DOCKSTHEFUTURE

defining the concept of "Port of the Future"

Deployment of the Projects Common Index: methodology for analysis and monitoring

Deliverable 3.3

This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 770064

Document Status	
Deliverable Lead	ISL
Internal Reviewer 1	Unige
Type	Deliverable
Work Package	WP3: Evaluation: analysis of the clustered Projects and activities of interest
ID	D3.3: Deployment of the Projects Common Index: methodology for analysis and monitoring
Due Date	M28
Delivery Date	M26
Status	Submitted
Dissemination Level	PU

Document History	
Contributions	ISL, PortExpertise, Unige
Version	v1 (12.11.2019) v2 (21.11.2019) incl. PeX and Unige remarks v3 (05.12.2019) overall adjustments v4 (13.01.2020) incl. PeX latest remarks v5 (03.02.2020) additional remarks v6 (26.02.2020) additional Remarks PeX + peer review remarks Unige v7 (27.02.2020) PeX alterations included v8 (27.02.2020) final remarks
Final Version	27.02.20

Disclaimer

The views represented in this document only reflect the views of the authors and not the views of Innovation & Networks Executive Agency (INEA) and the European Commission. INEA and the European Commission are not liable for any use that may be made of the information contained in this document. Furthermore, the information is provided "as is" and no guarantee or warranty is given that the information fit for any particular purpose. The user of the information uses it as its sole risk and liability

Table of contents

1. Introduction: The Project Common Index

Decision makers on all levels are liable to validate their respective decisions and present at least a general guideline or a strategic orientation. Although the concrete strategies may differ, similar aspects are to be tackled by the port management. As introduced in the deliverables of the second work package, the UN Sustainable Development Goals (SDGs) provide a framework of diverse goals for a sustainable future. The port management's task is to account for these goals within their strategic orientation as well as operational design and decisions.

However, not all UN SDGs are equally important for the Port of the Future concept. As the analysis in Work Package 1 and 2 has shown, there are clusters of objectives that can be grouped together, while many of the UN SDGs are hardly ever mentioned in the analysed projects – neither explicitly nor implicitly.[1] Therefore, in order to develop a meaningful KPI set for ports, a structure was developed that considers these peculiarities. Hence, some UN SDGs are only occasionally mentioned in the context of European port governance and policy, but they are not a regular part of port development programmes and projects. The analysis will focus on the core areas only.

The work on this structure was based on the methodology and analysis presented in D1.1 of the first work package. The smallest considered entity for decision makers or port authorities are measures, which are defined as "actions that ports of the future do to realise objectives".[2] Measures that are being carried out support a respective operational objective. Operational objectives mark practical steps and can be further grouped to tactical objectives. Tactical objectives were a key focus of the analysis carried out in work package one. They reflect the bridge between operational objectives and their concrete actions (measures) on the one hand and the strategic objectives on the other, which have long-term implications.

The tactical objectives that comprise operational objectives and respectively measures were connected to the UN SDGs. In work package two, the WPSP framework was used in order to group specific objectives and allocate them to SDGs.[3] The advantage of this approach is that the WPSP was developed in cooperation with port authorities and is hence known by the stakeholders.

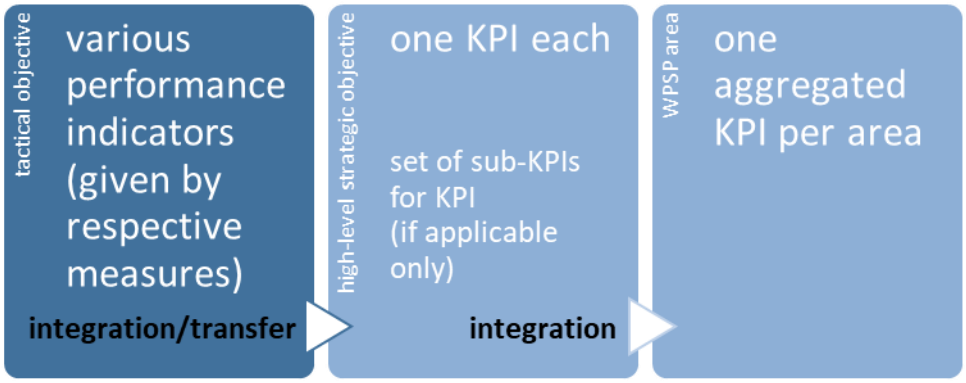
D3.1 started with the allocation of tactical objectives towards the 35 related WPSP topics. Additionally the WPSP topics have been grouped into high-level strategic objectives of which each represents one UN SDG. Therefore, it is possible to link the tactical objectives to specific UN SDGs through their link to WPSP topics.[4] The WPSP aggregation of the topics into five areas is still applicable and provides a good structure of classification. A comparison between the tactical objectives identified in work package 1 and the UN SDGs shows that more than 99% of all measures and their tactical objectives could be classified under just nine UN SDGs and their respective sub-goals (see below for detail).

