Programme design document form for CDM programmes of activities

(Version 04.1)

Complete this form in accordance with the Attachment "Instructions for filling out the programme design document form for CDM programmes of activities" at the end of this form.

PROGRAMME DESIGN DOCUMENT (PoA-DD)	
Title of the PoA	**P**rogramme for the application of **a**dvanced **h**ull coatings to reduce **s**hipping **f**uel consumption (PAHSF)
Version number of the PoA-DD	5
Completion date of the PoA-DD	25/08/2015
Coordinating/ managing entity	International Paint Ltd., a company in the AkzoNobel Group
Host Party(ies)	Not applicable (not CDM project)
Sectoral scope(s) and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral scope 7. Transport. Gold Standard methodology: Reducing Vessel Emissions Through the Use of Advanced Hull Coatings (version 2)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

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Title: Programme for the application of **a**dvanced **h**ull coatings to reduce **s**hipping **f**uel consumption (PAHSF)

Version no. 5.
Date: 25/08/2015

Version history:

Version: 1. Date: 9 July 2014. Uploaded for Pre-Feasibility Assessment (PFA). A similar version was sent to Gold Standard to support methodology revision request.

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

Version 3: Revised in response to Draft Validation Report; filename:
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. Revision takes into account comments from GS Registration Review.

A.2. Purpose and general description of the PoA

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The shipping industry accounts for 3.3% of total CO_2 emissions worldwide. International shipping, i.e. movement between ports in different countries, accounted for approximately 2.7% of total CO_2 emissions in 2007 (Buhaug et al., 2009). The emissions are largely from fuel consumption in engines using fuel oil, diesel, and in recent years, LNG. Most of the fuel is consumed to overcome hydrodynamic drag with a smaller part to overcome aerodynamic drag.

The Programme of Activities (PoA) consists of improved hull coatings intended to reduce hydrodynamic drag in ships. The Programme Coordinating Entity is the manufacturer of the advanced coating products, International Paint Ltd. The three main advanced products are denominated Intersleek 1100SR, Intersleek 900 family (comprising Intersleek 960 and Intersleek 970) and Intersleek 700 family (specifically Intersleek 757)[1]. All references to Intersleek 900 and Intersleek 700 in this document generally refer to the respective family of products.

The type of coating most commonly used on ships is a self-polishing copolymer (SPC) which slowly releases a biocidal antifouling agent. Biocidal antifouling coatings contain bioactive materials intentionally added to control the growth of organisms; biocidal coatings have a higher toxicity rating to both the environment and humans compared to the Intersleek systems. Intersleek products are substantially lower in toxicity compared to biocidal system. Intersleek 900 is a fluoropolymer foul-release coating while Intersleek 700 is a silicone foul-release coating. Intersleek 1100SR is a fluoropolymer-based system and is a modification of Intersleek 900. The fluoropolymer is developed from that used in Intersleek 900 by addition of particular chemical

[1] The Intersleek family of advanced hull coatings include some sub-brands. The file “Intersleek family of products.pdf” provides the full list.

groups in order to enhance the slime resistance and slime release properties. Besides lower toxicity, the use of Intersleek 1100SR, Intersleek 900 and Intersleek 700 reduce hull friction and hydrodynamic drag, reducing fuel consumption. Since ships typically use fossil fuels, reduced fuel consumption would reduce CO_2 emissions. Therefore all projects within the PoA would both reduce greenhouse gas (GHG) emissions as well as reduce contamination of seawater by avoiding the release of any biocidal antifouling agent.

Framework for the implementation of the proposed PoA

The proposed PoA would be implemented by International Paint Ltd. (IP), the manufacturer of the advanced hull coating. IP will be the aggregation entity for projects within the PoA.

Projects within the PoA would generally be ships travelling between ports in different countries. The fuel consumed for these trips is classified as international bunker fuels and the emissions from burning these fuels are not part of the national GHG inventories. International agreements limit GHG emissions from certain countries, but do not cover emissions from international shipping, since these emissions are not in the national inventories. Fuel savings leading to emissions reduction could generate carbon credits under the Gold Standard, if the requirements are met. In the case of domestic shipping, i.e. between ports in the same country, carbon credits would accrue provided there are no regulations covering shipping emissions.

While the Kyoto Protocol expires at the end of 2012, and has not been extended or replaced by a different international agreement, there are no legally binding limits to emissions of any Annex 1 country, or any non-Annex 1 country, beyond 2012. However, considering that emissions limits may be applicable to Annex 1 countries and at least to major non-Annex 1 countries, as suggested by the Copenhagen Accords (2009) as well as non-binding statements made at the UNFCCC meetings in Cancun (2010) and Durban (2011), no carbon credits would be claimed for emissions reduction in domestic shipping in any country.

As required in the methodology[2], "when the coating manufacturer is the aggregation entity, for the determination of carbon credits", as in this case, "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 for a substantial part of the 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.

[2] Based on the revised Gold Standard methodology, as approved by e-mail by Gold Standard on 9 Sep. 2014, and formally published on 17 Nov. 2014 A proposed revision to the approved version of the methodology was previously submitted to the Gold Standard on June 23, 2014.

Provided the results confirm fuel savings, they would contribute to increase confidence in advanced hull coating products, making them common practice."

The PoA would be coordinated by International Paint Ltd. in the following way. Each VPA within the proposed VPA would comprise a set of ships that are coated with an advanced hull coating over a certain period of time. Successive VPAs will comprise sets of ships that are so coated in subsequent time periods. Additional VPAs may be added up to a point when the activity is no longer considered additional, which may arise if there are regulations requiring the use of advanced hull coating, or the application of such coatings become common practice, in either case, as specified in detail in the methodology, and elsewhere in this PoA. If additionality is not lost, for either reason, carbon credits may be claimed for a period of 28 years from the date of registration of the PoA. (The Gold Standard PoA allows carbon credits to be claimed over a 28-year period comprising all VPAs within the PoA.) Note that individual VPAs within the PoA would have a much shorter crediting period, since each ship can claim carbon credits for a single docking cycle with the application of the advanced hull coating.

The PoA is a voluntary action of the Coordinating/Managing Entity (CME).

Sustainable development benefits

Foul release products offer significant environmental benefits compared to biocidal products. Besides significant fuel savings and CO_2 emissions reduction, as a biocide-free product, the advanced, foul release products eliminate release of biocides in to the marine environment.

Moreover, the advanced foul release products (as opposed to the conventional antifouling products) have higher volume solids and lower required film thickness than biocidal systems. This results in a 40% reduction in paint volume and 60% reduction in VOC emissions for first time application. At future dockings, paint volume required is typically reduced by over 75%, VOC emissions are reduced by over 80% and waste packaging is reduced by over 60%. However, projects under this PoA can claim carbon credits only for the first docking cycle following the application of the advanced hull coating.

A.3. CMEs and participants of PoA

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The Coordinating/Managing Entity (CME) of the PoA would be International Paint Ltd., a private company that is part of the AkzoNobel Group. International Paint Ltd. is the manufacturer of the advanced hull coating products. International Paint Ltd. will enter into agreements with prospective ship owners and operators to sell the coating product, obtain information necessary to determine baseline and project emissions, and emissions, and share the carbon credits with them, as described generically in A.2, and as will be detailed in specific agreements signed between International Paint Ltd. and each ship owner or operator. International Paint Ltd. would be supported by consultants, FReMCo and MGM Innova, as listed below.

A.4. Party(ies)

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (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.

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
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.5. Physical/ Geographical boundary of the PoA

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Since projects within the PoA comprise shipping, often international, there are no geographic boundaries as such. The PoA boundary potentially includes all shipping in the world. Ships within the PoA are likely to be large, e.g. cargo vessels, oil tankers, ferries, etc., and most likely exclude small ships, e.g. yachts, river boats, etc.

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.

