WKs operating retrofitted wagons: retrofitted wagons also have higher operational costs. Based on the industry validation of additional operational costs (presented in Annex 4 of the support study) operational costs throughout the life of the wagon were included by considering ongoing additional costs of EUR 0.0215 per wagon-km (base value) and a higher value of EUR 0.0338 per wagon-km (median value obtained in the field research among those respondents who disagreed with the base value). To simplify the calculations, only estimates for LL-blocks (which account for most of the retrofits since the Implementing Regulation came into force) are presented in Table 13.

*Table 13: Estimation of NPV and break-even point for wagons retrofitted in the three Member States with NDTAC schemes, including operational costs*

Country	Operational cost (EUR per wagon-km)	NPV after 6 years (EUR)	Break-even point, 50% of retrofit costs covered (km)	Number of years until 50% covered
DE	EUR 0.0215	-EUR 46	<i>Not achieved</i>	<i>Not achieved</i>
	EUR 0.0338	-EUR 4 948	<i>Not achieved</i>	<i>Not achieved</i>
NL – old bonus	EUR 0.0215	EUR 2 672	47 568	1.1
	EUR 0.0338	-EUR 230	141 935	3.2
NL – new bonus	EUR 0.0215	-EUR 3 462	<i>Not achieved</i>	<i>Not achieved</i>
	EUR 0.0338	-EUR 6 363	<i>Not achieved</i>	<i>Not achieved</i>
NL – old and new bonus	EUR 0.0215	-EUR 215	-	-
	EUR 0.0338	-EUR 3 116	-	-
AT	EUR 0.0215	EUR 2 672	47 568	1.1
	EUR 0.0338	-EUR 230	141 935	3.2

*Source: Study-team estimates.*

The consideration of operational costs changes the picture. For Germany (bonus of EUR 0.005 per axle-km, or EUR 0.02 per four-axle wagon-km), and under the new

<sup>31</sup> In the three Member States with an NDTAC scheme, retrofits with LL-blocks represent 96.5% of total wagons retrofitted.

bonus scheme in the Netherlands (EUR 0.0035 per axle-km, or EUR 0.014 for a four-axle wagon-km) break-even is never achieved. The bonuses received per wagon-km are smaller than the additional operational costs (EUR 0.0215 or EUR 0.0338 per wagon-km), and the NPV over a six-year period is also always negative. The same result was obtained in the impact assessment for the Implementing Regulation: estimates in that study, which included operational costs, put the NPV of retrofitting after 7 years at a negative EUR 2 465 (COWI and ProgTrans, 2014).

For Austria and the old Dutch bonus, the bonus of EUR 0.01 per axle-km (or EUR 0.04 per 4-axle wagon-km) is higher than the additional operational costs considered. As a result, it is possible to achieve break-even and a positive NPV after 6 years in some circumstances.

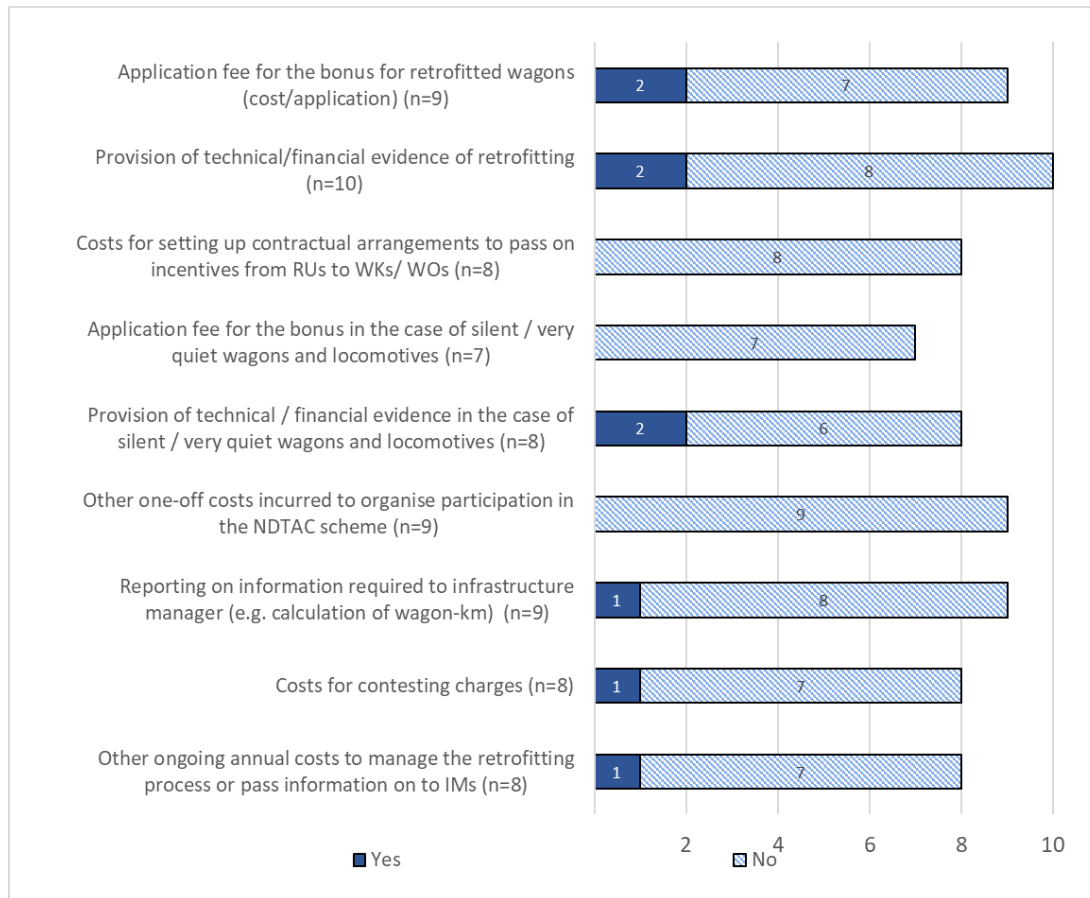
In its Recital 15, the Implementing Regulation also indicates that the bonus attributed could be higher to take into account the higher operational costs associated with composite brake blocks<sup>32</sup>. The results of the analysis presented above show that the minimum level of bonus set in the Implementing Regulation is not enough to cover operational costs; it is only enough to cover retrofitting costs. To make retrofitting more attractive, the higher level of bonus provided in Austria – and, up to the end of 2018, in the Netherlands – makes it possible for all costs associated with retrofitted wagons to be recovered.

In the survey, RUs and Ws participating in an NDTAC scheme were asked if they considered the costs they incurred in managing participation in the NDTAC scheme to be excessive. As shown in Figure 3, overall, most respondents did not believe that any of the named costs were excessive.

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<sup>32</sup> This recital also mentions that lower distances travelled per year (i.e. less than 45 000 km) could be another reason to increase the level of bonus.

*Figure 3: Do you consider any of the costs incurred in managing your participation in the NDTAC scheme in the following table to be excessive? (n=7-10)*



NDTAC countries have set up a cooperation mechanism, the SWD, to register low-noise freight wagons and manage applications for the bonus.

On the SEP, the views of the WKs and RUs are rather polarised. Out of 38 responses, 15 stakeholders consider the tool appropriate for applications for financial support, while 15 consider it not to be appropriate.

On the costs to IMs, the study team made an assessment comparing the annual costs indicated by each of the three IMs from the EU and the Swiss IM for comparison. This was compared to activity (measured by the mileage run by retrofitted wagons) in wagon-km in each of the Member States in the latest year for which data are available, and with the number of RUs that received a bonus in that year. The results of this assessment are presented in Table 14.

Table 14: Comparison of efficiency for IMs

	Netherlands	Germany	Austria	Switzerland
Ongoing costs (per year)	EUR 22 000	EUR 2 055 000	EUR 71 500	EUR 16 500
Mileage run by retrofitted wagons (millions of wagon-km)	51.5	435.8	76.52	418.2
Number of RUs receiving bonus	17	43	28	N/A
EUR/million wagon-km	EUR 427	EUR 4 715	EUR 934	EUR 39
EUR/RU	EUR 1 294	EUR 477 901	EUR 2 554	N/A

As can be seen, the German scheme appears to be more expensive than the Dutch, Swiss and Austrian schemes. This is a result of the significantly higher enforcement costs indicated by the German IM. However, these values should be viewed with some caution. The costs were indicated in ranges (with the mid-point being chosen for the overall estimate) and the German IM indicated much higher costs than the other three countries. While some of those higher costs could be explained by the scale of the German rail network and its NDTAC scheme, it is unclear whether this can explain the level of additional costs indicated<sup>33</sup>.

### 5.2.2 Benefits

To the extent that the Implementing Regulation has helped to increase retrofitting and the use of silent freight wagons, it is expected to have had a positive contribution to the well-being of the public in the affected regions. To provide an estimate of the external costs of rail-freight noise that can be reduced by the change of brake technology, the *Handbook on the external costs of transport*, commissioned by the European Commission, was used in the support study (Essen, et al., 2019)<sup>34</sup>.

When applied for 2018 for the Austrian NDTAC scheme, the direct effect of the Implementing Regulation on the estimated level of change of the external costs is estimated to be a reduction of EUR 21.8 million.

As described in Section 5.1, it is difficult to fully disentangle the effects of the NDTAC scheme and other effects (such as the national noise bans announced in Switzerland and Germany) on the pace of retrofitting. Therefore, the estimated benefits for external costs in Austria are likely to be the result of multiple factors, of which the Implementing Regulation is a main factor.

Further benefits, although limited because of the low number of Member States with an NDTAC scheme, include the reduction of administrative costs for RUs as a result of harmonised NDTAC schemes.

<sup>33</sup> Although the support study tried to further clarify the reasons for these relatively higher costs directly with the stakeholder, it was not possible to obtain further information.

<sup>34</sup> <https://op.europa.eu/en/publication-detail/-/publication/9781f65f-8448-11ea-bf12-01aa75ed71a1>

### 5.3 *Relevance*

As stated above, the broader objectives of the Implementing Regulation are to: (i) contribute to the reduction of rail-noise pollution; (ii) create an EU framework for NDTAC schemes; and (iii) reduce the risks for the competitiveness of the rail-freight sector. The operational objectives of the Implementing Regulation are:

- to create an EU framework for NDTAC schemes;
- to incentivise the retrofitting of existing freight wagons;
- to incentivise the use of silent rolling stock.

The general objective of mitigating health risks by reducing rail noise is because noise is of great concern for public health in the EU. This is compounded by the fact that rail-freight traffic has also been increasing throughout the EU in recent years. It increased by 13.2 billion tonne-kilometres (from 403.1 to 416.3 billion tonne-kilometres; 3.3%) from 2015 to 2017 (Eurostat, 2018). Input from sector stakeholders engaged as part of the study corroborate these concerns. In the OPC conducted before this study, 935 (76%) out of 1 237 citizens and citizen-association respondents indicated that the level of rail-freight noise in the area where they live or work has either slightly or significantly increased in the last 2 years. 1 185 of these respondents (96%) also stated that rail noise in the area where they live or work had a negative impact on their personal well-being. However, 97% of the responses were from Germany. Thus these figures largely represent one Member State that is particularly prone to problems with rail noise, due to specific topographic characteristics and the size of rail freight that passes through it, and in which rail noise receives significant political attention.

On the general objective of reducing the risks to the competitiveness of the rail sector, stakeholders pointed out that the internalisation of external costs of transport needs to be addressed more ‘horizontally’, across transport modes. The costs of reducing rail noise are particularly high, and if the rail industry has to absorb these costs without support, even more pressure would be put on the competitiveness of the rail sector to the benefit of road transport. Overall however, rail-sector stakeholders appear to recognise the impact on noise from rail freight and accept the fact that operators need to pay part of this cost.

Many of the engaged stakeholders agreed that it is still necessary to incentivise the retrofitting of wagons. 28 out of 36 respondents from the survey indicated there is still a need to incentivise RUs and WKs to take relevant action on rail noise. CER also commented that retrofitting incentives should be channelled to ensure there are enough quiet wagons to provide freight services on the most important European corridors from December 2024. However, input from other stakeholders questioned the need to incentivise retrofitting, arguing that because of the high costs associated with retrofitting older wagons, retrofitting does not always make economic sense, slowing down renewal of the fleet.

On incentivising the use of silent rolling stock, 15 out of 37 respondents indicated that the differentiation of infrastructure charges was an appropriate tool to incentivise retrofitting, while 16 indicated it was not. In most cases, the respondents suggested that incentivising retrofitting via NDTAC schemes is still relevant, but largely along with a range of other instruments.



