MinFuture

D2.1 Glossary

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Introduction

Well-defined terminology is of outmost importance to Material Flow Analysis (MFA). In many instances, data and terms comes from various sources and scientific disciplines depending on the objectives of an MFA study. It is up to the individual practitioner to interpret them and allocate them to the right reference point of an MFA system.

The MinFuture glossary includes a set of terms that are frequently used in MFA, including terms often used by MFA practitioners , which can cause confusion in other disciplines. The MinFuture project has also developed a set of key monitoring principles that work as a guideline to terminology used within the MFA community and by other disciplines. These principles are mainly related to systems and data, the two bottom components of the MinFuture pyramid, which provide the foundation of MFAs. The monitoring principles aim to improve our understanding of the meaning of certain data points and to avoid misinterpretation. Additional information about the monitoring principles can also be found in deliverable 2.2 Synthesis report: Challenges, systems and data and deliverable 5.1 The MinFuture framework.

1 Relevant terms

Material flow analysis	Material flow analysis (MFA) is the method used to track the physical economy, namely the stocks and flows of material and energy in a system defined in space and time.
System	Systems define where materials are located, either in the form of stocks or in processes, but also, where they are moving to (flows).
Data	Data represent observations of either stocks (at a given point in time) or flows (over a given time period).
Model	Models are mathematical representations of material cycles and their drivers which are used to simulate historical changes in material cycles or to make forecasts for future changes through the- use of scenarios.
Stages (MFA)	The stages dimension represents the various transformation and use stages of materials across their lifetime.
Time (MFA)	The time dimension provides the basis for model calibration and future scenario modelling.
Future scenarios	Possible future and hypothetical occurrences.
Indicators	Indicators are quantitative measures that are supposed to reflect how close we are to achieving set goals.
Layers (MFA)	The layers dimension explores the interactions and changing characteristics of materials across their life cycle.
The Pyramid	The pyramid framework includes essential MFA components used in

Framework	the monitoring of physical flows and stocks of materials.
Trade (MFA)	The trade dimension allows us to understand raw material dependencies, and the interlinkages between countries around the world.
Uncertainty	Uncertainty is inherent in all MFAs due to errors in system definitions and the data used.
Urban Stock	Urban stock is equal to "anthropogenic material stock" that consists of materials and products staying in the techno-sphere over a certain period of time. The anthropogenic material stocks could be categorised into mobile stock (e.g. consumer durables, machinery, and electronic equipment) and built environment stock (buildings and infrastructure).
Physical economy	Physical economy is concerned with natural resources and materials produced and consumed within specified spatial boundaries (e.g. regions, countries, cities).
Mineral Reserve	Reserves are part of the resource, which has been fully geologically evaluated and is commercially and legally mineable with current technology.
Mineral Resource	Resources are a concentration of a mineral commodity that may become of potential economic interest.

4 Key monitoring principles

1.1.1 Crude ore versus beneficiated ore

Some geological surveys report the crude ore in their statistics, whilst the majority report the beneficiated ore, namely the valuable part of the ore. The difference between the two represents the waste rock, Figure 8. Let us assume now that the aim of a study is to understand global production of a mineral commodity. When compiling data from different sources that report at different points in the system and do not provide sufficient metadata information, for example, the metal content of the crude ore, then it is highly likely that errors are introduced during the calculation process.

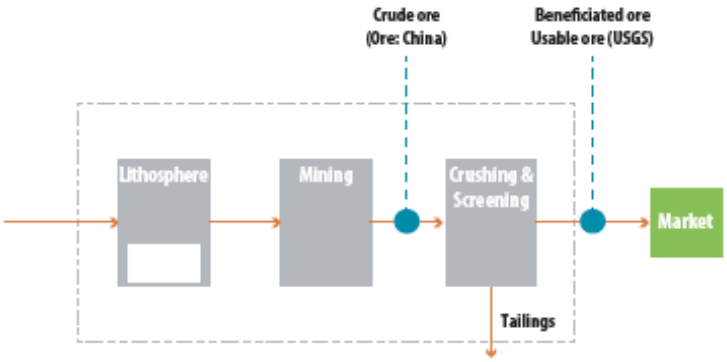

Figure 1: An illustration of the measurement points for crude

1.1.2 Production versus sold production

Most statistical agencies and geological surveys report data on production, sold production, or shipment, Figure 9. However, these terms represent different parts of the value chain. Production is the quantity of a material produced directly from a mine in a given year. Shipment and sold production represent the quantity of a material that has been sold in a given year. Often companies have inventories where material is stored after production. Sold production or shipmen may represent a quantity of a material that originates from an inventory. Therefore, the terms production and sold production or shipment do not mean the same thing and should not be used interchangeably as they may introduce errors to MFA. Equally, data providers should try to remove any inconsistencies associated with these terms by providing additional information on the measurement point they represent