A.6. Technologies/measures

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Hull coatings are designed to reduce hydrodynamic drag as well as limit plant and animal growth on the underwater hulls of ocean-going ships and coastal vessels.[3] Untreated, this creates significant additional hull resistance and, as a result, leads to higher fuel bills and increased emissions. These coatings have been based on various technologies with ongoing research and development on the part of the world's leading coatings companies enabling new and more effective products to be brought to market on a regular basis. Coatings fall into two broad categories, biocidal antifouling coatings and biocide free foul release coatings, each of which has subsets. Biocidal antifoulings – whether self polishing copolymers (SPC) or controlled depletion polymers – all function by releasing active ingredients, biocides, into the marine environment, repelling organisms and thereby preventing their adhesion to ships' hulls. Copper forms the basis for the most widely used biocides today.

The second group is biocide-free and is known generically as foul release coatings. Unlike biocidal antifoulings, they do not release any active ingredients into the marine environment but work on a pure physical basis using advanced polymer technologies. Again, there are subsets within the foul release grouping – some coatings are based on silicone technology; others are known as fluoropolymers.

Project activities within this PoA comprise the application of a biocide-free, fluoropolymer (Intersleek 1100SR and Intersleek 900) or silicone (Intersleek 700) foul release coating, to cargo vessels, cruise ships and other ships. The three main advanced products are denominated

[3] This paragraph and the next are largely based on the White Paper: "Eco-efficiency – a new tool to support better decisions on hull coating investments", prepared by International Paint.

Intersleek 1100SR, Intersleek 900 family (comprising Intersleek 960 and Intersleek 970) and Intersleek 700 family (specifically Intersleek 757)[4].

The baseline coating is a self polishing copolymer (SPC), which is a biocidal antifouling coating. Each ship within the PoA was coated with the SPC coating in the docking cycle prior to the application of the advanced hull coating.

The project owner is International Paint Ltd., the manufacturer of Intersleek 1100SR, Intersleek 900 and Intersleek 700, and the activity comprises a set of ships to which any of these coatings is applied.

A.7 Public funding of PoA

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This PoA and VPAs within it do not include any public funding or a diversion of ODA funding.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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The selection of baseline and the demonstration of additionality of projects within the PoA are shown below. However, there may be restrictions on the eligibility of VPAs in the future, because of new regulations or when sufficient number of ships has been coated with the advanced hull coating that the process becomes Common Practice, and no further ships may be included in any VPA. These considerations are listed at the end of Section B.2.

As indicated in the methodology[5], the CDM Tool for the demonstration and assessment of additionality is used as the basis for the identification of the baseline scenario and evaluation of additionality. Version 7.0.0 of the Tool was used. The text of the Tool refers to "project" or "project activity". We understand this to refer to VPAs within the PoA.

The selection of the baseline scenario

As per the Additionality Tool, version 7.0.0, the following steps should be applied to identify the baseline scenario:

Step 0: *Demonstration whether the proposed project activity is the first-of-its-kind*

As noted in the Tool (paragraph 14), "*This step is optional. If it is not applied it shall be considered that the proposed project activity is not the first-of-its-kind*."

The proposed project activity is not the first-of-its kind, hence we do not need this step.

Step 1: *Identification of alternatives to the project activity consistent with current laws and regulations*

Sub-step 1a: Define alternatives to the project activity:

[4] The Intersleek family of advanced hull coatings include some sub-brands. The file "Intersleek family of products.pdf" provides the full list. Product specifications for Intersleek 1100SR, Intersleek 970, and Intersleek 757 can be found in three attached files: Intersleek 1100SR 10084-M-eng-A4.pdf; Intersleek 970 3852-P-eng-usa-LTR.pdf; Intersleek 757 147-M-eng-A4.pdf.

[5] This is stated in the approved Version 1 and not modified in Version 2 of the methodology.

As noted in the methodology, the project activity comprises coating the hull of a ship using an advanced coating product. Possible baseline alternatives are:

1. The project activity itself, i.e. applying the advanced coating product, without carbon credits;
2. Applying a biocidal foul release coating that was also applied in the previous hull coating cycle;
3. Applying a less advanced coating product, with properties between the historical product (biocidal foul release coating) and the advanced product comprising the project activity.

Step 1b: Consistency with mandatory laws and regulations

Until fairly recently ship operators used biocidal coatings that were based on tributyltin (TBT). Since this material is both highly toxic and persists in the environment, a worldwide ban on the application of coatings containing tributyltin (TBT) on all vessels was imposed by the International Maritime Organization in 2003. They were replaced mainly by copper-based biocidal coatings using "boosting" biocides mainly organic in nature. However, general opinion is that they are less effective in controlling fouling growth and may also become the target of environmental legislation.

At present there is no ban on biocidal coatings. Future legislation may limit the use of certain types of coating products. For any ship to be coated with the advanced coating after any legislation affecting the choice of coatings should take into consideration the legislation in defining the baseline for that ship.

On the other hand, if there are laws and regulations that require fuel savings respect to an earlier period, or some other condition, which implies that one of the coating products cannot be applied, then again, the corresponding alternative can be excluded from the list of possible baselines.

As of this writing there are no rules requiring fuel savings in international shipping, from the IMO, the EU or anywhere else. If there were, crediting emissions reduction for fuel savings through this project could lead to double counting. Therefore, if such rules are introduced in the future that could lead to double counting, the situation should be analyzed carefully to make sure that GS rules are not being violated.

Since regulations may be introduced in the future, as per methodology each VPA-DD
"shall analyze the regulations applicable at the time of submission of a project activity, including those regulations that have been established but not yet gone into effect to evaluate their impact on the baseline and additionality. For instance, following the application (i.e. date of going into effect) of any regulations from the EU, say, that would favour advanced hull coatings, any ships applying the coatings would only be able to obtain carbon credits on routes not affected by the regulations. Since the emissions reductions are determined from actual ship fuel consumption on a daily / voyage basis, subject to certain data filters to eliminate "invalid" data, it would be a fairly straightforward procedure to eliminate all the days / voyages affected by regulations. For instance, it is possible that the European Union limits emissions from certain categories of ships travelling to and from EU member states, to be effective from a certain date. Since the advanced hull coating can help meet this regulation, in order to be conservative, fuel savings and emissions reductions for those voyages would not count towards carbon credits from the date that the regulations go into effect. Emission reductions which exceed regulatory requirements would still be eligible under this methodology. Thus if regulations require, e.g. a 5% reduction in emissions for certain routes, then any emissions reduction over this value, would count toward carbon credits.

"This process eliminates double counting of emissions reductions that are also part of a compliance regime."

According to the current legislation, apart from TBT, which was not included in the list of possible baseline scenarios in the methodology, no alternative baselines are eliminated by applicable laws and regulations. Therefore, as per methodology, all three alternatives remain valid and need to be considered in the following steps.

The methodology continues as follows:

"Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both Steps 2 and 3.)"

Project proponent may choose Step 2 or Step 3 or both. There are three baseline alternatives identified in Sub-Step 1(a). If none are excluded in Sub-Step 1(b), then the analysis should be applied to Alternative 1 vs. Alternative 2, Alternative 3 vs. Alternative 2, and Alternative 1 vs. Alternative 3, in order to establish the baseline scenario.

We choose:

Step 3: Barrier analysis

This step comprises several Sub-steps, which are described below:

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

Barriers may include
(a) Investment barriers, other than the economic/financial barriers in Step 2;
(b) Technological barriers; and
(c) Other barriers, preferably specified in the underlying methodology as examples.

The project activity faces all three types of barriers as described below:

Investment barriers. Many ship owners lease their ships to other operators. While the former is responsible for capital investments, including the application of hull coating, the latter would benefit from any fuel savings that result from reduced hydrodynamic drag as they pay the fuel bill. This split incentive is a common barrier to investments in energy efficiency. Examples include building designer versus building purchaser or landlord/tenant. Since the investor does not benefit from the fuel savings, the tendency is to use the lowest cost product that is accepted in the market. On a cost per litre basis, Intersleek 1100SR, Intersleek 900 and Intersleek 700 are much more expensive than biocidal antifouling coatings. Including the cost of preparation and application, using the advanced product is substantially more expensive. Therefore, ship owners prefer to use the biocidal antifouling coating. This is shown in Step 4 below (Common practice analysis).