The Project Common Index (PCI) is a score that is generated from the set of related Key Performance Indicators (KPIs) developed in D1.1, allocable costs and other evaluation criteria (transferability, innovativeness) which are relevant factors for the characteristics of future ports. It can be used to evaluate a specific measure as well as a complex project combining various

[1] This does not mean that ports cannot contribute to other UN SDGs. However, goals like "no poverty" (UN SDG 1) or "zero hunger" (UN SDG 2) are more relevant for developing countries than for European ports.
[2] See 11.1.1.2.6 in D1.1
[3] For extensive information please visit www.sustainableworldports.org
[4] The Table "Allocating tactical objectives to the high-level strategic objectives (UN SDGs), they contribute to" on page 16 of the Appendix displays this connection. A second table presents the linkage between WPSP topics and high-level strategic objectives as presented in D3.1 (including small amendments).

measures. Therefore, the current document refers to '*actions*' as a general term that encompasses measures and projects equally. The underlying pattern of the PCI links operational actions to the strategic aspect they contribute to. The impact of operational actions is measured with suitable performance indicators, which correspond to the aim of the project or measure. The operational level provides hundreds of these indicators. They capture operational effects; however, they may provide limited information regarding the impact on high-level strategic objectives. In order to compare the impact of two different actions on the same UN SDG, a comparable performance indicator is necessary. Hence, the performance indicators must be translated into KPIs. For some high-level strategic objectives, sub-KPIs have been introduced as an intermediate step. In order to compare between the five WPSP areas, KPIs of different UN SDGs need to be aggregated. The following graphic depicts this integration while the methodology of the KPIs will be discussed in detail in the second chapter.[5]

Aggregation stages of performance indicators



The idea is to create a framework that can be applied by different participating entities/stakeholders according to their specific preferences and objectives. It allows comparison between different projects regarding their contribution to a prospective port design with respect to their costs. The methodology itself is independent of the object that is subject for evaluation.

[5] The practical example in the appendix features the stages of aggregation.

2. Methodology of KPI measurement

The Grant Agreement lists different fields, which should be assessed with KPIs for the respective effects. The given enumeration is rather unstructured and vague. As introduced in Deliverable 3.1, the different KPIs are allocated to one of the five areas of the UN SDGs:

- Climate and Energy
- Community outreach and port-city dialogue
- Governance and Ethics
- Resilient Infrastructure
- Safety and Security

Each area consists of different high-level strategic objectives and their respective KPIs. However, their number varies from area to area. In order to obtain one KPI per area, the aggregated KPI, a consolidation of the respective KPIs is necessary. When aggregating the KPIs of one area, the calculation formula accounts for the varying number of KPIs per area. The general approach, however, remains the same.

In order to make the aggregated KPIs comparable, standardisation is required which is consistent among and within the WPSP 5 focus Areas.

A five-point scale, ranging from one to five with one being the lowest and five being the highest score, has been selected for all aggregated KPIs. The KPIs are of either qualitative or quantitative nature and approached differently:

	KPI	estimated effect	score	1	2	3	4	5
WPSP area	Name of KPI			low	low to medium	medium	medium to high	high

Overview of considered KPIs and their respective units (others than qualitative KPIs only)

WPSP areas	high-level strategic objectives	KPI name or type
Climate and Energy	Combat global warming (SDG 13)	reduction of port-related CO2-equivalent emissions [tons]
	Save natural resources (SDG 12)	waste reduction (plastic, dredging material) [tons]
Community outreach and port-city dialogue	Inclusive cities (SDG 11.3.2)	qualitative scale
	Land consumption (SDG 11.3.1)	former port area converted [square meters]
	Improve environmental quality (SDG 11.6)	reduction of emissions in port (noise, air)
	Good jobs (SDG 8.5)	qualitative scale
Governance and Ethics	Transparency (SDG 16.6)	qualitative scale
	Gender equality (SDG 5.5)	qualitative scale
	Equal opportunity (SDG 10.3)	port open to thrid-party operators [binary]
	Restrict corruption (SDG 16.5)	qualitative scale
	Green governance (SDG 15.9)	ISO 14001 [binary]
Resilient Infrastructure	Economic growth (SDG 8.1)	growth in port's throughput capacities [TEU, tons]
	Higher productivity (SDG 8.2)	savings due to optimization [Euro]
	Resilient infrastructure (SDG 9.1)	qualitative scale
	Account for resilience (SDG 13.2)	
Safety and Security	Reduce crime (SDG 16.1)	qualitative scale
	Safe working conditions (SDG 8.8)	qualitative scale

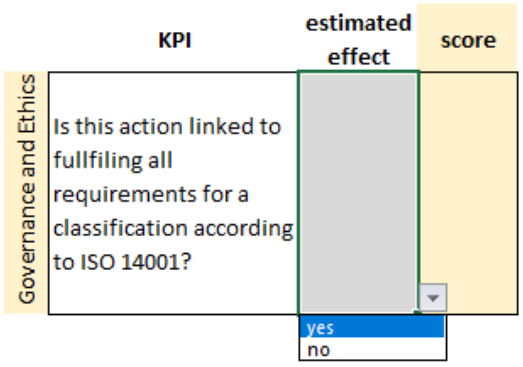
Qualitative KPIs

The score of a qualitative KPI of a specific project or measure is expressed according to the classification on the five-band scale. For qualitative KPIs only integer values between one (low impact) and five (high impact) are considered. Specific characteristics are provided for each of the five stages, which build the framework for evaluation. As an example, the KPI of the high-level strategic objective of *Gender Equality* is considered:

	KPI	estimated effect	score	1	2	3	4	5
Governance and Ethics	To which extent does this action promote and increase the share of women in upper management of port-based enterprises? To which extent does this action promote and increase the overall share of women in port-based enterprises?			**low** introduction of voluntary public events, e.g. "women career day", "girls day"; participation in "equal pay day" events	**low to medium** making salaries in upper management transparent; commit to non-binding equality initiatives; special programs that aim at increasing the share of female employees in traditionally male-dominated port-related professions	**medium** strong efforts to obtain equality in upper management, e.g. with mentoring program to individually foster women's careers within the organization; commit to binding equality initiatives; minimum quotas of 25% or more in upper management positions	**medium to high** set-up equally represented dual leadership positions; very strong efforts to obtain equality in upper management; commit to binding equality initiatives	**high** implementation of a mandatory quota of 50% in upper managment positions of public and private organisations

The objective of gender equality is an emotional topic that is addressed with manifold actions. It is not sensible to account for measures in this field by only considering efforts for minimum quotas of female executives. These quotas are easy to compare regarding their obligation (mandatory vs. intended) and target proportion (expressed as a percentage). However, quotas are only one aspect of actions that facilitate the goal of sustainably increasing the share of women in top level positions. Therefore, a framework is provided that includes quotas to some extent but primarily rely on qualitative factors. The scores of the five-band scale correspond to the *increase* in the impact towards the goal, in this example gender equality. The descriptions must not be too concrete (e.g. promote only one single action) but rather describe a framework with a universal but yet generic structure. Ultimately, it must support the user in locating the considered measure on the five-band score. In order to be comprehensible the user is obliged to state why the specific score was attributed. This additional information supports reviewing processes by other parties. The input is made in the designated text field.

The area of “Governance and Ethics” includes two KPIs that deviate from the five-band scale as they are binary KPIs. Their specification can be either *yes*, which results in a five-point score, or *no*, which results in a score of zero.



The example depicts that the binary KPI requires less evaluation by the user. Both characteristics of the scale are clear-cut and leave no room for interpretation. In this specific example, the required specifications are well established within a global standard.

Quantitative KPIs

The approach of measuring differs for each KPI, however, alignment in scaling guarantees the consistency among the different KPIs. For all quantitative KPIs we apply a scale where 1 additional point requires the respective effect to be 10 times higher. Here, decimal numbers as values are possible. For methodical reasons a score of 1 complies to a minimum threshold that needs to be

achieved in order to maintain a score of 1 (or above). Decimal numbers between 0 and 1 do not exist.

The calculation of each quantitative KPI differs. The first example is rather simple as the KPI for CO2 compensation or reduction is only subject to the respective amount of CO_2 measured in tons of equivalent units. The user of the DSS tool needs to enter this piece of information and the tool will give the respective score. For this example, we assume a specific action to reduce 19,700 tons of CO2 equivalent units per year, which results in a score of 3.29. This illustrates the effect of the exponential scale.

	KPI	unit	estimated effect	score	1	2	3	4	5
Climate and Energy	Reduction or compensation of port-related CO_2 equivalents emissions/year	tons (equivalent units)	19700	3,29	100	1.000	10.000	100.000	1.000.000

Other greenhouse gases (e.g. methane) are included by transforming them into CO_2 equivalents.

The calculation of other quantitative KPIs is more complex. Take the example from the area of Port-City Relations. The reduction of emissions in the port has a wide scope. We include the reduction in air and noise pollution. As each sub-KPI is calculated differently and is not comparable to the other, the highest of the sub-KPIs will become the KPI for this high-level-strategic objective. The reduction in noise emissions has been chosen as an example to depict the composition of a more complex KPI.

Noise is measured in decibel (dB); hence, its reduction can be expressed as the difference between noise levels. However, the specific exposure to noise is subject to many different variables, such as level of sound, position of emitter and recipient, weather or constructional conditions. Therefore, it is nearly impossible to find an exact measure for noise disturbance, especially in the environment of ports. In case an estimation based on the full scope of variables are not possible, alternatives must be provided. We therefore introduce the dB-reduction-coefficient, which will give a workable approximation technique for the evaluation of noise emissions.

If *noise* is selected as the type of emission a field of interaction will automatically open. The computation requires the input of five parameters, which are:

- Initial sound level [dB]
- estimated reduction in noise at source of emission [in dB]
- number of initial individual noise emitters[6]
- number of individual noise emitters after evaluated action
- estimated runtime over the year before evaluated action [%]

[6] We consider the information for one sinlge noise emitter, e.g. one gantry crane or one shipping berth. If the gantry cranes of a terminal or berthing place are upgraded with noise emission technology, the specific number is required. Structural changes in the port e.g. the closing of a track, berthing area will have a positive effect on the emitted sound for the population living nearby. The calculation tool also accounts for this, which is why the number of noise emitters after evaluated action is required.

- estimated runtime over the year after evaluated action [%]
- population density in the square kilometre of the source of emission [inhabitants per square kilometre]

A formula converts the entered parameters into the coefficient and calculates the corresponding score according to the five-band scale as presented above. In some cases, the dB-reduction-coefficient could result in values under 0.00 or over 9.21. However, those values also receive the respective maximum (5) or minimum score (0). As in the first example, 1 additional point requires the respective effect to be 10 times higher. This is not apparent in the scale because it is logarithmic.[7] This alignment ensures the consistency and conversion among the different KPIs for the following process of aggregation and for being able to calculate cost-efficiency.

