



Analysis of **CO₂ emissions** of shipping activities in Chatham Docks compared with the use of road haulage



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SCOPE OF THIS PAPER

Analysis of CO₂ emissions of Vessels importing and exporting via Chatham Docks and the potential impact of those vessels being transferred to Sheerness Port or being replaced fully by road vehicle transport.

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On behalf of Association of Chatham Docks Commercial Operators

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INTRODUCTION

This document has been produced at the request of the Association of Chatham Docks Commercial Operators in response to the Cities Outlook 2020 document produced by the Centre for Cities along with the intent to prove their constant work to protect the local community, whom they consider as key stakeholders.

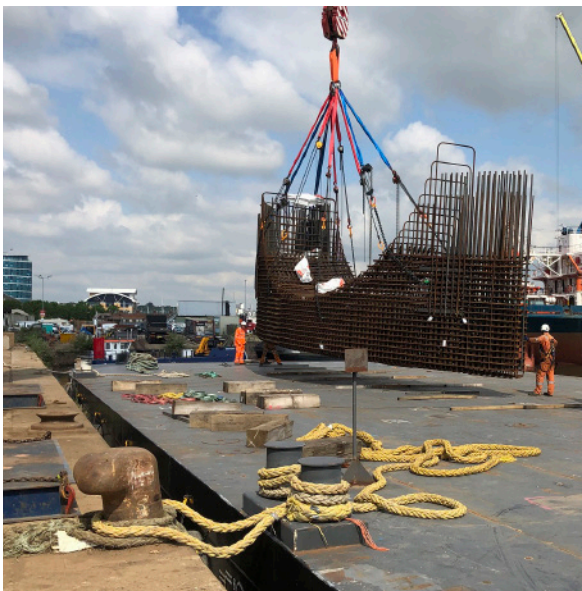
This work is vital as the local town of Chatham has been identified as having some the poorest levels of air quality within the whole of the UK having had 40 days in 2018 where the daily air quality index, monitored by the Met Office, was equal to or in excess of 4. The members of the Association of Chatham Docks Commercial Operators are all responsible and ethical businesses, with a shared key operational value of protecting the local environment.

The increased level of residential building applications being submitted to and granted by the Medway Council, it is key for the operational businesses of the area to work towards carbon neutrality as the increased focused housing areas will be large generators of CO2 emissions during their building and user lifetime. This combined with the likely increase in local unemployment due to the threat of closure of businesses in Chatham Docks resulting in increased levels of commuting and therefore detrimentally impacting air quality locally.

All the data gathered to generate this report has been taken from publicly available evidence-based information and approved by UK Government.

The author of this document is a member of the Institute for Corporate Responsibility & Sustainability, a chartered quality professional member of the Chartered Quality Institute, the Sustainability Committee of UK Certification Authority for Reinforcing Steels, which is responsible for the provision of guidance in the definition of the requirements of accreditation for companies within this sector, and an independent industry specialist member of BSI Technical Committee – ISE/104.

He has also recently provided specialist sector guidance to ResponsibleSteel™ standard team, the latest and most demanding CSR, responsible and sustainable sourcing standard, in the application of this standard to the industry and how to best apply and audit its requirements.



Analysis of CO₂ emissions of Vessels importing and exporting via Chatham Docks and the potential impact of those vessels being transferred to Sheerness Port or being replaced fully by road vehicle transport.

DATA BASIS

The calculations within this document are based upon data provided by Total Ship Services Ltd, who operate as the major shipping agent within Chatham Docks. The period covered for this data is the calendar year of 2019.

The data for vessels operated by Aggregate Industries at their site within Chatham Docks were not available at the time of the production of this report and have therefore been estimated using best practice data. The vessel movements related to the operations of European Active Projects Ltd have been discounted as they are for the repair/upgrade of vessels only. The data works on 157 sailings on a one directional basis and the CO₂ emissions based upon the site of the vessel required.

