TASK FORCE 1 - BEST PRACTICE FOR VERIFIERS ON THE USE OF EXTERNAL SHIP'S TRACKING DATA IN THE RISK ASSESSMENT

This paper provides guidance on how verifiers may use ship's tracking data from an external source and use/interpret the information for the purpose of the verifiers risk assessment and its implication for verification of the emissions report.

The general obligation for verifiers to check the credibility of reported data is stipulated in Regulation (EU) 2015/757 Article 15.1 to 5[1]. The most relevant paragraph in regard of the present guidance document is 15.1 and reads as follows:

1. The verifier shall identify potential risks related to the monitoring and reporting process by comparing reported CO_2 emissions *with estimated data based on ship tracking data and characteristics such as the installed engine power. Where significant deviations are found, the verifier shall carry out further analyses.*

As provided by Article 15.1, verifiers compare – as part of the verification risk assessment – the "external set of estimated data" with the reported data (from the ship). This comparison gives the opportunity to reduce[2] the size of samples to be analysed / tested in detail for verification of the ships emission report.
In essence, it allows adapting the verification activities to the result of the risk assessment.

The "sampling approach" for data verification is described in detail in the "Guidance for materiality and sampling" produced by the ESSF Verification and accreditation Subgroup.

The "external set of estimated data" would cover the following data of a specific ship:

1) aggregated fuel consumption
2) aggregated CO_2 emissions
3) aggregated distance, and
4) aggregated time spent at sea

For the purpose of this guidance, ship tracking data could be obtained through:

- onboard sources, such as the navigational or electronic chart display and information system (ECDIS)
- coastal / global positioning systems such as automatic identification system (AIS) or long range identification and tracking (LRIT)
- port call information related to ship movements

It should be acknowledged that the output figures of the external set of estimated data is not derived as measurements of compilations from the ship (i.e. data that has not been produced/compiled by the company).

In the following, this guidance paper focusses on the external data triggered by the Automatic Identification System (AIS) signal as an example for best practice. Essentially, the timely repeated signal of the ship´s position is combined by modelling and calculating with

[1] COMMISSION DELEGATED REGULATION (EU) 2016/2072: (9) The verifier should take a risk-based approach in verifying the emissions report, in accordance with paragraphs 1, 2 and 3 of Article 15 of Regulation (EU) 2015/757. Analysis of the susceptibility of reported data to potential material misstatement is an essential part of the verification process and determines how the verifier should carry out its activities.
[2] or possibly the outcome may reveal an increase of the sample size to be tested in detail

other ship specific data (from openly available data sources[3]) and as such derives to the "external set of estimated data" on fuel consumption and CO_2 emissions.

In regard of date / time records and the covered distances, in principle the data for "distance travelled" and "time spent at sea" is just the addition of places where the signal moved geographically and time wise (in UTC).
The AIS transmits with time intervals of 2 to 10 seconds ship´s information about position, course and speed. The distance covered by the ship between two AIS messages can be computed by using the "Haversine formula", which is an expression that gives distances between two points on a sphere from their longitudes and latitudes.

Furthermore, it should be noted that due to technical problems on the AIS as such, like unfavourable weather conditions (for the signal itself) and / or user mistakes, the AIS records can be missing or incomplete. Sometimes, e.g. in pirate areas the system is shut of intentionally.

For cases of good AIS coverage, the data for "distance travelled" and "time spent at sea" appears to be a quite reliable, external reference data set.

3.1 ATTENTIVENESS WITH HANDLING OF THE EXTERNAL SET OF ESTIMATED DATA

It should be acknowledged that the AIS-based modelling of ships fuel consumption underlays intrinsically some uncertainties caused by environmental conditions that are not (and can´t be) reflected to its full extent into the modelling.

Typically, the models are re-connected (calibrated) to "real" ships fuel consumption, however, deviations caused by several factors do exist. Nevertheless, if aggregated yearly, these models may serve as quite representative assessment of a ships fuel consumption over the year.