[7] The unit decibel is already expressed on a logarithmic scale.

3. Consolidation towards the Project Common Index

Firstly, the aggregated KPI per area needs to be generated. Each area contains a varying number of KPIs. Therefore, it is not possible to take an average of the KPIs to maintain the aggregated KPI for the area. Areas with more KPIs would be highly disadvantaged by this approach.[8] To compute an aggregated KPI the following formula is applied:

> Aggregated KPI = α x value of highest scoring KPI + (1-α) x (sum of value of remaining KPIs/number of remaining KPIs)
>
> With $0 \leq \alpha \geq 1$

We refer to this approach as the standard Ports-of-the-Future-weighing. However, deviations from this are possible. The user is able to define a customized aggregation formula based on the user's (stakeholder's) preferences.

The same methodology is applied when the aggregated KPIs of each area are further consolidated towards the Project Common Index.

> Consolidated Objectives Index = α x value of highest scoring aggregated KPI + 1-α x (sum of value of remaining four KPIs/four)
>
> With $0 \leq \alpha \geq 1$

As different stakeholders with different objectives may use the decision support tools, they may not want to consider the project or measure with the overall best score but rather concentrate on a specific area, e.g. the Port-City Relations. However, positive side effects of the project or measure on other areas might still be of minor interest. Hence, we introduce area-weighted Common Port Indices:

> Consolidated Objectives $\text{Index}_{\text{Port-City Relations}}$ = α x value of Port-City Relation aggregated KPI + 1-α x (sum of value of remaining four aggregated KPIs/four)
>
> With $0 \leq \alpha \geq 1$

With this special aggregation, we allow the comparison and ranking of projects or measures with respect to one special area of interests and its side-effects onto other areas. There will also be the possibility to set user-defined weights.

> Consolidated Objectives $\text{Index}_{\text{Custom}}$= $\alpha_{1\text{custom}}$ x value of Climate and Energy aggregated KPI + $\alpha_{2\text{custom}}$ x value of Port-City Relation aggregated KPI + $\alpha_{3\text{custom}}$ x value of Governance and

[8] The area "Climate and Energy" has two KPIs. If one has a score of five while the other's is zero, this yields to an average of 2.5. "Governance and Ethics" contains five high-level strategic subjects and their respective scores. If one maintains a value of five while the score of all others remains zero, the simple average would yield to an aggregated KPI of 1. As the number of high-level strategic objectives (respective KPIs) per area has no interpretational value, it should not come to the disadvantage of such areas.

Ethics aggregated KPI + $\alpha_{4custom}$ x value of Resilient Infrastructure aggregated KPI + $\alpha_{5custom}$ x value of Safety and Security aggregated KPI

with $\sum_{i=1}^{5} \alpha_{icustom} = 1$

The next step adds the monetary scope to the evaluation process. The Consolidated Objectives Index is divided by the respective costs of the *action*. When only one single measure of a project is evaluated, then only directly allocable costs must be considered. On the other hand, when a manifold project enters with its full costs all possible effects on the high-level strategic objectives must be considered.

Cost-adjusted consolidated Objectives Index [per million Euro] = Consolidated Objectives Index / allocable costs [in million Euro]

After accounting for costs, innovativeness and transferability enter the evaluation. For the concept of Innovativeness, again, a 5-band scale is applied to evaluate the degree of innovativeness, with 1 being the lowest and 5 the highest characteristic (compare D3.2).

1. None (score: 0): implementation of existing technology (e.g. OPS installation)
2. Low (score: 1): Innovations that make existing solutions more accessible, e.g. cost savings
3. Medium (score: 2): Improvement of existing technical solutions (e.g. 'greening' container terminal operating systems)
4. High (score: 3): adaptation of existing technology from other sectors or uses to the port sector (e.g. electric AGVs)
5. Very high (score: 4): development of completely new technical solutions that could also have an impact on other sectors (e.g. invention of ISO container)

Each stage results in a different score that enters the cost-adjusted potential contribution as a multiplier. While innovativeness is paramount for Ports of the Future, not all stakeholders or DSS tool users will necessarily look at innovative projects only. Therefore, the weight given to innovativeness can be adjusted by the user or deactivated completely.

Innovativeness-Score = Cost-adjusted-consolidated Objectives Index x innovativeness-multiplier

As stated in Deliverable 3.2 the innovative aspect is a crucial part of the evaluation for a project or measure in terms of DtF. A project or measure that is evaluated with regard to DtF must add some aspect of innovativeness. Only innovative solutions may be considered transferable as the pure implementation of an existing solution in one port does not provide any benefits to other ports. There may, however, be innovative ways to implement or adapt existing solutions which may also increase the transferability. Therefore, the transferability analysis is only possible when the score for innovativeness is not zero. After grading the innovativeness of an action, the transferability is the last step before obtaining the PCI.

