



Digital Products vs. Hard Copy Publications

Carbon emission equivalent CO₂e calculations

1. Scope

Regs4ships provide digital regulations to shipping managers and ships. This is a unique product. It is the intention to provide a matrix involving various inputs to show the customer the carbon saving they can achieve rather than employing the back office administration that is currently in place with most shipping companies with regards to the procurement, dispatch and update of certain publications.

Whilst this is not an exhaustive process as the variables can be broken down to the smallest processes, it is the intention to take a typical shipping company model (30 ships of various sizes and employment) and analyse what is required to keep the vessels and company within the parameters set by convention (IMO). This model has a 5-year life cycle.

2. Assumptions

2.1 Nautical publications (currently distributed by regs4ships) that are typically held by *all* SOLAS ships:

- IAMSAR
- SOLAS (consolidated)
- MARPOL (consolidated)
- STCW
- ISM Code
- ISPS Code
- LSA Code
- COLREGS
- CoSWP

These are **standard** across all shipping companies with contracting government Flag States.

- Shipping Notices
- Technical Circulars
- Statutory Instruments (or similar)
- Flag Notices

Author	Version	Date
M Robinson	1.0	24 March 2009



Digital Products vs. Hard Copy Publications

2.2 Specialist publications held by some ships

Code of Safety for special purpose ships

HSC Code

IBC Code

Code for the Carriage of Grain

MODU Code

2.3 Navigational publications are not included in this analysis (charts, ALRS, Pilot books, routing information, etc.).

2.4 Amendments to the main conventions and codes do not happen often whilst shipping notices, technical circulars, Statutory Instruments (or similar) and Flag notices are promulgated sometimes on a daily basis.

2.5 The shipping company model of 30 vessels comprises of:

Ships	Area of operation	GT	Type	Flag
10 (group A)	Near coastal	3000 - 7000	General cargo	UK
10 (group B)	European	7001 - 15000	Container	Liberia
10 (group C)	Inter-continental	15001 - 45000	Tanker/Gas	Marshall Is.

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2.6 The publications held on board for each group comprises of:

Group	Type	Publications
A	General Cargo	Standard + M Notices, IMSBC Code, Code for the Carriage of Grain
B	Container	Standard + Regulations, Notices, MONs, Security Advisories
C	Tanker Product/Gas/Chemical	Standard + Regulations, Marine Notices, Guidelines Safety Advisories, Tech. Circs, IBC Code

3. Statistics

3.1 Paper - It has been suggested¹ that to manufacture a conventional book (we can take this to be a publication of SOLAS/MARPOL, etc.) the cost in energy production and transportation is equivalent to 4.5 kWh or 6.6 lbs of CO₂.

3.2 IT product / CD-ROMS - transport costs

Through the data gathered by TRX² by Terrapass³ we can calculate (by weight) initially the carbon footprint for the transportation of digital regulations, assuming that the CD-ROM is sent via air freight/mail.

It can be shown that for Group 2 ships the calculations are thus:

Average travel distance from London for European delivery to Germany, Italy, Greece.

$$397 + 900 + 1486 = 928 \text{ statute miles}$$

$$928 / 1.150779 = 806\text{nm}$$

¹ Professor David Reay, THES

² Travel analytics

³ Carbon Offset reduction project

Author	Version	Date
M Robinson	1.0	24 March 2009



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Typical aircraft type (A320) consumes 2.569 Gallons per mile or 9.72 kg.

Fuel burnt therefore is $806\text{nm} \times 9.72 = 7,834$ kgs.

The weight of CO₂ can be calculated thus:

7834×3.15 (weight of CO₂ / weight of fuel) = 24677 kg of CO₂ having been emitted.

$2.20 \times 24677 = 54289$ lbs of CO₂ emitted over the whole flight.

Average Carbon footprint to 180 lbs (average persons weight) 1899 lbs CO₂⁴.

Weight of CD-ROM and packaging - 0.196 lbs.

$1899 / 180 = 10.55$ lbs CO₂ per lbs of weight (cargo)

$0.196 \times 10.55 = 2.06$ lbs CO₂ emitted for transport. This equates to 0.003% of the total CO₂ emissions for a short haul European flight.

A similar transport CO₂ emission can be calculated for Group C ships.

The production costs for a CD-ROM have been calculated⁵ to be 2.64 lbs of CO₂. This entails the production and addition of content for one CD-ROM.

Total CO₂ produced = $2.64 + 2.06 = 4.52$ lbs CO₂ emissions.

⁴ TRX CO₂ Emissions model for air travel V1.4

⁵ Forum for the Future paper

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4. Conclusion

4.1 The comparison is such that:

Books 6.6 lbs
CD-ROM 4.5 lbs

This equates to 68% saving.

The CO₂e (Carbon footprint) can be seen as

Books $6.6 \times 2.7 = 17.82$ lbs
CD-ROM $4.5 \times 2.7 = 12.15$ lbs

4.2 This can now be used as a model for use with the varying categories of ships but further work will be required for the transport costs of CD-ROMs for Group A vessels.

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