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Introduction

The [PLATINA4Action](#) coordination and support project was initiated to support the IWT policy of the European Commission, notably supporting the evaluation of the NAIADES III activities. The project started in January 2024 and will continue until end of 2026.

One of the specific aims of PLATINA4Action is “*performing impact estimations of NAIADES III actions and supporting the policy discussions to achieve modal shift and zero-emission IWT*”.

Quantitative modelling together with qualitative assessment will therefore be conducted for different scenarios and options to assess the contributions on the (increase of) modal share by the NAIADES III measures and their effect on the reduction of emissions from the inland fleet. The findings will also feed the recommendations for the next policy period 2028-2035 for a successor of NAIADES III.

To determine the progress of the IWT sector, it is essential to assess the development of key performance indicators (KPIs) for the key objectives of NAIADES III: emission reduction of IWT and its modal share.

KPIs must have clearly defined targets within a specific timeframe or trajectory. By comparing target values with the anticipated KPI values under a 'Business As Usual' (BAU) scenario, it is possible to determine if the expected evolution of the values of KPIs meet the expectations and policy ambitions. If KPI targets are not met under the BAU scenario, interventions can be discussed to bridge the gap between the expected evolution in the BAU scenario and the set targets.

Therefore, the initial research activities in PLATINA4Action concern the identification of KPIs and the specification of quantitative targets for inland waterway transport. In this discussion paper we focus on defining the target values for KPIs describing the emission performance and the modal share of inland waterway transport in Europe. Such targets need to be defined according to the ‘SMART’ principle, which means that targets shall be ‘specific’, ‘measurable’, ‘achievable and agreed’, ‘relevant’ and ‘time bound’.

Within PLATINA4Action, already work was done to determine the relevant KPIs. Regarding the target values for these KPIs, policy documents provide directions but do not yet give direct answers on the question what the specific target values need to be and what the exact scope is. Policy documents do however give directions. Relevant documents are: the EU Green Deal, Sustainable and Smart Mobility Strategy, NAIADES III, EU Taxonomy, Renewable Energy Directive and the Emission Trading System. The following section will provide a more detailed explanation. It presents a summary of objectives and requirements from these documents in view of arriving at a set of target values for modal shift and reduction of emissions.

Policy context

[EU Green Deal and Sustainable and Smart Mobility Strategy](#)

The EU Green Deal (EGD) and the Sustainable and Smart Mobility Strategy (SSMS) “putting European transport on track for the future” provide the most recent overarching policy background. The European Green Deal marks that transport accounts for a quarter of the EU’s climate change emissions, and still growing. To achieve climate neutrality, a 90% reduction in transport emissions is needed by 2050. Road,

rail, aviation, and waterborne transport including IWT will all have to contribute to the reduction. Furthermore, an element of reducing climate change emissions is the modal shift ambition. The European Commission is emphasizing with regards to the transportation sector that “*substantial part of the 75% of inland freight carried today by road should shift onto rail and inland waterways*”.

A milestone defined in the SSMS is on shifting more activity towards more sustainable transport modes is “*Transport by inland waterways and short sea shipping will increase by 25% by 2030 and by 50% by 2050*”.

NAIADES III

NAIADES III focuses on two core objectives¹:

- 1) shifting more freight transport to inland waterways
- 2) setting the sector on an irreversible path to zero-emissions.

Under the header “*Transitioning to zero-emission inland waterway transport*” (section 2.2) the following is stated (quote) “*Despite its strong environmental record compared to other transport modes, it is nonetheless crucial that inland waterway transport quickly embarks on a pathway to zero greenhouse gas emissions by 2050, if it is to remain competitive and sustainable*”.

EU-Taxonomy – technical screening criteria for inland vessels

More specific targets for individual Inland Waterway Transport vessels can be derived from the latest updates to the EU Taxonomy. The EU Taxonomy targets individual vessels and does focus on the state-of-the-art technology. Thus, it does not emphasise on average performance, nor does it include efficiency criteria for inland vessels.

