

MAGPIE

SMART GREEN PORTS

Work Package 7

Deliverable 7.3

Selection of Non-Tech Solutions

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Funded by
the European Union

This project has received funding from the European Union's Horizon 2020 (MFF 2014-2020) research and innovation programme under Grant Agreement 101036594

D7.3 SELECTION OF NON-TECH SOLUTIONS

GRANT AGREEMENT NO.	774253
START DATE OF PROJECT	1 November 2017
DURATION OF THE PROJECT	36 months
DELIVERABLE NUMBER	D7.3
DELIVERABLE LEADER	Larissa van der Lugt
DISSEMINATION LEVEL	PU
STATUS	V1.0
SUBMISSION DATE	15-11-2022
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774253.

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Modification Control

VERSION #	DATE	AUTHOR	ORGANISATION
V0.1	05-10-2022	L. van Son	Erasmus UPT
V0.2	21-10-2022	L. van Son	Erasmus UPT
V0.3	23-10-2022	L.M. van der Lugt	Erasmus UPT
V1.0	14-11-2022	L.M. van der Lugt	Erasmus UPT

Release Approval

NAME	ROLE	DATE
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Felipe Ferrari	Peer reviewer	13-10-2022
Govert Wagenaar	Peer reviewer	17-10-2022
Maarten Flikkema	Scientific Coordinator	15-11-2022

History of Changes

SECTION, NUMBER	PAGE	CHANGE MADE	DATE
			DD-MM-YYYY
			DD-MM-YYYY
			DD-MM-YYYY
			DD-MM-YYYY

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Executive Summary

The goal of Work Package 7 (WP7) within the MAGPIE project is to develop and demonstrate non-technological solutions that enable and accelerate the implementation of low or zero-emission technological and logistical solutions in the context of the port. The aim of this report is to present a qualified shortlist of non-technological solutions that will be designed and implemented by partners of Work Package 7. The report puts forth two non-technological solutions to be developed in the next stage of the Work Package 7's involvement in the MAGPIE project, shown in highlights in Table 1.

Table 1: Selection of Non-Technological Solutions

#	Non-technological solutions
1	Price Differentiation
2	Green Corridors
3	Operational Rules / guidelines
4	Voluntary agreements / Green certification
5	Regulatory experimentation
6	Targeted information schemes
7	Consensus tooling/consensus building
8	(Governance models for) Data sharing platforms
9	Cost/risk mitigation & split incentive alignment frameworks

The report established the two non-tech solutions, *price differentiation* and *Green Corridors*, with which WP7 will begin. Beyond the two mentioned non-tech solutions, WP7 established a tentative selection of a further seven non-tech solutions to be developed on an organic basis.

The progress towards this selection is described in the following sections, with particular attention given to the development of a set of selection criteria. The development of the selection criteria drew upon an interactive approach between the core research team and the active participation of the Work Package 7 partners. This selection process was qualified with a reflection on how the strategic priorities of this deliverable shifted from producing a shallow list of seven non-tech solutions to an initial two solutions.

The key conclusions of the report were in establishing the scope and ambition of WP7's solution development process. This ambition was limited to aiming to contribute feasibility and impact analyses for relevant parties and initiatives. Regarding the phased approach to the solution selection and development, this decision was made with the highly fluid nature of the energy transition in the port context in mind. The learning process is a crucial element of solution development, and thus this WP7 will seek to take learning on board.

1. Introduction

The MAGPIE project is an international collaboration working on demonstrating technical, operational, and procedural energy supply and digital solutions in a living lab environment to stimulate green, smart and integrated multimodal transport and ensure roll-out through the European Green Port of the Future Master Plan and dissemination and exploitation activities. The consortium, coordinated by the Port of Rotterdam, consists of 3 other ports (DeltaPort, Sines and HAROPA), 9 research institutes and universities, 32 private companies, and 4 other organisations. The project is divided in 10 main work packages which include energy supply chains, digital tools, 10 demonstrators for maritime, inland water, road, and rail transport, non-technological innovations and the development of a Masterplan for European Green ports.

1.1 Report Aims

The goal of Work Package 7 (WP7) within the MAGPIE project is to develop and demonstrate non-technological solutions that enable and accelerate the implementation of low or zero-emission technological and logistical solutions in the context of the port. The aim of this report is to present a qualified shortlist of non-technological solutions that will be designed and implemented by partners of Work Package 7.¹

The progress towards this selection is described in the following sections, with particular attention given to the development of a set of selection criteria. The development of the selection criteria drew upon an interactive approach between the core research team and the active participation of the Work Package 7 partners. The interactive approach enabled strategic priorities to be determined, which were then reflected in the selection process and choice of non-technological solutions.

