Our thanks go to ASD metal services, Leeds for providing this study

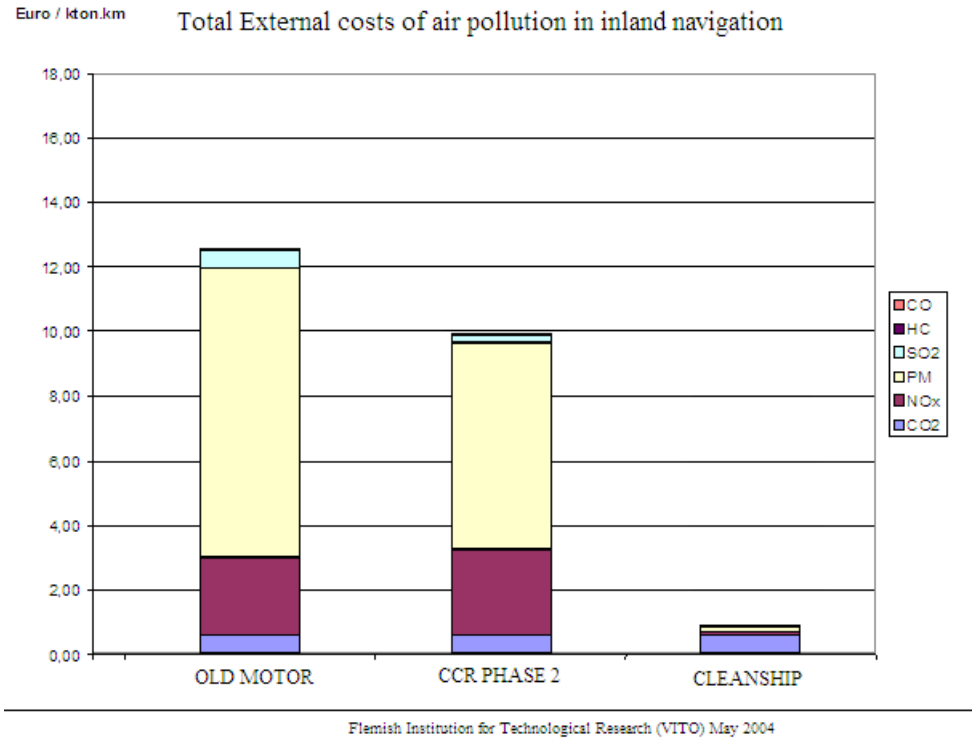
ENVIRONMENTAL REPORT

Transport of constructional steel Grove Wharf, Scunthorpe to Stourton Point, Leeds

The environmental impact of a transport flow is often assumed to refer only to the amount of Carbon Dioxide produced or its carbon footprint. In reality there are many other factors that need to be included such as other released pollutants (NO_x SO_2 particulates) and the wider impact on the environment (noise, accidents, congestion).

Exhaust emissions

Inland navigation is significantly less contaminating to the environment than other modes of transport, even when taking into account technological modernisation of truck engines and the advanced standardisation of fuels in road transport over the past decade. Even then inland navigation is still a much cleaner mode of transport than road transport. The slower technological modernisation of barge engines is partly caused by the much more sustainable character of barge engine investments, which as a consequence need much slower renewal.



No research has been carried out in the UK relating to pollution caused by inland waterways transport. Therefore research carried out in Belgium and the Netherlands has been used, this analysis uses data for vessels comparable in size to those in use in the UK.

Current EC regulations, in force since 2008, require the installation of CCR Phase 2 compliant engines in new vessels or when replacing the engine in an existing vessel. Improvements in the design of diesel engine has resulted in a small increase in fuel efficiency and in a reduction of particulate matter and SO_2 . As can be seen from this graph there will still be significant emissions of NO_x SO_2 and particulates.
In practice the SO_2 emissions are purely due to the amount of sulphur in the fuel. Over the last few years the quantity of sulphur in the diesel used by road vehicles has been reduced to an absolute minimum whilst at the same time the quantity of sulphur in fuel used for barges (gas oil) has stayed the same. During 2009 this will change as all types of diesel fuel will be of the same grade, resulting in the elimination of all SO_2 emissions from inland waterways vessels whatever the age of the motor.

Though the emission of particulate matter (PM) has been reduced in a modern CCR phase 2 compliant diesel motor it is still significant. It is possible to reduce PM by a further 95% by the installation of a regenerating particulate filter such as the Huss MD system.