CO₂ data per vessel type/sailing gathered via <http://www.sustainablefreight.com.au/tools-and-programs/emission-calculators/ship-type-carbon-emissions-calculator>

CO₂ data per vehicle journey gathered via <https://www.commercialfleet.org/tools/van/carbon-footprint-calculator>

The mpg rate used for these calculations is 7.9, based upon DEFRA data for the UK.

Due to the close proximity of Sheerness Port to Chatham Docks it has been considered that there will be no major difference in the CO₂ emissions for each sailing.

To ensure clarity in the calculations of the comparison of the use of shipping against road vehicles, the exact number of vehicles (based on 28t/vehicle) has been used. In actual terms, the number of vehicles used would be 10-15% higher due to sizes of individual cargo items. This will be calculated and shown as a further set of data based upon the maximum increase of 15%.

INITIAL ANALYSIS

The vessels using Chatham Docks with Total Ship Services Ltd facilities break down into 3 distinct groups:

1. Steel imports/exports
2. Timber imports
3. RDF exports
4. Cement powders

The calculations are based on the following:

- i) **Shipping** – recognised port to port sailing distances in nautical miles
- ii) **Vehicles** – direct road routes from the port to Chatham Docks – Cross channel ferry CO₂ shown separately (158kg/CO₂ per vehicle – <https://www.eurotunnelfreight.com/uk/about/carbon-counter/>), but no allowance for any other ferries has been made due to a lack of available data.

1. Steel imports/exports

These account for 100 vessel sailings providing raw materials for businesses inside and outside of the port and the transport of steel scrap to steel mills for recycling.



2. Timber imports

These account for 30 vessel sailings allowing the importation of FSC certified products to the UK for various end users.



3. RDF exports

These account for 15 vessel sailings for the export of RDF to appropriate facilities for use.



4. Cement Powders

These calculate to 12 vessel sailings per year for importation of cement powders for use in the UK Construction industry.



SUMMARY OF DATA GATHERED

Analysis based upon sailings – 2019

	VESSELS	NAUTICAL MILES	WEIGHT (T)	CO ₂ (T)
Steel	100	31,890	158,288	2,962
Timber	30	21,541	56,688	1,087
RDF	15	18,370	42,440	1,520
Cement Powder	12	4,368	72,000	1,416
Total	157	76,169	329,416	6,985

Conversion to transport by Road Vehicles

	VESSELS	WEIGHT (T)	CO ₂ (T)	Ferry CO ₂ (T)	Total CO ₂
Steel	5,720	158,288	6,792	904	7,696
Timber	2,038	56,688	2,509	322	2,831
RDF	1,524	42,440	2,582	241	2,823
Cement Powder	2,580	72,000	2,333	408	2,741
Total	11,862	329,416	14,216	1,875	16,091

Comparison CO₂ Emissions

	VEHICLES	VESSELS	+/-
Steel	7,696	2,962	4,734
Timber	2,831	1,087	1,744
RDF	2,823	1,520	1,303
Cement Powder	2,741	1,416	1,325
Total	16,091	6,985	9,106

The influence of additional haulage requirements

As stated in the data basis section of this document, there now follows the recalculation of this data based upon the requirement of an additional 15% haulage based upon size of items within individual loads of cargo. This may be influenced by the length or bulk of the product being transported, along with the applicable regulations for the transport of the product from its point of origin to its delivery to Chatham Docks.