Structured as follows, the report first situates the selection of the non-technological solutions in the context of the initiation phase of Work Package 7 in the MAGPIE project, entitled, "Task 7.1: Identification and selection of most impacting and promising non-tech innovations (M1-M12)". Section one takes care to establish that the results of this report have been built on previous deliverables. Section two introduces the methodology applied to devising robust and targeted selection criteria and elaborates on how the selection was made through a collaborative survey. Section three discusses the results of the selection process. This report

¹ Partners of Work Package 7 are as noted: Port of Rotterdam, Port of Sines, HAROPA Port, DeltaPort, Rotterdam School of Management Erasmus University (EUR RSM), Erasmus Centre for Urban Port and Transport Economics (Erasmus UPT), Delft University of Technology (TUD), Institute of Energy Economics at the University of Cologne (EWI), GoodFuels, INESC TEC - Institute for Systems and Computer Engineering, Technology and Science, Planco Consulting, and Netherlands Organisation for Applied Scientific Research (TNO).

ends with a short conclusion, and briefly outlines steps to be taken in the next phase of WP7's involvement in MAGPIE.

1.2 Background of Report D7.3

This report, alongside report D7.4, must be understood as the culmination of a series of preparatory subtasks undertaken over the first twelve months of the MAGPIE project. This initiation phase is entitled *Task 7.1 Identification and selection of most impacting and promising non-tech innovations* and it covers four deliverables shown in Figure 1. Each deliverable represents an important step towards Task 7.2, eventual development of the non-technological solutions which will follow in the period from the publication of this report. As such, the following subsection elaborates on the process to date.

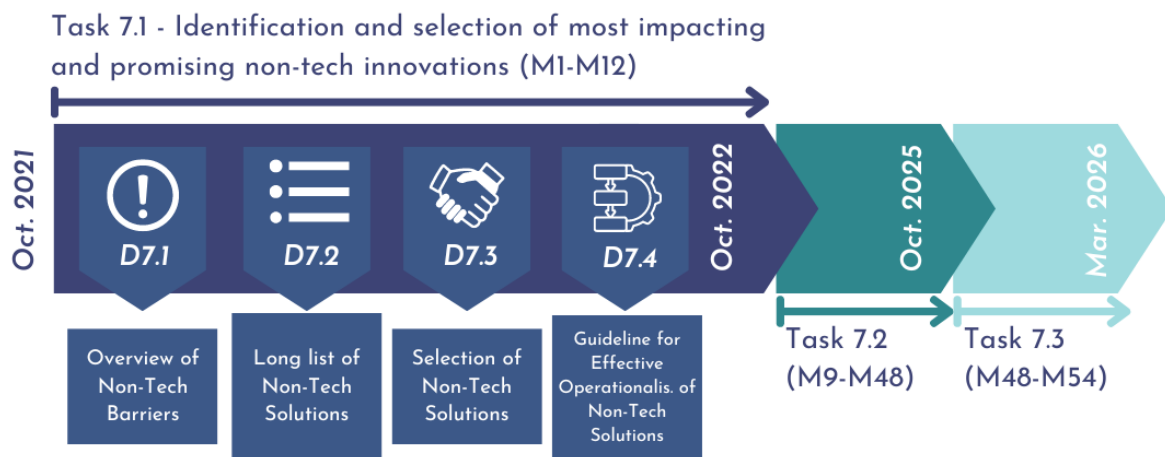


Figure 1: Deliverables for Task 7.1 "Identification and selection of most impacting and promising non-tech innovations (M1-M12)" of Work Package 7

D7.1 Innovation Barriers

The first subtask undertaken by Work Package 7 was the discovery and evaluation of innovation barriers in the transport sector. Titled Deliverable 7.1 "Identification of Innovation Barriers" (Report D7.1), the first report gathers, structures, and discusses the barriers related to the implementation of zero-emission solutions. The research limited its scope to assess innovation barriers experienced by stakeholders across road, rail, inland and seagoing transport, where these modalities share interfaces with the port context. A barrier is defined as a factor 'limiting the ability to perform the innovation process, due to the absence or lacking capability of one of the stakeholders, institutions, infrastructure or interactions.'

A series of interviews, buttressed by a structured literature review, resulted in a set of modality-bound innovation barriers. A more complete analysis of the results can be found in

report D7.1. For the purpose of this report, it suffices to establish the main barriers shared across the modalities, shown in Table 2. From these main barriers, report D7.1 separates the non-technological barriers from the purely technological barriers.

Technological barriers identified in the research, such as those related to infrastructure and technology, are addressed in the technology demonstrations of other Work Packages in the project and will thus not be directly addressed in WP7. WP7 recognizes the impact that tech barriers can have on the development of non-tech solutions. Infrastructural and technological limitations will to a certain extent limit what non-tech solutions can and will be considered. For this reason, WP7 will continue to monitor tech barriers, and their corresponding solutions, through contact with the demonstrators in other Work Packages.