As per Deliverable 5.3 transferability has two dimensions. The potential contribution towards transferability (PCT) captures to which extent a project is designed to be adopted by different ports. It is measured in a five-band-scale as the Transferability Score (TA-score). The TA-score anticipates the constraints for transfer and may consider the transferability if mechanisms regarding the transmission onto other ports are directly addressed or supported by the project design. A higher TA-score is obtained when peering with other ports is established in the project or when is

committed to assistance in transferring from donor to adaptor ports. The Transferability Score (TS) is expressed in values between 0 and 4

1. Zero-weight (score: 0): Not measured or project for a single port
2. Low (score: 1): no support or high constraints identified
3. Medium (score: 2): modest support (constraints and resolutions identified, but NO peered resources with other ports)
4. High (score: 3): limited potential (applicable in 1 to 4 targeted ports, constraints and suggested resolutions identified, AND peered resources to implement across minimal 3 ports)
5. Strong (score: 4): wide support: (applicable at multiple targeted ports (5 or more), constraints and suggested resolutions identified, peered resources to implement the solution in more than 3 ports (simultaneously (peering) or through assistance in transferring from donor to adaptor port

The user has to identify the parameters that identify the potential contribution of a project and give them as input in order to obtain the PCI:

Project Common Index = Innovativeness-Score x Transferability Score

The second dimension is the ease of transferability, whereby a proven methodology is evaluated which considers the constraints for transfer and provides the mechanisms, support and risk management for such peering between ports or collaboration between donor and adaptor ports. A five-band-scale visualises how projects are recognised adequate and transferable or peered in other ports, independent from their innovativeness through the Transferability Index (TA-index) [9]:

1. (score: +2): Strong support for transferability
2. (score: +1): Modest support for transferability
3. (score: 0): neutral
4. (score: -1): Modest constraint for transferability
5. (score: -2): Strong constraint for transferability

The DSS tool further processes the PCI by taking the full Transferability Analysis into account:

Project Common Index x (3 + Transferability Analysis Index)[10]

Various parameters enter the calculation at different stages. The consistency is important on all levels, most of all the computation of the KPIs where the exponential relation must underlie all KPI scales. Projects or measures that are different in targeted high-level strategic objectives, costs, transferability and innovativeness are only comparable as long as their computation has been run with the same weights when aggregating.

As the bare figure of the PCI is rather unspecific, the final DSS will provide a system of comparing the entered actions via a ranking system. Application-oriented details like this will be further introduced within the functional principles of the DSS tool in Task 5.2. Both the PCI and Transferability Analysis are developed in order to have both the possibility to use them as independent indicators as well as to have them synchronised within the DSS tool (D5.2),

[9] See D5.3
[10] The TA-index needs to be treated differently in the calculation as its range includes negative and positive numbers. The scores of the TA-index need to be transformed into positive integers. We do so by adding 3 here.

incorporated among the DSS outputs. However expectation setting on the outcome of the evaluation of each tool is dependent on the completeness of required data/information available from the evaluated projects

A. Appendix

Examplary calculation of a PCI (incl. quantitative KPIs)

For explaining the methodology of the Project Common Index and how it will be computed, we select a project from the Port of Genoa. It is part of their Port Environmental Energy Plan.[11]

> *Quay electrification in the ship repair area of the port of Genoa will be the first step to prevent moored ships from running their auxiliary engines for a long time, thus emitting large amounts of greenhouse gases in the heart of the city (there are 12 berthing points), and to considerably reduce noise emissions in the area.*
>
> *Genoa Port Authority has already included the project – co-financed by Liguria Region, the Ministry of the Environment and Genoa Port Authority for a total value of about €15 million – in its environmental policy programme, expecting its completion by 2013. […] At the port of Genoa, quay electrification will reduce CO_2 emissions by almost 10,000 tonnes every year*

This is a suitable and straightforward example as it:

- Gives exact costs
- Combines two areas (Climate and Energy + Port-City Relations)
- Gives (at least some) specific information about the extent and effect of the action

Starting the KPI calculation, we enter the estimated effect of 10,000 tons CO2-equivalent cut into the respective cell. The five-band scale ranges from 10 tons of reduced CO_2-equivalents (corresponding to a score of 1) to 100,000 tons of reduced CO_2-equivalents (corresponding to a score of 5). The underlying relation is exponential, not linear. Thus, an amount of 100 tons additionally saved CO_2-equivalent will result in different KPI score changes depending on the initial value. In this example, it results in a score of 4.0 for this KPI, yielding to an aggregated KPI of 3.2 for “Climate and Energy” (no custom weights applied).

The second dimension this action targets is the Port-City Relation. One goal of the onshore power supply system is reducing the emissions in the port, which is also considered as a KPI in DtF. However, emissions cover a variety of effects with noise being only one of them. Each of it has different variables that have an impact on the emission, as well as differing measuring units and respective KPI scales. Again, for the reason of comparison, the underlying relation is always exponential. When the emission type “noise” is selected, a specific interaction area opens where the input of key parameters is required. The needed variables are:

- Initial sound level [dB]
- estimated reduction in noise at source of emission [in dB]
- number of initial individual noise emitters[12]

[11] https://www.greenport.com/news101/Projects-and-Initiatives/genoa-port-environmental-energy-plan
[12] We consider the information for one sinlge noise emitter, e.g. one gantry crane or one shipping berth. If the gantry cranes of a terminal or berthing place are upgraded with noise emission technology, the specific number is required. Structural changes in the port e.g. the closing of a track, berthing area will have a positive effect on the emitted sound for the population living nearby. The calculation tool also accounts for this, which is why the number of noise emitters after evaluated action is required.