According to Article 4(2) of the Implementing Regulation, the basis for calculating the bonus level is the number of axles of a wagon and the number of kilometres run in a period determined by the IM. The Implementing Regulation also states that the bonus should aim to cover at least 50% of the additional cost for wagons running more than 45 000 km/year for 6 years. To achieve this 50% goal, the Implementing Regulation stipulates the minimum level of a bonus, which is set at EUR 0.0035 per axle-km. In Article 4(4), the Implementing Regulation makes an additional suggestion: when setting the level of the bonus, the IM may take into account inflation, the mileage run by wagons, and the operating costs linked with the use of retrofitted wagons.

As discussed above, the costs associated with composite brake blocks come from the initial expenditure on retrofitting, plus the ongoing operational costs.

Given the costs of materials and components (brake-block shoes, brake cylinders, valves and wheels) there is a direct correlation between the number of axles a wagon has and the costs of retrofitting that wagon (as these materials are needed on each axle). In addition, due to the higher operational costs of composite brake blocks compared to cast-iron brake blocks, there is a correlation between the mileage of a wagon and the rate of wear and tear and maintenance of brake systems. Therefore, basing the level of NDTAC bonus on both a per-axle basis, as per Article 4(2), and on the number of kilometres a wagon travels, remains relevant. However, for operators that do not travel long distances, the mileage-based calculations mean that the bonus cannot cover 50% of the retrofitting costs. From their perspective, this represents potential unfair treatment and a reduced incentive for retrofitting.

Another important aspect considered is the operational conditions of wagons. Varying operational conditions (e.g. mountainous routes or extreme winter conditions) can significantly affect the operational costs of composite brake blocks. By providing the flexibility for IMs to introduce a bonus that is higher than the minimum level of EUR 0.0035 per axle-km (as is currently the case for the Austrian scheme), the Implementing Regulation covers such cases.

Finally, Article 4(4) mentions that, besides mileage and operating costs, inflation can be a factor considered in calculating the bonuses. There are no indications that changes to the bonus formula were made to reflect the impact of inflation in any of the schemes. Given that inflation levels have been relatively low in the years since the Implementing Regulation was enacted this is properly justified. And there has been no indication from industry that such an adjustment would be needed.

#### *5.4 Sustainability*

Among the three Member States that had an NDTAC scheme in place in 2016-2018, only Germany has introduced a malus as part of the scheme, and only the German scheme should be expected to be financially sustainable on its own (without requiring subsidy from the government). In 2016 and 2017, the German IM generated significant income from the scheme, which resulted in a cumulative total income of EUR 17.3 million. For the immediate future, bonuses are expected to increase further as more wagons are retrofitted and inversely, the malus payments should reduce over time. Thus, the presence of a significant surplus during the first 2 years provides a significant cushion that can ensure the viability of the scheme.

According to Article 7(3) of the Implementing Regulation, ‘the total sum of malus paid over the duration of the scheme shall not be higher than the sum of bonuses’. The German Ministry of Transport was interviewed and indicated that the plan is for the scheme to balance out towards its end (with bonuses and maluses ending up roughly equal). In any case, Article 7(4) also states that if the Member State also applies a similar noise charge to road-freight transport, the requirements of Article 7(3) do not apply. As Germany now includes a noise component in the toll it charges to road freight under the ‘LKW-Maut’ scheme, it can potentially collect more maluses than the bonuses it distributes over the life of its NDTAC scheme.

As expected, in those countries where no malus was applied in 2016-2018 (Austria and the Netherlands), the NDTAC schemes have incurred cumulative costs of EUR 3.1 million and EUR 4.2 million respectively. These costs are expected to be covered by the government or other sources, but not internally by the scheme itself.

On the question of the lasting effect of the Implementing Regulation, ‘quieter’ routes will be introduced from December 2024 as a consequence of the revision of TSI Noise in 2019. This introduction of quieter routes makes it highly unlikely that the number and use of silent wagons would decrease after the ending of the NDTAC schemes in December 2021.

### 5.5 Coherence

Next to the Implementing Regulation on NDTAC schemes, the EU legal framework specifically targeting rail noise consists of the following main pieces of legislation:

- the Directive on a Single European Railway Area (2012/34/EU), which provides in Article 31(5) the legal basis for the Implementing Regulation;
- the Technical Specifications for Interoperability (TSI) on noise (TSI Noise), first adopted in 2005 and revised since – the latest revision being in May 2019;
- Regulation (EU) 1316/2013 establishing the Connecting Europe Facility (CEF).

One area of possible improved alignment between the Implementing Regulation and the 2019 revision of TSI Noise concerns their time spans. Some stakeholders consider this time span to be problematic. The TSI Noise rules implement a ban on noisy wagons on many ‘quieter’ routes across the EU by December 2024. However, according to Article 3 of the Implementing Regulation, NDTAC schemes may only be in place until 31 December 2021, 3 years before this. This earlier deadline may mean that retrofitting will happen at a faster pace (to take advantage of the bonus schemes before they expire) but there could also be shortages in maintenance facilities, and wagons might not be granted the full bonuses because they were retrofitted too late.

Regulation (EU) 1316/2013 establishing the Connecting Europe Facility (CEF) aims to accelerate investment in trans-European networks, and help the sector meet the high upfront costs of retrofitting on infrastructure and rolling stock. It aims to achieve both of these goals while also maintaining the competitiveness of rail. The financial instrument to achieve this is identified under Article 7(2): ‘actions to reduce rail-freight noise, including by retrofitting existing rolling stock in cooperation with, *inter alia*, the railway industry’.

Under the CEF, the retrofitting of existing rail-freight wagons is co-funded with grants of up to 20% of eligible costs<sup>35</sup>, up to a combined ceiling of 1% of the budgetary resources available for transport (corresponding to EUR 262.5 million).

Funding via the two mechanisms (CEF and NDTAC) is consistent, as they both have the same objective of supporting the retrofitting of wagons. The Implementing Regulation makes direct reference to the CEF and encourages Member States to take advantage of the European public funding opportunities to cover the costs associated with retrofitting. Input from stakeholders also suggests synergies between the two mechanisms.

In addition to CEF, some Member States also provide national funding to retrofit wagons. This is another mechanism to complement both CEF and the Implementing Regulation, and all have the same objective of supporting the retrofitting of wagons. Like the CEF, the Implementing Regulation also encourages Member States ‘to make relevant funds available’ (Recital 16).

The Commission also intended that the charges in the NDTAC schemes brought in by the Implementing Regulation would complement other measures to reduce noise that were consistent with the overall noise-mitigation objectives of EU policy. These objectives included noise mapping and action plans under the Environmental Noise Directive 2002/49/EC. One of the aims of this Directive is to provide ‘a basis for developing measures to reduce noise emitted by the major sources, in particular road and rail vehicles’. This aim of the Environmental Noise Directive is also consistent with one of the specific objectives of the Implementing Regulation: ‘to contribute to noise reduction in rail freight’.

The field research has highlighted some opposing views on the coherence between the Implementing Regulation and overall EU noise policy. CER and UIP consider that the Implementing Regulation is a narrow instrument that does not sufficiently address the entire transport sector beyond rail. They argue that rail freight has to absorb costs to address the noise policy, while other modes are contributing much less to internalise external costs.

The main characteristics of the three NDTAC schemes operating in the EU in 2016-2018 are shown in Table 1. The differences among the three schemes are minor:

- the bonus in the Netherlands is now at the minimum level set by the Implementing Regulation (changed from a higher figure in 2018), while in Germany the bonus is slightly above that, and in Austria the bonus is double the level of Germany;
- only the Netherlands has a bonus for silent trains as outlined in Article 5 of the Implementing Regulation;
- only Germany has introduced a malus.

The maximum bonus an RU can receive per wagon varies among the three Member States. In the Netherlands, it is set per wagon, while in Germany and Austria it is set per axle. Furthermore, the maximum bonus in Austria is almost double that of Germany. However, in Germany the NDTAC aims to cover only 50% of the costs, with the rest being covered by direct retrofitting subsidies.

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<sup>35</sup> i.e. the direct costs associated with composite brake blocks and their retrofitting (excluding wheelsets).

Although mechanisms for passing on bonuses between RUs and WKs vary in detail, all countries leave it to the market to sort out this passing on of bonus payments. In the Netherlands, this appears to be working (as no stakeholders raised any issues about this Member State), but in Austria and Germany there were concerns that the bonuses are not being effectively passed on from RUs to WKs. In its network statement, the Austrian IM incentivises RUs to pass on the bonus to WKs.

Despite these differences, stakeholders did not indicate any issues or inconsistencies among the schemes or any negative consequences.

### 5.6 *EU added value*

The Implementing Regulation aims to support the simplification and harmonisation of procedures to operate the NDTAC schemes. Its objective in this is to reduce the administrative and financial burdens for IMs and RUs. This is an important goal considering that rail-freight transport is generally an international business and would benefit from the development of a harmonised framework.

Overall, good progress has been made in retrofitting noisy freight wagons. However, the Implementing Regulation has not been able to attract Member States other than Austria and Czechia. The perception of rail noise varies between Member States, the need for a harmonised framework may therefore be less urgent in other Member States, limiting the introduction of NDTAC schemes.

The umbrella association of WKs (UIP, 2019) stresses the importance of having a common NDTAC scheme to avoid the emergence of a patchwork of different schemes in each Member State. Such a patchwork would increase transaction costs and incoherence due to divergent national approaches.

Only minor changes were made to the two schemes already in place following the adoption of the Implementing Regulation. The German NDTAC scheme was changed in: (i) the definition of a silent train, by adapting the initial threshold set at 100% to that of the Implementing Regulation (i.e. 90%); and (ii) making freight wagons retrofitted before the introduction of the NDTAC scheme (2012) also eligible for the bonus. The Dutch NDTAC scheme initially applied on a per wagon-km basis (i.e. EUR 0.04 per wagon-km). To comply with the Implementing Regulation, the Dutch IM modified the scheme by switching to a bonus based on the number of axles. Another change introduced to comply with the Implementing Regulation set an end to the NDTAC scheme (31 December 2021), something that was not originally planned. Due to budget constraints related to 2019-2021 governmental funding, in 2019 the bonus was reduced to EUR 0.0035 per axle-km, in compliance with the minimum set by the Implementing Regulation.

According to the Implementing Regulation, if progress with retrofitting is not satisfactory, Member States should be allowed to apply a malus after the end of the NDTAC scheme if a similar measure is applied to the road-freight-transport sector. The design of this malus should be consistent with the principles of internalisation of external costs of noise for all freight transport modes, in particular road transport (see Article 7). However, input from IMs suggests that the introduction of a malus could potentially hamper the competitiveness of the rail sector.

Finally, the obligation for Member States to report yearly to the Commission on the implemented NDTAC schemes makes it possible to monitor trends and conduct analyses centrally. However, the small number of implemented schemes limits the value of data analysis. The concerned Member States have not indicated a need for simplification of the reporting obligations.

## **6. CONCLUSIONS**

The impact of the Implementing Regulation on reducing rail noise has been positive, but rather limited. After the adoption of the Implementing Regulation, only two Member States have introduced a new NDTAC scheme, one of which started after the evaluation period. It is not possible to determine whether these two schemes would also have been implemented in the absence of the Implementing Regulation. Moreover, the impact of the Implementing Regulation is difficult to identify in the presence of other (EU and national) initiatives incentivising the retrofitting.

One of the aspects limiting the effectiveness of the Implementing Regulation is the absence of an explicit mechanism for passing on the bonus from RUs to WKs. This is necessary if the latter bear the costs of retrofitting and are not the same entity as the former.

Implementation costs for authorities and industry are low. The bonus payments are more than enough to cover the retrofitting costs. However, these bonus payments have been set by the implementing Member States at too low a level to also fully cover increased operational costs.

The general objectives of the Implementing Regulation remain relevant: to contribute to the reduction of rail-freight noise and to maintain the competitiveness of the rail-freight sector. Furthermore, in the run-up to the coming into force of ‘quieter routes’ from December 2024<sup>36</sup>, there is still a need to provide financial support to retrofit existing noisy wagons. In this context, the obligatory end date of the NDTAC schemes (i.e. 31 December 2021 as specified in Article 3(2)), which was meant to speed up retrofitting, may need to be reconsidered – and possibly extended – to allow Austria, Czechia and the Netherlands to prolong their schemes and to encourage other Member States to introduce a scheme.

The Implementing Regulation is in line with the overall EU framework and mechanisms that aim to reduce rail noise. The EU’s many initiatives to help reduce rail noise at the source through economic, financial and technical measures remain valid. The effects of the Implementing Regulation, having led to an increased number of retrofitted wagons, are likely to last, even after the expiry of the NDTAC schemes.

