

Green Marine Environmental Program

2019



Performance
Indicators for
Ship owners

Table of contents

1. AQUATIC INVASIVE SPECIES	3
1.A - DOMESTIC SHIP OWNERS	3
1.B - INTERNATIONAL SHIP OWNERS	4
2. POLLUTANT AIR EMISSIONS - SO _x AND PM.....	6
3. POLLUTANT AIR EMISSIONS - NO _x	8
4. GREENHOUSE GAS EMISSIONS.....	9
5. CARGO RESIDUES (International dry bulk cargo carriers operating in the Great Lakes and St. Lawrence only)	10
6. OILY WATER.....	11
7. GARBAGE MANAGEMENT	13
8. UNDERWATER NOISE.....	14

1. AQUATIC INVASIVE SPECIES

1.A - DOMESTIC SHIP OWNERS

OBJECTIVE: Reduce the risk of introducing and propagating aquatic invasive organisms and pathogens associated with ballast water discharges and biofouling.

NON-APPLICABILITY: This indicator does not apply to companies operating ships which pose no risk of introducing or propagating aquatic invasive species through the intermediary of ballast water (e.g. ships which do not use ballast, short haul ferries, barges, etc.).

LEVEL 1
Monitoring of regulations
LEVEL 2
<p><u>Note:</u> The US EPA VGP and USCG regulations contain operational measures 2.1 and 2.2 aimed at reducing the uptake and discharge of nonindigenous species. These measures should also be undertaken in Canadian waters.</p> <p>2.1. Minimize or whenever possible avoid uptake of ballast water in the following conditions:</p> <ul style="list-style-type: none"> - In shallow water; - In areas close to sewage outflows; - In areas with known epidemics or infestations; - In areas where dredging operations are underway; - In areas where tidal flushing is poor; - In areas identified by regulatory authorities. <p>2.2. Uptake only the minimum amount of ballast water required to safely depart the dock, and complete ballasting operations in deeper waters (while always ensuring the safety of the vessel).</p> <p>2.3. Develop and implement preventive voluntary measures if Canadian or U.S. authorities determine that a harmful species has established itself in a particular port.</p> <p><u>Domestic ship owners operating in the St. Lawrence and the Great Lakes:</u></p> <p>2.4. If feasible and safe, conduct salt water ballast exchange during coastal trades prior to re-entering the lakes.</p> <p><u>Note:</u> Coastal trade is defined as “Movement of cargo and passengers between inland waterways and coastal ports, and within EEZ waters”.</p> <p>2.5. Periodically inspect vessels’ hulls including niche areas, such as sea chests, propeller thrusters, keels, rudders, and dry dock support strips.</p> <p><u>Note:</u> Refer to 2011 IMO Biofouling Guidelines Sections 1.4, 7.2, 7.3, and 7.4. A copy can be found in the Members section of the Green Marine website.</p> <p>2.6. If needed, remove biofouling organisms from the hull, propellers, stern tube, sea chests, and other wetted portions of a vessel.</p> <p><u>Note:</u> Cleaning is suggested if biofouling covers over 15% of the wetted surfaces. At 15% coverage, the vessel is considered extensively fouled. Diagrams to help estimate percent coverage can be found in the Members section of the Green Marine website.</p>
LEVEL 3
<p>3.1. Maintain a Ballast Water Management plan and Biofouling Management plan for each vessel which includes all the best practices required to achieve Level 2. Have a policy to support scientific research (3.2).</p> <p><u>Note:</u> A Biofouling Management plan template can be found in the Members section of the Green Marine website.</p> <p>3.2. Support scientific research on ballast water or biofouling by providing access to ships for sampling by governmental and research groups.</p> <p><u>Note:</u> It is not necessary to actively participate in the research program in order to fulfill this criterion.</p> <p>3.3. Complete and maintain an annual inventory to evaluate the amount of ballast water taken and discharged by the company’s ships by origin/destination.</p> <p><u>Note:</u> See Annex 1-A.</p>
LEVEL 4
<p>Fulfill one of the following 3 criteria:</p> <p>4.1. Actively participate in the development and trial of a ballast water treatment method (mechanical, physical, or chemical) on one or several of the company’s vessels.</p> <p>OR</p> <p>4.2. Actively participate in research on reducing the risk of AIS introduction and spread associated with ballast water operations and discharges.</p> <p>OR</p> <p>4.3. Actively participate in research on reducing the risk of AIS via biofouling, for example - autonomous underwater cleaning or underwater cleaning reclamation (vacuum or other control technologies).</p> <p><u>Note:</u> Active participation is defined as the provision of support by the company, whether through financial means, human resources or equipment and can include an experimental shipboard trial.</p>
LEVEL 5
<p>5.1. Install and use a ballast water treatment system on one or several of the company’s vessels.</p> <p><u>Note:</u> See “Links to Ballast water Regulations” document in the Members section of the Green Marine website for reference and links to regulations.</p>

