GHG ASSESSMENT REPORT & REDUCTION ROADMAP

FOR GROUP GTS

Powered by STRATEGIC ADVISORY

Brussels, Belgium		08/10/21		
GREENFISH	**Name:** **Role:**	Suzanne REINARTZ *Lead Consultant*	Mick RICHARDS *Consultant*	Johanna DELMELLE *Junior Consultant*
GROUP GTS	**Name:** **Role:**	Roel SMETS *Chief Operational Officer*		

Change log

VERSION NUMBER	RELEASE DATE	COMMENTS
Version 1	08/10/2021	

Descriptive information

Company	Address	Sector
Group GTS	Albertkade 2A, 3980 Tessenderlo, BE	Freight & Logistics Services, Transportation

Assessment Summary	Company response
Chosen consolidation approach	Operational control
Description of the businesses and operations included in the company's organisational boundary	Group GTS provides container and other transport solutions for goods delivery in all EU countries but is specialised in transport within the Benelux region, Germany and France.
Reporting period covered	Calendar year 2020* *with the exception of some data from 2021, see Chapter 3

Activities included in the report	• Scope 1:
	  ○ Transport lanes planned by Group GTS
	  ○ Consumption of natural gas within Group GTS' premises
	• Scope 2:
	  ○ Consumption of electricity within Group GTS' premises

Chosen as base year and rationale	Calendar year 2020 was chosen as a base year. Due to data availability, some assumptions and proxy were made using data from 2021.
Base year emissions recalculations	N/A

Company Representative Contact Details

Name Roel SMETS
Function Chief Operational Officer
Phone 0478 79 91 53
Email roel.smets@group-gts.com

Assessor Contact Details

Name Suzanne REINARTZ
Function Lead Consultant
Phone 0477 31 21 43
Email sreinartz@greenfish.eu

Glossary

ABBREV.	MEANING
BEV	Battery-electric vehicle
CAPEX	Capital expenditures
CNG	Compressed Natural Gas
CO_2	Carbon dioxide
CO_2e	CO_2 equivalent
CSR	Corporate Social Responsibility
EF	Emissions Factor
FCL	Full Container Load
GHG	Greenhouse Gases
HC	Hydrocarbons
HVO	Hydrotreated Vegetable Oil
LCL	Less Than Container Load
LNG	Liquified Natural Gas
NOx	Nitrogen oxides
OPEX	Operational expenditures
PM	Particulate Matter
SBTi	Science-Based Target Initiative
SMEs	Small- and Medium-size Enterprises
TCOL	Total Cost of Life
TPMS	Tire Pressure Monitoring System

Summary

Purpose and context

Aware of the climate impact of its operations, Group GTS has decided to develop an ambitious sustainability strategy. This strategy includes environmental impacts as one of its pillars. Group GTS has notably committed to reducing absolute CO_2e emissions (Scope 1 & 2) by 25% by 2025.

In addition, Group GTS developed the following targets in collaboration with Greenfish, as a first step in its transition to carbon neutrality:

- Cut empty kilometres by 5% by mid-2022
- Ensure 10% of revenues comes from multimodal transport by 2023
- Have 100% of the fleet running on 25% alternative fuel by 2024

In light of this, Greenfish has developed a comprehensive sustainability and communication strategy, together with a GHG reduction roadmap for Group GTS.

Baseline emissions

Group GTS' total GHG emissions for 2020 amount to **23 382 tCO_2e**. The most significant emissions sources, namely Group GTS' hotspot, is the combustion of fuel needed for transport lanes planned by Group GTS (97% of total GHG emissions). Baseline emissions are detailed in Table 1 below.

Table 1: Group GTS' GHG emissions by scope

Scopes and categories	*Metric tons CO_2e*	*% of total*
Scope 1: Direct emissions from controlled operations	**22 758**	**97%**
Mobile combustion of fuel (transport lanes)	22 753	97%
Stationary combustion of natural gas	23	> 0.1%
Scope 2: Indirect emissions from the use of purchased electricity, steam, heating, and cooling	**624**	**3%**
Consumption of electricity	624	3%
Total Scope 1 & 2 emissions	**23 382 tCO_2e**	**100%**

Reduction roadmap

Reduction measures selected by Group GTS with the support of Greenfish are categorised into 4 tiers, based on prioritisation of measures. These tiers express a combination of the potential impact of a measure, its ease of implementation, and Group GTS' preferences:

- **Tier 1** consists of behavioural measures, including Tire Pressure Monitoring Systems (TPMS), speed limiters, and eco-driving courses. These measures are easy to implement and have low initial investment costs but have a relatively low impact.
- **Tier 2** consists of the intermodal transport measures. In the case of Group GTS, intermodal solutions include trains and barges. These measures have low initial investment costs and are effective at reducing emissions, but are harder to implement.
- **Tier 3** consists of replacing Euro VI truck by LNG trucks at the end of their economic lifetime. This measure has already been explored and is currently being tested by Group GTS.
- **Tier 4** consists of two types of measures: alternative fuels (HVO and Bio-LNG) as well as battery-electric vehicles. Several factors, such as availability and applicability, are keeping these measures from becoming more prominent in Group GTS' roadmap.

Greenfish then combined the baseline emissions calculation, reduction targets set by Group GTS, the available reduction measures, and Group GTS' preferred selection of measures into a reduction roadmap towards 2025. The core idea of this roadmap is that, when reaching economic end of life, assets need to be replaced by a more sustainable alternative. This reduction roadmap is based on a high degree of implementation of tier 1 and 2 measures, supplemented by tier 3 and, to a lesser extent, tier 4 measures. However, given Group GTS' business model, emissions reductions will largely rely on partnerships and shared efforts with both internal and external subcontractors. The realisation of the 25% reduction target also relies heavily on the success of intermodal transport (tier 2). In the event intermodal solutions are not growing as much as anticipated, an alternative scenario has been developed, in which the reduction from the four tiers is spread out more evenly.

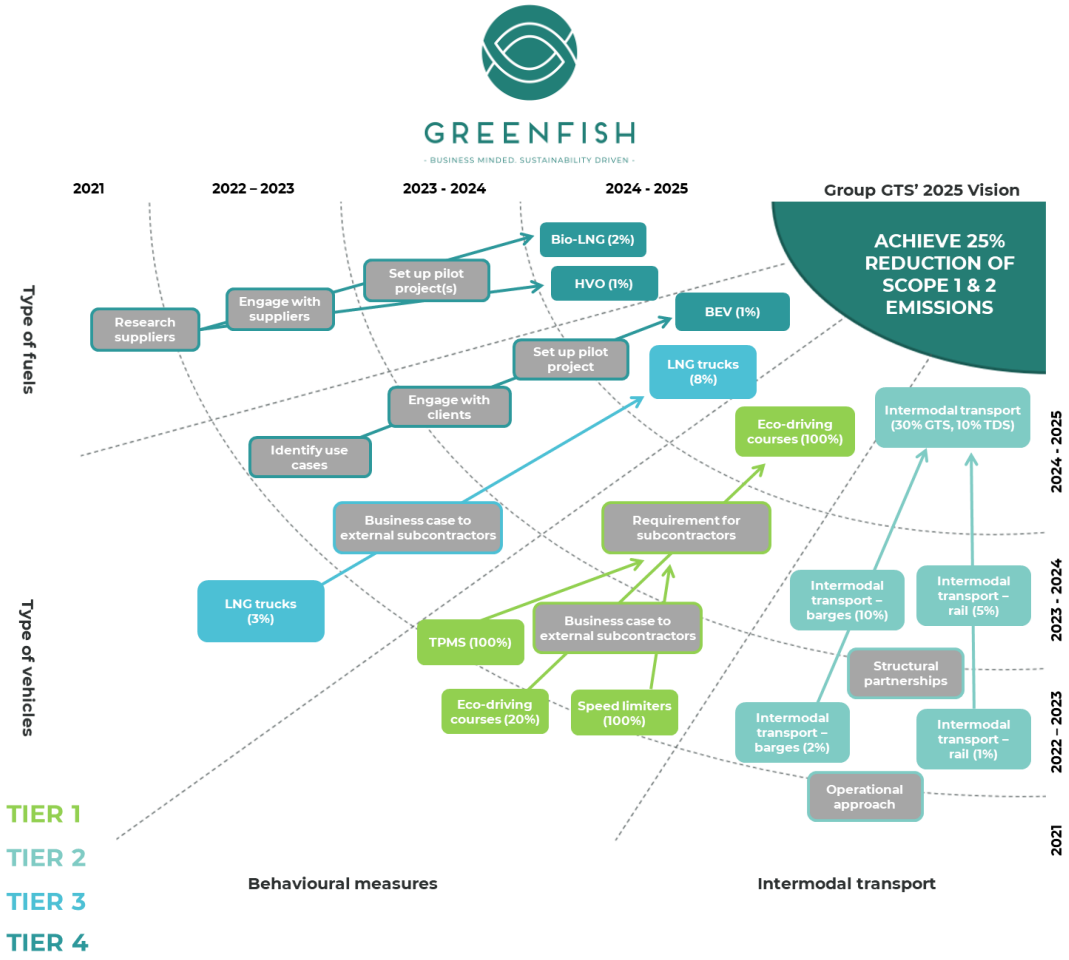

Figure 1: Group GTS' 2025 reduction roadmap

Conclusion

The pathway proposed in the reduction roadmap developed by Greenfish ensures Group GTS will reach its 25% emissions reduction target. It is however important to note that this roadmap is a static conclusion to a dynamic situation. The realisation of emissions reduction will highly depend on the development of the market, emergence of new technologies, client demands, and the ambition of Group GTS, which are all evolving factors. The roadmap should therefore be understood as a priority list, or action plan, helping Group GTS identify where to focus its resources and efforts. In brief, it is important to allow for sufficient flexibility to ensure Group GTS will meet its target in the most cost-efficient and intelligent manner.

Given its ambitious target, it is advised that Group GTS engages in a formal commitment in order to ensure the target is met.

TABLE OF CONTENTS

1. PROJECT OVERVIEW

Group GTS is an international organisation, leader in the field of transport and logistics for more than 70 years. Following its ambition to continuously invest in the future through innovation and integration of corporate social responsibility initiatives, Group GTS aims to embed sustainable principles within its own operations.

1.1. About Greenfish

Greenfish is an engineering and advisory company that drives sustainable business transformation, from strategy to implementation. Greenfish adopts a 360° approach to accelerate the sustainable transformation of companies and enable them to reach long-term competitiveness and climate neutrality. With 250 employees in 3 countries, and with more than 10 years of experience in sustainability and varied references in environmental intelligence, Greenfish has a strong expertise in carbon accounting and certifications in the GHG Protocol methodology, making it an appropriate partner to support Group GTS in this assessment and the development of its reduction roadmap.

1.2. Sustainability strategy

The global project approach taken by Greenfish to accompany Group GTS in its sustainability strategy is presented in Figure 2 below. Over the course of this project, Greenfish suggests a comprehensive sustainability and communication strategy, together with a GHG roadmap setting to tackle this challenge. This report comprises the delivery of the second and third phase of the full project: the GHG assessment of Group GTS' activities and setting of a GHG reduction roadmap.

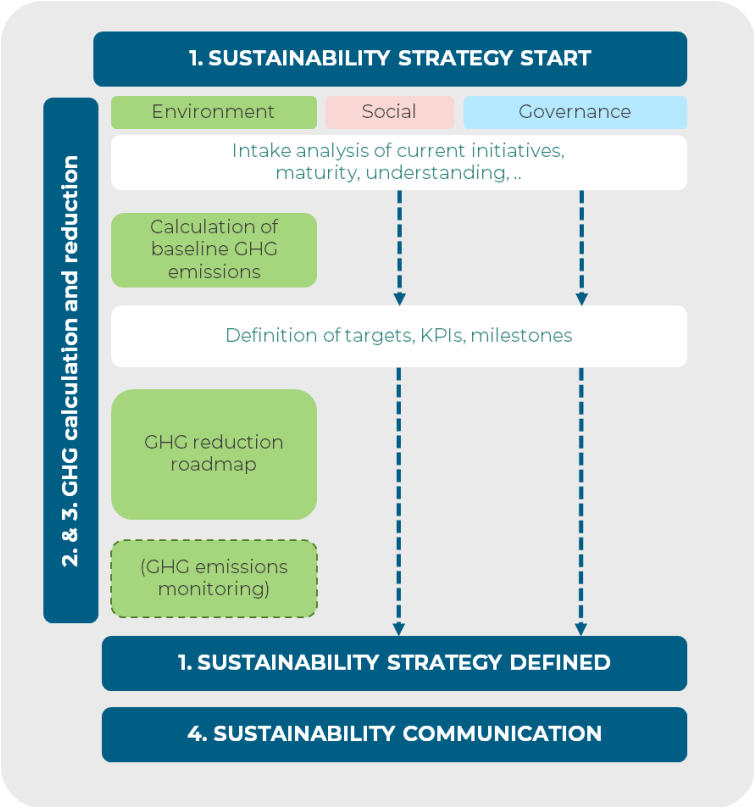

Figure 2: Greenfish's global project approach for Group GTS

The approach taken for phases 2 and 3 (definition of the reduction roadmap for Group GTS' emissions) of this global project approach follows the four steps shown in Figure 3. During phase 2, the organisational and operational boundaries are defined (Step 1) and a baseline is calculated based on the relevant data collected (Step 2). Phase 3 focuses on the selection and quantification of reduction measures (Step 3) and definition of the final scenarios and roadmap (Step 4).

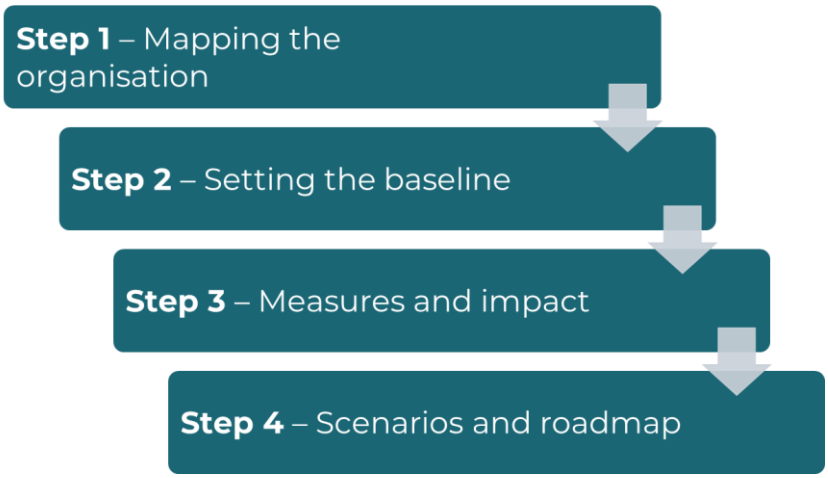

Figure 3: Greenfish's approach for Group GTS' reduction roadmap

1.3. Reduction targets

Following the sustainability strategy workshop hosted by Greenfish, Group GTS developed the following targets, committed to transitioning to carbon neutrality:

- Reduce absolute Scope 1 & 2 emissions by 25% by 2025
- Cut empty kilometres by 5% by mid-2022
- Ensure 10% of turnover comes from multimodal transport by 2023
- Have 100% of the fleet running on 25% alternative fuel by 2024

Group GTS' goals were refined during the communication workshop of Group GTS and Greenfish on 08/09/2021. The 25% reduction target and this roadmap, are Group GTS' first step in this ambitious journey towards carbon neutrality. Group GTS' sustainable journey has been illustrated during the communication workshop and is shown in Figure 4.

Figure 4: Group GTS' sustainable journey

1.4. Context

1.4.1. Climate change and GHG emissions

To tackle climate change and adapt to the context of the scarcity of fossil resources, commitments to reduce greenhouse gas (GHG) emissions are made at all levels: global, regional and national. Indeed, these objectives ought to be set at different geographical scales, and in both the short- and long-term, to be achieved. This requires the participation of all stakeholders, including governments, regions, cities, businesses, investors, and citizens.

At the international level the COP21 (Conference of the Parties), which took place in Paris in 2015, solidified the commitment of all countries present to reduce GHG emissions and limit climate change to 1.5°C compared to pre-industrial levels, with a progress review setting commitments every 5 years.

Additionally, the European Union has set for its Member States the following objectives for 2030:

- Reduce GHG emissions by at least 40% (compared to 1990 levels)
- Increase the share of renewable energies to at least 32%
- Improve energy efficiency by at least 32.5%

This GHG reduction target will enable the EU to move towards a low-carbon economy and fulfil the commitment made under the Paris Agreement.

1.4.2. Local Context

In 2015 Belgium joined other countries in signing the well-known Paris Agreement. Belgium has set for itself a 35% reduction target for its GHG emissions[1] compared to 2005.

The Walloon and Flemish regions, along with the Brussels Capital Region, have both made similar commitments. In 2018, the Walloon Government approved the Walloon contribution to Belgium's National Energy and Climate Plan, while in 2019, the Flemish government approved the Flemish Energy-Climate Plan 2021-2030. Additionally, in its long-term climate strategy, the Flemish region stated its ambition to achieve a minimum emissions reduction of 80% by 2050, compared to 2005[2]. In 2012, the Walloon region also joined the EU Covenant of Mayors for Climate & Energy, an EU-wide initiative gathering local governments that wish to voluntarily commit to implementing EU climate and energy objectives. The POLLEC programme, set by the Walloon region, ensure that this commitment is followed through[3].

The city of Tessenderlo, located in the Flemish Region and home to Group GTS' headquarters, belongs to those local governments that signed the EU Covenant of Mayors and committed to reducing GHG emissions by 40% by 2030[4], compared to 2011 levels.

1.4.3. Legislations for the transport sector

European commercial road transport accounts for almost half of all freight transport operations in the EU, employing nearly 11 million people directly. The transport sector is responsible for almost a quarter of Europe's GHG emissions[5].

Due to the size and impact of this sector, the EU has introduced a new **mobility package** intended to address several problems and support specific developments within the European road transport sector. This mobility package includes regulation on the posting of drivers, working time, and rules regarding road haulage and cabotage.

Additionally, the European Green Deal published in 2019 sets out a detailed vision on how to make Europe the first climate-neutral continent by 2050. To achieve this objective, the European Commission presented on July 14th, 2021 the **'Fit for 55' Package**. This legislative package proposes a revision of all climate and energy regulations to enable achieving an emissions reduction of at least 55% by 2030, compared to 1990 levels[6]. Several aspects of the 'Fit for 55' package are highly relevant for the road transport sector, such as contribution of low-carbon liquid

[1] European Commissions. (2019.) Assessment of the draft National Energy and Climate Plan of Belgium, Brussels. [Online]
[2] Vlaamse Overheid. (2019). Stratégie climatique flamande pour 2050. [Online]
[3] Wallonie Service Public (SPW). (2020). La Convention des Maires. [Online]
[4] EU Covenant of Mayors for Climate & Energy. (2020). Signatories – Tessenderlo. [Online]
[5] European Commission. (n.d.). Transport Emissions. [Online]
[6] FuelsEurope. (n.d.). Fit For 55 Package. [Online]

fuels, social dimension, Renewable Energy Directive, and Emissions Trading for Transport Fuels.

Given the current climate emergency, Group GTS has decided to tackle its GHG emissions by setting ambitious reduction targets. The challenge of the mobility package will however be a hurdle to overcome for Group GTS in achieving its climate ambition. Greenfish therefore worked with Group GTS in tackling this challenge by developing an actionable GHG reduction roadmap. As the above-mentioned mobility package and 'Fit for 55' package play a crucial part in the feasibility of the reduction roadmap, these directives are explained in detail in appendix A: REGULATIONS.

2. MAPPING THE ORGANISATION

In order to understand the company in the context of GHG emissions, the structural organisation of Group GTS is mapped so that the emissions can be attributed to the right department. This organisational chart is shown in Figure 5. The mapping of the organisation allowed Greenfish to select the fitting consolidation approach as is requested under the GHG Protocol.

2.1. Organisational structure

Group GTS offers a wide range of national and international transport services in all EU countries, specialised in the Benelux, Germany, and France. Group GTS' operations are divided into three main departments: Conventional transport (TDS), Container transport (GTS) and Warehousing. The first two departments consist of transportation services, generating their main emissions from fuel combustion by vehicles. These two departments therefore fall into Scope 1. The scope of warehousing department only takes into account the emissions linked to the consumption of electricity and natural gas (Scope 1 and 2) for the scope of this assessment.

Group GTS operates on several sites: Tessenderlo, Kallo, Ham (in Belgium) and Duisburg (in Germany), with Tessenderlo as the headquarter offices.