The Implementing Regulation helped to avoid a patchwork of national schemes that could have led to higher transaction costs and an uneven playing field for market competitors. However, the voluntary basis of the Implementing Regulation means that the added value of the Implementing Regulation has a limited effect in directly

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<sup>36</sup> The TSI Noise revision of 2019 introduces the concept of ‘quieter routes’: railways with intense freight traffic on which, from December 2024, only silent freight wagons may be operated.

incentivising Member States to adopt an NDTAC scheme. Some Member States have even introduced State Aid schemes instead of NDTAC schemes.

Based on this evaluation, the Commission will assess whether to give Member States the opportunity to extend the validity of their NDTAC schemes beyond 31 December 2021 (or to introduce a scheme after that date) or to repeal the Implementing Regulation.

## **Annex 1: Procedural information**

### **1. LEAD DG, DeCIDE PLANNING/CWP REFERENCES**

Lead DG: DG MOVE

Decide Planning: PLAN/2017/2021

### **2. ORGANISATION AND TIMING**

The evaluation of the Implementing Regulation was coordinated by an Inter-Service Steering Group, which was established early in the evaluation process, with representatives from:

- DG Environment
- DG Internal Market, Industry, Entrepreneurship and SMEs
- DG Mobility and Transport
- Secretariat General

The Inter-Service Steering Group met twice, on 6 October 2017 to discuss the Terms of Reference of the support study and in July 2019 to discuss the draft final report of the support study. Between these two meetings, the members of the Group have been invited to the meetings with the consultants, and/or were consulted in writing.

The evaluation support study, executed by Ricardo Nederland BV in association with TRT Trasporti e Territorio, took place between January and September 2019. The consultant also participated in the expert group meetings on 22 March and 26 June 2019.

### **3. EXCEPTIONS TO THE BETTER REGULATION GUIDELINES**

4. The Better Regulation Guidelines and Toolbox were followed without any exceptions.

### **5. CONSULTATION OF THE RSB (IF APPLICABLE)**

n/a

### **6. EVIDENCE, SOURCES AND QUALITY**

The evidence findings of the external support study prepared by Ricardo Nederland BV in association with TRT Trasporti e Territorio, fed into the analysis of this evaluation Staff Working Document. The consultant used the data of the Open Public Consultation which the Commission held in 2018 in its analysis. During the support study, the consultant used a mix of approaches including an evaluation matrix, desk research, interviews, a targeted consultation and case studies.

## Annex 2: Stakeholder consultation

### Introduction

The stakeholder consultation activities were mainly performed in the context of the support study and included interviews, surveys, an Open Public Consultation (OPC, the analysis only, as the OPC was set-up by the Commission before the support study), written contribution and expert group meetings. They covered stakeholders from countries with NDTAC schemes that were in force during the evaluation period (Germany, Austria, Netherlands and Switzerland), as well as stakeholders outside these countries. It also included a combination of surveys targeting the main group of stakeholders (affected railway undertakings (RU) and Wagons Keepers (WK)) and interviews with other types of organisations. In the case of authorities and infrastructure managers (IM) in the countries with NDTAC, tailored interviews were used – rather than a survey - as a more effective tool to get input into the specifics of the implementation of the scheme. Table II-II.1 below summarises the stakeholder engagement tools used.

Table II-1: Engagement tools used in field research

Engagement tool	Stakeholders targeted
Survey	Railway undertakings; wagon keepers
Interviews	Railway undertakings; wagon keepers; national ministries; rail regulatory bodies; infrastructure managers; rail equipment manufacturers; citizens' association
Written contributions	All interested stakeholders (mostly industry associations replied)
Open public consultation	All interested stakeholders (mostly citizens and citizens' associations replied)
Expert group meetings	Public officials of EU Member States

### Consultation strategy

#### *Surveys*

A survey was developed targeting the following stakeholder groups:

- Railway undertakings;
- Wagon keepers;
- Those identifying as both railway undertakings and wagon keepers.

A combined survey was produced, aimed at both railway undertakings and wagon owners/keepers whereby respondents are guided through to appropriate questions through the use of survey logic.

Table II-2: Responses to the survey

Respondent type	Number of completed responses	Percentage respondent type
Railway undertaking (including those that perform both functions)	22	51%
Wagon keeper	21	49%
TOTAL	43	100%



There are over 200 Wks in Europe, and 21 responded. Additional requests were made to the International Union of Wagon Keepers (UIP) to encourage their members to respond to the survey during the response period. According to these 21 respondents, they owned and/or operated on average 13,117 wagons in 2018. In comparison, UIP highlighted in the exploratory interview that they represent over 210,000 freight wagons, which is about one third to a half of the total fleet operating in Europe. The majority of responses received come from RUs in Central European countries, including five from Hungary and three from Poland. Two RUs from countries implementing NDTACs have replied to the survey as well and have been interviewed as a follow-up.

### *Interviews*

A total of 29 interviews were conducted during the course of the study. Initially, five exploratory interviews were undertaken with a small number of stakeholders (European Rail Infrastructure Managers (EIM), Community of European Railway and Infrastructure Managers (CER), DB Netz (Germany), International Union of Wagon Keepers (UIP) and the Dutch Ministry of Infrastructure and Water Management. The purpose of the exploratory interviews was to help develop a better understanding of the Implementing Regulation and help develop the methodology.

During the main interview programme, interviews were conducted with a range of other stakeholders, including RUs, national authorities, citizens associations, IMs, rail equipment manufacturers, and Wks. Two approaches have been taken to the interview method:

- **Selected stakeholder groups surveyed** (i.e. RUs and Wks) were interviewed after completion of the survey. The checklists for these interviews sought clarification on key points raised in the survey, and also included more open-ended questions to identify details on questions asked in the survey as well as any new questions that have arisen since the study began.
- **Other groups:** For the remaining groups of stakeholders, interviews began as soon as the general interview checklist was approved by the Commission.

Tailored interview checklists for each stakeholder group were developed to reflect the information and data needs identified for the study. Interviews were conducted by telephone.

*Table II-3: Number of stakeholders contacted with requests for interviews during the study*

<b>Stakeholder Type</b>	<b>Number interviewed</b>
Infrastructure managers	6 (+2 exploratory)
Railway Undertakings	10 (+1 exploratory)
Wagon owners/keepers	4 (+1 exploratory)
National Authorities	5 (+1 exploratory)
National Authorities – Regulatory bodies	1
Rail equipment manufacturers	3
Citizens' associations	1
<b>Total</b>	<b>29 (including 5 exploratory)</b>

**Note:** Email/written responses were received from three citizens' associations, two rail regulatory bodies and a national ministry

### *Open public consultation*

An analysis of the OPC responses has been carried out as part of the inception phase of the project. The OPC included 1,290 unique responses, the majority of which (1,250) were from German stakeholders. Both open-ended and closed-ended questions have been analysed in the report.

In the case of open-ended questions, they were translated and then analysed in one of three ways:

- Given the large number of responses to questions 6 and 14, the Latent Dirichlet Allocation (LDA) probabilistic modelling technique was used to identify common themes/topics and the associated number of responses around these topics;
- Responses to question 7 were analysed individually;
- Responses to question 15 were scanned to identify common topics/themes, and the most detailed 10 responses were closely assessed for specific and detailed recommendations made.

### *Call for written contributions*

As part of the evaluation, the European Commission put a call out to stakeholders for written contributions, to which five position papers were received. These were from:

- CER – Community of European Railway and Infrastructure Companies.
- Trafikverket – Swedish Transport Administration.
- EIM – European Rail Infrastructure Managers.
- UIP – International Union of Wagon Keepers.
- Citizens' group for safety and noise protection at the railway (a citizens' group).

### *Summary of the open public consultation*

The Open Public Consultation was launched by the European Commission (DG MOVE) on 28 March 2018 and was open for responses until 20 June 2018 (13 weeks).

### *Analysis of respondents' profile*

A total of **1291 responses** to the questionnaire were received, almost exclusively coming from citizens (96% of respondents) or their representatives (1.5% of respondents), as shown in Table II-4

*Table II-4: Classification of stakeholders responding to the questionnaire*

Stakeholder group	Number of responses	% of responses
As a citizen	1238	96%
As a citizens' association	31	2.5%
Other	22	1.5%
<b>Total</b>	<b>1291</b>	<b>100%</b>

Responses were received from citizens residing in, or organisations based in **11 EU Member States** (Austria, Belgium, France, Germany, Greece, Italy, Latvia, Lithuania, Netherlands, Poland and Spain). However, responses came almost exclusively from one single Member State (Germany), representing 97% of the total. (This is the case for both citizens (99% (1223 out of 1238) and associations (94% (29 out of 31)).

*Table II-5: Distribution of the responses by country of residence/establishment*

Member State	Number of unique responses	Number of coordinated responses	% of responses
Austria	2	-	<1%
Belgium	2	-	<1%
France	3	-	<1%
Germany	1250	2	97%
Greece	1	-	<1%
Italy	2	-	<1%
Latvia	1	-	<1%
Lithuania	1	-	<1%
Netherlands	2	-	<1%
Poland	1	-	<1%
Spain	1	-	<1%
Blank	22	-	1.7%
<b>Total</b>	<b>1289</b>	<b>2</b>	<b>100%</b>

The analysis of the responses suggests that two responses were coordinated following an exact template for answers. One of these responses has been filtered out to avoid duplication of results, hence from hereafter reference is made to 1290 unique responses.

Following the introduction section, the questionnaire was split into two main sections:

- Section 1 included questions focusing on the views and experiences on the issue of rail noise and;
- Section 2 focused on the views and experiences of respondents on measures tackling rail freight noise.

The table below presents the total number of responses received for each question in the two sections. A larger number of respondents provided answers to multiple choice questions compared to the free text responses.

*Table II-6: Total number of responses for questions in Sections 1 and 2*

Section 1 - The issue of rail noise		Section 2 - Measures tackling rail freight noise	
Questions	No. of responses	Questions	No. of responses
Q1	1268	Q7 ((b) free text)	562
Q2	1268	Q8	1268
Q3	1237	Q9	1268
Q4	1268	Q10	1268
Q5	1268	Q11	1268
Q6 (free text)	974	Q12	1268
		Q13	1268
		Q14 (free text)	599
		Q15 (free text)	581

### **Expert Group meetings**

Two expert group meetings were held. The first meeting, on 22 March 2019, involved officials from Austria, Belgium, Croatia, Hungary, Finland and Germany, recruited from the GERM Expert Group (Group of Experts on Rail Market Opening). The discussion

regarded experiences with national NDTAC schemes and, from Member States without NDTAC schemes, reasons for not having introduced such a scheme.

A second meeting was held on 26 June 2019, not only involving Member State representatives (from Austria, Denmark, Germany, the Netherlands and Poland) but also sector representatives from CER, EIM, the European Shippers' Council and UNIFE.

### **Use of results**

The results of the stakeholder consultation have been used in the evaluation to provide answers to the 19 evaluation questions. Annex 3b presents which analytical tools and data source have been used per evaluation question.

### **Main results**

This section gives a brief overview of the main results of the stakeholder consultation in relation to the six evaluation criteria of effectiveness, efficiency, relevance, sustainability, coherence and EU added value.

#### *Effectiveness*

The Austrian NDTAC scheme was the only scheme that was implemented after the application of the Implementing Regulation (as of December 2017), and according to Austrian industry players the establishment of a regulated European framework has favoured the application of the NDTAC scheme in this Member State, which has therefore led to an increase in the number of retrofitted wagons.

During interviews with IMs, the Implementing Regulation has only been found to be slightly effective in increasing the use of silent rolling stock. They argue that even without the EU framework and subsequent NDTAC scheme, the process of retrofitting existing wagons or using silent rolling stock could have still occurred without the EU framework and subsequent NDTAC scheme due to other factors – namely the TSI Noise (but in this case close to the envisaged starting date of December 2024), the ban of noisy freight wagons planned in Germany and Switzerland, and access to alternative funding (CEF or national subsidies).