The following list is providing some examples of the factors influencing possible deviations of the model from the conditions the ship is exposed to in reality. The non-exhaustive list may serve as indication:

- reflection of real weather conditions
  - the fuel consumption can easily double or triple in strong wind / weather condition
  - weather routing systems would be discredited in AIS-modelling as it don´t take into account the higher fuel consumption in bad weather areas which the routeing system is avoiding, and instead calculate just the longer distance for getting around the bad weather area
    (this is also true for the negative effect of travelling longer distance at higher speed in order to achieve same Estimated Time of Arrival, (ETA)
- current in seas and estuaries
- draft and trim variations of the ship (fully laden or ballast)
- fuel consumption for auxiliary engines / boilers is modelled and may be ship type / loading and route dependent, those consumers are not commonly identical
- sometimes AIS signals are not captured by Satellites. Therefore on high seas a coverage gap might occur which might influence the results, distance determination
- maintenance condition of ships' machinery influences the SFOC

[3] e.g. engine data by IHS-Fairplay, Clarkson Research Services, …

- maintenance and condition of ships' hull influences the resistance and by that the fuel consumption (see above)
- different AIS model may vary and might provide different aggregated outputs
- only generic ship machinery data are provided by public available data bases. In case ship owners have applied efficiency improvements but have not changed the data in the public available data set (e.g. IHS-data base), the efficiency increase (= decrease in fuel consumption) can´t be reflected properly

The sample size for voyages being analysed / tested comes as an outcome from the risk assessment the verifier is obliged to perform as part of the data verification process (ref. to Article 11; 12.; 13.; 16 of COMMISSION DELEGATED REGULATION (EU) 2016/2072)

Verifiers make use of the external set of estimated data which might allow an adaption of verification efforts, .e.g. in decreasing the sample size the verifier needs to analyse / test in detail.

If the data on aggregated fuel consumption and on aggregated CO_2 emission reported from a ship is within about ± 20% of the "external set of estimated data", it is considered best practise that the sample size of voyages to be analysed / tested in detail may be decreased up to 40% of the initial sample size.

The following graph illustrate the issue:

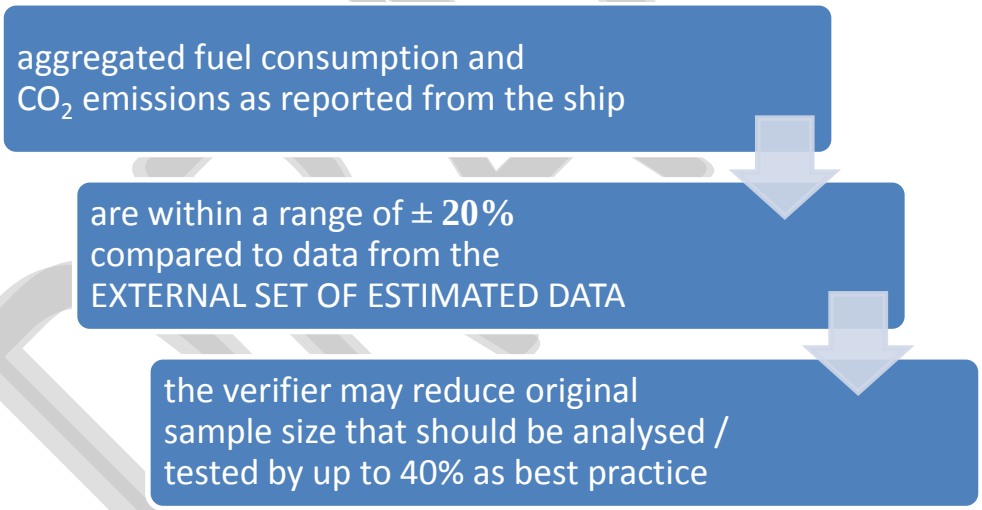

Figure 1: decision tree for a reduced sample size

Appendix

Example:

verifiers risk assessment original voyage sample size:		20 voyages
aggregated fuel consumption of the ship as reported for the emission report:		
HFO:	5000 t	
MGO:	1200 t	
sum:	6200 t	
result of external estimated fuel consumption:		
sum:	6000 t	
comparison of reported fuel consumption with external estimated fuel consumption is well within the ± 20% proximity level		
verifier can reduce the sample size to:		12 voyages

Abbreviations

AIS	Automatic Identification System
ETA	Estimated Time of Arrival
IHS Fairplay data	Ship data base sorted by IMO no. (IHS is the company trade name)
LRIT	Long Range Identification Tracking
SFOC	Specific Fuel Oil Consumption
UTC	Coordinated Universal Time