Contents

• The Shipping Pamphlet

• The Shipping KPI Project
  – The Project Objective and History
  – The KPI Standard Concept
  – The Depository

• The Shipping KPI Standard
  – The SPIs (Shipping Performance Indexes)
  – The KPIs (Key Performance Indicators)
    – Calculation and scaling
  – The PIs (Performance Indicators)
Shipping KPI

There is a need for an international standard defining, measuring and reporting information on operational performance in shipping. To meet this need a group of 18 ship management and ship owning companies decided to launch the Shipping KPI project aiming at improving the ability of the shipping industry to respond to increasing demands from society.

The project was funded by the participating companies but received part funding from the Norwegian Research Council. A Steering Committee headed by Wilh. Wilhelmsen ASA has been overseeing the project work while MARINTEK has been the Project Manager and the main R&D partner. Additional info can be found at: http://www.sintef.no/Projectweb/Shipping-KPI/

Objectives
The main objective has been to establish an international standard for measuring performance in shipping (KPIs) which will lead to:

- increased transparency on quality, safety and environmental performance in ship operation
- enhanced governance in ship operation
- future regulatory developments in shipping towards “process output” regulation

The Shipping KPI Concept

The Shipping KPI Concept is based on aggregating and collating information for two purposes; internal improvement and external communication. This is done in a three level approach:

The Performance Indicator (PI) is what is directly observable or measurable within the company (as an example; number of incidents, fuel consumption, exposure hours etc.). In the Shipping KPI model over 100 PIs are defined today.

The Key Performance Indicator (KPI) is built combining a set of PIs. The KPIs are grouped in the 4 original Balanced Score Card (BSC) perspectives and a newly introduced additional HSE perspective. Some of the KPIs are not related to any of the BSC perspectives. In the model 33 KPIs are defined.

The Shipping Performance Index (SPI) is built combining a set of relevant KPIs best expressing the organisations ability to perform within the theme of interest. In the model 7 SPIs are defined; Environmental Performance, Safety Performance, Security Performance, HR Performance, Technical Performance, Navigational Performance and Operational Performance.

Development Method
The KPI model has been developed through several iterations with industry stakeholders. A three phased approach was used:

- first known KPIs in use in the industry today where collected
- then the KPIs where collated, cleaned and mapped into the extended Balanced Score Card perspectives
- finally a stakeholder information analysis was performed to elicit a wider set of KPIs and the requirements for forming the SPI

This process resulted in a set of KPIs and subordinate PIs that were used to express performance information relevant for external stakeholders (owner, class, flag/port state etc.) as SPIs.

The iterative development model relies on the R&D partners to facilitate the process and exploit the mutual knowledge of the industry partners so that the result reflects the joint industry knowledge. To achieve this, a series of thematic workshops was used where the guiding principle for decision was consensus. This indicates that to some extent the KPIs are result of compromises, which again make the KPIs more general applicable.

**Theoretical Foundation**

**Balanced Score Card (BSC)**

Kaplan & Norton (1996) give a framework for a strategic measurement and a management system through the use of “The Balanced Scorecard” where organizational performance is measured using 4 perspectives to support strategies and visions in an organization: these perspectives are financial aspects, customers, internal business processes as well as learning and growth. The perspectives are interconnected and equally important for the success of an organization according to Kaplan & Norton.

When mapping the Shipping KPIs into the BSC perspective it became evident that due to the industry focus on HSE it made sense to expand the model to include this. The KPIs are therefore mapped into 5 perspectives or groups for internal improvement.

**Stakeholder Analysis (SA)**

Traditionally Stakeholder Analysis is used to identify stakeholders influencing or being affected by a policy or organizational change. Methods for performing SA as described by K. Schmeer (1999) are too rigorous for our purpose. We used an approach more in the tradition of Systems Engineering and Requirements Engineering (Springer 2002).

The SA methodology can be divided in two approaches, the theoretical and the pragmatic approach. We applied the pragmatic approach and due to the lack of direct access to a broad set of stakeholders we relied on the earlier developed Shipping Model (Maritime ICT R&D project funded by NRC 1995-1997) and from this identified relevant stakeholders. As stakeholders can act in different roles a set of roles where defined and from the roles we elicited the likely information requirements. The hypothesis was that if we could satisfy the different roles we would also satisfy the stakeholder different needs and different stakeholders would get consistent information. From the stakeholder needs the set of 7 SPIs where defined.

**SPI Match Making**

When the areas of stakeholders interest where defined the project applied a match making approach where we used the Intermanager KPI Working Group to answer the question about what KPIs would best express a company’s ability to perform within the area of an SPI. This exercise where conducted iteratively and resulted in a matching matrix. The matrix express which KPI are well suited to measure the ability to perform within an area, which KPIs are moderately good and which are not useful.

**Mathematics**

When calculating the KPIs and SPIs some mathematical challenges exist. First PIs are numbers in very different scales, from relative number to $ and tons. To the extent possible the KPIs are designed so that they are relative numbers meaning that they are ratios of PIs. Even so the scales of some of the KPIs are different and to be able to directly compare KPIs they are scaled in to a 0-100 range. This makes them comparable but some transparency is lost due to the rescaling and calculation. For internal improvement the base value of the KPI can be used but for benchmarking the rescaled value should be used.

To calculate the SPI we use a weighted sum, in order to encompass that some of the KPIs are influencing an SPI to a larger extent than others. This weighting is not firm yet and needs to be addressed to a larger community for validity.
## An Example (SPI - Environmental Performance)

<table>
<thead>
<tr>
<th>SPI</th>
<th>Weight</th>
<th>KPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Cargo incidents during cargo operations</td>
<td>Total number of damaged or lost cargo units during cargo handling</td>
</tr>
<tr>
<td>L</td>
<td>Cargo incidents during voyage</td>
<td>Total number of damaged or lost cargo units during voyage</td>
</tr>
<tr>
<td>L</td>
<td>Flawless Port state control performance</td>
<td>Zero deficiencies inspections</td>
</tr>
<tr>
<td>H</td>
<td>Environmental deficiencies</td>
<td>Environmental deficiencies</td>
</tr>
<tr>
<td>L</td>
<td>Port state control detention rate</td>
<td>Total number of inspections resulting in a detention</td>
</tr>
<tr>
<td>L</td>
<td>Technical failures</td>
<td>Equipment for cargo</td>
</tr>
<tr>
<td>L</td>
<td>Navigational Incidents</td>
<td>Collision</td>
</tr>
<tr>
<td>L</td>
<td>Fuel Efficiency</td>
<td>SFC at time of observation</td>
</tr>
<tr>
<td>L</td>
<td>Crew planning</td>
<td>Not on time relief of crew</td>
</tr>
<tr>
<td>L</td>
<td>Crew Management</td>
<td>Crew training</td>
</tr>
<tr>
<td>H</td>
<td>Ballast Water Discharge Violations</td>
<td>Ballast water discharge violations</td>
</tr>
<tr>
<td>H</td>
<td>Violations of MARPOL Annex 3, 4 and 5</td>
<td>The total number ballast water discharges during a calendar year</td>
</tr>
<tr>
<td>H</td>
<td>Spills</td>
<td>Total number of cargo releases to the environment</td>
</tr>
<tr>
<td>H</td>
<td>Contained Spills</td>
<td>Total no of contained spills</td>
</tr>
<tr>
<td>H</td>
<td>CO2 emissions</td>
<td>Emitted Mass CO2</td>
</tr>
<tr>
<td>H</td>
<td>NOX emissions</td>
<td>Emitted Mass NOx</td>
</tr>
<tr>
<td>H</td>
<td>SOX Emissions</td>
<td>Emitted Mass SOX</td>
</tr>
</tbody>
</table>

The table above show one SPI and from which KPIs it is built. The weight H/L indicates which KPIs are considered as a highly relevant (H) or relevant (L) indicator for a vessel's Environmental Performance. The table does not show the calculation principle from PI to KPI nor does it show the weighted aggregation from KPIs to SPI.
Application of Results

There are several potential applications of the results from standardising the performance measurements within an industry. We will elaborate shortly on some:

**Internal Improvement** is one obvious application but the industry is already applying KPIs in their management so the effect of standardising it is questionable as this might drive changes in data collection methods which can lead to additional work. If the company also rely on specialised KPIs they might not be covered within the standard.

**Benchmarking** is also an obvious application and for this purpose standardisation act as enabler to achieve an industry benchmark. To do an industry benchmark several roads can be pursued, either through a third party data collection and anonymous presentation of results or through bi-lateral data exchange between contract parties. Either way the question of data validity will arise and have to be tackled.

**Performance Based Contracting** is a very interesting aspect of applying standardised performance measures. The incentivization built in a KPI-based contract payment method offers substantial advantages. This can act as boost for the industry towards better performance. Some side effects have to be observed like marked segregation and competition shifting (could be an EU issue)

**Building Public awareness** through use of standardised KPIs are an objective tool to keep public opinion informed about absolute performance levels and also to show trend and effect of measures applied to achieve particular industrial or political objectives.

Making the Results Available

When the Shipping KPI standard is defined the result shall be made available through a web based interface, a Depository. The definitions and the calculation formulas will be available. But most important is that to the extent possible the relevant background information and the evaluations performed while selecting the KPI definitions will be available as well.

If deemed necessary and if an operational concept can be found, a Q&A session and maybe a forum will be included in the Depository. The latter is dependent on the availability of an entity to manage the forum, to ensure the quality of the material uploaded. The Depository will be available at the end of 2008.

For Further Information Please Contact:

Guy Morel  
guy.morel@intermanager.org  
General Secretary  
InterManager  
Phone  +336 8086 0986

Harald Sleire  
harald.sleire@marintek.sintef.no  
Project Manager  
MARINTEK  
Phone  +47 7359 5500
Shipping KPI Standard

Ver 0.1
2008 NOV 17

IPR
The content of this document is the intellectual property of InterManager, the International Ship Managers’ Association, and should not be used for any commercial purpose or included in any application or service intended for commercial sale without Intermanager’s prior written consent.

Copyright © InterManager, the International Ship Managers’ Association 200[8]
No part of this work may be reproduced or transmitted in any form or by any means, or stored in any retrieval system of any nature without prior written permission, except for permitted fair dealing under the Copyright, Designs and Patents Act 1988. Application for permission for other use of copyright material including permission to reproduce extracts of the work shall be made to InterManager. Full acknowledgement of author and source must be given.
Contents

• The Shipping KPI Project
  – The Project Objective and History

• The Shipping KPI project results
  – The KPI Standard Concept
  – The KPI Depository
  – The SPIs
  – The KPIs
    – Calculation and scaling
Increased transparency

- Focus on quality matters, safety issues and environmental performance
- Develop frameworks for reporting of operational performance
  - meaningful for stakeholders without technical/ maritime background
Current industry situation

- Too many different indicators (KPIs)
  - Potential for confusion and mistakes
- Comparison of performance between companies is difficult
- Additional manpower required to present the same information in many different ways (onboard, in office and to externals)
- Difficult to mobilize organizational focus on quality improvement due to lack of aggregated measurements
- New reporting requirements are emerging, especially regarding environmental issues and Corporate Social Responsibility (CSR)
The KPI Project objectives

Develop an international standard for ship operation and corresponding tools to measure company and vessel performance

In order to:

• boost performance improvements internally in companies engaged in ship operation activities

• provide an efficient communication platform of ship operation performance information to internal and external stakeholders
Project organisation

Steering committee:
- Wilh. Wilhelmsen ASA, chairman
- Intermanager
- Eurasiagroup
- MARINTEK (observer)

Project Manager
- MARINTEK

Quality Assurance

MARINTEK Expert team
- Business professionals
- University professors

KPI Review Board
- TBN

Workshops

InterManager’s KPI Working Group
Project history

Oct. 2004
Discussion at Lloyd’s
Ship Management
conference at Cyprus

November 2005
Concluded prestudy
with Intellectual
Capital Service

Jan. 2005
Established Sponsor
Group

Feb. 2006
Application to
Research Council of
Norway

June 2006
Research Council of
Norway approved
funding

April 2007
1st draft of KPIs from
Marintek

Oct. 2006
Kick-off at Lloyd’s
Ship Management
conference at Cyprus

Jan. 2008
1st Workshop with
‘KPI working group’

Sept. 2007
Revised objectives
and project plan
Industry contributors

- Jebsen Management AS/Aboitiz Jebsen Bulk Transport Corp.
- V.Ships
- Bernhard Schulte Shipmanagement
- Barber Ship Management
- EMS Ship Management
- Eurasia International Limited
- Columbia Shipmanagement Ltd
- Anglo-Eastern Shipmanagement (Ltd.)
- Høegh Fleet Services AS
- Seaspan Ship Management Ltd
- Thome Ship Management Pte Ltd
- NYK Shipmanagement Singapore
- A.P. Møller-Maersk
- Epic
- Tsakos Shipping & Trading
- Chemikalien Seetransport GmbH
- Dobson Fleet Management
- Navigo Management Co
- Stolt-Nielsen Transportation Group
- TESMA holding
- Wilh. Wilhelmsen ASA
- BW Gas ASA
The Shipping KPI Standard - Concept

- Aggregated indexes for external communication
- Extended Balanced Score Card for internal improvement
- Corporate measurements

Financial

SPI

KPI

PI

Processes
Customer
Learning
HSE
Others
The Shipping KPI Standard - SPIs

- Environmental performance
- HR performance
- Safety performance
- Security performance
- Technical Performance
- Navigation Performance
- Operational Performance
The Shipping KPI Standard - KPIs