Table 2: Innovation barriers in the port and transport sector

	#	Barrier Type	Illustrative barrier example
Non-tech	1	Economics	Lack of business case
	2	Knowledge	Lack of adequate models describing multimodal dependencies
	3	Standards & Regulation	Lack of non-fossil fuel standards
	4	Interaction	Lack of trust between stakeholders
	5	Directionality	Lack of clear emission reduction goals
Tech	6	Technology	Immature technology
	7	Infrastructure	Absence of sustainable energy infrastructure

Among the non-tech barriers, *economics*, e.g. *lack of business case*, is mentioned most often across all the modalities included in the research scope. The research noted a dire lack of business case for commercial actors to invest in emission reduction technology. To add, the innovation barriers shown in Table 2 are not isolated from one another. In fact, report D7.1 has come to understand the *economics* barrier to innovation as the sum of most, barriers identified in the research. To clarify, barriers such as uncertain policy orientations (*directionality*), insufficient regulation (*standards & regulation*), or lack of trust between stakeholders (*interaction*), create unfavorable economic conditions (uncertainty) that disincentivize or prevent the scale-up/commercialization of new zero-emission technologies. Besides this, barriers in terms of regulation or lack of knowledge may delay the uptake of certain technological innovations and solutions. A conclusion drawn from this is that all barriers must be considered when tackling the most prominent, that being *economics*.

D7.2 Identifying a long list of solutions for the barriers

The second subtask of Task 7.1 ventured to compile a long list of potential non-tech solutions from which an eventual selection can be made for further development. Deliverable 7.2,

“*Long list of Non-technological Solutions*” (Report D7.2) offers a structured identification of potential non-tech solutions organized by type and domain. Three non-technological solution ‘clusters’ are proposed, ensuring the necessary breadth of scope to tackle the innovation barriers identified in report D7.1 and to prevent omissions. It should be noted that the solutions proposed in these clusters are diverse, can overlap, and can address multiple barriers. The clusters are shown in Table 3, along with the main barrier addressed.

Table 3 Non-tech solution types organized by cluster

Cluster	Type of solutions	Main barrier addressed
Policy Solution	Market Intervention	Economics
	Regulation & Norm creation	Standards & regulation
	Market Formation	Directionality
	Regulation & Legislation on safety	Standards & regulation
Business Concept	Burden/price sharing mechanisms	Economics
	Platform models	Interaction
	(Green) Certification	Interaction
	Market restructuring (consolidation)	Economics
Information provision & quality	Knowledge transfer & diffusion	Knowledge
	Skills & expertise development	Knowledge
	Quality provision of knowledge	Knowledge

The three clusters, *Policy solutions*, *business concepts*, and *information provision & quality*, ensure that the longlist of non-tech solutions is organized and manageable. Their function is to group the specific non-tech solutions of varying conceptual levels, implementation levels, maturity, targeted barriers, under recognizable themes. Each cluster is briefly defined as follows.

Solutions under *policy solutions* support the creation of a policy regime that stimulates and facilitates both the development and broad implementation of sustainable innovations in the transport sector. These solutions comprise a long-term and consistent framework of policy that advances a sustainable public good through market creation and guidance, institutional support, and financial instruments.

Solutions under *business concepts* stimulate sustainable innovations across value chains through mutual value creation opportunities between stakeholders that reduce transaction costs. Mutual value creation refers to beneficial cooperation, sustainable transactions, reducing (investment) uncertainty, bringing trust, bringing transparency and institutionalization.

Solutions under *information provision & quality* refer to solutions that seek to overcome information gaps, create public awareness about a novel technology, and develop a cadre of new expertise.

The longlist was compiled through two mutually reinforcing approaches. The first approach employed a literature review, making use of academic, peer-reviewed articles as well as reports and industrial studies. The second approach consisted of a survey of members and participants of WP7. For more detail on the longlist and the solutions, refer to report D7.2.

Steps have been taken since the publication of report D7.2 in June 2022 to evaluate the longlist. Supplementary detail has been added to specific solutions, including examples of solutions in practice, with the aim to strengthen both the longlist and the proceeding selection process. This supplementary attention to the longlist beyond the publication of report D7.2 was an important process in the evaluation of the longlist. The process allowed the research team to reflect on practical considerations regarding the selection of both impactful and feasible non-tech solutions for further development.

2. Methodology for the preliminary selection of non-tech solutions

This report is the logical progression from the two previous deliverables that are described in section 1.2. The next section describes the process leading to the selection of two non-tech solutions with a further shortlist of seven tentatively selected for additional scrutiny. The section is structured as follows; subsection 2.1 describes the development of the selection criteria and subsection 2.2 describes the selection process.