The EU Taxonomy aims for zero direct (tailpipe) CO₂ emissions. However, if achieving zero direct CO₂ emissions is not technologically and economically feasible, the EU Taxonomy refers to the methodology for calculating CO₂e/MJ values according to the FuelEU Maritime legislation. The criteria in the Taxonomy regulation² from year 2025 onwards, regarding the inland freight and passenger vessels, are as follows:

Time period (y)	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050
Gram CO ₂ e/MJ	76.4	61.1	45.8	30.6	15.3	0
Reduction compared to fossil diesel	20%	36%	52%	68%	84%	100%

The table above also presents what the relative reduction is in comparison with the gram CO₂e emission per MJ for fossil diesel. It needs to be stressed however that application of this gram CO₂e/MJ methodology is only applicable if achieving zero direct CO₂ emissions is technologically and economically unfeasible for vessels.

Regarding air pollutant emissions, it is defined in the criteria that engines in vessels need to comply with emission limits outlined in Annex II to Regulation (EU) 2016/1628. This includes vessels meeting those limits without type-approved solutions such as through after-treatment.

RED-III

Similar to FuelEU Maritime and, to some extent, the EU Taxonomy, the Renewable Energy Directive revision (RED-III) implementation includes a well-to-wake approach based on the CO₂equivalent emissions, expressed in grams CO₂e per energy content unit (MJ). In case the Member State follows this well-to-wake approach, the reduction target for transport to be achieved on national level shall be 14.5% by the year 2030

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0324>

² https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302485

compared to average carbon intensity in the base year 2010. This concerns the CO₂e reduction in grams per MJ of energy supplied to the transport market, without limiting the total volume of energy supplied or the overall volume of CO₂ equivalent emissions. However, also another approach is possible for implementing RED-III on member state level. This 2nd approach focuses on the share of renewable fuels in the total fuel mix, which must be at least 29% in 2030. Additionally, multipliers can be taken into account for certain types of energy and applications.

ETS

The ETS (Emissions Trading System) approach is different. It does set clear limits on the absolute overall CO₂ emissions (capping the emissions). It establishes a cap that gradually decreases over time, ensuring that emission reductions are achieved also in absolute terms (e.g. megatons of CO₂ emitted).

The ETS2 approach considers tank-to-wake emissions and treats all renewable fuels as CO₂ neutral, regardless of their well-to-tank emissions as it follows the IPCC method for national accounting of CO₂ emissions in transport³. The well to-tank emissions are covered by the industrial sector producing the energy or fuel while the RED also sets clear requirements on the fuel production (e.g. type of feedstocks) to address the well-to-tank emissions.

As a new element in the revised ETS directive under Fit-for-55, the fuel supply to Inland Waterway Transport can optionally be placed under the ETS2 as an opt-in. The opt-in means that member states can decide for themselves whether or not to expand ETS2 to fuel supply to other sectors which fall under the scope of the Effort Sharing Regulation (ESR) and for which there are binding national CO₂e reduction targets in place. IWT is one of these sectors covered under the ESR.

ETS2 is the new system which will be obligatory for fuel supply for road transport in Europe. This ETS2 is placed next to the existing ETS. This new ETS2 system is designed in a way that by 2044 no new emission rights will be auctioned. This basically means that under ETS2 fossil fuels will be phased out by 2044 in those sectors which are covered in ETS2, including those which have been added as an opt-in by member states. Thus only renewable fuels can be used or fuels or energy without CO₂ tailpipe emissions. For example biofuels, e-fuels, hydrogen or electricity would still be possible after 2044 to be supplied under ETS2.

Concluding from policy and legislative documents

There are different policy documents which present ambitions, objectives and goals regarding modal share and emissions. However, in many cases they are not specific for inland waterway transport. Moreover, targets lack clarity regarding their exact scope. Below we zoom in on the targets for Modal shift and emissions respectively.

Summarising for the modal shift targets

Two references are made:

- 1. “substantial part of the 75% of inland freight carried today by road should shift onto rail and inland waterways”.
- 2. “Transport by inland waterways and short sea shipping will increase by 25% by 2030 and by 50% by 2050”.