1. AQUATIC INVASIVE SPECIES

1.B - INTERNATIONAL SHIP OWNERS

LEVEL 1
Monitoring of regulations
LEVEL 2
<p><u>Note:</u> The US EPA VGP and USCG regulations contain operational measures 2.1 and 2.2 aimed at reducing the uptake and discharge of nonindigenous species. These measures should also be undertaken in Canadian and international waters.</p> <p>2.1. Minimize or whenever possible avoid uptake of ballast water in the following conditions:</p> <ul style="list-style-type: none"> - In shallow water; - In areas close to sewage outflows; - In areas with known epidemics or infestations; - In areas where dredging operations are underway; - In areas where tidal flushing is poor; - In areas identified by regulatory authorities. <p><u>Note:</u> International ship owners should call on local agents to provide specific information and instructions in this matter.</p> <p>2.2. Uptake only the minimum amount of ballast water required to safely depart the dock, and complete ballasting operations in deeper waters (while always ensuring the safety of the vessel).</p> <p>2.3. Develop and implement preventive voluntary measures if Canadian or U.S. authorities determine that a harmful species has established itself in a particular port.</p> <p>2.4. Periodically perform in-water inspections of the vessel's hulls including niche areas, such as: sea chests, propeller thrusters, keels, rudders, and dry dock support strips. <u>Note:</u> Refer to 2011 IMO Biofouling Guidelines Sections 1.4, 7.2, 7.3, and 7.4. A copy can be found in the Members section of the Green Marine website.</p> <p>2.5. If needed, remove biofouling organisms from the hull, propellers, stern tube, sea chests, and other wetted portions of a vessel and dispose of removed substances in accordance with local, state, and federal law. <u>Note:</u> Cleaning is suggested if biofouling covers over 15% of the wetted surfaces. At 15% coverage, the vessel is considered extensively fouled. Diagrams to help estimate percent coverage can be found in the Members section of the Green Marine website.</p> <p>2.6. For each vessel, keep a record book on details of all inspections and biofouling management measures undertaken on the ship. <u>Note:</u> A template of such a record book can be found in the Members section of the Green Marine website.</p>
LEVEL 3
<p>3.1. Maintain a Ballast Water Management plan and Biofouling Management plan for each vessel which includes all the best practices required to achieve Level 2. Have a policy to support scientific research (3.2). <u>Note:</u> A Biofouling Management plan template can be found in the Members section of the Green Marine website.</p> <p>3.2. Support scientific research on ballast water or biofouling by providing access to ships for sampling by governmental and research groups. <u>Note:</u> It is not necessary to actively participate in the research program in order to fulfill this criterion.</p> <p><u>International ship owners operating in the Great Lakes and St. Lawrence only:</u></p> <p>3.3. Produce an annual internal report listing cases of non-compliance with respect to salinity of ballast tanks. This report is to be accompanied by an analysis of the reasons for such cases and by measures aimed at reducing their frequency.</p> <p>3.4. Produce an annual report showing any cases where the Port State Control issues a fine or warning for improper ballast exchange or reporting. For such cases include root cause(s) and preventive action(s) taken.</p> <p>3.5. Conduct deep-water ballast water exchange at every opportunity, even if the vessel is bound for a port where ballast water exchange is not mandatory.</p> <p><u>For vessels with antifouling coating:</u></p> <p>3.6. Within dry-docking specifications, select coating with effective coating lifespan in line with schedule for next dry-docking and anticipating operational wear, such as contact with lock walls or abrasive cleaning. <u>Note:</u> The effective coating lifespan is determined by the manufacturer based on the vessel-specific application scheme (e.g. coating thickness); it is the age of an anti-fouling coating after which the coating is no longer expected to satisfactorily prevent or deter the attachment and growth of biofouling organisms.</p>

LEVEL 4

AND, fulfill one of the following 3 criteria:

4.1. Actively participate in the development and trial of a ballast water treatment method (mechanical, physical or chemical) on one or several of the company's vessels.