Technological barriers. Suppliers often state that their product is new and improved. For instance the product brochure for Intersleek 1100SR states "Ultra smooth surface reduces drag and fuel consumption", with a footnote stating "In comparison to typical self polishing antifouling products." However, fuel consumption depends on many parameters besides hull surface smoothness. Moreover, hull smoothness degrades after long periods of time, so that fuel savings cannot be determined from short-term tests such as sea trials. Finally, since some advanced products maintain a low level of fouling and a low hull resistance over longer periods of time compared to traditional products, fuel savings need to be determined over extended periods of time. Thus the purchaser of the hull coating product cannot determine fuel savings easily or accurately.

Moreover, new products could have other problems that may emerge over time. Thus perceived technological risks may be high. For instance, the US Navy recognizes the benefits of foul release coatings, but also notes potential risks:

"Foul release coatings are non-toxic, and consist of compliant and 'slippery' materials to discourage adhesion by marine biofoulers such as barnacles and tubeworms. *Their expense, lack*

of durability, and need for frequent in-water husbandry has limited their use by the Navy."[6] (Emphasis added)

Clearly if the US Navy has doubts about foul release coatings, so will the typical ship owner.

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)[7] 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:

> *"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.*

[6] "Bio-inspired marine biofouling-control coatings". Office of Naval Research Acquisition Program. http://www.navysbir.com/n11_2/N112-166.htm

[7] Cited as CLIMA.B.3/SER/2011/0014

- *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.

Other barriers. Finally, we may note that the advanced coating product comprising the project activity has become available only recently and very few ships have applied them. As noted in the Additionality Tool, Version 7.0.0, other barriers should "preferably be specified in the underlying methodology". This is indeed the case for the Gold Standard methodology. For details, see Step 4: Common practice analysis.

The barriers identified here apply to the advanced coating product which is substantially more expensive than the bioicidal antifouling coating. The latter is commonly used so that it faces no technological barrier and is indeed part of prevailing practice.

Of the three alternative baselines noted in Sub-step 1(a), no. 2 does not face any of these barriers. The extent to which alternatives 1 and 3 face barriers is determined by the Common practice analysis, as specified in the GS methodology.

We now proceed to:

Step 4: Common practice analysis

The CDM Additionality Tool was the basis for undertaking common practice analysis, which is specified in detail in the Gold Standard approved methodology[8], as noted below:

> *"Sub-Step 4.1: Identify the total number of ships in category "i" that have already applied an advanced hull coating of level "j" and have started commercial operation before the start date of the project. Note their number $N_{all,i,j}$. Project activities registered under Gold Standard shall not be included in this step.*
>
> *"Clearly the self-polishing, biocidal coating, which is the baseline for this methodology to be applicable, is excluded. Also excluded are any non-biocidal coatings that do not claim to save fuel. Advanced hull coatings that do not contain biocidal materials and reduce hull resistance can be further subdivided into two levels. The first level comprises "silicone based combined foul release coatings" which do not contain biocides and provide a certain, intermediate level of fuel savings. The second level comprises "fluoropolymer based foul release coatings".*
>
> *"Projects previously registered under the Gold Standard on the basis of fuel savings from advanced hull coatings are excluded from the calculation. However, projects registered under other voluntary markets are not, since the applicability conditions may be very different."*
>
> *"Step 4.2: Within ships identified in Step 4.1, identify those that apply technologies different than the technology applied in the proposed project activity. Note their number N_{diff}.*

[8] Methodology Version 1, not modified in Version 2.

"Since level two coatings provide superior performance, when the project activity (as described in the PDD) comprises the level two coating, N_{diff} is considered to be all ships that have the baseline biocidal coating or a level one coating. However, if the project activity comprises a level one coating, then N_{diff} would only consider ships with biocidal coating. Any ships with level 2 coatings would be included within the project activity group, since their performance is superior to that of the project activity."

"Step 4.3: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of ships using technology similar to the technology used in the proposed project activity in all ships of same category as in the proposed project activity. The proposed project activity is a "common practice" if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3."

The results of the common practice analysis are shown in Table 1. 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.

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
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, 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). Thus, in the near future, the application of Intersleek 700 on cruise ships would not be eligible for carbon credits.

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 later 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.

The common practice is somewhat conservative insofar as the data are from early 2014, while ships included in the first 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.

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.
- 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

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

Hence the PoA and the first VPA meets the common practice test as long as no LNG tankers are included.

As per paragraph 64 of the Additionality Tool, ver. 7.0.0:

“Outcome of Step 4: If outcome of Step 4 is that the proposed project activity is not regarded as “common practice”, then the proposed project activity is additional.”

The Common Practice test, described above, needs to be repeated for each subsequent VPA to confirm common practice. Based on the table above, additionality is demonstrated at the PoA level, and for the first VPA, which is submitted at the same time. The analysis above would need to be repeated for each subsequent VPA to demonstrate additionality.

Note that the Common Practice test is discriminated by ship category. If the results indicate that for a certain category of ship (e.g. LNG tankers), the project activity at a certain Level is common practice, no further ships in that category may be included in that or any subsequent VPA at that Level. However, ships in other categories or at a higher Level may continue to be included in VPAs, until they reach their own Common Practice limits.

Benefits of Project Registration under the Gold Standard

The Gold Standard methodology includes a detailed monitoring procedure for the quantification of fuel and energy savings and emissions reduction. The existence of this methodology provides confidence to ship owners/operators in order to consider advanced hull coatings, which are

considerably more expensive than the traditional hull coatings. The registration of VPAs within this PoA followed by monitoring and verification would provide independent demonstration of fuel and energy savings and associated cost savings to the ship owners and operators, as well as a share of the carbon credit revenues, as agreed with International Paint Ltd. The demonstrated benefits would provide greater awareness of advanced hull coatings and would encourage other ship owners and operators to use such coatings, thereby decreasing biocides being released into and contaminating the waters, and decreasing overall global CO_2 emissions from the shipping industry.

Demonstration of additionality

This step—Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of any project activity within the PoA registered under the Gold Standard—comprises the assessment and demonstration of additionality, which was undertaken largely in the previous section ("The selection of the baseline scenario").

This section limits itself to one remaining aspect of the analysis of additionality—the project start date.

The Gold Standard defines the "**Start Date of a Project"** activity as follows:[9]

> ***'Start date of the 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 Gold Standard defines a "**Regular Project Cycle"** as follows:[10]

> *'**Regular Project Cycle**' means the project cycle that applies to projects applying for Gold Standard registration (as defined under **time of first submission**) before the start date of the project.*

The Gold Standard defines a "**Retroactive Project Cycle"** as follows[11]:

> ***'Retroactive Project Cycle'*** *means the project cycle that applies to projects applying for Gold Standard registration (as defined under **time of first submission**) after the start date of the project.*

"**Time of first submission**" mentioned in the definition of "Regular Project Cycle" is defined as follows:

> ***'Time of first submission'*** *means submission of the **Local Stakeholder Consultation Report** for projects proceeding under the regular project cycle, and submission of the required Gold Standard project documentation for a **Pre-Feasibility Assessment** and payment of the applicable fee under the retroactive project cycle.*

Pre-feasibility Assessment, mentioned in the definition above, is defined as follows:
'Pre-feasibility Assessment' means the step required to assess whether a proposed retroactive project complies with Gold Standard criteria and can potentially apply for registration under The Gold Standard.

In this case, the project activity comprises the application of an advanced hull coating to ships. According to the above definition, the Start date, for a given ship, is therefore the day the advanced hull coating is applied to that ship. Each VPA within the PoA comprises a set of ships, coated on different days. However, considering the definition of the start date, the start date of the VPA may be considered to be the earliest date on which a ship included within the VPA was coated with the advanced hull coating.