Stakeholders identified a key parameter of the Implementing Regulation, which can influence competition: to what extent the incentives introduced (bonuses) have been passed from the RU to WKs, and how the costs of rail freight transport have been influenced. There are currently no mandatory provisions within the Implementing Regulation that require the passing of all or part of the bonus – the Implementing Regulation merely suggests in its preamble that ‘the incentives should be passed on to those who bear the costs of retrofitting’. According to a national authority, UIP and some WKs, the passing of the noise bonus from the RUs to the WKs in Austria and Germany is insufficient, and it relies on the willingness of RUs to enter private contractual relations with the WKs. Additionally, within the survey of RUs and WKs, whilst four out of eight respondents stated the bonus is fully passed on, another three stated the bonus is only partially passed on or not passed on at all. This situation implies that, in some cases, the WKs are having to fully borne the costs of retrofitting, and the development of a silent

fleet could have therefore been slowed down to some extent. Another interviewed WK added that they have attempted to recover the costs by charging higher prices, but the RUs can bargain and offset an initially higher price.

According to the view of main rail industry representatives (CER, UIP and EIM) the impact of the Implementing Regulation on the competition between the rail and road sector has been, in principle, negative. They pointed out that the process of retrofitting freight wagons to mitigate rail freight noise emissions requires significant upfront investment costs and leads to increased ongoing maintenance and operating costs. This is seen to put rail freight in a disadvantageous position in comparison to the road transport sector where similar requirements are not in place.

However, they stated that, on the basis of the Implementing Regulation, the presence of support instruments (either through direct subsidies or through NDTAC bonuses) is considered to have a positive effect. They help offset the higher costs and reduce the risk of loss of competitiveness of rail transport. That is, while any efforts to retrofit might have detrimental impacts on the competition with the rail sector, NDTAC schemes help ameliorate those negative impacts by providing some financial support.

IMs interviewed from the three Member States confirm that the pace of retrofitting of rail freight wagons and the level of use of silent rolling stock would have been generally lower in the absence of the NDTAC schemes and EU framework. This suggests the current NDTAC schemes have had a positive impact on the rate of retrofitting. During the survey of RUs and WKs opinions were more mixed: 15 out of 37 respondents considered the NDTAC appropriate to incentivise the retrofitting of existing wagons, whilst 16 did not. This was a very similar case for the use of silent rolling stock.

### *Efficiency*

Overall, the input from stakeholders revealed that the cost of the bonus payment itself is the most important cost element. Beyond the costs of the bonus scheme, as expected, IMs incurred most of the direct implementation, monitoring and enforcement costs, whilst costs for national authorities were limited.

The Implementing Regulation implies a possible initial role for national authorities in the design and introduction of the scheme, and an obligation under article 9 to report to the Commission data on the implementation of the scheme. However, interviews with the three national authorities (NL, AT, DE) indicated that these entities, while responsible for the initial impetus to implement a NDTAC scheme, have more of a supervisory role during the actual implementation of the schemes.

As part of the interviews, IMs and authorities provided estimates of the initial (one-off) and ongoing costs of implementation and monitoring of the schemes during interviews. The costs mentioned by the three IMs and three ministries reveal differences between countries in how the responsibilities for tasks relating to the NDTAC scheme have been shared between the organisations. When considering if any costs are unnecessary or excessive and if there is scope for reduction, two IMs suggested there is very limited, if

any, potential. In comparison, the third IM considered the calculation of bonus payments and reviewing/ verifying registrations are labour and time intensive. In their view, some of the associated time spent (and costs) could be reduced by simplification to the provisions of the relevant article(s) of the Implementing Regulation (Articles 4 and 8). However, no additional input was provided.

The three IMs and three ministries concerned also provided estimates on costs for the enforcements of the NDTAC schemes. Only one national authority reported some small costs, whilst the other two did not report any enforcement costs. In the case of IMs, one-off and ongoing costs reported by two IMs were relatively small. In contrast, the third IM estimated costs of over €1,000,000 for the development of a new database and IT facilities. However, they clarified that this extra investment was not necessary for participating in the scheme.

When considering costs for other authorities that may be involved in the scheme design or implementation, interviews with the three regulatory authorities (AT, DE, NL) indicated that none had any significant costs.

Through the survey, WKs and RUs were asked to comment on the validity of estimates of the total costs of retrofitting from literature using a 2018 ERA report (ERA, 2018) and (COWI and ProgTrans, 2014) (as shown in Table 8). During interviews, only a few stakeholders were able to provide estimates of actual retrofitting costs. Many respondents agreed with the figures presented, and the few alternative figures provided applied to specific technical or climatic conditions. Hence, the values sourced from literature were deemed appropriate.

Within the survey, over half of respondents agreed with the estimates of additional operational costs of CBBs, whilst approximately one third indicated that the actual costs are higher. The majority of responses suggested the estimate of lifecycle costs in the ERA study were appropriate. Some input provided suggests that these may be higher, but the estimates provided seem to be related to specific technical or climatic conditions, which may not be generally applicable.

During the RU and WK survey, just over half the respondents reported relatively low administrative costs associated with their participation in the scheme, with these stakeholders indicating there are 'no costs' or that the costs (one-off or ongoing) are below €100,000. However, it is to be noted that these values are based on a small sample size (six RUs and three WKs) and may not be fully representative. Additional input from interviews on the size of administrative costs also supported the view that the administrative costs were not significant.

Stakeholders commented on the comparison of NDTAC schemes to other funding mechanisms available for retrofitting wagons. Answers received suggest the NDTAC schemes have a smaller role and national funding schemes are the most significant source for retrofitting.

Two respondents considered it was the differences between the schemes that make the process complicated, rather than one scheme being more efficient than another. As a result, they considered that the main limitation is the fact that the administrative processes need to be synchronised across the different NDTAC schemes. In that respect, the responses of the specific stakeholders suggest that the participation in the SEP which was intended to harmonise the application process for RUs and WKs has not been achieved. One RU and one WK indicated that it has helped achieve some savings. However, the response rate on the SEP-related questions in the survey was very low. As such it has not been possible to establish how significant the benefits of SEP have been.

#### *Relevance of the objectives of the Implementing Regulation*

Input from stakeholders support concerns of rail freight noise and associated health. In the OPC conducted, 935 out of 1237 (76%) citizen and citizen' association respondents indicated that the level of rail freight noise in the area where they live or work has either slightly or significantly increased in the last two years. 1185 (96%) also stated that rail noise occurring in the area where they live or work has a negative impact on their personal well-being. (It is worth noting however that 97% of the responses were from Germany).

As noted by a ministry and an IM as part of the interviews, rail freight noise tends to be less accepted by the population than noise caused by road transport especially because a higher share of rail transport happens at night. However, other stakeholders highlighted the fact that noise is not an important problem for all Member States. Stakeholders were also asked to reflect on the relevance of the objective 'to contribute to the mitigation of health risks relating to rail freight noise and improve the well-being of EU citizens'. Most stakeholders interviewed agreed the objective to mitigate health risk is still very relevant today.

During interviews both CER and UIP considered that policy makers have so far targeted almost exclusively the railway sector when it comes to noise. Rail has had to cover all costs (except when there is state support), and since the revised TSI Noise, the sector is required to invest a lot to retrofit. One of the regulatory bodies added that the costs for rail noise reduction are particularly high and rail actors have had to absorb them without support, putting even more pressure on the competitiveness of the rail sector in relation to road transport.

In general, rail sector stakeholders recognise the impact of rail freight on noise and accept the fact that operators need to pay part of this cost for the sector to remain competitive. In any other case, there is a danger that the rail freight will not be accepted by citizens. Stakeholders generally agree the objective of reducing risks to competitiveness of the sector is still quite relevant in today's market.

Input from stakeholders supported the continued need to incentivise retrofitting of wagons, however they may not necessarily apply across the whole sector for all EU Member States. In the WK and RU survey, 28 out of 36 respondents indicated there is still a need to provide incentives to RUs and WKs to take relevant action on rail noise.

CER also commented that retrofitting incentives should be channelled to guarantee enough quiet wagons would provide freight services on the most important European corridors as of December 2024.

Interviews with one Ministry of Transport, a national authority and an IM highlighted the need for incentives because of the high number of noisy wagons still in circulation. According to one Ministry, only a small part of the EU wagon fleet is retrofitted, suspending NDTAC schemes and removing financial support would make matching the new TSI noise rules in 2024 more challenging. In their view, any revision of the Implementing Regulation should allow at least the possibility for extending the life of existing schemes and incentives in place.

However, during interviews other stakeholders (two RUs) argued that because of the big investment and high costs of retrofitting older wagons, retrofitting does not always make economic sense and therefore incentivises to retrofit are no longer needed. Funding for new wagons (or scrapping incentives for old wagons) could be a more important and efficient way.

Stakeholders, including German ones, recognised that at the Member State and EU level, legislation in place may force the use of silent wagons even without incentives. They stated in interviews that these bans remove the need for any further incentives. During the OPC, a large proportion of citizens and citizen associations (804 out of 1268; 63%) also suggested the best way to incentivise the retrofitting of noisy wagons is to ban them, suggesting support for this regulatory instrument.

Stakeholders also examined whether the use of NDTAC type schemes are relevant as a means to incentivise retrofitting. Responses to the surveys highlighted a mixed picture. Fifteen out of 37 indicated that the differentiation of infrastructure charges is an appropriate tool to incentivise retrofitting, whilst 16 indicating it is not.

Conclusions from the stakeholders' input suggest that NDTAC schemes are most suited for countries that see a significant proportion of cross-border traffic as they create incentives to ensure domestic and international traffic is silent. They are not necessarily appropriate for all countries, and other tools (complementary or otherwise) may be more successful in incentivising retrofitting.

Input from stakeholders commented on the current provisions and rules for calculating the level of bonus, including the correlation between the number of axles of a wagon and mileage run (used to calculate the bonuses as per the Implementing Regulation), and the costs of retrofitting. The limitations imposed on the grants (€ 211/axle and € 0.005/axle-km) are such that 50% is guaranteed only in cases where the annual distance covered is at least 42,200km, a condition not always met by their wagons. Therefore, in cases like these, the mileage-based calculations can be considered unfair to operators that do not travel the long distances required to receive 50% bonus.

Two RU stakeholders highlighted concerns with operational conditions. Mountainous routes require more breaking and more frequent replacement of brakes, increasing the



operational costs of CBBs. Additionally, climatic conditions in Nordic Member States increase retrofitting and operational costs – sintered blocks (which are more expensive) are used, and the wheel wear can be seven times higher in winter than summer these Member States.

#### *Financial sustainability of the existing NDTAC schemes*

Input on the financial sustainability of the schemes was limited to the German case. Among the three NDTAC schemes, only the German one includes a malus. As such, is the only scheme expected to be financially sustainable on its own.

According to the German Ministry (discussed in interviews and expert group meetings), there is currently an imbalance between the amount of funds received through maluses, and the amount given in bonuses. However, they clarified the scheme has been designed to accumulate more maluses at the beginning to secure the funding for the bonuses when the scheme will approach its end, and the number of noisy trains paying for the maluses will be sensibly lower. They confirmed this balance will be achieved by the end of the scheme (in 2021).

#### *Coherence of the Implementing Regulation*

Input from the field research (mainly from interviews) suggests that there are indeed synergies between NDTAC schemes and other EU rail noise policy. Consistency with the TSI Noise rules was highlighted by many interviewees. Some stakeholders suggested that the recent revision of the rules is expected to have an impact on the retrofitting pace - it combines a ‘push’ factor created by the impending ban of noisy wagons on "quieter routes" and a ‘pull’ factor created because of the incentives provided by the NDTAC system currently in place.

Stakeholders (mainly from interviewees and the expert group meetings) suggested one area of possible inconsistency between the Implementing Regulation and the TSI Noise 2019 revision however - the time span. They highlighted that new TSI rules implement the ban on noisy wagons on “quieter” routes by December 2024 but, according to the Implementing Regulation, NDTAC schemes shall only be in place until 31 December 2021, three years prior to this. This, according to some stakeholders, is problematic. According to some stakeholders, this earlier deadline may mean that retrofitting will happen at a faster pace but there could also be shortages in maintenance facilities, and wagons might not be granted the full bonuses because they were retrofitted too late. Overall however, the stakeholder input provided does not suggest that this difference between the two legislations is particularly an issue.

Consistency between the Implementing Regulation and Regulation (EU) 1316/2013 establishing the Connecting Europe Facility (CEF) was also highlighted by some stakeholders during the interviews. The CEF funding is thought to be an additional trigger to start retrofitting of freight wagons and/or the use of retrofitted wagons.

Input received from stakeholders regarding consistency with overall EU noise policy was mixed. Within the expert group meetings, overall coherence with the polluter-pays

principle of the 2011 Transport White Paper was highlighted. Rail freight are currently having to absorb costs to address the noise policy whilst other modes are having to do almost nothing. However, since the Implementing Regulation is only strictly relevant to rail, their comments do not indicate that it is not compatible and in the context of broader EU noise policy.