OR

4.2. Actively participate in research on reducing the risk of AIS introduction and spread associated with ballast water operations and discharges.

OR

4.3. Actively participate in research and development on reducing the risk of AIS via biofouling, for example - autonomous underwater cleaning or underwater cleaning reclamation (vacuum or other control technologies).

Note: Active participation is defined as the provision of support by the company, whether through financial means, human resources or equipment and can include an experimental shipboard trial.

LEVEL 5

5.1. Install and use a ballast water treatment system on one or several of the company's vessels in advance of the schedule dictated by IMO, USCG, and EPA VGP, as applicable. And, for each installed and in-use system, adopt contingency measures, as per MEPC 71/WP.9 Annex 4.

2. POLLUTANT AIR EMISSIONS - SO_x AND PM

OBJECTIVE: Reduce pollutant air emissions of sulphur oxides (SO_x) and particulate matter (PM).

LEVEL 1							
Monitoring of regulations							
LEVEL 2							
<p>2.1. Implement a systematic control policy for documenting fuel (bunker notes). <u>Note:</u> Bunker notes must be conserved and annual consumption notes must be kept for each ship.</p> <p>2.2. Use climatology and weather forecasting to take advantage of tidal currents and avoid storms. Plan voyages to reduce running hours and idling time.</p> <p>2.3. Optimize trim for fuel efficiency when loading ships and barges.</p> <p>2.4. Follow voluntary slow speed measure in specific zones, as identified by port or governmental authority.</p> <p>2.5. Implement a preventive engine maintenance system in order to optimize performance.</p> <p>2.6. Identify optimal engine speed or engine load for fuel efficiency. Inform crew and ensure awareness of this optimal 'economic' speed. Transit at this speed to the extent practicable.</p> <p>2.7. Implement a replacement program for LED or other energy efficiency light upgrades.</p> <p><u>Tugs Only:</u> 2.8. Reduce tug idling with dispatch scheduling and/or providing tie-up locations where awaiting tow or escort.</p>							
LEVEL 3							
<p>3.1. Complete an annual inventory of SO_x and particulate matter (PM) emissions for all the company's ships. <u>Note:</u> See Annexes 2-A, 2-B, and 2-D.</p> <p>AND, fulfill one of the following 4 criteria:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; vertical-align: top;"> <p><u>International ship owners</u> 3.2. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 2.5 %. <u>Note:</u> Fuel sulphur limit is 0.1 % within an ECA and 3.5 % outside ECAs.</p> </td> <td style="width: 25%; vertical-align: top;"> <p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 3.3. Use a fuel with a sulphur content equal to or less than ≤ 0.5 % (or equivalent by scrubbing) or shore power by one or more of the company's ships when such ships are docked. <u>Note:</u> See regulation SOR/2012-69 Section 111.1 and "Section 111.1" document in the Members section of the Green Marine website.</p> </td> <td style="width: 25%; vertical-align: top;"> <p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 3.4. The average sulphur content by mass of the total amount of fuel oil consumed annually by all of the company's vessels is 0.01 % below permitted levels.</p> </td> <td style="width: 25%; vertical-align: top;"> <p>OR <u>Domestics subject to Canadian Sulphur in Diesel Fuel Regulations or US EPA regulations limiting fuel sulphur content to 0.0015% (ULSD) (for example, harbour craft)</u> 3.5. Plug one or more vessels into shore power at one or more docks.</p> </td> </tr> </table>				<p><u>International ship owners</u> 3.2. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 2.5 %. <u>Note:</u> Fuel sulphur limit is 0.1 % within an ECA and 3.5 % outside ECAs.</p>	<p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 3.3. Use a fuel with a sulphur content equal to or less than ≤ 0.5 % (or equivalent by scrubbing) or shore power by one or more of the company's ships when such ships are docked. <u>Note:</u> See regulation SOR/2012-69 Section 111.1 and "Section 111.1" document in the Members section of the Green Marine website.</p>	<p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 3.4. The average sulphur content by mass of the total amount of fuel oil consumed annually by all of the company's vessels is 0.01 % below permitted levels.</p>	<p>OR <u>Domestics subject to Canadian Sulphur in Diesel Fuel Regulations or US EPA regulations limiting fuel sulphur content to 0.0015% (ULSD) (for example, harbour craft)</u> 3.5. Plug one or more vessels into shore power at one or more docks.</p>