- number of individual noise emitters after evaluated action
- estimated runtime over the year before evaluated action [%]
- estimated runtime over the year after evaluated action [%]
- population density in the square kilometre of the source of emission [inhabitants per square kilometre]

Not all parameters are at disposal. Hence, assumptions are required:

- Initial sound level [dB]:
  As this measure targets the electrification of repairing docks the initial sound level with running auxiliaries will be lower compared to auxiliaries while the ship is berthing in operation (e.g. ships won't have freight on board, cruise ships will not host guests and the respective crew for catering etc at this time). Hence, we assume the average base level of sound per ship to be **85 dB**
- estimated reduction in noise at source of emission [in dB]
  As we do not obtain any information regarding the type of ships or average year of building assumptions have to be made to which about the lowering effect of switching to onshore power supply. We estimate the effective reduction per auxiliary to be **2 dB**
- number of initial individual noise emitters
  The facilities include **12** berthing places
- number of individual noise emitters after evaluated action
  All **12** berthing places will be equipped
- estimated runtime over the year before evaluated action [%]
  As we do not obtain any information regarding the utilisation of the berth places we consider an average running time of **10%** over the year (This might seem quite low for repairing docks but this number implies that all of the 12 docks are occupied and in use. In practice, this will not be the case most of the time.)
- estimated runtime over the year after evaluated action [%]
  No information given, expected to remain unchanged.
- population density in the square kilometre of the source of emission [thousand people]
  The repairing docks are close to residential areas. The population density for this part of Genoa is roughly **16,000** people per square kilometre.

The scale for noise emissions ranges from 0 to 9.2. These unusual values are obtained as the variable decibel itself is already a logarithm. Still, each additional scoring point requires the effect to be 10 times higher than the initial one.[13]

The parameters lead to a score of 2.8 for the KPI for reduction in emissions in port. The aggregated KPI value is 2.3. The two received aggregated KPIs require further consolidation in order to compute the Project Common Index. We do not select a custom weighing and receive 2.67 as the consolidated objective index. Moving on towards the Project Common Index further input is necessary. The cost for the presented action is 15 million Euro. Although it is rather uncommon to use onshore power supply in repair yards so far, the general application of this technology is widely spread. We assume an innovativeness-score of 1 which is the second lowest

[13] Decibel is usually expressed as a common logarithm (to base ten). However we converted it to a natural logarithm to be in line with the other scales. A dB-reduction-coefficient of 2,3026 results in a score of 2, a coefficient of 4.6052 in a score of 3. We can convert with e to the power of 2,3026 (equals 10) and e to the pwoer of 4.6052 (equals 100). Hence, the consistency with other KPIs is given as each additional scoring point requires the effect to be 10-times higher than the initial one.

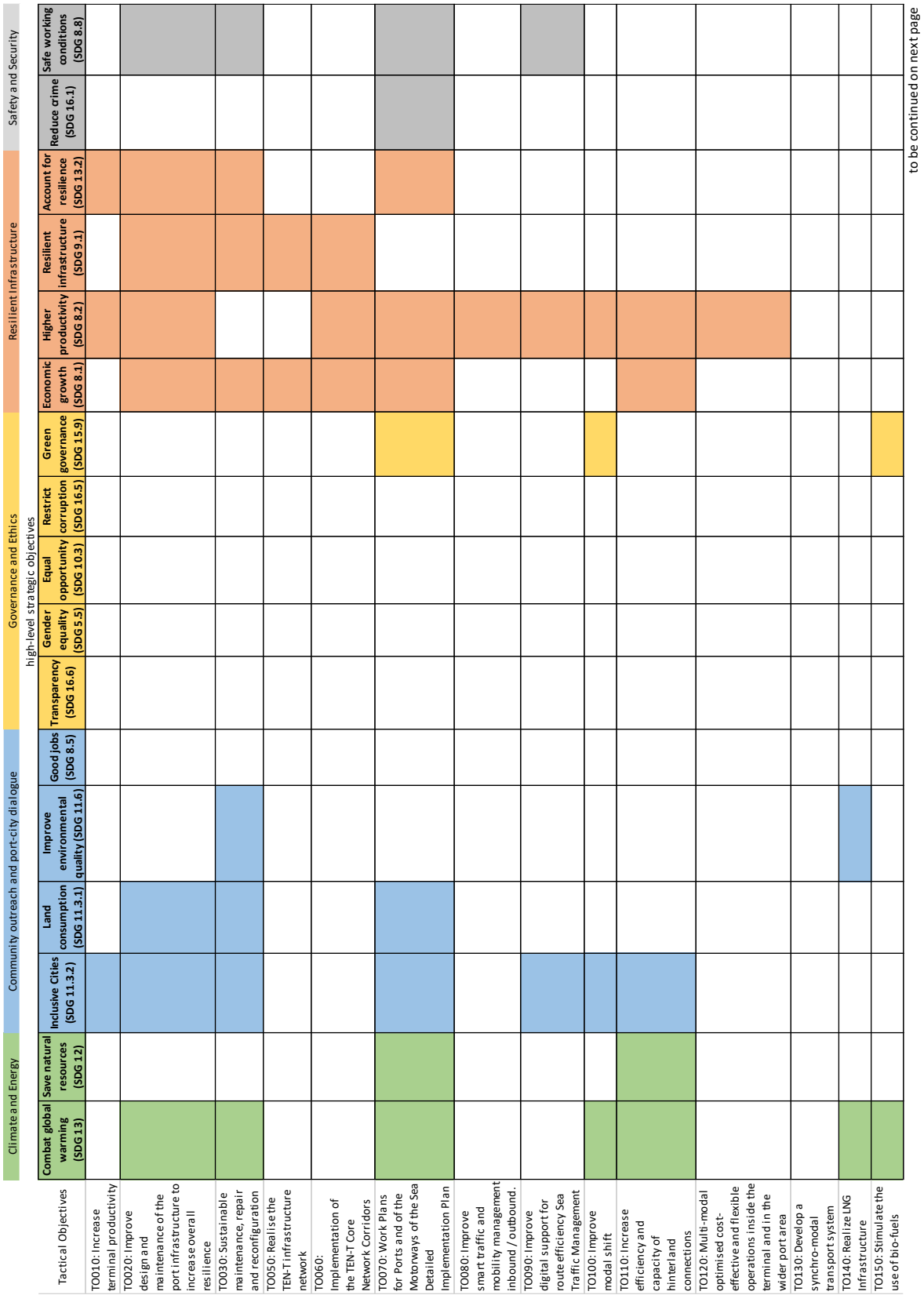
possible value. Any action receiving a score of zero would be rejected by PoF as a non-future-oriented project. The PCI value at this stage only considers potential contribution to transferability (if not ZERO score on innovativeness and transferability). However, a project can still be evaluated in the DSS tool and Transferability Analysis (independent from innovativeness). If the Transferability Methodology results in a positive TA-index, the DSS tool will consider as such and use the formula:

Project Common Index x (3 + Transferability Analysis Index).[14]

[14] This is further outlined in the D5.3 – Transferability Analysis and its reflection in the D5.2 – Decision Support System.

Tables and Figures

Allocating tactical objectives to the high-level strategic objectives (UN SDGs), they contribute to



to be continued on next page

WPSP areas	Climate and Energy		Community outreach and port-city dialogue				Governance and Ethics					Resilient Infrastructure				Safety and Security	
high-level strategic objectives / Tactical Objectives	Combat global warming (SDG 13)	Save natural resources (SDG 12)	Inclusive Cities (SDG 11.3.2)	Land consumption (SDG 11.3.1)	Improve environmental quality (SDG 11.6)	Good jobs (SDG 8.5)	Transparency (SDG 16.6)	Gender equality (SDG 5.5)	Equal opportunity (SDG 10.3)	Restrict corruption (SDG 16.5)	Green governance (SDG 15.9)	Economic growth (SDG 8.1)	Higher productivity (SDG 8.2)	Resilient infrastructure (SDG 9.1)	Account for resilience (SDG 13.2)	Reduce crime (SDG 16.1)	Safe working conditions (SDG 8.8)
TO160: Increase the use of cold ironing electrification	X																
TO170: Use of solar power	X				X												
TO180: Emission reductions	X	X	X	X	X						X				X		X
TO190: Define environmental thresholds	X	X	X	X	X						X				X		
TO200: Energy transition towards new energy store facilities	X	X															
TO210: Optimise renewable energy use including smart grids	X	X	X		X		X										
TO220: Increase efficiency in industrial processes	X	X				X											
TO230: Create innovative energy storage systems	X																
TO240: Support circular economy schemes	X	X	X	X	X							X					
TO250: Develop innovations for increasing sustainability in all transport modes	X		X		X							X	X				X
TO260: Harmonise safety regime	X			X								X	X	X	X		X
TO270: Increase resilience against climate change	X		X	X	X						X	X		X	X	X	X
TO280: Increase resilience against and terrorism																X	
TO290: Optimise and digitalise the logistic chain sharing data between all stakeholders in secure way, with usage of IT data security technology from other sectors.						X						X			X		

to be continued on next page

	WPSP areas															
	Climate and Energy		Community outreach and port-city dialogue				Governance and Ethics					Resilient Infrastructure				Safety and Security	
	high-level strategic objectives																
Tactical Objectives	Combat global warming (SDG 13)	Save natural resources (SDG 12)	Inclusive Cities (SDG 11.3.2)	Land consumption (SDG 11.3.1)	Improve environmental quality (SDG 11.6)	Good jobs (SDG 8.5)	Transparency (SDG 16.6)	Gender equality (SDG 5.5)	Equal opportunity (SDG 10.3)	Restrict corruption (SDG 16.5)	Green governance (SDG 15.9)	Economic growth (SDG 8.1)	Higher productivity (SDG 8.2)	Resilient infrastructure (SDG 9.1)	Account for resilience (SDG 13.2)	Reduce crime (SDG 16.1)	Safe working conditions (SDG 8.8)
TO310: Identification of real-time indicators to improve the quality of services provided.																	
TO320: Harmonisation of port services																	
TO330: Encourage harmonised data sharing.																	
TO340: ICT and communication: data sharing between all stakeholders including G2B (gov. to business), roadmap to fully deploy reporting directives further (waste reporting, SECA reporting, ...)																	
TO350: Realise uniform systems on all European rail and waterways close to ports																	
TO360: Advanced and efficient links and integration in the socio-economic industrial and urban surrounding environment																	
TO370: Improve the quality of public space in the port																	
TO380: Improved integrated port and city common development planning																	
TO390: Improve recreational facilities in the port surrounding																	
TO400: Organize events to introduce the port to young people																	

