

 Component project activity design document form for CDM component project activities (Version 03.0)	
<i>Complete this form in accordance with the Attachment "Instructions for filling out the component project activity design document form for CDM component project activities" at the end of this form.</i>	
COMPONENT PROJECT DESIGN DOCUMENT (CPA-DD) ¹	
Title of the CPA	PAHSF Project 1
Version number of the CPA-DD	6
Completion date of the CPA-DD	22/09/2015
Title of the PoA to which the CPA is included	Programme for the application of advanced hull coatings to reduce shipping fuel consumption (PAHSF)
Host Party(ies)	None
Estimated amount of annual average GHG emission reductions	29100 tCO ₂

¹ The CDM changed the definition of CPA from CDM Project Activity to Component Project Activity. While this newer definition would be equally applicable to CDM and Voluntary carbon markets, we use the abbreviation VPA used in Gold Standard documents.

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

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Programme for the application of advanced hull coatings to reduce shipping fuel consumption (PAHSF)

A.2. Title of the CPA

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PAHSF Project 1

Version no. 6.

Date: 22/09/2015

Version history:

Version no. 1. Date: 9 July 2014. Uploaded to Gold Standard for Pre-Feasibility Assessment. A similar version was sent to support methodology revision request.

Version 2. Date: 30 October 2014. Incorporates changes based on approved revisions to methodology and feedback from PFA.

Version 3. Revision takes into account Draft Validation Report, file:
DVRP_14DG28MD_ver.00_27022015.pdf

Version 4. 14/06/2015. Revision takes into account additional comments received by email from Validator on 7 June 2015.

Version 5. 25/08/2015. Revision takes into account comments from Gold Standard Registration review.

Version 6. Shipping company names and ship names and IMO numbers for one shipping company have been redacted in this, redacted, version of the document, for reasons of confidentiality, as agreed to with Gold Standard.

A.3. Description of the CPA

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The VPA comprises the application of advanced hull coatings to reduce fuel consumption to ships. The advanced coatings applied comprise Intersleek 1100SR, Intersleek 900 family (comprising Intersleek 960 and Intersleek 970) and Intersleek 700 family (specifically Intersleek 757).

The set of 17 ships in the VPA is identified in the table below, which also includes the ship type and the “Intersleek” advanced hull coating applied:

	Ship Id: IMO number/ classification number	Ship name	Ship type	Intersleek
Shipping company:				
1	9xxxx14/ 86366		Ro-Ro Cargo	700
2	9xxxx52 86375		Ro-Ro Cargo	700
3	9xxxx40 86374		Ro-Ro Cargo	700
4	9xxxx68 86377		Ro-Ro Cargo	700/1100SR
5	9xxxx56 86376		Ro-Ro Cargo	700/1100SR
6	9xxxx70 86378		Ro-Ro Cargo	700/1100SR
7	9xxxx76 82973		Ro-Ro Passenger	700
8	9 xxxx 88 82974		Ro-Ro Passenger	700
9	9 xxxx 90 83199		Ro-Ro Passenger	700
10	9 xxxx 54 79707		Ro-Ro Passenger	900
11	9 xxxx 12 79832		Ro-Ro Passenger	700
12	9 xxxx 64 71590		Pure Car Carrier	700/1100SR
13	9 xxxx 52 71589		Pure Car Carrier	700
14	9 xxxx 02 74845		Pure Car Carrier	700/1100SR
15	9 xxxx 93 74599		Pure Car Carrier	700/1100SR
16	9 xxxx 68 88032		Ro-Ro Passenger	700

² Note: one shipping company did not want their ships identified, for reasons of competitiveness. In these cases, four digits of the IMO number and ship names have been redacted. However, a separate five digit “Classification number” has been added to allow ship identification. Gold Standard agreed to this.

³ The initial list in VPA DD version 1 included this ship. Data for this ship does not meet the requirements for the revised Gold Standard methodology, as approved by e-mail by Gold Standard on 9 Sep. 2014. Hence this ship is not included in this version. However, in order not to change the serial numbers, the row is not deleted.

⁴ Three ships were added in version 2 of the VPA DD, and remain in version 3.

17	9 xxxx 63 88027		Ro-Ro Passenger	700
Shipping company: Lykiardopoulos & Co⁵				
18	9289726	Argenta	Crude Oil Tanker	900

A.4. Entity/individual responsible for the operation of CPA

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Since each VPA includes a set of ships supplied with the advanced hull coating by International Paint Ltd (IP), which is also the Coordinating/Managing Entity, IP would also be responsible for each VPA.

A.5. Technical description of the CPA

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Project activities within this VPA (as in the overall PoA) comprise the application of an advanced hull coating, which is biocide-free, to cargo vessels, vehicle carriers, Roll on Roll off (Ro-Ro) ferries, all owned by the , and one Crude Oil Tanker owned by . Each VPA includes a set of ships, for which the baseline coating is a self polishing copolymer (SPC), which is a biocidal antifouling coating. Each ship within the VPA was coated with the SPC coating in the docking cycle prior to the application of the advanced hull coating. This is also the baseline scenario, i.e. in the absence of the project activity, the SPC coating would be applied to the ship. The three main advanced hull coatings, comprising the project activity, are denominated Intersleek 1100SR, Intersleek 900 family (comprising Intersleek 960 and Intersleek 970) and Intersleek 700 family (specifically Intersleek 757)⁶. They are all biocide free.

A.6. Party(ies)

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) CPA implementer(s) (as applicable)	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Not applicable for Gold Standard VERs.	International Paint Ltd, a private company that is part of the AkzoNobel Group. http://www.international-pc.com/Pages/default.aspx	N.A.
Not applicable for Gold Standard VERs.	The FReMCo Corporation, Burlington, Ontario, Canada. A private company www.fremco.com	N.A.
Not applicable for Gold Standard VERs.	MGM Innova Miami, FL, USA. A private company www.mgminnova.com	N.A.

A.7. Geographic reference or other means of identification

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⁶ The Intersleek family of advanced hull coatings include some sub-brands. The file "Intersleek family of products.pdf" provides the full list.

Each VPA within the PoA comprises a set of ships, identified by the ship names and their unique ship identification numbers according to the International Maritime Organisation (IMO). The names and IMO numbers of the ships within this VPA are listed in the table in section A.3.

A.8. Duration of the CPA

A.8.1. Start date of the CPA

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According to Gold Standard 2.2 Requirements, p. 21:

“The start date of a project means the earliest date at which either the implementation or construction or real action of a project begins (further, the guidance provided in paragraph 67 of CDM EB 41st meeting report is applicable).”

The “implementation” or “real action” here is the application of an advanced hull coating. The VPA comprises ships that were coated with an advanced hull coating from Feb. 28, 2010 to Sept. 26, 2013. For each ship the project activity comprises the docking cycle with the advanced hull coating.

The start date of the VPA is then Feb. 28, 2010.

Some key events and dates are shown below.

Event	Date
First Presentation of carbon credit opportunities by consultant, FReMCo to programme sponsor (International Paint)	16 June 2009
Emails among International Paint stakeholders discussing due diligence around FReMCo proposal	21-24 Sept 2009
First contract between FReMCo and International Paint to undertake a feasibility study for carbon credits through advanced hull coatings	25 Sept. 2009
Payment terms letter requested by International Paint, provided by FReMCo	30 Sept. 2009
Mutual Non-Disclosure Agreement, with stated Purpose “An Assessment of the Opportunity to Create Greenhouse Gas Emission Reduction Credits from the Environmental benefits brought by International Paints’ Intersleek Marine Coatings”	1 Oct. 2009
Confidentiality agreement between MGM Innova and International Paint	18 Aug. 2010
Presentation of Feasibility Study by MGM Innova/FReMCo to International Paint recommending Gold Standard project development	26 October 2010
Project Idea Note was presented by MGM Innova/FReMCo to Gold Standard	9 Nov. 2010
Gold Standard confirmation that project activity would be eligible under Gold Standard	16 Nov. 2010
Contract between MGM Innova and FReMCo with respect to GS methodology development services to be offered to International Paint	25 March 2011
Submission of new methodology and draft PDD by MGM/FReMCo to Gold Standard	13 Sept. 2011
Gold Standard publishes approved methodology “Reducing Vessel Emissions Through the Use of Advanced Hull Coatings”	8 June 2012
Design Consultation Meeting, London, UK	26 June 2013
PP submission of Clarification Request to Gold Standard (initial)	15 October 2013
Gold Standard response to above Clarification Request (most	31 March 2014

recent)	
PP Submission of methodology revision request	17 May 2014
Gold Standard e-mail agreement on acceptable revisions to methodology (most recent)	9 September 2014
PoA and VPA submitted for validation	30 October 2014
Revised methodology formally published by Gold Standard	17 November 2014

The above table indicates both prior consideration of carbon credits and continuous actions in methodology, programme and project development.

A.8.2. Expected operational lifetime of the CPA

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For each ship, the lifetime is the length of a docking cycle, until it is again coated with a hull coating. The hull coating is applied on a docking cycle, which is typically 60 months for most cargo vessels, though the docking cycle for some ships is shorter, e.g. 36, 30 or 24 months, and even as low as 12 months for small passenger ships. Thus the operational lifetime is specific to the ship, and would depend on the next coating application. The docking cycle for individual ships would be different, so that the operational lifetime would end when each ship is recoated. There are several ways of undertaking an *ex ante* estimate of the end of the operational lifetime of the last ship in this VPA. First, considering the most recent date on which a ship was coated (Sept. 2013) and that the longest docking cycle for any ship with the baseline coating to be 6 years (██████████), the docking cycle for all ships coated with the advanced hull coating would finish no later than Sept. 30, 2019, which would then be the end of period. Second, the so-called "Dataplan report" generated when advanced hull coating was applied indicates a month and year when the ship would be coated next. The most future of these dates is Sep. 15, 2018. However, the manufacturer of the advanced coating has indicated that ship owners may delay recoating hulls with advanced coatings, since these products are expected to degrade slower than baseline coatings. Considering this possibility, we allow for the operational lifetime to end on Dec. 31, 2020. As noted above, the actual, *ex post*, operational lifetime of the VPA would be determined by the date on which the last ship is recoated.

Considering a start date of Feb. 28, 2010 and an end date of Dec. 31, 2020, the operational lifetime of the overall VPA would be 10 years and 10 (ten) months.

A.9. Choice of the crediting period and related information

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The methodology allows for a single docking cycle following the application of the advanced hull coating. Therefore the crediting period for each ship will be limited by the duration of the docking cycle, see A.8.2.