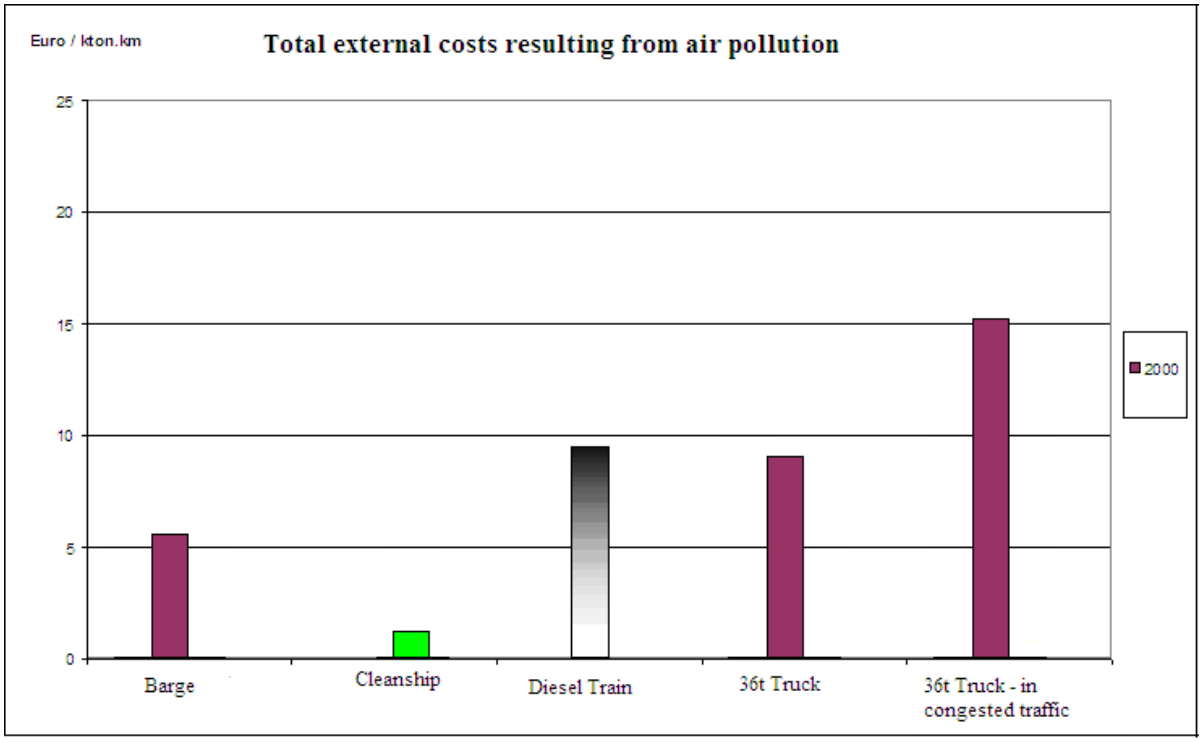
Further reduction of NO_x is not quite as simple, current technological solutions require the injection of a urea solution into a specialist secondary catalytic convertor such as the Huss SCR system which reduce emissions by approximately 80%.

In order to test these possibilities the **cleanship** project has been promoted by the European commission and has included all these tecnologies. The table below shows the decrease in emissions that have been obtained in practice.

	NOx	PM	FC	CO2	SOx
ATM Fuel Efficiency CCR phase2	-7%	-7%	-7%	-7%	-7%
LSF Low sulphur fuel, EN 590, 10 ppm	none	-17%	none	none	-99.5%
SCR Selective catalytic reduction (urea injection)	-85%	none	none	none	none
PMF Particulate matter filter	none	-95%	+2%	+2%	+2%
Total emission reduction	-86%	-96%	-5%	-5%	-99.5%