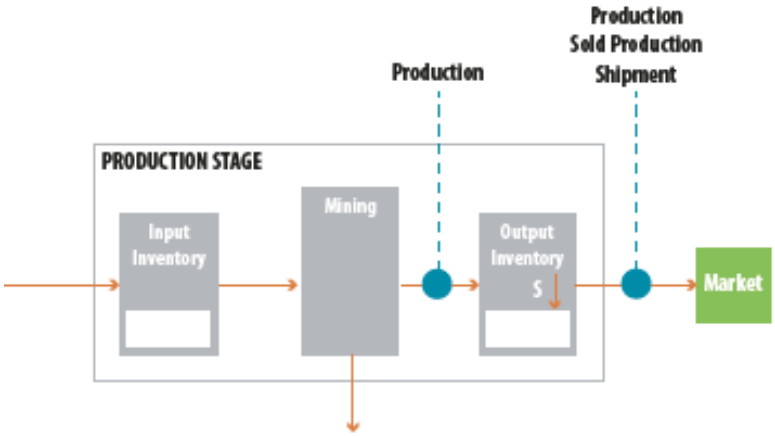

Figure 2: An illustration of the measurement points for production and production sold / shipment

1.1.3 Finished products (steel)

The term finished steel or finished products may correspond to various different production stages, Figure 10. It can be interpreted as the sum of the production of all steel companies, or as the sum of finished steel production by a country. Interpreting the numbers wrongly, for example due to product from company A feeding into company B, may results in double counting especially when attempting to calculation production at country level.

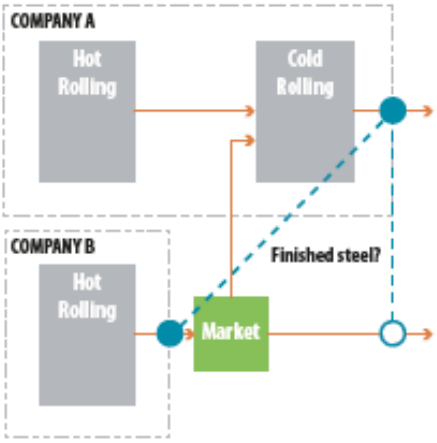

Figure 3: An illustration of the different measurement points that may be accounted for when quantifying 'finished steel' products from different companies

1.1.4 End Use

The term end use is relative and has different meanings for different sectors, Figure 11. Wrongly interpreting the end use statistics can result in inconsistencies throughout the material cycles.

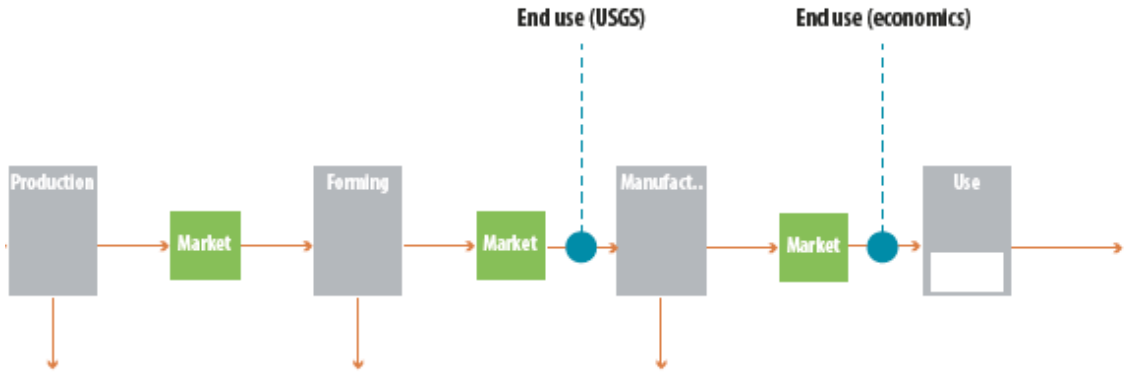

Figure 4: An illustration of different measurement points for end use products

1.1.5 Domestic shipment

Domestic shipment (DS) the "trade" within a single country, cannot be visualized directly when using markets. However, it can be visualized if trade is visualized without markets (Figure 12). To be able to understand the relationship between what a single country produces for own use and their import reliance, it is important that these concepts are properly understood. Production and apparent consumption (AC) can be calculated if DS, import (I) and export (E) are known (see formula), provided that there are no significant stock delays in the market.