<p><u>International ship owners</u> 3.2. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 2.5 %. <u>Note:</u> Fuel sulphur limit is 0.1 % within an ECA and 3.5 % outside ECAs.</p>	<p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 3.3. Use a fuel with a sulphur content equal to or less than ≤ 0.5 % (or equivalent by scrubbing) or shore power by one or more of the company's ships when such ships are docked. <u>Note:</u> See regulation SOR/2012-69 Section 111.1 and "Section 111.1" document in the Members section of the Green Marine website.</p>	<p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 3.4. The average sulphur content by mass of the total amount of fuel oil consumed annually by all of the company's vessels is 0.01 % below permitted levels.</p>	<p>OR <u>Domestics subject to Canadian Sulphur in Diesel Fuel Regulations or US EPA regulations limiting fuel sulphur content to 0.0015% (ULSD) (for example, harbour craft)</u> 3.5. Plug one or more vessels into shore power at one or more docks.</p>				
LEVEL 4							
<p>Fulfill one of the following 4 criteria:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; vertical-align: top;"> <p><u>International ship owners</u> 4.1. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 2.2 %.</p> </td> <td style="width: 25%; vertical-align: top;"> <p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 4.2. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.1% below permitted limits. <u>Note:</u> In 2019, the permitted regulatory limit is 0.40% (or 8.0 % by cumulative average), as per regulation SOR/2012-69 Section 111.1 (4)(g), making the required average sulphur level ≤ 0.3 % (or 7.9 % by cumulative average).</p> </td> <td style="width: 25%; vertical-align: top;"> <p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 4.3. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.03 % below permitted levels.</p> </td> <td style="width: 25%; vertical-align: top;"> <p>OR <u>All ship owners</u> 4.4. Use of equipment or alternative fuel allowing for the attainment of the same level of sulphur emissions as above.</p> </td> </tr> </table>				<p><u>International ship owners</u> 4.1. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 2.2 %.</p>	<p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 4.2. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.1% below permitted limits. <u>Note:</u> In 2019, the permitted regulatory limit is 0.40% (or 8.0 % by cumulative average), as per regulation SOR/2012-69 Section 111.1 (4)(g), making the required average sulphur level ≤ 0.3 % (or 7.9 % by cumulative average).</p>	<p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 4.3. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.03 % below permitted levels.</p>	<p>OR <u>All ship owners</u> 4.4. Use of equipment or alternative fuel allowing for the attainment of the same level of sulphur emissions as above.</p>
<p><u>International ship owners</u> 4.1. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 2.2 %.</p>	<p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 4.2. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.1% below permitted limits. <u>Note:</u> In 2019, the permitted regulatory limit is 0.40% (or 8.0 % by cumulative average), as per regulation SOR/2012-69 Section 111.1 (4)(g), making the required average sulphur level ≤ 0.3 % (or 7.9 % by cumulative average).</p>	<p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 4.3. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.03 % below permitted levels.</p>	<p>OR <u>All ship owners</u> 4.4. Use of equipment or alternative fuel allowing for the attainment of the same level of sulphur emissions as above.</p>				