2.1 Selection Criteria

The development of the selection criteria for the non-tech solutions was a process undertaken by the core research team in consultation with WP7 members.²

The formulation of the initial criteria was done in tandem with the compilation of the longlist of solutions (report D7.2). Following the *problem definition* carried out in the identification of the barriers, the core research team could begin to define the desired scope and traits of a successfully implemented solution.³ Through a brainstorm process, the authors of this report listed four basic, tentative factors on which the initial criteria would be formed. These are listed as follows:

- The impact of the solution in the context of the energy transition
- The coverage and scope of the solution to address barriers across the modalities
- The feasibility of the assessment of the solution in a pilot setting
- The scalability of the solutions to other ports, modalities, and other sectors

Feedback on the criteria was iterative, given over a course of meetings in June, August, and September of 2022.⁴ Feedback from the core research team identified problems with the clarity of the factors. First, an objective reference point for determining impact was not defined. Second, it was unclear if coverage referred to a solution's direct applicability to a barrier. If so, this could be seen as a measure of impact. Third, questions on feasibility of a pilot-alike assessment depended which stakeholder could implement the solution. This had not yet been determined. Fourth, conceptual overlap between scalability and coverage led

² Partners of Work Package 7 are as noted: Port of Rotterdam, Port of Sines, HAROPA Port, DeltaPort, Rotterdam School of Management Erasmus University (EUR RSM), Erasmus Centre for Urban Port and Transport Economics (Erasmus UPT), Delft University of Technology (TUD), Institute of Energy Economics at the University of Cologne (EWI), GoodFuels, INESC TEC - Institute for Systems and Computer Engineering, Technology and Science, Planco Consulting, and Netherlands Organisation for Applied Scientific Research (TNO).

³ Scott R. Furlong and Michael E. Kraft, *Public Policy: Politics, Analysis, and Alternatives*, 7d ed. Sage Publishing, 2020)

⁴ The relevant meetings took place on June 15th, August 16th, September 1st, and September 2nd.

to confusion. Several iterations of the selection criteria were devised as priorities were reformulated, the understanding of the longlist (report D7.2) was sharpened, and certain critical reference points were defined (see section 3.2 for discussion on reference points). A notable result of the consultations with WP7 members was in aligning expectations of what is feasible, what constitutes impact, and how the element of time should be considered and included in the selection process. Careful inspection of the initial criteria resulted in the definition of WP7’s priorities for the selection process. It was determined that the selection criteria should be limited to three questions on the following factors:

- *Feasibility*: Can the non-tech measure be implemented by the stakeholders within the port community?
- *Impact*: In what way does the measure tackle an innovation barrier? Directly, indirectly, or impact on multiple barriers?
- *Timeframe*: What is the expected timeframe needed to realize the implementation of the solution?

Feasibility	Impact	Timeframe
<p>The port community's capacity, or leverage, to implement a given solution.</p> <p>E.g., <i>taxes</i> are low feasibility solutions since the port can only lobby policy makers to implement them.</p>	<p>The degree to which a given solution will tackle a major barrier identified in previous deliverables.</p> <p>Impact is seen as either direct or indirect on one or multiple barriers.</p>	<p>The expected timeframe needed to realize the solution's implementation.</p> <p>Timeframes are 2026, 2030, 2040, or 2050.</p>

Figure 2: Finalized Selection Criteria

The three basic criteria are shown in Figure 2. All three criteria will be applied to assess each of the solutions for each of the individual modalities separately. An estimation of the expected timeframe for potential development and implementation is included.

2.2 Selection Process

Upon finalizing the criteria, the selection of the non-tech solutions was made in consultation with the WP7 partners. The selection process was interactive, built on an approach that consisted of a survey completed by the WP7 partner organizations and institutions, followed by a discussion of the results in a workshop setting on the 15th of September.

Desired result of the selection process

The desired result of the selection process was a set of two non-tech solutions that will begin development with immediate effect. A further preliminary selection of an additional six to

eight solutions will be made based on the results of the selection process. This additional six to eight solutions were tentatively selected both due to their promising characteristics and to fulfill the requirement of a shortlist. These additional solutions are not definite; instead, they have been earmarked for further consideration as part of the phased approach of the solutions’ development in Task 7.2.

The choice for these additional solutions will be made on an ad hoc basis depending on two different variables. First variable is the success of a given non-tech solution which might have broader applicability. The second is the emergence of barriers that are discovered, or encountered, when implementing a non-tech solution. WP7 aims to develop a new set of two solutions roughly every nine months.

Given the fluid and complex context to which these solutions will be applied, the framework for choosing the next solutions is equally adaptive. WP7 foresees that the choice of the next solution will depend on the learnings developed in the implementation process of (previous) non-tech solutions. As such, the evaluation guideline, developed in Deliverable 7.4, will be relied upon to inform the decision on the additional solutions. Furthermore, a similar process of consultation with the WP7 members will be undertaken when choosing the next solutions.