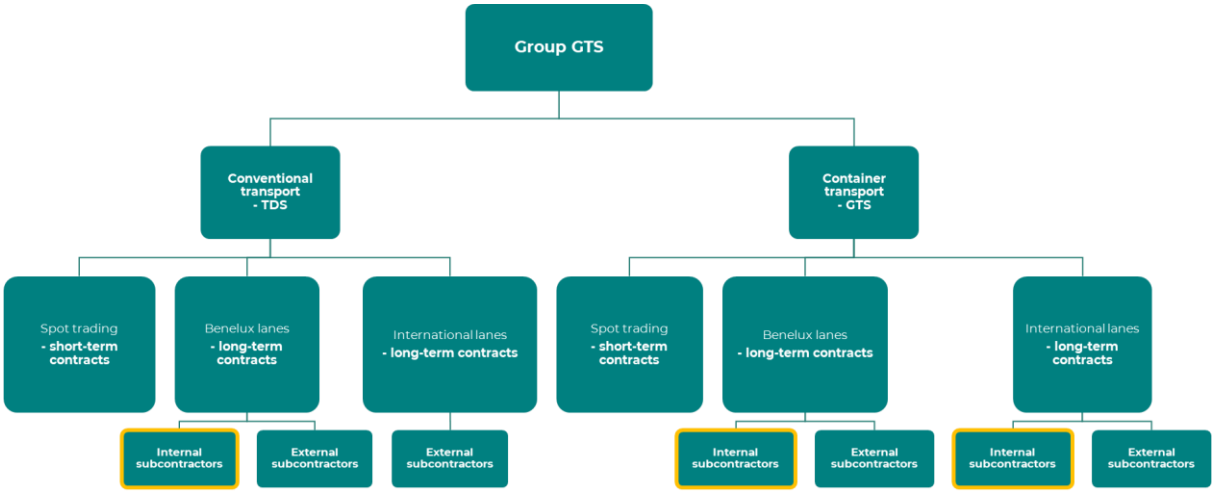

Figure 5: Mapping of Group GTS' transport operations (excluding warehousing)

Figure 5 shows the structure of the two transport departments: Conventional transport (TDS) and Container transport (GTS). In each department, the same sub-services are offered: spot trading, Benelux transport lanes and international transport lanes.

Spot trading refers to short-term placing of transport orders. Through this service, Group GTS pairs transport requests with subcontractors using standardised, short-term contracts. These services therefore represent one-off transport solutions that are planned by Group GTS. On the other hand, in its **Benelux and international services**, Group GTS plans recurring transport lanes via long-term contracts with subcontractors. Part of these subcontractors are subsidiaries of Group GTS itself (later referred to as **internal subcontractors**). Internal subcontractors of Group GTS include Jenson Logistics, H. Van Aerde & Zonen and Dextra Distribution.

2.2. Consolidation approaches

Under the GHG Protocol, consolidation approaches define how companies set the boundaries of their GHG assessment. These approaches are used to combine emissions data from separate operations across the company. While the choice of consolidation approach is left to the company, it is required by the GHG Protocol that one single approach be applied across the entire organization. Three consolidation approaches are presented in the GHG Protocol methodology:

1. **Equity share approach**: This approach reflects the economic interest the company holds in the operations. It can be simplified as "only taking into account the share of what belongs to my company".

2. **Control approach**
    a. **Financial control**: This approach reflects the company's ability to direct financial policies and the possibility to enjoy economic benefits from the operations.
    b. **Operational control**: This approach reflects the authority to introduce and implement operating policies.

Table 2 below summarises the three consolidation approaches and their implications for GHG accounting.

Table 2: Consolidation approaches suggested by the GHG Protocol

APPROACH		DEFINITION	GHG ACCOUNTING
EQUITY SHARE		Has a certain percent of ownership	% of ownership
CONTROL	FINANCIAL CONTROL	Directs financial policies to gain economic benefits	If yes: 100 % If no: 0 % If joint: % owned
	OPERATIONAL CONTROL	Has authority to introduce and implement operating policies	If yes: 100 % If no: 0 %

The GHG Protocol Corporate Standard makes no recommendation as to whether companies should opt for the equity share or any of the two control approaches, but rather encourages companies to account for their emissions by applying the approach best suited to their business activities and organisational context. Based on a study looking at approaches selected by CDP-compliant companies[7], around 60% of Global 500 companies chose the operational control approach in 2011. A similar result was observed in the CDP 2012 investor program, thereby confirming that the operational control tends to be the most selected approach.

The choice of the consolidation approach was therefore made considering what approach best defines Group GTS' operations and which emissions Group GTS should be held accountable for. Given its business model that heavily relies on working with subcontractors, operational control is the best fitting approach for Group GTS. The GHG assessment therefore accounts for all emissions of operations under Group's GTS operational control (i.e. the transport lanes that are under the planning and control of Group GTS, the direct and indirect emissions from buildings that Group GTS operates, etc). Not considering the emissions linked to the operations of Group GTS' subcontractors would result in a misrepresentation of Group GTS' emissions, as these emissions are directly incumbent to Group GTS' business operations. Emissions from transport lanes planned by Group GTS, regardless if performed by internal or external subcontractors, are therefore included in Group GTS' Scope 1.

[7] Climate Disclosure Standards Board. (2014). Proposals for boundary setting in mainstream reports. [Online]

3. GHG ASSESSMENT

This assessment follows the methodology presented by the GHG Protocol Corporate Standard. Next to a short description of the GHG Protocol, this chapter includes the timeframe, boundaries, and data quality of the project. It should be noted that no data were available for the GTS department in 2020. Instead, 2021 data from March to August were extrapolated to 12 months and used as proxy for 2020.

Launched in 1998, the GHG Protocol is a multi-stakeholder partnership aimed at developing and promoting the use of consistent methods of GHG accounting and reporting. Together, the complementary standards of the GHG Protocol form a comprehensive framework for managing emissions. Today, the GHG Protocol is the most widely used accounting tool to measure, manage and report GHG emissions. The detailed description of the GHG assessment methodology followed throughout this report is found in appendix B: GHG ASSESSMENT METHODOLOGY.

In order to rigorously calculate GHG emissions, it is first necessary to clearly define the scope of the GHG emissions calculation are made. Defining the organisational and operational boundaries allows to frame the scope of the assessment. This section elaborates on the GHG assessment boundaries.

3.1. Timeframe

At the project kick-off, the envisaged reference period for this assessment was the 2020 calendar year. As the data collection began, it became apparent that data gaps existed for this year. In agreement with Group GTS, it was therefore decided that data from 2021 for the container department would be used to create a proxy and assumptions for 2020. This extrapolation has been performed to bridge the existing data gaps for the year 2020 and is as close as possible to an accurate reflection of the baseline year. Implications on data quality are further explained in paragraph 3.4.

3.2. Organisational Boundary

The organisational boundary determines which operations are included in the GHG assessment. Choosing a single consolidation approach ensures that emissions are evaluated consistently throughout the organisation. As explained in Chapter 2, Group GTS applies the **operational control approach**, meaning that the assessment accounts for all emissions from the operations that fall under the operational control of Group GTS (i.e. including the planning of lanes performed by subcontractors).

Group GTS operates several sites across Belgium in Tessenderlo, Kallo, and Ham, which all fall under the operational control of Group GTS. Group GTS also has operations in Duisburg (Germany), however assets and operations associated with the Duisburg location are not included in the boundary of this assessment due to significant operational differences and lack of data. It was instead assumed that the operations of Group GTS in Germany would be part of an extended boundary.

3.3. Operational Boundary

The operational boundary is defined by the emissions sources linked to organisational activities that are considered in the assessment. All of Group GTS' direct emissions are included (Scope 1), as well as indirect GHG emissions linked to the consumption of electricity (Scope 2). Scope 3 indirect emissions were not included in the scope of this assessment.

3.4. Data quality

Data was retrieved through the collection process usually followed for GHG assessments. Activity data was pre-selected based on the categories retained for the assessment and collection efforts were concentrated on data deemed essential for the GHG assessment. Continuous exchanges between Greenfish and Group GTS allowed to supplement, refine, and improve quality of the data. The data gathered for this assessment consists of primary data collected by Group GTS and later processed by Greenfish. To ensure that this data is interpreted correctly by Greenfish to perform the necessary calculations, several interviews were held between Greenfish and planners as well as other employees at Group GTS.

Emissions factors were retrieved from GHG Protocol approved third-party databases, such as ADEME, and academic research. Databases and sources used for this assessment and the reduction roadmap are listed in appendix C: DATA SOURCE. It is important to note that calculating GHG emissions comes with uncertainty. Indeed, inaccuracies may appear in the statement of the company's activity data or in the emissions factors used.

For activity data a qualitative approach for estimating uncertainty is taken, detailing the accuracy of the source and data. Levels of uncertainty are displayed alongside assumptions and methodological information in appendix D: CALCULATION: ASSUMPTIONS AND EMISSIONS FACTORS. It should be noted that no data were available for the GTS department in 2020. Instead, 2021 data from March to August were extrapolated to 12 months and used as proxy as it is the closest approximation for the 2020 data.

Regarding emissions factors, uncertainty is expected to be low given the use of up-to-date and geographically relevant databases. Moreover, no monetary ratios were used in this assessment, thereby removing the uncertainty linked to this type of emissions factors. As data of emissions factors become more precise over time, the level of certainty of the calculations will be consequently improved. To further improve the accuracy of future assessments, an exhaustive work of solidifying the most uncertain data should be carried out by Group GTS. It is advised that Group GTS closely monitors its operations, through the use of software or artificially intelligent route planners. Since the beginning of this project, Group GTS has notably started working on harmonisation of data collection by implementing similar transport management systems across the different departments, which will notably help Group GTS gather data more efficiently.

3.5. Summary of Assessment Boundaries

Table 3: Group GTS' GHG assessment boundaries

Base Year	2020 (Calendar year)
Consolidation Approach	Operational control
Geographic Boundary	Group GTS' premises in Belgium (Tessenderlo, Kallo and Ham)
Operational Boundaries	
Scope 1	Included: • Mobile combustion of fuels • Stationary combustion of natural gas
Scope 2	Included: • Electricity consumption in offices and warehouses
Scope 3	Not included

4. BASELINE EMISSIONS

This section reports the results of Group GTS's GHG baseline assessment, i.e. GHG emissions generated inside the company's operational control for the year 2020. Overall results are discussed in this section along with identified hotspots.

4.1. Base Year Emissions

Base year emissions are summarised in Table 4 below. Group GTS' emissions amounted in total to **23 382 tCO_2e**.

Table 4: Group GTS' base year emissions

Scopes and categories	*Metric tons CO_2e*
Scope 1: Direct emissions from controlled operations	**22 758**
Mobile combustion of fuel (transport lanes)	22 753
Stationary combustion of natural gas	23
Scope 2: Indirect emissions from the use of purchased electricity, steam, heating, and cooling	**624**
Consumption of electricity	624
Total Scope 1 & 2 emissions	**23 382 tCO_2e**

4.2. Emissions by Scope

The graph below represents total GHG emissions by scope. The results show that 97 % of emissions are attributed to Scope 1 and the remaining 3% to Scope 2.

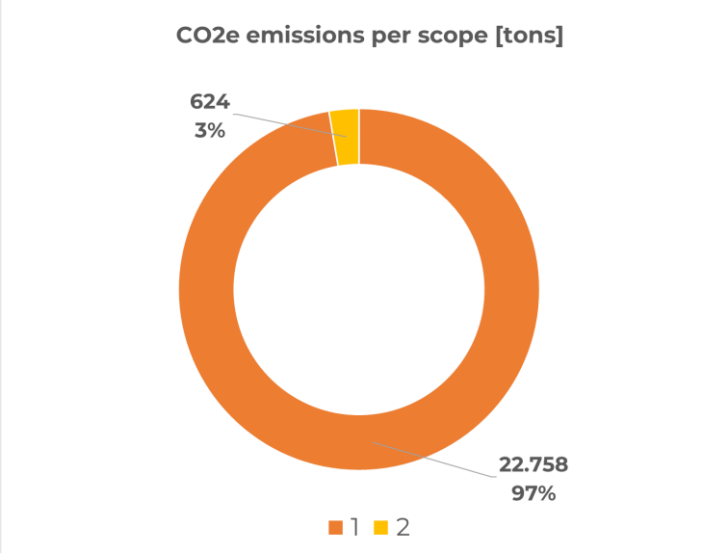

Figure 6: Group GTS' GHG emissions per scope [tCO_2e and %]

4.3. Emissions by department

Figure 5 below shows the distribution of Scope 1 & 2 emissions between Group GTS' main departments. 62 % of Group GTS' emissions are attributed to TDS, 35% to GTS, and the remaining 3% are Scope 2 emissions distributed between all departments.

In terms of transport orders, TDS planned in total 32 944 lanes (53%) while GTS planned 29 646 lanes (47%). However, from the perspective of kilometres travelled, TDS is responsible for 15 135 990 km (64%), while GTS is only responsible for 8 364 721 km (36%). This is explained by the average distances of lanes planned by TDS being longer. Indeed, the average distance of trips planned by TDS is 370 km, while lanes managed by GTS have an average distance of 237 km. This difference in distances justifies more emissions being allocated to TDS than to GTS.

Table 5: Share of Group GTS' operations (lanes, kilometres, and CO_2e emissions) per department

	TDS	GTS
Transport lanes	53%	47%
Kilometres	64%	36%
CO_2e emissions	62%	35%

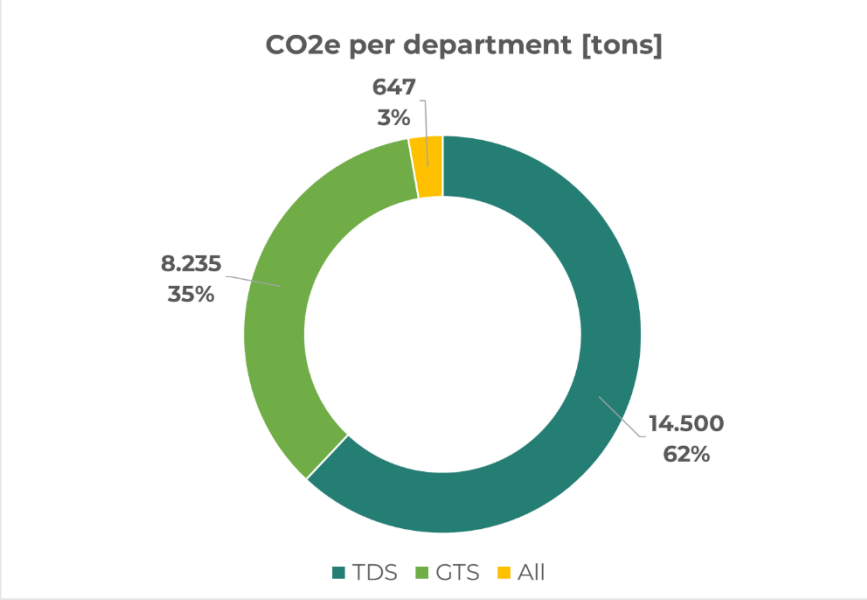

Figure 7: Group GTS' GHG emissions per department [tCO_2e and %]

As stated in section 3.4, it should be noted that this share of emissions is based on data from different years. Consequently, several factors affect the representativeness of this distribution. Firstly, container transport fluctuates on a yearly basis due to congestion in the sector, impacting the predictability of deliveries. Moreover, the data provided for the GTS department covers the period

that coincided with the Evergreen blockage incident[8], leading to the error margin for containers likely to be higher.

Secondly, TDS' capacity has decreased by ± 30% between 2020 and 2021. Due to the COVID-19 pandemic, several subcontractors have stopped working. Consequently, trips planned by the TDS department are likely to have been impacted. On the other hand, the pandemic has put pressure on online shopping and international deliveries, thereby increasing demand for container transport.

Figure 8 below shows, in a simplified manner, the evolution of both departments over time, as well as the impact of the COVID-19 pandemic. The graph also shows the expected development of the departments in the near future. In future assessments, it is anticipated that the share of lanes and emissions move towards a 50-50 distribution, to then be overtaken by GTS. Indeed, after 2021, GTS is expected to grow at a quicker pace than TDS, based on market trends and Group GTS' interest in intermodal transport (see Chapter 5).

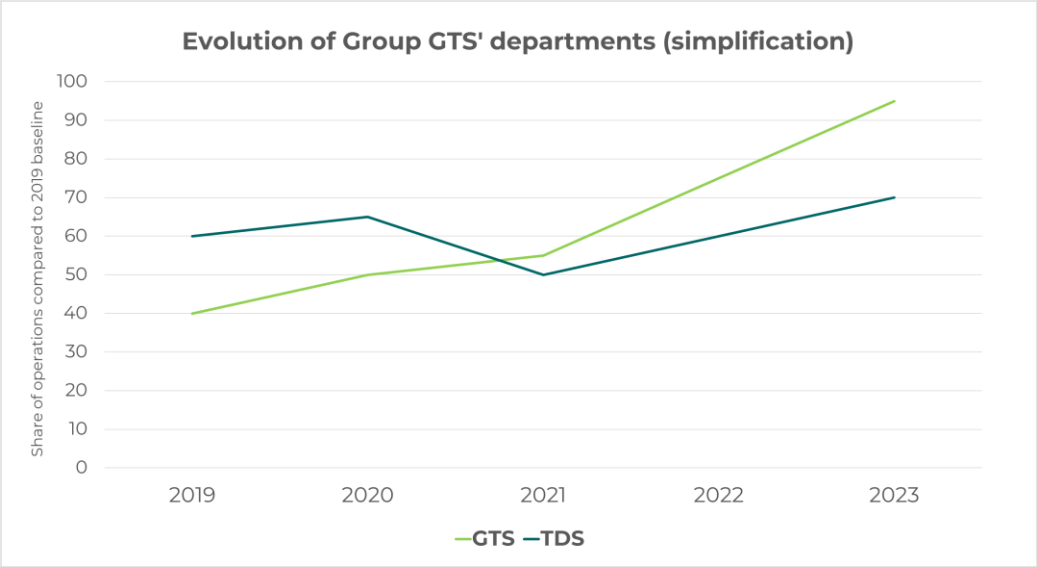

Figure 8: Expected evolution of GTS/TDS ratio compared to 2019

Figure 8 is an oversimplification of the situation and is intended to show a pattern for the two departments, rather than actual shares or numbers. Overall business is expected to grow. GTS is expected to account for the largest share of that growth, thereby reversing the GTS/TDS ratio of 2019.

4.3.1. TDS

Within the TDS department **International lanes** represent more than 90% of the emissions. **Benelux lanes** represent around 7% of the emissions allocated to the department, while **Spot trading** only accounts for the remaining 2%.

[8] In March 2021, the 20,000 TEU container ship, registered by the shipping company Evergreen, was wedged across Egypt's Suez Canal, blocking one of the world's busiest trade route for 6 consecutive days.

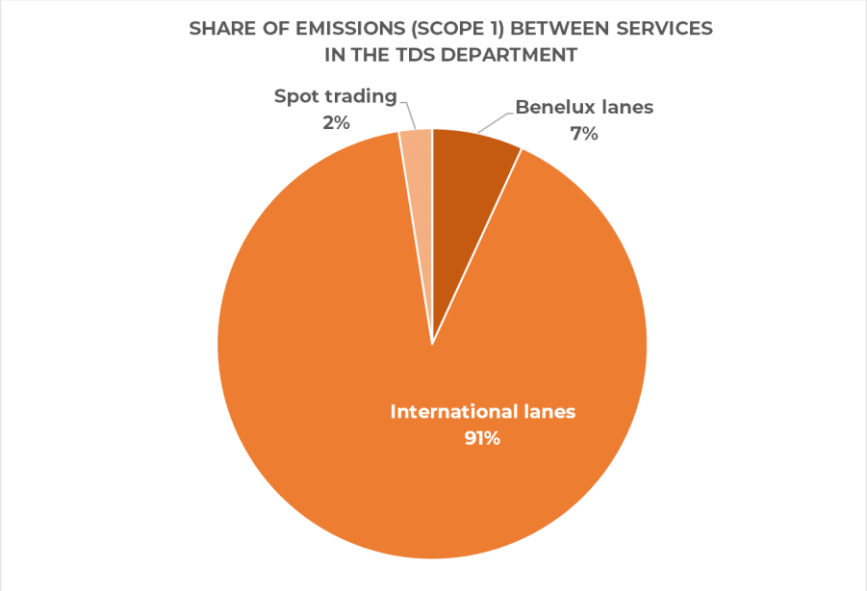

Figure 9: Scope 1 emissions per service – TDS department [in %]

4.3.2. GTS

Similar to TDS, for GTS the majority of the department's emissions are allocated to **International lanes** (86%). **Benelux lanes** are responsible for around 7% of the emissions, **Spot trading** for 2% and other services (i.e. other planning groups than International, Benelux and Spot trading) for 5%. In conclusion, the share of emissions between the services within each department is relatively similar, with the exception of other services being provided in the GTS department.