LEVEL 4 (continued)			
AND, fulfill one of the following 3 criteria:			
<p><u>International ship owners</u> 4.5. Use a fuel with a sulphur content equal to or less than 0.1%, or equivalent by scrubbing, or shore power by the majority of the company's ships when such ships are docked.</p>	<p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 4.6. Use a fuel with a sulphur content equal to or less than 0.5% (or equivalent by scrubbing) or shore power by the majority of the company's ships when such ships are docked.</p>	<p>OR <u>Domestics subject to Canadian Sulphur in Diesel Fuel Regulations or US EPA regulations limiting fuel sulphur content to 0.0015 % (ULSD)</u> 4.7. Plug majority of vessels into shore power at majority of docks.</p>	
<p>AND (all ship owners), fulfill one of the following 2 criteria:</p> <p>4.8. Sample PM emissions for one of the fleet's main engine types (slow-speed, medium-speed, high-speed, gas or steam turbine). <u>Note:</u> Sampling must be repeated every five (5) years. The sampling test plan must be consistent within the fleet, comparable with prior tests, and a recognized methodology, such as ISO 8178 or 40 CFR 51 Appendix M and 40 CFR 60 Appendix A.</p> <p>OR</p> <p>4.9. Actively participate in research and development on reducing the impact of SOx and PM emissions, for example – improving inventory tools, developing hybrid or blended fuels, or conducting a pilot project on emission reduction technologies. <u>Note:</u> Active participation is defined as the provision of support by the company, whether through financial means, human resources or equipment and can include an experimental shipboard trial.</p>			
LEVEL 5			
Fulfill one of the following 4 criteria:			
<p><u>International ship owners</u> 5.1. The average sulphur content by mass of the total amount of fuel consumed annually by all of the company's vessels is less than 1.5 %.</p>	<p>OR <u>Canadian Domestic Carriers participating to fleet averaging under existing regulations</u> 5.2. The average sulphur content by mass of the total annual amount of fuel oil consumed annually by all of the company's vessels is 0.2 % below permitted limits. <u>Note:</u> In 2019, the permitted regulatory limit is 0.40 % (or 8.0 % by cumulative average), as per regulation SOR/2012-69 Section 111.1 (4)(g), making the required average sulphur level ≤ 0.2 % (or 7.8 % by cumulative average).</p>	<p>OR <u>US Flagged Domestic Carriers regulated by the EPA 'Act to Prevent Pollution from Ships' (APPS) limiting fuel sulphur content to 0.1 %</u> 5.3. The average sulphur content by mass of the total amount of fuel oil consumed annually by all of the company's vessels is 0.05 % below permitted levels.</p>	<p>OR <u>All ship owners</u> 5.4. Use of equipment or alternative fuel allowing for the attainment of the same level of sulphur emissions as above.</p>
AND, fulfill one of the following 3 criteria:			
<p><u>International ship owners</u> 5.5. Use a fuel with a sulphur content equal to or less than 0.1 %, or equivalent, or shore power by 75 % of the company's ships when such ships are docked.</p>	<p>OR <u>Canadian Domestic Carriers participating in fleet averaging under existing regulations</u> 5.6. Exclusively use a fuel with a sulphur content equal to or less than 0.5 % (or equivalent by scrubbing) or shore power when the company's ships are docked. Exception: Ships that must use their main engine during port operations or are equipped with auxiliary engines that use heavy oil. For these ships, the required sulphur level will be 1.0 %.</p>	<p>OR <u>Domestics subject to Canadian Sulphur in Diesel Fuel Regulations or US EPA regulations limiting fuel sulphur content to 0.0015 % (ULSD)</u> 5.7. Plug all vessels into shore power at all docks.</p>	
<p>AND (all ship owners), fulfill the following criterion:</p> <p>5.8. On board one or more of the company's owned ships, compared to no treatment, achieve a 75 % or greater reduction of PM emissions per ship by (i) applying pre-treatment and on-engine measures, (ii) applying after-treatment measures, such as a diesel particulate filter (DPF), diesel oxidation catalysts (DOCs), or other exhaust gas cleaning system (EGSC), or by (iii) burning LNG.</p>			

3. POLLUTANT AIR EMISSIONS - NO_x

OBJECTIVE: Reduce pollutant air emissions of nitrogen oxides (NO_x).