http://www.cleanestship.eu/project

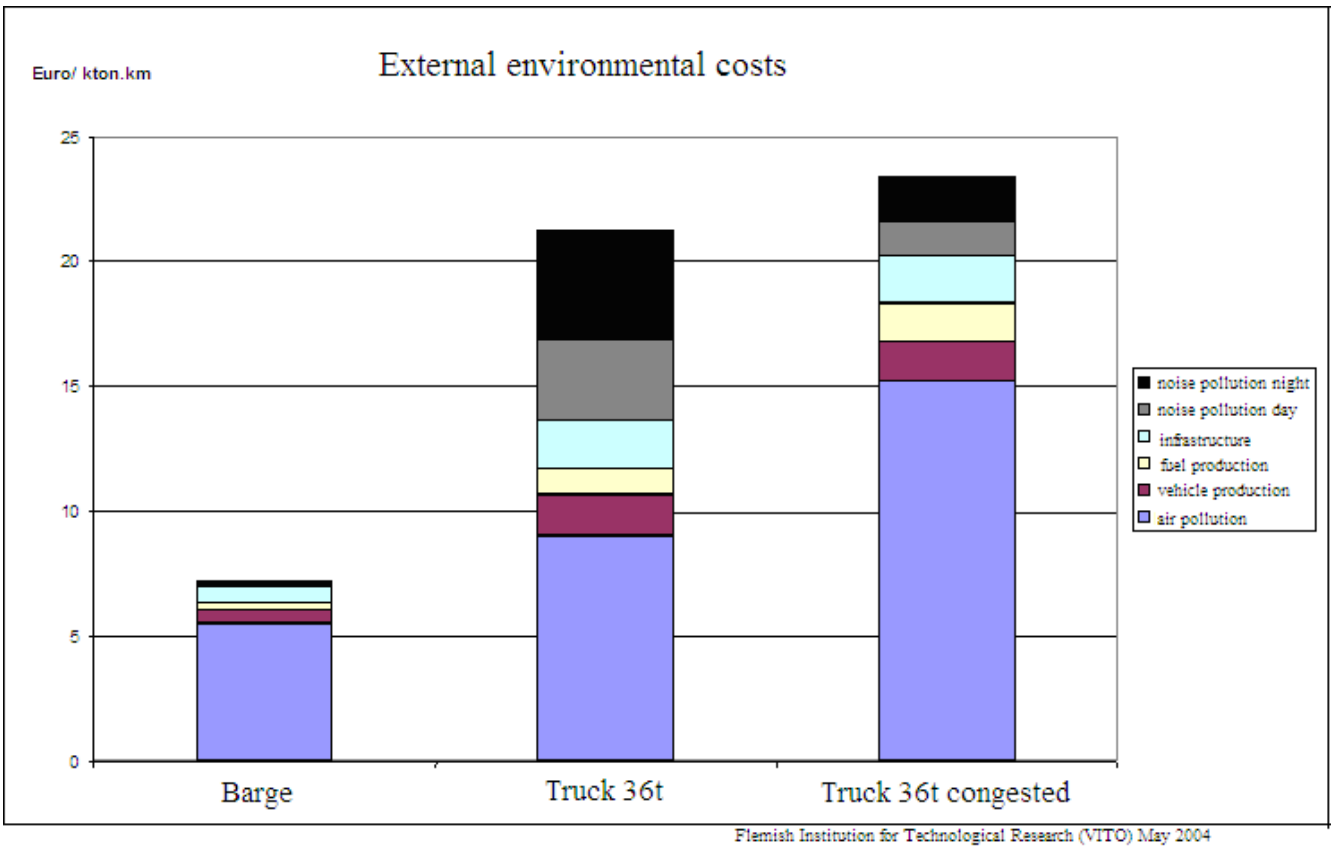
The resulting overall reduction in emissions can be seen below



Flemish Institution for Technological Research (VITO) May 2004

External Costs

This can be split into two sections, the environmental costs and the total external costs.