- Accidental releases of substances as def by MARPOL
- Ballast Water Discharge Violations
- Budget control per vessel
- Cargo incidents during cargo operations
- Cargo incidents during voyage
- CO2 emissions
- Condition of Class
- Contained Spills
- Crew behaviour
- Crew management
- Crew planning
- Drydocking Planning Performance
- Environmental deficiencies
- Failure of critical equipment and systems
- Fire and Explosions
- Flawless Port state control performance

- HR deficiencies
- Lost Time Injury Frequency
- Lost Time Sickness Frequency
- Navigational deficiencies
- Navigational Incidents
- No of Violations of MARPOL Annex 1-6
- NOx emissions
- Operational deficiencies
- Port state control deficiency rate
- Port state control detention
- Safety deficiencies
- Security deficiencies
- SOx emissions
- Vessel availability
The Shipping KPI Standard - PIs

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAE</td>
<td>Additional Authorized Expense</td>
</tr>
<tr>
<td>Absconded crew</td>
<td></td>
</tr>
<tr>
<td>Actual drydocking costs</td>
<td></td>
</tr>
<tr>
<td>Actual drydocking duration</td>
<td></td>
</tr>
<tr>
<td>Actual off-hire</td>
<td></td>
</tr>
<tr>
<td>Actual running Costs and Accruals</td>
<td></td>
</tr>
<tr>
<td>Agreed drydocking costs</td>
<td></td>
</tr>
<tr>
<td>Agreed drydocking duration</td>
<td></td>
</tr>
<tr>
<td>Allision</td>
<td></td>
</tr>
<tr>
<td>Average number of vessels under management</td>
<td></td>
</tr>
<tr>
<td>Ballast water discharge violations</td>
<td></td>
</tr>
<tr>
<td>Collision</td>
<td></td>
</tr>
<tr>
<td>Condition of class</td>
<td></td>
</tr>
<tr>
<td>Criminal offence</td>
<td></td>
</tr>
<tr>
<td>Drug/alcohol abused</td>
<td></td>
</tr>
<tr>
<td>Emitted Mass CO2</td>
<td></td>
</tr>
<tr>
<td>Emitted Mass NOx</td>
<td></td>
</tr>
<tr>
<td>Emitted Mass SOx</td>
<td></td>
</tr>
<tr>
<td>Failure of critical equipment and systems</td>
<td></td>
</tr>
<tr>
<td>Fatalities due to injuries</td>
<td></td>
</tr>
<tr>
<td>Fatalities due to sickness</td>
<td></td>
</tr>
<tr>
<td>Grounding</td>
<td></td>
</tr>
<tr>
<td>Lost Workday Cases</td>
<td></td>
</tr>
<tr>
<td>No of crew not relieved on time</td>
<td></td>
</tr>
<tr>
<td>No of dismissed crew</td>
<td></td>
</tr>
<tr>
<td>No of logged warnings</td>
<td></td>
</tr>
<tr>
<td>No of violations of MARPOL Annex 1-6</td>
<td></td>
</tr>
<tr>
<td>Number of cases where a crew member is sick for more than 24 hours</td>
<td></td>
</tr>
<tr>
<td>Number of new cadets</td>
<td></td>
</tr>
<tr>
<td>Officer working days</td>
<td></td>
</tr>
<tr>
<td>Officers retention rate</td>
<td></td>
</tr>
<tr>
<td>Permanent Total Disabilities</td>
<td></td>
</tr>
<tr>
<td>Permanent Partial Disabilities</td>
<td></td>
</tr>
<tr>
<td>Planned off-hire</td>
<td></td>
</tr>
<tr>
<td>PSC inspections resulting in zero deficiencies</td>
<td></td>
</tr>
<tr>
<td>Severe spills of bulk liquid</td>
<td></td>
</tr>
<tr>
<td>Total Exposure Hours</td>
<td></td>
</tr>
<tr>
<td>Total no of contained spills of bulk liquid</td>
<td></td>
</tr>
<tr>
<td>Total number of accidental releases of substances covered by MARPOL, to the environment</td>
<td></td>
</tr>
<tr>
<td>Total number of cargo units/passengers transported</td>
<td></td>
</tr>
<tr>
<td>Total number of damaged or lost cargo units/passengers injured during cargo handling</td>
<td></td>
</tr>
<tr>
<td>Total number of damaged or lost cargo units/passengers injured during voyage</td>
<td></td>
</tr>
<tr>
<td>Total number of Environmental related deficiencies</td>
<td></td>
</tr>
<tr>
<td>Total number of explosion incidents</td>
<td></td>
</tr>
<tr>
<td>Total number of fire incidents</td>
<td></td>
</tr>
<tr>
<td>Total number of HR related deficiencies</td>
<td></td>
</tr>
<tr>
<td>Total number of navigation related deficiencies</td>
<td></td>
</tr>
<tr>
<td>Total number of operational related deficiencies</td>
<td></td>
</tr>
<tr>
<td>Total number of PSC inspections</td>
<td></td>
</tr>
<tr>
<td>Total number of PSC deficiencies</td>
<td></td>
</tr>
<tr>
<td>Total number of PSC inspections resulting in a detention</td>
<td></td>
</tr>
<tr>
<td>Total number of recorded external inspections</td>
<td></td>
</tr>
<tr>
<td>Total number of safety related deficiencies</td>
<td></td>
</tr>
<tr>
<td>Total number of security related deficiencies</td>
<td></td>
</tr>
<tr>
<td>Training days</td>
<td></td>
</tr>
<tr>
<td>Transport Work</td>
<td></td>
</tr>
<tr>
<td>Vessel running cost budget</td>
<td></td>
</tr>
<tr>
<td>Violation of rest hours</td>
<td></td>
</tr>
</tbody>
</table>

Copyright © InterManager, the International Ship Managers’ Association 200[8]
Development of a hierarchical structure with accompanying definitions of indicators is another objective of the project. A set of Key Performance Indicators (KPIs) will be defined through an alignment process involving ship management companies and other stakeholders. The KPIs will form basis for the SPI definitions.

The project looks forward to deliver at KPIs as follows (also MARS/SEY program, CNS/SHIP Assessment Toolkit and IGT, 2003):

1. KPIs:
   - a numerical, objective measure of performance
   - key to the strategic business objective
   - actionable and influenced by the relevant stakeholder/manager
   - accountable to stakeholder/manager
   - output oriented, not focused on input or activity
   - possible to calculate with limited efforts and within limited time

The objectives of KPIs are to:
- measure for continuous improvement
- measure for internal and external benchmarking
- measure to set incentives

Published October 30, 2006
For Further Information or Help

Contact:
Guy Morel
guy.morel@intermanager.org
General Secretary
InterManager
Phone +336 8086 0986

Harald Sleire
harald.sleire@marintek.sintef.no
Project Manager
MARINTEK
Phone +47 7359 5500

Or visit the Depository (fully implemented by 31/12-2008)

http://www.sintef.no/Projectweb/Shipping-KPI/
Shipping Performance Indexes

“SPI”
**SPI: Operational Performance**

Operational Performance is a measure of the operational efficiency of the vessel including all cargo transport related operations including safe and efficient cargo handling, transport timeliness, reliability and cost efficiency.

### Highly Relevant KPIs (H):
- A: [Cargo incidents during cargo operations](#)
- B: [Cargo incidents during voyage](#)
- C: [Port state control detention](#)
- D: [Vessel availability](#)
- E: [Budget control per vessel](#)
- F: [Operational deficiencies](#)
- G: [Drydocking planning performance](#)

### Relevant KPIs (L):
- J: [Crew management](#)
- K: [Failures to critical equipment and systems](#)
- M: [Crew planning](#)
- N: [Flawless Port state control performance](#)
- O: [Navigational Incidents](#)
- P: [CO2 Emission](#)
- Q: [NOx emission](#)
- R: [SOx emission](#)
- S: [Accidental releases as defined by MARPOL](#)
- T: [Contained spills](#)
- U: [Security deficiencies](#)

**SPI Rating Formula**

\[
SPI \text{ Rating Formula} = \frac{(H \times (A + B + C + D + E + F + G)) + (L \times (J + K + M + N + O + P + Q + R + S + T + U))}{(H \times 8) + (L \times 11)}
\]

**Rating Parameters:**

- H = 3
- L = 1
## SPI: Navigational Performance

Navigational Performance is a measure of the navigational incidents recorded for each vessel. Navigational Incident is related to safe navigation.

<table>
<thead>
<tr>
<th>Highly Relevant KPIs (H):</th>
<th>Relevant KPIs (L):</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Navigational incidents</td>
<td>C: Crew management</td>
</tr>
<tr>
<td>B: Navigational deficiencies</td>
<td>D: Failures of critical equipment and systems</td>
</tr>
<tr>
<td>E: Crew planning</td>
<td></td>
</tr>
</tbody>
</table>

**SPI Rating Formula**

\[
\frac{(H \times (A + B)) + (L \times (C + D + E))}{(H \times 2) + (L \times 3)}
\]

**Rating Parameters:**

- \( H = 3 \)
- \( L = 1 \)
## SPI: Navigational Performance Calculation Example

<table>
<thead>
<tr>
<th><strong>Highly Relevant KPIs (H):</strong></th>
<th><strong>Relevant KPIs (L):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• A: Navigational incidents 80</td>
<td>• C: Crew management 70</td>
</tr>
<tr>
<td>• B: Navigational deficiencies 60</td>
<td>• D: Failures of critical equipment and systems 40</td>
</tr>
<tr>
<td>• E: Crew planning 45</td>
<td></td>
</tr>
</tbody>
</table>

**SPI Rating Formula**

\[
SPI = \frac{(H \times (A+B)) + (L \times (C+D+E))}{(H \times 2) + (L \times 3)}
\]

**Rating Parameters:**

- \(H = 3\)
- \(L = 1\)

\[
= \frac{3 \times (80 + 60) + 1 \times (70 + 40 + 45)}{3 \times 2 + 1 \times 3} = \frac{420 + 155}{9} = 64
\]
SPI: Environmental Performance

Environmental Performance is a measure of emissions, spills and other forms of pollution that impact the environment, caused by the vessel operations.
Recorded for each vessel.

<table>
<thead>
<tr>
<th>Highly Relevant KPIs (H):</th>
<th>Relevant KPIs (L):</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: No of Violations of MARPOL Annex 1-6</td>
<td>J: Crew management</td>
</tr>
<tr>
<td>B: CO2 emission</td>
<td>K: Failures to critical equipment and systems</td>
</tr>
<tr>
<td>C: NOx emission</td>
<td>M: Cargo incidents during cargo operations</td>
</tr>
<tr>
<td>D: SOx emission</td>
<td>N: Crew planning</td>
</tr>
<tr>
<td>E: Ballast water discharge violations</td>
<td>O: Cargo incidents during voyage</td>
</tr>
<tr>
<td>F: Accidental releases as defined by MARPOL</td>
<td>P: Port state control detention</td>
</tr>
<tr>
<td>G: Contained spills</td>
<td>Q: Flawless port state control performance</td>
</tr>
<tr>
<td>I: Environmental deficiencies</td>
<td>R: Navigational incidents</td>
</tr>
</tbody>
</table>

SPI Rating Formula = \((H \ast (A+B+C+D+E+F+G+I)) + (L \ast (J+K+M+N+O+P+Q+R))\)
\((H \ast 8) + (L \ast 9)\)

Rating Parameters:
H=3
L=1
## SPI: Technical Performance

Technical Performance is a measure of the technical incidents for each vessel including technical breakdown and technical underperformances.

<table>
<thead>
<tr>
<th>Highly Relevant KPIs (H):</th>
<th>Relevant KPIs (L):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A: Failures to critical equipment and systems</td>
<td>• C: Crew management</td>
</tr>
<tr>
<td>• B: Condition of class</td>
<td>• D: Cargo incidents during cargo operations</td>
</tr>
</tbody>
</table>

### Relevant KPIs (L):

- E: Crew planning
- F: Cargo incidents during voyage
- G: Port state control detention
- I: Flawless Port state control performance
- J: Navigational Incidents
- K: Violations of MARPOL Annex 1-6
- M: CO2 emission
- N: NOx emission
- O: SOx emission
- P: Accidental releases as defined by MARPOL
- Q: Contained spills
- R: Vessel availability

### SPI Rating Formula

\[
SPI \text{ Rating Formula} = \frac{(H \times (A+B)) + (L \times (C+D+E+F+G+I+J+K+M+N+O+P+Q+R))}{(H \times 2) + (L \times 14)}
\]

### Rating Parameters:

- \(H = 3\)!!
- \(L = 1\)!!
**SPI: Safety Performance**

Safety Performance is a measure of accidents/incidents resulting in injuries or death. Environmental damage and safety of assets and cargo are covered by a different SPI. An accident is a special form of incident involving injuries or death to personnel (check OSHAS, ISO 18001 def).

We would also like to include near misses but the challenge here is the reporting and quality of such. Near misses are also considered more leading than lagging.

<table>
<thead>
<tr>
<th>Highly Relevant KPIs (H):</th>
<th>Relevant KPIs (L):</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Flawless Port state control performance</td>
<td>E: Crew management</td>
</tr>
<tr>
<td>B: LTIF</td>
<td>F: Failures to critical equipment and systems</td>
</tr>
<tr>
<td>C: Safety deficiencies</td>
<td>G: Cargo incidents during cargo handling</td>
</tr>
<tr>
<td>D: Fire and Explosions</td>
<td>I: Crew planning</td>
</tr>
</tbody>
</table>

\[
SPI \text{ Rating Formula} = \frac{(H \times (A + B + C + D)) + (L \times (E + F + G + I + J + K + M + N))}{(H \times 4) + (L \times 8)}
\]

**Rating Parameters:**

- H = 3
- L = 1
### SPI: Security Performance

Security Performance is a measure of security incidents (as described in the ISPS Code) recorded for each vessel. Security incident is an intentional or unintentional breach of security (ref ISPS code).