LEVEL 1
Monitoring of regulations
LEVEL 2
<p>2.1. Implement a systematic control policy for documenting fuel (bunker notes). <u>Note:</u> Bunker notes must be conserved and annual consumption notes must be kept for each ship.</p> <p>2.2. Use climatology and weather forecasting to take advantage of tidal currents and avoid storms. Plan voyages to reduce running hours and idling time.</p> <p>2.3. Optimize trim for fuel efficiency when loading ships and barges.</p> <p>2.4. Follow voluntary slow speed measure in specific zones, as identified by port or governmental authority.</p> <p>2.5. Implement a preventive engine maintenance system in order to optimize performance.</p> <p>2.6. Identify optimal engine speed or engine load for fuel efficiency. Inform crew and ensure awareness of this optimal 'economic' speed. Transit at this speed to the extent practicable.</p> <p>2.7. Implement a replacement program for LED or other energy efficiency light upgrades.</p> <p><u>Tugs Only:</u> 2.8. Reduce tug idling with dispatch scheduling and/or providing tie-up locations where awaiting tow or escort.</p>
LEVEL 3
<p>3.1. Complete an annual inventory of NO_x emissions for all the company's ships. <u>Note:</u> See Annexes 2-C and 2-D.</p>
LEVEL 4
<p>4.1. Conduct sampling of NO_x emissions on at least one of the company's ships within the last five (5) years. The sampling test plan must be consistent within the fleet, comparable with prior tests, and a recognized methodology, such as ISO 8178 or IMO NO_x Technical Code 2008.</p> <p>4.2. On board one or more of the company's owned ships, install a higher tier engine than required or use and maintain on-engine or after-treatment NO_x emission reduction technologies, like selective catalytic reduction (SCR) or exhaust gas recirculation (EGR), or methods that result in a 15% reduction of NO_x emissions below the permitted limits. <u>Note:</u> Permitted limits are published in the document 'NO_x emission permitted limits' in the Members section of the Green Marine website.</p>
LEVEL 5
<p>5.1. On board the majority (50%+1) of the company's owned ships, install a higher tier engine than required or use and maintain on-engine or after-treatment NO_x emission reduction technologies or methods that result in a 15 % reduction of NO_x emissions per ship below the permitted limits. <u>Note:</u> Permitted limits are published in the document 'NO_x emission permitted limits' in the Members section of the Green Marine website.</p> <p>OR</p> <p>5.2. On board one or more of the company's owned ships, achieve a 50% or greater reduction of NO_x emissions per ship below the permitted limits by installing a higher tier engine than required or by using and maintaining NO_x emission reduction technologies.</p>

4. GREENHOUSE GAS EMISSIONS

OBJECTIVE: Reduce greenhouse gas (GHG) emissions.

LEVEL 1
Monitoring of regulations
LEVEL 2
<p>2.1. Implement a systematic control policy for documenting fuel (bunker notes). <u>Note:</u> Bunker notes must be conserved and annual consumption notes must be kept for each ship.</p> <p>2.2. Use climatology and weather forecasting to take advantage of tidal currents and avoid storms. Plan voyages to reduce running hours and idling time.</p> <p>2.3. Optimize trim for fuel efficiency when loading ships and barges.</p> <p>2.4. Follow voluntary slow speed measures in specific zones, as identified by port or governmental authority.</p> <p>2.5. Implement a preventive engine maintenance system in order to optimize performance.</p> <p>2.6. Identify optimal engine speed or engine load for fuel efficiency. Inform crew and ensure awareness of this optimal 'economic' speed. Transit at this speed to the extent practicable.</p> <p>2.7. Implement a replacement program for LED or other energy efficiency light upgrades.</p> <p><u>Tugs Only:</u> 2.8. Reduce tug idling with dispatch scheduling and/or providing tie-up locations where awaiting tow or escort.</p>
LEVEL 3
<p>3.1. Complete an annual GHG emissions inventory (totals and intensity) for the company's entire fleet. <u>Note:</u> See Annex 3-A.</p> <p>3.2. Adopt an Energy Performance plan that has quantifiable objectives and which formally incorporates the best practices required for achievement of level 2. <u>Note:</u> See Annex 3-B.</p>
LEVEL 4
<p>4.1. Achieve an annual average reduction in GHG intensity (GHG emissions per tonne-nautical mile or per hour for tugs, passenger vessels, or other non-cargo ships) of 1.0% since 2008. <u>Note:</u> See Annex 3-A for the methodology.</p>
LEVEL 5
<p>5.1. Achieve an annual average reduction in GHG intensity (GHG emissions per tonne-nautical mile or per hour for tugs, passenger vessels, or other non-cargo ships) of 2.0% since 2008. <u>Note:</u> See Annex 3-A for the methodology.</p>

5. CARGO RESIDUES (International dry bulk cargo carriers operating in the Great Lakes and St. Lawrence only)

OBJECTIVE

Reduce cargo residue discharges.