Conversion to transport by Road Vehicles +15% additional haulage

	VESSELS	WEIGHT (T)	CO ₂ (T)	Ferry CO ₂ (T)	Total CO ₂
Steel	6,578	158,288	7,811	1039	8,850
Timber	2,344	56,688	2,885	370	3,255
RDF	1,753	42,440	2,970	277	3,247
Cement Powder	2,967	72,000	2,683	469	3,152
Total	13,642	257,416	16,349	2,155	18,504

Comparison CO₂ Emissions -15% additional haulage

	VEHICLES	VESSELS	+/-
Steel	8,850	2,962	5,888
Timber	3,255	1,087	2,168
RDF	3,247	1,520	1,727
Cement Powder	3,152	1,416	1,736
Total	18,504	6,985	11,519

As can be seen from the calculated comparison data, should the decision be made to close Chatham Docks as an operational port, the CO₂ emission impact for the area would grow by 9,106 tonnes should these vessels be directly replaced with HGV vehicles, which increases to 11,519 tonnes when making allowances for addition haulage requirements. The figure of 11,519 tonnes would equate to filling Wembley Stadium just under six times.



Transporting of Goods from Sheerness Docks

As part of this report, consideration has been given to the same goods being shipped to Sheerness Docks. Although in many cases, **the port is unsuitable for the unloading of the types of vessels or contents of the loads**, this has been ignored.

The following table details the CO₂ emissions of the transport of the goods the additional 21.3 miles to the site at Chatham Docks to match fully any further transport emissions.

	VEHICLES	WEIGHT (T)	CO ₂ (T)
Steel	5,720	158,288	184
Timber	2,038	56,688	60
RDF	1,524	42,440	45
Cement powder	2,580	72,000	83
Total	11,982	329,416	372

As can be clearly seen from the data gathered and calculated, the closure of Chatham Docks as an operational port would have an extremely detrimental effect upon the CO₂ levels and air quality within the area.



Source: World Health Organisation

CARBON OFFSETTING VIA TREE PLANTING

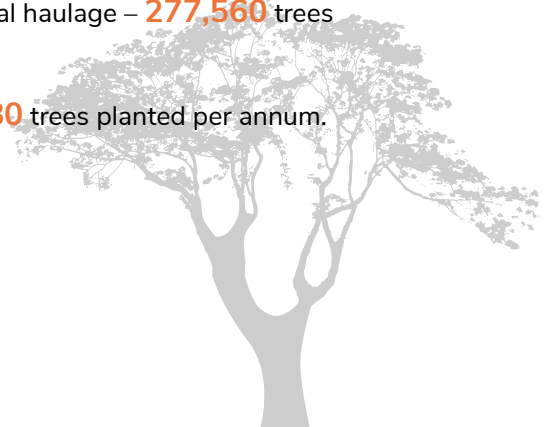
Although estimates vary, for the purposes of this study, we will use the often quoted figure of 15 trees planted will offset 1 tonne/CO₂.

This would therefore need the following requirements:

Conversion of transport to road vehicles – **241,365** trees planted per annum.

Conversion of transport to road vehicles +15% additional haulage – **277,560** trees planted per annum.

Additional road transport from Sheerness Docks – **5,580** trees planted per annum.



FURTHER INFORMATION

Potential future CO₂ emissions for the site if changed to residential use:

Based on the 950 dwellings planned for the complete Chatham Waters development (<https://peellandp.co.uk/chatham-waters/>) – 775 cars travelling the average mileage for the area, 7,500 miles, would contribute an additional 1,327 tonnes of CO₂ emissions based upon the average CO₂ emissions of cars in the UK at 0.1419kg/CO₂ per km.

Given the future plans for entertainments, restaurants etc. based upon parking at a similar size to the nearby Dockside Outlet (380 parking spaces utilised 3 x day).

Vehicles visiting the site from within Medway at 16 mile round trip to facilities open 360 days per year would contribute a further 1,500 tonnes of CO₂ emissions.



It should be noted that from the 158,288 tonnes of steel delivered, 99,610 tonnes came from one of the cleanest steel mills in the whole of Europe. For the material supplied the sector average is 839kg CO₂e per tonne, this mill is currently producing at 451kg CO₂e. At this time, a new hydrogen based steel making facility is being built at this mill to reduce the level of CO₂ further by the removal of large amounts of fossil fuels from the production process, along with the expansion of the wind turbine power generation on site will mean that CO₂ levels of the manufacturing will drop even further.