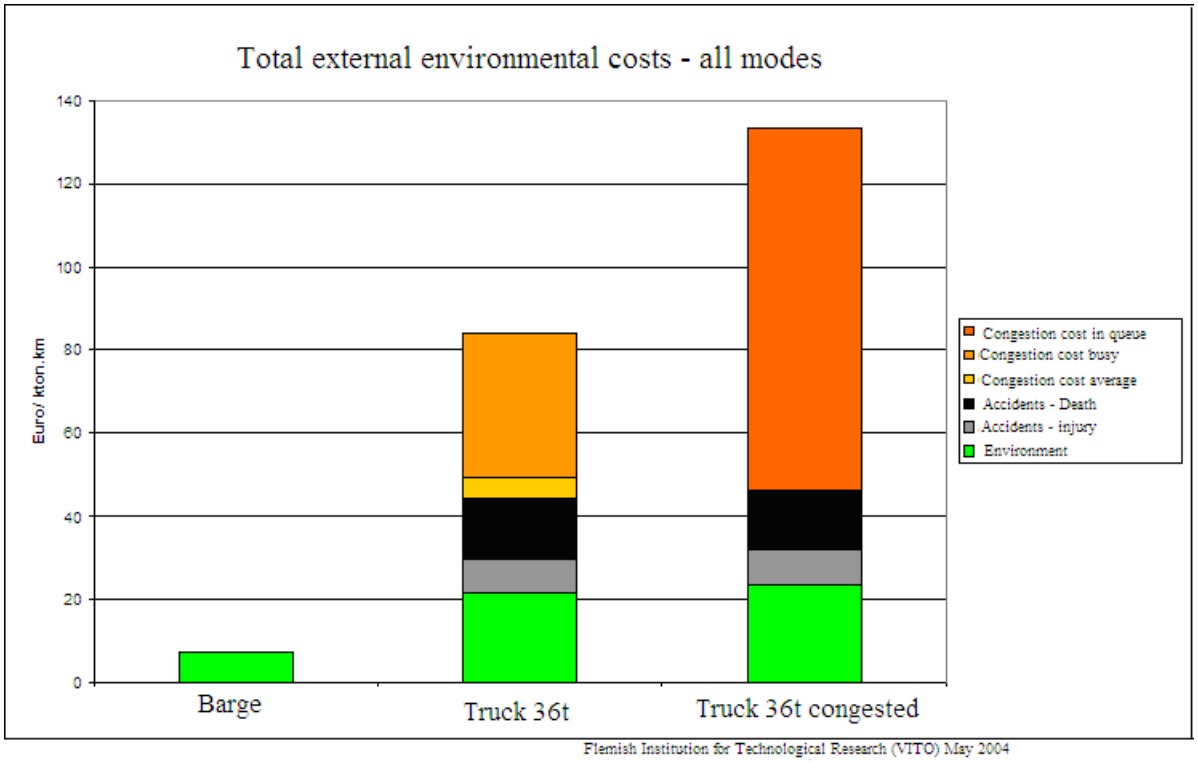


The VITO research in May 2004 reported that for inland navigation, total external costs of environmental impacts, accidents and congestion are 7 times lower than in road transport. Except for the costs of sulphur dioxide (reduced to zero in 2009) and for nitrogen oxide (removable by special catalyst), all categories of external costs have a better score in inland navigation than in other modes of transport. The benefits of inland navigation are even greater, if the external costs of the total life cycle are taken into account. Total life cycle costs include production and maintenance of the infrastructure and of the vehicles.

This finding is a consequence of the relatively longer life span of infrastructure and vessels in inland navigation.

Other external costs compared with external environmental costs.

In order to compare total external costs of several modes of transport, VITO also studied costs that are not related directly to the environment. In this respect as well, inland navigation scores much better than railway and road transport. Inland navigation is by far the safest mode of transport. On canals and rivers in Flanders, some 7 accidents are counted per billion ton-kilometres; on the Rhine there are 11 accidents per billion ton-kilometres. By contrast, an average of 150 accidents per year is counted per billion ton-kilometres in road transport. The accident figure is ten times lower for railway transport, and even 20 times for inland navigation. The number of deaths in inland navigation accidents is 240 times lower than in road transport, and the number of heavily injured even 1.300 times. The this is also the case for congestion and noise pollution as well.



Carbon Footprint Calculation:

The current operation transports imported steel from Wharton Grove Wharf Ltd. Grove Wharf, Gunness, Scunthorpe DN15 8UA to ASD metal services, Stourton Point, Haigh Park Road, Leeds LS10 1RX.

By Road:

Currently the steel is transported by truck in 24 tonne loads. The distance by road is 52miles (84km) or a total of 104miles for a round trip. The ASD transport department reports an average fuel use of 9 miles/gallon.

104/9 = 11.55 gallons per load or for a 24 tonne load 0.48 gallon/tonne = 2.18l/tonne

Giving an emission of 69g CO_2/tonne/km

By Water:

The MV Inland Navigator was used for the trial period on this route. The distance by water is 46 miles, but the lorry distance of 52miles is used for comparison purposes. Over five round trips an average of 412l of fuel was used for a complete round trip, with no correlation with the tonnage carried, so a full load of 300 tonne is used for calculation purposes.

412l/300tonne = 1.37l/tonne

Operation with a larger vessel (600 tonne capacity) would be more fuel efficient with an expected fuel usage of approximately 1.2l/tonne, a saving of 0.98l/tonne or 45% over road transport.

Producing an emission of 38g CO_2/tonne/km

ASD expect to transport 60,000 tonnes per year saving a total of 58,800 l/year

Specific Gravity of Diesel 0.84
1kg of diesel = 860g of Carbon = 3150g of CO_2 1l of diesel = 722g of Carbon = 2650g of CO_2

One year's operation would therefore save 42,450 kg off Carbon or 156 tonnes of CO_2