NOTE:

These practices are not part of a performance indicator, and participants are therefore not required to link their performance with any particular level. The performance indicator on cargo residues was retired from the Green Marine program in 2016. Since the indicator was developed in 2007, Green Marine successfully raised awareness and participants improved their performance. Seven companies carrying dry bulk in the Great Lakes and St. Lawrence region reported to this indicator, and collectively, they reached an average of level 4 in 2015, the highest recorded average for any performance indicator. Over the years, US and Canadian regulations have also increased. However, it was decided to maintain the zero discharge policy (previously a level 5 requirement for that indicator) for all international ship owners within the Great Lakes / St. Lawrence area and make it a prerequisite for any new international ship owner joining the Green Marine program.

CRITERIA
5.1. Implement a zero discharge policy for all cargo residues in the Great Lakes – St. Lawrence area.

6. OILY WATER

OBJECTIVE: Minimize risk of oily water discharges.

LEVEL 1	
Monitoring of regulations	
LEVEL 2	
<p>Vessels using an Oily Water Separator (OWS) on board: <u>Implementation of 6 of the following 9 best practices on all company vessels:</u></p> <p>2.1. Conduct annual calibration of the oil content monitor or monthly sampling and analysis of the treated water by an accredited firm for every oily water separator (OWS).</p> <p>2.2. Periodically test oil content alarm prior to operating the oily water separator.</p> <p>2.3. Use seals or locks on all overboard discharge valves.</p> <p>2.4. Post signs in the vicinity to clearly indicate who is responsible for opening any of the OWS overboard discharge valves, for operating oily water separation equipment and for oil transfer procedures.</p> <p>2.5. Lock out or seal the oil content meter so that the calibration cannot be tampered with.</p> <p>2.6. Maintain proper coordination with the navigation bridge when opening the overboard discharge valve so the bridge can also record the activity and the vessel's position.</p> <p>2.7. When feasible, only operate the oily water separator during the daytime.</p> <p>2.8. Regularly clean the applicable bilges and remove any solid material that may reduce the performance of the OWS.</p> <p>2.9. Reduce as much as possible the use of emulsifying cleaners and agents that can impact the performance of the OWS.</p>	<p>Vessels NOT using Oily Water Separator (OWS) on board: <u>Implementation of the majority of applicable best practices on all company's vessels:</u></p> <p>2.10. Regularly inspect and perform preventative maintenance of equipment using oil (engines, burners, pumps, heaters, filters, etc.) or water (condensers, boilers, pumps, etc.) to prevent leaks.</p> <p>2.11. Regularly inspect and maintain stern tube seals and bearings to prevent water from entering.</p> <p>2.12. Stop leaks of oil or water in the engine room as soon as possible.</p> <p>2.13. Clean up oil and water spills as soon as possible after maintenance and repair operations.</p> <p>2.14. Regularly clean and inspect bilge pump system to ensure proper functioning.</p> <p>2.15. Regularly clean bilges and remove any solid material.</p> <p>2.16. Post signs in the vicinity to clearly indicate who is responsible for bilge water transfer procedures.</p> <p>2.17. Give staff proper training on bilge water transfer procedures.</p> <p>2.18. Keep available on board oil absorption pads to intervene in case of minor oil spills.</p>
LEVEL 3	
<p>3.1. Adopt an Oily Water Management plan that formally incorporates all the best practices itemized in level 2. <u>Note:</u> See Annex 4-A.</p> <p>3.2. Complete an annual inventory of bilge water (produced, treated, discharged to sea, and off-loaded to shore, as applicable) and of oil residue (sludge) on a vessel by vessel basis and for the fleet as a whole. <u>Note:</u> See Annex 4-B.</p>	
LEVEL 4	
<p>For fleets with median vessel gross tonnage \geq 400 GT (ITC)</p> <p>4.1. Adopt a modernization policy for oily water separators and all related control and verification equipment. Systematic application of this policy on all new buildings and all ships undergoing major modifications. <u>Note:</u> See Annex 4-C.</p> <p><u>Implementation on at least one ship in the company's fleet</u></p> <p><u>Vessels built after January 1st, 2011:</u></p> <p>4.2. Implement an integrated bilge treatment system such as that defined in the IMO's revised guidelines (MEPC.1/Circ.511, 18 April 2006).</p> <p>OR</p> <p><u>Vessels built before 2011:</u></p> <p>4.3. Demonstrate an integrated bilge treatment system approach by respecting the requirements defined at annex 4-D. <u>Note:</u> See Annex 4-D.</p>	<p>For fleets with median vessel gross tonnage < 400 GT (ITC)</p> <p>4.4. Set reduction targets (for the fleet as a whole <u>or</u> by vessel category) for bilge water produced.</p> <p>4.5. Implement effective measures to reduce the quantity of bilge water and sludge produced on 50 % of the company's vessels. <u>Examples:</u> Separate drainage systems for water and oil drains, installation of drip trays or coamings under equipment, use less water for maintenance and cleaning, replacement and repair of stern tube seals, etc.</p>