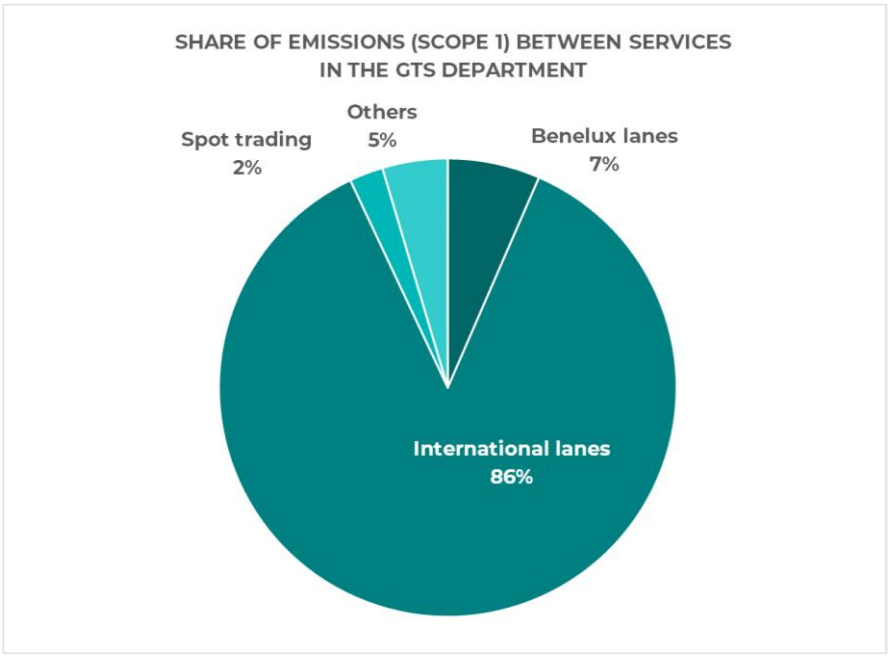

Figure 10: Scope 1 emissions per service – GTS department [in %]

Within the GTS department, transport orders are performed either by internal or external subcontractors. Internal subcontractors are transport companies that are subsidiaries of Group GTS, such as Jenson Logistics, H. Van Aerde & Zonen or Dextra Distribution.

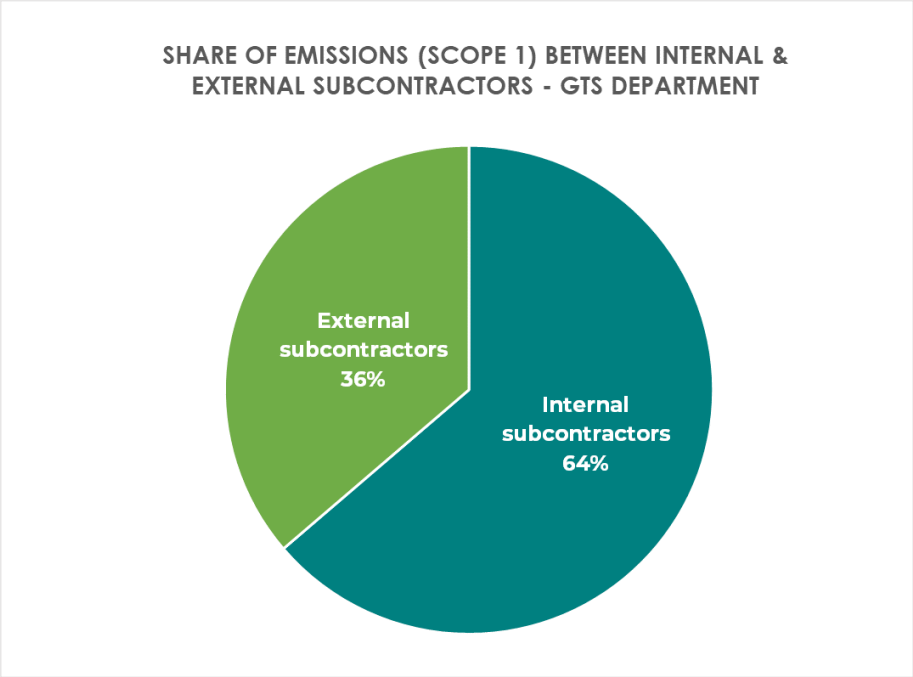

Figure 11: Share of Scope 1 emissions between internal and external subcontractors in the GTS department [in %]

The share between internal and external subcontractors varies depending on the service provided by GTS. For **Benelux lanes**, internal subcontractors are responsible for 31% of emissions, compared to 69% for **International lanes**. Most of the emissions linked to **Spot trading** are allocated to external subcontractors (85%). Lastly, for other planning groups external subcontractors account for 64%.

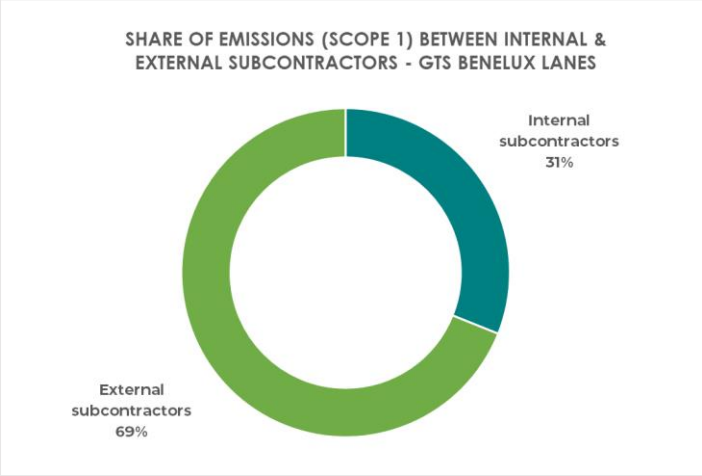

Figure 12: Share of Scope 1 emissions between internal and external subcontractors in the GTS department – Benelux lanes [in %]

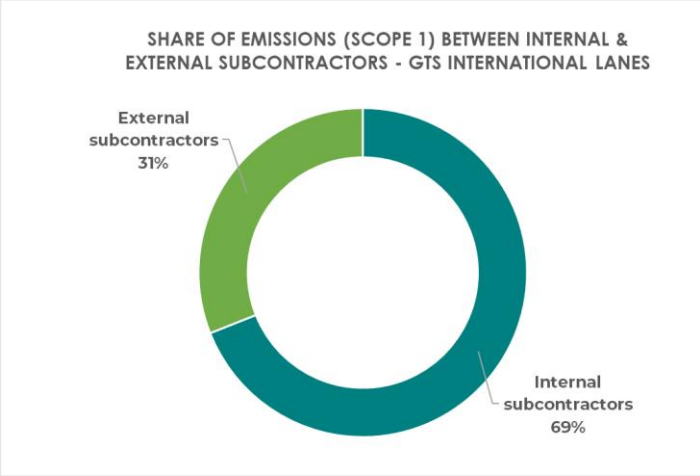

Figure 13: Share of Scope 1 emissions between internal and external subcontractors in the GTS department – International lanes [in %]

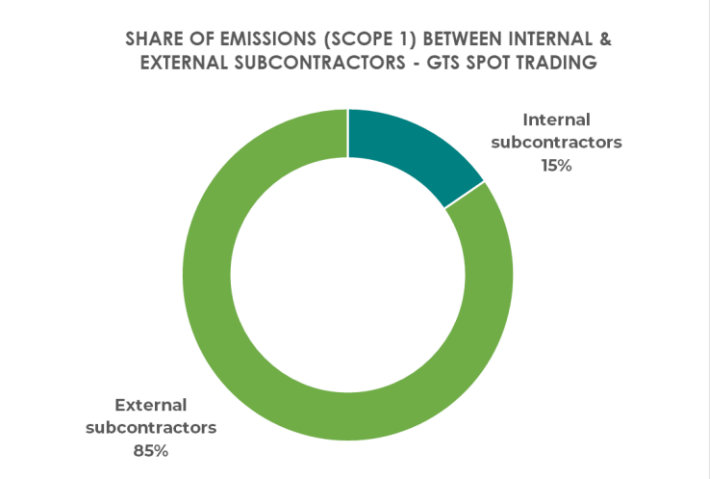

Figure 14: Share of Scope 1 emissions between internal and external subcontractors in the GTS department – Spot trading [in %]

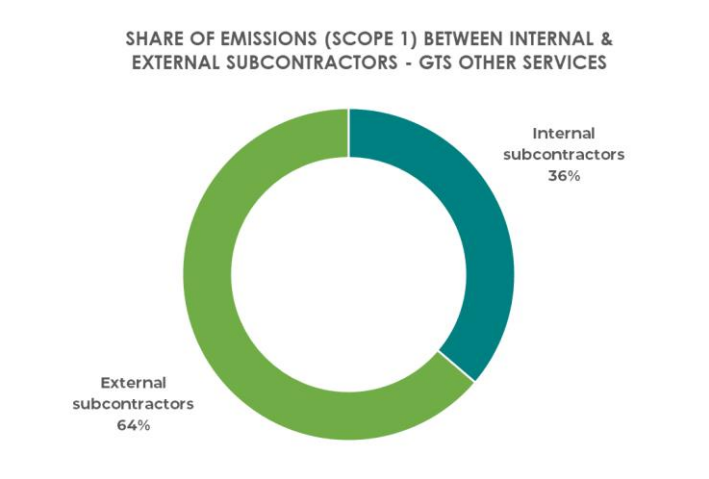

Figure 15: Share of Scope 1 emissions between internal and external subcontractors in the GTS department – Other services [in %]

5. REDUCTION MEASURES

After setting the baseline emissions, an array of reduction measures was identified by Greenfish. The following chapter first introduces reduction measures and then discusses the "reduction measures & prioritisation" workshop hosted on 02/09/2021. This workshop resulted in a selection of measures that Group GTS wants to include in the reduction roadmap. These measures were then prioritised and evaluated on costs, potential impact on emissions, and ease of implementation. No differentiation between GTS and TDS is made in this chapter, as the reduction measures and scenarios are applicable for the entire Group GTS fleet.

Key take-aways :

- The measures selected during the workshop are prioritised into 4 tiers: 1) behavioural measures, 2) intermodal transport, 3) LNG trucks, and 4) BEVs and alternative fuels.
- Behavioural measures have been identified as "quick-wins", being easy to implement for a relatively low investment. Their impact is however relatively low.
- Intermodal transport has been identified as a key measure by Group GTS. The implementation of this tier is therefore key for emissions reduction.
- LNG trucks are already being explored by Group GTS and are thus also expected to play an important part in reaching the 25% reduction target.

5.1. Identified reduction levers

For the purpose of the exercise, it was assumed that Group GTS' baseline fleet in 2020 was solely composed of Euro V (8%) and Euro VI trucks (92%), running on B7 diesel. The LNG trucks (3%) acquired by Group GTS were not counted as part of the baseline situation but were accounted for in the year 2021. Each identified measure was compared to this baseline scenario, with regards to :

1. operational expenses,
2. capital expenses,
3. availability of the technology, and
4. potential for CO_2e reduction.

In a later stage, selected measures were then compared to the "business as usual" situation, in which it was assumed that trucks are replaced every 7 years by similar trucks with no other measures implemented. This estimate is based on an average of several studies done on the economic lifetime of trucks.

The following paragraphs briefly present the four categories of measures identified by Greenfish and discussed with Group GTS. Each measure is explained in detail in appendix E: IDENTIFIED REDUCTION MEASURES, along with relevant parameters (CAPEX, OPEX, availability and CO_2e reduction potential). Information about the legislative and economic context of countries most relevant to Group GTS' operations (Belgium, France, Germany, and Poland) is included.

5.1.1. Type of vehicle

The current fleet that falls under the Group GTS operational control consists of Euro V and Euro VI trucks. Since Euro V trucks are being phased out, the assumption in the business-as-usual situation is that all trucks that reach their end of life will be replaced by new Euro VI trucks.

The first category of measures addresses the type of vehicle that Group GTS chooses instead of a Euro VI truck. Alternative vehicles researched for this exercise include: CNG and LNG trucks, hydrogen trucks, battery-electric vehicles (BEVs), hybrid trucks and LHVs. More detailed descriptions of these measures are listed in appendix E, along with a comparison to a 100% Euro VI trucks scenario.

5.1.2. Type of fuel

A second category of measures concerns the type of fuel that the selected trucks will run on. The different types of fuel identified as potential reduction levers are biodiesel, HVO, CNG and LNG, Bio-CNG and Bio-LNG, green and grey hydrogen, as well as green and grey electricity. These alternative fuels are presented in detail in appendix E, along with a comparison with a 100% Euro VI trucks scenario.

5.1.3. Intermodal transport

Another lever for emissions reduction is the switch to intermodal transport. Intermodal transport refers to the use of more than one transportation mode to move a shipment between two points. Products stay in the same container but undergo various modes of transport throughout their journey. Switching to intermodal transport can involve rail freight as well as sea or inland waterway freight. Because of the geographical focus of Group GTS' operations, sea freight was not considered in this study. Both alternatives, rail transport and barges, are explained in appendix E: IDENTIFIED REDUCTION MEASURES, and compared to a 100% Euro VI trucks scenario.

5.1.4. Behavioural measures

Lastly, the fourth category of reduction measures includes different behavioural changes that Group GTS can stimulate. These actions are listed in appendix E, and compared to a baseline scenario in which these measures are not yet implemented. These behavioural measures include speed limiters, tire pressure monitoring systems (hereafter TPMS) and eco-driving courses.

5.2. "Reduction measures & prioritisation" workshop

Greenfish hosted a "reduction measures & prioritisation" workshop with Group GTS' employees and executives. During the workshop, Group GTS collectively explored possible reduction measures and their potential impact. Through several exercises, reduction measures were first discussed, then selected and prioritised based on Group GTS' targets, overall strategy, and ease of implementation.

Figure 16: Examples of action cards used during the "reduction measures & prioritisation" workshop

At the beginning of the workshop, participants were presented the reduction measures listed hereabove, in the form of playing cards. In groups, participants selected a series of cards, or bundles of reduction measures, that they thought should be part of the Group GTS strategy to achieve its 25% reduction target. This first selection of measures was based on the different parameters and information given on the cards.
Figure 16 above shows two examples of cards used.

The "bundles", or combinations, of reduction measures were then explored by the different groups using an Excel validation tool developed by Greenfish. The tool allowed participants to try out different levels of implementation and observe the impact on Group GTS' reduction target. The result of this exercise was presented by each group to the rest of the participants. Finally, the measures collectively chosen were then discussed one by one and placed on a power/impact matrix, as shown in Figure 17 below.

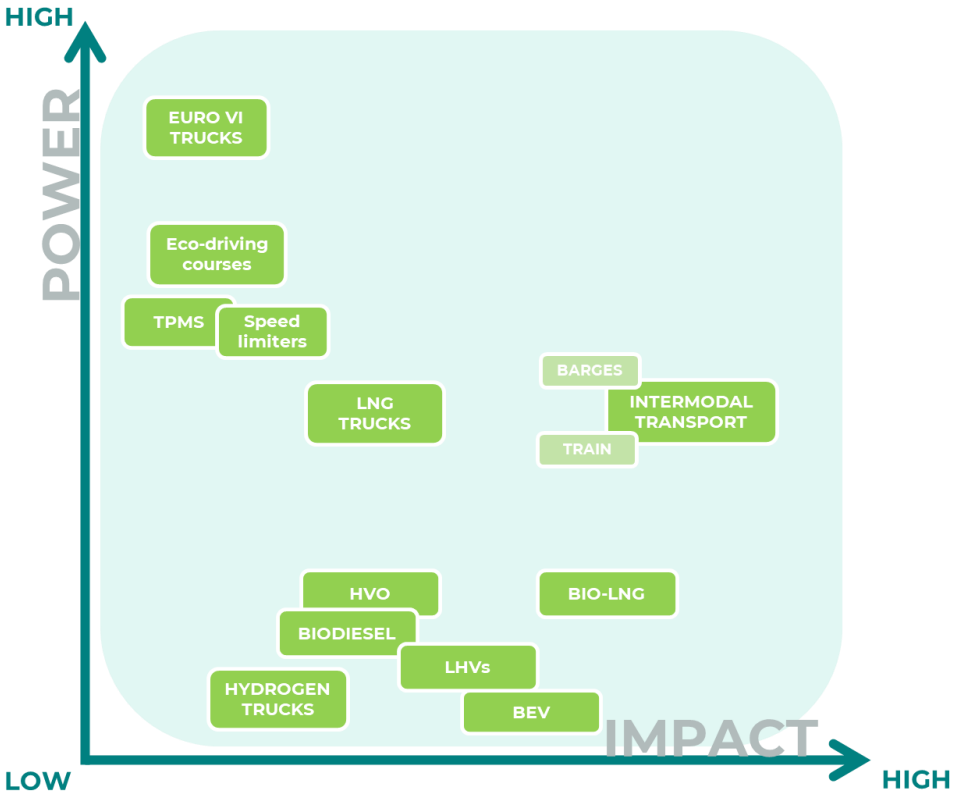

Figure 17: Power/Impact matrix developed during the "reduction measures & prioritisation" workshop

The "power" axis refers to the control Group GTS has over the implementation of the measure and the ease of implementation, while the "impact" axis maps the potential for emissions reduction of each measure. This tool was used to create an order in the measures selected by the different teams, and to come to an agreement on which measures should be included in the strategy. Three conclusions were drawn based on this exercise:

- Behavioural measures were identified as "quick-wins", being reasonably easy to implement for a relatively low investment. Yet, the impact of these measures was deemed low.
- There was a consensus around intermodal transport solutions as an important measure. Since Group GTS has dedicated resources to the exploration of intermodal solutions, the belief was that this measure should be high on the power axis. Also, this measure has the potential to bring significant emissions reduction. It was therefore decided that intermodal transport would be a key measure in Group GTS' reduction roadmap, which aligns with the targets Group GTS had previous developed in the sustainable strategy workshop.
- Lastly, LNG-powered trucks were represented in all the groups' measure selections. LNG is also a measure already being explored by Group GTS, and one that Group GTS expects to play an important part in the reduction roadmap.

By the end of the workshop, participants had collectively agreed on the final mix of reduction measures to include in Group GTS' roadmap: TPMS, Speed limiters, Eco-driving courses, LNG trucks, Intermodal solutions (barges and rail transport), HVO, Bio-LNG and BEVs.

5.3. Evaluation of selected measures

The previous paragraph shows the arrangement of measures as created during the "reduction measures & prioritisation" workshop. Greenfish has revaluated the power of implementation and the potential impact reduction, resulting in a restructured and categorised version of the graph (see Figure 18). This figure only contains the final selection of measures. These rearrangements are based on the interviews with Group GTS' planners, the team responsible for intermodal solutions, and in-depth calculations.

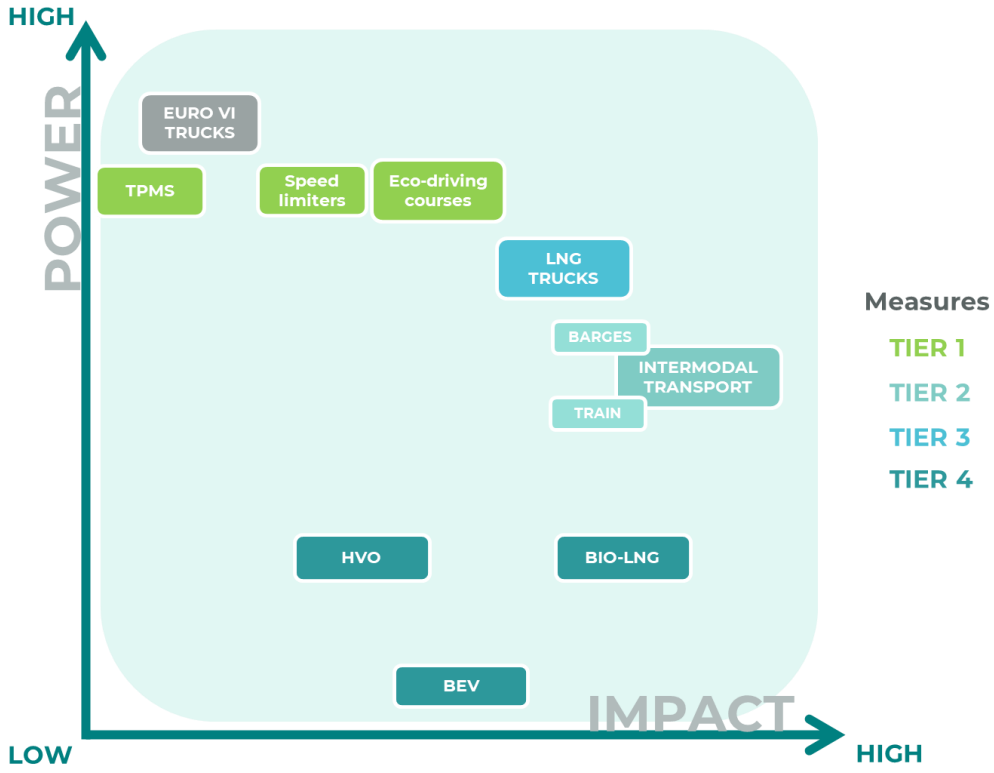

Figure 18: Selected reduction measures and prioritisation

The most important addition to the original graph is the categorisation of the measures into 4 tiers. These tiers express a prioritisation, based on a combination of the potential impact of a measure, the ease of implementation, and Group GTS' preferences. The preferences are mainly built on pathways that Group GTS is already exploring (i.e. intermodal transport and LNG trucks).