**Highly Relevant KPIs (H):**
- A: Security deficiencies

**Relevant KPIs (L):**
- B: Crew management
- C: Crew planning
- D: Port state control detention
- E: Flawless port state control performance
- F: Crew behaviour

**SPI Rating Formula**

\[
SPI \text{ Rating Formula} = \frac{(H \times A) + (L \times (B+C+D+E+F))}{(H) + (L \times 5)}
\]

**Rating Parameters:**
- \(H = 3\)
- \(L = 1\)
## SPI: HR Performance

Human Resources Performance is a measure of the company's ability to employ, retain and develop personnel with the required competences in order to ensure safe and efficient operations of the vessels.

### Highly Relevant KPIs (H):
- A: Crew management
- B: Crew planning
- C: Crew behaviour
- D: LT SF
- E: HR deficiencies

### Relevant KPIs (L):
- F: Cargo incidents during cargo operations
- G: Cargo incidents during voyage
- I: Navigational incidents
- J: Violations of MARPOL Annex 1-6
- K: Ballast water discharge violations
- M: Security deficiencies
- N: Vessel availability
- O: LTIF

### SPI Rating Formula

\[
SPI \text{ Rating Formula } = \frac{(H \times (A+B+C+D+E)) + (L \times (F+G+I+J+K+M+N+O))}{(H \times 5) + (L \times 8)}
\]

### Rating Parameters:
- \( H = 3 \)
- \( L = 1 \)
This page is intentionally left blank
Key Performance Indicators

“KPI”
### KPI: Accidental releases of substances as def by MARPOL

Accidental discharges to the environment in violation of MARPOL during a calendar year. Due to difficulties related to measuring the actual volume/quantity of a spill, only number of spills are counted. Measured per vessel for internal improvement as well as external communication.

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A: Total number of accidental releases of substances covered by MARPOL, to the environment</td>
</tr>
<tr>
<td>• B: Severe spills of bulk liquid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KPI Value Formula=</th>
</tr>
</thead>
<tbody>
<tr>
<td>A + B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KPI Rating Formula=</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = 100 rating</td>
</tr>
<tr>
<td>1 = 50 rating</td>
</tr>
<tr>
<td>&gt; 1 = 0 rating</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating Parameters:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
</tr>
</tbody>
</table>

This KPI counts the number of (severe) spills of liquid and accidental releases of substances
**KPI: Ballast water discharge violations**

Any discharge or exchange of ballast water (or lack of doing so) during a calendar year, not in compliance with applicable rules and regulations

**Relevant PIs:**
- Ballast water discharge violations

**KPI Value Formula:** \[ \sum \text{Ballast water discharge violations} \]

**KPI Rating Formula:**
- \[ 0 = 100 \text{ rating} \]
- \[ 1 = 50 \text{ rating} \]
- \[ > 1 = 0 \text{ rating} \]

This KPI counts the number of times where prevailing regulations regarding treatment of ballast water has been violated.
## KPI: Budget control per vessel

The overall costs deviation (management, purchasing, operation, M&R, crewing) vs. budgets. Show the ability of the ship manager to effectively plan the ship’s operating costs (e.g. predictable costs, good budgeting). The costs deviation is adjusted for agreed additional expenditure.

Measured per fiscal year.
Measured per vessel for internal improvement as well as external communication

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Vessel running cost budget</td>
<td></td>
</tr>
<tr>
<td>• Actual running costs and accruals</td>
<td></td>
</tr>
<tr>
<td>• Additional Authorized Expenses (AAE)</td>
<td></td>
</tr>
</tbody>
</table>

### KPI Value Formula:

\[
\text{Vessel running cost budget - (Actual running costs and accruals - AAE)} \div \text{Vessel running cost budget} \times 100\%
\]

### KPI Rating Formula:

\[
100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:

\[
Z = 10
\]

This KPI measures the deviations from the vessel's running cost budget in percentage by comparing it to the vessel's actual running costs and accruals and taking into account additional authorized expense (AAE) as these expenses are in fact altering the vessel's running cost budget by being authorized/approved by the ship owner.
## KPI: Budget control per vessel
### Calculation Example

### Relevant PI's:
- Vessel running cost budget: 1,2M USD
- Actual running costs and accruals: 1,5M USD
- Additional Authorized Expenses (AAE): 0,25M USD

### KPI Value Formula:

\[
\text{KPI Value} = \frac{\text{Vessel running cost budget} - (\text{Actual running costs and accruals} - \text{AAE})}{\text{Vessel running cost budget}} \times 100\% \]

\[
= \frac{1,2 - (1,5 - 0,25)}{1,2} \times 100\% = 4,17\%
\]

### KPI Rating Formula:

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - 10 \times 4,17 = 100 - 41,7 = \textbf{58,3}
\]

### Rating Parameters:
- Z = 10
**KPI: Cargo incidents during cargo operations**

The total number of cases where cargo is damaged or lost or passengers are injured during cargo operations during a calendar year. Made relative to the total number of cargo units transported during a calendar year. Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- Total number of damaged or lost cargo units or passengers injured during cargo handling
- Total number of cargo units or passengers transported

### KPI Value Formula:

\[
\text{KPI Value} = \frac{\text{Total number of damaged or lost cargo units or passengers injured during cargo handling}}{\text{Total number of cargo units or passengers transported}}
\]

### KPI Rating Formula:

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value})
\]

**Rating Parameters:**

- \( Z = 100000 \)

This KPI represents a ratio between the total quantity of damaged or lost cargo or injured passengers (during handling operations such as loading cargo or boarding passengers) relative to the total quantity of cargo or number of passengers handled during a calendar year. By defining the KPI as a ratio, benchmarking is feasible even between different vessels (or companies on an aggregated level).
## KPI: Cargo incidents during cargo operations
### Calculation Example

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of damaged or lost cargo units or passengers injured during cargo handling</td>
<td>4</td>
</tr>
<tr>
<td>Total number of cargo units or passengers transported</td>
<td>150,000</td>
</tr>
</tbody>
</table>

### KPI Value Formula=
\[
\text{KPI Value} = \frac{\text{Total number of damaged or lost cargo units or passengers injured during cargo handling}}{\text{Total number of cargo units or passengers transported}}
\]

### KPI Rating Formula=
\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - (10^5 \times 2.6 \times 10^{-5}) = 100 - 2.6 = 97.4
\]

### Rating Parameters:
\[
Z = 100000 = 10^5
\]

A cargo destruction rate of 1000ppm will give zero rating, 1000 unit destroyed out of one million transported.
KPI: Cargo incidents during voyage

The total number of cases where cargo is damaged or lost or passengers are injured during voyage during a calendar year. Made relative to the total number of cargo units transported during a calendar year. Measured per vessel for internal improvement as well as external communication.

Relevant PIs:
- Total number of damaged or lost cargo units or passengers injured during voyage
- Total number of cargo units or passengers transported

KPI Value Formula:

\[
\text{KPI Value} = \frac{\text{Total number of damaged or lost cargo units or passengers injured during voyage}}{\text{Total number of cargo units or passengers transported}}
\]

KPI Rating Formula:

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value})
\]

Rating Parameters:

\[Z = 10000\]

This KPI represents a ratio between the total quantity of damaged or lost cargo or injured passengers (during the actual sea voyage) relative to the total quantity of cargo or number of passengers transported during a calendar year. By defining the KPI as a ratio, benchmarking is feasible even between different vessels (or companies on an aggregated level).
## KPI: Cargo incidents during voyage
### Calculation Example

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
<th></th>
<th>4</th>
<th>150.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of damaged or lost cargo units or passengers injured during voyage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of cargo units or passengers transported</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### KPI Value Formula=

\[
\text{KPI Value Formula} = \frac{\text{Total number of damaged or lost cargo units or passengers injured during voyage}}{\text{Total number of cargo units or passengers transported}}
\]

\[
= \frac{4}{150.000} = 2,6 \times 10^{-5}
\]

### KPI Rating Formula=

\[
\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value}) = 100 - (10^4 \times 2,6 \times 10^{-5}) = 100 - 0,26 = 99,74
\]

### Rating Parameters:

\[Z = 10000 = 10^4\]

A cargo destruction rate of 10000ppm will give zero rating, 10000 unit destroyed out of one million transported.
# KPI: CO2 emissions

The estimated CO2 efficiency during a calendar year. Measured per vessel for external communication

## Relevant PIs:
- Emitted Mass CO2
- Transport Work

## KPI Value Formula:

$$\text{KPI Value Formula} = \frac{\text{Emitted Mass CO2} \times 10^6}{\text{Transport Work}}$$

## KPI Rating Formula:

$$\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value})$$

## Rating Parameters:

$$Z = 7$$

This KPI compares emitted mass of CO2 to the vessel’s total transport work, hereby stating the vessel’s energy efficiency. As the PI ‘Emitted Mass CO2 is to be given in tons, the PI’s value is multiplied by 1 million to get the KPI value in g/ton mile.
KPI: CO2 emissions
Calculation Example

**Relevant PIs:**
- Emitted Mass CO2 103.500 ton
- Transport Work 20.710.647.000 tonmile

**KPI Value Formula:**
\[
\text{KPI Value} = \frac{\text{Emitted Mass CO2} \times 10^6}{\text{Transport Work}} = \frac{103500 \times 10^6}{20710647000} = 4,98 \text{g/tonmile}
\]

**KPI Rating Formula:**
\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - 7 \times 4,98 = 65,1
\]

**Rating Parameters:**
- \( Z = 7 \)

**Some typical emission factors**

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>Index unit</th>
<th>CO2</th>
<th>NOx</th>
<th>SOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG Tanker</td>
<td>g/ tonmile</td>
<td>66,5</td>
<td>1,9</td>
<td>1,2</td>
</tr>
<tr>
<td>Chemical Tanker</td>
<td>g/ tonmile</td>
<td>23,5</td>
<td>0,7</td>
<td>0,4</td>
</tr>
<tr>
<td>Crude Oil Tanker</td>
<td>g/ tonmile</td>
<td>8</td>
<td>0,2</td>
<td>0,1</td>
</tr>
<tr>
<td>Bulk Dry</td>
<td>g/ tonmile</td>
<td>7,6</td>
<td>0,2</td>
<td>0,1</td>
</tr>
<tr>
<td>Container</td>
<td>g/ tonmile</td>
<td>96,5</td>
<td>2,7</td>
<td>1,7</td>
</tr>
<tr>
<td>Refrigerated Cargo</td>
<td>g/ tonmile</td>
<td>124,3</td>
<td>3,5</td>
<td>2,2</td>
</tr>
<tr>
<td>RO-RO Cargo</td>
<td>g/ tonmile</td>
<td>94,9</td>
<td>1,8</td>
<td>1,7</td>
</tr>
</tbody>
</table>

Z value to be updated (agreed), and need to be differentiated between ship size and other factors.
## KPI: Condition of class

All condition of class during a calendar year. Condition of class is a written statement from class (ref. IACS). Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- Condition of class

<table>
<thead>
<tr>
<th>KPI Value Formula</th>
<th>( \sum \text{Conditions of class} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI Rating Formula</td>
<td>( 100 - (Z \times \text{KPI Value}) )</td>
</tr>
<tr>
<td>Rating Parameters:</td>
<td>( Z = 20 )</td>
</tr>
</tbody>
</table>

This KPI counts the total number of Conditions of Class issued. Conditions of class is not measured as a ratio as the potential denominator (total no of inspections where CoCs can be stated) is said to be relatively low between all vessels.
## KPI: Condition of class
### Calculation Example

**Relevant PIs:**
- Condition of class = 3

<table>
<thead>
<tr>
<th>KPI Value Formula</th>
<th>$\sum$Conditions of class = 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI Rating Formula</td>
<td>$100-(Z\times\text{KPI Value}) = 100 - 20\times3 = 40$</td>
</tr>
<tr>
<td>Rating Parameters</td>
<td>$Z = 20$</td>
</tr>
</tbody>
</table>
# KPI: Contained Spills

Contained spills should cover liquid spills including cargo and bunkers contained on the vessel. Summarized per calendar year.
Measured per vessel for internal improvement as well as external communication.

## Relevant PIs:
- Total no of contained spills of bulk liquid

## KPI Value Formula:
\[ \sum \text{Number of contained spills of bulk liquid} \]

## KPI Rating Formula:
\[ 100-(Z \times \text{KPI Value}) \]

## Rating Parameters:
\[ Z = 33.33 \]

Some spills are contained but still represent an incident that should be recorded. This KPI counts the total number of contained spills. No denominator has been proven necessary for benchmarking purposes.
### KPI: Contained Spills Calculation Example

**Relevant PIs:**
- Total no of contained spills of bulk liquid: 2

<table>
<thead>
<tr>
<th>Formula</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KPI Value Formula:</strong></td>
<td>$\sum \text{Number of contained spills of bulk liquid} = 2$</td>
</tr>
<tr>
<td><strong>KPI Rating Formula:</strong></td>
<td>$100 - (Z \times \text{KPI Value}) = 100 - 33.3 \times 2 = 33.4$</td>
</tr>
</tbody>
</table>

**Rating Parameters:**
- $Z = 33.33$
KPI: Crew behaviour

The behaviour of the crew on a vessel. Counted per calendar year and made relative to the average number of crew onboard the vessel during a calendar year. If one incident of the same crew breach several categories, each breach should be counted individually. Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- A: Absconded Crew
- B: Criminal offence
- C: Drugs or alcohol abused
- D: No of dismissed crew
- E: No of logged warnings
- F: Total Exposure hours

### KPI Value Formula:
\[
\frac{(A+B+C+D+E) \times (24 \times 365)}{F}
\]

### KPI Rating Formula:
\[
100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:
- \( Z = 1000 \)

This KPI counts the total number of breaches of code of conduct made by the vessel's crew such as substance abuse, criminal offences and AWOLs. As the number of crew on different vessels vary significantly, total exposure hours (divided by 24*265 to represent the average number of crew onboard the vessel) is used as a denominator to enable benchmarking.
### KPI: Crew behaviour Calculation Example

#### Relevant PIs:
- **A**: Absconded Crew 0
- **B**: Criminal offence 0
- **C**: Drugs or alcohol abused 0
- **D**: No of dismissed crew 0
- **E**: No of logged warnings 1
- **F**: Total Exposure hours 90,000 (approximately 10 persons onboard)

#### KPI Value Formula:
\[
\frac{(A+B+C+D+E) \times (24 \times 365)}{F} = \frac{(0+0+0+0+1) \times 24 \times 365}{90000} = 0,0973
\]

#### KPI Rating Formula:
\[
100 - (Z \times \text{KPI Value}) = 100 - 1000 \times 0,0973 = 100 - 97,3 = 2,7
\]

#### Rating Parameters:
- **Z** = 1000
# KPI: Crew management

The KPI measures the ship management organisation's ability to acquire and maintain the required competence/crew for their operations. Measured per calendar year. Measured as a company KPI for internal improvement as well as external communication.