It can be concluded that these are not specific and dedicated to inland waterway transport. With respect to the first reference, it remains unclear what ‘substantial part’ means. And it is also unclear what part of freight carried by road should move to rail and what part should move to inland waterways?

³ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02003L0087-20240301>

Annex III of ETS2 Article 30f referring to the IPCC 2006 guidelines for national greenhouse gas inventories .

For the second reference, regarding increase of short sea shipping (SSS) and a shift to inland waterways transport (IWT), the question is how this shall be divided between SSS and IWT?

Additionally, various metrics can measure a rise in transportation services. The increase is typically quantified using the widely recognised tonne-kilometres (tkm) to indicate transport performance.

Next to this, the increase in the modal share is a relative change, but it is unclear what the reference period is and what data and scope is applied. Therefore, it is unclear what exactly is expected from IWT in terms of the quantitative contributions to these modal shift and to the transport growth ambitions which are mentioned in the EGD and the SSMS policy documents.

It needs therefore to be assessed what increase of IWT can reasonably be expected, taking into account different scenarios and to work with a first set of targets. As a starting point, PLATINA4Action proposes to initially define the modal shift target as follows with assuming 2021 as base year since this is also the starting year of the NAIADES III programme:

The modal share of inland waterway transport shall increase by 25% by 2030 and by 50% by 2050, that is, 5.0% and 6.0% modal share respectively, calculated in ton-kilometres (tkm) compared to the base year 2021 (modal share was 4.0%).

Summarising for the zero-emission objective

Following the IPCC global warming mitigation agreements and the translations into the EU Green Deal and the Smart Sustainable Mobility Strategy, the NAIADES III clearly mentions “...zero greenhouse gas emissions by 2050”. This gives a specific quantitative target (zero GHG emissions) for a specific time horizon (2050). This is a major reference for PLATINA4Action for the policy evaluation and policy recommendation work to be done in.

Although not explicitly stated whether this pertains to the well-to-wake or tank-to-wake scope, it is reasonable to assume that the well-to-wake approach is the logical choice for the 2050 target. This assumption aligns with the focus of NAIADES III on CO₂ emissions from transportation operations. Additionally, emissions from the well-to-tank energy supply for the IWT sector are already addressed by other EU policies, such as RED-III, EU Taxonomy, and the ETS (for example, electricity production). This approach complements the broader objectives of the EU Green Deal.

The EU Taxonomy criteria for inland vessels define that by 2050 either the vessels need to be zero-emission tailpipe or well-to-wake CO₂ emissions need to be zero by 2050 for vessels which comply with Taxonomy criteria. However, it is not prescribed that the whole fleet will be EU Taxonomy proof by 2050 since EU Taxonomy addresses individual vessels.

A pertinent question is if a trajectory to 2050 should be adopted and if yes, what greenhouse gas emission reduction targets should be set for example for the years 2030 and 2040?

Furthermore, the NAIADES III communication lacks definitive targets for air pollutant emissions like NO_x and particulate matter. The following question can therefore be raised: Is the current legalisation NRMM Stage V sufficient to cap such air pollutant emissions over the next decades, or is a revision needed (e.g. NRMM Stage VI) to implement more strict limits for air pollutant emissions? And what levels of air pollutant emissions could be set as targets for 2030, 2040, 2050? Here also the development of emission reduction of road haulage may play a role, seen the motivation for the modal shift ambitions to reduce external costs by modal shift.

In the context of the NAIADES target for 2050, it can be remarked that ETS2 opt-in implementation for IWT by member states can already lead to zero greenhouse emissions by 2044 seen from the tank-to-wake perspective according to the IPCC methods for national accounting. If all countries apply this for IWT (such as planned by The Netherlands) the NAIADES III target can already be reached in the business as usual (BAU)

scenario by 2045. It must be stressed however, that it is optional for Member States to decide whether to apply the ETS2 opt-in also to fuel supply for inland navigation or not. It is yet uncertain if this will take place and therefore what exactly to take into account in the BAU scenario.