The next section evaluates the selected measures, looking at the total cost of life, the applicability of the measure regarding Group GTS' operations, the impact the measure can have on the reduction of emissions and the balance between CAPEX and OPEX.

5.3.1. Applicability and impact

Not all measures can be implemented for the complete fleet. Some types of trucks and intermodal solutions might only be suitable for specific use cases, while others can only apply to the current fleet. Furthermore, some technologies are not ready yet to be implemented at scale and are therefore only available for a limited part of the fleet (as is the case for HVO and Bio-LNG).

The following graph shows the share of Group GTS' lanes that each measure is applicable to, and the impact the measure can have on the reduction of overall emissions. The magnitude of these two parameters is showed for a single point in time, in 2020, when Group GTS had not started reduction efforts yet.

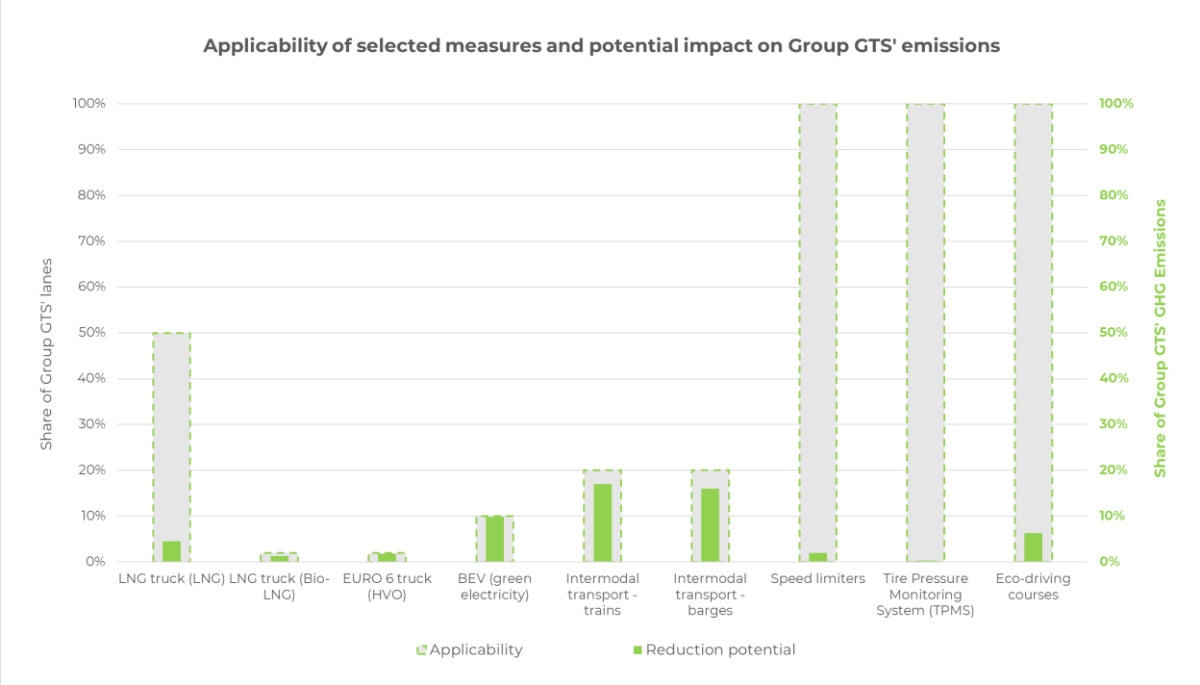

Figure 19: Applicability and potential impact of measures selected by Group GTS

To illustrate, BEVs driving on green electricity have 98% lower emissions than Euro VI trucks. Yet, BEVs are only suitable for approximately 10% of all Group GTS' transport lanes. Therefore, the potential impact of BEVs is 98% of 10%, resulting in just 9,8% of the total emissions. On the contrary, TPMS and speed limiters are applicable to all the diesel (Euro V & VI) trucks, but can only reduce emissions by 0,3% and 2% respectively. Paragraph 5.3.3 explains the applicability of the measures in more detail.

5.3.2. Cost comparison

Next to the applicability and impact of the selected measures, the costs of implementing a measure should be considered. To make a fair comparison, the intermodal solutions are evaluated separately from the measures concerning trucks, such as behavioural measures and fuel types.

5.3.2.1. Road transport

The economic lifetime of a Euro VI diesel truck is 7 years. Because Group GTS does not intend to shrink the existing fleet, the truck needs to be replaced when that lifetime comes to an end.

Because some measures require high upfront investments, whilst others affect mostly the operational expenses, the Total Cost Of Life (TCOL) is compared. This gives a fair comparison of the combined costs over time (i.e. CAPEX plus OPEX). In many cases the TCOL of life is lower for greener alternatives to the Euro VI truck, even though the initial investment is higher, thus saving money in the long term.

The following graph (Figure 20) shows the TCOL and the effectiveness of each measure at reducing emissions. Costs and CO_2e reductions are shown on a truck-by-truck basis, expressed as the relative change (%) to the baseline Euro VI truck driving 130 000 kilometres per year on B7 diesel.

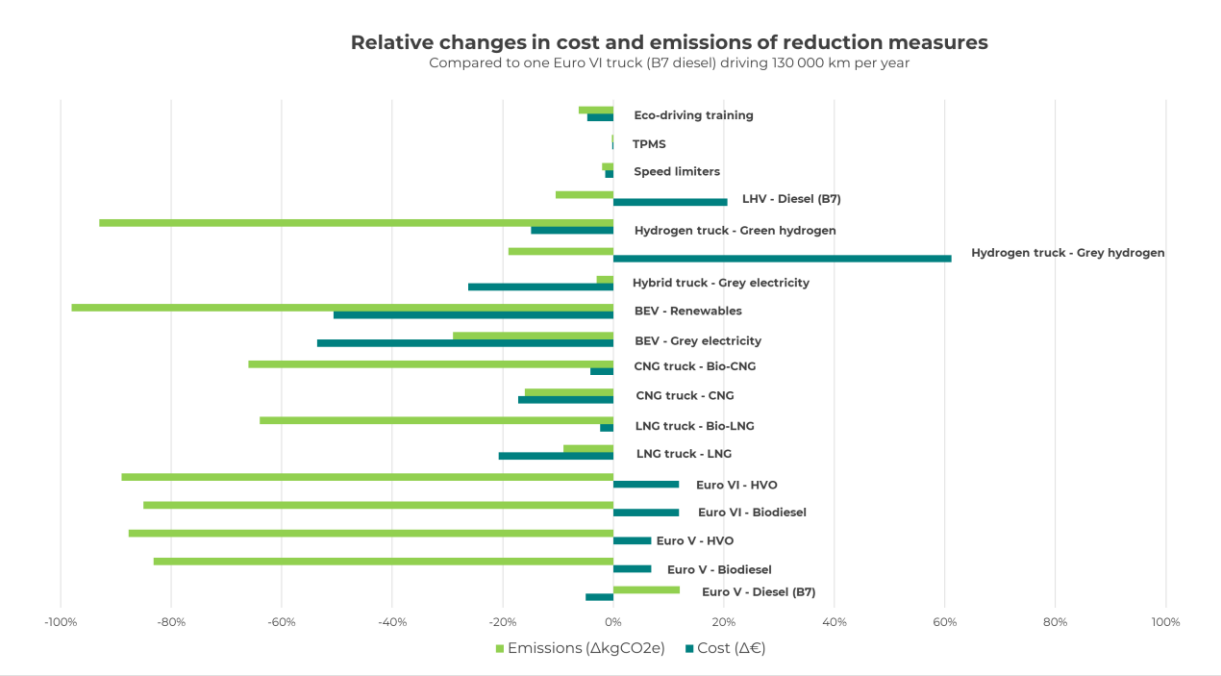

Figure 20: Comparison of cost and impact on overall emissions of each identified measure

For instance, the implementation of a speed limiter in a Euro VI truck requires an initial investment but reduces the TCOL of that truck. Overall, the reduction in TCOL is higher than the investment costs and therefore money is saved (and the bar is on the left-hand side of the zero-line). Next to reducing costs, the measure also reduces emissions.

A measure will only be implemented if it positively affects the reduction of emissions. Even though the Euro V truck might be a cheaper option, the higher emissions explain why Group GTS is phasing out these trucks.

5.3.2.2. Intermodal transport

A comparison between intermodal transport and truck transport is not as easily done, since it is affected by the specifics of the shipments it is replacing. Where an LNG truck could directly replace any diesel truck, this is not the case for, for instance, rail transport. It depends highly on the geographical location and the urgency of the delivery. Numerous studies were carried out on creating rules of thumb for the financial feasibility of intermodal transport. Generally, the conclusion is that the longer the distance, the cheaper intermodal transport becomes. Where that tipping point lies exactly depends mostly on the available infrastructure. Therefore, it is not possible to create a static graph for the cost comparison between a Euro VI truck and intermodal transport solutions.

Yet, Group GTS is exploring options for intermodal transport with the aim of increasing supply chain efficiency. To do this, Group GTS will need to create partnerships with transport companies owning assets. The strategy is to start with an operational approach, focusing on inefficiencies in current operations and identifying chances for GTS to include shipments. After becoming more engaged with the world of intermodal transport, the aim is to move to a more structural approach. Since there is a shortage in truck drivers, GTS could also use their assets to build partnerships with intermodal transport providers, taking care of the last kilometres with their trucks.

The end goal for Group GTS is to improve efficiency. Since this metric is largely measured in cost, it is assumed that, in the long-term, GTS will only implement intermodal solutions if these reduce costs compared to truck transport.

5.3.3. Evaluation per tier

As shown in Figure 18, Greenfish categorised the selected measures into four tiers. These tiers reflect the level of priority the measures should be given. A prioritisation does not imply that an action in tier n+1 should only start after an action in tier n is completed. Rather, that resources should be dedicated to certain actions according to the tier they are in.

The following section will discuss each tier separately and reflects on the applicability, potential impact and cost of each measure.

5.3.3.1. Tier 1

Tier 1 consists of **behavioural measures**. These measures could be defined as low hanging fruits; they are easy to implement and have low initial investment costs, but relatively low reduction potential. Measures that fall into this category are:

- Tire Pressure Monitoring Systems (TPMS)
- Speed limiters
- Eco-driving courses

Figure 21 shows that the additional costs of implementing the behavioural measures have no significant effect on CAPEX of a Euro VI truck, but do affect the TCOL, since they increase the truck's efficiency. Especially the eco-driving courses

and the speed limiters have a notable impact on OPEX, through associated efficiency improvements and fuel savings.

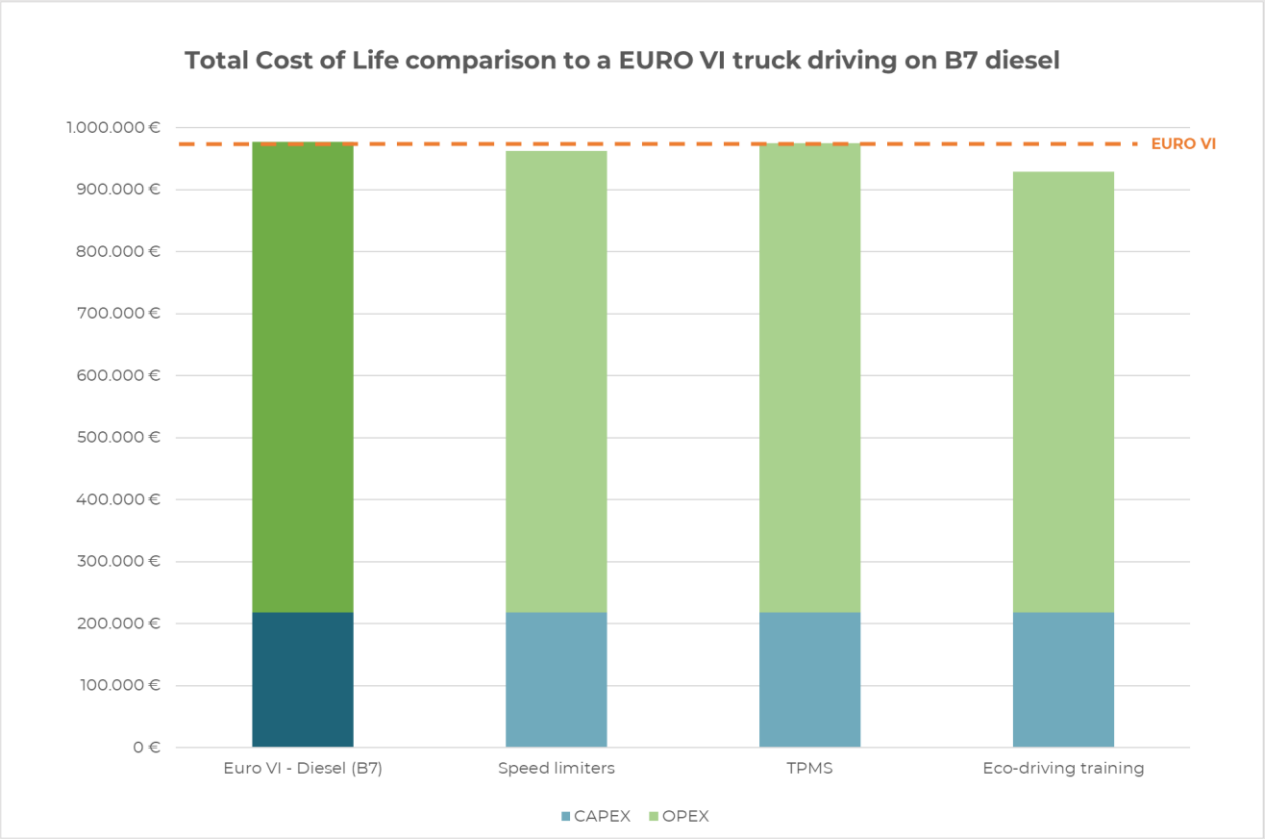

Figure 21: TCOL comparison, implementation of behavioural measures on a Euro VI truck

These measures are applicable to all diesel trucks (Euro V and VI). In 2020, the GTS fleet consisted fully of diesel trucks and therefore this measure was 100% applicable. As a result, the emissions factor of a Euro VI truck – after all the behavioural measures are implemented – can be reduced by approximately 6%.

The implementation at internal subcontractors will be easier than at external subcontractors. Yet, the fact that these measures have a short payback period and result in a reduction of emissions, may ease the process to convince external subcontractors.

5.3.3.2. Tier 2

Tier 2 consists of the **intermodal transport measures**. These measures have low initial investment costs but are relatively harder to implement. The implementation is completely dependent on third parties since Group GTS has no aspiration of owning barges and trains in the near term.

Since all transport takes place in Europe, marine shipping is not considered here. Measures that are considered in this category are:

- Rail transport (trains)
- Inland shipping (barges)

The two main factors that decide if intermodal solutions are suitable for a transport lane are the geographical locations of start and finish points, as well as the urgency of the delivery. Group GTS aims to cover 30% of all kilometres driven in container transport and 10% of all kilometres driven in conventional transport by intermodal solutions, by 2025. Internally at Group GTS, this is seen as an ambitious target. Therefore, this is taken as the upper limit of applicability, which is displayed in Figure 19.

Generally, intermodal solutions will reduce GHG emissions but are relatively hard to implement. Although no initial investments are needed, operational expenses for intermodal solutions depend strongly on the transport lane. Also, Group GTS depends on existing networks for implementation. Paragraph 5.3.2.2 discusses this dependency in more detail. If successful, intermodal transport has the potential of reducing both costs and emissions.

5.3.3.3. Tier 3

Tier 3 consists of **purchasing LNG trucks** instead of new Euro VI trucks. The initial investment costs are higher than for a Euro VI truck, yet this measure is possible to implement directly at the internal subcontractors. For external subcontractors, it might be harder to convince them of the advantages this higher investment might bring.

Even though this measure requires a high upfront investment, the TCOL is lower than that of a Euro VI truck driving on diesel (B7 blend). The reason for that is the price difference between diesel and LNG. Over the economic lifetime of a truck, the reduction in OPEX makes up for the higher CAPEX. Figure 22 below shows the TCOL comparison between all truck options and shows the difference in CAPEX and OPEX. Whilst reducing costs, the LNG truck will also reduce emissions, thus resulting in costs saved for abated emissions.

In theory, this measure could be implemented for the complete fleet over time. Yet, it is unrealistic to expect a Euro VI truck to be replaced before the end of its economic lifetime. Therefore, it is expected that 50 to75% of the current fleet will still be in use by 2025. This results in a maximum applicability of LNG trucks at 50%, as is shown in Figure 19. The emissions factor for an LNG truck (driving on standard LNG) is 9% lower than that of a Euro VI truck (driving on B7 diesel). This means that the potential emissions reduction is estimated to be at best 4,5%.

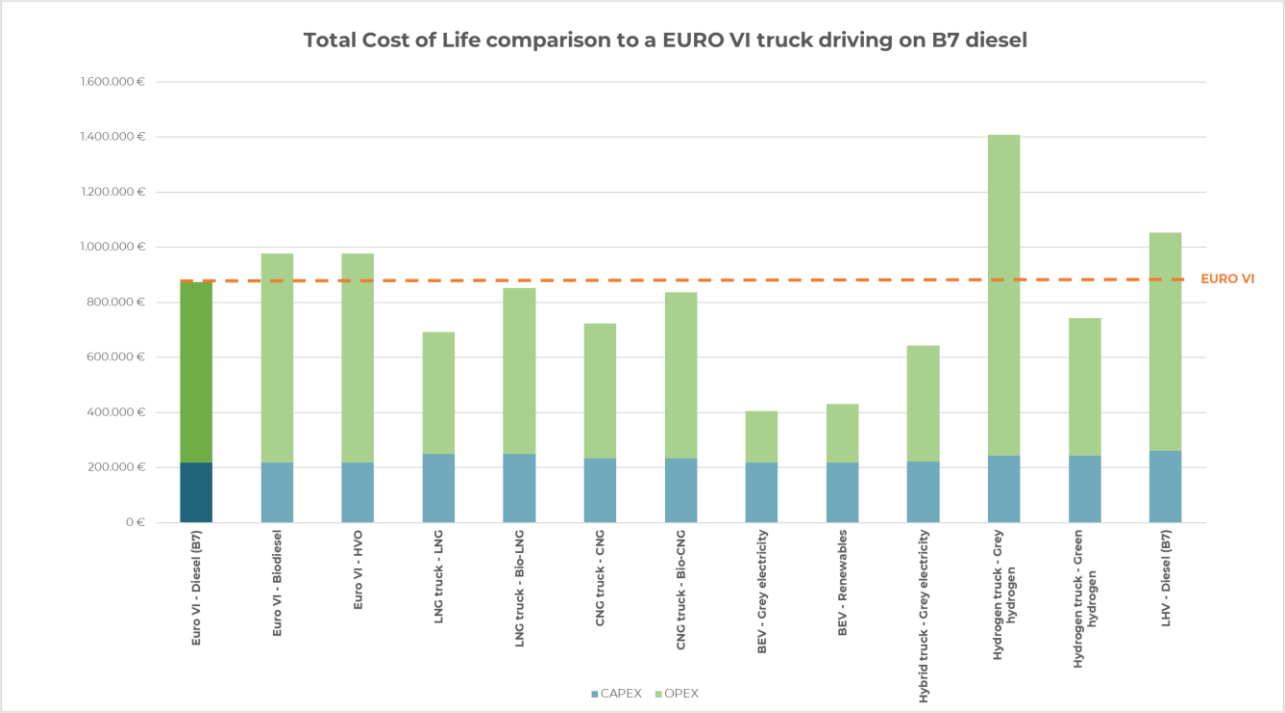

Figure 22: Implementation of different truck options compared to TCOL of a Euro VI truck

5.3.3.4. Tier 4

Tier 4 consists of two types of measures: one requiring upfront investments and one impacting mainly OPEX. Both are hard to implement, for different reasons which are explained further. Measures that are considered in this category are:

- HVO
- Bio-LNG
- BEVs

HVO and Bio-LNG

The first subcategory consists of HVO and Bio-LNG. These are both promising fuels that will probably play a role in the transport sector of the future. Unfortunately, both technologies are still in early stages, and it is likely that the European infrastructure will not yet be sufficient to implement these measures at scale by 2025.