Survey

The survey was conducted using an Excel spreadsheet containing direct questions pertaining to a solution’s *Feasibility, Impact, and Timeframe*. These direct questions were repeated for each of the modalities per solution. The survey the modified longlist of potential solution identified in report D7.2. A total of 25 solutions (see Annex 1: ‘*Selection Support Tool for Non-Tech Solutions*’).

To ensure homogeneity of the results, the answers for each question are standardized and can be selected in the dropdown menu. Similarly, the questions do not vary per modality, owing to the criteria having been simplified and aligned to reflect the strategic priorities. This also ensures the homogeneity of the answers to the questions across all the modalities. The questions and the answers are shown in Table 4 below.

Table 4: Survey questions and standard answers

Survey Questions	Standard Answers
What is the port's leverage to establish the solution?	Low, Medium, High
Does it tackle a specific barrier	Directly, Indirectly, Multiple, or None
Can it be realized before:	2026, 2030, 2040, 2050.

The survey was sent by email to each organization participating in WP7, a total of 11 organizations have given their input.

Consultations

The responses to the survey were compiled and the performance of each measure was tallied in a separate excel spreadsheet (see Annex 2: 'Selection Support Tool Tallied'). A work session was held to discuss the results of the survey in open dialogue, allowing for amendments, additions, and debate about the solutions on the shortlist. Initially the aim was to select 8 non-tech solutions for further assessment. In comparing the results and the discussion in the work session it came out that nine solutions scored substantially better. In previous discussions it already was decided that the outcome of the selection process should not be set in stone as we now enter a period of four years in which the solutions are partially in sequence tackled and along this period changes can occur. Therewith the actual selection can still be altered slightly, of course only based upon new grounded insights and well executed assessment. But, decision was taken to now mention these nine solutions in the shortlist. Thus, the work session ensured that there was agreement among the WP7 partners on which of the non-tech solutions to highlight for immediate development and which of the non-tech solutions would be included in the extended preliminary selection.

3. Results and Discussion

3.1 Results of the selection process

The results of the selection process are shown in Table 5. The table shows a series of nine non-tech solutions, of which two are highlighted: *price differentiation* and *green corridors*.

Table 5 : Selection of Non-Technological Solutions

#	Non-technological solutions	
1	Price Differentiation	Adjustment of pricing schemes to incentivize transitional behavior, e.g., port dues based on associated emissions/propulsion technology
2	Green Corridors	Deliberately defined and institutionally supported transport corridors that accelerate and showcase use of low-emission fuels and technologies, e.g., a just signed MoU between Rotterdam and Singapore
3	Operational Rules/guidelines	Order & control instrument: Speed restriction on different transport modalities
4	Voluntary agreements/Green certification	Voluntary used or governmental pushed certification (block chain based) of green or carbon neutral products and support by trusted technologies, e.g., GoodFuels or certify for green hydrogen
5	Regulatory experimentation	Allowing port parties to conduct live experiments in a controlled environment under the supervision of the regulator, e.g., EU sandbox to explore new AI regulation
6	Targeted information schemes	Publish information schemes for a specific target group, e.g., a white paper series for policy makers
7	Consensus tooling/consensus building	Tools that support finding consensus between port parties
8	(Governance models for) Data sharing platforms	Governance framework for digital services in the port context, e.g., for data safety, fair business outcomes
9	Cost/risk mitigation & split incentive alignment frameworks	Risk sharing frameworks, e.g., start-up financing (green bond markets), financial guarantees for 'stranded assets', Contracts for Difference, Standardized long-term contracts for Renewable Energy Solutions (RES) investments between generators and consumers.

The selection process drew upon input from the WP7 partners on in the workshop on the 15th of September. As such, the preliminary selection of the solutions shown in Table 5 differs from the tallied results of the survey. This discrepancy can be explained by the changes and amendments proposed in the work session by the WP7 members. One result is the inclusion

of the *cost/risk mitigation* solution, which expanded the preliminary selection to a total of nine solutions instead of eight.

The two solutions selected for the first in-depth further assessment

The two highlighted non-tech solutions are the solutions that WP7 will begin developing with immediate effect. Though this will entail further planning, the development trajectory of these two non-tech solutions will begin with an exploratory study to create an overview of existing initiatives, establish potential external partners for contact, and investigate pitfalls and issues experienced by the initiatives.

Given the novelty of Green Corridors, this exploratory study will focus more on investigating how, and if, WP7 can contribute to ongoing initiatives.

For price differentiation, the exploratory study will have more extant information to examine. The goal of the exploratory study of price differentiation will likely be to find potential points of friction in its implementation in a certain context - specifically, in inland shipping - and seek to find mutually reinforcing mechanisms to extend its efficacy.

This process will be guided by the guideline and evaluation framework developed in Deliverable 7.4. The exploratory study will seek to establish important baseline information on aims of the solutions, who the important stakeholders are, what the interests of stakeholders are, and what or where knowledge-gaps extant initiatives exist. The two core research teams have been set up to approach the exploratory study for the two respective solutions.