[9] Gold Standard Requirements Version 2.2, p. 22.

[10] Gold Standard Requirements Version 2.2, p. 20.

[11] Gold Standard Requirements Version 2.2, p. 20.

According to the methodology, the determination of emissions reduction requires, among other information, regression analysis of daily data on ship fuel consumption and ship speed, for the baseline period, which is the entire docking cycle prior to the application of the advanced hull coating. Therefore, in order to undertake the regression analysis, the baseline docking cycle should be finished, i.e. the ship has already been coated with the advanced hull coating product. Under these circumstances, and considering the definitions above, every ship that is listed in a VPA has already been coated, and the VPA is therefore retroactive. Thus, every VPA within this PoA would be retroactive, by necessity. This is the case not only for the first VPA, but all VPAs in the future as well.

Therefore all VPAs would be subject to a Pre-feasibility Assessment (PFA), as per Gold Standard rules. We have consulted the Gold Standard for an exemption to the Pre-feasibility Assessment for all VPAs. However, they have indicated that they cannot issue a blanket exemption to the PFA. We hope that a single PFA for the PoA and first VPA would be sufficient and that further VPAs would not require PFAs. A number of documents (listed below) were uploaded on July 9, 2014 as part of the Pre-Feasibility Assessment.

Hull_coating_PoA_design_consultation_3feb14
Hull_coating_PoA_PDD_9july14
Hull_coating_VPA_PDD_9july14
International_Paint_First_VPA_Gold_Standard_Passport_9july14
PFA_Cover_letter
Common_practice_test_5jul14
Eurocargo_malta_data_analysis_12jun14

Gold Standard provided feedback on Aug. 22, 2014. Based on the feedback, a number of changes were made in various documents, with revised versions as listed below[12]:

Hull_coating_PoA_design_consultation_14oct14.docx

The start date determines the crediting period, and the Gold Standard defines the rules for the Regular Project Cycle as follows:[13]

> *"For VER project activities proceeding under the regular project cycle, the start date of the Gold Standard Crediting Period shall be the date of start of operation or a maximum of two years prior to Gold Standard registration, whichever occurs later, and be mentioned in section C.2.11 or C.2.2.1 of the PDD."*

Therefore, all VPAs under this PoA would be retroactive, with crediting period starting no earlier than 24 months prior to the registration date.

Considering the analysis presented in the previous section, and the compliance with the condition of starting date, assuming that the Pre-feasibility Assessment is successful, the first and subsequent VPA within this PoA are additional.

B.2. Eligibility criteria for inclusion of a CPA in the PoA

>>

[12] The feedback and our response can be found in "GS2767_PFA feedback response MGM Fremco 30oct14.pdf"

[13] Gold Standard Requirements Version 2.2, p..

The feedback to the Pre-Feasibility Assessment has references a CDM *Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities*. Specifically, Standard *Section 3.2. Development and update of eligibility criteria* has been indicated. Article 16 of the Standard section lists eligibility criteria, which are shown in the left column of the table below, with comments specific to VPAs within this PoA in the right. It is understood that "CPA" refers to CDM, and this is "VPA" in our case.

According to CDM standard, "The eligibility criteria shall cover as a minimum the following"	**Relevance to VPAs within this PoA**
(a) The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA;	Not relevant, no geographical area involved in this PoA
(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);	Each VPA comprises a set of ships, each of which are identified by a unique, global number issued by the International Maritime Organisation.
(c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;	The technology comprises advanced hull coatings, whose specifications are summarized in Sec. A.6 above. Detailed specifications can be found in files cited in a footnote there. The technology specifications are provided in the methodology and applied at the PoA and VPA levels. The measure comprises the application of a standard industrial product from a global manufacturer.
(d) Conditions to check the start date of the CPA through documentary evidence;	Yes, documentary evidence should be provided to indicate date on which advanced coating was applied.
(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs;	Each VPA to be included in the PoA should meet the applicability conditions specified in the methodology, and copied in Sec. B.2 of the Generic VPA below. Compliance with these conditions is illustrated in Sec. B.5 of the Generic VPA below.
(f) The conditions that ensure that the CPA meets the requirements pertaining to the demonstration of additionality as specified in section B.1 above;	Each VPA, at point of submission for inclusion in the PoA, shall be evaluated to ensure the requirements of additionality are demonstrated as per conditions in section B.1 above: • **Step 1:** Identification of alternatives to the project activity consistent with current laws and regulations • **Step 2:** Barrier analysis to include a discussion on current and relevant technological barriers related to the VPA • **Step 4:** common practice test and analysis will be undertaken at the VPA level, to ensure the project activity is not common practice.
(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;	Local stakeholder consultations, to consist of those parties identified as necessary (ship owners, operators and plant manufacturing workers) shall be conducted for each VPA. Similarly, environmental impact analysis will be carried out at the VPA level.

(h) Conditions to provide an affirmation that funding from Annex I Parties, if any, does not result in a diversion of official development assistance;	There is no ODA involved in any aspect of this project.
(i) Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation);	The target group is shipping. There are no further restrictions.
(j) Where applicable, the conditions related to sampling requirements for the PoA in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities";	Not applicable. No sampling involved in this PoA.
(k) Where applicable, the conditions that ensure that every CPA (in aggregate if it comprises of independent sub units) meets the small-scale or microscale threshold and remains within those thresholds throughout the crediting period of the CPA;	Not applicable. VPAs are not small scale.
(l) Where applicable, the requirements for the debundling check, in case the CPAs belongs to small-scale or microscale project categories.	Not applicable. VPAs are not small scale, hence debundling is not relevant.

In view of the analysis above, items (b), (c), (d), (e), (f), and (g) are relevant to VPAs within this PoA.

Each VPA comprises a set of ships. The methodology specifies applicability conditions for any ship to be included in a Gold Standard project. These applicability conditions are also eligibility conditions for each VPA in a PoA using the methodology. Thus each ship within the VPA must also meet the following eligibility conditions[14]:

- The ship is not new, i.e. it had at least one full docking cycle of operation with the traditional biocidal hull coating.
- 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
- 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. 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.
- Where data on fuel consumption for *navigation purpose only* is available for the baseline period, it should be used for regression analysis. For cases, where data is available only for *total fuel consumption for main engines* 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,

[14] Note that the methodology includes a number of other applicability conditions, which are relevant to the PoA as a whole and does not affect the inclusion of ships in each VPA.

where the total fuel consumption also includes uses other than navigation and maneuvering, it should NOT be used for regression analysis.

The CDM standard referred to above includes a section *3.2.2. Updating eligibility criteria***.** Basically it requires (Article 23) eligibility criteria to be updated as indicated in the methodology.

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 apply[15]. 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.

B.3. Application of technologies/measures and methodologies

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The proposed PoA and VPAs within it use a single methodology:
"Reducing Vessel Emissions Through the Use of Advanced Hull Coatings"
Version 2.

B.4. Date of completion of application of methodology and standardized baseline and contact information of responsible person(s)/ entity(ies)

>>
Date of completion: 23/04/2015

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

Contact: gdutt@mgminnova.com

SECTION C. Management system

>>
The Coordinating/Managing Entity (CME) of the PoA is International Paint Ltd., the manufacturer of the advanced hull coatings.

As CME, the responsibilities of International Paint Ltd. include a management plan for the inclusion of ships for each VPA.

The headings (and associated footnotes) in blue below are taken from Paragraph 19 of the CDM "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities."

(a) A clear definition of roles and responsibilities of personnel[16] involved in the process of inclusion of CPAs, including a review of their competencies;

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

[16] It is not necessary to specify the names of personnel, but the descriptions of functions are required.