Analysis of stakeholder consultation (through position papers, interviews and surveys), revealed no issues in terms of any overlaps, differences or contradictions within the Implementing Regulation. The main characteristics of the three NDTAC schemes in operation in the EU were found to be fairly similar, with only minor differences noted. Germany is the only Member State to introduce a malus. Stakeholders did not indicate any issues or inconsistencies among the three national NDTAC schemes or any negative consequences.

#### *EU added value*

The Implementing Regulation aims at supporting the simplification and harmonisation of NDTAC scheme procedures by reducing the administrative and financial burdens, and the added value for setting a legal framework for NDTAC schemes at EU level is recognised as an important aspect across the consulted stakeholders. One Ministry agreed this is an important aspect considering that rail freight is, to a large extent, an international business and would benefit from the development of a harmonised framework.

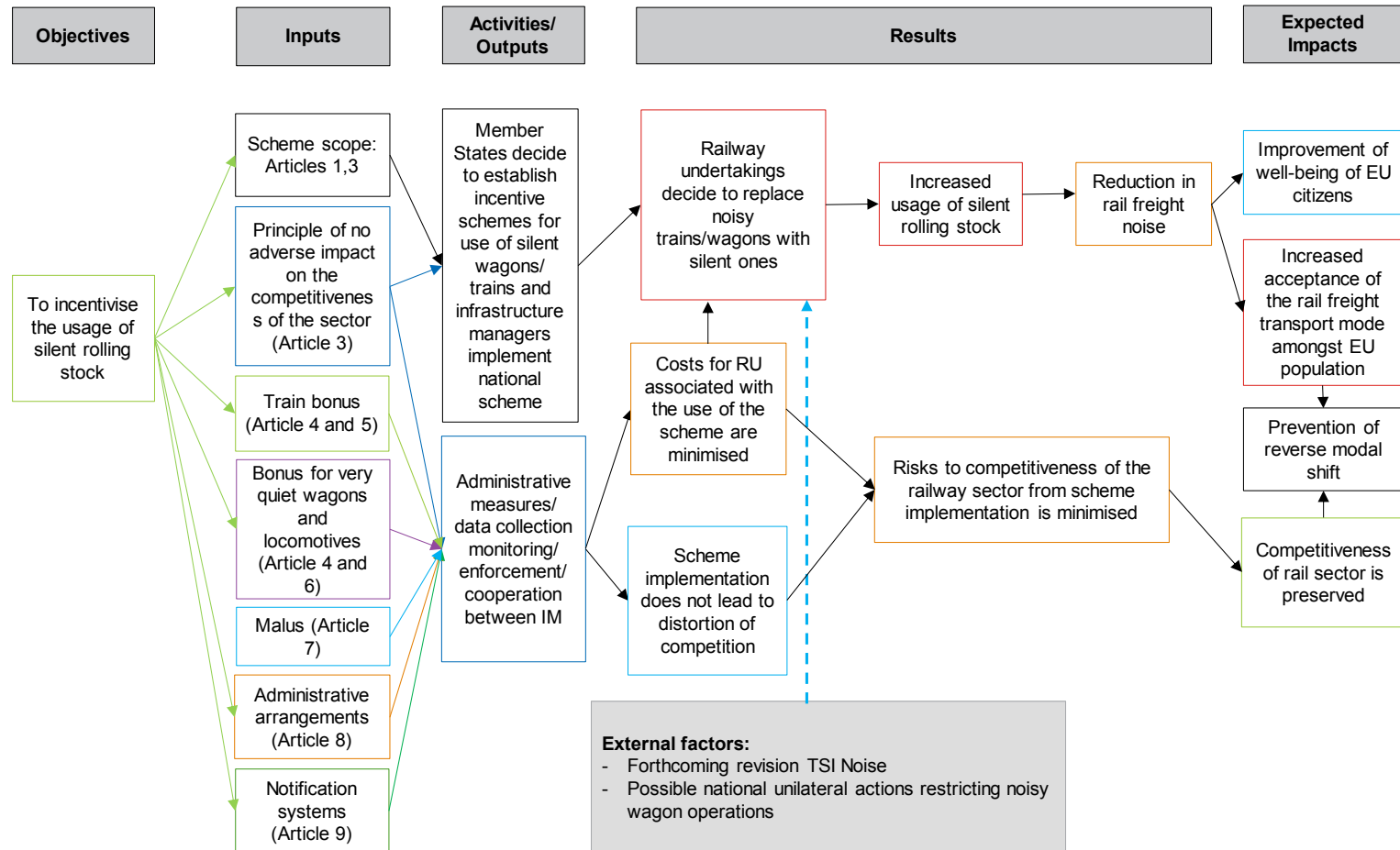
An IM stated that the added value for setting a harmonised legal framework for the NDTAC schemes could have been higher if other Member States had applied this measure. Stakeholders consider that in the absence of the Implementing Regulation, the Austrian NDTAC scheme would not have been introduced. CER stated that the legal framework at EU level is useful but not sufficient for incentivising retrofitting and would work better as a complementary tool of direct funding schemes to support the retrofitting process. EIM supported the suggesting that any revision of the Implementing Regulation should keep the voluntary nature of Member States to implement NDTAC schemes. However, UIP stresses the importance of having a common NDTAC scheme to avoid the emergence of a patchwork of different schemes in each Member States, increasing transaction costs and incoherence due to divergent national approaches.

National authorities and RU's opinions were that, although NDTAC schemes are not the actual driving force for the retrofitting of rail wagons, they are an important complementary measure to cover at least in part the additional operational costs resulting from the use of composite brake blocks. In general, they see favourably the prolongation of the Implementing Regulation, at least until 2024, as this will allow the continuation of financial support in the concerned countries.

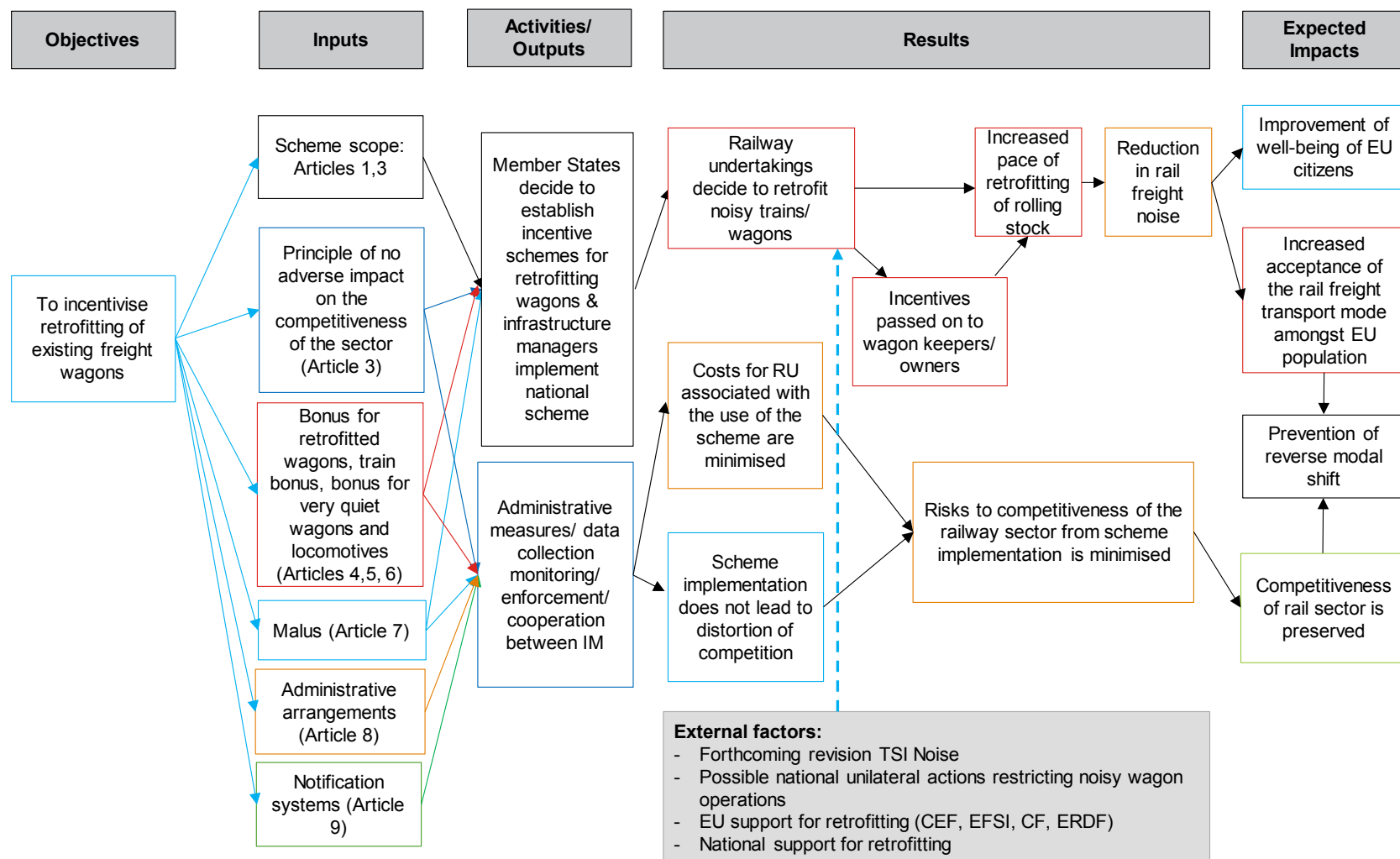
## Annex 3: Methods and analytical models

### Annex 3a: Intervention logic per operational objective

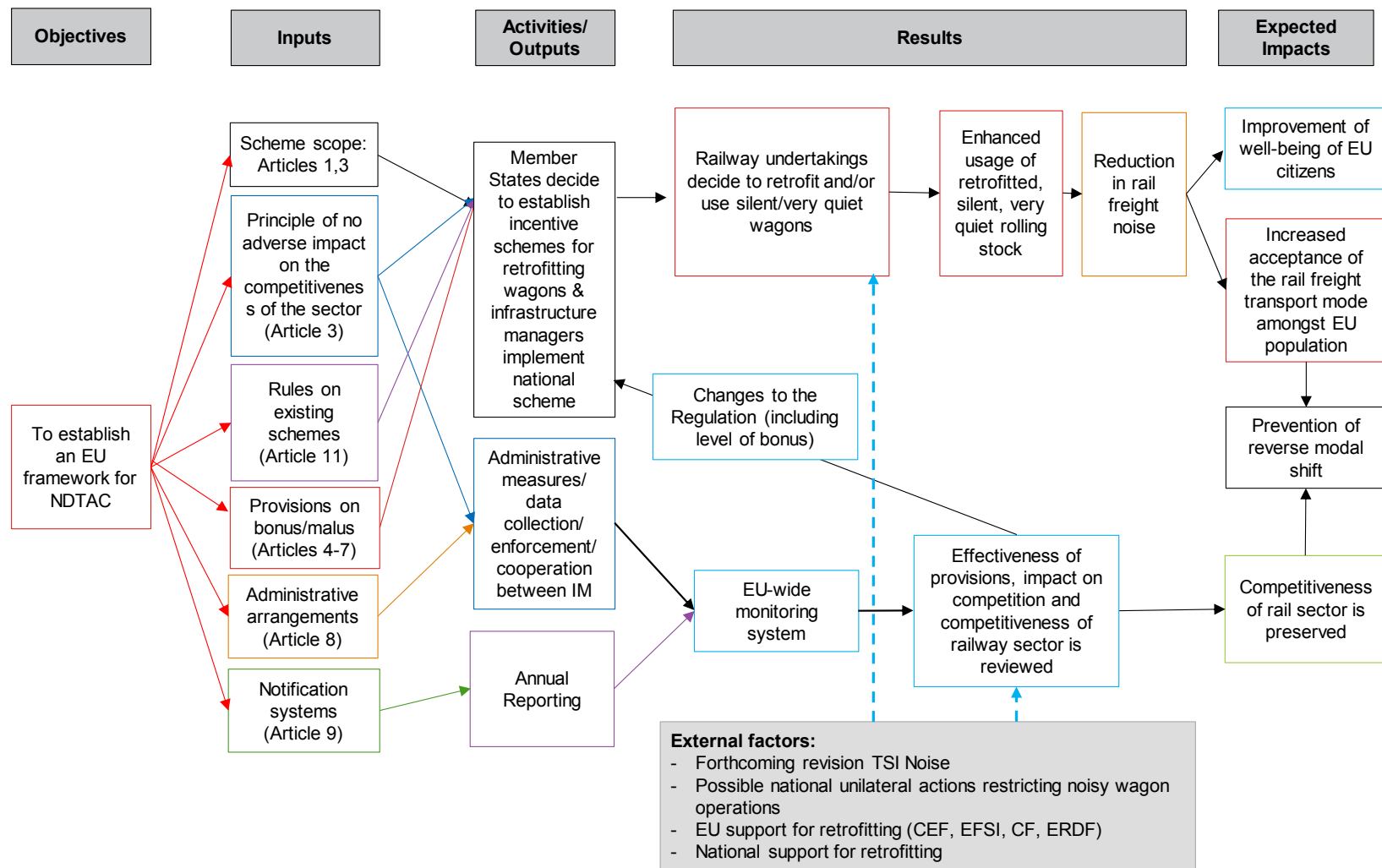
#### Intervention logic: Operational Objective 1