to be continued on next page

	WPSP areas																
	Climate and Energy		Community outreach and port-city dialogue				Governance and Ethics					Resilient Infrastructure				Safety and Security	
	high-level strategic objectives																
Tactical Objectives	Combat global warming (SDG 13)	Save natural resources (SDG 12)	Inclusive Cities (SDG 11.3.2)	Land consumption (SDG 11.3.1)	Improve environmental quality (SDG 11.6)	Good jobs (SDG 8.5)	Transparency (SDG 16.6)	Gender equality (SDG 5.5)	Equal opportunity (SDG 10.3)	Restrict corruption (SDG 16.5)	Green governance (SDG 15.9)	Economic growth (SDG 8.1)	Higher productivity (SDG 8.2)	Resilient infrastructure (SDG 9.1)	Account for resilience (SDG 13.2)	Reduce crime (SDG 16.1)	Safe working conditions (SDG 8.8)
TO410: Develop tailor human resources management to the age of workers																	
TO420: Monitor and forecast the development of port labour market																	
TO430: Improve the visibility of port related business in the education																	
TO440: Develop harmonised professional and vocational training packages																	
TO450: Increase harmonization between EU and non EU ports in terms of common approach to the Port of the Future Topics																	
TO460: Develop and efficient links between TENT network and non EU transport networks																	
TO470: Develop transferability mechanisms to facilitate the application of H2020 results in CEF projects																	
TO500: long-term binding of logistical offer/logistics, harbour based/related businesses																	
TO510: Build political support for the port																	
TO520: Simplify or accelerate approval processes																	

to be continued on next page

WPSP areas

	Climate and Energy		Community outreach and port-city dialogue				Governance and Ethics					Resilient Infrastructure				Safety and Security	
	high-level strategic objectives																
Tactical Objectives	Combat global warming (SDG 13)	Save natural resources (SDG 12)	Inclusive Cities (SDG 11.3.2)	Land consumption (SDG 11.3.1)	Improve environmental quality (SDG 11.6)	Good jobs (SDG 8.5)	Transparency (SDG 16.6)	Gender equality (SDG 5.5)	Equal opportunity (SDG 10.3)	Restrict corruption (SDG 16.5)	Green governance (SDG 15.9)	Economic growth (SDG 8.1)	Higher productivity (SDG 8.2)	Resilient infrastructure (SDG 9.1)	Account for resilience (SDG 13.2)	Reduce crime (SDG 16.1)	Safe working conditions (SDG 8.8)
TO600: Reduce residental intra-port traffic																	
TO610: Reduce water consumption																	
TO620 Improve intra-port cargo flows by alternative transportation systems																	
TO630: Reduce number of fatal accidents																	
TO640: Reduce number of non-fatal accidents																	
TO650: Reduce absence due to illness																	
TO660: Reduce industrial accidents																	
TO670: Reduce number of nautical incidents																	
TO680: Improve waste management																	

Linkage between WPSP topics and high-level strategic objectives

WPSP areas	high-level strategic objectives	related WPSP topics as in WP2.2
Climate and Energy - Combat climate change and approach circular economy	Combat global warming (SDG 13)	To improve the energy efficiency at ports
		To transit from fossil/based economy to bio-based economy
		To Increase the portion of renewable energy in port
		To promote green infrastructure at ports
		To provide systematic incentives for clean ships
		To deploy alternative transport fuels
	Save natural resources (SDG 12)	To have transition towards circular economy
Community outreach and port-city dialogue - Establish sustainable port-city relations and improve quality of life in port cities	Inclusive cities (SDG 11.3.2)	To transform the port governance into stakeholder management
		To set up community outreach
		To strengthen city-port relations
		To promote spatial planning
		To promote the public awareness and port culture
		To publish annual port sustainability report
	Land consumption (SDG 11.3.1)	To increase the share of nature areas in ports
	Improve environmental quality (SDG 11.6)	To reduce / mitigate the externalities of port operations
	Good jobs (SDG 8.5)	To improve employment conditions in the port
		To enhance the skills and education of port labour
Governance and Ethics - Promote good governance practices in port authorities	Transparency (SDG 16.6)	To transit towards Transparency and integrity in policy
	Gender equality (SDG 5.5)	To have policies with equal rights and opportunities
	Equal opportunity (SDG 10.3)	To set fair trade regulations for ports or bw ports
	Restrict corruption (SDG 16.5)	To put anti-corruption regulations
	Green governance (SDG 15.9)	To establish a Governance towards responsible supply chains
Resilient Infrastructure - Provide resilient infrastructure to meet demands for maritime transport and sustainable landside logistics	Economic growth (SDG 8.1)	To consider resilience in port planning and design
		To encourage port project financing and investments
		To have an effective public-private partnerships
	Higher productivity (SDG 8.2)	To transit towards digitization and automation in port activities
	Resilient infrastructure (SDG 9.1)	To have working with nature
	Account for resilience (SDG 13.2)	To take adaptive measures for climate resilience
		To put in place ecosystems management
Safety and Security - Establish a framework to ensure safe port operations	Reduce crime (SDG 16.1)	To establish cyber-security for port data network and platforms
		To optimise protection of critical infrastructure
		To comply with ISPS code
	Safe working conditions (SDG 8.8)	To improve nautical safety
		To enhance the port labor safety
		To set responsible care Safety and Security