The parent business of the supplying mill are currently operating trials across the world on further improvements, such as the conversion of the manufacturing wastes to create zero emission biofuels will therefore allow them to attain their goal of being a carbon neutral steel maker by 2050, in line with the terms of the 2015 Paris Agreement on Climate Change.



ANALYTICAL CONCLUSIONS

1. The best actual forecast of potential CO₂ impact is 12,610t/CO₂, based upon the closure of Chatham Docks and the site is redeveloped for mixed use. This is the equivalent weight of 154 Boeing 737 aircraft, fully laden at take off.



2. The total number of trees required to be planted on an annual basis to offset these CO₂ emissions would be 189,153.



3. These impact figures represent the position based on the loss of only the operations served by Total Ship Services Ltd. within the Docks, and the additional dwellings under consideration.

4. Further significant increases in CO₂ emissions will increase the impact, should the other tenants also be forced to relocate through the closure. An example of which would be the additional 73t/CO₂ emissions which would be generated by staff travelling an additional 10 miles per journey on their daily commute. If business attempted to relocate within this distance it would obviously add over 350t/CO₂ emissions for transportation of goods.



POTENTIAL FURTHER CO₂ SAVINGS IF CHATHAM DOCKS WAS FULLY UTILISED

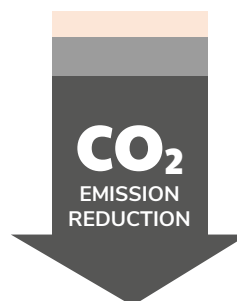
The calculations within this report are based upon the use of four out of the six operational berths within the docks handling over a quarter of a million tonnes of material. This was a year when steel imports and their values were greatly depressed due to the poor demand due to 'dumping' of steel across Europe by the Chinese mills and the uncertainty of Brexit.



These factors combined reduced the levels of material handled and processed within the docks by just under 50%. Based upon the UK Economy and steel market recovering, thanks to projects such as HS2, the docks would be capable of handling in excess of one million tonnes of cargo if all the available berths would be usable for material handling.



The potential CO₂ emissions savings for the area would then be in excess of 60,000 tonnes as this would potentially reduce vehicle use within the area for commuting by staff members and also by the cutting of heavy goods vehicle deliveries to the area. This would also be greatly increased by the use of the zero emission biofuels potentially being created by steel manufacturers.



As part of other potential carbon emission savings identified, solar panels could be installed on all of the buildings within the docks. Based upon previous investigations carried out by ArcelorMittal Kent Wire Ltd, the roof space of their buildings could match the 2.691Mwh/PA supply installed for the operations of their facilities, which would therefore mean that the docks could create its own power supply.



CONCLUSIONS

The following conclusions can be summarised from the evidence-based investigations and analysis carried out during the compilation of this report:

- i) The re-designation of Chatham Docks from industrial to mixed use would have a detrimental effect on the local air quality. It is calculated, that the additional commercial and private activities will adversely impact the Daily Air Quality Index measurements by at least 3 additional points. This would worsen Air Quality by 300% from its current level of 1 to a level of 4 and propel Chatham into being one of the worst affected areas in the UK outside of Central London.
- ii) The loss of the businesses within the Docks, and their endeavours to improve the local environment, would place an increased risk to the SSSI's and RAMSAR sites within the area. The industrial operations of the site place increased requirements of pollution prevention on these businesses. There are no such compliance requirements for residential/ mixed used developments.
- iii) The owners & developers of the site place no importance on compliance with the requirements of the 2015 Paris Agreement on Climate Change, the United Nations Sustainable Development Goals or the potential risks to the health of the local population based upon the plans for the development for the site.
- iv) The potential growth of the site as an operational Dock, along with its manufacturing facilities, are the optimal environmentally friendly option and offer the greatest level of certainty for future improvement in the air quality of the area.