## Intervention logic: Operational Objective 2



### Intervention logic: Operational Objective 3



### Annex 3b: Evaluation matrix

Operational sub-questions	Indicators	Analytical tools and success criteria	Data sources
<b>Effectiveness</b>			
<b>EQ1. To what extent does the Regulation contribute to the reduction in rail freight noise? In particular, to what extent has the Regulation contributed to a higher level of retrofitting of wagons and enhanced usage of the silent rolling stock compared to the situation without the Regulation being adopted? What is the progress in retrofitting of wagons? To the extent possible please assess the contribution of the Regulation to the overall well-being of the EU citizens in the affected regions.</b>			
To what extent has the Regulation contributed to the retrofitting of existing freight wagons and enhanced the usage of silent rolling stock compared to the baseline (situation without the Regulation being adopted but with TSI noise standards in place)?	<ul style="list-style-type: none"> <li>Fleet development and retrofitting rates.</li> <li>Totally new silent wagons purchased.</li> <li>Comparison of the retrofitting rate and purchase of totally new wagons with respect to the baseline</li> <li>Comparison of use of silent rolling stock with respect to the baseline</li> </ul>	<p>Quantitative analysis of the number of retrofitted wagons with composite brake blocks and purchase of totally new wagons rates.</p> <p>Quantitative analyses of the rates with respect to the type of wagon and countries covered in this study.</p> <p>Qualitative input from stakeholders to assess the extent that action has been taken as a result of the Regulation or as a result of other provisions (TSI noise standards)</p> <p>Elaboration of a matrix to summarise the distribution of retrofitted wagons with respect to the countries covered in this study.</p> <p>Estimation of the variation of the external cost of noise of rail (see EQ3).</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>Increasing rate of retrofitted rail freight wagons in the fleet since the adoption of the Regulation compared to the baseline.</li> <li>Increase in use of silent trains compared to the baseline</li> </ul>	<p>Drawing from the data sources elaborated in Task 2.2, e.g. EURA database, SWDB</p> <p>Targeted stakeholder interviews (RUs, WKs, WOs)</p> <p>Desk research (i.e., review of the legislation, development of silent wagons and withdraw of noisy wagons, development of TSI requirements).</p> <p>Key findings from Swiss case study.</p> <p>European Commission's 'Handbook on the external costs of transport', 2019 version</p>

What are the main drivers and hindrances when addressing the mitigation of rail freight noise?	Categories of driver or hindrance (i.e., technical, administrative, regulatory, financial, context-specific, etc.)	Qualitative analysis corroborated with stakeholders input.	Drawing from above data sources.  All relevant surveys and/or interviews (where appropriate).
What are costs and benefits for EU citizens in the affected regions?	<p>Qualitative analysis of costs borne and benefits generated for EU citizens in relation to the adoption of the Regulation.</p> <p>It is worth noting that the <u>noise costs of rail depend heavily on the local context</u> (e.g. population density around rail lines), time of the day and intensity of rail traffic (i.e., the noise emission disturbance of an isolated train is higher than the disturbance of a train in a line where other services are operated). <u>For these reasons, it is very difficult to carry out a quantitative estimation of costs and benefits.</u></p>	<p>Qualitative description of costs and benefits involved and qualitative considerations on progresses achieved since the adoption of the Regulation.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>Increasing share of retrofitted rail freight wagons since the adoption of the Regulation.</li> <li>Increasing trend in transport performance of silent freight trains (i.e., train-km or t-km).</li> </ul>	<p>Drawing from above data sources and indicators to infer links</p> <p>Surveys of industry, including IMs, RUs, ROs, and WKs.</p> <p>Desk research.</p>
<p><b>EQ2. To what extent does the Regulation influence competition and competitive position of different actors within the rail sector? The analysis should assess different aspects of the issue at stake, in particular:</b></p> <ul style="list-style-type: none"> <li><b>The assessment should explore the effects on the competition between the RUs and wagon keepers coming from different countries. It should distinguish between different countries applying NDTAC schemes, including Switzerland on the one hand, and the states that established NDTAC schemes versus other states on the other hand.</b></li> <li><b>The assessment should look into the competition between the different market players and assess to what extent have the incentives induced through the NDTAC schemes been passed from railway undertakings to wagon keepers.</b></li> </ul>			
Is there any difference, regarding the incentives or bonuses/malus, between the countries applying NDTAC schemes?	<p>Variables used to incentivise the retrofitting / use of silent wagons and comparison between the different NDTAC of countries that apply the schemes.</p> <p>Impact on competition between:</p> <ul style="list-style-type: none"> <li>Each of the countries with NDTAC schemes</li> <li>Countries with NDTAC schemes vs those without</li> </ul>	<p>Qualitative analysis and review of the type of variable used and differentiation, if any.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>Increase of the number of silent wagons used and rail freight transport activities performed on international travel from other countries to countries covered in this study.</li> <li>Measures taken in the countries</li> </ul>	<p>Survey of the industry (i.e., rail freight transport activities performed and localisation on the geographical scope).</p> <p>Desk research (e.g., annual reports, IMs network statements).</p>

	Identification of best practices and success factors.	covered in this study have positive effects in other countries (i.e., business driven retrofitting).	
To what extent the incentives introduced through NTDAC schemes have been passed from RUs to WKs?	<p>Type and amount of the incentive scheme of countries where the NDTAC schemes have been introduced.</p> <p>Extent that the incentives are passed from RU to WKs.</p>	<p>Discount applied and any differentiation used, if any.</p> <p>Identification of the stakeholders involved (i.e., size of the market).</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>The incentive introduced through NDTAC has been passed through to the stakeholder that bears the costs</li> </ul>	<p>Surveys of industry, including RUs, WOs and WKs (i.e., rail freight transport activities performed and localisation on the geographical scope).</p> <p>Desk research (e.g., annual reports, IMs network statements)</p>
<b>EQ3. To what extent does the Regulation affect the competition between the rail and road sectors?</b>			
To what extent have the costs of rail freight transport been influenced by the Regulation?	<p>Variation in rail freight costs since the adoption of the Regulation.</p> <p>Given the specific context of this intervention, it is worth noting that the <u>actual effect of the NDTAC schemes on competition between rail and road modes cannot be readily disentangled from other large scale effects and endogenous</u> factors (i.e., general market trends, construction or enhancement of new infrastructures, etc.).</p> <p>It is also worth remembering that the cost of rail freight transport could be influenced by subsidies provided at the national level. However, data availability on subsidies is rather poor and the analysis can be complicated by the large number of existing subsidy schemes.</p> <p>Thus, we will use a proxy indicator, i.e. the part of the cost that is influenced by the Regulation. The indicator is the extent to which the NDTACs plus</p>	<p>Qualitative and quantitative analysis, corroborated with stakeholder input.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>The cost of rail freight transport has not increased due to the adoption of the Regulation.</li> <li>The problem of rail noise has been reduced and public opposition to railway expansion has reduced</li> </ul>	<p>Surveys of industry, including RUs, WOs and WKs (i.e., rail freight transport activities performed and localisation on the geographical scope).</p> <p>Desk research (i.e., main stakeholders annual reports).</p>



	<p>other subsidies have covered the cost of retrofitting.</p> <p>On the more qualitative side, we will use the input from affected stakeholders as indicators of the impact (or not) of the measure on rail/road competition. The level of public opposition to railway development (as proxied by reductions in noise) also affects the ability for rail to compete with road.</p>		
<b>EQ4. To what extent has the EU framework (e.g. administrative measures, data collection, enforcement and cooperation mechanism) been set in an effective way?</b>			
<p>Has the EU framework been set in an effective manner?</p> <p>What changes were made to the existing NDTAC schemes when EU intervention was put in place?</p>	Type of measure, i.e. administrative measures, data collection, enforcement and cooperation mechanisms	Evaluation grid cross-checking the effect of the measures with respect to relevant variables (i.e., level of retrofitting (one-off costs and number of wagons), effects on the competition).	Drawing from above data sources.
<b>EQ5. Which of the NDTAC schemes has proved to be the most effective in the achievement of objectives of the Regulation? Based on the current experience what is the most effective level of bonuses/malus?</b>			
To what extent the NDTAC schemes have been effective to achieve the objectives of the Regulation?	<p>For each of the countries with NDTACs:</p> <ul style="list-style-type: none"> <li>• Identification of differences with respect to the rail freight wagons that have been retrofitted and the renewal rate?</li> <li>• Identification of differences in the share of existing retrofitted freight wagons with respect to totally new silent wagons purchased</li> <li>• If any, what are the reasons that have led operators to prefer totally new rail freight wagons compared to retrofitting existing ones?</li> </ul>	Estimation of the amount of bonus and malus with respect to the financial support for retrofitting and relationship with respect to the renewal rate.	<p>Surveys of industry, including RUs, WOs and WKs. Getting up-to-date and actual estimates of ongoing costs and revenues.</p> <p>Desk research (e.g., annual reports, IMs network statements)</p>

What is the most effective level of bonus/malus?	Level of bonus/malus to achieve the aims of the Regulation.	Qualitative and quantitative analysis of the most effective level of bonus/malus against the other schemes adopted.	Drawing from above data sources.
What other factors contributed to the effectiveness?	Retrofitting programmes introduced and funding at national level.	<p>Funds allocated by national programmes to retrofit rail freight wagons, including countries not covered in this study.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>The Regulation made a positive contribution to the objectives, in combination with other factors</li> </ul>	<p>Surveys of industry, including RUs, WOs and WKs (i.e., rail freight transport activities with silent wagons performed in countries not covered in this study).</p> <p>Desk research (i.e., main stakeholders annual reports).</p>
<b>EQ6. Which unexpected or unintended effects (positive or negative) have occurred as a result of the intervention and what factors have influenced those achievements? Please specify the effects for each stakeholder respectively.</b>			
<p>What are the other effects or factors that have resulted from the Regulation?</p> <p>What other factors have either positively or negatively affected the achievements observed since the adoption of the Regulation?</p>	Unexpected or unintended effects or factors, where possible by relevant category. Type of stakeholder involved.	<p>Evaluation grid cross-checking other factors and qualitative analysis of positive and negative consequences.</p> <p>Summary of the key findings with respect to the unexpected or unintended effects or factors for each stakeholder and by country to infer to what extent other factors either positively or negatively occur.</p>	<p>Surveys of industry, including RUs, WOs and WKs.</p> <p>Desk research (i.e., general review).</p>
<b>Efficiency</b>			
<b>EQ7. What are the direct or enforcement or implementation costs for the national authorities (and IM)? Among other points, please distinguish between the pure enforcement costs, costs linked to the monitoring (the administrative costs and reporting arrangements) and costs linked to the adjustment to the Regulation (i.e. substantive compliance costs)?</b>			