A.9.1. Start date of the crediting period

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The starting date of the crediting period for each ship will be the date following the application of the advanced hull coating. Thus the start date of the crediting period will be specific to each ship. The starting date of the crediting period for the entire VPA will therefore extend from earliest date on which any ship was coated, i.e. Feb. 28, 2010, see above, with the understanding that the crediting period would be limited by the conditions on retroactive crediting. The crediting period would continue till the last ship when any of the ships receive another hull coating. Of course, for each ship, its crediting period would be limited to its own docking cycle over the entire period for the entire VPA.

A.9.2. Length of the crediting period

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The length of the crediting period for each ship will be the duration of the docking cycle, until the ship is coated again, see A.8.2 and A.9.1. The overall crediting period for the VPA will therefore start on the date that the first ship received the advanced hull coating, and end when the last ship with the advanced hull coating reaches the end of its docking cycle. During this overall period, each ship will be credited for its own docking cycle. The length of the crediting period would be limited by the end of the operational lifetime of the VPA. The start date of the crediting period is Feb. 28, 2010 and the end date of operational lifetime is Dec. 31, 2020 (see Sec. A.8.2). This interval is 10 years and 10 (ten) months. A single crediting period of 10 years is chosen for this VPA. In reality, the crediting period would be shorter because of the conditions of retroactive crediting in the Gold Standard.

A.10. Estimated amount of GHG emission reductions

The table below estimates emission reductions to be claimable, assuming retroactive crediting starting from 14 August 2013. The estimates are based on available data following the application of the advanced hull coating, and extrapolating up to the end of the expected date when the next application of hull coating, i.e. for the expected duration of the docking cycle. Since some ships were coated earlier than others, and are also coated more frequently, the number of ships in the docking cycle falls off with time, and quickly after 2015. The table below shows ex-ante emissions reductions up to Feb. 27, 2020. Actual emission reductions would be based on measured fuel consumption data for the actual docking cycle of each ship, and could extend to 2020.

Emission reductions during the crediting period	
Years (calendar years, except as noted)	Annual GHG emission reductions (in tonnes of CO₂e) for each year
2010 (from Feb. 28)	not creditable
2011	not creditable
2012	not creditable
2013 (from 14 August)	45149
2014	51551
2015	32998
2016	23053
2017	21205
2018	2019
2019	0
2020 (up to Feb. 27)	0
Total number of crediting years	10
Annual average GHG emission reductions over the crediting period	17597
Total estimated reductions (tonnes of CO₂e)	175975

A.11. Public funding of the CPA

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This VPA does not include any public funding or a diversion of ODA funding.

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The VPA is not a part of another carbon credit activity, within the Gold Standard or any other carbon market. This is easy to verify, since there are no approved methodologies for the project activity outside the Gold Standard, this VPA is the first project activity within the first (and so far only) PoA involving this methodology.

A.12. Confirmation for CPA

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The VPA is not a part of another carbon credit activity, within the Gold Standard or any other carbon market. This is easy to verify, since there are no approved methodologies for the project activity outside the Gold Standard, this VPA is the first project activity within the first (and so far only) PoA involving this methodology.

A.13. Contact information of responsible persons/ entities for completing the CDM-CPA-DD-FORM

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Gautam Dutt / Alfredo Nicastro, MGM Innova
Peter Chant / Alison Morris, FReMCo.

Contact: gdutt@mgminnova.com

SECTION B. Environmental analysis**B.1. Analysis of the environmental impacts**

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The environmental impact analysis is undertaken at the VPA level, for the specific ships included in each VPA.

B.2. Environmental impact assessment

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There is no negative environmental impact. A number of quantitative measures of favourable environmental impact are listed in the VPA Passport, and supplementary documentation, specifically Eco-efficiency Reports for each individual ship.

SECTION C. Local stakeholder comments**C.1. Solicitation of comments from local stakeholders**

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For reasons explained in the PoA-DD, the project activity is global, with each VPA comprising ships travelling generally on international waters. While there are no local stakeholders, International Paint Ltd is required to undertake local stakeholder consultations involving specific stakeholder types identified in discussions with Gold Standard. As noted in Sec. F.1 of PoA DD, Gold Standard has indicated that "..., *the consultation could be undertaken post registration.*" A stakeholder consultation was undertaken in June 2015, and the report is under preparation, to be presented post registration.

C.2. Summary of comments received

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The report is under preparation. See C.1, above.

C.3. Report on consideration of comments received

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The report is under preparation. See C.1, above.

SECTION D. Eligibility of CPA and estimation of emissions reductions**D.1. Reference of methodology(ies) and standardized baseline(s)**

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Reducing vessel emissions through the use of advanced hull coatings
Version 2 (17 November 2014).

The methodology incorporates the following CDM methodological tools:

- “Tool for the demonstration and assessment of additionality.” Version 07.0.0
- “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion.” Version 2.

No CDM standardized baselines are involved.

Note: Project proponents submitted a proposed revision to the methodology in May 2014. Gold Standard agreed to certain changes in an email dated 9 September 2014. Subsequently project consultants prepared a “Draft Version 2” of the methodology, dated 16 September 2014, incorporating text changes approved by Gold Standard. Version 2 was published by Gold Standard on 17 November 2014. This version 5 of VPA PDD is based on Version 2 of the methodology, which is identical to the Draft Version 2 used at the time of document submission for validation.

D.2. Applicability of methodology(ies) and standardized baseline(s)

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The VPA within the PoA uses a single methodology:

“Reducing Vessel Emissions Through the Use of Advanced Hull Coatings”
Version 2 (17 November 2014)..

Each VPA within the PoA must meet eligibility conditions specified in the PoA-DD, Section B.2, based on CDM *Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities*. The relevant criteria (as analysed in PoA DD, Sec. B.2) are copied below. Note that criteria (a), (h) through (L) are not relevant.

(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);

(c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;

(d) Conditions to check the start date of the CPA through documentary evidence;

(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by VPAs;

(f) The conditions that ensure that the VPA meets the requirements pertaining to the demonstration of additionality as specified in section B.1 of PoA DD;

(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;

Moreover, each VPA within the PoA must meet the applicability conditions of the methodology, as described in Section B.2 of the PoA-DD and copied below.

Each VPA comprises a set of ships. The methodology specifies applicability conditions for any ship to be included in a Gold Standard project. Thus each ship within the VPA must meet the following applicability conditions:

- The ship is not new, i.e. it had at least one full docking cycle of operation with the traditional biocidal hull coating.
- Evidence is provided on time for validation to demonstrate that the advanced hull coating does not contain any biocides or other toxic materials. These and other environmental benefits of the advanced hull coating should be clearly demonstrated and be independently verified through life cycle studies following ISO 14040 and ISO 14044.
- The ship did not undergo engine overhaul or replacement, or any other modification that would reduce its fuel consumption at the same time as the advanced hull coating was applied or at any time during the docking cycle for which carbon credits are being claimed. See Appendix D of methodology on “Energy efficiency measures applicable to existing ships”;
- Evidence needs to be provided to indicate (underwater) hull cleaning dates in the baseline period at the time of registration for carbon credits, and records need to be kept to indicate underwater hull cleaning during the project docking cycle, following the application of the advanced hull coating. Ships that undergo hull cleaning in the project docking cycle while none occurred in the baseline docking cycle can only claim emission reductions under this methodology up to the time of the hull cleaning.
- Certain countries or groups of countries may impose fuel efficiency conditions for ships travelling to and from these countries. In those cases, emission reductions would not continue to be eligible for those routes, from the date of application of the regulations. See Step 1b of the application of the Section “Identification of the baseline scenario and demonstration of additionality”.
- Emission reductions can only be claimed for one single project docking cycle for each ship included in the project activity.
- If biofuel blends are used, the % of petroleum and biofuel components of each fuel purchase should be recorded. Emissions reductions would only apply to reduced petroleum fuel consumption, with no credits for biofuel use through this methodology. However this methodology could be combined with another methodology to include emissions reduction through biofuel use.
- Data as needed for the application of the proposed methodology are available for the entire baseline docking cycle and confirmed by official documentation to be provided as evidence on time for validation (e.g. engine logs, deck logs, bunker delivery notes). Since shipping company may not have recorded all the needed data for the entire baseline period, enough data should be available for the results of the regression analysis of baseline data to be valid. Since shipping company may not have recorded all the needed data for the entire baseline period, enough data should be available for the results of the regression analysis of baseline data to be valid⁷. Moreover, fuel supply dates and quantities are made available at the time of validation, in order to allow for cross checking ship’s log data on fuel consumption.
- The fuel consumption used for navigation purpose in baseline period should be used for regression analysis. In cases, where PP can demonstrate by providing convincing and documented argumentation that navigation fuel is only used for navigation and

⁷ Note the end of the second paragraph of the introduction which states “(b) *analyzing enough data from the previous cycle* to determine the regression coefficients to a high level of accuracy.” (emphasis added, but phrase was in previously approved version of methodology).

maneuvering activities, total fuel consumption can also be used for regression analysis. In both cases, the same "boundary" for fuel consumption data should be used both in baseline and project scenario. In such cases, where the total fuel consumption also includes uses other than navigation and maneuvering, it should NOT be used for regression analysis.

- The project applicant shall bear the cost of a professional statistician contracted by The Gold Standard Foundation for the validation of:
 - The results of the regression analysis applied to the submitted project activity in line with the model(s) provided in the methodology;
 - A new regression model presented for approval by The Gold Standard Foundation prior to the submission of a project activity.
- In order to aggregate emission reductions and make the project activity viable, the methodology may be used to provide carbon credits to the manufacturer of the advanced hull coating and not to the individual ships or shipping companies or charter operators, who in fact would be reducing fuel consumption and thereby reducing emissions. However, the methodology is also applicable to ship owners and operators, considering that some companies may own sufficient number of vessels for them to apply for carbon credits directly, without requiring the manufacturer as an aggregation entity.
- When the coating manufacturer is the aggregation entity, for the determination of carbon credits, shipping operator must make fuel consumption data available to the coating manufacturer. To this end, an agreement is needed between the coating manufacturer and the purchaser of the coating product that covers the following issues:
 - *Benefits to the shipping company.* The coating manufacturer would share with the shipping company or charter operator a part of the carbon credits. All must formally commit in this agreement to not claim credits from the same ships as part of activities under another scheme.
 - *Obligations of the shipping company or charter operator.* In order to determine emissions reduction, data covering ship speed, fuel consumption, days since coating application, sea condition, etc., are needed a substantial part of docking cycle with the traditional hull coating prior to the application of the advanced hull coating. These are used to determine baseline emissions. Each data item may be based on "noonday" data, voyage data, or a combination of the two. Similar data are also needed for the entire docking cycle following the application of the advanced hull coating. Furthermore information must be provided on whether any measures with a potential impact on fuel consumption have been implemented during that period. Thus, the shipping owner or charter operator is obliged to provide the needed data and information, as part of its formal agreement with the coating manufacturer. The detailed data would be considered confidential, and would only be shared with the validation and verification entities and The Gold Standard Foundation, with the understanding that the information would not be publicly available. Summary statistics used to determine fuel savings and emissions reduction would be published in the verification reports and would be publicly available. Provided the results confirm fuel savings, they would contribute to increase confidence in advanced hull coating products, making them common practice.