The person responsible for administering the tasks within the management plan is the Business Manager, Marine Marketing, International Paint Ltd. This position is currently held by Mr. Trevor Solomon. In certain technical aspects, the Manager will be supported by PoA/VPA development consultants. For the PoA and VPA 1, this consultancy is being undertaken by FReMCo and MGM Innova.

There are two major steps in the selection of ships for inclusion in a VPA. The comprise "Initial selection of ships for inclusion in VPA" and "Data analysis for confirming the inclusion of ships in the VPA." Each major step is discussed below.

Initial selection of ships for inclusion in VPA

The sequence of tasks is shown below.

- International Paint Ltd. invites ship owners and operators to a presentation, on the Intersleek product line and the benefits of participating in the Gold Standard Programme of Activities. The most recent presentation took place in London, United Kingdom, on 29th April, 2014. A copy of the presentation is attached [14342 CC Customer Revision 01_master.pdf].
- Discussions with individual ship owners and operators on specific ships under consideration. See details in attached file: Carbon Credit Process Steps.pdf
- Initial screening of ships by International Paint Ltd. to determine if each ship qualifies or not. For ships that pass the initial screening, MGM Innova undertakes a detailed evaluation of each ship in a VPA that is part of the PoA. The evaluation procedure is detailed in Sec. B.5 of the Generic VPA, below.
- International Paint Ltd. informs the ship owners/operators of ships that do not qualify, for not meeting one or more of the eligibility criteria, and which ships could be included in a VPA within the PoA.
- The final list of ships is included in the VPA.

Data analysis for confirming the inclusion of ships in the VPA

Data covering the baseline period, i.e. the docking cycle with the baseline hull coating, are analyzed by MGM Innova on behalf of International Paint Ltd. The analysis includes a regression analysis of fuel consumption rate versus average speed, and other parameters. For a ship to be included in a VPA associated with this PoA, regression results should be considered satisfactory in terms of standard error of estimate, the t-value of the coefficients estimated and R^2. If the regression results are not satisfactory for a given ship, the ship cannot be included in the VPA.

All ships included in each VPA would have already been coated with the advanced hull coating, in order to have baseline data needed for analysis and inclusion in the VPA. Depending on the ships included in the VPA, and the data collected prior to the submission of each VPA, there will be some "post" data included with the VPA-DD. The data parameters measured would be the same as for the baseline data. This limited post data would be analyzed to determine fuel savings and emission reduction using the procedure outlined in the methodology. This limited post data analysis, extrapolated to the estimated duration of the docking cycle with the advanced hull coating, would be the basis for ex-ante estimates of emissions reduction.

International Paint Ltd. would continue to collect data from ship owners/operators for ships that are included in each VPA. Periodically, the post data would be analyzed by MGM Innova on behalf of International Paint Ltd. to determine fuel savings and emissions reduction. Emissions reduction would be accumulated for certain periods, e.g. calendar years, until the hull of each ship is recoated.

(b) Records of arrangements for training and capacity development for personnel;

Internal training on carbon credits and vessel eligibility is an on-going process with the sales team within International Paint Ltd. The following is an example of the training programme run in 2014:

Date	Location	Attendees	Topics	Trainer
10/04/2014	Webinar	45 Attendees from Sales teams from Far East and Middle East	Carbon Credits introduction	Trevor Solomon
10/04/2014	Webinar	17 attendees from Sales teams from Europe and Americas	Carbon Credits introduction	Trevor Solomon
04/06/2014	Webinar	35 attendees from Sales teams from North and South America	Carbon Credits introduction	Trevor Solomon
10/06/2014	Dubai	6 sales team members	Carbon Credits – use with customer	Trevor Solomon
10/06/2014	Germany	10 sales team members from Germany and Netherlands	Carbon Credits – use with customer	Michael Hindmarsh
26/06/2014	China	35 sales team from China, Japan, Hong Kong and Taiwan	Carbon Credits – use with customer	Trevor Solomon
01/07/2014	South Korea	40 sales team from Korea and East Russia	Carbon Credits – use with customer	Trevor Solomon
15/07/2014	North America	10 sales team from North America	Carbon Credits – use with customer	Michael Hindmarsh
16/09/2014	Singapore	30 sales team from Singapore, Malaysia, Vietnam, Australia, Indonesia and India	Carbon Credits – use with customer	Trevor Solomon

A copy of version 2 of the Webinar is attached as file: Carbon Credits Webinar Revision 02.pdf

(c) A procedure for technical review of inclusion of CPAs;

As noted in (a) above, MGM Innova undergoes the data analysis to determine if each ship qualifies under the PoA. FReMCo performs a technical review of the analysis and ensures that methodology applicability conditions and other eligibility conditions for inclusion of VPA in the PoA are met.

(d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA);

The procedure is specified in Sec. B.5 of the Generic VPA below.

(e) Records and documentation control process for each CPA under the PoA;

Screening and evaluation of individual ships for inclusion in a VPA require that International Paint Ltd collect data from ship owners/operators. The details are specified in “General Vessel Data Collection Method” (filename: Data Collection method.pdf).

(f) Measures for continuous improvements of the PoA management system[17];

[17] Improvements may include addition or restructuring of functions/posts for which prior approval by the Board is not required as long as the CME is able to demonstrate to the DOE that the deliverables of the management system specified in the registered PoA-DD are fully met.

The PoA management system will require revision under the following circumstances:

- A methodology revision which affects the applicability conditions and/or eligibility conditions for inclusion of a ship in a VPA and of the VPA in the PoA;
- International Paint Ltd selects other consultants, instead of those currently involved (MGM Innova and FReMCo.

In such case, the management plan described here, including references to Sec. B.5 of the Generic VPA and the document "General Vessel Data Collection Method" may need to be modified.

(g) Any other relevant elements.

No other elements are believed to be relevant.

SECTION D. Duration of PoA

D.1. Start date of PoA

>>
The start date of the PoA would be 1 January 2010. The earliest date at which a ship included in the first VPA was coated with an advanced hull coating was Feb. 28, 2010. The first VPA accompanying the presentation of the PoA comprises ships that were coated with an advanced hull coating from Feb. 28, 2010 to Sept. 26, 2013, i.e. all ships were coated after 1 January 2010. The Start date of all subsequent VPAs would also need to be on or after 1 January 2010. This is included in the Eligibility Criteria for the inclusion of any VPA within the PoA (see Section B.5 of Generic VPA).

Email exchange between project developer and Gold Standard re Start date

MGM/FReMCo understanding[18]:	Gold Standard response[19]
Our understanding is that the Start Date of a PoA is the date of first submission of the PoA, *i.e.*, the date design consultation report was submitted on the registry. The Start Date of a VPA is the earliest date on which advanced coating was applied to any ship in the given VPA. For an example, in the case of the first VPA, the earliest advanced coating date was January 1, 2010; so the first VPA start date will also be January 1, 2010. Please confirm;	For Gold Standard voluntary PoAs, PoA start date does not have any significance. The reason being that unlike the CDM PoAs where the start date of VPA cannot be before PoA start date, for a GS PoA; one can have a VPA with start date before PoA start date. Your understanding of the VPA start date is absolutely right.

D.2. Duration of the PoA

>>
The duration of the PoA is 28 years, as allowed by the Gold Standard rules. However, the entry of new ships into new VPAs, and of further VPAs may be limited before the 28 year period, because of one of several conditions, as specified in the methodology. Specifically, if there is an international agreement requiring ships to use an advanced hull coating, any ship coated with an advanced coating product on or after the date such an agreement goes into effect cannot be part

[18] Extract of email from gdutt@mgminnova.com to sriskandh@cdmgoldstandard.org, and vikash@cdmgoldstandard.org, 24 March 2014. Others copied.

[19] Extract of email from sriskandh.subramanian@goldstandard.org to gdutt@mgminnova.com, 31 March 2014. Among those copied is: vikash@cdmgoldstandard.org

of a VPA, and there can be no new VPAs within this PoA. Moreover, depending on the Level of the advanced hull coating, as defined in the methodology section "Common practice analysis", as soon as 20% of all ships have been coated with a given Level of advanced coating, no additional ships with an advanced hull coating at this Level or an inferior Level may be included in a VPA.