In theory, all Euro VI trucks could drive on HVO. Yet, considering the low availability of the technology and based on trends in the market, it is expected that a maximum 2% of the diesel trucks will be able to drive on HVO. The emissions factor of a Euro VI truck driving on HVO is 89% lower than that of a Euro VI truck driving on the B7 diesel blend, bringing the overall reduction impact to 1,89%. Roughly the same argumentation is applicable to Bio-LNG. All LNG trucks could drive on Bio-LNG, if the technology was widely available. However, it is expected that maximum 2% of the LNG trucks will be able to drive on Bio-LNG. An LNG truck driving on Bio-LNG has an emissions factor that is 64% lower than one driving on standard LNG, making the reduction potential of Bio-LNG 1,63%.

Because HVO is more expensive than B7 diesel, the TCOL of a Euro VI truck driving on HVO is higher (Figure 22). Yet, the extra investment in HVO will have a significant effect on the reduction of emissions (Figure 20).

Bio-LNG on the other hand is cheaper than B7 diesel, even though it is more expensive than standard LNG. Figure 22 shows that the TCOL of an LNG truck driving on Bio-LNG is still lower than that of a Euro VI truck driving on standard diesel. This is therefore a measure that saves emissions and costs in the long-term. Figure 20 shows that a euro invested in Bio-LNG is particularly effective at reducing emissions.

Battery-electric vehicles

Battery- electric vehicles (BEVs) on the other hand are more widely available and are taking off throughout the transport sector. Moreover, the suitability of BEVs depends on the specification of the transport lane (distance and frequency).

Based on the transport lanes in 2020, around 13,4% of all of Group GTS' kilometres have the potential to be driven by BEVs. This is based on all lanes for which distance was below 300 kilometres. This does not consider the urgency of the delivery or the present infrastructure. More likely, the applicability of this measure lies between 5-10% of all covered kilometres throughout Europe.

Group GTS has stated that it is not seeking a pioneering role and therefore, will only opt for BEVs if a client is willing to make the investment. This could be interesting for clients with a lot of short distance deliveries on regular transport lanes.

The change from Euro VI to BEVs is significant. Indeed, per kilometre covered, the emissions (including production-related emissions) of a BEV powered by green electricity are 98% lower. Group GTS has declared during the workshop that there is no intent to invest in BEVs if they are powered by electricity that is not 100% green. Since a shift to BEVs must be done in close collaboration with a client, Group GTS has stated that green electricity (generated on site at the client, for instance) would be a condition for such a partnership. Potentially, this could mean that BEVs could reduce the overall emissions by almost 10% (Figure 19).

The required investment for BEVs is decreasing rapidly and is expected to be lower than that of a Euro VI truck by 2025. Because of the price difference between electricity and diesel, the TCOL of a BEV is lower than that of a Euro VI truck driving on B7 diesel. Thus, on a truck-by-truck comparison a shift to a BEV will abate emissions and will save money over the economic lifetime of the truck.

It must also be noted that this does not consider the investments in infrastructure. If public infrastructure is insufficient and additional investments are required, the total costs can be higher. The two main investments would be for charging infrastructure and the technology to generate green electricity. It depends on the scale of the operation to calculate if the TCOL is still lower than that of a Euro VI truck.

6. REDUCTION ROADMAP

This chapter combines the baseline emissions calculation, the reduction targets set by Group GTS, the available reduction measures, and Group GTS' preferred selection of measures into a reduction roadmap towards 2025. The core of the roadmap is simple: When assets reach their economic end of life, they should be replaced by a more sustainable alternative.

Greenfish developed a validation model that calculates the scale at which the selected measures (discussed in paragraph 5.3.3) need to be implemented to meet the emissions reduction target. Based on this model two scenarios were developed.

This chapter starts by discussing the fleet composition and the reduction per measure for both scenarios. Here, the 'fleet' is understood as all vehicles used to cover the transport lanes planned by Group GTS, including both internal and external subcontractors. No differentiation between GTS and TDS is made in the reduction roadmap as it is applicable for the entire Group GTS fleet. Then, the intermediate targets and actions that Group GTS needs to take to meet the final targets in 2025 are reviewed. Since the final target is an absolute target, the implications of growth of Group GTS are discussed as well. Finally, additional recommendations are given that could help Group GTS in their transition, but fall outside the scope of the reduction roadmap.

Key take-aways :

- Emissions reduction will mainly be achieved by replacing trucks by more sustainable alternatives once reaching economic end of life.
- The reduction roadmap is based on a high degree of implementation of tier 1 and 2 measures, supplemented by tier 3 and, to a lesser extent, tier 4 measures.
- An alternative scenario is presented, in order to mitigate for the possibility that intermodal solutions might not be as successful as anticipated.
- Relationship and partnership building will be key for Group GTS to achieve its reduction target. The first step of the reduction roadmap is therefore to engage as much as possible with relevant stakeholders (i.e. subcontractors, suppliers, etc).
- In order to mitigate the impact of company growth on GHG emissions, Group GTS should ensure this growth is achieved through sustainable alternatives.
- The reduction roadmap should be understood as a guidance document that will likely will over time, not as a step-by-step definite agenda.

6.1. Scenarios

With each measure implemented, the composition of Group GTS' fleet will change. The changes are evaluated on a year-to-year basis. Since Group GTS does not have the power to implement all the selected measures directly, time and effort will be required to build the relationships with (internal and external) subcontractors. These relationships are specifically necessary for implementing the measures with high initial costs. The expectation is that the implementation will be slow in the first years but will speed up in the final years (2024 and 2025) to meet the reduction targets. This trend is reflected in both scenarios.

6.1.1. Scenario 1: Group GTS Selection

The first scenario referred to as the **Group GTS Selection** is based on a high degree of implementation of tier 1 and 2 measures, supplemented by tier 3 and (to a lesser extent) tier 4 measures.

Group GTS has already started investing in a team dedicated to increasing the share of transport executed by intermodal solutions. The ambition is to cover 30% of all kilometres driven in container transport and 10% of all kilometres driven in conventional transport by intermodal solutions, by 2025. Based on the division between the container and conventional transport departments in 2020 (see Figure 8) and the interviews, this results in 20% of the total fleet. Here, it is assumed that the targets for intermodal transport (tier 2) are achieved, resulting in the need for relatively small numbers of tier 4 measures to meet the overall reduction target of 25% by 2025.

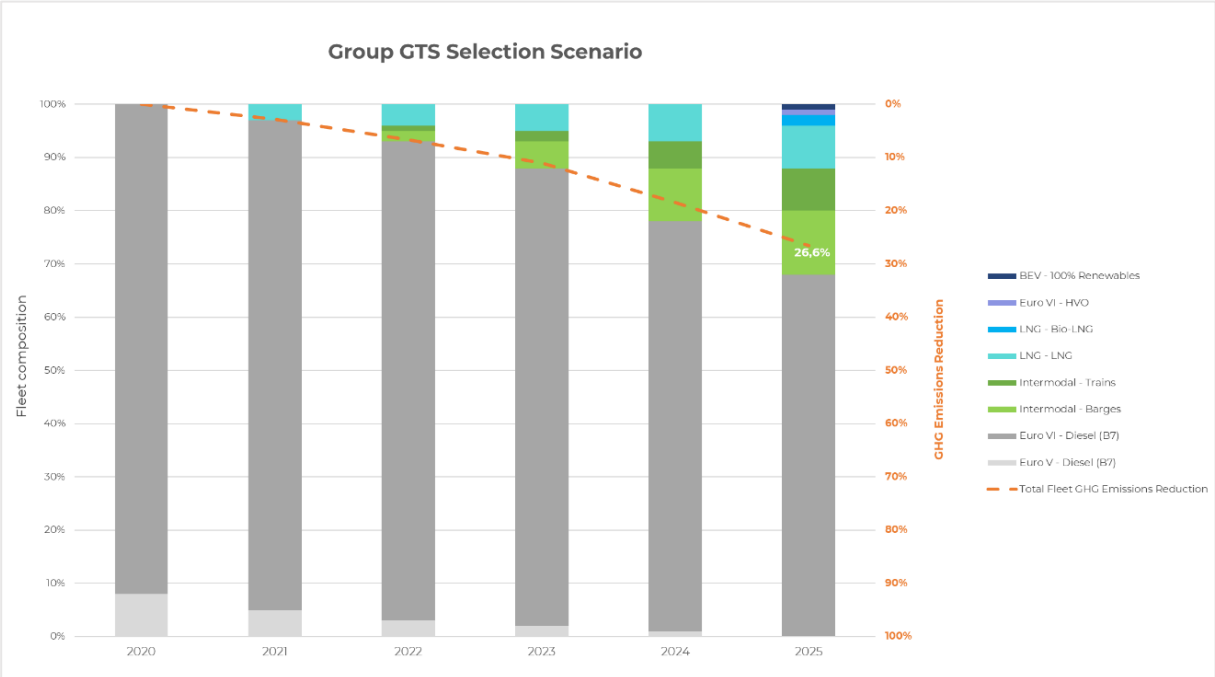

Figure 23: Fleet composition and impact on overall GHG reduction for the Group GTS Selection Scenario

Figure 23 displays the evolving composition of the fleet on the left axis (bar chart) and the emissions reduction on the right axis (dotted line), over time. The baseline fleet of 2020 consists fully of Euro V and Euro VI trucks that run on diesel (B7 blend). The number of LNG trucks will increase gradually over time and in 2025, a small share of those trucks will drive on Bio-LNG. In even smaller shares, some of the diesel trucks will drive on HVO and a small fleet of BEVs will be introduced. most obvious change in the composition of the fleet will be the rollout of intermodal transport solutions (green bars).

To fully understand why the emissions are decreasing in this scenario, it is useful to evaluate the impact of each measure individually. Figure 24 below displays three trends:

- Diesel trucks making up the 'old fleet' that have reached their end of life will be removed. Elimination of these relatively inefficient trucks will reduce emissions, as would the elimination of any truck. These reductions are shown in the negative percentage area.
- Behavioural measures will be implemented, reducing the emissions of the remaining diesel trucks. These reductions are also shown below the x-axis. The red line is the combination of the reductions resulting from phasing out the 'old fleet' and making the remnants of that fleet more efficient.
- As Group GTS' operations are expected to grow, the diesel trucks that have reached their end of life will need to be replaced. All the emissions above the x-axis represent the replacement fleet, for which the yellow line gives the total emissions. To reach Group GTS' reduction target, the replacement fleet needs to be more sustainable than the old fleet it replaces.

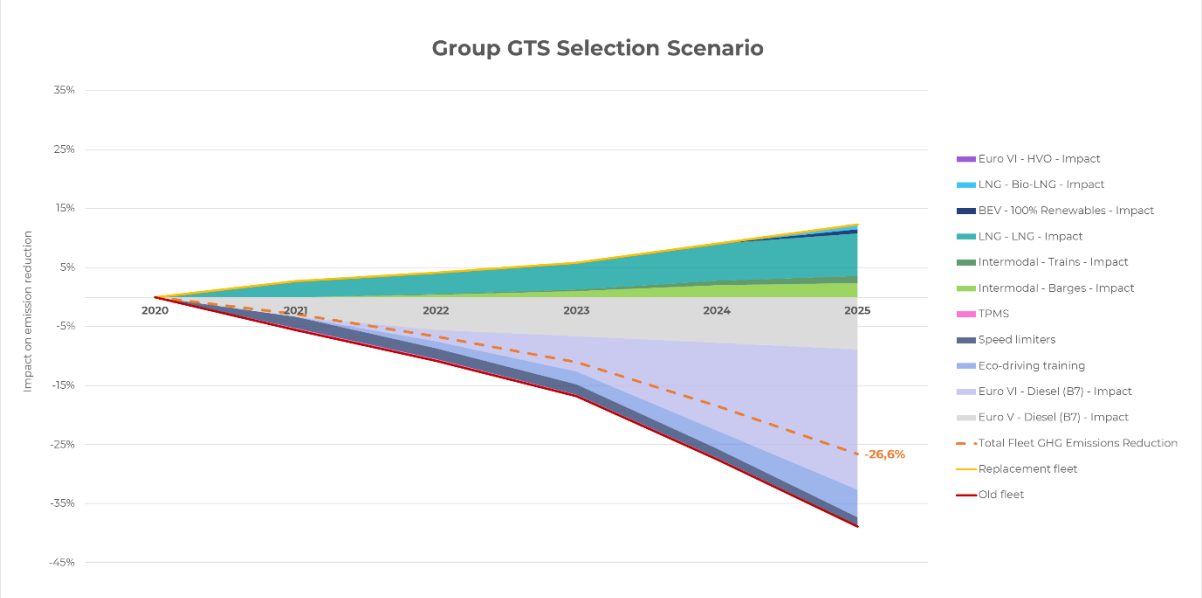

Figure 24: Impact of individual reduction measures on overall GHG emissions for the Group GTS Selection Scenario

The three trends mentioned above result in a combined impact on the total GHG emissions which is displayed by the orange dotted line. In the *Group GTS Selection Scenario,* this combined impact results in a 26,6% reduction.

6.1.2. Scenario 2: Diversified Alternative

The second scenario, which is called the **Diversified Alternative**, is based on a more even distribution of measures from all tiers. If the ambitious targets for the integration of intermodal transport solutions are not met, the roadmap will require more implementation of LNG trucks and innovative fuels to meet the overall reduction target of 25% by 2025.

Figure 25 displays the evolving composition of the fleet on the left axis and the emissions reductions on the right axis, over time. The number of LNG trucks will increase more aggressively than in Scenario 1. By 2025, almost half of those trucks will drive on Bio-LNG. Some of the diesel trucks will drive on HVO and a small fleet of BEVs will be introduced. Because Group GTS has already started to implement LNG trucks, it makes sense to focus the efforts of implementing tier 4 measures on Bio-LNG.

Intermodal transport solutions will cover just 12% of all shipments, as opposed to the 20% in Scenario 1. This could mean, for instance, that finding intermodal solutions for conventional transport has been unsuccessful and that only 24% of container transport is being done by intermodal transport.

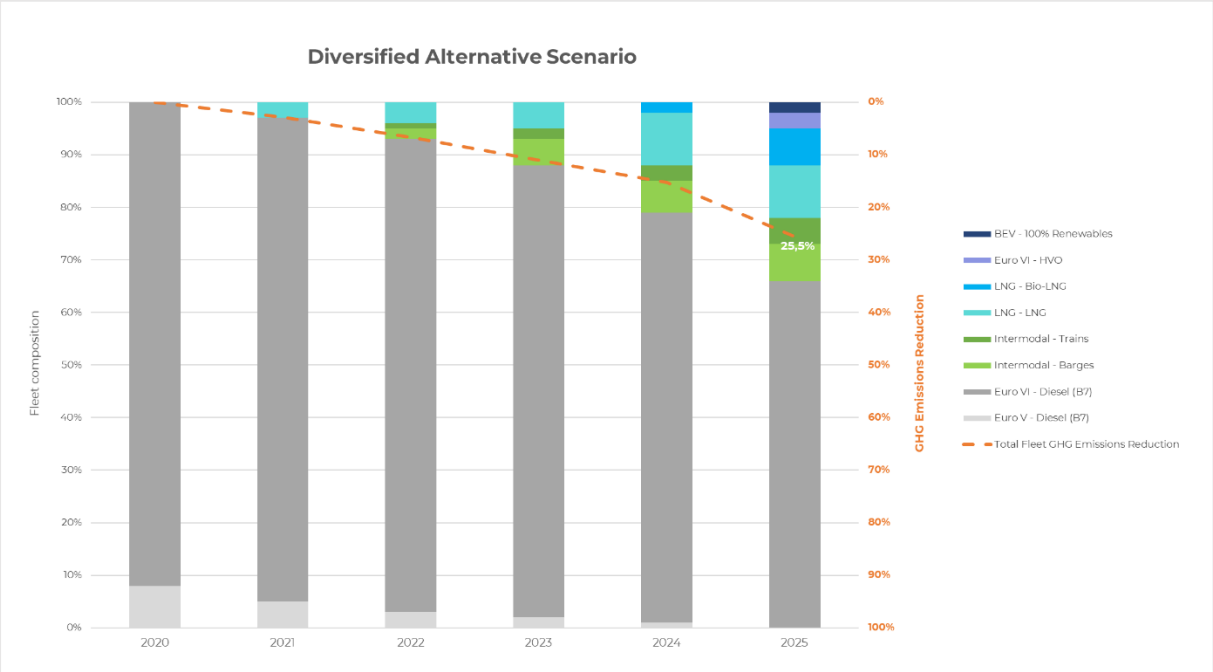

Figure 25: Fleet composition and impact on overall GHG reduction for the Diversified Alternative Scenario

As performed for the *Group GTS Selection Scenario*, the impact of each measure is evaluated individually in Figure 26. Again, the old fleet is replaced by a more sustainable fleet and behavioural measures are implemented to decrease emissions from the remnants of the old fleet.

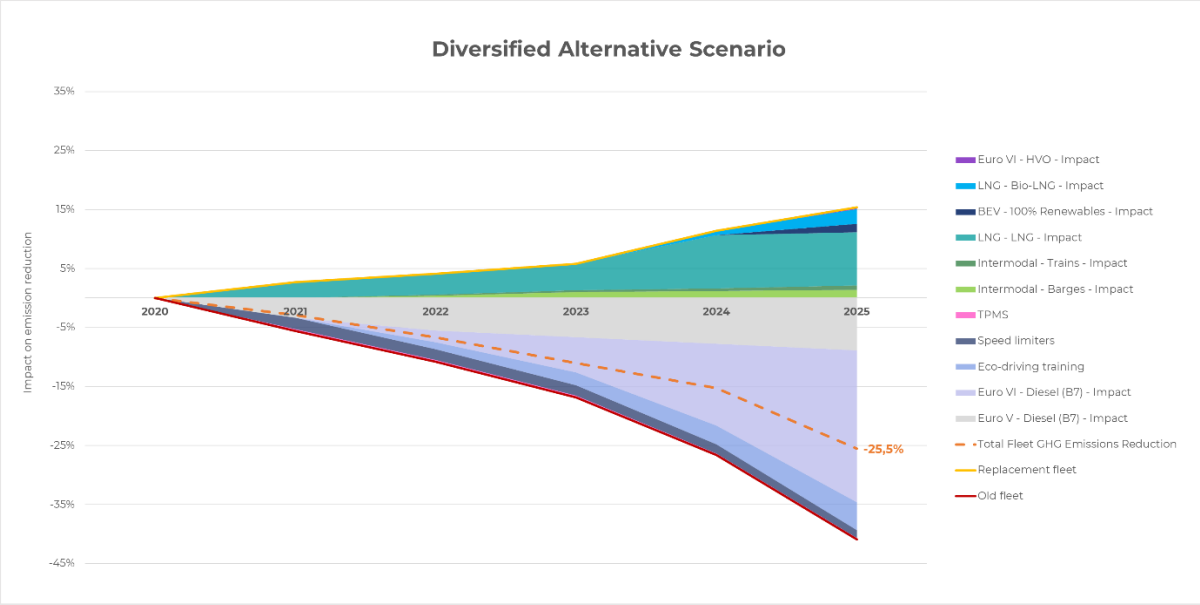

Figure 26: Impact of individual reduction measures on overall GHG emissions for the Diversified Alternative Scenario

These trends result in a combined impact on the total GHG emissions, displayed by the orange dotted line. In the *Diversified Alternative Scenario,* the combined impact results in a 25,5% reduction.

6.2. Implications of growth

Both scenarios assume that the total size of operations of Group GTS will over time remain as it is in 2020. Though the intention of Group GTS is to grow its operations, it is impossible to predict this future evolution. Indeed, as Figure 8 has shown, at one point the operations of TDS declined suddenly because of the effects of COVID-19.

For the reduction roadmap it does not matter exactly what the change (growth or decline) will be. Rather, it is important to understand the implications of change for the emissions reduction to know how to adapt. Figure 27 is a sensitivity analysis displaying the effect on emissions reduction driven by a change in total operations.

If, hypothetically, the total fleet composition would evolve according to the situation sketched in Table 6, the fleet in 2025 would have seen an 8% growth compared to 2020. This growth would then have been the result of a growing share of Euro VI trucks. Figure 27 shows that a situation like this would negatively influence the emissions reduction by more than 7%.

