

Towards more reliable emission data for the external cost calculation of IWT

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We reviewed the quality of datasets used to calculate emissions and external costs for Inland Waterway Transport (IWT) at EU level (€/tkm). We had a look at what data is needed and what is available. This allowed us to identify the knowledge gaps regarding the external costs of emissions to air. Based on these conclusions, we made recommendations on how to close the main gaps and validate these with the sector.

Review of the findings

We did not compare the methodologies for data collection but focused on the data behind it.

Logistics parameters

- ❑ There are no complete and reliable datasets available on European level regarding vessel kilometres and average load factor.
- ❑ Load (on loaded trips) often depends on the available water depth. Especially in free-flowing sections of waterways this fluctuates, just as well as their bandwidth.
- ❑ We also found a huge gap in information regarding the share of empty sailings. The only information available is the voluntary Eurostat data table.
- ❑ Eurostat statistics contain only two categories for vessels over 1500 tonnes. We need more differentiation between vessel size classes (especially for large vessels and coupled units)

Energy consumption

- ❑ The specific energy consumption differs from waterway to waterway and per vessel type. Models are used to estimate fuel consumption.
- ❑ However there is no representative dataset available on actual fuel consumption, measured in real life.
- ❑ There is limited information on the parameters that influence fuel consumption: there is for instance only limited data about the effect of sailing speed on the fuel consumption (and emissions).

Emission parameters

- ❑ Real world emission factors NO_x and PM_{2.5} are unknown.
- ❑ Emission factors for LNG engines are hardly known yet.
- ❑ Information on auxiliary engines is largely missing, we have only limited information on the power they provide and the use made of them.

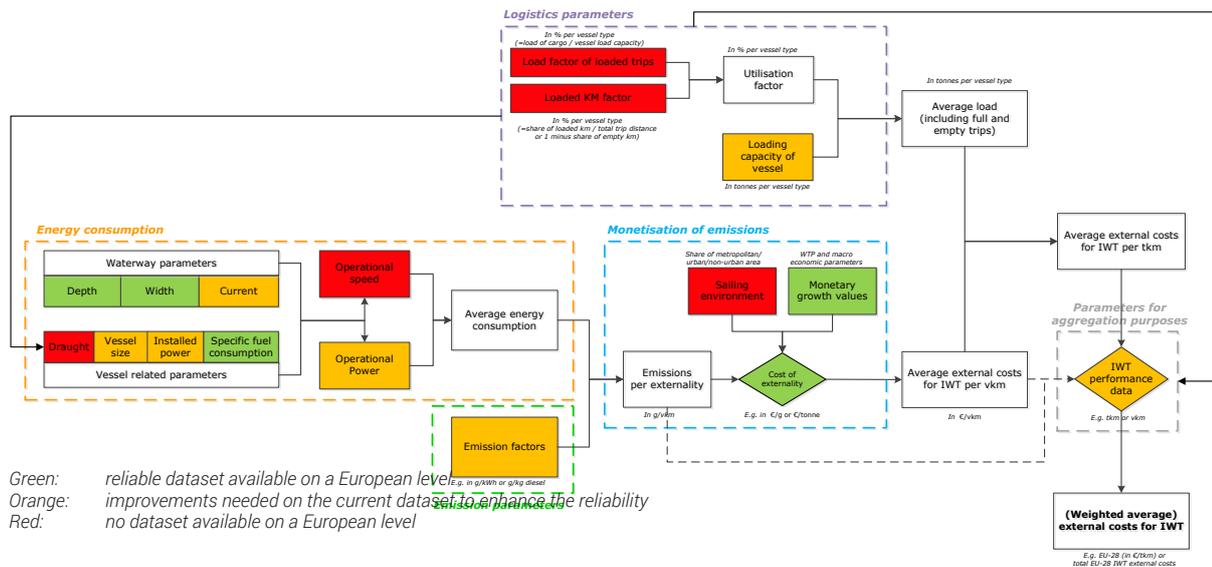
Monetisation

- ❑ We found big differences between countries and types of areas as regards the shadow prices for NO_x and PM.
- ❑ We need more detailed information on the geographic breakdown of the traffic and transport performance: e.g. not only consider rural areas, vessels also pass urban areas.

Aggregation

- ❑ Significant information about inland waterway transport gets lost when translating information from a single dataset per trip (where possible) to the aggregated Eurostat statistics.

Visual overview of the main gaps in data



Recommendations

1. We need to collect data on fuel consumption and develop reliable models based on accurate speeds and waterway information. We could use RIS sources: AIS in combination with ECDIS, NtS,...
2. We need more reliable data on the average tonnage carried by inland vessels per travelled kilometre, properly taking into account the share of empty trips. We could use German data from DESTATIS and extrapolate to similar countries/situations, explore options to use AIS to determine the total km sailed and the load per km, or ask Eurostat/National Statistics Institutes to provide more data.
3. To address the lack of geographic detail to determine impact of NOx and PM2.5 emissions by inland waterway transport, we need to make use of GIS, OD-flow data (e.g. ETIS+) and explore if it is possible to use AIS or TENTec.