**Relevant PIs:**
- **D:** Training days
- **E:** Officer working days
- **F:** Number of new cadets
- **G:** Average number of vessels under management
- **H:** Officer retention rate

**KPI Value Formula:**

\[
KPI \text{ Value} = \frac{A \times D}{E} + B \times \frac{F}{G} + C \times H
\]

**KPI Value Parameters:**
- \(A = 60.83\)
- \(B = 2\)
- \(C = 4\)

**KPI Rating Formula:**

\[
KPI \text{ Rating} = (Z \times KPI \text{ Value}) - 100
\]

**Rating Parameters:**
- \(Z = 35\)

This KPI combines the training effort, ability to have new cadets onboard and the officer retention rate to express crew management capability of the ship manager. Due to the different score-range for the three ratios, three value parameters (A, B and C) are introduced.
### KPI: Crew management Calculation Example

#### Relevant PIs:
- **D**: Training days  
  - Value: 20
- **E**: Officer working days  
  - Value: 1825 (crew of 5)
- **F**: Number of new cadets  
  - Value: 11
- **G**: Average number of vessels under management  
  - Value: 10
- **H**: Officer retention rate  
  - Value: 0.6

#### KPI Value Formula:

\[
KPI = \frac{A \times D}{E} + B \times \frac{F}{G} + C \times H \\
= 60.83 \times \frac{20}{1825} + 2 \times \frac{11}{10} + 4 \times 0.6 \\
= 0.666 + 2 + 2.4 = 5.266
\]

#### KPI Value Parameters:
- **A**: 60.83
- **B**: 2
- **C**: 4

#### KPI Rating Formula:

\[
(KPI \times Z) - 100 = 5.26 \times 35 - 100 = 84.1
\]

#### Rating Parameters:
- **Z**: 35
### KPI: Crew planning

The ship management organisation’s performance in crew planning.
Measured per calendar year.
Measured as a vessel KPI for internal improvement as well as external communication.

**Relevant PIs:**
- No of crew not relieved on time
- Violation of rest hours

<table>
<thead>
<tr>
<th><strong>KPI Value Formula</strong></th>
<th>No of crew not relieved on time + Violation of rest hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KPI Rating Formula</strong></td>
<td>100-(Z*KPI Value)</td>
</tr>
<tr>
<td><strong>Rating Parameters:</strong></td>
<td>Z = 10</td>
</tr>
</tbody>
</table>

This KPI counts the ship manager's ability to relieve crew on time as well as avoiding violations of rest hours.
## KPI: Crew planning
### Calculation Example

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No of crew not relieved on time</td>
<td>1</td>
</tr>
<tr>
<td>Violation of rest hours</td>
<td>4</td>
</tr>
</tbody>
</table>

## KPI Value Formula:
No of crew not relieved on time + Violation of rest hours = 1 + 4 = 5

## KPI Rating Formula:
100 - (Z*KPI Value) = 100 – 10*5 = **50**

## Rating Parameters:
Z = 10
# KPI: Drydocking planning performance

The deviations (positive or negative) from scheduled drydocking plan related to time and costs per drydocking. Summarized per 5 year rolling time period. Measured per vessel for internal improvement as well as external communication.

## Relevant PIs:
- Agreed drydocking duration
- Actual drydocking duration
- Agreed drydocking costs
- Actual drydocking costs

## KPI Value Formula

\[
\text{KPI Value} = \frac{\text{Actual drydocking duration} - \text{Agreed drydocking duration}}{\text{Agreed drydocking duration}} \times 100\% + \frac{\text{Actual drydocking costs} - \text{Agreed drydocking costs}}{\text{Agreed drydocking costs}} \times 100\%
\]

## KPI Rating Formula

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value})
\]

## Rating Parameters

\[Z = 2\]

This KPI measures the deviations from planned duration and costs of a vessel's drydocking in percentage. Both 'positive' and 'negative' deviations are treated equally as the KPI measures the ship managers' ability to create accurate plans and not their ability to cut time and costs.
## KPI: Drydocking Planning Performance Calculation Example

### Relevant PIs:
- Agreed drydocking duration: 14 days
- Actual drydocking duration: 16 days
- Agreed drydocking costs: 4M USD
- Actual drydocking costs: 3,9M USD

### KPI Value Formula:

\[
\text{KPI Value} = \frac{\text{Actual drydocking duration} - \text{Agreed drydocking duration}}{\text{Agreed drydocking duration}} \times 100 + \frac{\text{Actual drydocking costs} - \text{Agreed drydocking costs}}{\text{Agreed drydocking costs}} \times 100
\]

\[
= \frac{16 - 14}{14} \times 100 + \frac{3,9 - 4}{4} \times 100 = 14,3\% + 2,5\% = 16,8\%
\]

### KPI Rating Formula:

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - 2 \times 16,8 = 100 - 33,6 = 66,4
\]

### Rating Parameters:

- \(Z = 2\)

Be aware that it is the absolute value of the deviation that is used, so both negative and positive deviations reduce your performance.
### KPI: Environmental deficiencies

Environment-related deficiencies, observations and non-conformances, recorded during external inspections and audits during a calendar year. Made relative to the total number of external inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

#### Relevant PIs:
- Total number of environmental related deficiencies
- Total number of recorded external inspections

#### KPI Value Formula:
\[
\text{Total number of Environmental related deficiencies} \div \text{Total number of recorded external inspections}
\]

#### KPI Rating Formula:
\[
100 - (Z \times \text{KPI Value})
\]

#### Rating Parameters:
- \( Z = 33.33 \)

This KPI is part of a range of KPIs related to deficiencies that are identified during external inspections. These deficiencies are categorized depending on their nature such as deficiencies related to environmental issues such as a failure in the Oily Water Separator (OWS).

The total number of recorded external inspection is used as a denominator in all these KPIs to enable benchmarking between vessels that are subject to a uneven number of external inspection.
## KPI: Environmental deficiencies
### Calculation Example

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total number of Environmental related deficiencies</td>
<td>13</td>
</tr>
<tr>
<td>• Total number of recorded external inspections</td>
<td>3</td>
</tr>
</tbody>
</table>

### KPI Value Formula:

\[
\text{KPI Value Formula} = \frac{\text{Total no of Environmental related deficiencies}}{\text{Total number of recorded external inspections}} = \frac{13}{3} = 4.33
\]

### KPI Rating Formula:

\[
\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value}) = 100 - 33.33 \times 4.33 = 100 - 144.4 = 0 \quad \text{NB!}
\]

### Rating Parameters:

\[Z = 33.33\]

---

The rating will in this example give a negative number but we set the KPI Rating to zero. Worse performance than zero is not recorded.
## KPI: Failure of critical equipment and systems

The total number of failures to equipment and systems in the critical list (as required by the ISM code 10.3 and defined in the company SMS) resulting in whole or partial unavailability during a calendar year. Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- Failure of critical equipment and systems

### KPI Value Formula

\[ \Sigma \text{Failure of critical equipment and systems} \]

### KPI Rating Formula

\[ 100 - (Z \times \text{KPI Value}) \]

### Rating Parameters:

\[ Z = 20 \]

As the vessels’ critical lists may vary in size it could be argued that e.g. the number of items on the list could be used as a denominator for benchmarking purposes. In any case, a failure to a critical equipment or system is a serious matter, regardless of the number of items in the vessel’s critical list, and the KPI ‘Failure to critical equipment and systems is kept without a denominator.
## KPI: Failure of critical equipment and systems

### Calculation Example

<table>
<thead>
<tr>
<th><strong>Relevant PIs:</strong></th>
<th><strong>Failure of critical equipment and systems</strong>  = 3</th>
</tr>
</thead>
</table>

### KPI Value Formula

\[ \sum \text{Failure of critical equipment and systems} = 3 \]

### KPI Rating Formula

\[ 100 - (Z \times \text{KPI Value}) = 100 - 20 \times 3 = \underline{40} \]

### Rating Parameters:

\[ Z = 20 \]
# KPI: Fire and Explosions

The total number of fire and explosions incidents during a calendar year. Measured per vessel for internal improvement as well as external communication

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total number of fire incidents</td>
</tr>
<tr>
<td>• Total number of explosion incidents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KPI Value Formula=</th>
<th>Total number of fire incidents + Total number of explosion incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI Rating Formula=</td>
<td>0 = 100 rating</td>
</tr>
<tr>
<td></td>
<td>1 = 50 rating</td>
</tr>
<tr>
<td></td>
<td>&gt; 1 = 0 rating</td>
</tr>
</tbody>
</table>

| Rating Parameters: | N/A |

This KPI counts the total number of incidents related to fire and explosions
### KPI: Flawless Port state control performance

The ratio of port state control inspections resulting in zero deficiencies during a calendar year compared to the total number of PSC inspections. Measured per vessel for internal improvement as well as external communication.

#### Relevant PIs:
- PSC inspections resulting in zero deficiencies
- Total number of PSC inspections

#### KPI Value Formula:
\[
\text{KPI Value Formula} = \frac{\text{PSC inspections resulting in zero deficiencies}}{\text{Total number of PSC inspections}}
\]

#### KPI Rating Formula:
\[
\text{KPI Rating Formula} = Z \times \text{KPI Value}
\]

#### Rating Parameters:
\[
Z = 100
\]

This KPI is one of three KPIs related to Port State Control Inspections. The three areas covered are: 'Port state control deficiency rate' which measures the ratio of the total number of issued deficiencies during port state control inspection against the total number of port state control inspections conducted, 'Port state control detention' which measures the total number of port state control inspections resulting in a detention and this specific KPI, 'Flawless port state control performance' which measures the percentage of port state controls resulting in zero deficiencies against the total number of port state control inspections conducted.
**KPI: Flawless Port state control performance Calculation Example**

**Relevant PIs:**
- PSC inspections resulting in zero deficiencies: 2
- Total number of PSC inspections: 4

**KPI Value Formula:**
\[
\frac{\text{PSC inspections resulting in zero deficiencies}}{\text{Total number of PSC inspections}} = \frac{2}{4} = 0.5
\]

**KPI Rating Formula:**
\[Z \times \text{KPI Value} = 100 \times 0.5 = 50\]

**Rating Parameters:**
- \(Z = 100\)
### KPI: HR deficiencies

HR-related deficiencies, observations and non-conformances, recorded during external inspections and audits during a calendar year. Made relative to the total number of external inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

#### Relevant PIs:
- Total number of HR related deficiencies
- Total number of recorded external inspections

#### KPI Value Formula

\[
\text{KPI Value Formula} = \frac{\text{Total number of HR related deficiencies}}{\text{Total number of recorded external inspections}}
\]

#### KPI Rating Formula

\[
\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value})
\]

#### Rating Parameters:

\[
Z = 33.33
\]

This KPI is part of a range of KPIs related to deficiencies that are identified during external inspections. These deficiencies are categorized depending on their nature such as deficiencies related to HR issues such as lack of compliance to resting-hours.

The total number of recorded external inspection is used as a denominator in all these KPIs to enable benchmarking between vessels that are subject to a uneven number of external inspection.
**KPI: Lost Time Injury Frequency**

The number of Lost Time Injuries (LTI) per unit exposure hours (OCIMF). Exposure hours are 24 hours per day while serving onboard. Note that injuries during spare-time on board are also included. LTI is the sum of Fatalities, Permanent Total Disabilities, Permanent Partial Disabilities and Lost Workday Cases. Measured per calendar year. Measured per vessel for internal improvement as well as external communication.