Table 6: Implications of 8% growth on Group GTS' fleet

	2020	2025
Share of Euro VI trucks	84%	92%
Share of intermodal transport	10%	10%
Share of other transport types	6%	6%
Total fleet	**100%**	**108%**

Furthermore, the graph in Figure 27 shows two things:

1. A decline of the fleet will always benefit the reduction of emissions.
2. Growth will always have a negative impact on the reduction of emissions, yet it depends on the type of technology driving the growth how big this impact will be.

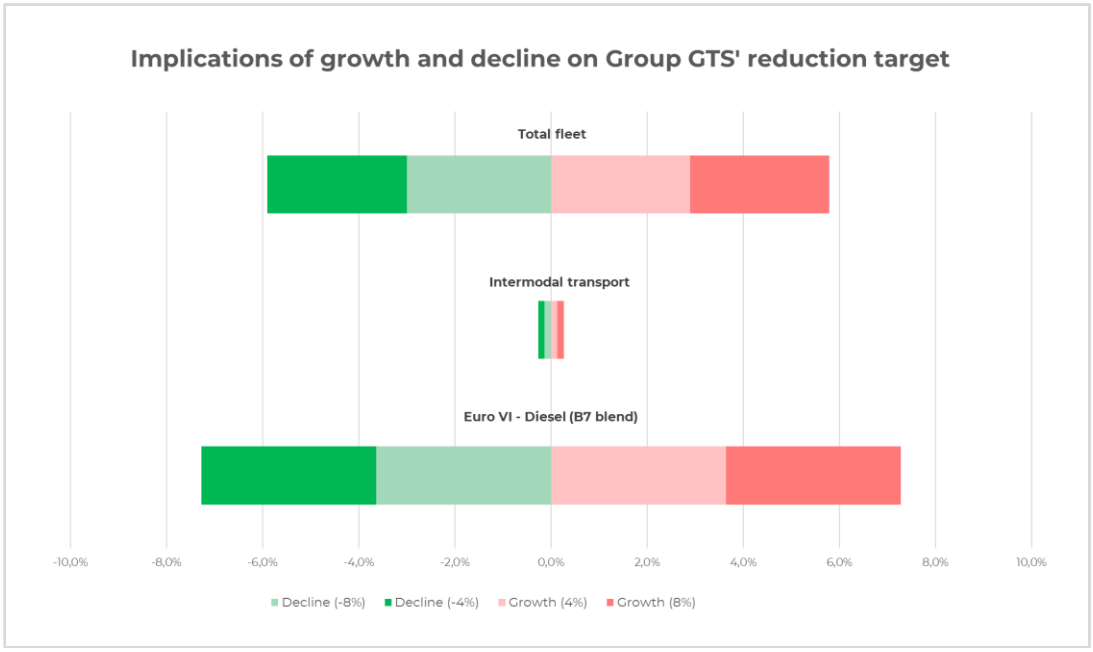

Figure 27: Implications of growth and decline on Group GTS' reduction target

Holding the impact of this growth through Euro VI trucks against the *Group GTS Selection Scenario*, this would mean that less than 20% reduction would be achieved (instead of 26,6%). If this growth would have been a result of increased utilisation of intermodal solutions, the achieved reduction would still have been 26,4%.

This exercise shows that if Group GTS is willing to grow its operations and still aims to achieve its reduction target, the growth must be achieved through sustainable alternatives.

6.3. Roadmap implementation

Figure 28 shows the reduction roadmap developed for Group GTS, including Key Performance Indicators as well as the necessary intermediary actions to reach its 25% reduction target.

The roadmap is structured around four rings. Each ring represents a period, with different objectives and actions. The final targets are represented in the 2024-2025 ring, in coloured boxes. While advancing though these periods, Group GTS will also implement different actions in partnership with (internal and external) subcontractors. These actions are represented by the grey boxes.

1. Exploring phase

The first phase involves exploratory work by Group GTS, such as identifying possible reduction measures, creating a reduction roadmap, and creating internal awareness. Group GTS is currently at the end of this phase. The exploration work and development of the roadmap was mostly done through this project, in collaboration with Greenfish.

2. Connecting phase

In the second phase, Group GTS will research the stakeholders to engage with (i.e. external subcontractors or suppliers). These stakeholders will act as strategic partners with whom Group GTS can further investigate the potential for implementation of the selected reduction measures. Discussions will then start between the stakeholders and Group GTS regarding possible pilot projects.

In parallel, Group GTS will need to identify use cases and engage with clients to identify opportunities for each of the selected measures. Lastly, in order to efficiently implement the roadmap, Group GTS is expected to already start implementing low hanging fruits (i.e. behavioural measures) internally.

3. Planning and testing phase

This phase comprises the initiation of implementation of the chosen solutions by Group GTS. This can be done through setting pilot projects with suppliers identified in the earlier phases and can be performed at a small scale first. These pilot projects will then serve as a first test, from which a first set of conclusions and lessons will be drawn. Based on the conclusions and main take-aways from these pilot projects in the third period, reduction measures will be readjusted where needed and follow-up actions will be planned.

4. Implementing phase

In the last phase, Group GTS will kick-off the wider implementation of reduction measures, including both internal and external subcontractors. The adoption of reduction measures can be accelerated through Group GTS sharing the business case for each measure and results of the pilot projects. These lessons learnt should aid to convince all stakeholders in the supply chain to implement the measures.

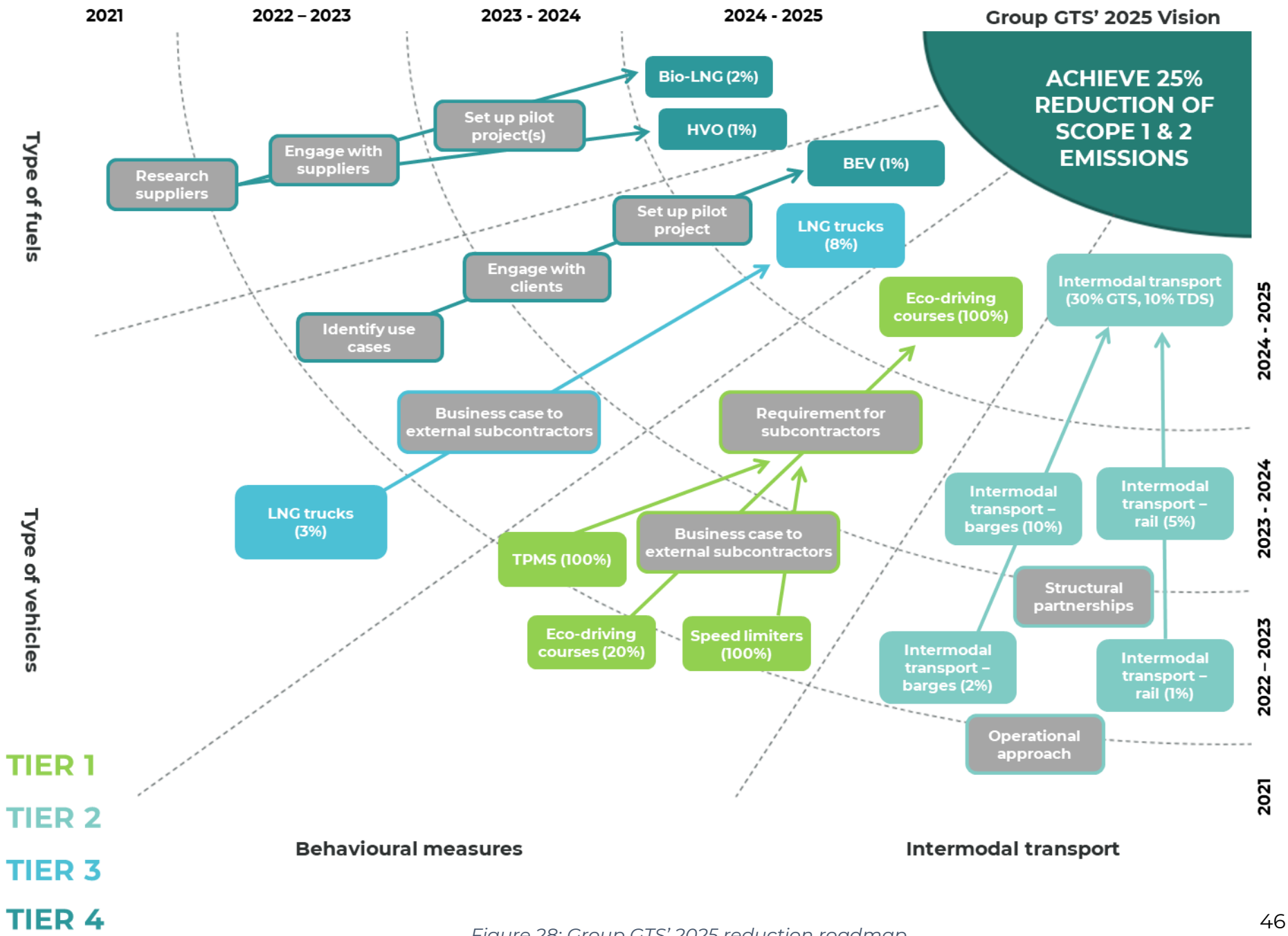

Figure 28: Group GTS' 2025 reduction roadmap

It should be noted that the different phases presented above are a general guideline, not a strict framework. The phases of implementation for the measures will not all run in parallel. For some reduction measures, Group GTS has started the testing phase in 2021 (e.g. LNG trucks), for others the exploring phase will only start in 2022.

The four tiers of measures are tackled through different actions, throughout the four phases.

6.3.1. Tier 1 measures

As explained in Chapter 5, Tier 1 measures are low hanging fruits, meaning that these measures have low investment costs and are relatively easy to implement. During the connecting period (2022-2023), Group GTS will first need to implement these measures internally. TPMS and speed limiters are easy fixes and should therefore directly be fully implemented. Eco-driving training, being the only measure that does not constitute a one-off action, should however be offered first to a share of the drivers (± 20%). This will allow some time for Group GTS to collect economic and environmental advantages of such courses and share them with external subcontractors to progressively increase the share of drivers receiving the training. In order to maximise the chance of high adoption rates, Group GTS should investigate offering these courses in partnerships with subcontractors. By 2024 (end of the planning and testing phase), Group GTS will need to make these behavioural measures **requirements for subcontractors**, so that in 2025 all three measures are 100% implemented.

6.3.2. Tier 2 measures

Tier 2 measures refer to intermodal transport solutions, i.e. using trains and barges in addition to road transport. Currently in the exploring phase, Group GTS is already mapping transport lanes and analysing its client base in order to identify opportunities where intermodal solutions can be offered. By the end of the exploring phase, Group GTS will have identified strategic train and barge terminals and tried out a few multi-modal lanes.

In the connecting phase (2022), Group GTS should first offer this service based on an **operational approach**, meaning that intermodal solutions will be implemented using existing networks. Indeed, Group GTS will not be able to own barges or trains, nor is it the direction the company wants to take. Group GTS will then need to work with barge and train terminals as a “regular” client first. Progressively, Group GTS should move towards a more **structural approach** in which partnerships are set up between Group GTS and these terminals. By 2023, clients should ideally be able to book multi-modal transport orders with Group GTS, leaving GTS to plan the order as efficiently and as sustainable as possible. Placing Group GTS as this one-stop shop will be key in ensuring the success of intermodal solutions, as existing clients already resort to other logistics companies to book barge transport, for instance. Group GTS will therefore need to compete by marketing itself as the middleman, in charge of overseeing the entire transport order, including the different transportation modes.

This operational approach is expected to take off by the end of 2021, with 5 to 10% of container transport being shifted to intermodal lanes first, starting most likely with barges. The focus of the connecting phase will therefore be on GTS more than TDS. By 2025, Group GTS' objective is to reach 30% of GTS' operations being offered through intermodal solutions, and 10% of TDS' operations. It is expected that in this last phase, intermodal lanes will grow towards a 50-50 distribution between barges and trains. However, at the end of the connecting phase, Group GTS will need to reflect on its trajectory with regards to intermodal transport. If by 2023 intermodal transport is not as successful as anticipated, Group GTS should not go for the structural approach but should instead fall back onto the Diversified Alternative scenario explained above.

6.3.3. Tier 3 measures

Tier 3 consists of replacing Group GTS' old fleet by LNG trucks. This measure was already in the planning and testing phase in 2021, as Group GTS started implementing LNG trucks with internal subcontractors. The focus for the coming years will therefore be on expanding the implementation of this measure, both internally and externally. In order to convince external subcontractors, Group GTS should build up and share the **business case** for LNG trucks.

6.3.4. Tier 4 measures

Tier 4 includes two sub-categories of measures: alternative fuels and battery-electric vehicles (BEVs). Both measures are complex to implement and are not a priority for Group GTS. However, as explained in section 0, in the event that intermodal transport is less successful than expected, Group GTS will need to rely more heavily on this tier to achieve its 25% reduction measure.

Regarding fuels, HVO and Bio-LNG are both in their early stages, meaning that infrastructure is still poorly developed and that supply is low. Nonetheless, the fuels are expected to play an important role in decarbonising transport in the coming years. During the exploring and connecting phases, Group GTS should focus on researching and **engaging with suppliers**. Once strategic suppliers have been identified, **pilot projects** should be set up for a small fraction of the Group GTS' fleet, and run through the planning and testing phase. The first step in developing these pilot projects will be to find a subcontractor who is willing to try out the recommended measure. The choice of the subcontractor should be based on its size and relevance to Group GTS' activities, its relationship with Group GTS, and its interest in sustainability and emissions reduction. Based on the discussion and brainstorming that took place over the course of the project, some subcontractors have already surfaced as potential contestants for pilot projects, such as Gretveja. A more thorough analysis should however be carried out by Group GTS before making a final decision. The results of these pilot projects will then serve to convince more subcontractors, allowing Group GTS to achieve the set targets for these two measures.

The second subcategory that is part of this tier is the implementation of battery-electric vehicle. BEVs are more widely available but are only suitable for orders that meet specific conditions (i.e. short distances, high frequency). In the first two periods, Group GTS needs to **identify use cases** (i.e. situations for which BEVs are suitable such as on-site deliveries, warehousing-related transport, etc). Once these opportunities have been identified, Group GTS will need to **connect with clients** and start the discussion regarding the possibility to implement BEVs. The final step is then to set up **pilot projects** with interested clients and selected subcontractors.

As already explained, Group GTS is not seeking a pioneering role in the implementation of these measures. For this reason, the targets suggested in the roadmap for this tier are kept intentionally low. Indeed, implementation will heavily rely on the willingness of clients to pay a premium and subcontractors to invest. Nevertheless, these achievable targets will lay the foundations for higher levels of implementation in the longer term.

6.4. Roadmap interpretation

Based on Group GTS' business model, this reduction roadmap is more of a qualitative action plan than a quantitative one. Emissions reduction will rely on partnership and shared efforts with both internal and external subcontractors. The focus should then be on laying the right foundations for these reduction measures.

Lastly, this roadmap should not be seen as an "agenda" with set dates or a fixed list of actions. Rather, it should be understood as a guidance document that needs to evolve over time, based on the development of the market, emergence of new technologies, demands of clients, and the ambition of Group GTS. In other words, the development of a reduction roadmap is a static conclusion from a dynamic situation. The realisation of emissions reduction will highly depend on the market and infrastructure. If the availability and/or price of a technology changes, the roadmap is likely to change too. It is therefore important to allow for sufficient flexibility to ensure Group GTS meets its target in the most cost-efficient manner.

6.5. Additional recommendations

A few other measures have been discussed by Group GTS, notably improving back loads, increasing the load factor of trucks, or reducing empty kilometres. While those optimisation measures can all help to further reduce emissions, they have not been included in the roadmap due to a lack of tangible reduction estimations. Moreover, while the optimisation of planning already initiated by Group GTs in 2021 will not reduce absolute emissions, it will help the business grow and sustain itself over time. The harmonisation of transport planning management systems across departments will also improve monitoring and management of GHG emissions through better data collection. To have a better understanding of the impact intermodal solutions can have, it is recommended that not only kilometres but also the weight per shipment be measured. Doing that will enable Group GTS to then express transport lanes in tonne.kilometres. This allows Group GTS to identify the true potential of intermodal solutions, thereby making inefficiencies in the supply chain measurable and actionable.

Secondly, the reduction roadmap developed for Group GTS includes the development of pilot projects. The success of these projects will be pivotal in convincing subcontractors to adopt the recommended measures. It is therefore advised that Group GTS seeks assistance in setting up and implementing these pilot projects, thereby maximising the chances of success. Developing the right communication techniques and material will also be crucial in securing these partnerships. This could include the creation of one-pagers for subcontractors about measures they can implement and the impact these measures have on emissions.

Alongside pilot projects, Group GTS should explore different financial incentives that could help subcontractors adopt reduction measures. These incentives range from opting for second-hand LNG trucks to offering help in identifying and securing subsidies and setting up carbon prices or “low carbon premiums” for subcontractors. While subsidies are partially covered in the appendix of this report, it is advised that Group GTS further studies these possibilities through a separate dedicated project.

Lastly, combining the results of the reduction roadmap with the output of the communication workshop, it is advised that Group GTS engages in a formal commitment regarding emissions reduction. Indeed, public commitments not only are powerful communication tools but also help ensure that ambitious reduction target are met.

7. APPENDICES

A. REGULATIONS

1. The Mobility Package

European commercial road transport accounts for almost half of all freight transport operations in the EU, employing nearly 11 million people directly. The transport sector is responsible for almost a quarter of Europe's GHG emissions[9].

Due to the size and impact of this sector, the EU has introduced a new mobility package intended to address several problems and support specific developments within the European road transport sector. The harmonisation and simplification of the rules aims to result in better and more consistent enforcement across all Member States. Supporting social fairness, fair competition, improving the environmental performance of road transport operations, and encouraging innovation are some of the main goals of this new package of legislative initiatives[10].

The European Commission's Mobility Package is a collection of three initiatives concerning the governance of commercial road transport in the European Union. The three initiatives are the following:

1. Posting of drivers
   The mobility package includes a directive laying down specific rules for posting[11] drivers in the transport sector and enforcement requirements. The posting legislation will apply to cabotage (i.e. transport between two or more places loading and/or unloading in one country by a transport operator from another country) and to international transport operations. Exceptions to the package include transit, bilateral operations and bilateral operations involving two additional loading or unloading operations.[12,13]

2. Working time
   The mobility package also describes the regulation requirements covering maximum daily and weekly driving times:
   - Minimum breaks and daily and weekly rest periods,
   - Positioning by means of tachographs (which record information about driving activity, such as time, speed, and distance).[8,14]

[9] European Commission. (n.d..). Transport Emissions. [Online]
[10] IRU. (n.d.) European Commission Mobility Package. [Online]
[11] Posting is a situation where a truck driver works for a limited period in another EU Member State and acquires social rights temporarily in that Member State (European Commission. (n.d.) Factsheet "Truck drivers' posting". [Online])
[12] Eurofund. (2020). Mobility package. [Online]
[13] European Parliament. (2020). Directive (EU) 2020/1057 of the European Parliament and of the Council. [Online]
[14] European Parliament. (2020). Directive (EU) 2020/1054 of the European Parliament and of the Council. [Online]

3. Rules regarding road haulage and cabotage
   Regulation (EU) 2020/1055 is intended to revise the rules relating to cabotage and to combat the use of 'letterbox companies', by forcing haulage companies to demonstrate that they have a significant volume of business in the Member State in which they are registered.[15]

On February 19th, 2021, the European Commission published the results of two studies to assess the expected impacts of two specific aspects of Mobility Package (phase I).

During the negotiations on the Package, the Commission made a Declaration concerning two aspects:

1. The compulsory return of the vehicle to the Member State of establishment every eight weeks,
2. The application of cabotage quotas on international combined transport operations.

According to the Commission, these two requirements run counter to the ambitions of the European Green Deal. The two provisions have not been subject to an impact assessment prior to adoption of the Package by the co-legislators. The Commission therefore committed to proceed with a close assessment of their likely climate, environmental and market impact. Two studies undertaken by independent consultants[16] suggest that the return obligation for lorries and the quotas imposed on combined transport operations are likely to have several negative effects, including an increase of transport emissions. Indeed, the analysis of the return obligation for vehicles shows that the provision is likely to create additional journeys, potentially resulting in up to 2,9 million tonnes of additional CO_2e emissions in 2023.

Cabotage, referring to hauliers from one country picking up and delivering goods within another country, has become a common practice since the liberalisation of the internal EU market. The study focusing on the cabotage quotas for international combined transport operations estimates that a widespread use by Member States of the option to introduce them could lead to an additional 397 000 tonnes of CO_2e emissions and other potential negative long-term effects on rail and intermodal freight.[17]

Now, the Commission aims to have an open dialogue to assess the possible next steps in the light of the need to pursue the Green Deal objectives, the proper functioning of the Single Market, and the need to secure high social standards and the well-being of drivers.