Implementation costs for national authorities and IMs	<p>Ongoing costs (EUR/year) related to:</p> <ul style="list-style-type: none"> <li>• Reviewing and verifying registrations of retrofitted wagons.</li> <li>• Calculation and disbursement of bonus payments / malus charges (if applicable).</li> <li>• Auditing / Random checks on retrofitting.</li> <li>• Any additional costs/savings due to Single-Entry Point (SEP).</li> </ul>	<p>Quantitative analysis:</p> <p>Develop a spreadsheet tool that uses input from stakeholders and cross-checking with literature to determine costs (EUR and EUR per year for one-off and ongoing costs, respectively). The costs will be converted to present terms and summed across the different types.</p> <p>Depending on the number and distribution of responses, we will determine the appropriate statistical methods to apply in order to come up with the overall estimates (e.g. different techniques are appropriate depending on the number of responses, skewness and representativeness of the respondents). At this stage it is not possible to confirm given we do not have the responses, but our team is highly skilled in statistical approaches).</p> <p>Where precise figures are not available, we will seek to gain insight at least into the magnitude of the costs (negligible vs EUR 100's / 1,000's / 100,000's etc)</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• Costs are proportionate</li> </ul>	<p>Targeted stakeholder interviews, which will aim to include representatives of authorities and infrastructure managers from all countries that have introduced NDTAC schemes (Germany, Netherlands, Austria).</p> <p>Case study of SEP.</p> <p>Published literature, where available. See Task 1.4 for examples.</p>
Enforcement costs for ministries and/or for infrastructure managers	<p>One-off costs (EUR) related to:</p> <ul style="list-style-type: none"> <li>• Familiarising with new requirements of the Regulation.</li> <li>• Design and implementation of new NDTAC schemes where applicable, or adjustment of existing schemes to ensure compliance with the Regulation.</li> <li>• Creating or adapting registers and databases (additional costs over systems already in place): <ul style="list-style-type: none"> <li>◦ Any additional costs / savings due to SEP.</li> </ul> </li> <li>• Adapting procedures for monitoring.</li> <li>• Initial costs to establish cooperation with other Member States.</li> <li>• Training of staff.</li> </ul> <p>Ongoing costs (EUR/year) related to:</p> <ul style="list-style-type: none"> <li>• Monitoring / gathering data for reporting, per Article 9 (additional costs over procedures already in place).</li> </ul> <p>Other monitoring costs.</p>		
Costs for other authorities	<p>One-off costs (EUR) related to:</p>	<p>Depending on the number and distribution of responses, we will determine the appropriate</p>	<p>Targeted stakeholder interviews</p>

(regulatory bodies)	<ul style="list-style-type: none"> <li>Familiarising with new requirements of the Regulation.</li> </ul> <p>Ongoing costs (EUR/year) related to:</p> <ul style="list-style-type: none"> <li>Monitoring / gathering data for reporting.</li> <li>Other monitoring costs.</li> </ul>	<p>statistical methods to apply in order to come up with the overall estimates (e.g. different techniques are appropriate depending on the number of responses, skewness and representativeness of the respondents). At this stage it is not possible to confirm given we do not have the responses, but our team is highly skilled in statistical approaches).</p> <p>Where precise figures are not available, we will seek to gain insight at least into the magnitude of the costs (negligible vs EUR 100's / 1,000's / 100,000's etc)</p>	
Overall costs for authorities	Combination of all of the above	Combination of all of the above	Combination of all of the above
<p><b>EQ8. What are different direct costs involved for different industry stakeholders? What are the benefits for the industry? In your assessment, please distinguish between direct substantive compliance costs and administrative costs.</b></p> <p>Among other points, please assess in particular the direct and indirect retrofitting costs for railway undertakings and wagon keepers. Has the Regulation had any impact on the level of the retrofitting costs and their affordability for railway undertakings and wagon keepers? If yes, then which? What is the cumulative level of bonuses wagons receive from different schemes? To what extent does the cumulative level of bonuses wagons receive from different NDTAC schemes cover retrofitting costs?</p>			
Direct substantive compliance costs	<p>One-off costs related to:</p> <ul style="list-style-type: none"> <li>Equipment cost of retrofitting per wagon (specify whether estimates refer to K or LL type blocks).</li> <li>Labour for replacement (hours).</li> <li>Any other subsidy received for retrofit (e.g. national funding, CEF) – i.e. net cost to WK of retrofit, accounting for any funding assistance.</li> <li>Opportunity cost of wagons taken out of service for retrofit.</li> </ul>	<p>Quantitative.</p> <p>Use the responses from surveys and interviews, triangulated with the literature, in order to develop a spreadsheet calculation of the direct and indirect costs of retrofitting or replacement taking into account also the reduction in costs due to funding received from other sources. The costs will be converted to present terms and summed across the different types.</p> <p>Depending on the number and distribution of responses, we will determine the appropriate</p>	<p>Surveys of industry, including railway undertaking and wagon keepers. Getting up-to-date and actual estimates from the affected stakeholders will be important to assess the actual impacts in practice.</p> <p>Case study of SEP.</p> <p>Previous literature provides a good basis for triangulating costs received via the surveys, including</p>

	<ul style="list-style-type: none"> <li>Costs of purchasing silent/very quiet wagons/locomotives</li> </ul> <p>Ongoing annual costs / benefits related to:</p> <ul style="list-style-type: none"> <li>Additional lifetime costs of low noise brakes (e.g. higher maintenance) per axle km.</li> <li>Bonus (or reduction in charges) received, <ul style="list-style-type: none"> <li>Retrofit bonus + eligibility for silent train / very quiet wagon/locomotive bonuses.</li> <li>Mileage in relevant countries eligible for NDTAC bonus vs total mileage.</li> </ul> </li> <li>Other costs, e.g. redeploying wagons on different routes.</li> </ul> <p>Also key questions are:</p> <ul style="list-style-type: none"> <li>The amount of pass-through of incentives from RU to WK in practice.</li> <li>Have there been any cases where retrofitting was <u>carried out but the expected bonus was not received</u>? What were the reasons for this (e.g. inability to produce required evidence).</li> </ul> <p>If the RU has not made use of NDTAC schemes: what was the reason for this? Please explain:</p> <ul style="list-style-type: none"> <li>Already compliant.</li> <li>Redeployed trains elsewhere.</li> <li>Not technically compatible.</li> <li>Administrative burdens.</li> <li>Scheme incentives are not high enough.</li> <li>Scheme incentives are not passed through to appropriate stakeholder.</li> </ul>	<p>statistical methods to apply in order to come up with the overall estimates (e.g. different techniques are appropriate depending on the number of responses, skewness and representativeness of the respondents). At this stage it is not possible to confirm given we do not have the responses, but our team is highly skilled in statistical approaches).</p> <p>Due to the difference in costs between K and LL type blocks, separate estimates for these different types are needed. Similarly, costs for silent and very quiet wagons/locomotives will be estimated separately</p> <p>Calculations are needed per unit (wagon) and in total in order to answer the evaluation question in full, along with consideration of the arrangements for passing through incentives to different actors.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>The Regulation has reduced the level of retrofitting costs for relevant stakeholders and rendered them affordable for RUs and/or WKs.</li> <li>The cumulative level of bonuses received from different schemes covers the retrofitting costs.</li> </ul>	<p>the previous IA and the results of funded research projects. See Task 1.4 for examples</p> <p>Also of relevance are the reports that are formally required under Article 9.</p> <p>Expert peer review from our rail noise expert will also be used to sense-check the estimates and provide further insights.</p>
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<p>Administrative/reporting costs</p>	<p>One-off costs related to:</p> <ul style="list-style-type: none"> <li>• Application for the bonus and provision of technical / financial evidence of retrofitting – per wagon and in total.</li> <li>• For silent / very quiet wagons and locomotives, application and associated additional proof needed– per application and in total.</li> <li>• Setting up contractual arrangements to pass on incentives from RUs to WKs.</li> </ul> <p>Ongoing annual costs related to:</p> <ul style="list-style-type: none"> <li>• Reporting of information required, e.g. calculation of wagon-km.</li> <li>• Any additional costs / savings due to SEP (have they used SEP – if not, why? Has the SEP led to any additional applications over what would have been done via separate national systems only?).</li> <li>• Contesting charges, if applicable.</li> <li>• Any other costs, e.g. route changes if applicable.</li> </ul>		
<p>What are the total retrofitting costs for the industry and how do these compare with the cumulative bonus received, i.e., the benefits for the industry? What is the proportion of administrative costs?</p> <p>Is the level of bonus in each Member State appropriate to cover the retrofitting</p>	<p>Cumulative bonus received as reported by the NDTAC schemes, or estimated depending on:</p> <ul style="list-style-type: none"> <li>• Amount of bonus per axle km (current and historical rates).</li> <li>• Number of eligible axle km on relevant track per year.</li> <li>• Maximum bonus per wagon (current and historical).</li> <li>• Maximum bonus duration.</li> </ul> <p>Costs for retrofitting needs to be calculated from the</p>		

costs incurred by the industry as prescribed by the Regulation	<p>following information:</p> <ul style="list-style-type: none"> <li>• Unit costs to retrofit a wagon (number of axles, type of wagon, type of brakes, labour costs).</li> <li>• Total number of wagons retrofitted by year.</li> <li>• Additional maintenance costs (wheel changing and reprofiling, wear rate, costs) and age of wagons at retrofit, average mileage.</li> </ul>		
How does the NDTAC scheme compare to other funding mechanisms available for retrofitting wagons	<ul style="list-style-type: none"> <li>• NDTAC schemes bonus level</li> <li>• Funding available via other sources (e.g. CEF, national subsidies)</li> </ul>	Quantitative assessment provided by stakeholders (RU, WK) of the relative importance of the different sources of funding available	
<b>EQ9. Based on analysis carried out for the previous two evaluation questions, please assess to what extent has the EU framework been efficient? How are costs and benefits distributed amongst relevant actors?</b>			

<p>How are costs and benefits distributed among relevant actors? To what extent has the EU framework been efficient?</p>	<ul style="list-style-type: none"> <li>• One-off costs and ongoing annual costs</li> <li>• Average external costs of noise of freight trains</li> <li>• Transport performance data of noisy and silent freight wagons (i.e., train-km and/or tonne-km).</li> </ul>	<p>Calculate the distribution of costs and benefits among the population exposed, infrastructure managers, railway undertakings and wagon keepers.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• The costs and benefits are distributed proportionately among stakeholders.</li> <li>• There is no category of stakeholders that faces disproportionate costs or enjoys disproportionate benefits</li> <li>• Bonuses / reductions in charges are passed through to the appropriate party that bears the cost of retrofitting.</li> </ul> <p>Calculate the overall share of administrative costs in the total costs.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• There are no identified costs that were unnecessary / avoidable (crf. EQ5).</li> <li>• The proportion of administrative costs is minimised where possible through use of existing systems, e.g. existing registers</li> </ul> <p>Calculate the total costs of the intervention.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• The framework has been efficient, i.e. total admin costs have been minimised and the costs/benefits are distributed fairly</li> </ul>	<p>European Commission's 'Handbook on the external costs of transport', 2019 version. The average external cost of noise is provided by the Handbook considering the number of people exposed to a certain noise level originating from a transport mode. For the purpose of this study no assumptions will be made on possible evolution of the exposed population.</p> <p>Analysis focussed on Austria, Germany, the Netherlands and Switzerland, from 2015 to the last year for which the data is available (2018 or 2019).</p> <p>Surveys of industry, including railway undertaking and wagon keepers and access to industry databases. This will be used to get up-to-date and actual estimates of one-off costs, ongoing costs and transport performance of noisy and silent wagons (i.e., train-km and/or tonne-km).</p> <p>Case study of SEP and Switzerland.</p> <p>Previous literature for triangulating costs and, where possible, transport performance data.</p> <p>Expert peer review from our rail noise expert will also be used to sense-check the estimates and provide further insights.</p>
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<b>EQ10. Which of the NDTAC schemes has proved to be the most efficient? What are the conditions allowing for this efficiency?</b>			
Are there any differences in the costs for different stakeholders in each of the NDTAC schemes? If so, what are they and who is affected? What is the reason for them?	<p>Drawing on the above indicators.</p> <p>Additional qualitative indicators for exploring the possible reasons for differences in efficiency between the NDTAC schemes:</p> <ul style="list-style-type: none"> <li>• Type of system (bonus, bonus/malus).</li> <li>• Maximum bonus duration.</li> <li>• Maximum bonus per wagon.</li> <li>• Relative use of SEP vs national applications.</li> <li>• Control system / method of auditing.</li> <li>• Mechanisms for passing incentives between wagon keepers and wagon owners.</li> </ul>	<p>Split analysis of costs for the different NDTAC schemes and review separately.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• There are no significant differences in efficiency between NDTAC schemes (all schemes are equally efficient).</li> </ul>	<p>Drawing from above data sources, and taking into account considerations such as the difference between schemes that were introduced prior to the Regulation, as well as shared costs via SEP.</p>
<b>EQ11. Has the Regulation resulted in unnecessary regulatory burdens or inefficiencies? What are the reasons for this? Is there a potential for the reduction of the regulatory costs for the main actors? What are the factors which hinder the efficient application of the Regulation and potential solutions to address them?</b>			
<p>Are there specific costs (substantive compliance, enforcement, administrative etc) that are unduly high?</p> <p>Are there specific aspects of the Regulation that could be improved to increase its efficiency?</p>	<p>Drawing on above indicators.</p> <p>Additional question to include would ask directly:</p> <ul style="list-style-type: none"> <li>• Are there any costs that you consider excessive?</li> <li>• Are there any costs that could be removed without impacting the effectiveness of the Regulation?</li> <li>• What are they and why can they be removed? What would the cost saving be?</li> <li>• Do you have any other suggestions to increase the efficiency of the Regulation?</li> </ul>	<p>Review analysis for EQ1 – 4 and take note of any anomalously high or low cost estimates. Follow up with relevant stakeholders in these cases to understand what the reasons for these were and whether due to the Regulation or other factors.</p> <p>Complement with direct interpretation of the questions indicated that will ask stakeholders to identify specific issues.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• The Regulation has not resulted in any unnecessary regulatory burdens or inefficiencies.</li> </ul>	<p>All relevant surveys and/or interviews (where appropriate).</p>
<b>Relevance</b>			