The subsequent stages of the solutions' development are listed as follows: a design and execution phase will establish how the solutions will be implemented and evaluated. This phase will be reinforced by the evaluation process that will run parallel to the solution's development. Finally, further insights and ways forward will be divined - including the selection of the next solutions to be developed. Though the exact timeline for each stage is yet to be set in stone in the baseline information phase, the development of the first two non-tech solutions, and each set of non-tech solutions thereafter, will take roughly nine months. For more information on the guideline and evaluation framework, please see Deliverable 7.4.

The shortlist: a provisional set of solutions

The provisional set consist of the bottom seven non-tech solutions in Table 5. These seven non-tech solutions represent possible solutions for further consideration at a later stage or following the successful development of solutions one (*price* differentiation) and two (*Green Corridors*). The provisional set is earmarked due to its acknowledged potential, according to the survey results and workshop discussions.

WP7 maintains the position that the solutions should be developed in a phased approach, beginning with the most promising solutions, for several reasons. First, a phased approach ensures that WP7 benefits from the learning gained from each development process. A second, related reason is that non-tech solutions are not isolated solutions, and therefore cannot be implemented individually. There is considerable potential for overlap, for instance, between Green Corridors and price differentiation. Not to mention, there is an inherent uncertainty over how the implementation of a non-tech measure will impact the port ecosystem, the different sectors that operate in it, and thus the types of innovation barriers that can arise. An integrative, organic approach that begins with two non-tech solutions will give the solution development team the necessary flexibility to adjust, learn, and address new problems as they arise.

The process towards the selection of the additional measures will follow the suggestions and learnings taken from the evaluation framework developed in Deliverable 7.4. Based on this evaluation, the choice for the next solutions will be made in consultation with WP7 partners. The timeline for the development for all eight solutions is 36 months from October 2022 to October 2025. WP7 will allocate approximately nine months for the development of two solutions to ensure that a set of eight can be developed within the 36 months. Hence, the decisions regarding the next solutions will follow a similar timeline, i.e., towards the end of the nine-month period.

3.2 Discussion of the results

The design of the selection criteria and selection of the solutions was a consultative process done with input from the WP7 partners. Several points of discussion arose out of the various consultations among the core research team and with the general WP7 group of partners naturally impacted the design of the selection criteria and influenced the selection of the non-tech solutions.

In particular, the discussion over the results during the work session on the 15th of September raised several issues about the ambition, choice, and process of selection. The issues listed below are elaborated on in the following section.

- How do we approach the results of the survey?
- What can/should be our ambition within WP 7?
- What is the scope of the solutions?
- What were main results from identification of barriers?

Discussion on results of survey

The survey produced a total of six responses out of the 11 organizations approached. The results were not unanimous across the survey results. Due to the variety of organizations in

the pool, (ports, universities, a sustainable bunker fuel retailer, and an independent research organization) the areas of expertise represented in the survey differed. This led to several varied responses on the modalities covered and in the relative appraisal of the non-tech solutions. It became clear that interpretations of what some non-tech solutions would solve loosely varied per responder. Notable examples were *voluntary agreements, demand commitment agreements, niche development roles, and governance models for data and platform management*.

The variance underscored the importance of alignment of the stakeholders' interpretation of the solutions. The work session was designed in anticipation of this issue and in the discussions the understanding of the WP7 partners of the proposed non-tech solutions was aligned. Nevertheless, this report acknowledges divergent conceptualizations of the non-tech solutions among the WP7 partners as a limitation of the selection process.

Establishing the ambition and scope of WP7

The second issue raised concerned the ambition and scope of WP7's contribution to the MAGPIE project. WP7 has a unique position within the MAGPIE project. It aims to tackle barriers around technological and logistics solution for getting to a carbon neutral, smart, and multimodal port and port-related transport system. However, typical solutions may vary strongly in nature (rules and regulation, market mechanisms, knowledge exchange oriented, etcetera), may fall outside the direct competence to act of the port's stakeholders, and may bandwagon on solutions for which initiative has already been taken at global or national level (e.g., as part of the Getting to Zero Coalition, or within the IMO, or as part of an existing Green Corridor initiative).

A crucial element of this is the identification of the hierarchical level at which the solution can be implemented. The hierarchical level of implementation of a solution shapes the selection process because of the impact on feasibility this will have. For instance, if the implementation of proposed non-tech solution falls under the authority of an international organization or national government, then WP7 cannot affect its implementation.

In response to this, it was agreed that the ambition of WP7 should be to create more insight in the feasibility, impact, or conditions for certain solutions, depending on the type of issue tackled. Also, to come up with grounded ideas for shaping the context in which certain non-tech solutions could help accelerating the uptake of technical and logistical solutions. This then can be given as an advice to either the ports, national governments, or European Commission.