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• F: Fatalities due to injuries</td>
</tr>
<tr>
<td>• LWC: Lost workday cases</td>
</tr>
<tr>
<td>• PTD: Permanent total disabilities</td>
</tr>
<tr>
<td>• PPD: Permanent partial disabilities</td>
</tr>
<tr>
<td>• TEH: Total exposure hours</td>
</tr>
</tbody>
</table>

**KPI Value Formula:**

\[
\text{KPI Value Formula} = \frac{F + LWC + PTD + PPD}{\text{TEH} \times 10^{-6}}
\]

**KPI Rating Formula:**

\[
\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value})
\]

**Rating Parameters:**

\[Z = 8\]

This KPI represents a ratio between Lost Time Injuries (fatalities, lost workday cases and permanent total and partial disabilities) against the total exposure hours. The unit for the KPI value is in incident per million hour exposure.
# KPI: Lost Time Injury Frequency Calculation Example

## Relevant PIs:
- **F**: Fatalities due to injuries \(= 0\)
- **LWC**: Lost workday cases \(= 3\)
- **PTD**: Permanent total disabilities \(= 0\)
- **PPD**: Permanent partial disabilities \(= 0\)
- **TEH**: Total exposure hours \(= 87600\) (crew of 10)

## KPI Value Formula:
\[
\text{KPI Value} = \frac{F + LWC + PTD + PPD}{TEH \times 10^{-6}} = \frac{0 + 3 + 0 + 0}{87600 \times 10^{-6}} = \frac{3}{0.876} = 3.423
\]

## KPI Rating Formula:
\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - 8 \times 3.42 = 72.6
\]

## Rating Parameters:
- \(Z = 8\)
### KPI: Lost Time Sickness Frequency

The number of cases where a crew member is sick for more than 24 hours per unit exposure hours, including fatalities. Exposure hours are 24 hours per day while serving onboard. Note that sickness during onboard spare-time is also included. Measured per calendar year.

#### Relevant PIs:
- A: Number of cases where crew member is sick for more than 24 hours
- B: Fatalities due to sickness
- TEH: Total Exposure Hours

#### KPI Value Formula:
\[
\text{KPI Value Formula} = \frac{A + B}{\text{TEH} \times 10^{-6}}
\]

#### KPI Rating Formula:
\[
\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value})
\]

#### Rating Parameters:
Z = 4

This KPI represents a ratio between the total number of cases where a crew member is sick for more than 24 hours as well as the total number of fatalities due to sickness against the total exposure hours. The unit for the KPI value is in incident per million hour exposure.
### KPI: Lost Time Sickness Frequency Calculation Example

**Relevant PIs:**
- **A:** Number of cases where crew member is sick for more than 24 hours
- **B:** Fatalities due to sickness
- **TEH:** Total Exposure Hours

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Number of cases where crew member is sick for more than 24 hours</td>
</tr>
<tr>
<td>B</td>
<td>Fatalities due to sickness</td>
</tr>
<tr>
<td>TEH</td>
<td>Total Exposure Hours</td>
</tr>
</tbody>
</table>

**KPI Value Formula:**

\[
\text{KPI Value} = \frac{A + B}{\text{TEH} \times 10^{-6}} = \frac{2 + 0}{87600 \times 10^{-6}} = \frac{2}{0.876} = 2.28
\]

**KPI Rating Formula:**

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - 4 \times 2.28 = 90.88
\]

**Rating Parameters:**

- **Z** = 4
**KPI: Navigational deficiencies**

Navigation-related deficiencies, observations and non-conformances, recorded during external inspections and audits during a calendar year. Made relative to the total number of external inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

**Relevant PIs:**
- Total number of Navigational related deficiencies
- Total number of recorded external inspections

**KPI Value Formula:**
\[
\text{KPI Value} = \frac{\text{Total number of Navigational related deficiencies}}{\text{Total number of recorded external inspections}}
\]

**KPI Rating Formula:**
\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value})
\]

**Rating Parameters:**
\[
Z = 33.33
\]

This KPI is part of a range of KPIs related to deficiencies that are identified during external inspections. These deficiencies are categorized depending on their nature such as deficiencies related to safety issues such as mal-functioning radar.

The total number of recorded external inspection is used as a denominator in all these KPIs to enable benchmarking between vessels that are subject to a uneven number of external inspection.
## KPI: Navigational incidents

Any navigational incident resulting in a collision, allision or grounding during a calendar year. All incidents are counted and summed up, regardless of the cause of the incident. Measured per vessel for internal improvement as well as external communication.

**Relevant PIs:**
- Collision
- Allision
- Grounding

### KPI Value Formula

$\text{KPI Value Formula} = (A \times \text{Collision}) + (B \times \text{Allision}) + (C \times \text{Grounding})$

**Value Parameters:**
- $A = 2$
- $B = 1$
- $C = 2$

### KPI Rating Formula

$\text{KPI Rating Formula} = 100 - (Z \times \text{KPI Value})$

**Rating Parameters:**
- $Z = 50$

This KPI measures the total number of collisions, allisions and groundings recorded during a calendar year.

The KPI's value is a simple counter where the parameters weight collision and grounding twice as influential to the KPI as an allision.
<table>
<thead>
<tr>
<th>Relevant PIs</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Allision</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grounding</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**KPI Value Formula:**

\[(A \times \text{Collision}) + (B \times \text{Allision}) + (C \times \text{Grounding}) = 2 \times 0 + 1 \times 1 + 2 \times 0 = 1\]

**Value Parameters:**

- A = 2
- B = 1
- C = 2

**KPI Rating Formula:**

\[100 - (Z \times \text{KPI Value}) = 100 - 50 \times 1 = 50\]

**Rating Parameters:**

- Z = 50
**KPI: No of violations of MARPOL Annex 1-6**

KPI covering substances overboard (outside operational emissions and oil-spills) in breach of regulation during a calendar year. Measured per vessel for internal improvement as well as external communication.

**Relevant PIs:**
- Number of violations of MARPOL Annex 1-6

<table>
<thead>
<tr>
<th><strong>KPI Value Formula</strong></th>
<th>$\Sigma$ Violations of MARPOL Annex 1-6</th>
</tr>
</thead>
</table>
| **KPI Rating Formula** | 0 = 100 rating  
1 = 50 rating  
> 1 = 0 rating |

This KPI counts the number of times where MARPOL Annex 1-6 has been violated.
## KPI: NOx emissions

The estimated NOx efficiency during a calendar year. Measured per vessel for external communication

### Relevant PIs:
- Emitted Mass NOx
- Transport Work

### KPI Value Formula:
\[
\text{Emitted Mass NOx} \times 10^6 \\
\text{Transport Work}
\]

### KPI Rating Formula:
\[
100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:
\[
Z = 250
\]

This KPI compares emitted mass of NOx to the vessel's total transport work, hereby stating the value achieved (transport work) by the emission of NOx. As the PI 'Emitted Mass NOx is to be given in tons, the PI's value is multiplied by 1 million to get the KPI value in g/ton mile.
KPI: NOx emissions
Calculation Example

Relevant PIs:
• Emitted Mass NOx 4000ton
• Transport Work 20.710.647.000 tonmile

KPI Value Formula = \[
\frac{\text{Emitted Mass NOx}}{\text{Transport Work}} = \frac{4500 \times 10^6}{20710647000} = 0,217 \text{ g/tonmile}
\]

KPI Rating Formula = 100 - (Z*KPI Value) = 100 - 250 * 0,217 = 100 - 54,3 = 45,7

Rating Parameters: Z=250

Z value to be updated (agreed), and need to be differentiated between ship size and other factors

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>Index unit</th>
<th>CO2</th>
<th>NOx</th>
<th>SOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG Tanker</td>
<td>g/ tonmile</td>
<td>66,5</td>
<td>1,9</td>
<td>1,2</td>
</tr>
<tr>
<td>Chemical Tanker</td>
<td>g/ tonmile</td>
<td>23,5</td>
<td>0,7</td>
<td>0,4</td>
</tr>
<tr>
<td>Crude Oil Tanker</td>
<td>g/ tonmile</td>
<td>8</td>
<td>0,2</td>
<td>0,1</td>
</tr>
<tr>
<td>Bulk Dry</td>
<td>g/ tonmile</td>
<td>7,6</td>
<td>0,2</td>
<td>0,1</td>
</tr>
<tr>
<td>Container</td>
<td>g/ tonmile</td>
<td>96,5</td>
<td>2,7</td>
<td>1,7</td>
</tr>
<tr>
<td>Refrigerated Cargo</td>
<td>g/ tonmile</td>
<td>124,3</td>
<td>3,5</td>
<td>2,2</td>
</tr>
<tr>
<td>RO-RO Cargo</td>
<td>g/ tonmile</td>
<td>94,9</td>
<td>1,8</td>
<td>1,7</td>
</tr>
</tbody>
</table>
## KPI: Operational deficiencies

Operational-related deficiencies, observations and non-conformances, recorded during external inspections and audits during a calendar year, not including HR, security, safety and environmental deficiencies. Made relative to the total number of external inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- Total number of Operational related deficiencies
- Total number of recorded external inspections

### KPI Value Formula:
\[
\text{KPI Value} = \frac{\text{Total number of Operational related deficiencies}}{\text{Total number of recorded external inspections}}
\]

### KPI Rating Formula:
\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:
- \( Z = 16.67 \)

This KPI is part of a range of KPIs related to deficiencies that are identified during external inspections. These deficiencies are categorized depending on their nature such as deficiencies related to security or environment. This specific KPI (Operational deficiencies) is a KPI that will cover all deficiencies that are not easily placed in one of the other more specific KPIs within this range.

The total number of recorded external inspection is used as a denominator in all these KPIs to enable benchmarking between vessels that are subject to a uneven number of external inspection.
KPI: Port state control deficiency rate

The number of deficiencies reported during Port State Control Inspections during a calendar year. Made relative to the total number of port state control inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- Total number of PSC deficiencies
- Total number of PSC inspections

**KPI Value Formula:**
\[
\text{Total number of PSC deficiencies} \div \text{Total number of PSC inspections}
\]

**KPI Rating Formula:**
\[
100 - (Z \times \text{KPI Value})
\]

**Rating Parameters:**

\[Z = 15.2\]

This KPI is one of three KPIs related to Port State Control Inspections. The three areas covered are; 'Flawless port state control performance' which measures the percentage of port state controls resulting in zero deficiencies, 'Port state control detention' which measures the total number of port state control inspections resulting in a detention and this specific KPI, 'Port state control deficiency rate' which measures the ratio of the total number of issued deficiencies during port state control inspection against the total number of port state control inspections conducted.
**KPI: Port state control deficiency rate**

**Calculation Example**

<table>
<thead>
<tr>
<th>Relevant PIs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total number of PSC deficiencies</td>
</tr>
<tr>
<td>• Total number of PSC inspections</td>
</tr>
</tbody>
</table>

**KPI Value Formula:**

\[
\text{KPI Value} = \frac{\text{Total number of PSC deficiencies}}{\text{Total number of PSC inspections}} = \frac{12}{4} = 3
\]

**KPI Rating Formula:**

\[
\text{KPI Rating} = 100 - (Z \times \text{KPI Value}) = 100 - (15,2 \times 3) = 100 - 45,6 = \text{54,4}
\]

**Rating Parameters:**

\[
Z = 15,2
\]
## KPI: Port state control detention

The number of Port State Control Inspections resulting in a detention during a calendar year.

Measured per vessel for internal improvement as well as external communication

### Relevant PIs:
- Total number of PSC inspections resulting in a detention

### KPI Value Formula:

\[
\text{Total Number of PSC inspections resulting in a detention}
\]

### KPI Rating Formula:

\[
\begin{align*}
\text{Rating Formula} &= \begin{cases} 100 & \text{if KPI Value} = 0 \\ 0 & \text{if KPI Value} > 0 \end{cases} \\
\end{align*}
\]

### Rating Parameters:

N/A

This KPI is one of three KPIs related to Port State Control Inspections. The three areas covered are: 'Flawless port state control performance' which measures the percentage of port state controls resulting in zero deficiencies, 'Port state control deficiency rate' which measures the ratio of the total number of issued deficiencies during port state control inspection against the total number of port state control inspections conducted and this specific KPI, 'Port state control detention' which measures the total number of port state control inspections resulting in a detention.

No denominator is used in this KPI
### KPI: Port state control detention
#### Calculation Example

**Relevant PIs:**
- Total number of PSC inspections resulting in a detention  = 1

**KPI Value Formula:**
Total Number of PSC inspections resulting in a detention  = 1

**KPI Rating Formula:**
- 0
- 100 if KPI Value = 0
- 0 if KPI Value > 0

**Rating Parameters:**
N/A

This KPI is binary, if you have a detention on the vessel your Rating is zero, else it is 100.
## KPI: Safety deficiencies

Safety-related deficiencies, observations and non-conformances, recorded during external inspections and audits during a calendar year. Made relative to the total number of external inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

### Relevant PIs:
- Total number of Safety related deficiencies
- Total number of recorded external inspections

### KPI Value Formula:
\[
\text{Total number of Safety related deficiencies} / \text{Total number of recorded external inspections}
\]

### KPI Rating Formula:
\[
100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:
\[
Z = 33.33
\]

This KPI is part of a range of KPIs related to deficiencies that are identified during external inspections. These deficiencies are categorized depending on their nature such as deficiencies related to safety issues such as misplaced life buoys or fire hoses.

The total number of recorded external inspection is used as a denominator in all these KPIs to enable benchmarking between vessels that are subject to a uneven number of external inspection.
# KPI: Security deficiencies

Security-related deficiencies, observations and non-conformances, recorded during external inspections and audits during a calendar year. Made relative to the total number of external inspections during a calendar year. Measured per vessel for internal improvement as well as external communication.

## Relevant PIs:
- Total number of Security related deficiencies
- Total number of recorded external inspections

## KPI Value Formula:
\[
\text{Total number of Security related deficiencies} \\
\text{Total number of recorded external inspections}
\]

## KPI Rating Formula:
\[
100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:
\[
Z = 33.33
\]

This KPI is part of a range of KPIs related to deficiencies that are identified during external inspections. These deficiencies are categorized depending on their nature such as deficiencies related to security issues such as lack of compliance to the ISPS code.

The total number of recorded external inspection is used as a denominator in all these KPIs to enable benchmarking between vessels that are subject to a uneven number of external inspection.
## KPI: SOx emissions

The estimated SOx efficiency during a calendar year. Measured per vessel for external communication.