EQ12. To what extent are the objectives which were identified at the time of adoption of the Regulation still adequate in the current context? Please take into account the political, legal, technological and market developments. To what extent there is still a need to incentivise the retrofitting via NDTAC schemes?			
Is the objective to contribute to mitigation of health risks relating to rail freight noise still relevant in today's market?	<ul style="list-style-type: none"> <li>• Extent of noise exposure and associated health risks from railway noise in the EU.</li> <li>• Extent of public opposition to rail due to noise issues.</li> </ul>	<p>Analysis of these indicators will demonstrate the continuing need (or not) to mitigate noise from rail in the EU.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• There is a continuing need to mitigate rail noise and hence the objective to mitigate noise and its associated health risks is still relevant.</li> </ul>	<p>EEA noise reports and national reports of the same.</p> <p>2011 White Paper on Transport and other relevant over-arching EU policy documents.</p> <p>Drawing also on data sources from previous evaluation questions to establish e.g. number of noisy wagons.</p>
Is the objective to reduce risks to competitiveness of rail freight sector still relevant in today's market?	<ul style="list-style-type: none"> <li>• Goods travelling by rail in the 2015-2017 period</li> <li>• Share of goods travelling by rail (2015-2017)</li> </ul>	<p>Analysis of these indicators will demonstrate the continuing need to ensure the competitiveness of the rail freight sector and avoid reverse modal shift from road to rail.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>• The objective is still relevant and there are still risks that the internalisation of noise costs will lead to decreasing competitiveness of the rail freight sector.</li> </ul>	<p>Stakeholder views, including from the open public consultation.</p>
To what extent is there still a need to incentivise retrofitting via NDTAC schemes?	<ul style="list-style-type: none"> <li>• Number of noisy wagons still in circulation in the EU.</li> <li>• Average remaining lifetime of these noisy wagons.</li> <li>• Cost of retrofitting brakes on noisy wagons.</li> <li>• Competitiveness of the rail freight sector.</li> </ul>	<p>Analysis of these indicators will demonstrate the extent that noisy wagons are still an issue in the EU, since these are not targeted by the TSI Noise limits for new/renewed wagons. The continuing need to preserve competitiveness is another relevant factor in considering incentives for retrofitting and the need to avoid negatively impacting the economics of the rail</p>	

		<p>industry.</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>There is still a need for incentives to support retrofitting of noisy wagons in the EU and hence the objectives to support this retrofitting are still relevant.</li> </ul>	
<b>EQ13. To what extent do elements constituting the bases for calculating bonuses under the NDTAC schemes reflect well the sources of costs linked to retrofitting?</b>			
Are the underlying assumptions for calculating the bonuses under the NDTAC schemes still appropriate?	<p>To what extent do the assumptions adequately match the real costs and usage patterns of rail freight rolling stock in today's market:</p> <ul style="list-style-type: none"> <li>What are the bases for calculation of bonuses for the different NDTAC schemes?</li> <li>Does the bonus cover at least 50% of the additional retrofitting costs?</li> <li>If not, which elements of the calculation contribute to this? (e.g. costs, mileage, remaining lifetime of the wagons?)</li> </ul>	<p>Calculation of the costs from the efficiency questions and comparing this to the bonus calculations.</p> <p>This will be compared to the bonus calculations for the NDTAC schemes and also the guidance in the Regulation (i.e. aiming to cover at least 50% of the additional cost for wagons running more than 45,000km/year for 6 years).</p> <p>Success criteria:</p> <ul style="list-style-type: none"> <li>The bonuses as calculated cover at least 50% of the additional cost of retrofitting</li> </ul>	Drawing on data sources for the questions on efficiency.
<b>Sustainability</b>			
<b>EQ14. To what extent have the existing NDTAC schemes proved to be financially sustainable? In particular is there a balance between the cumulative level of bonus deducted and cumulative malus paid?</b>			
Are the existing NDTAC schemes financially sustainable?	<ul style="list-style-type: none"> <li>Level of bonus pay-outs.</li> <li>Level of malus charges.</li> </ul>	<p>Assessment of the actual application of malus charges, and comparison of the level of bonus pay-outs versus the level of malus charges.</p> <p>If no malus charges have been applied,</p>	<p>Drawing on the data sources for the questions on efficiency.</p> <p>Stakeholder input (via interviews) on the application, or not, of malus</p>

		assessment on why that has been the case.  Success criteria: <ul style="list-style-type: none"><li>• NDTAC schemes are revenue neutral</li></ul>	charges and the reasons behind that.
Coherence			
EQ15. To what extent does the Regulation contribute to the overall European legal framework aiming at the rail noise reduction? To what extent is it coherent with the overall noise mitigation objective of the EU policy and its underlying legal acts? Are there any differences, overlaps or contradictions or inconsistencies?			
Does the Regulation contribute to the overall EU framework aiming at rail noise reduction?	<ul style="list-style-type: none"><li>• Extent that the Regulation contributes to noise reductions from the existing fleet and the mechanisms for this.</li></ul>	Mapping of the different instruments and their mechanisms for targeting noise to show areas of complementarity or overlap, including the main set of instruments: <ul style="list-style-type: none"><li>• CEF (financial support mechanisms)</li><li>• TSI Noise (measures aimed at new fleet)</li><li>• Environmental Noise Directive (increasing monitoring and action plans)</li></ul>	Analysis of the text of the Regulation itself, alongside review of the text of relevant EU policies including the Staff Working Document on rail freight noise reduction, TSI Noise etc.
Is the Regulation coherent with overall noise mitigation objectives of EU policy? Are there any differences, overlaps or contradictions or inconsistencies?	<ul style="list-style-type: none"><li>• Extent of interactions / synergies with the overall EU policy on noise levels</li><li>• Extent of any interactions / synergies with other areas (e.g. measures aimed at the new fleet).</li></ul>		
EQ16. To what extent are the provisions set in the Regulation coherent and consistent with one another? If not entirely, what would be the differences, overlaps or contradictions or inconsistencies? What are the negative consequences, if relevant?			
Are there any provisions in the Regulation that are not coherent or consistent with one another? Are there any significant issues arising from identified inconsistencies?	<ul style="list-style-type: none"><li>• Presence and importance of differences, overlap or contradictions between the provisions of the Regulation.</li><li>• Extent that stakeholder consider that such inconsistencies represent significant problems.</li></ul>	Qualitative analysis. Logical analysis will be used to review the provisions of the Regulation and identify any issues. In addition, this will be corroborated with stakeholder input.  Success criteria: <ul style="list-style-type: none"><li>• No areas of incoherence, inconsistency,</li></ul>	Analysis of the text of the Regulation itself.  Complemented by questions to stakeholders in the interviews and/or surveys regarding any possible inconsistencies.

		overlaps or contradictions identified. <ul style="list-style-type: none"> <li>No significant issues identified arising from potential inconsistencies (if identified).</li> </ul>	
<b>EQ17. To what extent are the current national provisions setting up NDTAC schemes consistent with one another? If not entirely, what would be the differences, overlaps or contradictions or inconsistencies? What are the negative consequences, if relevant?</b>			
Are there any provisions at national level that are not consistent with other schemes? What are the differences and potential negative consequences?	<ul style="list-style-type: none"> <li>Presence and importance of differences, overlap or contradictions between the provisions of the NDTAC schemes.</li> <li>Extent that stakeholders consider that such inconsistencies represent significant problems.</li> </ul>	Qualitative analysis. Logical analysis will be used to review the provisions of the NDTAC schemes and identify any issues. In addition, this will be corroborated with stakeholder input  Success criteria: <ul style="list-style-type: none"> <li>No areas of incoherence, inconsistency, overlaps or contradictions identified.</li> <li>No significant issues identified arising from potential inconsistencies (if identified).</li> </ul>	Analysis of provisions of the NDTAC schemes.  Complemented by questions to stakeholders in the interviews and/or surveys regarding any possible inconsistencies.
<b>EU added value</b>			
<b>EQ18. To what extent is there a need for setting a legal framework for NDTAC schemes at EU level? What actual evidence can be found of the Regulation's added value, over and above what could reasonably have been expected from interventions of Member States?</b>			
What is the added value for setting a legal framework for NDTAC schemes at EU level?  Would the Member States set different rules if there was no regulation at the EU level?  Are there situations or circumstances which imply that the legislation at the	Drawing from above indicators of effectiveness.  Number and share of Member States that would have set different rules if there was no regulation at EU level.  Impact of non-harmonised legislation at national level	Qualitative and quantitative analyses.  Logical analysis will be used to review the provisions of the Regulation and identify any issues. In addition, this will be corroborated with stakeholder input and key findings of the case studies.  Success criteria: <ul style="list-style-type: none"> <li>The Regulation has provided added value compared to a legal framework set at national level, in terms of e.g.</li> </ul>	Drawing on the data sources for the questions on efficiency, effectiveness and relevance.  Targeted interviews.  Surveys of industry and case study of SEP and Swiss NDTAC experience.

Member State level would achieve better results than the EU-level regulation? If any, what would such situations and circumstances be?		rates of retrofitting, use of silent wagons, competitiveness of the rail sector.	
<b>EQ19. What would be the most likely consequences of not prolonging the existence of intervention at EU level?</b>			
What is the consequence if the intervention at EU level is not prolonged.	Likely impacts of not prolonging the intervention.	<p>Qualitative and quantitative analyses.</p> <p>Logical analysis will be used to review the provisions of the Regulation and identify any issues/problems arising from not prolonging the intervention and relying only on Member State action.</p> <p>In addition, this will be corroborated with stakeholder input and key findings of the case studies.</p>	<p>Drawing on the data sources for the questions on efficiency, effectiveness and relevance.</p> <p>Targeted interviews.</p> <p>Surveys of industry and case study of SEP and Swiss NDTAC experience.</p>

## **Annex 4: Stakeholder validation of estimated retrofitting and operational costs**

The Implementing Directive does not oblige railway undertakings or wagon keepers to retrofit their freight wagons. As such, retrofitting costs are not a direct consequence of the Implementing Regulation. As elaborated in section 6.2.2 of the support study, stakeholders were asked about the retrofitting costs estimates used by ERA and by the Commission and more specifically the validity of estimates of the total costs of retrofitting from the literature:

- A recent report from the ERA (2018) on the costs of retrofitting was considered to be the most reliable guide to the current cost of LL-block retrofit. The study also involved significant stakeholder engagement (as relayed to the study team by a trade organisation in the industry). The ERA (2018) cost estimate of an LL-block retrofit of €1,760 was therefore used in surveys.
- For K-blocks, the cost of retrofitting was taken from (COWI and ProgTrans, 2014) and adjusted using the producer price index. A value of €7,970 was used on the survey.

Over half of respondents accepted the estimates on both K-blocks and LL-blocks, or proposed a lower estimate. The respondents providing a higher estimate, generally referred to specific technical or climatic conditions. Therefore, the values of €1,760 for a LL-block wagon retrofit and €7,970 for a K-blocks wagon were used in this analysis.

### **Operational Costs**

Ongoing operational costs of LL and K-blocks are higher than the respective costs for CI brake blocks and vary depending on the type of blocks retrofitted. According to the study by ERA (ERA, 2018), additional (when compared to CI brake blocks) on-going maintenance costs for 4-axle wagons equipped with LL and K-blocks were estimated within the range of € 0.017-0.025 per wagon-km, with a median value of €0.0215 (equal to €986 per wagon per year for 45,000 km mileage). As part of survey and interview of RUs and Ws they were asked to comment on their validity. Over half of respondents agreed with these estimates, with around one third indicating that the costs are higher. Overall, the majority of responses suggest that the estimate of the lifecycle costs in the ERA study as rather realistic and appropriate. Some input provided suggests that these may be higher, but the estimates provided seem to be related to specific technical or climatic conditions which may not be generally applicable. Further confidence in these figures comes from the fact that they are both recent and that they are the result of extensive stakeholder engagement.