This recognizes that WP7 may occupy a certain broker position to stakeholders that have mandates to enact solutions in practice. For instance, if there are new domains where a given non-tech solutions could be applied, or if there are potential synergies between solutions that

are unexploited, WP7 could contribute with feasibility and impact analyses for relevant parties and initiatives. The requirement for this broker position is that the solutions for which WP7 offers analyses and advice must be relevant to, and within the competence of, the Port Community.

The Port community must have the authority and capacity to leverage the non-tech solutions. This report understands the term Port community to refer to the stakeholders operating within the port’s network (including the hinterland) and stakeholder’s whose operations contribute to the functioning of the port’s network (see Figure 3). Such a broad definition ensures that all relevant actors are included in the Port Community as necessary. This means that our solutions and advice could be offered to actors beyond simply the port authorities.

Figure 3: A view of the stakeholders in the Port Community⁵



Another crucial issue that was raised in the discussion concerned the scope of the WP7 solutions: just limiting to the content (read demo’s) of the MAGPIE project or going beyond. What had not been set in stone in previous steps was whether these non-tech solutions were designed to support the demonstrations in other work packages in the MAGPIE project.

⁵ Adapted from T. Notteboom and W. Winkelmanns, "Dealing with Stakeholders in the Port Planning Process," in *Across the Border: Building upon a Quarter of Century of Transport Research in the Benelux* (Antwerp: De Boeck, 2003),

Through consultation with members of the core research team, it was determined that the non-tech solutions developed in WP7 will not be demo specific. Rather, the goal of the non-tech solutions is to contribute to MAGPIE's overarching goal of facilitating the energy transition in the European ports in a reproducible manner.

Non-tech solutions will focus on finding solutions to critical barriers within the realm of the port community, and at the possible points at which stakeholders within the port community have the leverage to implement prospective non-tech solutions (see also second consideration). This broad approach will likely indirectly benefit the development of the various technologies being demonstrated in the MAGPIE program, but these non-tech solutions will not be explicitly tied to any of the demos.

Main points on the barriers

Based upon the work in report D7.1, and upon regular inputs from the industry experts in WP 7 and the wider MAGPIE network, we may state the following on the barriers:

- The lack of business case is the major barrier overall. As stated in section 1.2, the lack of business case may be seen at the culmination of many other barriers. This barrier is expressed in both investment uncertainty as well as a price gap between new fuels/solutions and existing practices.
- The barriers - also the business case barrier - require a complete value chain approach. This implies that a set of actors need to act together and start introducing solutions. Bringing actors together and making 'network' based solutions work is a challenge in itself, for which non-tech solutions may be needed.
- Barriers quite often need to be seen in combination. For instance, a lack of standard could mean that proper insurance is not possible, increasing the financial risk for the owner of said technology.

Phased development of the shortlist over the years of the project

An issue previously alluded in this report is the desired result of this deliverable. The initial aim of providing a well-defined shortlist of eight non-tech solutions has, upon consultation with WP7 members, been adjusted to a phased approach. We have learned over the past year that the energy transition in the port context is a highly fluid process. This fluidity extends to the development of the technological solutions, for which the non-tech solutions are instrumental in their implementation and acceleration.

The fluidity requires continuous monitoring of barriers, solutions, and trends in the energy transition of the port context - both within and outside the MAGPIE project. For this reason, WP7 will endeavour to develop two non-tech solutions in the first phase. Based on the learnings we will reconsider the shortlist and come to a next selection for following project-

years. This will prevent us from limiting our choice of solutions to the preferences of the present snapshot. A welcome benefit of the phased approach is that it favours the selection of coherent, robust, and long-lasting solutions as a consequence of the learning process and narrowing of different perspectives.

The evaluation of the shortlist and the selection process will occur roughly towards the end of the four nine-month cycles that it will take to develop two solutions. The guideline and evaluation system developed in Deliverable 7.4 addresses this flexibility and contains a built-in mechanism for evaluating each solution's successes and failures. This evaluation will support the choice of the next non-tech solutions.

Reciprocal relationship of the solutions

The solutions in the longlist as identified in this project cannot be looked upon and assessed in isolation. For example, price differentiation may be more effectual if implemented in combination with several monetary incentives. To add, it may need an environmental labelling action first, and/or it may require a corridor agreement with different ports involved to ensure broader participation.

4. Conclusions

This report aimed to present a qualified, preliminary shortlist of non-tech solutions for development in the next phase of WP7's involvement in MAGPIE. The report established the two non-tech solutions, *price differentiation* and *Green Corridors*, with which WP7 will begin. Beyond the two mentioned non-tech solutions, WP7 established a tentative selection of a further seven non-tech solutions to be developed on an organic basis.

The report discussed the stages of the selection process, beginning with the design of a selection criteria through an iterative process. As with the selection criteria, the ultimate selection of the non-tech solutions followed fruitful consultation and discussion between the core research team and the general WP7 partners.