### Relevant PIs:
- Emitted Mass SOx
- Transport Work

### KPI Value Formula:

\[
\text{KPI Value Formula = } \frac{\text{Emitted Mass SOx} \times 10^6}{\text{Transport Work}}
\]

### KPI Rating Formula:

\[
\text{KPI Rating Formula = } 100 - (Z \times \text{KPI Value})
\]

### Rating Parameters:

\[
Z = 500
\]

This KPI compares emitted mass of SOx to the vessel’s total transport work, hereby stating the value achieved (transport work) by the emission of SOx. As the PI ‘Emitted Mass SOx is to be given in tons, the PI’s value is multiplied by 1 million to get the KPI value in g/ton mile.
KPI: SOx emissions Calculation Example

Relevant PIs:
- Emitted Mass SOx 2000 ton
- Transport Work 20,710,647,000 tonmile

**KPI Value Formula:**
\[
\text{Emitted Mass SOx} \div \text{Transport Work} = \frac{2000 \times 10^6}{20710647000} = 0.097 \text{ g/tonmile}
\]

**KPI Rating Formula:**
\[
100 - (Z \times \text{KPI Value}) = 100 - 500 \times 0.097 = 100 - 48.5 = 51.5
\]

**Rating Parameters:**
 Z = 500

Z value to be updated (agreed), and need to be differentiated between ship size and other factors

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>Index unit</th>
<th>CO2</th>
<th>NOx</th>
<th>SOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG Tanker</td>
<td>g/tonmile</td>
<td>66.5</td>
<td>1.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Chemical Tanker</td>
<td>g/tonmile</td>
<td>23.5</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>Crude Oil Tanker</td>
<td>g/tonmile</td>
<td>8</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Bulk Dry</td>
<td>g/tonmile</td>
<td>7.6</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Container</td>
<td>g/tonmile</td>
<td>96.5</td>
<td>2.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Refrigerated Cargo</td>
<td>g/tonmile</td>
<td>124.3</td>
<td>3.5</td>
<td>2.2</td>
</tr>
<tr>
<td>RO-RO Cargo</td>
<td>g/tonmile</td>
<td>94.9</td>
<td>1.8</td>
<td>1.7</td>
</tr>
</tbody>
</table>
**KPI: Vessel availability**

A percentage of the total usage against the total availability (discounting planned off-hire) of a vessel during a calendar year. Measured per vessel for internal improvement as well as external communication.

**Relevant PIs:**
- Actual off-hire
- Planned off-hire

**KPI Value Formula:**

\[ 1 - \frac{\text{Actual offhire} - \text{Planned offhire}}{365 \times 24} \]

**KPI Rating Formula:**

\[(Z \times \text{KPI Value}) - 100\]

**Rating Parameters:**

\[Z = 2\]

This KPI calculates the vessel utilization as a percentage of the total utilization time available. By subtracting hours of planned off-hire from 365x24 (which would be the ‘optimal utilization’) the 100% availability is found.
### KPI: Vessel availability
#### Calculation Example

**Relevant PIs:**
- Actual off-hire: 23h
- Planned off-hire: 18h

<table>
<thead>
<tr>
<th>KPI Value Formula</th>
<th>( (1 - \frac{\text{Actual off-hire} - \text{Planned off-hire}}{365 \times 24}) \times 100% ) = ( (1 - \frac{23 - 18}{365 \times 24}) \times 100% = 99.94% )</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI Rating Formula</td>
<td>( Z \times \text{KPI Value} - 100 = 2 \times 99.94 - 100 = 99.88 )</td>
</tr>
<tr>
<td>Rating Parameters</td>
<td>( Z = 2 )</td>
</tr>
</tbody>
</table>

KPI: Vessel availability

**Calculation Example**

**Relevant PIs:**
- Actual off-hire: 23h
- Planned off-hire: 18h

<table>
<thead>
<tr>
<th>KPI Value Formula</th>
<th>( (1 - \frac{\text{Actual off-hire} - \text{Planned off-hire}}{365 \times 24}) \times 100% ) = ( (1 - \frac{23 - 18}{365 \times 24}) \times 100% = 99.94% )</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI Rating Formula</td>
<td>( Z \times \text{KPI Value} - 100 = 2 \times 99.94 - 100 = 99.88 )</td>
</tr>
<tr>
<td>Rating Parameters</td>
<td>( Z = 2 )</td>
</tr>
</tbody>
</table>
Performance Indicators

“PI”
<table>
<thead>
<tr>
<th>PI: AAE (Additional Authorized Expense)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The amount asked by the ship manager from the ship-owner (or charterer) for additional expenses related to agreed exceptional items during a fiscal year</td>
</tr>
<tr>
<td><strong>Used in KPI(s):</strong></td>
</tr>
<tr>
<td>• Budget control pr vessel</td>
</tr>
<tr>
<td><strong>PI Value:</strong></td>
</tr>
<tr>
<td>Total AAE per vessel</td>
</tr>
<tr>
<td>AAE should be given in USD</td>
</tr>
<tr>
<td><strong>Data Capture:</strong></td>
</tr>
<tr>
<td>This PI is used in the calculation of deviation from the vessel's running cost budget as AAE should be withdrawn when calculating a vessel's actual running costs and accruals as the AAE are in fact approved by the ship owner hence it can be argued that they are in fact part of the vessel's running cost budget</td>
</tr>
</tbody>
</table>
## PI: Absconded crew

Number of crew absent without leave (AWOL) during a calendar year

### Used in KPI(s):
- Crew behaviour

### PI Value:
\[ \sum \text{Crew AWOL} \]

### Data Capture:
Data concerning this PI is taken from internal reporting and is subject to manipulation and subjective interpretations.

---

This PI is part of 5 PIs related to crew misbehaviour.
All incidents (all PIs) together are used in calculation of the KPI 'Crew behaviour' with the average number of crew onboard vessel used as a denominator.
## PI: Actual drydocking costs

The actual costs of the yard stay for drydocking. Summarized per 5 year rolling time period

### Used in KPI(s):
- Drydocking planning performance

### PI Value:
Actual costs

Costs should be given in USD

### Data Capture:

This PI is used to be able to measure the deviation from a vessel's drydocking schedule (related to costs) by comparing the value to the Agreed drydocking costs. Together with the PIs 'Actual drydocking duration and 'Agreed drydocking duration' a KPI called 'Drydocking planning performance' is created.
### PI: Actual drydocking duration

The actual duration of the yard stay for drydocking. Summarized per 5 year rolling time period

<table>
<thead>
<tr>
<th><strong>Used in KPI(s):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Drydocking planning performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PI Value:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual duration</td>
</tr>
</tbody>
</table>

Duration should be given in Days

<table>
<thead>
<tr>
<th><strong>Data Capture:</strong></th>
</tr>
</thead>
</table>

This PI is used to be able to measure the deviation from a vessel's drydocking schedule (related to duration) by comparing the value to the Agreed drydocking duration. Together with the PIs 'Actual drydocking costs' and 'Agreed drydocking costs' a KPI called 'Drydocking planning performance' is created
## PI: Actual off-hire

The actual number of hours lost during a calendar year due to (full details described in prevailing Charter Party);
Interruption of service level caused by; deficiency of personnel or stores, repairs, breakdowns and overhaul, neglect of
duty of crew, medical advice or treatment of crew, detention of vessel or quarantine, planned off-hire, reduction of vessel
performance regarding speed or cargo handling

### Used in KPI(s):
- Vessel availability

### PI Value:
\[\sum \text{Number of hours claimed by the Charterer through the principals}\]

### Data Capture:

This PI together with the PI 'Planned off-hire' provides a percentage of the vessel's actual availability in light of (365x24)
minus the planned off-hire=100%
### PI: Actual running costs and accruals

Total annual (fiscal year) cost per vessel including M&R, purchasing, operation, crewing, insurance and other vessel operating costs. Capital expenses such as upgrades, drydockings and modifications are not taken into account.

**Used in KPI(s):**
- Budget control pr vessel

**PI Value:**
Total annual cost per vessel

Costs should be given in USD

**Data Capture:**

This PI is used to be able to measure the deviation from a vessel's running costs budget represented in percentage by comparing it to the PI 'Vessel running costs budget'
## PI: Agreed drydocking costs

The agreed costs of the yard stay for drydocking. Summarized per 5 year rolling time period

<table>
<thead>
<tr>
<th>Used in KPI(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Drydocking planning performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PI Value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreed costs</td>
</tr>
</tbody>
</table>

Costs should be given in USD

<table>
<thead>
<tr>
<th>Data Capture:</th>
</tr>
</thead>
</table>

This PI is used to be able to measure the deviation from a vessel's drydocking schedule (related to costs) by comparing the value to the Actual drydocking costs. Together with the PIs 'Actual drydocking duration and 'Agreed drydocking duration' a KPI called 'Drydocking planning performance' is created
**PI: Agreed drydocking duration**

The agreed duration of the yard stay for drydocking. Summarized per 5 year rolling time period

**Used in KPI(s):**
- Drydocking planning performance

**PI Value:**
Agreed duration

Duration should be given in Days

**Data Capture:**

This PI is used to be able to measure the deviation from a vessel's drydocking schedule (related to duration) by comparing the value to the Actual drydocking duration. Together with the PIs 'Actual drydocking costs' and 'Agreed drydocking costs' a KPI called 'Drydocking planning performance' is created.
## PI: Allision

The act of unintentional striking a fixed objects. Summarized pr calendar year

<table>
<thead>
<tr>
<th><strong>Used in KPI(s):</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Navigational incidents</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PI Value:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sum \text{ Allisions} )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Data Capture:</strong></th>
<th></th>
</tr>
</thead>
</table>

This PI is one of three PIs used in the KPI 'Navigational incidents'. The two other PIs are Collision' and 'Grounding'. The categorization of navigational incidents is used to be able to identify the different potential results of a navigational incident.
PI: Average number of vessels under management

The average number of vessels under management during a calendar year

**Used in KPI(s):**
- Crew management

**PI Value:**
\[ \sum \text{Average number of vessels under management} \]

**Data Capture:**
All vessels within the fleet should be given the same value on this PI

This PI is one of 5 PIs related to the KPI 'Crew management' which reflects the ship manager's willingness and ability to acquire and maintain the required competence/crew for their operations. This specific PI gives the average number of vessels under management (during a calendar year) which is used as a (sub) denominator in the KPI.
**PI: Ballast water discharge violations**

Any discharge or exchange of ballast water (or lack of doing so) during a calendar year, not in compliance with applicable rules and regulations

**Used in KPI(s):**
- Ballast water discharge violations

**PI Value:**
\[ \sum \text{Violations} \]

**Data Capture:**

This PI counts the total number of violations of applicable rules and regulations related to ballast water management. The PI is the only PI in the KPI 'Ballast water discharge violations' as the potential denominator related to the total number of ballast water operations is considered as non relevant.
## PI: Collision

The total number of recorded collision incidents between two or more floating objects. Summarized per calendar year

### Used in KPI(s):
- Navigational incidents

### PI Value:
\[ \Sigma \text{ Collisions} \]

### Data Capture:

This PI is one of three PIs used in the KPI 'Navigational incidents'. The two other PIs are 'Allision' and 'Grounding'. The categorization of navigational incidents is used to be able to identify the different potential results of a navigational incident.
### PI: Condition of class

Existing CoC at time of measurement. Condition of class is a written statement from class (ref. IACS)

**Used in KPI(s):**
- Condition of Class

**PI Value:**
\[ \sum \text{Condition of class} \]

**Data Capture:**
Data concerning this PI can be taken from class inspection reports

This PI counts the total number of Conditions of class that are stated for the vessel during a calendar year. The PI is the only PI in the KPI 'Condition of class' as there is no need for a common denominator (such as the total number of class inspections) in the KPI for benchmarking purposes.
## PI: Criminal offence

Crew (Officers and Ratings) charged with criminal offence during a calendar year

### Used in KPI(s):
- Crew behaviour

### PI Value:
\[ \sum \text{Crew charged} \]

### Data Capture:
Data concerning this PI is taken from internal reporting and is subject to manipulation and subjective interpretations

This PI is part of 5 PIs related to crew misbehaviour.
All incidents (all PIs) together are used in calculation of the KPI 'Crew behaviour' with the average number of crew onboard vessel used as a denominator.
## PI: Drug/alcohol abused

Cases where crew (Officers and Ratings) are caught abusing drugs or alcohol during a calendar year

### Used in KPI(s):
- Crew behaviour

### PI Value:
\[ \Sigma \text{Crew caught abusing} \]

### Data Capture:
Data concerning this PI is taken from internal reporting and is subject to manipulation and subjective interpretations.

This PI is part of 5 PIs related to crew misbehaviour. All incidents (all PIs) together are used in calculation of the KPI 'Crew behaviour' with the average number of crew onboard vessel used as a denominator.
### PI: Emitted mass CO2

The total qty of emitted tons of CO2 during a calendar year

**Used in KPI(s):**
- CO2 emissions

**PI Value:**
Fuel Used * Fuel Quality Factor

Fuel Used to be given in ton
Fuel Quality Factor:
- 3.09 for Distillate fuels
- 3.02 for Residual Fuels

**Data Capture:**
Calculation is based on the fuel consumption and fuel quality, so to be accurate the emitted mass should be calculated for each bunkering (or at least each change in fuel quality) and than aggregated for a year per vessel.

This PI is used in calculation of energy efficiency in the KPI ‘CO2 emissions’ by dividing the value on the PI ‘Transport work’
## PI: Emitted mass NOx

The total qty of emitted kilos of NOx during a calendar year

### Used in KPI(s):
- NOx emissions

### PI Value:
Fuel Used x Engine Speed Factor

Fuel Used to be given in ton
Engine Speed Factor:
- 93 for RPM < 200
- 60 for RPM 200-1000
- 50 for RPM > 1000

### Data Capture:
This PI apply a rule of thumb to be generally applicable. A more accurate method exists for newer vessels which have emission certificates, those who have this should use the more accurate method to calculate the emitted mass NOx.