The demonstration that the applicability conditions are met is provided in Section D.5 below.

Besides the eligibility criteria listed in the methodology, two other criteria may limit the entry of new VPAs into the PoA. These are described in the following two paragraphs.

New regulations may come into place, e.g. the EU may limit emissions on routes to and from EU ports, and include these emissions within the EU Emissions Trading Scheme (EU ETS). In the

latter case, Gold Standard rules related to the EU ETS may apply⁸. New IMO regulations may be introduced and could affect all shipping. These may not exclude all further crediting, but may restrict the number of credits that may be claimed. In any case, future regulations are to be monitored within the PoA, in order to understand and allow for the implications for such regulations on the inclusion of additional VPAs within the PoA, or limiting the credits to be issued from them.

A common practice test is essential for the demonstration of additionality. Thus each new VPA must meet the common practice test, as described in Section B.1 of the PoA-DD.

The results of the common practice analysis are shown in Table 1. All categories of ships across the world have been considered. Some ship categories are unlikely to be relevant for claiming carbon credits, e.g. “Navy” and “Production fixed platform”. They are marked in red in the table. The ship categories for each ship in this VPA were listed in Sec. A.3 above and are marked in green below⁹.

⁸ See, e.g. Gold Standard Ver. 2.2. *Requirements*. Project eligibility criterion, III.I.3, p. 28.

⁹ Note that the list below consider “Ro Ro” as a single category, while ships in Sec. A.3 were separated into “Ro Ro Passenger” and “Ro Ro Cargo”. Ships in either sub-category belong to the single category in Table 1. Similarly, Table 1 includes a single category “Vehicle carrier”, of which “Pure car carrier” shown in Section A.3 is a sub-category.

Table 1. Determination of Common Practice
(Source: Common_practice_test 5jul14.xlsx)

Vessel Category [1]	Total Number of ships in category [1]	Number of ships with Level 1 coatings (Intersleek 700) N _{all} Level 1 [2]	Number of ships with Level 2 coating (Intersleek 900+1100SR) N _{all} Level 2 [2]	N _{diff} Level 1	N _{diff} Level 2	F Level 1	F Level 2	N _{all} - N _{diff} Level 1	N _{all} - N _{diff} Level 2
Barge	438	12	2	424	436	0.032	0.005	-412	-434
Bulker	10657	35	55	10567	10602	0.008	0.005	-10532	-10547
Chemical tanker	5325	19	44	5262	5281	0.012	0.008	-5243	-5237
Container	5009	109	113	4787	4896	0.044	0.023	-4678	-4783
Cruise	534	31	64	439	470	0.178	0.120	-408	-406
Dredger	1570	0	7	1563	1563	0.004	0.004	-1563	-1556
Exploration drilling	279	0	2	277	277	0.007	0.007	-277	-275
Ferry	3670	32	67	3571	3603	0.027	0.018	-3539	-3536
Fishing	22136	3	60	22073	22076	0.003	0.003	-22070	-22016
General cargo	15483	13	24	15446	15459	0.002	0.002	-15433	-15435
LNG Carrier	388	95	88	205	300	0.472	0.227	-110	-212
LPG Carrier	1262	1	12	1249	1250	0.010	0.010	-1248	-1238
Miscellaneous	2595	4	4	2587	2591	0.003	0.002	-2583	-2587
Navy	1375	49	82	1244	1293	0.095	0.060	-1195	-1211
Offshore vessel	10509	47	202	10260	10307	0.024	0.019	-10213	-10105
Product Tanker	4201	12	13	4176	4188	0.006	0.003	-4164	-4175
Production fixed platform	136			136	136	0.000	0.000	-136	-136
Production floating	266	3	2	261	264	0.019	0.008	-258	-262

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Reefer	963	6	9	948	954	0.016	0.009	-942	-945
Ro-Ro	3538	101	136	3301	3402	0.067	0.038	-3200	-3266
Tanker	4008	35	91	3882	3917	0.031	0.023	-3847	-3826
Tug	17505	29	73	17403	17432	0.006	0.004	-17374	-17359
Vehicle carrier	854	11	12	831	842	0.027	0.014	-820	-830

¹ Lloyds Vehicle Count, downloaded 16April 2014. See file "VesselCounts Lloyds 16apr14.xlsx"

² Number of ships coated with Intersleek 700, Intersleek 900, Intersleek 1100SR from International Paint Ltd, see "IP Vessel Count by Year_2014.xlsx"

As indicated in the methodology, common practice test is conducted at two levels of technology: level 1 is silicone coating (here Intersleek 700) whereas level 2 is fluoropolymer (here Intersleek 900 or Intersleek 1100SR). The common practice limit of $F = 0.2$ has already been reached for LNG carriers, which would not be eligible for Gold Standard carbon credits. They are highlighted in brown in the table. For all other categories, F values are below 0.2 and the value of the difference $N_{all} - N_{diff}$ is negative, i.e. definitely not greater than 3.. Note, however, that for cruise ships, the F value for level 1 (i.e. silicone coating) is close to 0.2 (highlighted in yellow above). Note that there are no cruise ships among the 25 ships in the VPA. The only two categories included in the VPA are general freighters and Ro-Ro, shown in green in the table above. In each case, the F values are small.

The number of ships with Intersleek 700 (level 1) and Intersleek 900 or 1100SR (level 2) coatings in Table 1 are based on data from International Paint Ltd. There are a few other manufacturers of silicone coatings but as of now no other manufacturer for fluoropolymer coatings. Thus the level 2 numbers are also industry totals. The number of ships coated with silicone coatings from other manufacturers cannot be determined with precision, since the data are confidential. However, an industry review of hull coatings published in late 2013 lists all manufacturers of such products (Fathom 2013). Chapter 3 lists a number of coating manufacturers and their products. While the number of ships with advanced coatings is not published, it is clear from the review that biocidal products dominate the market penetration.

Table 2 lists other hull coating manufacturers with non-biocidal products that might qualify as level 1 products. Most are silicone based.

Table 2. Non-biocidal coatings that could be considered as a Level 1 coating products

Manufacturer	Coating product	Coating material
Hempel	Hempasil 77500	Silicone
	Hempasil X3	Silicone
Jotun	SeaLion Resilient	Polysiloxane epoxy system with added silicone oil
	SeaLion Repulse	Silicone
Chugoku Marine Paints (CMP)	Bioclean HB	Silicone
Korean Chemical Company (KCC)	Lo-Frick	Silicone
PPG (Sigma)	Sigmaglidle 890 Sigmaglidle 990 Sigmaglidle 1290	Silicone
Sherwin Williams	Sher-Release	Silicone
Nippon Paint Marine Company (NPMC)	Ecolosilk	Silicone

The common practice is somewhat conservative insofar as the data are from early 2014, while ships included in the VPA were all coated before this, some as far back as 2010, when the number of ships with advanced coatings was smaller, so that F would also be smaller.

Since the F values for the ship categories are considerably below 0.2, the first VPA meets the common practice test.

The above table and text may be summarized as follows:



- For LNG tankers, since both F1 and F2 exceed 0.2, project activity may be considered the baseline scenario (Baseline alternative 1, as in Sub-step 1a) so that the project would not be additional for these ships. *This VPA does not include any ships in these categories.*
- For all other ship categories, both F1 and F2 are below 0.2, meaning that Baseline alternatives 1 and 3 face barriers, so that Baseline alternative 2 is the baseline scenario. *This is the baseline scenario for all ships in this VPA.*

Note that baseline alternative 2 is: “Applying a biocidal foul release coating that was also applied in the previous hull coating cycle”

D.3. Sources and GHGs

The physical boundary of each VPA (Voluntary Project Activity) within the PoA would be the ships included in the VPA, identified by the ship names and their unique ship identification numbers according to the International Maritime Organisation (IMO). The names and IMO numbers would be listed in the VPA. The ships within this VPA are listed in the table in section A.3.

The following text, in quotes, is copied from the methodology:

“The *project boundary* is the physical, geographical location of the ships to which the hull coating is applied. The project boundary covers the routes where each ship consumes fuel and where emissions occur. However, improved hull coating reduces fuel use only during movement. Moreover, time at port and docks may vary. Thus, to avoid the effect of unrelated factors, only the cruising (or navigation) part of each route will be considered (i.e. excluding ports, dry docks and manoeuvres) for the purpose of determining fuel consumption and emissions. In some cases, where fuel consumption for navigations is not separately recorded, the project boundary would include “navigation and manoeuvring.” In both baseline and project scenarios, the same “boundary” for fuel consumption data should be used.

“*The greenhouse gases included in or excluded from the project boundary.* This methodology applies to an energy efficiency measure that would reduce the consumption of marine diesel or fuel oil consumption in ships. The combustion of these fuels also produces small amounts of two other greenhouse gases: methane (CH₄) and nitrous oxide (N₂O). Insofar as less fuel would be burnt in the project scenario as in the baseline scenario, but the combustion system is not modified by the project activity, there would be reductions in methane and nitrous oxide emissions as well from reduced fuel use. However, these emissions reductions are neglected for conservativeness; the focus of the present methodology is exclusively on carbon dioxide emissions reduction.

“Coating a ship involves electricity consumption at the dry dock. The amount of electricity consumed for this activity, undertaken only once for each painting cycle, typically every five years, is insignificant compared to the energy used by the ship engines. Moreover, this electricity consumption would be present and be basically independent of the type of coating applied. Therefore, for simplicity, and with hardly any loss of accuracy, the electricity consumption for coating the ship hull is excluded both from the baseline and the project scenarios.

“Note that ships may be underwater cleaned during the docking cycle. This is not expected to be done for the advanced hull coating. By not counting this process (which may be present in

the baseline scenario), and its associated emissions, the methodology is being conservative in the assumptions on emissions reduction.”

Emissions sources and GHGs included and excluded are indicated in the Table below.

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Fuel consumption by ship engines (excluding rough seas)	CO ₂	Yes	Major emission source.
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
Project scenario	Fuel consumption by ship engines (excluding rough seas)	CO ₂	Yes	Major emission source.
		CH ₄	No	Excluded for simplification.
		N ₂ O	No	Excluded for simplification.