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

>>

The environmental impacts of the baseline and project activities are global in nature, given that the activity generally involves international shipping. Any given VPA within the programme would include a number of ships, each of which would be operating generally in international waters. There is no geographical distinction between one VPA and another, and no new insight can be gained by conducting an environmental impact analysis for another set of ships. Therefore, we propose that a complete environmental analysis be undertaken at the PoA level only.

E.2. Analysis of the environmental impacts

>>

The project activity comprises the application of a silicone or fluoropolymer foul-release hull coating, instead of a biocidal, self polishing copolymer (SPC) antifouling coating, which is the baseline coating, as well as the coating applied to the ship in the previous docking cycle. The environmental advantages of the fluoropolymer foul-release coating, compared to other alternatives, including the SPC coating are described in the following text, taken from a report by Corbett et al. (2010):

"Fluoropolymer foul release (FFR) hull coatings can be applied to vessels to mitigate biofouling. Biofouling is the presence of organisms attached to surfaces immersed in the ocean, in this case vessel hulls (Dennington, 2010; Yebra, Kiil, & Dam-Johansen, 2003). Biofouling increases drag and therefore also increases fuel use and emissions (Dennington, 2010; Hopkins, Forrest, & Coutts, 2010; Kane, 2010; Kattan, 2010; Yebra et al., 2003). Fuel costs can be as much as 50-60% of operating costs; therefore, loss of fuel-efficiency due to biofouling is a major concern for vessel owners and operators (Kattan, 2010). Shipowners apply various antifouling coatings to their vessels to help reduce biofouling. Antifouling coatings reduce average hull roughness, thereby increasing hydrodynamic efficiency, leading to reduced fuel consumption and greenhouse gas (GHG) emissions.

"Fluoropolymer foul release coating is biocide-free and allows organisms to attach to vessels when stationary but these organisms are detached when the vessel is underway (and traveling at high enough speed) due to hydrodynamic forces (Dennington, 2010). Other antifouling coatings contain biocides and include organotin compounds like tributyltin (TBT); non-TBT self-polishing copolymers (SPC); and copper (Kattan, 2010; Yebra et al., 2003). These coatings react with seawater to release biocides and help reduce biofouling. Coatings containing TBT have been banned and no vessel is currently allowed to use TBT as a biocide (European Parliament, 2003; International Maritime Organization, 2001). Antifouling performance with TBT was excellent but there were serious environmental concerns; current SPC technology does not perform as well as TBT-based coatings (Kane, 2010; Kattan, 2010)."

Silicone hull coatings are also biocide free and save fuel compared to the baseline hull coating.

E.3. Environmental impact assessment

>>

No negative environmental impact is expected from the project activity covered by this PoA. Please see Gold Standard Passport for additional information.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

>>
Because of the dispersed nature of the project, there are no local stakeholders. Therefore, the stakeholders consulted at the PoA level were part of the Programme Design Consultation process, summarized below. Full details were provided in the document "Hull_coating_PoA_design_consultation_3feb14.pdf" uploaded on 24 February 2014 to the Markit Environmental Registry, Project ID: GS2767. A slightly edited version 2 (Hull_coating_PoA_design_consultation_14oct14.pdf) takes into account (a) response to clarification request; (b) approval of methodology revision request; and (c) data analysis

The PoA comprises projects that involve the application of advanced hull coatings on ships at sea. While the ships are registered to some country, of which it is a flag carrier, this is generally a matter of convenience. Thus, Panama is the country with the largest registered fleet is followed by Liberia, Bahamas, and the Marshall Islands (Wang, 2010). Clearly, most of the shipping involves other countries, so that there is no local stakeholder to speak of. The organization designated by the UNFCCC to deal with emissions from international shipping is the International Maritime Organisation (IMO), with headquarters in London, UK, and the IMO may be considered to be the most important stakeholder. Moreover, Lloyds Register Group is also based in London. For this reason, the Design Consultation meeting was held in London. A large number of people were invited to attend the London meeting, providing them with the details of the Programme and inviting their comments. However considering the globally dispersed nature of the invitees, comments were also received by email.

Moreover, Fundamental Principles of The Gold Standard Certification Scheme (Gold Standard Requirements, V.2.2, Ch. 1, p. 13) states:
"Cultural conditions vary, languages vary and the definition of 'community' is dynamic – every project happens under unique circumstances. Thus, when in doubt, simply demonstrate that sincere and best efforts were made to apply the Gold Standard tools in full while at the same time apply transparent and reproducible ***pragmatism*** *to the final decisions related to the project."*

In the case of VPAs under the proposed PoA, while each VPA is unique insofar as it includes a different set of ships, the circumstances are not. Hence, it is both transparent and pragmatic to undertake a global stakeholder consultation at the PoA level, with no need to undertake additional consultations for each VPA.

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. The relevant email exchange is copied in the table below.

Email exchange between project developer and Gold Standard re Stakeholder consultation

MGM/FReMCo understanding[20]:	Gold Standard response[21]
a) Since ships are at sea or at port in many different countries, there is no "local" area and no strictly local stakeholders as such. Therefore, stakeholder consultation will include specific vessel owners and operators. Please confirm;	Stakeholders include any individuals/organizations that are directly impacted by the project. As written earlier, the list of stakeholder should include the vessel owner, operator, coat manufacturer (e.g. workers in the plant) etc as a bare minimum.

[20] Extract of email from gdutt@mgminnova.com to sriskandh@cdmgoldstandard.org, and vikash@cdmgoldstandard.org, 24 March 2014. Others copied.

[21] Extract of email from sriskandh.subramanian@goldstandard.org to gdutt@mgminnova.com, 31 March 2014. Among those copied is: vikash@cdmgoldstandard.org

b) VPA stakeholder consultations do not need to be conducted through physical meetings, since potential participants are located in many different countries. Webcasts and teleconferences with email response to questionnaire should be enough. Please confirm;	VPA stakeholder consultations should use a mix of live (physical) meetings and consultations via telephone/web-conferencing. GS requires that stakeholders are given a chance to comment and the best efforts and ways to extract that feedback are employed. We can discuss this further.
c) Since not all ships from first VPA were identified at the time of design consultation, an additional stakeholder consultation with ship owners and operators will be required and could be done post registration, again with webcast/teleconference and email follow-up modes acceptable. Please confirm;	Same as above. This could be a mix of physical and non-physical consultations. Also in this case, as mentioned previously, verification will have to be done systematically to give the verifying DOE a chance to look at feedback received post-registration.

With this understanding, no local stakeholder comments are included in this PoA-DD.

F.2. Summary of comments received

>>
Comments in Design Consultation meeting are included in the Design Consultation Report (DCR), mentioned in F.1 above. The main comments received and how they were taken into consideration in the current PoA are copied from the DCR in the section below.

F.3. Report on consideration of comments received

>>
Extract from Design Consultation Report, section C.2:

"*Most of the comments related to the application of the methodology and the comments were positive. However, concern was expressed in three areas:*

1. *That the methodology is limited to non-biocidal coatings, but there are advanced, biocidal hull coatings as well.*
2. *The methodology is limited to ships in long voyages, since only entire days of sailing are counted for the determination of fuel consumption and emissions reduction.*
3. *The methodology is limited to advanced hull coatings and does not contemplate multiple measures to reduce fuel consumption.*

On the first issue, we believe that the biocidal nature of the advanced hull coatings is a major part of the "Do no harm" aspect of Gold Standard requirements. Therefore, we believe that the methodology should remain as written, and be limited to non-biocidal coatings.