This PI is used in calculation of value achieved by emitting NOx in the KPI ‘NOx emissions’ by dividing the value on the PI ‘Transport work’
# PI: Emitted mass SOx

The total qty of emitted kilos of SOx during a calendar year

**Used in KPI(s):**  
• SOx emissions

**PI Value:**  
Fuel Used x Sulphur Content Factor

Fuel Used to be given in ton  
Sulphur Content Factor = Sulphur Content in % x 20

**Data Capture:**  
Calculation is based on the fuel consumption and fuel quality, so to be accurate the emitted mass should be calculated for each bunkering (or at least each change in sulphur content) and than aggregated for a year per vessel. Sulphur content should be taken from fuel quality reports.

This PI is used in calculation of value achieved by emitting SOx in the KPI ‘SOx emissions’ by dividing the value on the PI ‘Transport work’
### PI: Failure of critical equipment and systems

The total number of failures to equipment and systems in the critical list (as required by the ISM code 10.3 and defined in the company SMS) resulting in whole or partial unavailability during a calendar year

**Used in KPI(s):**
- Failure to critical equipment and systems

**PI Value:**
\[ \sum \text{Failures to critical equipment and systems} \]

**Data Capture:**

This PI is the only PI for the KPI ‘Failure of critical equipment and systems’. As the vessels’ critical lists may vary in size it could be argued that e.g. the number of items on the list could be used as a denominator for benchmarking purposes. In any case, a failure to a critical equipment or system is a serious matter, regardless of the number of items in the vessel’s critical list, and the KPI ‘Failure to critical equipment and systems’ is kept without a denominator.
## PI: Fatalities due to injuries

Crew fatalities due to work-related injuries occurring (extension of OCIMF) during a calendar year

### Used in KPI(s):
- Lost Time Injury Frequency

### PI Value:
\[ \sum \text{Fatalities} \]

### Data Capture:

This PI is part of 5 PIs that together form the KPI 'Lost Time Injury Frequency' by counting all lost workday cases, fatalities due to injuries, permanent total disabilities and permanent partial disabilities and use the total exposure hours as a denominator to get the frequency
**PI: Fatalities due to sickness**

The number of crew fatalities other than injury related cases. Including suicide

**Used in KPI(s):**
- Lost Time Sickness Frequency

**PI Value:**
\[ \sum \text{Cases} \]

**Data Capture:**

This PI is part of 3 PIs that together form the KPI 'Lost Time Sickness Frequency' by counting cases of sickness over 24 hours as well as fatalities due to sickness and use the total exposure hours as a denominator to get the frequency
## PI: Grounding

Unintentional contact by a vessel with the sea bed. Summarized pr calendar year

**Used in KPI(s):**
- Navigational incidents

**PI Value:**
\[ \sum \text{Groundings} \]

**Data Capture:**

This PI is one of three PIs used in the KPI 'Navigational incidents'. The two other PIs are 'Collision' and 'Allision'. The categorization of navigational incidents is used to be able to identify the different potential results of a navigational incident.
### PI: Lost Workday Cases (LWC)

LWC is an injury resulting in an individual being unable to carry out any of his duties or to return to work on the next scheduled work shift on the day following the injury, unless caused by delays in getting medical treatment ashore (OCIMF). Summarized per calendar year.

**Used in KPI(s):**
- Lost Time Injury Frequency

**PI Value:**
\[ \sum \text{LostWorkdayCases} \]

**Data Capture:**

This PI is part of 5 PIs that together form the KPI 'Lost Time Injury Frequency' by counting all lost workday cases, fatalities due to injuries, permanent total disabilities and permanent partial disabilities and use the total exposure hours as a denominator to get the frequency.
<table>
<thead>
<tr>
<th><strong>PI:</strong> No of crew not relieved on time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of crew not relieved within the agreed tenure of contract, excluding extensions initiated by crew measured over a calendar year</td>
</tr>
</tbody>
</table>

**Used in KPI(s):**
- Crew planning

**PI Value:**
\[ \sum \text{Crew not relieved within the agreed tenure of contract measured over a cal. year} \]

**Data Capture:**

This PI is used in the KPI ‘Crew planning which reflects the ship manager's ability to adhere to agreed tenure of contracts as well as official requirements related to rest hours
**PI: No of dismissed crew**

Cases where crew has been dismissed due to breach of discipline before end of contract, during a calendar year

**Used in KPI(s):**
- Crew behaviour

**PI Value:**
\[ \sum \text{Crew dismissed} \]

**Data Capture:**
Data concerning this PI is taken from internal reporting and is subject to manipulation and subjective interpretations

This PI is part of 5 PIs related to crew misbehaviour.
All incidents (all PIs) together are used in calculation of the KPI 'Crew behaviour' with the average number of crew onboard vessel used as a denominator
<table>
<thead>
<tr>
<th>PI: No of logged warnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any logged warning given by superior to a member of the crew during a calendar year</td>
</tr>
</tbody>
</table>

**Used in KPI(s):**  
- Crew behaviour

**PI Value:**  
\[ \sum \text{Logged warnings} \]

**Data Capture:**  
Data concerning this PI is taken from internal reporting and is subject to manipulation and subjective interpretations

This PI is part of 5 PIs related to crew misbehaviour.  
All incidents (all PIs) together are used in calculation of the KPI 'Crew behaviour' with the average number of crew onboard vessel used as a denominator
<table>
<thead>
<tr>
<th>PI: No of violations of MARPOL Annex 1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of violations of MARPOL Annex 1-6</td>
</tr>
<tr>
<td><strong>Used in KPI(s):</strong></td>
</tr>
<tr>
<td>• No of violations of MARPOL Annex 1-6</td>
</tr>
<tr>
<td><strong>PI Value:</strong></td>
</tr>
<tr>
<td>∑ Violations</td>
</tr>
<tr>
<td><strong>Data Capture:</strong></td>
</tr>
</tbody>
</table>

This PI counts the number of times where MARPOL Annex 1-6 has been violated and feeds data into the KPI with the same name.
## PI: Number of cases where a crew member is sick for more than 24 hours

The number of cases where crew members are sick for more than 24 hours, only counted when the crew member has been onboard the vessel for a minimum of four days. Summarized per calendar year.

**Used in KPI(s):**
- Lost Time Sickness Frequency

**PI Value:**
\[ \sum \text{Cases} \]

**Data Capture:**

This PI is part of 3 PIs that together form the KPI 'Lost Time Sickness Frequency' by counting cases of sickness over 24 hours as well as fatalities due to sickness and use the total exposure hours as a denominator to get the frequency.
<table>
<thead>
<tr>
<th>PI: Number of new cadets</th>
</tr>
</thead>
<tbody>
<tr>
<td>The total no of cadets recruited during a calendar year for the overall organisation</td>
</tr>
</tbody>
</table>

**Used in KPI(s):**
- Crew management

**PI Value:**
\[ \sum \text{New Cadets} \]

**Data Capture:**
As the number of new cadets is calculated on a fleet level, all vessels within the fleet should be given the same value on this PI

This PI is one of 5 PIs related to the KPI 'Crew management' which reflects the ship manager's willingness and ability to acquire and maintain the required competence/crew for their operations. This specific PI reflects the total number of new cadets assigned to the fleet.
### PI: Officer working days

**Total number of officer working days during a calendar year (fleet average)**

**Used in KPI(s):**
- Crew management

**PI Value:**
\[ \sum \text{Officer working days} \]

**Data Capture:**
As Officer working days is calculated on a fleet level, all vessels within the fleet should be given the same value on this PI.

This PI is one of 5 PIs related to the KPI 'Crew management' which reflects the ship manager's willingness and ability to acquire and maintain the required competence/crew for their operations. This specific PI reflects the total number of officer working days which is used as a (sub) denominator in the KPI.
## PI: Officers retention rate

Rate of officers returning to the organisation after completion of tour of duty over a two year period

**Used in KPI(s):**
- Crew management

**PI Value:**
% of officers employed 2 years ago still in the active list today

**Data Capture:**
As the officers retention rate is calculated on a fleet level, all vessels within the fleet should be given the same value on this PI. Data is captured by analysing your employment database 2 years back and identifying how many of those in the data base are still on your list of active officers.

This PI is one of 5 PIs related to the KPI 'Crew management' which reflects the ship manager's willingness and ability to acquire and maintain the required competence/crew for their operations. This specific PI reflects the ship manager's ability to retain their officers (hence competence and experience).
**PI: Permanent Total Disabilities (PTD)**

PTD is any work injury which incapacitates an employee permanently and results in termination of employment on medical grounds (e.g. loss of limb(s) permanent brain damage, loss of sight) and precludes the individual from working either at sea or ashore (OCIMF). Summarized per calendar year

<table>
<thead>
<tr>
<th>Used in KPI(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>•Lost Time Injury Frequency</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PI Value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sum \text{PermanentTotalDisabilities} )</td>
</tr>
</tbody>
</table>

| Data Capture: |

This PI is part of 5 PIs that together form the KPI 'Lost Time Injury Frequency' by counting all lost workday cases, fatalities due to injuries, permanent total disabilities and permanent partial disabilities and use the total exposure hours as a denominator to get the frequency
PI: Permanent Partial Disabilities (PPD)

PPD is any work injury which results in the complete loss, or permanent loss of use, of any member or part of the body, or any impairment of functions of parts of the body, regardless of any pre-existing disability of the injured member or impaired body function, that partially restricts or limits an employee's basis to work on a permanent basis at sea. Such an individual could be employed ashore but not at sea in line with industry guidelines (OCIMF). Summarized per calendar year

**Used in KPI(s):**
- Lost Time Injury Frequency

**PI Value:**
\[ \sum \text{PermanentPartialDisabilities} \]

**Data Capture:**

This PI is part of 5 PIs that together form the KPI 'Lost Time Injury Frequency' by counting all lost workday cases, fatalities due to injuries, permanent total disabilities and permanent partial disabilities and use the total exposure hours as a denominator to get the frequency.
### PI: Planned off-hire

The number of hours planned for repair and maintenance during a specific calendar year, including Class renewal surveys, Intermediate surveys, Dry-dockings, and Modification jobs that are agreed with the charterer/vessel operator.

**Used in KPI(s):**
- Vessel availability

**PI Value:**
\[ \sum \text{Hours planned off-hire} \]

**Data Capture:**

To be able to measure a vessel's availability it is natural to subtract the planned off-hire from a total potential availability (typically 365x24) as it is the unplanned unavailability that should be given focus.
**PI: PSC inspections resulting in zero deficiencies**

The total number of port state control inspections resulting in zero deficiencies (not counting observations - code99) during a calendar year.

**Used in KPI(s):**
- Flawless port state control performance

**PI Value:**
\[ \sum \text{Port state control inspections resulting in zero deficiencies during a calendar year} \]

**Data Capture:**
Data concerning this PI is captured by counting the number of Port state control inspections where no deficiencies are reported.

This PI is used in the KPI, 'Flawless port state control performance' which measures the percentage of port state controls resulting in zero deficiencies against the total number of port state control inspections conducted.
### PI: Severe spills of bulk liquid

A severe spill is a spill above one barrel. Summarized per calendar year

**Used in KPI(s):**
- Accidental releases of substances as def by MARPOL

**PI Value:**
\[ \sum \text{Cases} \]

**Data Capture:**

This PI together with the PI ‘Total no of accidental releases of substances covered by MARPOL, to the environment’ makes the KPI ‘Accidental releases of substances as def by MARPOL’ by counting the total number of spills, liquid (this PI) or solids (covered by the PI ‘Total no of accidental releases of substances covered by MARPOL, to the environment’).
## PI: Total Exposure Hours (TEH)

TEH is the total number of hours the crew stays on a given vessel in a given year. The number is an aggregate of all crew-members on a given vessel in a given year. (OCIMF)

### Used in KPI(s):
- Lost Time Sickness Frequency
- Lost Time Injury Frequency
- Crew behaviour

### PI Value:
\[ \sum \text{Crew days} \times 24 \]

### Data Capture:
Aggregate the number of crew days to be able to capture varying crew sizes over the year.

This PI is used as a denominator in several KPIs on basis of enabling benchmarking of vessels which vary regarding the number of crew onboard.
**PI: Total no of contained spills of bulk liquid**

Total no of contained spills (nothing going overboard) during a calendar year

**Used in KPI(s):**
- Contained spills

**PI Value:**
\[ \sum \text{Cases} \]

**Data Capture:**

Some spills are contained but still represent an incident that should be recorded. This PI counts the total number of contained spills and feeds into the KPI 'Contained spills' as the only PI.
<table>
<thead>
<tr>
<th><strong>PI: Total number of accidental releases of substances covered by MARPOL, to the environment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total number of accidental releases of substances covered by MARPOL, to the environment</strong></td>
</tr>
<tr>
<td><strong>Used in KPI(s):</strong></td>
</tr>
<tr>
<td>• Accidental releases of substances as def by MARPOL</td>
</tr>
<tr>
<td><strong>PI Value:</strong></td>
</tr>
<tr>
<td>( \Sigma ) Cases</td>
</tr>
<tr>
<td><strong>Data Capture:</strong></td>
</tr>
</tbody>
</table>

This PI together with the PI ‘Severe spills of bulk liquid’ makes the KPI ‘Accidental releases of substances as def by MARPOL’ by counting the total number of spills, liquid (covered by the PI ‘Severe spills of bulk liquid’) or solids (this PI).
<table>
<thead>
<tr>
<th>PI: Total number of cargo units/passengers transported</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The total number of cargo units/passengers transported during a calendar year</strong></td>
</tr>
</tbody>
</table>

**Used in KPI(s):**
- Cargo incidents during cargo operations
- Cargo incidents during voyage

**PI Value:**
\[
\sum \text{Number of cargo units/passenger transported}
\]

For Container Carriers use number of units
For Gas Carriers use cubic metres
For PCC/PCTC use units
For Bulk use metric tons
For Passenger use number of passengers

**Data Capture:**
Data concerning this PI is available from an aggregation of all consignments during a calendar year for the vessel in question.
It is vital that this PI’s unit is in coherence with the unit chosen for the PI ‘Total number of damaged or lost cargo units/passengers injured during cargo handling’ or PI ‘Total number of damaged or lost cargo units/passengers injured during voyage’, depending on which KPI that is to be calculated

This PI is used as the denominator in two KPIs (‘Cargo incidents during cargo operations' and 'Cargo incidents during voyage’) both related to cargo incidents or passenger injuries during handling/embarking and voyage.
**PI: Tot no of damaged or lost cargo units/passengers injured during cargo handling**

The total number of damaged or lost cargo units/passengers injured during cargo operations during a calendar year. The number is taken from received claims.