Data for fuel consumption for navigation may be available separately from other uses of the fuel in question. If such data are not available, where data is available only for *total fuel consumption for main engines* for navigation and maneuvering purposes may be used. In either case, the project boundary is shown in Figure 1.

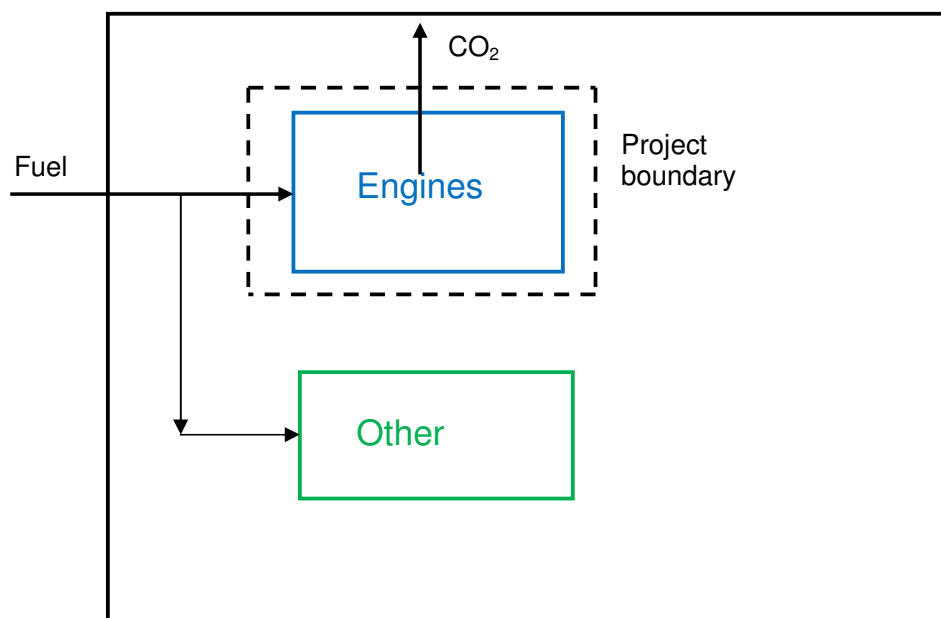


Figure 1. Project boundary where fuel consumed by main engines for navigation (or for navigation and manoeuvres) and corresponding emissions are included in project boundary. Other uses of the same fuel as that used by ship engines are excluded.

D.4. Description of the baseline scenario

>>



The VPA comprises a set of 17 ships. The baseline scenario is defined for each ship at the VPA level. For each ship to be included in this VPA, we need to establish that the baseline scenario for the ship is the application of a biocidal foul release coating that was also applied in the previous hull coating cycle. This is baseline alternative (2) as listed in Sub-step 1a of Step 1 of Section B.1 (Demonstration of additionality for PoA).

To demonstrate that this alternative is indeed the baseline, a common-practice analysis was undertaken, as presented in Table 1 above. Thus it was shown that for the category of all ships included in this VPA and for the Level of the coating, the value of F is below 0.2.

D.5. Demonstration of eligibility for a CPA

>>

As noted in Sec. B.2 of PoA (and copied in D.2 above), items (b), (c), (d), (e), (f), and (g) of the eligibility criteria listed in the CDM standard are relevant to VPAs within this PoA. These specific items are listed below and discussed in the context of this VPA. Note that criteria (a), (h) through (L) are not relevant.

(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);

Each ship in the VPA is identified by a unique, global number issued by the International Maritime Organisation. The IMO numbers for the ships considered in this VPA (including one ship not included finally) are listed in the table below. Since this is the VPA within the POA and there were no other projects or PoA's using this methodology presented to the Gold Standard, there is no possibility of double counting emissions reductions.

(c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;

The advanced coatings used are all from the Intersleek family and the coating(s) used for each ship are also listed in table below. These coatings were specifically mentioned in the technology description provided in Section A.6 of the PoA DD.

(d) Conditions to check the start date of the CPA through documentary evidence;

International Paint Ltd uses a standard reporting format called "Dataplan reports" for each ship coated with a hull coating. These reports include the dates as well as the type of coating applied. Dataplan reports for all ships included in the VPA are available.

Basic data including IMO no, hull coating in previous docking cycle, advanced hull coating applied, key dates, ship log data, and all data cleaning and processing *for each ship* is provided as an Excel book, as listed below (Ship IMO numbers and names for one shipping company have been redacted from the public version of this document, for reasons of confidentiality).

	Ship Id: IMO no./ classification no.	Ship name	Excel file name (all are .xlsx)
	Shipping co.		
1	9xxx14/		[Eliminated from list ¹¹]



	86366		
2	9xxx52 86375		
3	9xxx40 86374		
4	9xxx68 86377		
5	9xxx56 86376		
6	9xxx70 86378		
7	9xxx76 82973		
8	9 xxxx 88 82974		
9	9 xxxx 90 83199		
10	9 xxxx 54 79707		
11	9 xxxx 12 79832		
12	9 xxxx 64 71590		
13	9 xxxx 52 71589		
14	9 xxxx 02 74845		
15	9 xxxx 93 74599		
16	9 xxxx 68 88032		
17	9 xxxx 63 88027		
	Shipping company	Lykiardopoulo & Co ¹³	
18	9289726	Argenta	Argenta analysis 19oct14

(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs;

The table below indicates how compliance with methodology applicability conditions for each ship was confirmed for each ship in this VPA.

Applicability condition	Demonstration
The ship is not new, i.e. it had at least one full docking cycle of operation with the traditional	Standard databases on ship registry indicate ship construction date. Ship construction date

¹¹ The initial list in VPA DD version 1 included this ship. See footnote in Section A.3 where ships are listed.

¹² The version of this file submitted with validation had a typographical error in the IMO number, here corrected.

¹³



biocidal hull coating.	for each ship is listed in the Dataplan report when advanced coating was applied. Dates of application of baseline coating as well as advanced hull coating are also listed in sheet "ER 25aug15" of file "VPA_1 Reg results and ER 25aug15.xlsx", These data confirm that none of the ships was new and had at least one docking cycle with traditional biocidal hull coating.
Evidence is provided on time for validation to demonstrate that the advanced hull coating does not contain any biocides or other toxic materials. These and other environmental benefits of the advanced hull coating should be clearly demonstrated and be independently verified through life cycle studies following ISO 14040 and ISO 14044.	Advanced hull coatings used in this VPA are from the Intersleek family and comprise Intersleek 700 family, Intersleek 900 family and Intersleek 1100SR. They are specifically mentioned in Section A.2 and A.6 of the PoA DD. Moreover, Eco Efficiency Assessment (EEA) Reports for each of these families have been provided to indicate that they do not contain biocides or other toxics.
The ship did not undergo engine overhaul or replacement, or any other modification that would reduce its fuel consumption at the same time as the advanced hull coating was applied or at any time during the docking cycle for which carbon credits are being claimed.	No other fuel savings measures implemented. "Dataplan report" for each ship indicates all activity undertaken during dry dock when advanced hull coating is applied.
Evidence needs to be provided to indicate (underwater) hull cleaning dates in the baseline period at the time of registration for carbon credits, and records need to be kept to indicate underwater hull cleaning during the project docking cycle, following the application of the advanced hull coating. Ships that undergo hull cleaning in the project docking cycle while none occurred in the baseline docking cycle can only claim emission reductions under this methodology up to the time of the hull cleaning.	Each Dataplan report also lists previous dry dockings as well as previous underwater hull cleanings. The Dataplan reports for all ships were reviewed and confirm that no hull cleaning took place in the baseline period. Where there was underwater cleaning, carbon credits may be limited as indicated in the methodology, and copied in the left column.
Certain countries or groups of countries may impose fuel efficiency conditions for ships travelling to and from these countries. In those cases, emission reductions would not continue to be eligible for those routes, from the date of application of the regulations. See Step 1b of the application of the Section "Identification of the baseline scenario and demonstration of additionality".	At the time of submission of this VPA, no such regulations were in place.
Emission reductions can only be claimed for one single project docking cycle for each ship included in the project activity.	This condition should be observed for each ship included in the VPA.
If biofuel blends are used, the % of petroleum and biofuel components of each fuel purchase should be recorded. Emissions reductions would only apply to reduced petroleum fuel consumption, with no credits for biofuel use	No biofuels were used in any of the ships included in the VPA for the baseline period and for the project period for which data were available. If biofuel blends are used in any of these ships in future dates, this methodology



through this methodology. However this methodology could be combined with another methodology to include emissions reduction through biofuel use.	condition should be met.
Data as needed for the application of the proposed methodology are available for the entire baseline docking cycle... Since shipping company may not have recorded all the needed data for the entire baseline period, enough data should be available for the results of the regression analysis of baseline data to be valid. ¹⁴	Data were extensively checked for completeness, so that an adequate amount of data covering the entire baseline docking cycle are available. Ships that did not meet this condition were excluded from the VPA. (At least 7 ships were excluded.)
Where data on fuel consumption for <i>navigation purpose only</i> is available for the baseline period, it should be used for regression analysis. For cases, where data is available only for <i>total fuel consumption for main engines</i> for navigation and maneuvering purposes, it may be used for regression analysis. In both cases, the same “boundary” for fuel consumption data should be used both in baseline and project scenario. In such cases, where the total fuel consumption also includes uses other than navigation and maneuvering, it should NOT be used for regression analysis.	For 11 ships in the VPA () navigation fuel consumption was separately recorded. For six ships () only total fuel consumption data were available. The type of data available is summarised in sheet “Reg results” of file “VPA_1 Reg results and ER 25aug15.xlsx”,
The project applicant shall bear the cost of a professional statistician contracted by The Gold Standard Foundation for the validation of: - The results of the regression analysis applied to the submitted project activity in line with the model(s) provided in the methodology; - A new regression model presented for approval by The Gold Standard Foundation prior to the submission of a project activity.	As noted at the end of Section F3 of PoA DD, “the underlying statistical model was not changed, so that a review by a statistician should not be necessary.” This issue may be taken up with GS once Validation is completed.
In order to aggregate emission reductions and make the project activity viable, the methodology may be used to provide carbon credits to the manufacturer of the advanced hull coating and not to the individual ships or shipping companies or charter operators, who in fact would be reducing fuel consumption and thereby reducing emissions. However, the methodology is also applicable to ship owners and operators, considering that some companies may own sufficient number of	This PoA is designed for the case in which International Paint Ltd is the aggregation entity. International Paint Ltd is the aggregation entity for all ships included in any VPA using this PoA. This is further specified in the agreement between International Paint Ltd and the ship owner/operator. VPA1 includes only two shipping companies: and .