[15] European Parliament. (2020). Directive (EU) 2020/1055 of the European Parliament and of the Council. [Online]
[16] European Commission. (2021). Study on return of the truck requirement, Study on the cabotage restrictions on the combined transport road legs. [Online]
[17] European Commission. (2021). Mobility Package I: European Commission publishes study results. [Online]

2. The 'Fit for 55' package

The European Green Deal published in 2019 sets out a detailed vision on how to make Europe the first climate-neutral continent by 2050. To achieve this objective, the European Commission presented on July 14th, 2021, the 'Fit for 55' Package. This legislative package proposes a revision of all climate and energy regulations to enable achieving emissions reduction of at least 55% by 2030, compared to 1990 levels[18]. The package comprises thirteen proposals; eight of them are revisions to existing laws and five are new proposals.[19]

Importance for the transport sector

Some of Europe's unique challenges with regards to transport are to develop and deploy innovative low-carbon technologies in vehicles and in fuels/energy and to create economic value for the transport ecosystem and help the relevant EU industries achieve world-leadership.[11]

Several aspects of the 'Fit for 55' package are highly relevant for the road transport sector, such as:

1. Contribution of low-carbon liquid fuels
   Low-carbon liquid fuels will be a key instrument for the decarbonisation of long-distance road transport.[11]

2. Social dimension
   The transition should carefully address the societal aspects deriving from changes in employment pattern, skills requirements and inequalities between EU regions and sectors of society. No one should be left behind, and access to affordable mobility should be protected as one of the fundamental rights of all citizens[20].

3. Renewable Energy Directive
   The revision of the Renewable Energy Directive creates the best opportunity to make it the primary regulatory instrument to drive the effective and efficient decarbonisation of road transport fuels and the development and deployment of renewable fuels, including from biological, non-biological origin, captured or recycled origin.

4. Emissions Trading for Transport Fuels
   The EU Emissions Trading System (ETS) puts a price on carbon and lowers the cap on emissions from certain economic sectors every year. To address the lack of emissions reductions in road transport, a separate new emissions trading system will be set up for fuel distribution for road transport[21].

[18] FuelsEurope. (n.d.). Fit For 55 Package. [Online]
[19] Interreg Europe. (2021). Commission launches the Fit for 55% Package. [Online]
[20] FuelsEurope. (n.d.). Fit For 55 Package. [Online]
[21] European Commission. (2021). European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions. [Online]

B. GHG ASSESSMENT METHODOLOGY

This assessment follows the methodology presented by the GHG Protocol Corporate Standard & Scope 3 (Corporate Value Chain) Standard. Launched in 1998, the GHG Protocol is a multi-stakeholder partnership aimed at developing and promoting the use of consistent methods of GHG accounting and reporting. Together, the complementary standards of the GHG Protocol form a comprehensive framework for managing emissions. Today, the GHG Protocol is the most widely used accounting tool to measure, manage and report GHG emissions.

The GHG Protocol adheres to the principles of relevance, completeness, consistency, transparency, and accuracy. Following the GHG Protocol therefore ensures the relevance of the choice of emissions sources, the completeness of the inventory, the accuracy of the definition of scopes and boundaries, and relevance of data collected and processed.

1. Scopes

Three scopes are presented in the GHG Protocol methodology. These scopes are visualised in Figure 29.

- **Scope 1**: Direct emissions from sources that are owned or controlled by the reporting company. This concerns emissions caused by physical or chemical processing; emissions from the generation of electricity, heat, or steam, the consumption of fuel for heating, machinery and transportation of goods and employee, as well as possible fugitive emissions from cooling and air conditioning installations.
- **Scope 2**: Indirect emissions from purchased electricity, heat, or steam. These emissions are generated by power plants owned by utility companies.
- **Scope 3**: All other indirect emissions resulting from the activities of the reporting company, from sources which are owned or controlled by another company. These include, but are not limited to, emissions linked to the production and transport of purchased products (goods and services), waste treatment, employee commuting, and business travel (excluding company cars which are included in Scope 1).

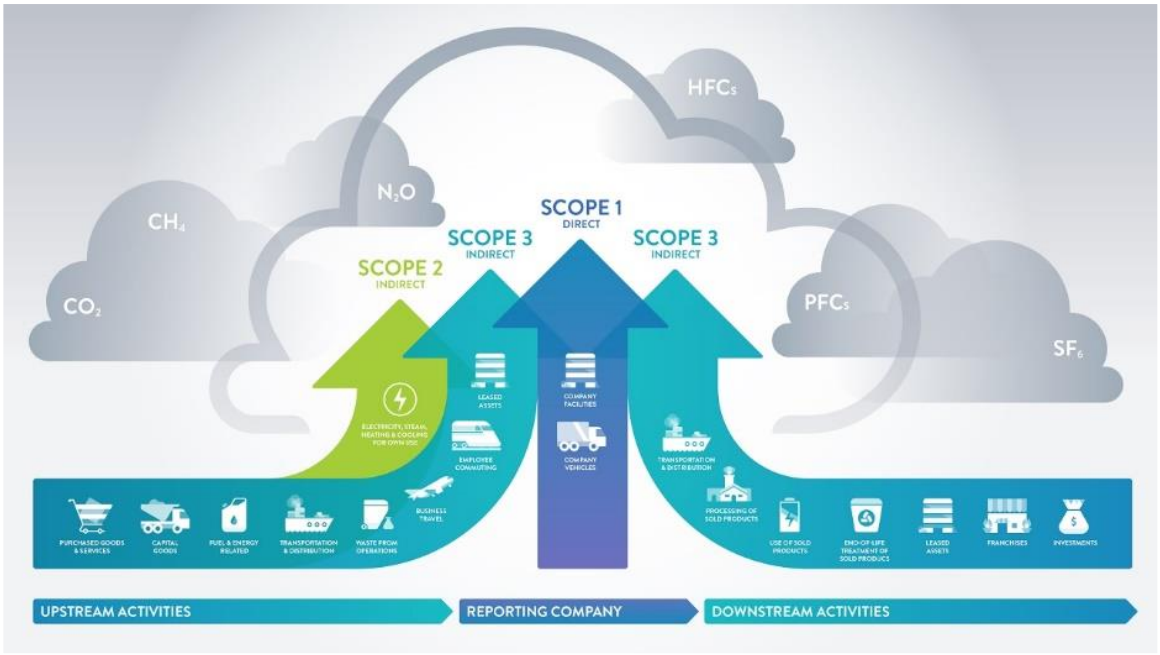

Figure 29: 3 Scopes of the GHG Protocol

2. Base Year

The GHG Protocol requires to define a reference year. Establishing a base year is required for Scope 1 and 2 emissions, and for Scope 3 emissions when companies choose to track performance or set a reduction target. The base year is usually the first year in which a rigorous GHG assessment has been carried out, in order to compare emissions over time, assess the relevance of actions taken by the company and the predictions made on future emissions. The reporting must therefore clearly state the assumptions and omissions made when selecting and calculating base year emissions.

In the case of Group GTS, the base year selected for this assessment is 2020.

If any given parameter changes after the base year, base year emissions should be recalculated. It is therefore encouraged to develop a base year recalculation policy in order to define the circumstances in which base year emissions will be recalculated. Possible changes that can trigger recalculation include:

- Change in the consolidation approach,
- Significant changes in the structure of the company (mergers, acquisitions, outsourcing of activities, etc.),
- Significant changes in the calculation methodology (improved activity data, up-to-date emissions factors),
- Discovery of significant errors.

It is of the utmost importance to maintain consistency in GHG assessments to be able to correctly compare an organisation's impact on the environment from one year to another and the relevance of the actions implemented to reduce its ecological footprint. Failure to recalculate base year emissions to reflect such changes would compromise the consistency and relevance of the assessment.

However, the reporting company is not expected to recalculate base year emissions to reflect organic growth or decline of its activities.

3. Greenhouse Gases

GHG assessments do not only account for carbon or CO_2 emissions, but for all emissions of the greenhouse gases recommended by the Kyoto Protocol. The GHG Protocol thus covers the accounting and reporting of seven GHGs:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Nitrogen trifluoride (NF_3)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)

CO_2 emissions are the direct consequence of deforestation and the use of fossil fuels (coal, oil, and gas), and are responsible on their own for 69% of the anthropogenic greenhouse effect. Methane emissions are generated by livestock, the anaerobic fermentation of organic matter, and leaks linked to the use of fossil fuels, and are responsible for 18% of the anthropogenic greenhouse effect. N_2O emissions result from the oxidation of nitrogen compounds and are principally linked to the use of manure and fertilizers, as well as aerosols. N_2O emissions are responsible for 5% of the anthropogenic greenhouse effect. Finally, industrial gases, HFC, PFC and SF_6, are mainly used for the production of cold in air conditioners and refrigerators. Despite a very low concentration in the atmosphere, they have significant global warming potential.

For the purpose of GHG assessments, all GHGs are converted into CO_2 equivalent (CO_2e) based on their Global Warming Potential (GWP). GWP reflects the relative radiative forcing impacts of a particular greenhouse gas, compared to CO_2. GHGs do not have the same impact on the atmosphere, nor the same lifetime. To compare the impacts of emissions and reductions of different gases, these seven GHGs are thus measured in a common unit using a conversion factor, determined by calculating the equivalence of emitting one kilogram of CO_2 over a period of 100 years in the atmosphere[22].

Table 7: GWP of GHGs based on IPCC's 5th assessment report[23]

GHG	GWP	CO2 equivalence
CO_2	1	1 kg CO_2e
CH_4	28	28 kg CO_2e
N_2O	265	265 kg CO_2e
HFCs	140 - 11,700	140 - 11,700 kg CO_2e
PFCs	6,500 - 9,200	6,500 - 9,200 kg CO_2e
SF_6	23,500	23,500 kg CO_2e

[22] IPCC. (2014). AR5 Anthropogenic and Natural Radiative Forcing, p. 73-79. [Online]
[23] Greenhouse Gas Protocol. (2014). Global Warming Potential Values. [Online]

Organic CO_2 emissions are not included in GHG assessment as these are simply CO_2 stored in organic form returning to the atmosphere, unless these emissions are clearly linked to deforestation (significant, unnatural reduction in the biomass of a geographical area).

4. Uncertainty

Uncertainty is linked to two factors:

- Uncertainty about the activity data. While some data is known with precision such as energy or fuel consumption, other data is estimated or extrapolated from surveys,
- Uncertainty about emissions factors.

All the values obtained throughout the assessment and presented in this report are displayed with most relevant figures. It is important to understand that while these values are uncertain, they make it possible to compare, prioritise and assess the evolution of emissions rather than precisely quantifying emissions.

5. Calculations of GHG Emissions

In most cases it is not possible to directly measure the greenhouse gas emissions resulting from a given action. Indeed, while this measurement has become a common scientific practice, it is rarely achievable by a company. The most common way to obtain a measure of GHG emissions is therefore to estimate them through calculation, from activity data - for instance distance travelled by car, number of computers purchased, etc.

The data used to derive GHG emissions from activity data are called emissions factors and are expressed according to the relevant activity in the form of CO_2e/"unit of activity". It then makes it possible to move from measuring human activity to measuring the greenhouse effect that this activity generates.

The equation for calculating GHG emissions is the following:

Table 8: Methodologies and tools used

Scope	*Methodologies used to calculate or measure emissions*
Scope 1	GHG Protocol Corporate Accounting and Reporting Standard
Scope 2	GHG Protocol Corporate Accounting and Reporting Standard

C. DATA SOURCE

Table 9: Databases and sources used in Group GTS' assessment and roadmap

Institution/author	Type	Description/title	Use
ADEME (2018, 2021)	Database	Public online database of emissions factors (mainly for France and other European countries)	GHG assessment
DEFRA (2021)	Database	Extensive public database of emissions factors for the United-Kingdom	GHG assessment
co2emissiefactoren (2020, 2021)	Database	Public online database of emissions factors (mainly for Belgium and the Netherlands)	GHG assessment
Panteia (2020)	Report	"Cost Figures for Freight Transport" (report commissioned by the Netherlands Institute for Transport Policy Analysis)	Cost analysis
International Council on Clean Transportation (2017)	Report	"Transitioning To Zero-Emissions Heavy-Duty Freight Vehicles" (study conducted for the International Zero-Emissions Vehicle Alliance)	Cost analysis
CE DELFT (2021)	Report	"STREAM Freight Transport 2020 - Emissions of freight transport modes"	Reduction scenarios
Transport Research Centre, TRANSyT, Universidad Politécnica de Madrid (2018)	Academic paper	"Evaluation of Eco-Driving Training for Fuel Efficiency and Emissions Reduction According to Road Type"	Reduction scenarios
TNO Innovation for Life & European Commission's DG CLIMA (2013)	Report	"Study on Tyre Pressure Monitoring Systems as a means to reduce Light Commercial and Heavy-Duty Vehicles fuel consumption and CO_2 emissions"	Reduction scenarios
European Environment Agency (2020)	Article	"Do lower speed limits on motorways reduce fuel consumption and pollutant emissions?"	Reduction scenarios

D. CALCULATION: ASSUMPTIONS AND EMISSIONS FACTORS

Emissions sources often have several activities linked to the production of GHGs. GHG emissions can thus fall into different categories, including stationary combustion, mobile combustion, process emissions or fugitive emissions. Therefore, different calculation methods were used to cover all sources of GHGs. Emissions sources relevant to Group GTS' activities are listed below, along with explanations of the calculation methodology and assumptions.

Table 10: Recap of uncertainty levels by Scope

Scopes and categories	Uncertainty
Scope 1	
Mobile combustion of fuel (transport lanes) - TDS	Medium
Mobile combustion of fuel (transport lanes) - GDS	High
Stationary combustion of natural gas	Low
Scope 2	
Consumption of electricity	Low
Scope 3	N/A

Scope 1

1. Fuel consumption

Conventional transport (TDS)

This category includes the GHG emissions caused by the combustion of fuel linked to transport lanes performed by the TDS department.

Description	Transport orders perfomed by internal and external subcontractors, planned by the TDS department
Emissions Source Type	Mobile combustion of fuel
Activity Data	Number of lanes (including distances in km) planned by TDS for each service (International, Benelux, and Spot trading)
Assumption(s)	It was assumed that all lanes were performed by Euro VI trucks (>17 tons) using regular diesel, with an average load factor of 85% (based on estimations made by DEFRA). As no data on empty kilometres were recorded by Group GTS, the same emissions factor was applied to all lanes.
Emissions Factor(s)	DEFRA database (2021)
Uncertainty	Medium

Container transport (GTS)

This category includes the GHG emissions caused by the combustion of fuel linked to transport lanes performed by the GTS department.

Description	Transport orders perfomed by internal and external subcontractors, planned by the GTS department
Emissions Source Type	Mobile combustion of fuel
Activity Data	Number of lanes (including distances in km, load weight, empty kilometres, and distiction with refregirated trucks) planned by GTS for each service (International, Benelux, Spot trading, and others)
Assumption(s)	Data from 01/03/2021 to 30/08/2021 were extrapolated to 12 months and used as proxy for 2020 as no data were available for the base year. It was assumed that all lanes were performed by Euro VI trucks (>17 tons) using regular diesel, with an average load factor of 85% (based on estimations made by DEFRA). For Benelux lanes, the emissions factor was adapted to reflect the average load (> 33 tons). A different emissions factor (based on load factor) was also applied to empty kilometres and a distinction was made for refrigerated trucks, for which suitable emissions factors were applied, both for empty and full kilometres. For around 3 400 entries (~10% of the data) no distances were recorded. Based on Group GTS' insights, these entries either represent orders that were sold externally (i.e. outside of Group GTS' operational control and assessment boundary) or short commutes and docking operations for which distances are assumed around 2 km or less. These entries were thus not accounted for in the calculations.
Emissions Factor(s)	DEFRA database (2021)
Uncertainty	High

2. Natural gas consumption

This category includes the GHG emissions linked to the stationary combustion of natural gas withing Group GTS' premises.

Description	Energy consumption on Group GTS' premises
Emissions Source Type	Stationary combustion of natural gas
Activity Data	Invoice for natural gas consumption in kWh

Assumption(s)	Only combustion emissions were considered (i.e. upstream emissions not accounted in this scope). Although the office located in Ham is rented from a 3rd party, energy consumption linked to this asset is included the Scope 1 & 2 inventory due to the choice of consolidation approach (i.e. operational control).
Emissions Factor(s)	ADEME database
Uncertainty	Low

Scope 2

3. Electricity consumption

This category includes the GHG emissions linked to the stationary combustion of natural gas withing Group GTS' premises.

Description	Purchased electricity on Group GTS' premises
Emissions Source Type	Consumption of electricity
Activity Data	Invoices for electricity consumption in kWh
Assumption(s)	Only combustion emissions were considered (i.e. upstream emissions not accounted in this scope). The specific electricity mix consumed by Group GTS was detailed on the separate invoices, but emissions were calculated following the location-based approach. Although the office located in Ham is rented from a 3rd party, energy consumption linked to this asset is included the Scope 1 & 2 inventory due to the choice of consolidation approach (i.e. operational control).
Emissions Factor(s)	ADEME and CO2emissiefactoren databases
Uncertainty	Low

Transport lanes that are not planned by Group GTS are considered to be out of its operational control. Hence, those lanes are not part of the boundary of this assessment and related emissions were therefore not calculated.

Scope 3

Value chain emissions are not included in the scope of this assessment. Therefore, no calculation was performed.

E. IDENTIFIED REDUCTION MEASURES

1. Type of vehicle

Action #1 – EURO VI TRUCKS

The Euro VI norm is a specific European emissions standard for exhaust emissions (CO_2, NOx, HC and PM) for both passenger cars and heavy-duty vehicles such as trucks. The higher the norm, the more stringent the standard and its requirements. With the Eruo VI norm, the permitted NOx level went down by 80 % and the PM level was cut by 50% compared to Euro V.

		Comparison with Euro VI scenario
OPEX	LOW	0 %
CAPEX	MEDIUM	0 %
Availability of the technology	HIGH	-
CO_2e reduction potential	LOW	0 %

	Legislative context and subsidies
Belgium	Euro VI trucks are required to pay less per kilometre on toll roads than more polluting, older trucks[24]. To illustrate, a Euro III truck pays 18,9 Eurocent/km while a Euro VI truck with a similar capacity pays only 13,3 Eurocent/km.[25]
Germany	The German government has started a subsidy programme to support entrepreneurs and haulers in buying new Euro VI trucks. The subsidy amounts to a maximum of 15 000 € and requires that a Euro III, IV or V truck must be discarded. An additional requirement is that the new truck is equipped with a blind spot system.[26]
Poland	Covering a total toll road network of around 3 660 km, road charges in Poland also depend on the size of the vehicle (i.e. weight, number of axles), the route taken, and Euro class of the vehicle.[27]

Action #2 – CNG & LNG TRUCKS

In CNG and LNG trucks, natural gas is used as fuel (compressed or liquefied form). Natural gas is a much cleaner burning fuel than diesel. Today Europe counts around 4 000 CNG stations and 430 LNG stations. Gas can also be delivered in tanks, containing gas for distances up to 1 000 km. In 2021, Group GTS' fleet was composed by 3% of LNG vehicles. It was thus decided to follow this direction and focus on LNG rather than CNG. Based on the information given by GTS during workshop, it is estimated that LNG-powered trucks are economically viable as of driving distances of 130 000 km per year.