On the second issue, we believe that the limitation to long voyages is arbitrary and discriminatory, with no environmental or social justifications. Moreover, the baseline of the approved methodology (fuel consumption in previous docking cycle) is equally applicable to ships that undertake short voyages, e.g. ferries, coastal shipping. Moreover, the monitoring requirements, currently limited to entire days of full sailing can be easily modified to consider the entire voyage (excluding manoeuvres). Therefore, with only minor variations, the methodology could be adapted to ships in short voyages. Moreover, the change would not require a revision or a new version of the methodology. The applicability conditions of the approved methodology includes the following text (emphasis added):

- *"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**."*

Short voyage trips would require a minor modification in the regression model. Thus, the approval of any project including short-voyage ships would require an additional step for these ships rather than a new methodology.

On the third issue, applicability to multiple measures, the methodology would require more significant changes, outside the applicability conditions specified in the approved methodology. All such changes would require a new / revised methodology preparation and submission, and be subject to Gold Standard approval."

Note that the methodology was revised as suggested above and the revised methodology was submitted to the Gold Standard in May 2014, and, following feedback from Gold Standard, a further revision was submitted on 20 June 2014. Draft Version 2 of the methodology, dated 16 Sep. 2014, was based on changes accepted by GS TAC, by email on 14 July 2014 and 9 Sept. 2014. At the time of document submission for validation, the revised methodology had not been published by the Gold Standard. Methodology version 2 (identical to Draft Version 2) was formally published by Gold Standard on 17/11/2014, and is the basis for this version of the PoA DD and associated documents, submitted in response to the Draft Validation Report. In this most recent version, the applicability conditions were made more flexible so as not to exclude ships or data unnecessarily, but the underlying statistical model was not changed, so that a review by a statistician should not be necessary. This PoA DD and the first VPA are based on this revised methodology.

SECTION G. Approval and authorization

>>
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PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

>>
The purpose of the generic VPA is to indicate how the PoA would be applied for any given VPA. Each VPA comprises a set of ships that are coated with an advanced hull coating leading to fuel savings and CO_2 emissions reduction.

SECTION B. Application of a baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology(ies) and standardized baseline(s)

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

The Gold Standard 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 CO_2 emissions from fossil fuel combustion". Version 2.

No 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 3 of VPA PDD (in response to Draft Validation Report) 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.

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

>>
The methodology chosen is:
"Reducing Vessel Emissions Through the Use of Advanced Hull Coatings"
Version 2 (17 November 2014).

Each VPA within the PoA must meet the applicability conditions of the methodology, as described above 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[22]. 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.

- Where data on the fuel consumption of the ship's main and auxiliary engines used for navigation are available for the baseline period, these should be used in regression analysis. However, many ships may not record fuel consumption for navigation separately, and some ships may use the same fuel for other purposes. In this case, the total consumption of the fuel used for navigation may be used for analysis. Note that, more disaggregated data may be monitored following the application of the advanced hull coating and may also be available for some periods of the baseline cycle. Thus fuel consumption data may cover different boundaries in different periods. For consistency, the same "boundary" for fuel consumption data should be used both in baseline and project cycles.

Besides the applicability 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 apply[23]. 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 establishing the appropriate baseline scenario and for the demonstration of additionality. Thus each new VPA must meet the common practice test, as described in Section B.1.

B.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 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.

[22] 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).

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

"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 (CH_4) and nitrous oxide (N_2O). 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 and its associated emissions, present only in the baseline scenario, the methodology is being conservative in the assumptions on emissions reduction."

Emissions sources and GHGs included and excluded are also indicated below.

Source		Gas	Included	Justification/Explanation
Baseline	Fuel consumption by ship engines during voyages (cruising only)	CO_2	Yes	Major emission source.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project activity	Fuel consumption by ship engines during voyages (cruising only)	CO_2	Yes	Major emission source.
		CH_4	No	Excluded for simplification.
		N_2O	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.

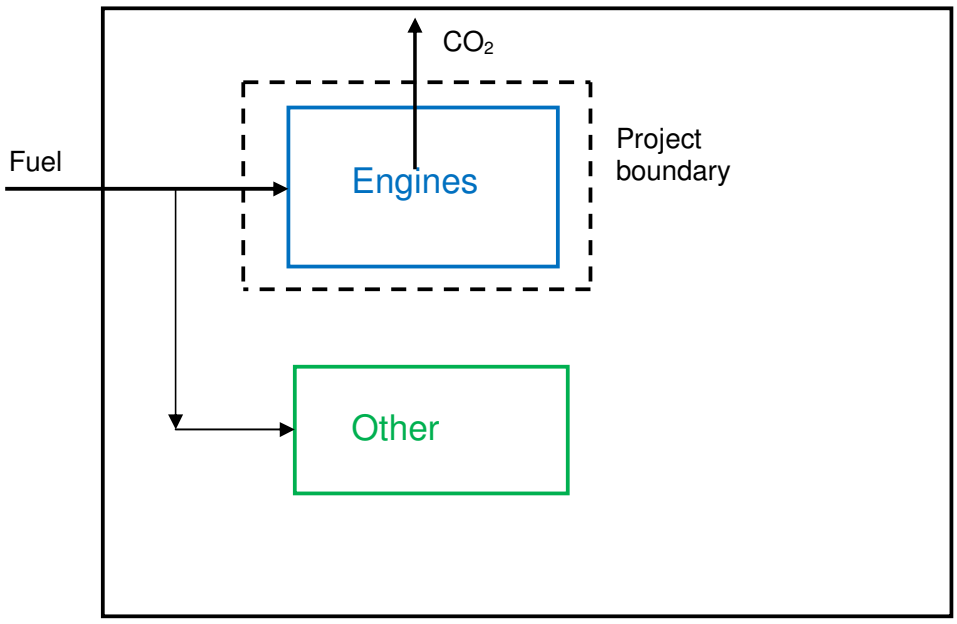

Figure 1. Project boundary where fuel consumed by main engines for navigation (or for navigation and manoeuvres) and corresponding emissions are included in project boundary. Other uses of the same fuel as that used by ship engines are excluded.

B.4. Description of baseline scenario

>>
Each VPA within the PoA comprises a set of ships. For each ship to be included in the 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, we need to undertake a common-practice analysis, as presented in Table 1, and show that for the category of the ship in question and for the Level of the coating, the value of F is below 0.2.

The baseline scenario as defined must be verified for each ship included in a VPA, at the time of its submission. Thus the baseline scenario is defined for each ship at the VPA level.

B.5. Demonstration of eligibility for a generic CPA

>>
As noted above (Sec. B.2 of PoA), 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 a generic VPA.

CDM standard eligibility criteria relevant to VPAs within this PoA (the item letters below correspond to the full CDM list of criteria)	**Demonstration of eligibility for a generic VPA**

(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);	Each VPA should list the names of the ships and their identification by a unique, global number issued by the International Maritime Organisation. The CME should keep a record of all ships included in this and all previous VPAs, to guarantee that there has been no double counting. CME should also check with Gold Standard to ensure that other Gold Standard projects or PoAs presented for similar project activities do not include any of the ships included in the proposed VPA.
(c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;	Each VPA should list the advanced coating used, and ensure that it meets 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;	Each VPA should include documentary evidence to indicate date on which advanced coating was applied to each ship.
(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs;	Each VPA to be included in the PoA should meet the applicability conditions specified in the methodology, and copied in Sec. B.2 of the Generic VPA above. Compliance with these applicability conditions is discussed below.
Article I. (f) The conditions that ensure that the CPA meets the requirements pertaining to the demonstration of additionality as specified in section B.1 above;	The additionality of each ship included in the VPA should be verified, using the procedure described in Sec. B.1 of the PoA DD above. This evaluation is closely linked to the determination of the baseline scenario, see B.4 of Generic VPA above
(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;	CME is required to undertake local stakeholder consultations involving only those specific stakeholder types identified in discussions with Gold Standard.

Each VPA comprises a set of ships. The methodology specifies applicability conditions for any ship to be included in a Gold Standard project, as copied above in Section B.2 of the PoA-DD and again in B.2 of this generic VPA-DD. These applicability conditions are additional eligibility conditions for each VPA to be included in a PoA. The table below indicates how compliance with these applicability conditions for each ship within any VPA would be determined.