¹⁴ This last sentence was included in the revised methodology, Draft version 2, 16 September 2014, following approval by Gold Standard (e-mail 9 Sept. 2014). Also appears in Methodology Version 2, formally approved by Gold Standard.



vessels for them to apply for carbon credits directly, without requiring the manufacturer as an aggregation entity.	
When the coating manufacturer is the aggregation entity, for the determination of carbon credits, shipping operator must make fuel consumption data available to the coating manufacturer. To this end, an agreement is needed between the coating manufacturer and the purchaser of the coating product that covers the following issues: - <i>Benefits to the shipping company.</i> The coating manufacturer would share with the shipping company or charter operator a part of the carbon credits. All must formally commit in this agreement to not claim credits from the same ships as part of activities under another scheme. - <i>Obligations of the shipping company or charter operator.</i> In order to determine emissions reduction, data covering ship speed, fuel consumption, days since coating application, sea condition, etc., are needed a substantial part of docking cycle with the traditional hull coating prior to the application of the advanced hull coating. These are used to determine baseline emissions. Each data item may be based on “noonday” data, voyage data, or a combination of the two. Similar data are also needed for the entire docking cycle following the application of the advanced hull coating. Furthermore information must be provided on whether any measures with a potential impact on fuel consumption have been implemented during that period. Thus, the shipping owner or charter operator is obliged to provide the needed data and information, as part of its formal agreement with the coating manufacturer. The detailed data would be considered confidential, and would only be shared with the validation and verification entities and The Gold Standard Foundation, with the understanding that the information would not be publicly available. Summary statistics used to determine fuel savings and emissions reduction would be published in the verification reports and would be publicly available. Provided the results confirm fuel savings, they would contribute to increase confidence in advanced hull coating products, making them common practice.	Copies of agreements between International Paint Ltd and the two shipping companies have been made available to the Validator.



(f) The conditions that ensure that the CPA meets the requirements pertaining to the demonstration of additionality as specified in section B.1 of PoA DD and section D.2 above;

Additionality should be demonstrated for each ship category being considered for the VPA. Specifically this involves three steps, as per CDM Additionality Tool ver. 7:

- **Consistency with mandatory laws and regulations (Tool, Sub-step 1b)**

As noted in the table above, no regulations imposing fuel efficiency requirements were in place at the time of submission of the VPA;

- **Barrier analysis (Tool, Step 3)**

The project activity faces technological barriers, specifically in the following category listed in the CDM additionality tool:

“Risk of technological failure: the process/technology failure risk in the local circumstances is significantly greater than for other technologies that provide services or outputs comparable to those of the proposed CDM project activity, as demonstrated by relevant scientific literature or technology manufacturer information;”

The project activity involves an advanced hull coating. An independent, third party review of advanced hull coatings was published in Fathom (2013). The study (p. 15) identified the following technical limitations for hull coating products for reducing GHG emissions:

- *“The efficacy of the hull coating.*
- *The impact of slow-steaming.*
- *The technical maturity of the products.*
- *Differences in performance.”*

The study cited a 2012 study by the European Commission (EC)¹⁵ and commented:

“The ability of some of the newer hull coatings to live up to their claims of extremely long life is a technical concern” it admitted.

Fathom (2013, p. 15) further notes:

“It should also be noted that the technical performance of the coatings has been impacted by market conditions (e.g. widespread slow steaming and extended idle periods) that could not have been foreseen at the time of their development.”

Market conditions refer to the global economic downturn starting in 2008. Slow steaming refers to the operation of ships (especially low value cargo vessels) at lower speed to save fuel. The methodology applies strict conditions to ensure that ship speed in the post period is within the range defined by the baseline period. It should be noted that a few ships had to be excluded from this VPA, because of slow steaming in part of the post period.

On the question of technical maturity, Fathom (2013, p. 16) noted:

¹⁵ Cited as CLIMA.B.3/SER/2011/0014



“A fundamental market barrier to the uptake of hull coating solutions is the maturity of the technology, the relative number of installations and the proven delivery of promised savings.”

For further details

Fathom (2013, p. 16) also identified “non-technical barriers” including *inter alia*.

- *“Lack of a market-wide performance measuring standard to allow for easy comparison between products, which exacerbates the technical barrier of possible product under-performance.”*
- *Lack of information or understanding of the economic returns relative to other coatings on the market.”*

It should be noted that the Gold Standard methodology includes a rigorous “performance measuring standard” that would permit ship owners and operators to evaluate the fuel savings and economic returns of advanced hull coating products.

For further details on the question of technical maturity, other technical and non-technical, please refer to the source document: Fathom (2013).

The above cited document confirms that the project activity (application of advanced hull coatings) faces technological barriers.

- **A common practice test (Tool, Step 4)**

Each new VPA must meet the common practice test, as described in Section B.1 of the PoA DD and Sec. D.2 above. The results of the common practice test are shown in Table 1 above, confirming that the project activity is not common practice.

Since the conditions stated in the three steps above are met, additionality is confirmed for all ships included in the VPA.

(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;

International Paint Ltd is required to undertake local stakeholder consultations involving specific stakeholder types identified in discussions with Gold Standard. As noted in Sec. F.1 of PoA DD, “Subsequent consultation with Gold Standard suggested that a local stakeholder consultation should comprise ship owners and operators, as well as people at the manufacturing facilities where the advanced hull coating is manufactured. However, *the consultation could be undertaken post registration.*” A stakeholder consultation has not been undertaken so far.

The analysis above confirms that the VPA only includes ships for which all eligibility conditions including all methodology applicability conditions are met. However, as noted in the previous paragraph, a stakeholder consultation is pending, to be undertaken post registration, and prior to the issuance of any carbon credits.

D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

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The methodology specifies the procedure for determining project, baseline and leakage emissions, as well as emissions reductions, as summarized below.

Project and baseline emissions are each directly proportional to the respective fuel consumption (as given by Eq. (1) and (2) of the methodology, and noted below:

Project emissions are given by:

$$PE_{j,y} = \sum_i \left(\sum_k FC_{i,j,k} \right) \times COEF_{i,y} \quad (1)$$

Where

- $PE_{j,y}$ = CO₂ emissions from fossil fuel combustion in ship j during year y (tCO₂/yr)
- $FC_{i,j,y}$ = Quantity of fuel type i combusted in ship j during year y (mass or volume unit/yr)
- $COEF_{i,y}$ = CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)
- i = Fuel type combusted in ship j during year y.
- j = Ship
- k = Days meeting filter conditions described in the methodology

Baseline emissions are given by:

$$BE_{j,y} = \sum_i \left(\sum_k BFC_{i,j,k} \right) \times COEF_{i,y} \quad (2)$$

Where:

- $BFC_{i,j,k}$ = Quantity of fuel type i that would have been combusted in ship j during year y (mass or volume unit/yr)

The days excluded from the determination of project emissions are also excluded from the determination of baseline emissions.

Emissions reductions are determined basically by summing the fuel savings for each valid day of data. using Eq. (7) of the methodology:

$$ER_{j,y} = \sum_i \left(\sum_k FS_{i,j,k} \right) \times COEF_{i,y} \quad (7)$$

Where

- $ER_{j,y}$ = Reduction in CO₂ emissions in ship j during year y (tCO₂/yr)
- $FS_{i,j,k}$ = Savings of fuel type i combusted in ship j during day k (mass unit), counting only valid days, i.e. applying the filter described in methodology.
- $COEF_{i,y}$ = CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit), see below
- i = Fuel type combusted in ship j during year y.



The methodology offers two options for the determination of COEF, as in the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”, Version 2. Option A requires knowledge of the chemical composition of the fuel. Since ships use bunker fuels purchased from different locations, it is not practical to determine its chemical composition. Hence Option B is chosen:

$$COEF_i = NCV_i \times EF_{CO_2,i} \quad (TF.4)^{16}$$

where

$$\begin{aligned} COEF_i &= \text{CO}_2 \text{ emission coefficient of fuel type } i \text{ (tCO}_2\text{/tonne)} \\ NCV_i &= \text{Net calorific value of the fuel type } i \text{ (GJ/tonne)} \\ EF_{CO_2,i} &= \text{CO}_2 \text{ emission factor of fuel type } i \text{ (tCO}_2\text{/GJ)} \end{aligned}$$

The values of NCV and EF are standard values, as listed by the IPCC or the IMO, as described in the methodology, and listed in Section B.6.2. Whatever values are chosen for any given ship remain unchanged for the period covering the baseline and project periods.

Baseline fuel consumption is determined in a dynamic manner for each day of project fuel consumption, by considering the average speed for that day and a relationship between baseline fuel consumption and daily average ship speed. The Basic Model is described in methodology Eq. (3):

$$FC = a \times V^n \quad (3)$$

Taking natural logs of both sides of Eq. (3), we have:

$$\ln(FC) = \ln(a) + n \ln(V) \quad (4)$$

with daily average data for fuel consumption (FC) and ship speed (V), corresponding to the Pre-period. The Basic Model comprises a regression of **ln (FC)** versus **ln (V)** which would give ‘n’ as a slope and ‘ln (a)’ as intercept. The regression yields an estimate of ‘n’ directly while the value of ‘a’ can be calculated from the estimate of ‘ln (a)’.

Since FC is the fuel consumption in a 24-hour period, this fuel consumption rate may be denominated “power” and represented by “P”. Eq. 4 becomes:

$$\ln(P) = \ln(a) + n \ln(V) \quad (5)$$

The basic model may use another explanatory variable, days since coating application (D), considering that the hull would degrade over time. This may be stated as:

$$\ln(P) = \ln(a) + n \ln(V) + k D \quad (5a)$$

where D represents days since the application of the baseline coating.

Prior to applying the regression analysis, the methodology requires certain data filtering:

¹⁶ Here “TF” refers to the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”, Version 2.



“Days or voyages with wind force exceeding Beaufort Scale 6 are excluded. In the case of noonday data, days with less than 23 hours of sailing should be excluded, since these days include port and manoeuvre activities. In the case of voyage data, where data are available fuel consumption and speed for the navigation component of the voyage should be used for analysis. However, if such data are not available for the baseline period, total consumption of the fuel used for propulsion may be used¹⁷. This would include port and manoeuvre activities. However, in all cases, the data boundary should be consistent for the entire data analysis covering all of the baseline and project cycles.”

The methodology specifies other conditions under which data may be corrected (e.g. incorrect year, month or date) All data filtering should be reported, and applied to both baseline and project data in a consistent manner.

The methodology provides additional objective tests for detecting and excluding outliers, specifically:

- If the recorded value of speed is outside the range ($V_{av} - 3s$, $V_{av} + 3s$), then the day may be eliminated, where ‘s’ is the standard deviation of V.
- If the recorded value of fuel consumption is outside the range ($FC_{av} - 2s$, $FC_{av} + 2s$), then the day may be eliminated, where ‘s’ is the standard deviation of FC.