[24] TTM. (2018). Belgische tol doet aandeel Euro VI trucks verdubbelen. [Online]
[25] Vlaamse overheid. (n.d.). Kilometerheffing – Tarieven. [Online]
[26] TTM. (2021). Duitsers geven 15.000 Euro subsidie voor aanschaf Euro 6 truck. [Online]
[27] Transport & Environment. (2018). Emission Reduction Strategies for the Transport Sector in Poland. [Online]

		Comparison with Euro VI scenario
OPEX	LOW	↓ 30-35%
CAPEX	HIGH	↑ 25-30%
Availability of the technology	MEDIUM	
CO_2e reduction potential	MEDIUM	↓ 10-15%

	Legislative context and subsidies
Belgium	In Flanders, SMEs and large enterprises can qualify for the 'Ecology premium+', through which financial support is granted for light good vehicles with CNG as fuel, CNG-fuelled truck, LNG-fuelled truck. The amount of the 'Ecology premium+' is determined by: (1) the nature of the investment, (2) the ecoclass of the technology, (3) the size of the company. The subsidy results in a net support percentage per technology depending on the size of the company, ranging between 15-45% of the additional cost of the technology. The total amount granted to a company cannot not exceed 1 000 000 € over a period of 3 years.[28] It should however be noted that the support percentages for natural gas trucks have been reduced.[29] In Wallonia, a similar measure exists. The premium can amount up to 24 000 €/truck, with a maximum of 30 vehicles.[30]
France	A system of accelerated depreciation for CNG and LNG heavy vehicles is available until December 31st 2024. Companies can thus deduct a percentage of the value of the vehicle from their taxable profit. The percentage is: • 40% for vehicles of 16 tonnes or more; • 60% for vehicles between 3,6 and 16 tonnes; • 20% of the original value for light commercial vehicles between 2,6 and 3,5 tonnes[24,31,] As of January 1st 2021, CNG has been subject to the TICGN (Taxe Intérieure de Consommation sur le Gaz Naturel). In 2021, the tax was around 5,23 €/MWh for natural gas used as vehicle fuel, i.e. 0,075 €/kg, making LNG and CNG very comparing with the 0,594 €/litre tax for diesel. By switching to LNG or CNH-powered vehicles, transporters are also free of the procedures for partial reimbursement of the TICPE on diesel fuel.[24]
Germany	From January 1st 2019 to December 31st 2020, hauliers using natural gas trucks (CNG or LNG) were completely exempt from paying the Lkw-Maut tax (amount between 17,3 and 18,7 Eurocent/km for a 18-tonnes truck). This Maut exemption for LNG and CNG trucks has been extended to the end of 2023. Until then, LNG and CNG trucks will not be required to pay Maut tax on German roads.[24]
Poland	Since August 14th 2019, drivers no longer have to pay excise duty on natural gas. It means a decrease in the net price by 33 grosze (0,0825 €) per m^3 for CNG and 67 grosze (0,1675 €) per kg for LNG.[32]

Action #3 – BATTERY-ELECTRIC VEHICLES

Battery-electric vehicles (BEVs) exclusively use energy stored in rechargeable battery packs, with no secondary source of propulsion. These vehicles are suitable for trips of 300 kilometres or less (which represents 13,4% of Group GTS' lanes), due

[28] Vlaamse overheid. (n.d.). Subsidies & Financiering - Ecologiepremie+. [Online]
[29] Vlaamse overheid. (2021). Limitatieve Technologieënlijst - Technologieën alfabetisch gerangschikt per thema. [Online]
[30] Commissie voor de Regulering van de Elektriciteit en het Gas (2019). Studie over de concurrentiepositie van aardgas gebruikt als CNG en LNG brandstof voor verschillende voertuigtypes. [Online]
[31] Gaz Réseau Distribution France. (n.d.). Les aides fiscales et financières des véhicules GNV. [Online]
[32] GasHD.eu. (2019). CNG & LNG in Poland without excise duty. [Online]

to the need for recharging time and availability of infrastructure. The impact of switching to BEVs will greatly vary depending on the sourcing of the electricity. Indeed, the production of grey electricity (i.e. from fossil fuels) generates upstream GHG emissions, in contrast to green electricity produced from renewable sources which produces close to zero emissions.

		Comparison with Euro VI scenario
OPEX	LOW	↓ 65-70%
CAPEX	HIGH	↑ 0-5 %
Availability of the technology	MEDIUM	-
CO_2e reduction potential	MEDIUM	↓ 30-98 %

	Legislative context and subsidies
Belgium	In Flanders, EVs and plug-in hybrids were exempt from registration tax until the end of 2020. Electric cars emitting less than 50g CO_2/km were also exempt from ownership taxes. These exemptions were however not extended after 2020. In Brussels and Wallonia, fully electric vehicles are required to pay only the minimum registration rate of 61,50 €. Electric cars also have the lowest rate of annual circulation tax (83,56 € as opposed to 1 900 €). For companies, expenses for electric vehicles emitting less than 42g CO_2/km are 100% tax deductible.[33]
France	In France, purchase grants, or ecological bonuses, are offered based on the type of vehicle. A bonus of up to 7 000 € is available for vehicles emitting 20g CO_2/km or less. For plug-in hybrid vehicles emitting between 21g and 50g CO_2/km, a bonus of up to 2 000 € is available. Scrappage schemes, or conversion bonuses are also available. These bonuses go up to 5 000 € for the purchase of second hand or new BEVs and PHEVs, if the buyer gets rid of his diesel car (older than 2001) or gasoline car (older than 1997). Both fully-electric vehicles and plug-in hybrids are also eligible for either a 50% discount or are fully exempt from paying the license plate registration (carte grise) in Metropolitan France (depending on the region). Fully-electric vehicles that serve as company cars are also exempt from this registration tax.[27] Lastly, the ADVENIR programme covers the costs of supply and installation of charging points for companies and residential collectives. Up to 40% of the purchase and installation costs of EV charging points are covered by this programme.[34]
Germany	As for France, some purchase grants are available in Germany. For vehicles priced up to 40 000 €, a grant of 9 000 € is available for fully-electric vehicles, or 6 750 € for plug-in hybrids. For cars priced up to 65 000 €, the grant ranges from 7 500 € for fully electric vehicles to 5 625 € for plug-in hybrid ones. An additional bonus of 100 € is available if the purchased vehicle is equipped with an Acoustic Vehicle Alert System (AVAS). Until 2030, a one-off subsidy of up to 50% of the purchase costs is available for purely electric vehicles used for commercial deliveries. Moreover, for a limited period until the end of 2021, funding for electric buses, trucks and their charging infrastructure will be increased. Private and municipal operators will receive 1.2 billion € to switch to alternative drive systems, as an incentive to make urban transport switch to electric.
Poland	Electric and plug-in electric vehicles are exempt from registration tax in Poland.[35]

[33] Wallbox. (n.d.). EV and EV Charger Incentives in Europe: A Complete Guide for Businesses and Individuals. [Online]
[34] Wallbox. (n.d.). How To Get An EV Subsidy In France. [Online]
[35] European Automobile Manufacturers Association. (2018). Overview on Tax Incentives for Electric Vehicles in the EU. [Online]

Action #4 – HYDROGEN TRUCKS

The technology for hydrogen-powered trucks is still in the experimental stage and is therefore very expensive. Hydrogen is only available in limited quantities and needs to be stored at very high pressure (700 bar) and extremely low temperatures. The distribution infrastructure is currently not yet fully developed. Hydrogen trucks are therefore not ready to be used on a large scale.

Grey hydrogen

		Comparison with Euro VI scenario
OPEX	HIGH	↑ 78 %
CAPEX	MEDIUM	↑ 20-25 %
Availability of the technology	LOW	-
CO_2e reduction potential	HIGH	↓ 19 %

Green hydrogen

		Comparison with Euro VI scenario
OPEX	HIGH	↓ 24 %
CAPEX	MEDIUM	↑ 20-25 %
Availability of the technology	LOW	-
CO_2e reduction potential	HIGH	↓ 93 %

	Legislative context and subsidies
Belgium	All political entities in Belgium (i.e. the three regions and the federal state) have implemented carbon-related taxation for vehicles, which may be an incentive to deploy hydrogen-based transport. There is however currently no carbon pricing mechanism that would give a signal to low-carbon alternative solutions[36].
France	France has already included some specific targets relating to the use of hydrogen in road transport. In the light-duty vehicle segment, the goal is to have around 5 000 hydrogen vehicles on the road by 2023, growing to 20 000 – 50 000 by 2028. For heavy-duty transport, France aims to have 200 hydrogen vehicles on the road by 2023 and between 2 000 and 8 000 by 2028. Moreover, France has set up a CO_2 pricing mechanism in 2014 and has introduced carbon-related taxes for vehicles, which are key to support the progressive shift to low-carbon vehicles, such as hydrogen.[37]
Germany	According to its draft NECP, Germany expects to cover about 0,1% of its transport needs with hydrogen by 2030, and around 0,2% by 2040. In February 2020, the first draft national hydrogen strategy has been released. It foresees that by 2030 at least, 20% of Germany's hydrogen should be produced from renewable energy. Germany will further develop and implement its National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP 2) to provide a solid technological basis and support the market ramp-up phase.

[36] European Commission. (2020). Opportunities for Hydrogen Energy Technologies Considering the National Energy & Climate Plans – Belgium. [Online]
[37] European Commission. (2020). Opportunities for Hydrogen Energy Technologies Considering the National Energy & Climate Plans – France. [Online]

	Regarding CO_2 pricing, Germany has set up a mechanism and introduced carbon-related taxation for vehicles. Both measures are key to support the progressive uptake of low-carbon vehicles (including hydrogen).[38]
Poland	Poland has set up a CO_2 pricing mechanism in 1990, which is key to support the progressive shift to hydrogen-powered vehicles.[39]

Action #5 – LHV (LONGER HEAVIER VEHICLES)

LHV is a type of heavy goods vehicles. Articulated lorries are the most common configuration of LHVs, ranging from 25 to 35m in length. Despite being a solution for reducing costs and emissions, LHVs raise safety questions and require high infrastructure investments. In Europe, each country has its own legislation regarding LHVs. In Belgium, only 49 routes are approved for LHVs.

		Comparison with Euro VI scenario
OPEX	MEDIUM	↑ 20-25 %
CAPEX	HIGH	↑ 40 %
Availability of the technology	MEDIUM	-
CO_2e reduction potential	LOW	↓ 10 %

No specific subsidies or taxes are currently in place for LHVs.

Action #6 – HYBRID TRUCKS

Hybrid vehicles are powered by an internal combustion engine and an electric motor. Plug-in hybrid HGVs offer a limiter gain on emissions compared to a classic truck. Moreover, the source of energy used to produce electricity can further decrease this gain.

		Comparison with Euro VI scenario
OPEX	MEDIUM	↓ 36 %
CAPEX	MEDIUM	↑ 0-5 %
Availability of the technology	HIGH	-
CO_2e reduction potential	LOW	↓ 3%

	Legislative context and subsidies
Belgium	Certain environmentally friendly vehicles are exempt to pay the annual circulation tax, or get a discount on that tax.[40]
France	Purchase grants, or ecological bonuses, of up to 2 000 € are offered for plug-in hybrid vehicles emitting between 21g and 50g CO_2/km.

[38] European Commission. (2020). Opportunities for Hydrogen Energy Technologies Considering the National Energy & Climate Plans – Germany. [Online]
[39] European Commission. (2020). Opportunities for Hydrogen Energy Technologies Considering the National Energy & Climate Plans – Poland. [Online]
[40] Vlaamse overheid. (n.d.). Milieuvriendelijke voertuigen. [Online]

	Plug-in hybrids are also eligible for either a 50% discount or are fully exempt from paying the license plate registration (carte grise) in Metropolitan France depending on the region.
Germany	For vehicles priced up to 40 000 €, a grant of 6 750 € is available. For plug-in hybrid cars priced up to 65 000 €, the grant goes up to 5 625 €.
Poland	Plug-in electric vehicles are exempt from the registration tax.[41]

2. Type of fuel

A second category of measures concerns the type of fuel Group GTS' trucks run on. The different types of fuel identified as potential reduction levers are listed below, along with a comparison with a 100% Euro VI trucks scenario.

Action #7 – BIODIESEL

Biodiesel is a renewable, clean-burning diesel substitute that can be used in existing diesel engines. No investment is needed to switch to biodiesel. Operational costs will however increase due to higher fuel costs.

		Comparison with Euro VI scenario
OPEX	MEDIUM	↑ 15-20%
Availability of the technology	LOW	-
CO_2e reduction potential	HIGH	↓ 80-85 %

Action #8 – HVO (HYDROTREATED VEGETABLE OIL)

Hydrotreated Vegetable Oil (HVO) is a biofuel made by adding hydrogen to vegetable oil. HVO can be used in conventional diesel engines, either pure or blended with diesel. HVO is currently not available at motorway service stations but can be delivered in tanks of 1 000 to 3 6000 L. HVO is about 15%-20% more expensive than regular diesel.

		Comparison with Euro VI scenario
OPEX	MEDIUM	↑ 16 %
Availability of the technology	LOW	-
CO_2e reduction potential	HIGH	↓ 89 %

Action #9 – CNG & LNG

Natural gas offers clean combustion, low CO_2 emissions, and competitive fuel cost. Today Europe has about 4000 CNG stations and 430 LNG stations.

[41] European Automobile Manufacturers Association. (2018). Overview on Tax Incentives for Electric Vehicles in the EU. [Online]

		Comparison with Euro VI scenario	
		LNG	CNG
OPEX	LOW	↓ 32 %	↓ 25 %
Availability of the technology	LOW	-	-
CO_2e reduction potential	MEDIUM	↓ 9 %	↓ 16 %

Action #10 – BIO-CNG & BIO-LNG

Bio-LNG and bio-CNG are biofuels made by separating methane in organic waste. The energy density of bio-LNG/CNG makes these fuels suitable for long distances. Due to the large availability of industrial organic waste streams, the supply of bio-LNG/CNG is expected to increase in the coming years.

		Comparison with Euro VI scenario
		BIO-LNG
OPEX	LOW	↓ 8 %
Availability of the technology	LOW	-
CO_2e reduction potential	HIGH	↓ 64 %

Action #11 – AVERAGE ELECTRICITY MIX

The electricity needed to operate electric vehicles can be supplied by the regular electricity mix (i.e. through the grid). In Belgium, this mix consists of 40% nuclear, 30% gas, 15% renewables and 15% others (including imports). For the purpose of this assessment, electricity provision has been considered only for Belgium, based on the location of Group GTS' premises.

		Comparison with Euro VI scenario
OPEX	LOW	↓ 71 %
Availability of the technology	HIGH	-
CO_2e reduction potential	MEDIUM	↓ 29 %

Action #12 – RENEWABLES

The electricity needed to operate electric vehicles can be supplied via renewables (solar, wind, etc). However, consuming renewable energy costs more than using the average electricity supplied via the grid. Moreover, the question of availability and storage remains an issue, holding back renewables from large scale implementation.

		Comparison with Euro VI scenario
OPEX	MEDIUM	↓ 67 %
Availability of the technology	MEDIUM	-
CO_2e reduction potential	HIGH	↓ 98 %

Action #13 – GREY HYDROGEN

Grey is the most common form of hydrogen and is produced by separating hydrogen from carbon using natural gas or fossil fuels like oil and coal. The excess carbon generates CO_2 emissions, with around 9 kg of CO_2 for one kg of hydrogen produced. Grey hydrogen accounts for most of the production today.

		Comparison with Euro VI scenario
OPEX	MEDIUM	↑ 78 %
Availability of the technology	HIGH	-
CO_2e reduction potential	LOW	↓ 19 %

Action #14 – GREEN HYDROGEN

Green hydrogen is produced by water electrolysis using renewable electricity and is the cleanest form of hydrogen. The high cost of production is currently the main factor behind the low use of green hydrogen.

		Comparison with Euro VI scenario
OPEX	HIGH	↓ 24 %
Availability of the technology	LOW	-
CO_2e reduction potential	HIGH	↓ 93 %

3. Intermodal transport

Another lever for emissions reduction is the switch to intermodal transport. Intermodal transport refers to the use of more than one transportation mode to move a shipment between two points. Products stay in the same container but undergo various modes of transport throughout their journey. Switching to intermodal transport can involve rail freight as well as sea or waterway freight. As most of Group GTS' operations are in Europe, sea freight has been disregarded. Both alternatives, trains and barges, are explained below and compared with a 100% Euro VI trucks scenario.

Action #15 – RAIL FREIGHT

Rail freight transport is the use of railroads and trains to transport goods. Rail transport is known to be more cost and energy efficient than other means of transportation. Rail transport is however not as flexible as road transport. This solution is suitable for roughly 30% of Group GTS' container transport.

		Comparison with Euro VI scenario
OPEX	HIGH	-
Availability of the technology	HIGH	-
CO_2e reduction potential	HIGH	↓ 85 %

Action #16 – INLAND WATERWAY TRANSPORT

Sea and inland waterway freight use carrier ships and barges to transport containers. A 15-barge tow can move as much bulk freight as 870 trucks. Barges are therefore a cost-efficient way to transport high quantities over medium/long distances and to reduce shipping emissions. Shipment by water ways is however not as flexible as road transport. This solution is suitable for roughly 5% of Group GTS' container transport.

		Comparison with Euro VI scenario
OPEX	MEDIUM	-
Availability of the technology	HIGH	-
CO_2e reduction potential	HIGH	↓ 80 %

	Legislative context and subsidies
E.U.	Intermodal transport, also called "combined transport", is promoted within the European Union through the Combined Transport Directive (Council Directive 92/106/EEC). The Directive seeks to promote combined transport operations through the elimination of authorisation procedures and quantitative restrictions. This regulation also clarifies the non-application of road cabotage restrictions on road legs, and provides financial support through fiscal incentives for certain combined transport operations. To be eligible for the provisions within the CT Directive, the movement of goods must meet a number of specific criteria, such as type of load units and distances.[42] On August 19th, 2021, the European Commission unveiled the Inception Impact Assessment (IIA). This assessment sets out the scope within the amendment of the Combined Transport Directive is to be developed. Several measures are described in the IIA, including the extension of the scope of the Directive to all intermodal or multimodal transport operations that promise to save on externalities beyond a certain threshold when evaluating against road-only transport, using a common calculation method.

4. Behavioural measures

Lastly, the fourth category of reduction measures includes different behavioural changes that Group GTS can promote. These actions are listed below and compared to a baseline scenario in which these measures are not yet implemented.

[42] European Commission. (n.d.). Multimodal and combined transport. [Online]

Action #17 – SPEED LIMITER

Speed limiters are devices installed on trucks to control and limit the maximum driving speed of vehicles. Maintaining a lower, sustained speed (reducing the incidence of acceleration, deceleration, and braking) can help decrease emissions.

		Comparison with baseline scenario
CAPEX	LOW	↑ 100 %
Availability of the technology	HIGH	-
CO_2e reduction potential	LOW	↓ 2%

Action #18 – TIRE PRESSURE MONITORING SYSTEM

Tire Pressure Monitoring Systems (TPMS) alert drivers when tire pressure is too low using sensors located in the wheels. Properly inflated tires avoid unnecessary emissions through better fuel efficiency.

		Comparison with baseline scenario
CAPEX	LOW	↑ 100 %
Availability of the technology	HIGH	-
CO_2e reduction potential	LOW	↓ 0,3 %

Action #19 – EFFIENCY DRIVING TRAININGS

Offering "efficiency driving" or "eco-driving" courses is a cost-effective way of improving vehicle fuel economy and reducing CO_2 emissions. Research shows a general fuel saving after eco-driving training of between 5 to 8%.

		Comparison with baseline scenario
CAPEX	LOW	↑ 100 %
Availability of the technology	HIGH	-
CO_2e reduction potential	MEDIUM	↓ 5 - 8 %

Action #20 – INCREASING LOAD FACTOR

The load factor measures vehicle utilisation and is the ratio of the average load to total vehicle freight capacity. Given that no data was available regarding load factors, it was assumed that the trucks operated by Group GTS followed the average, set by DEFRA at 85%. An increase to 100% loaded trucks would take better advantage of Group GTS' capacity and will ultimately decrease the need for similar lanes. This measure is however subject to several constraints, including cabotage regulations and issues of back load availabilities.

Illustration

	Scenario A – Average load factor					
	Distance	**Capacity**	**Load factor**	**t.km**	**kgCO2e/t.km**	**Emissions (tCO_2e)**
Truck 1	11.860,00	20,00	85%	201.620,00	0,18142	36,58
Truck 2	18.000,00	20,00	85%	306.000,00	0,18142	55,51
Truck 3	12.000,00	20,00	85%	204.000,00	0,18142	37,01
Truck 4	15.850,00	20,00	85%	269.450,00	0,18142	48,88
Total	**57.710,00**			**981.070,00**		**177,99**

In scenario A, four trucks are needed to transport a total capacity of 981 070 t.km of goods, resulting in 178 tCO_2e.

	Scenario B – 100% load factor					
	Distance	**Capacity**	**Load factor**	**t.km**	**kgCO2e/t.km**	**Emissions (tCO_2e)**
Truck 1	11.860,00	20,00	100%	360.000,00	0,12009	43,23
Truck 2	18.000,00	20,00	100%	301.000,00	0,12009	36,15
Truck 3	12.000,00	20,00	100%	320.000,00	0,12009	38,43
Total	**49.050,00**			**981.000,00**		**117,81**

In scenario B, only three trucks are required to transport the same freight capacity, resulting in 118 tCO_2e instead of 178. Through this simplified example, one can easily observe how increasing the load factor not only reduces the total freight traffic, thereby leading to reduced congestion while also improving vehicle utilisation, but also helps decrease emissions.

		Comparison with baseline scenario
CAPEX	LOW	-
Availability of the technology	HIGH	-
CO_2e reduction potential	MEDIUM	↓ 34 %