Eligibility condition as per applicability condition in methodology	**Demonstration for evaluating applicability condition**
The ship is not new, i.e. it had at least one full docking cycle of operation with the traditional biocidal hull coating.	Standard databases on ship registry indicate ship construction date. For all ships to be eligible, this date should precede advanced hull coating by at least one docking cycle. Records of previous hull coating, from ship owner or hull coating manufacturer or installer. Note that if records of the previous docking cycle exist, clearly the ship is not new.
Evidence is provided on time for validation to demonstrate that the advanced hull	Each VPA should list the advanced coating materials used. If they include products not

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.	listed in Section A.2 and Section A.6 of the PoA DD above, documentary evidence should be included to demonstrate that they do not contain any biocides or other toxic materials.
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";	Work order for each ship, indicating what services were undertaken at the same time as the advanced hull coating was applied. International Paint Ltd uses a standard reporting format called "Dataplan reports" which include all work undertaken during the dry dock when 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.	Ship logs, confirmed by copies of work orders indicating underwater cleaning dates. 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 each VPA, it should be verified that no such regulations are 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 through this methodology. However this methodology could be combined with another methodology to include emissions reduction through biofuel use.	If biofuel blends are used in the ships, this methodology condition should be met.
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	Data should be checked for completeness, so that all dates since previous application of hull coating are either covered by sailing with separate data for "loaded" and "ballast" conditions for ship categories with

(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. 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.	substantial differences in loading status.
Where data on fuel consumption for *navigation purpose only* is available for the baseline period, it should be used for regression analysis. For cases, where data is available only for *total fuel consumption for main engines* 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.	Ship logs.
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.	If the regression analysis used for any ship included in a VPA is based on models not specified in the methodology version used for the VPA DD, the model should be approved by the Gold Standard.
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.	This PoA is designed for the case in which International Paint Ltd is the aggregation entity. This is true for all ships included in any VPA using this PoA.
When the coating manufacturer is the aggregation entity, for the determination of carbon credits, shipping operator must	Shipping companies should provide data as required by methodology and noted in Sec. A.2 of PoA DD above and in left column here

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.	

Besides the applicability criteria listed in the methodology, two other criteria may limit the entry of new VPAs into the PoA. These were described in Sec. B.2 of the Generic VPA above. Compliance with these two criteria should be checked for each VPA as described below.

New regulations that might affect carbon credits. Regulations on emissions from shipping may affect some of the voyages for some of the ships included in each VPA. Each VPA DD should state if such regulations are in place.

Additionality. Additionality should be demonstrated for each ship category being considered for each VPA. Specifically this involves a common practice test. Thus each new VPA must meet the common practice test, as described in Section B.1 of the PoA DD, including the determination of the baseline scenario, also discussed above in Sec. B.4 of the Generic VPA.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

>>
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

$PE_{j,y}$ = CO_2 emissions from fossil fuel combustion in ship j during year y (tCO_2/yr)
$FC_{i,j,y}$ = Quantity of fuel type i combusted in ship j during year y (mass or volume unit/yr)
$COEF_{i,y}$ = CO_2 emission coefficient of fuel type i in year y (tCO_2/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 CO_2 emissions in ship j during year y (tCO_2/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.

$COEF_{i,y}$ = CO_2 emission coefficient of fuel type i in year y (tCO_2/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 CO_2 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:

$$COEF_i = NCV_i \times EF_{CO_2,i} \quad (TF.4)^{24}$$

where

$COEF_i$ = CO_2 emission coefficient of fuel type *i* (tCO_2/tonne)

NCV_i = Net calorific value of the fuel type *i* (GJ/tonne)

$EF_{CO_2,i}$ = CO_2 emission factor of fuel type *i* (tCO_2/GJ)

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:

[24] Here "TF" refers to the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", Version 2.

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

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

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

> *"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 used[25]. 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 (Vav - 3s, Vav + 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 (FCav - 2s, FCav + 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.

The procedure described below applies to Option 1 above, i.e. for the case where the Basic Model is applicable. If not, an equivalent set of details of the analysis should be presented, corresponding to the alternative model, and be part of the submission to the Gold Standard.

As we interpret the methodology, each VPA would comprise ships for which the Basic Model is applicable, and could include ships where one or more alternative models were applied. The ships for which alternative models were applied would be listed separately, so that Gold Standard statistical experts could consider them separately for review.

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*

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

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."*

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	*Baseline power, from regression*	*Fuel savings, (Baseline power less Project power) X 24 hours (for daily data), or X voyage duration (voyage data)*
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.

B.6.2. Data and parameters fixed ex-ante

>>

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 = Marine diesel
Unit	kg/GJ
Description	CO_2 emission factor of fuel type 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* = Low sulphur heavy fuel oil
Unit	kg/GJ
Description	CO_2 emission factor of fuel type *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* = Liquefied natural gas
Unit	kg/GJ
Description	CO_2 emission factor of fuel type *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.

B.6.3. Ex-ante calculations of emission reductions

>>
Emissions reduction are proportional to fuel savings. The fuel savings from the PoA would depend on the number of ships included in each 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. Therefore, it is not reasonable to make ex ante estimates of emission reductions at the PoA level.

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

B.7.1. Data and parameters to be monitored by each generic CPA

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 / voyage 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 /voyage 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 *previous* 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	*Previous* coating material (j)
Unit	-
Description	*Previous* 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 *baseline* 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 *advanced* 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 *project* 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 *project* 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 *baseline* and *project* 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 *baseline* and *project* 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 *project* 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. *Note that all hull cleaning would be underwater*.

At the time of presentation of the PoA, there are no regulations limiting carbon credits from project activities covered by the Programme. However, since such regulations may come into force in the future, monitoring should also include future regulations such as those listed in the methodology, including EU-ETS, other entities, and the International Maritime Organisation.

B.7.2. Description of the monitoring plan for a generic CPA

>>
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. 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.

Appendix 1. Contact information of coordinating/managing entity and responsible person(s)/ entity(ies)

CME and/or responsible person/ entity	X CME ☐ Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA
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	http://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

CME and/or responsible person/ entity	☐ CME X Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA
Organization	The FReMCo Corporation Inc.
Street/P.O. Box	2470 No. 1 Side Road
Building	
City	Burlington
State/Region	Ontario
Postcode	L7P 0S2
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

CME and/or responsible person/ entity	☐ CME X Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA
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

The PoA or any VPA 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.

The Gold Standard

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 GS3492 (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 of 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

The Gold Standard

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	Dr David Williams
Title:	Marketing Director	RD&I Director
On behalf of:	International Paints Limited	
Place:	Felling, United Kingdom	

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

The methodology cannot be applied in a generic manner to determined baseline and project emissions, and emissions reduction. Examples based on actual data are provided in the first VPA.

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

As noted in Section B.6.3, it is not possible to perform ex ante calculation of emissions reduction for projects under this PoA.

Appendix 5. Further background information on the monitoring plan

No additional information on monitoring plan beyond what is stated in Section B.7.

Appendix 6. Summary of post registration changes

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

Appendix 7. References

Corbett, J. J., Winebrake, J. J., Green, E., and Comer, B., 2010. "Energy and GHG Emissions Savings Analysis of Fluoropolymer Foul Release Hull Coating", Report prepared by Energy and Environmental Research Associates.

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Document information

Version	*Date*	*Description*
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the *Guideline: Completing the programme design document form for CDM programme of activities* (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraph 2 and 3 of general instructions and **Error! Reference source not found.**; • Change the reference number from *F-CDM-PoA-DD* to *CDM-PoA-DD-FORM*; • Editorial improvement.
03.0	3 December 2012	EB 70 Revision to reflect changes to the *Guideline: Completing the programme design document form for CDM programmes of activities* (EB 70, Annex 6)
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
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