This selection process was qualified with a reflection on how the strategic priorities of this deliverable shifted from producing a shallow list of seven non-tech solutions to an initial two solutions. The key conclusions of the report were in establishing the scope and ambition of WP7's solution development process. This ambition was limited to aiming to contribute feasibility and impact analyses for relevant parties and initiatives. Regarding the phased approach to the solution selection and development, this decision was made with the highly fluid nature of the energy transition in the port context in mind. The learning process is a crucial element of solution development, and thus this WP7 will seek to take learning on board. This will entail a continuous revaluation of the context of the solutions and the solutions themselves.

The immediate next steps following this report will be the development of the aforementioned solutions: *price differentiation* and *Green Corridors*. This process will be guided by the Guideline and Evaluation framework developed in Deliverable 7.4. The development of the first two solutions (and the subsequent solutions, if the framework itself is not adjusted) will begin with an exploratory study to establish important baseline information on aims of the solutions, who the important stakeholders are, what the interests of stakeholders are, and what or where knowledge-gaps extant initiatives exist. The two core research teams have been set up to approach the exploratory study for the two respective solutions.

The subsequent stages of the solutions' development are listed as follows: a design and execution phase will establish how the solutions will be implemented and evaluated. This phase will be reinforced by the evaluation process that will run parallel to the solution's development. Finally, further insights and ways forward will be divined - including the selection of the next solutions to be developed. Though the exact timeline for each stage is yet to be set in stone in the baseline information phase, the development of the first two

non-tech solutions, and each set of non-tech solutions thereafter, will take roughly nine months.

Annex 2: 'Selection Support Tool Talled'

Measure	Ocean going				Inland shipping				Truck				Rail			
	Leverage	High need	Low	Barriers	Leverage	High need	Low	Barriers	Leverage	High need	Low	Barriers	Leverage	High need	Low	Barriers
	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
1. Traction and tax exemptions	0	1	3	1	0	0	1	3	0	0	3	1	0	0	3	1
2. Flexible market-based mechanisms	4	4	4	3	5	5	5	1	2	2	2	1	2	2	1	2
3. Price differentiation	4	3	3	3	3	3	3	1	2	2	2	1	2	2	1	2
4. Service discrimination	1	3	3	1	1	3	1	1	1	3	1	1	1	4	3	1
5. Standardization	2	2	2	1	2	2	2	1	2	2	2	1	2	2	2	1
6. Government initiated and funded R&D and pilot support	1	1	4	4	1	4	4	1	4	4	4	1	4	4	4	1
7. Subsidies	1	1	3	1	2	2	2	1	3	2	2	1	4	2	2	1
8. Operational rules/guidelines like speed restriction/ reduction	2	3	2	2	3	2	2	2	2	2	1	1	2	2	1	4
9. Regulatory Experimentation & Incentive Regulations	2	3	2	1	3	2	1	1	3	3	1	1	3	3	2	3
10. Governance models for data and platform management	2	1	2	2	1	1	3	2	2	3	1	1	1	5	1	2
11. Green Public Procurement	1	2	2	1	1	1	3	1	2	2	3	1	1	3	1	2
12. Green Shipping Corridors	2	2	1	1	1	2	1	1	2	2	1	1	1	2	1	3
13. Data Sharing Platforms & Partnerships	3	3	1	2	4	1	1	2	3	3	1	3	1	2	1	3
14. Investment & cost risk mitigation	3	3	1	2	2	2	2	2	2	2	2	2	3	2	2	2
15. Voluntary Agreements/ Benchmarking/ Green or Carbon Neutral certifi.	1	2	1	1	1	3	1	1	1	1	3	4	1	1	2	4
16. Market alignment/ new business models that enhance uptake of new technology	1	2	1	1	2	3	1	1	2	2	1	1	2	2	2	1
17. Split incentive alignment frameworks	1	2	2	1	2	2	2	1	4	4	1	4	1	4	1	4
18. Demand commitment agreements	1	1	3	2	1	4	4	1	2	2	2	2	1	4	2	2
19. Niche Development roles	3	3	2	2	4	1	4	1	2	2	2	2	4	4	2	2
20. Consensus building	2	1	1	1	2	2	2	1	1	2	1	3	1	2	1	3
21. Innovation Hubs	2	1	1	1	2	2	2	1	2	2	2	2	1	2	2	2
22. Targeted Information Schemes	3	3	1	3	3	2	2	2	3	3	2	3	3	2	3	3
23. Decision support tools (Marginal Abatement Costs)	1	1	2	2	1	2	2	2	3	3	1	2	2	2	3	1
24. Feasibility Studies	1	1	1	2	1	2	1	1	2	2	1	2	1	2	2	3
25. Port User Forums	4	1	1	2	1	5	1	2	1	2	1	2	1	2	1	2