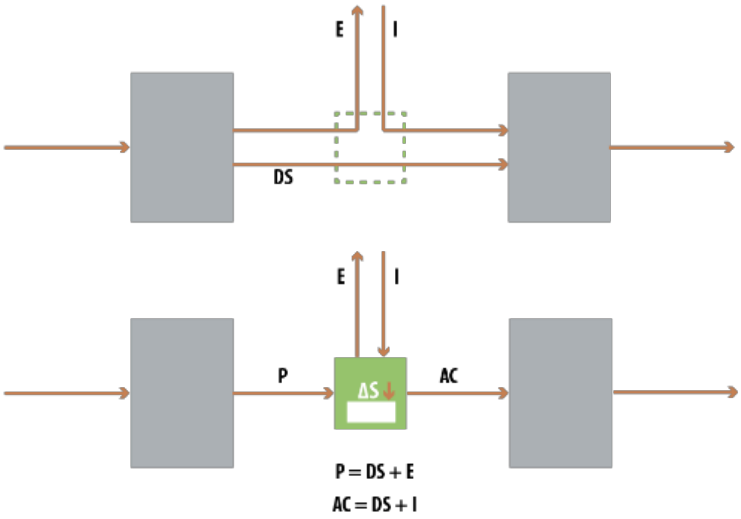

Figure 5: An illustration of how domestic shipment may be accounted for in MFA

1.1.6 International trade

Trade is visualised using markets, however, trade between countries does not happen instantly and can occur in a variety of forms. Markets consists of several sub-processes such as transit, boarder control, customs and warehouses that all can contain stocks which can further lead to delays in the system and to inconsistencies between the measurement (statistics) of import and export. In addition, trade can happen illegally (smuggling), in which the materials are not tracked at all. As an example of possible delays in the system, it is possible to export materials for storage in a bonded warehouse where the material can be stored for some time (possibility to speculate in material prices) before being imported to another country (Figure 13).

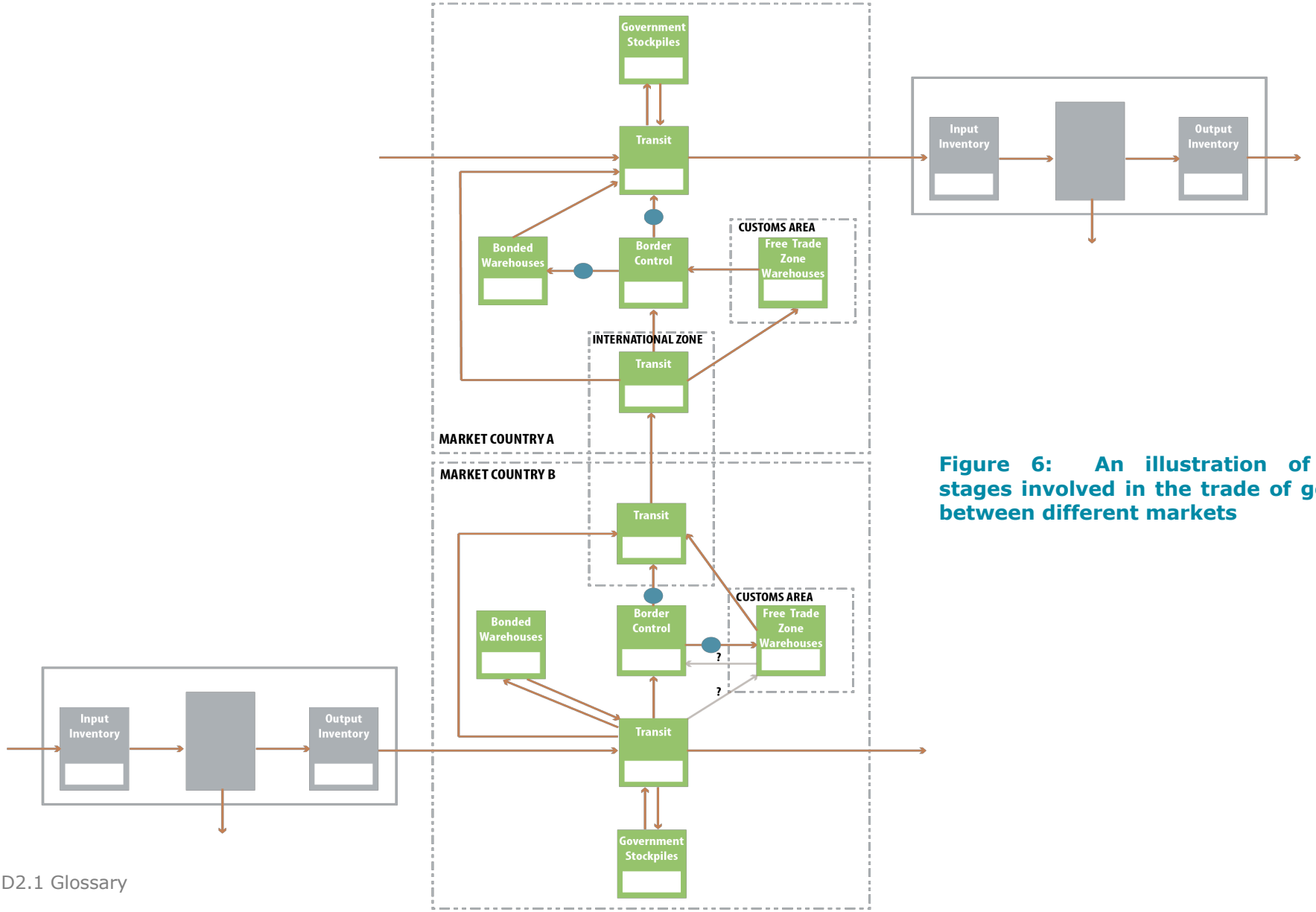

Figure 6: An illustration of the stages involved in the trade of goods between different markets