The Renewable Energy Directive (RED-III) however, does address the well-to-tank emission performance and RED-III also regulates the feedstocks used to produce fuels. As a result, RED-III can be seen as complementary to ETS2. A limitation of RED-III is however that the path is defined until the year 2030, but it is not defined how it will further develop from 2030 towards 2050. Moreover, it is yet unclear how member states will exactly transpose the RED-III into national law, for example if they will set more specific requirements to fuel supply in IWT or not? This also leaves food for discussion and open questions to define the BAU scenario.

Other factors to be taken into account

It shall be kept in mind that the growth of demand for inland transport, for example as result of modal shift, or resulting from unlocking of new markets and commodities, are factors which may lead to increase of energy consumption and related emissions of the inland fleet. On the other hand, also freight demand from traditional industries and commodities (e.g. ore, coal, oil) may reduce which gives a reduction of transport demand and emissions.

After taking into account these evolutions, the transport volume of IWT can be compared with the expected transport volume or transport performance (tkm) of road and rail. Next the modal share can be determined for the BAU scenarios and for the scenario including the 35 NAI4DES III measures. This will be the basis for discussion what realistic and achievable targets may be for modal share of IWT in 2030, 2040 and 2050.

Regarding the emissions, also the efficiency of transport plays a role. In this respect, unfavourable impacts may be expected from the increase of low water periods as result of climate change which reduces the transport efficiency of IWT and increases the relative energy consumption and related emissions.

However, there are also positive factors and opportunities which reduce energy consumption of IWT. Examples are energy efficiency gains resulting from logistic optimisations, use of modern right-sized propulsion systems, economies of scale (larger/longer vessels) and other efficiency measures such as the improvement of the vessels' hydrodynamics or smart navigation.

It needs to be seen what the impact will be from the quantitative forecasts for the freight demand developments taking into account the developments in different market segments of IWT and also the developments in other modes. Furthermore, the impact of climate change and efficiency measures will be relevant to take into account for the estimation of required energy for IWT and the related emissions.

Preliminary set of targets to be considered for IWT within PLATINA4Action

This section presents the view of the PLATINA4Action consortium for a first set of targets to be applied in the work of PLATINA4Action. It is a first and tentative definition which can be revised later, also based on the findings regarding the feasibility. For example, it may turn out that targets are unrealistic or not ambitious enough. This shall be seen based on the outcomes of the BAU scenario and the analyses to be made in PLATINA4Action in the years 2025 and 2026.

Time horizon

As regards the time horizon for the targets we propose the following years to align with the set-up of the Digital Twin model being developed in PLATINA4Action:

- 2030
- 2040

- 2050

KPI targets GHG emissions following the TTW IPCC scope:

- 2030: 15% reduction in overall tons emissions compared to 2015
- 2040: 50% reduction in overall tons emissions compared to 2015
- 2050: 100% reduction in overall tons emissions compared to 2015, achieving zero greenhouse gas emission according to NAIADES III.

KPI targets air pollution performance, in particular NOx and PM emissions

- 2030: 30% reduction (in absolute tons emitted) compared to 2015
- 2040: 50% reduction (in absolute tons emitted) compared to 2015
- 2050: 90% reduction (in absolute tons emitted) compared to 2015

KPI targets modal share of IWT

It first needs to be evaluated:

- 1. Into what extent can an absolute growth of inland waterway transport of 25% by 2030 and 50% by 2050 realistically be expected from IWT (tkm) and what is the relative growth compared to other modes under different scenarios?
- 2. Which share of road transport can realistically be shifted to IWT on EU level? Is a modal share of 5.0% or 6.0% feasible on EU level (tkm)?

Within the PLATINA4Action project, research will be done how the targets relate to the 'Business As Usual scenario' with respect to the emissions. For different settings (a negative, moderate and positive scenario) it will be analysed what the gap is between the BAU scenarios and the targets.

Important will be to analyse how transport volume and modal share of IWT evolves under the different settings. Next a discussion can be started about the targets for modal share of IWT in 2030, 2040 and 2050.

Subsequently, it can be assessed what measures could be considered to close the gap and to reach the targets. An iterative process may be applied to arrive by the year 2026 at a final set of targets and a package of measures to be recommended for the next policy period (2028-2035).