

Air Emissions Monitoring and Reporting in Maritime Ports

Nowadays, ports all over the world are stressed with regulations requiring them to increase the effort to reduce air emissions created directly (e.g., during intra-terminal logistics) or indirectly (consumption of energy produced in the local power grid) in the port. Ports constantly need to align with those regulations. In addition, the ports neighborhood, economic pressure and the competitive nature of the maritime ports industry have to be taken into account. The planning is constituted in an emissions reduction plan (ERP), that might consist of strategies and actions. These are then implemented in different projects.

The (e.g., annual) **air emissions inventory (AEI)** is the most important artefact to show the impact of the implemented ERP/projects towards its main goal: the reduction of emissions. A port can then compare its results with its historic results and act accordingly. A synonym for the AEI might be air emissions report.

We consider two types of AEIs:

- A **port-wide AEI** is characterized by a leading organization that is responsible for the creation of the port-wide AEI. Other organizations share emission data with the leading organization to be processed and included in the port-wide AEI. The emission data of the leading organization can also be included.
- An **organization-specific AEI** only includes the emission data of one organization of a port and the responsibility lies with the same organization.

The aim of this survey is threefold:

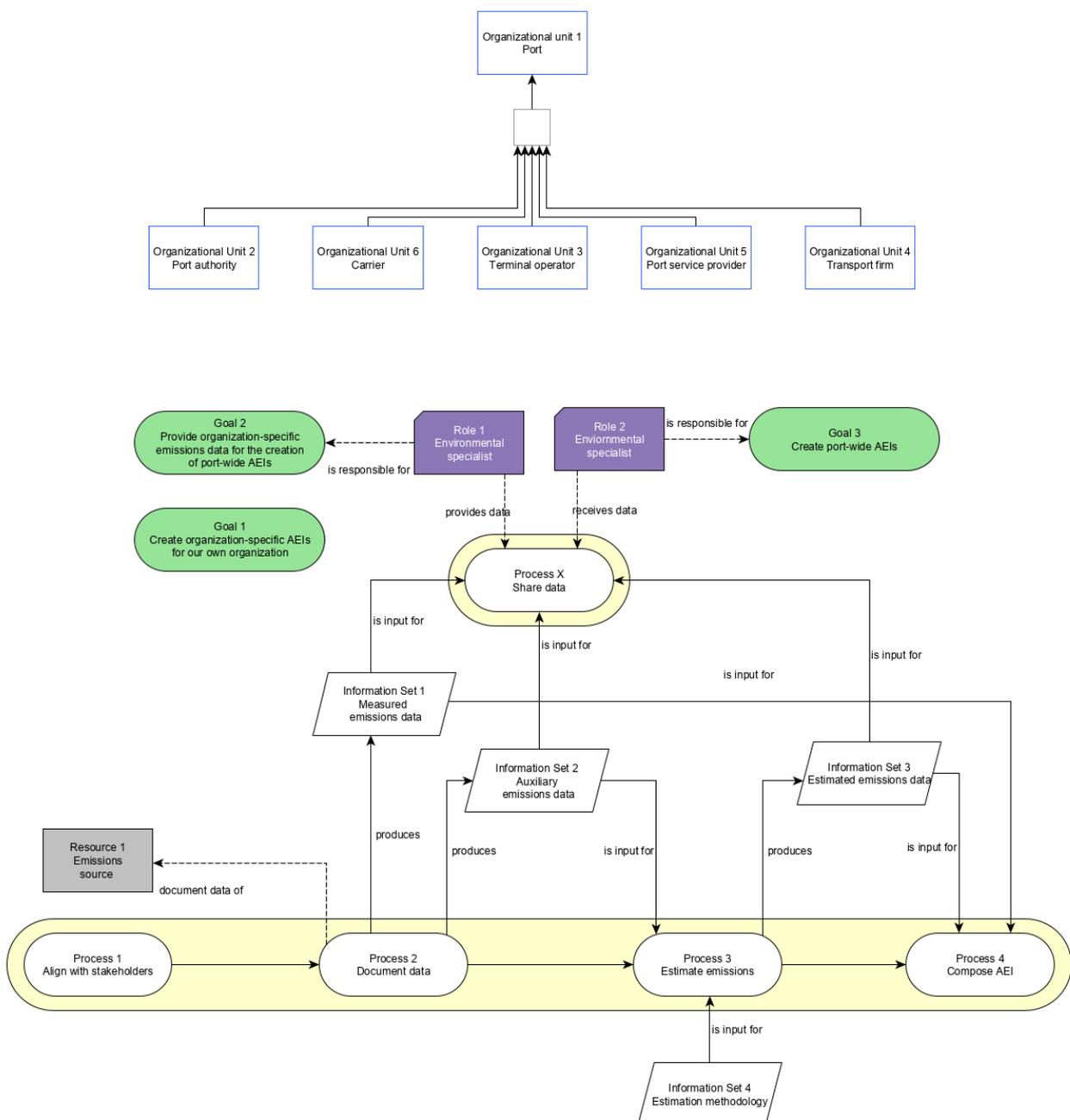
- Reveal the use of IT in the AEI creation process.
- Reveal the motivation and problems for the AEI creation process.
- Reveal how AEIs are used.