Stakeholder exchange activities

These findings were validated with the sector at a Platina 2 expert workshop (5 October 2015, Brussels) and a working group meeting on Inland Waterway Statistics with National Statistics Offices (6 November 2015, Luxembourg). Based on these exchanges, we developed a paper as input for the CESNI Group to explore how we could add consumption and emission data on a variety of engines.

Some concrete outcomes

- As the current data is not reliable, there is no basis yet to start discussions about internalising external costs. The data quality needs to be improved first before any comparison of aggregated external costs of different transport modes can be compared.
- As the legal framework regarding data collection on EU level cannot be changed on short term, we need to focus on voluntary actions in the meantime to close data gaps.
- EUROSTAT and NSIs could take the following voluntary actions:
 - Explore how to use energy statistics as a basis to determine fuel consumption and CO2 emission.
 - Address the lack of information about the empty trips/sailings.
 - Expand the information about different vessel sizes (especially the larger classes).
- CDNI fuel bunkering information can be used to estimate fuel consumption on a macro level. A research project and publication is already planned by CCNR in the framework of the Market Observation of IWT in the EU.
- It is too costly to extract aggregated and anonymise data from AIS. There is too much data and it would require too much effort from NSIs and EUROSTAT. Building on CoRISMA seems more appropriate, involving national RIS authorities. Aggregated AIS data could possibly be supported by the European Commission as a Connecting Europe Facility project.
- We could think of extending the European Hull DataBase with more accurate engine information. CESNI mentioned in its draft work programme: "Adaptation of ES-TRIN in relation to the content and the functions of the European

hull database” which would link the 2 databases and provide more info on engines.

- Another option would be to improve the IVR database with more accurate data on installed engines, validated by ship owners and possibly linked to EHDB. This database can be adapted without changing the legal basis. The question remains whether ship owners will be happy to input data and effectively feed the database with accurate information.
- PROMINENT is currently measuring real world fuel consumption and emissions.
- TENtec 2016 will have a call for tender to collect data on IWT related to their geographical position (Lot 2 call for tender MOVE/B1/2014-527).

Questions and answers

Q: Where you surprised to see lack of data?

A: Yes and no. The key indicator for emissions is fuel consumption. There are some studies, but not all that many. This work also shows the complexity of this kind of calculations. A central database validated by experts and the sector would be a good step forward.

Q: Would you prefer legal or voluntary actions to improve this data?

A: That doesn't matter so much, as long as we obtain the most accurate information possible.

Q: We need a lot of data, as it helps entrepreneur to see the real cost of IWT. Did you compare with other industries? e.g. road, sea,... How do they do it? Can we learn from them?

A: We did not compare to other transportation modes. For IWT, the emission calculation is more complex than other transport modes. There is a large variety in vessels, types of waterways, sailing conditions. That is why getting accurate data on emissions for IWT is more complicated than e.g. road transport.

Q: How does road transport know their average fuel consumption?

A: Average car fuel consumption and emissions are known. You multiply the distance with the average emission of the truck divided by the cargo. For internal waterway transport, there are estimates but the challenge is to unify the information in a standard way so that they are truly comparable.

Q: This piece of work focuses on emissions and fuel consumption. But Voies Navigables de France go a step further and also calculate e.g. damage to infrastructure and the cost to repair it. There is a wider impact of transport than only emissions. Did you take that into account?

A: We know that there is an impact on a variety of external aspects: noise, damage, etc. However, within this study, we focussed only on NOx and PM. The other elements could be brought into the equation in a future study.

Q: Did you look at other fuel types such as GTL, electric propulsion, etc.

A: For the emission indicators, we looked at LNG, Diesel, GTL and also other fuel types. However, most information is available about diesel engines as they are most known and most popular. There is scope for more research into other energy sources.

Comment: At the ISPRA research facilities in Italy, a working group is working on emission standards for different modes of transport. We could have a look at that.

A: Newer engines are indeed cleaner. We hope to be able to improve our data in the next 5 years to be able to compare IWT with other modes of transport. This would allow for evidence-based decision making.

Q: Within Royal BLN-Schuttevaer, we ask our members about their fuel consumption in relation to their trajectory. We started this pilot project with 20 ship owners. How big should the sample be to extrapolate?

A: This is a great pilot project to get a first estimate. Of course we need something similar also from other countries. The sample size depends on the size of the fleet, to be representative and valid.