As noted in the methodology, these limits are somewhat arbitrary and may result in many days/voyages to be excluded. In such cases, other limits may be applied, provided they are reported and applied uniformly to both baseline and project data.

After applying any data filters and eliminating outliers as indicated above, the Basic Model should be applied to the data set corresponding to the docking cycle prior to the application of the advanced hull coating.

The methodology provides two options, depending on the results of the regression analysis:

1. If the fit is reasonable, with acceptable standard error, no bias in residuals, then this model may be used to predict baseline fuel consumption and determine fuel savings.
2. If the model does not adequately fit the data, either the ship must be dropped from further analysis, or an alternative model may be used to estimate fuel savings. In this case, the alternative model must be submitted for approval by the Gold Standard.

All ships in this VPA meet Option 1 above, so that no alternative model is proposed here. The procedure described below applies to Option 1 above, i.e. for the case where the Basic Model is applicable.

As specified in the methodology:

“For ships characterized by a single loading condition, a single set of regression coefficients are obtained from the entire baseline data. For high/low displacement ships, the baseline data are first separated into days/voyages operating under ballast condition and days/voyages operating loaded.

The regression coefficients are valid over the range of speeds in the data set upon which the regression is based. Therefore, this range of speed should be noted, together with the estimation of the coefficients. The regression model is valid for predicting fuel consumption only in this range of valid ship speeds.”

¹⁷ The consumption of any fuel not used for propulsion should be excluded in all cases.



The fuel savings for each day of ship operation following the application of the advanced hull coating are determined as specified in the methodology:

“Note that project fuel consumption together with average speed is measured and recorded on a daily basis for “Noonday” data or per-voyage (or a combination of the two). The relationship between baseline power and average speed (or adjusted speed) is determined using regression analysis of baseline data of daily power (or voyage power) and average speed (or adjusted speed), except for days (voyages) in which the measured ship speed is outside the range of validity, as explained above. This relationship, combined with measured daily (or voyage) average speed in the project scenario, i.e. with the advanced hull coating, is used to estimate baseline fuel consumption for each day (or voyage) in the project scenario.”

“Fuel savings are determined as the difference between estimated baseline fuel use and actual project fuel use for each valid day/voyage of project voyages. Valid data may exclude stormy and incomplete days/voyages, as well as days/voyages with anomalous data, following the same rules as were used to filter data in the baseline period. The process is illustrated in the table below. The data columns shown in italics are determined by calculation. The shaded row indicates a day excluded by the filters (i.e. stormy, incomplete or with anomalous data).”

Date/Voyage	Project power of all ship engines, measured	Average speed over ground, V (or average adjusted speed, AV)	Vessel condition, L, = 0 for ballast, 1 for loaded	<i>Baseline power, from regression</i>	<i>Fuel savings, (Baseline power less Project power) X 24 hours (for daily data), or X voyage duration (voyage data)</i>
1					
2					
3					

For each ship, data such as that shown in the table above should be recorded. Once fuel savings have been estimated for each day, total savings may be determined by summing over the days in each year. Emissions reductions can then be determined using methodology Eq. (8), as noted above.

Since carbon credits would be shared between IP and the ship owner/operator, according to an agreement made prior to the sale and installation of the advanced hull coating, emissions reduction for each ship should be recorded separately, so that the shares can be accurately determined.

Leakage emissions

As noted in the methodology: “Since the project activity comprises the use of one coating product instead of another, no leakage effects are expected.” Therefore no leakage emissions need to be considered.

D.6.2. Data and parameters fixed ex-ante

Note: the following data tables are identical to those in Section B.6.2 of the PoA-DD. Thus, no additional data or parameters are needed ex ante for this or any other VPA.

Data / Parameter	i = Residual fuel oil
Unit	TJ/Gg = GJ/tonne
Description	Net calorific value of the fuel type i = Residual fuel oil
Source of data	IPCC, 2006, Volume 2, Table 1.2
Value(s) applied	40.4
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.

Data / Parameter	i = Marine diesel
Unit	TJ/Gg = GJ/tonne
Description	Net calorific value of the fuel type i = Marine diesel
Source of data	IPCC, 2006, Volume 2, Table 1.2
Value(s) applied	43.0
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.



Data / Parameter	i = Low sulphur heavy fuel oil
Unit	TJ/Gg = GJ/tonne
Description	Net calorific value of the fuel type i = Low sulphur heavy fuel oil
Source of data	IPCC, 2006, Volume 2, Table 1.2 for residual fuel oil
Value(s) applied	40.4
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.

Data / Parameter	i = Liquefied natural gas
Unit	TJ/Gg = GJ/tonne
Description	Net calorific value of the fuel type i = Liquefied natural gas
Source of data	IPCC, 2006, Volume 2, Table 1.2 for natural gas
Value(s) applied	48.0
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.

Data / Parameter	i = Residual fuel oil
Unit	kg/GJ
Description	CO ₂ emission factor of fuel type i = Residual fuel oil
Source of data	IPCC, 2006, Table 3.5.2
Value(s) applied	77.4
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.



Data / Parameter	<i>i</i> = Marine diesel
Unit	kg/GJ
Description	CO ₂ emission factor of fuel type <i>i</i> = Marine diesel
Source of data	IPCC, 2006, Table 3.5.2
Value(s) applied	74.1
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.

Data / Parameter	<i>i</i> = Low sulphur heavy fuel oil
Unit	kg/GJ
Description	CO ₂ emission factor of fuel type <i>i</i> = Low sulphur heavy fuel oil
Source of data	IPCC, 2006, Table 3.5.2 for residual fuel oil
Value(s) applied	77.4
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.

Data / Parameter	<i>i</i> = Liquefied natural gas
Unit	kg/GJ
Description	CO ₂ emission factor of fuel type <i>i</i> = Liquefied natural gas
Source of data	IPCC, 2006, Table 3.5.2 for natural gas
Value(s) applied	56.1
Choice of data or Measurement methods and procedures	None
Purpose of data	Calculation of baseline and project emissions
Additional comment	Standard fuel, hence IPCC data used. Alternatively, IMO data may be used, see below.

D.6.3. Ex-ante calculation of emission reductions

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Emissions reduction are proportional to fuel savings. The fuel savings for each VPA would depend on the number of ships included in the VPA, and the actual fuel savings achieved by each ship during the project period, i.e. following the application of the advanced hull coating.



Moreover, fuel savings are determined in a dynamic manner from measured project fuel consumption for each day/voyage and an estimate of baseline fuel consumption under the same conditions for that day/voyage.

All ships included in the VPA have already been coated with advanced hull coating. This is necessary for baseline data analysis. Thus, the project period has started for all ships in the VPA. The amount of post data depends on the date of application of the advanced hull coating, and the most recent data analysed for the preparation of the VPA. Thus the amount of post data varies from ship to ship.

The table below, an extract from the “ER 25aug15” sheet of “VPA_1 Reg results and ER 25aug15.xlsx,” gives key dates as well as ex-ante ER estimates by calendar year. The table lists 16 ships owned by the , all included in VPA-1. Estimated emissions reduction from measured data using the methodology procedure by calendar year are shown in green cells. Calendar years prior to the application of the advanced hull coating are shown in grey. Available data are used to determine annual emissions reduction as shown in column “Estimated annual ER”. Estimates for future years are based on this annualized value. However, since crediting ends when the hull of each ship is recoated, ER is limited by this date. A few ships have already been recoated, while estimated dates are available for other ships. These dates are used to cut off ERs, and pro-rate ERs for the calendar year when ship was or expected to be recoated. Thus ERs are extrapolated for calendar years 2014 to 2018, in which year the last of the ships included in this VPA is expected to be recoated. No ERs are expected for 2019 and 2020. Note that ships may be recoated earlier or later than this expected date. Hull damage may lead to earlier recoating. On the other hand, if hull degradation with the advanced coating is slower, owners may delay recoating. The total for all ships is shown at the bottom right (175975) and reported in the following section. Annual average ERs are shown immediately above (17597).



Ship name	Baseline coating date	Data start date	Advanced coating date	Data up to	2013	2014	Estimated annual ER	Next advanced coating date	Estimated 2014	Estimated 2015	Estimated 2016	Estimated 2017	Estimated 2018	T
	31/03/2011	30/05/2011	25/08/2012	16/12/2013	7684		5966	15/08/2015	5966	3694	0	0	0	
	01/02/2011	12/04/2011	28/08/2012	08/12/2013	2379		766	15/08/2015	766	474	0	0	0	
	16/05/2012	10/06/2012	03/09/2013	28/12/2013	148		465	15/09/2018	465	465	465	465	328	
	01/02/2012	04/05/2012	20/08/2013	30/12/2013	-211		465	15/09/2018	465	465	465	465	327	
	01/06/2012	15/08/2012	28/08/2013	15/11/2013	-139		465	15/02/2016	465	465	57	0	0	
	01/03/2008	01/12/2008	14/02/2011	21/12/2013	822		3139	15/02/2014	387	0	0	0	0	
	01/09/2008	13/10/2008	31/01/2011	06/11/2013	5556		4911	15/11/2013	0	0	0	0	0	
	01/10/2009	30/10/2009	23/12/2010	12/09/2013	14755		11428	26/09/2013	0	0	0	0	0	
	15/05/2008	19/01/2009	08/03/2011	26/09/2013	3522		3944	15/10/2015	3944	3101	0	0	0	
	01/10/2008	05/01/2009	15/01/2011	11/11/2013	4422		4510	15/06/2014	2039	0	0	0	0	
	19/06/2009	05/08/2009	01/09/2013	30/12/2013	-40		108	15/08/2018	108	108	108	108	67	
	02/09/2008	23/04/2009	27/08/2011	15/11/2013	204		108	15/08/2016	108	108	108	0	0	
	15/08/2007	04/01/2008	26/09/2013	10/12/2013	305		1635	15/09/2016	1635	1635	1156	0	0	
	13/09/2009	22/11/2009	10/09/2013	10/12/2013	251		1409	15/09/2018	1409	1409	1409	1409	992	
	12/04/2011	15/04/2011	08/01/2013	29/06/2014	7472	4174	7975	15/01/2018	7975	7975	7975	7975	306	
	19/11/2010	02/01/2011	20/12/2012	22/06/2014	11825	4795	11310	15/12/2017	11310	11310	11310	10783	0	
	15/03/2005	07/03/2007	28/02/2010	13/11/2013	14286	8721	14509	15/02/2015	14509	1789	0	0	0	
		Earliest	28/02/2010											
		Latest	26/09/2013				Latest	15/09/2018					Ann . av	
Updated	25/08/2015		Total from	14/08/2013	45149				51551	32998	23053	21205	2019	

D.6.4. Summary of the ex-ante estimates of emission reductions

The nature of the methodology is such that baseline and project emissions are not determined separately. Moreover, there are no leakage emissions. Emission reductions are determined from monitored data. Hence the table below only shows values for the last column, with N.A. (not applicable) for baseline and project emissions and zero for leakage. The values below are based on estimates for individual ships, shown in the previous table. While the crediting period starts in 2010, the table below indicates emissions reduction based on GS rules for retroactive crediting, from 14/08/2013. The end of the crediting period for the project is the date when all ships have been recoated. According to the table above, this is in 2018. However, since ships with advanced coating may delay the application of the next coating. To allow for this a 10-year crediting period was chosen, with zero ex-ante emissions reduction for 2019 and the small part of 2020 until the crediting period ends. Actual values, if any, will depend on ships that are not recoated until that year.