In addition, you can use this questionnaire to assess the quality of your process.

We use this data for scientific research purposes only. During the survey, you can decide to be informed about the results of this survey. Depending on the activities of your organization, the survey will take about 20 to 45 minutes.

Model and explanation

The figure below depicts a generic AEI creation process. The depicted sub processes (see yellow frame, process 1, 2, X, 3, 4) represent different parts of this survey.



The term "emissions" refers to "air emissions".

Organizational Units

- The term port is used as the aggregation of organizations. Some of these organizations are depicted in the model.
- The organizations do not necessarily need to be a legal entity, they can also be integrated within a single "port organization".
- Please apply this model to your port, so that you treat, e.g., terminal operations as activities of the organization "Terminal operator", and general port management as activities of the "Port authority".

Information Sets

- Information Set 1: Measured emissions data is either measured emissions that can be uniquely assigned to an instance of an emission source (e.g., measuring the emissions of a single truck) or that cannot be uniquely assigned (e.g., measuring the emissions of a port area).
- Information Set 2: Auxiliary emission data (e.g., for trucks: engine starts, working hours, engine type) is used for the estimation of real emissions data. If possible, real air emissions data can be included in the documentation.
- Information Set 3: Estimated emissions data is the result of calculations (estimations) based on the Information Set 2: Auxiliary emission data and Information Set 4: Estimation methodology.
- Information Set 4: Estimation methodology is a document that contains guidance and information such as: geographic domain, estimation formulas, emission factors

Processes

- Process 1: Align with stakeholders: Emission sources [Resource 1] operators [Organizational Units] are informed that they should carry out the documentation of air emission data. Other stakeholders' requirements need to be considered, these are, e.g., neighboring communities, NGOs, government agencies, truck associations to align with their requirements.
- Process 2: Document data: [Information Sets 1 and 2] (auxiliary) emissions data and measured emissions data of air emissions sources (e.g., trucks, quay cranes) is documented, e.g., in excel or a database. This process includes to identify which air emission sources need to be considered for the documentation beforehand.
- Process X: Share data: The documented data [Information Sets 1 and 2] is provided and received by different roles or organizations.
- Process 3: Estimate emissions: The emissions data is estimated based on the auxiliary emissions data [Information Set 2] and the estimation methodology [Information Set 4].
- Process 4: Compose AEI: Estimated and measured emission data [Information Sets 1 and 3] are put in a document (the AEI) to publish it. The AEI might include figures, graphs, tables. Text might compare the development of the air emissions data over the years.