<table>
<thead>
<tr>
<th>Used in KPI(s):</th>
<th>Cargo incidents during cargo operations</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>PI Value:</strong></th>
<th>( \sum ) Number of damaged or lost cargo units/passengers injured</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Container Carriers</td>
<td>use number of units</td>
</tr>
<tr>
<td>For Gas Carriers</td>
<td>use cubic metres</td>
</tr>
<tr>
<td>For PCC/PCTC</td>
<td>use units</td>
</tr>
<tr>
<td>For Bulk</td>
<td>use metric tons</td>
</tr>
<tr>
<td>For Passenger</td>
<td>use number of passengers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Data Capture:</strong></th>
<th>Data concerning this PI is taken from official claims reports received by the ship manager from the ship owner/operator depending on who the cargo owner directs the claim to.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>It is vital that this PI's unit is in coherence with the unit chosen for the PI 'Total number of cargo units/passengers transported' which is the denominator when calculating the relevant KPI's value</td>
</tr>
</tbody>
</table>

This PI is used in the KPI 'Cargo incidents during handling' and captures data related to damaged or lost cargo as well as injured passengers during cargo handling or embarking passengers.
# PI: Tot no of damaged or lost cargo units/passengers injured during voyage

The total number of damaged or lost cargo units/passengers injured during voyage during a calendar year. The number is taken from received claims.

## Used in KPI(s):
- Cargo incidents during voyage

## PI Value:
\[
\sum \text{Number of damaged or lost cargo units/passengers injured}
\]

For Container Carriers use number of units
For Gas Carriers use cubic metres
For PCC/PCTC use units
For Bulk use metric tons
For Passenger use number of passengers

## Data Capture:
Data concerning this PI is taken from official claims reports received by the ship manager from the ship owner/operator depending on who the cargo owner directs the claim to.

It is vital that this PI's unit is in coherence with the unit chosen for the PI 'Total number of cargo units/passengers transported' which is the denominator when calculating the relevant KPI's value.

This PI is used in the KPI 'Cargo incidents during voyage' and captures data related to damaged or lost cargo as well as injured passengers during voyage.
**PI: Total number of Environmental related deficiencies**

Includes deficiencies, negative observations and non-conformances of an environmental consequence (local regulations and MARPOL) as a result of recorded external inspections and audits during a calendar year

**Used in KPI(s):**
- Environmental deficiencies

**PI Value:**
\[ \Sigma \text{Environmental-related deficiencies} \]

**Data Capture:**
Data concerning this PI can be taken from external inspection reports. In any case the categorization of deficiencies (according to the PIs in the Shipping KPI hierarchy) must be done subjectively

This PI is one of several PIs that capture information concerning deficiencies. A system of 6 categories of deficiencies (environmental, HR, security, operational, navigational and safety) are feeding values into 6 different KPIs (based on the same categorization) with the PI 'Total number of external inspection) as the common denominator in all KPIs for benchmarking purposes
# PI: Total number of explosion incidents

The total number of explosion incidents on a vessel during a calendar year

<table>
<thead>
<tr>
<th>Used in KPI(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fire and Explosions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PI Value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sum$Incidents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Capture:</th>
</tr>
</thead>
</table>

This PI counts the total number of explosion incidents onboard a vessel and together with the PI 'Total number of fire incidents' form the KPI 'Fire and Explosions'
# PI: Total number of fire incidents

The total number of fire incidents on a vessel during a calendar year

<table>
<thead>
<tr>
<th><strong>Used in KPI(s):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fire and Explosions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PI Value:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sum \text{Incidents} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Data Capture:</strong></th>
</tr>
</thead>
</table>

This PI counts the total number of fire incidents onboard a vessel and together with the PI 'Total number of explosion incidents' form the KPI 'Fire and Explosions'
**PI: Total number of HR related deficiencies**

Includes deficiencies, negative observations and non-conformances with a HR consequence as a result of recorded external inspections and audits during a calendar year.

**Used in KPI(s):**
- HR deficiencies

**PI Value:**
\[ \Sigma \text{HR deficiencies} \]

**Data Capture:**
Data concerning this PI can be taken from external inspection reports. In any case the categorization of deficiencies (according to the PIs in the Shipping KPI hierarchy) must be done subjectively.

This PI is one of several PIs that capture information concerning deficiencies. A system of 6 categories of deficiencies (environmental, HR, security, operational, navigational and safety) are feeding values into 6 different KPIs (based on the same categorization) with the PI 'Total number of external inspection) as the common denominator in all KPIs for benchmarking purposes.
# PI: Total number of Navigation related deficiencies

Navigation-related deficiencies, negative observations and non-conformances, recorded during external inspections and audits during a calendar year

**Used in KPI(s):**
- Navigational deficiencies

**PI Value:**
\[
\sum \text{Navigation-related deficiencies}
\]

**Data Capture:**
Data concerning this PI can be taken from external inspection reports. In any case the categorization of deficiencies (according to the PIs in the Shipping KPI hierarchy) must be done subjectively.

This PI is one of several PIs that capture information concerning deficiencies. A system of 6 categories of deficiencies (environmental, HR, security, operational, navigational and safety) are feeding values into 6 different KPIs (based on the same categorization) with the PI ‘Total number of external inspection) as the common denominator in all KPIs for benchmarking purposes.
## PI: Total number of Operational related deficiencies

Operational-related deficiencies, negative observations and non-conformances, recorded during external inspections and audits during a calendar year, not including HR deficiencies, security deficiencies, safety deficiencies and environmental deficiencies

### Used in KPI(s):
- Operational deficiencies

### PI Value:
\[ \Sigma \text{Operational-related deficiencies} \]

### Data Capture:
Data concerning this PI can be taken from external inspection reports. In any case the categorization of deficiencies (according to the PIs in the Shipping KPI hierarchy) must be done subjectively.

This PI is one of several PIs that capture information concerning deficiencies. A system of 6 categories of deficiencies (environmental, HR, security, operational, navigational and safety) are feeding values into 6 different KPIs (based on the same categorization) with the PI 'Total number of external inspection) as the common denominator in all KPIs for benchmarking purposes.
### PI: Total number of PSC inspections

Total number of port state control inspections during a calendar year

**Used in KPI(s):**
- Port state control deficiencies
- Port state control detentions

**PI Value:**
\[ \sum \text{Port state control inspections pr calendar year} \]

**Data Capture:**
Data concerning this PI is captured by counting the number of Port state control inspections

This PI is used as the denominator in two KPIs (‘Port state control deficiencies’ and Port state control detentions’) to enable benchmarking of vessels even with a different number of port state control inspections (hence a different risk for receiving deficiencies/detentions in the first place)
**PI: Total number of PSC deficiencies**

The total number of deficiencies including deficiencies resulting in detention, excluding observations (code99) from port state control inspections during a calendar year

**Used in KPI(s):**
- Port state control deficiency rate

**PI Value:**
\[ \sum \text{ Deficiencies} \]

**Data Capture:**
Data concerning this PI can be taken from the Port state control inspection reports issued after each inspection

A comprehensive picture regarding port state control performance is considered as vital. This PI together with the PI 'Total number of PSC inspections' provides a ratio of the total number of deficiencies over the total number of PSC inspections in the KPI 'Port state control deficiency rate'.
## PI: Total number of PSC inspections resulting in a detention

The total number of port state control inspections, excluding verifications, resulting in a detention during a calendar year. Multiple reasons for detention in one inspection count as ONE

### Used in KPI(s):
- Port state control detention

### PI Value:
\[
\sum \text{Number of inspections resulting in a detention}
\]

### Data Capture:
Data concerning this PI can be taken from counting all port state control inspection reports that contains a detention

This PI counts the number of port state control inspections resulting in a detention. This is because a comprehensive picture regarding port state control performance is considered as vital.
### PI: Total number of recorded external inspections

Total number of recorded external inspections by external bodies (class, port, flag, vetting, insurance, charterers) also including external ISO/ISM/OHSAS audits during a calendar year (excluding voluntary inspections made for the purpose of quality improvement)

#### Used in KPI(s):
- Environmental deficiencies
- HR deficiencies
- Security deficiencies
- Operational deficiencies
- Safety deficiencies
- Navigational deficiencies

#### PI Value:
\[ \sum \text{External inspections} \]

#### Data Capture:
Data concerning this PI can be taken from summing up all external inspections for the vessel in question during a calendar year

This PI serves as a common denominator in 6 different KPIs (for benchmarking purposes) related to deficiencies identified during external inspections
<table>
<thead>
<tr>
<th><strong>PI: Total number of Safety related deficiencies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety-related deficiencies, negative observations and non-conformances, recorded during external inspections and audits during a calendar year</td>
</tr>
</tbody>
</table>

**Used in KPI(s):**
- Safety deficiencies

**PI Value:**
\[ \sum \text{Safety-related deficiencies} \]

**Data Capture:**
Data concerning this PI can be taken from external inspection reports. In any case the categorization of deficiencies (according to the PIs in the Shipping KPI hierarchy) must be done subjectively

This PI is one of several PIs that capture information concerning deficiencies. A system of 6 categories of deficiencies (environmental, HR, security, operational, navigational and safety) are feeding values into 6 different KPIs (based on the same categorization) with the PI 'Total number of external inspection' as the common denominator in all KPIs for benchmarking purposes.
### PI: Total number of Security related deficiencies

Total number of security related deficiencies, including negative observations and non-conformances as a result of recorded external inspections and audits during a calendar year. A security related deficiency is a result of violation of the ISPS code.

<table>
<thead>
<tr>
<th>Used in KPI(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Security deficiencies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PI Value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sum$ Security-related deficiencies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Capture:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data concerning this PI can be taken from external inspection reports. In any case the categorization of deficiencies (according to the PIs in the Shipping KPI hierarchy) must be done subjectively.</td>
</tr>
</tbody>
</table>

This PI is one of several PIs that capture information concerning deficiencies. A system of 6 categories of deficiencies (environmental, HR, security, operational, navigational and safety) are feeding values into 6 different KPIs (based on the same categorization) with the PI 'Total number of external inspection' as the common denominator in all KPIs for benchmarking purposes.
**PI: Training days**

Total number of training days during a calendar year (fleet average)
Training = Training exceeding statutory requirements performed by formal trainer (excluding computer-based)

**Used in KPI(s):**
- Crew management

**PI Value:**
\[ \sum \text{Training days} \]

**Data Capture:**
As Training days is calculated on a fleet level, all vessels within the fleet should be given the same value on this PI

This PI is one of 5 PIs related to the KPI 'Crew management' which reflects the ship manager's willingness and ability to acquire and maintain the required competence/crew for their operations. This specific PI reflects the ship manager's willingness to invest in crew training.
**PI: Transport Work**

Transport work is a product of the cargo transported and the distance sailed for a specific vessel during a calendar year.

**Used in KPI(s):**
- CO2 emissions
- NOx emissions
- SOx emissions

**PI Value:**
\[ \sum \text{Loaded Cargo} \times \text{Distance Sailed} \]

**Data Capture:**
Transport work is given as ton-mile i.e. Loaded cargo is measured in metric tons and distance is measured in nautical miles. For some shipping segments, the metric ton may not be considered applicable as cargo measure and IMO opens for the usage of different units of measure for different segments. [Container Ships: TEU (empty or full), Passenger vessels: passengers, Car carriers: car units or occupied lane meters]

**NOTE:** This is not suitable for the KPI if it is to enable comparison between modes (e.g. bulk vs. containers)

This PI is used as a denominator in KPIs related to emissions in order to be able to say something about the energy efficiency (related to CO2) and value achieved by emissions (related to NOx and SOx)
## PI: Vessel running cost budget

Total annual (fiscal year) budget per vessel including M&R, purchasing, operation, crewing, insurance and other vessel operating costs. Capital expenses such as upgrades, drydockings and modifications are not taken into account.

### Used in KPI(s):
- Budget control pr vessel

### PI Value:
Total budget per vessel

Budget should be given in USD

### Data Capture:

This PI is used to be able to measure the deviation from a vessel's running costs budget represented in percentage by comparing it to the PI 'Actual running costs and accruals'.
## PI: Violation of rest hours

This PI measures the number of cases of STCW or ILO violations regarding rest or work hours.

### Used in KPI(s):
- Crew planning

### PI Value:
\[ \sum \text{Number of cases of work hours violations during a calendar year} \]

### Data Capture:

This PI is used in the KPI 'Crew planning' which reflects the ship manager's ability to adhere to official requirements related to rest hours as well as agreed tenure of contracts.