Year	Baseline emissions (t CO ₂ e)	Project emissions (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions (t CO ₂ e)
2010 (from Feb. 28)	N.A.	N.A.	0	Not creditable
2011	N.A.	N.A.	0	Not creditable
2012	N.A.	N.A.	0	Not creditable
2013 (from 14 August)	N.A.	N.A.	0	45149
2014	N.A.	N.A.	0	51551
2015	N.A.	N.A.	0	32998
2016	N.A.	N.A.	0	23053
2017	N.A.	N.A.	0	21205
2018	N.A.	N.A.	0	2019
2019	N.A.	N.A.	0	0
2020 (up to Feb. 27)	N.A.	N.A.	0	0
Total	N.A.	N.A.	0	175975
Total number of crediting years	10 (ten)			
Annual average over the crediting period	N.A.	N.A.	N.A.	17597

D.7. Application of the monitoring methodology and description of the monitoring plan

D.7.1. Data and parameters to be monitored

Note: the data tables listed in this section are identical to those listed in the PoA-DD. The data, however, would correspond to the ships included in each VPA, and would therefore be different for each ship within each VPA.

General comments on all the data tables in this section:

- Emissions reduction is determined from a regression analysis of baseline fuel consumption and from daily measurements during the project period. Hence, for each of the variables

below, the row “Data applied” is not applicable, since all the data tables are needed to determine emissions reduction. In some cases, data are needed to disqualify ships from participating in the VPA or to limit the period over which emissions reduction may be credited. **Hence in all tables below, the row “Data applied” is filled in as “N.A.” (not applicable).**

- Emissions reduction is determined by comparing fuel consumption for each day in the project fuel consumption with the fuel that the ship would have consumed under similar conditions in the baseline period (determined by regression analysis of data over the entire baseline period). Hence the table row “Purpose of data” cannot be separated into items needed for the determination of baseline and project emissions. **Hence in all tables below, the row “Purpose of data” is filled in as “N.A.” (not applicable).**

For each participating ship in the VPA record the data shown in the following tables:

Data / Parameter	j
Unit	None
Description	Ship identification number for the jth ship in the project activity. Also name of ship.
Source of data	Ship owner / or coating manufacturer
Value(s) applied	N.A. (see Notes above tables)
Measurement methods and procedures	None
Monitoring frequency	Once, when the ship is coated.
QA/QC procedures	None
Purpose of data	N.A. (see Notes above tables)
Additional comments	This is a record of the ships where the advanced coating product is applied.

Data / Parameter	Date_prev(j)
Unit	Date
Description	Date on which the <i>previous</i> coating application was finished on ship j.
Source of data	Ship owner and / or coating manufacturer
Value(s) applied	N.A.
Measurement methods and procedures	Recorded at the dry dock where the coating is applied.
Monitoring frequency	Once, when the ship is coated.
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	Corresponds to baseline scenario



Data / Parameter	<i>Previous</i> coating material (j)
Unit	-
Description	<i>Previous</i> coating material on ship j.
Source of data	Ship owner and / or coating manufacturer
Value(s) applied	N.A.
Measurement methods and procedures	Recorded at the dry dock where the coating is applied.
Monitoring frequency	Once, when the ship is coated.
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	Corresponds to baseline scenario

Data / Parameter	Hull cleaning (underwater) in <i>baseline</i> period (j)
Unit	Date
Description	Hull cleaning date during baseline coating cycle on ship j.
Source of data	Ship owner and / or dry dock operator
Value(s) applied	N.A.
Measurement methods and procedures	Recorded at the dry dock where hull is cleaned.
Monitoring frequency	As needed
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	

Data / Parameter	Date_adv(j)
Unit	Date
Description	Date on which the <i>advanced</i> coating application is finished on ship j.
Source of data	Ship owner and / or coating manufacturer
Value(s) applied	N.A.
Measurement methods and procedures	Recorded at the dry dock where the coating is applied.
Monitoring frequency	Once, when the ship is coated.
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	Corresponds to <i>project</i> scenario



Data / Parameter	Advanced coating material (j)
Unit	-
Description	Advanced coating material on ship j.
Source of data	Ship owner and / or coating manufacturer
Value(s) applied	N.A.
Measurement methods and procedures	Recorded at the dry dock where the coating is applied.
Monitoring frequency	Once, when the ship is coated.
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	Corresponds to <i>project</i> scenario

Data / Parameter	Main engine fuel (j)
Unit	-
Description	Main engine fuel in ship j.
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	None
Monitoring frequency	N.A.
QA/QC procedures	Fuel type should be confirmed with fuel purchase invoices.
Purpose of data	
Additional comments	Corresponds to both <i>baseline</i> and <i>project</i> scenarios. Any changes from baseline to project scenario should be noted.

Data / Parameter	Auxiliary engine fuel (j)
Unit	-
Description	Main engine fuel in ship j.
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	None
Monitoring frequency	N.A.
QA/QC procedures	Fuel type should be confirmed with fuel purchase invoices.
Purpose of data	N.A.
Additional comments	Corresponds to both <i>baseline</i> and <i>project</i> scenarios. Any changes from baseline to project scenario should be noted.



Data / Parameter	Engine or other modifications undertaken at the same time as the application of advanced hull coating
Unit	-
Description	Any other measures that would reduce fuel consumption
Source of data	Ship operator with documentation from third party (where applicable), e.g. Dry Dock Work Scope
Value(s) applied	N.A.
Measurement methods and procedures	See list of other measures in methodology Appendix D.
Monitoring frequency	Once at time of hull coating
QA/QC procedures	N.A.
Purpose of data	N.A.
Additional comments	Ship would not be eligible for carbon credits, if there were any other energy efficiency measures applied

Data / Parameter	Change in fuel at the same time as the application of advanced hull coating
Unit	-
Description	Engine or other modifications to allow for a different fuel to be used
Source of data	Ship operator with documentation from third party (where applicable)
Value(s) applied	N.A.
Measurement methods and procedures	None
Monitoring frequency	Once at time of hull coating
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	Ship would not be eligible for carbon credits, if there were any other energy efficiency measures applied

For long voyages, ships are at sea between ports, and certain data are recorded in ship logs. These are normally called “Noonday data”, since the data are recorded at noon of each day. For ships operating in long routes, for each day of both the baseline and the project period, each of the following data variables should be recorded. For ships operating on shorter voyages, typically lasting less than a couple of days, “Voyage data” need to be recorded, as described further below.



Data / Parameter	Date
Unit	-
Description	Calendar date
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	None
Monitoring frequency	Daily
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	

Data / Parameter	Daily distance (nautical miles)
Unit	Nautical miles
Description	Distance travelled in last day, since last daily record
Source of data	Ship operator supplemented by charter party agreements, (as applicable)
Value(s) applied	N.A.
Measurement methods and procedures	AIS / GPS
Monitoring frequency	Daily
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	

Data / Parameter	Daily steaming time (hours)
Unit	Hours
Description	Hours of sailing since last daily record
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	None
Monitoring frequency	Daily
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	



Data / Parameter	V
Unit	Knots
Description	Average daily speed through water since last daily record
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	Calculated from previous two data variables.
Monitoring frequency	Daily
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	

Data / Parameter	Sea state (Beaufort scale)
Unit	Beaufort number
Description	Sea state, noted at the time of daily data recording
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	Observation
Monitoring frequency	Daily
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	

Data / Parameter	Vessel condition
Unit	Ballast/Loaded, or displacement
Description	Loading condition of ship at the time of data recording
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	Ship logs will indicate vessel loading condition
Monitoring frequency	Daily. However, value will not change significantly during any voyage
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	



Data / Parameter	FC(ME)
Unit	Tonnes
Description	Fuel consumption of the main engine since last daily record
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	Fuel flow meter
Monitoring frequency	Daily
QA/QC procedures	Calibration of fuel flow meter, periodic dip test on tanks
Purpose of data	N.A.
Additional comments	When same tank supplies for than one engine, or other non-engine equipment, the dip test can only be compared with the sum of all flow meters

Data / Parameter	FC(AE)
Unit	Tonnes
Description	Daily fuel consumption of the auxiliary engine(s) since last daily record
Source of data	Ship operator
Value(s) applied	N.A.
Measurement methods and procedures	Fuel flow meter
Monitoring frequency	Daily
QA/QC procedures	Calibration of fuel flow meter, periodic dip test on tanks
Purpose of data	N.A.
Additional comments	When same tank supplies for than one engine, or other non-engine equipment, the dip test can only be compared with the sum of all flow meters

For ships that operate mostly on shorter distances, “Voyage data” are recorded in ship logs. The objective is the same as in the case of Noonday data, to determine the rate of fuel consumption and average speed, in this case per voyage, instead of per 24-hour period. For ships operating in shorter routes, for each voyage of both the baseline and the project period, each of the following data variables should be recorded.



Data / parameter:	Date of voyage start and end
Data unit:	-
Description:	Calendar date
Source of data:	Ship operator
Measurement procedures (if any):	None
Monitoring frequency:	Per voyage
QA/QC procedures:	None
Any comment:	

Data / parameter:	Distance between departure port and arrival port
Data unit:	Nautical miles
Description:	Distance between departure port and arrival port
Source of data:	Ship operator supplemented by charter party agreements, (as applicable)
Measurement procedures (if any):	Ship log data on distance actually travelled.
Monitoring frequency:	Per voyage
QA/QC procedures:	None
Any comment:	If actual distance along sea route for the voyage is unavailable, a typical distance between departure and arrival ports (from other voyage records) may be used.

Data / parameter:	Voyage time
Data unit:	Hours
Description:	Hours of navigation between departure and arrival ports
Source of data:	Ship operator
Measurement procedures (if any):	Ship log data on departure and arrival times, preferably from when ship leaving port starts navigation to when ship stops navigation at arrival port.
Monitoring frequency:	Per voyage
QA/QC procedures:	None
Any comment:	If data not available, total voyage time may be used.



Data / parameter:	V
Data unit:	Knots
Description:	Average navigation speed during voyage
Source of data:	Ship operator
Measurement procedures (if any):	Calculated from previous two data variables.
Monitoring frequency:	Per voyage
QA/QC procedures:	None
Any comment:	In some cases, the ship log may record the average speed directly. Preference will be given to data based on distance and time, since these are likely to be primary data.

Data / parameter:	Sea state (Beaufort scale)
Data unit:	Beaufort number
Description:	Sea state
Source of data:	Ship operator
Measurement procedures (if any):	Observation, recorded in ship log
Monitoring frequency:	Per voyage
QA/QC procedures:	None
Any comment:	

Data / parameter:	Vessel condition
Data unit:	Ballast/Loaded, or displacement
Description:	Loading condition of ship at the time of data recording
Source of data:	Ship operator
Measurement procedures (if any):	Ship logs will indicate vessel loading condition
Monitoring frequency:	Per voyage
QA/QC procedures:	None
Any comment:	Loading condition is only relevant for certain ship categories, such as bulk loader, tanker, etc.



Data / parameter:	FC (ME)
Data unit:	Tonnes
Description:	Fuel consumption of the main engine for navigation part of voyage
Source of data:	Ship operator
Measurement procedures (if any):	Fuel flow meter
Monitoring frequency:	Per voyage
QA/QC procedures:	Calibration of fuel flow meter, periodic dip test on tanks
Any comment:	If fuel consumption for the navigation part of the voyage is not available separately, total fuel consumption in voyage may be used. However, the data should be consistent for the entire analysis period, including baseline and project. When same tank supplies more than one engine, or other non-engine equipment, the dip test can only be compared with the sum of all flow meters.

Data / parameter:	FC (AE)
Data unit:	Tonnes
Description:	Fuel consumption of the auxiliary engine(s) for navigation part of voyage
Source of data:	Ship operator
Measurement procedures (if any):	Fuel flow meter
Monitoring frequency:	Per voyage
QA/QC procedures:	Calibration of fuel flow meter, periodic dip test on tanks
Any comment:	If fuel consumption for the navigation part of the voyage is not available separately, total fuel consumption in voyage may be used. However, the data should be consistent for the entire analysis period, including baseline and project. When same tank supplies more than one engine, or other non-engine equipment, the dip test can only be compared with the sum of all flow meters

If there are additional underwater hull cleanings following the application of the advanced hull coating, the following data tables should be filled out.



Data / Parameter	Hull cleaning (underwater) in <i>project</i> period (j)
Unit	Date
Description	Hull cleaning date following application of advanced coating on ship j.
Source of data	Ship owner and / or dry dock operator.
Value(s) applied	N.A.
Measurement methods and procedures	Recorded at the dry dock where hull is cleaned.
Monitoring frequency	As needed
QA/QC procedures	None
Purpose of data	N.A.
Additional comments	If hull was cleaned in the baseline period, a hull cleaning is allowed in the project period as well, i.e. carbon credits are not affected. <i>Note that all hull cleaning would be underwater.</i>

At the time of presentation of the PoA and this first VPA, there are no regulations limiting carbon credits from project activities covered by the Programme. Hence no monitoring of regulations is required. However, subsequent VPAs will need to review regulations

D.7.2. Description of the monitoring plan

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The monitoring plan comprises the collection and analysis of data recorded in ship logs. Data needed are date and/or voyage, and data that would allow a determination of average ship speed (e.g. recorded ship speed or voyage distance and time) and average fuel consumption rate for each day or voyage.

Monitoring data, shown in tables in previous pages, covering both baseline and project periods, are best recorded and analyzed in Excel workbooks. An example is given in “analysis_19oct14.xlsx”.

Data in the project period should cover the entire docking cycle following the application of the advanced hull coating. Data for each monitoring and reporting period (for the purpose of claiming carbon credits) could be a fixed period for all ships, e.g. a calendar year, and would cover project data as noted above. However, the monitoring and reporting period for each ship for carbon credit purposes ends at the end of the docking cycle, when the hull of that ship is recoated.

Data should be recorded for the entire docking cycle following the application of the advanced hull coating. Data should be stored for at least two years following the end of the crediting period or last issuance of VERs.

SECTION E. Approval and authorization

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Appendix 1. Contact information of CPA implementer(s) and responsible person(s)/ entity(ies) for completing the CDM-CPA-DD-FORM

CPA implementer and/or responsible person/ entity	☒ CPA implementer(s) ☐ Responsible person/ entity for completing the VPA-DD-Form
Organization	International Paint Ltd
Street/P.O. Box	Stoneygate Lane, Felling, Gateshead
Building	
City	Tyne and Wear
State/Region	
Postcode	NE10 0JY
Country	United Kingdom
Telephone	+44(0)191-469-6111
Fax	+44(0)191-495-2003
E-mail	trevor.solomon@akzonobel.com
Website	www.international-marine.com
Contact person	
Title	Business Manager
Salutation	Mr.
Last name	Solomon
Middle name	
First name	Trevor
Department	Worldwide Marine Marketing
Mobile	
Direct fax	+44(0)191-495-2003
Direct tel.	+44(0)191-401-2468
Personal e-mail	trevor.solomon@akzonobel.com



CPA implementer and/or responsible person/ entity	☐ CPA implementer(s) X Responsible person/ entity for completing the VPA-DD-Form
Organization	The FReMCo Corporation Inc.
Street/P.O. Box	2470 No. 1 Side Road
Building	
City	Burlington
State/Region	Ontario
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Country	Canada
Telephone	1-905-336-3704
Fax	
E-mail	amorris@fremco.com
Website	www.fremco.com
Contact person	
Title	Senior Business Manager
Salutation	Mrs.
Last name	Morris
Middle name	Marie
First name	Alison
Department	
Mobile	
Direct fax	
Direct tel.	1-905-320-8181
Personal e-mail	amorris@fremco.com

I.



CPA implementer and/or responsible person/ entity	☐ CPA implementer(s) ☒ Responsible person/ entity for completing the VPA-DD-Form
Organization	MGM Innova
Street/P.O. Box	2 South Biscayne Blvd. Suite 2160
Building	
City	Miami
State/Region	Florida
Postcode	33131
Country	United States
Telephone	1.786.975.2188
Fax	
E-mail	gdutt@mgminnova.com
Website	www.mgminnova.com
Contact person	
Title	Vice President, Science and Technology
Salutation	Dr.
Last name	Dutt
Middle name	Shankar
First name	Gautam
Department	-
Mobile	
Direct fax	
Direct tel.	+54.11.4767.3796
Personal e-mail	gdutt@mgminnova.com



Appendix 2. Affirmation regarding public funding

This VPA or any other within the PoA has not received and will not receive any Official Development Assistance (ODA). This affirmation is provided as file “Annex D executed14112014.pdf” and copied below.



ANNEX D - OFFICIAL DEVELOPMENT ASSISTANCE DECLARATION

Date: October 27, 2014

The Gold Standard Foundation

79 Avenue Louis Casai

Geneva Cointrin, CH-1216

Switzerland

RE: Declaration of Non-Use of Official Development Assistance (ODA) by Project Owner of G53492 [PoA] and GS2767 (VPA #1) ("Project")

International Paint Limited [Project Owner]

As Project Owner of the above-referenced Project, and acting on behalf of all Project Participants, I now make the following representations:

International Paint Limited [Project Representative or Coordinating/Managing Entity]

I hereby declare that I am duly and fully authorized by the Project Owner of the above-referenced project to act on behalf of all Project Participants and make the following representations:

I. The Gold Standard Documentation

I am familiar with the provisions of The Gold Standard Documentation relevant to ODA. I understand that the above-referenced Project is not eligible for Gold Standard registration if the Project receives or benefits from ODA with the condition that some, or all, of the carbon credits [CERs, ERUs, or VERs] coming out of the Project are transferred to the ODA donor country. I hereby expressly declare that no financing provided in connection with the above-referenced Project has come from or will come from ODA that has been or will be provided under the condition, whether express or implied, that any or all of the carbon credits issued as a result of the Project's operation will be transferred directly or indirectly to the country of origin of the ODA.

In the event the Project is a Programmes of Activities where the CME is also implementing one or more Component Project Activities (CPAs) or Voluntary Project Activities (VPAs), I further acknowledge and understand that this Declaration is applicable to all of the CPAs/VPAs where the CME and the CPA/VPA implementing entity is the same.

II. Duty to Notify Upon Discovery

If I learn or if I am given any reason to believe at any stage of project design or implementation that ODA has been used to support the development or implementation of the Project covered by this Declaration, or that an entity providing ODA to the host country may at some point in the future benefit directly or indirectly from the carbon credits generated from the Project as a condition of



investment, I will notify The Gold Standard immediately using the Amended ODA Declaration Form provided below.

III. Investigation

The Gold Standard reserves the right to conduct an investigation into any project it reasonably believes may be receiving ODA with the condition that some or all of the carbon credits from the Project will be transferred to the ODA donor country.

IV. Sanctions

I am fully aware that the sanctions identified in The Gold Standard Terms and Conditions may be applied to me or the above-referenced Project in the event that any of the information provided above is false or I fail to notify The Gold Standard of any changes to ODA in a timely manner.

I swear that all of the statements contained herein are true to the best of my knowledge.

Signed: 

Name: Robert Wong

Title: Marketing Director

On behalf of: International Paints Limited

Place: Felling, United Kingdom



Dr David Williams

RD&I Director



Appendix 3. Applicability of methodology(ies) and standardized baseline(s)

See Excel book “VPA_1 Reg results and ER 25aug15.xlsx”, for a summary of Basic data for all 17 ships. These confirm eligibility of methodology for all ships included in the VPA.

Data for each ship is in individual Excel workbooks. For example, see “19oct14.xlsx.”



Appendix 4. Further background information on ex ante calculation of emission reductions

Explanations are given in Excel sheets of each Excel book. One such book covers each ship in this VPA.



Appendix 5. Further background information on monitoring plan

No additional information on monitoring plan.



Appendix 6. Summary of post registration changes

[This section blank for now, since registration has not happened yet.]

**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-CPA-DD-FORM in A.13. and Error! Reference source not found.; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Error! Reference source not found.; • Change the reference number from <i>F-CDM-CPA-DD</i> to <i>CDM-CPA-DD-FORM</i>; • Editorial improvement.
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project activity design document form" (EB 66, Annex 16).
01.0	27 July 2007	EB33, Annex42 Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: component project activity, project design document		