GREEN MARINE ENVIRONMENTAL PROGRAM
 Performance Indicators for Ship owners – 2019

LEVEL 5	
For fleets with median vessel gross tonnage \geq 400 GT (ITC)	For fleets with median vessel gross tonnage < 400 GT (ITC)
<p><u>On the majority of the company's ships:</u></p> <p><u>Vessels built after January 1st, 2011:</u> 5.1. Implement an integrated bilge treatment system such as that defined in the IMO's revised guidelines (MEPC.1/Circ.511, 18 April 2006).</p> <p>OR</p> <p><u>Vessels built before 2011:</u> 5.2. Demonstrate an integrated bilge treatment system approach by respecting the requirements defined at annex 4-D. Note: See Annex 4-D.</p>	<p>5.3. Implement effective measures to reduce the quantity of bilge water and sludge produced on 75 % of the company's vessels:</p> <p>5.4. Demonstrate an annual reduction of the quantity of bilge water and/or sludge produced (intensity unit is to be determined by the company, e.g. tonnes/hour of operation).</p>

7. GARBAGE MANAGEMENT

OBJECTIVE: Reduce ship generated garbage and increase recycling.

APPLICABILITY: This performance indicator only applies to the company's owned vessels.

LEVEL 1
Monitoring of regulations
LEVEL 2
<p>2.1. Equip all of the company's ships with recycling bins and give staff proper training on established user procedures and the waste management hierarchy (reduce, reuse, recycle, recovery, disposal).</p> <p>2.2. Favor suppliers that use less packaging.</p> <p>2.3. Encourage the use of reusable, biodegradable and/or recyclable supplies.</p> <p>2.4. No shipboard incineration at port.</p> <p><u>Domestic ship owners only:</u></p> <p>2.5. Reuse as much as possible dunnage, lining and packaging material.</p>
LEVEL 3
<p>3.1. Produce an annual inventory of different types of garbage generated in the company's entire fleet, and indicate the company's actual garbage management practices.</p> <p><u>Note:</u> Garbage types refer to the categories defined in MARPOL Annex V, but each company can include additional categories.</p>
LEVEL 4
<p>4.1. Develop and implement a garbage management strategy defining targets, tools and measures for reducing garbage generated, reducing discharge at sea and increasing recycling.</p> <p><u>Note:</u> See Annex 5-A.</p>
LEVEL 5
5.1. Demonstrate continual improvement by achieving targets defined in the garbage management strategy.

8. UNDERWATER NOISE

OBJECTIVE

Reduce underwater noise made by ship operations to reduce impacts to marine mammals.

NOTES:

- Green Marine recognizes that underwater noise may potentially impact a broader range of aquatic species other than just marine mammals. While the initial objective of this indicator covers marine mammals, future development of this Performance Indicator may expand its scope.
- Green Marine recognizes that for most ships, under most operational conditions, cavitation is the main source of underwater noise.
- Applicable only for vessels transiting in salt water.

LEVEL 1
Monitoring of regulations
LEVEL 2
<p>2.1. Conduct regular hull cleaning and propeller blade maintenance. The participant must keep a record of these actions for each vessel in their fleet. <u>Note:</u> Hull cleaning and propeller maintenance should at least be done during dry dock.</p> <p>2.2. Review the list of sensitive areas in Canadian and US waters to determine whether the participant's vessels transit through or have operations in such areas. Ensure that this information is communicated to each vessel. <u>Note:</u> See Annex 6-A.</p>
LEVEL 3
<p>3.1. Actively participate in providing whale sighting data (in Canadian and US waters) through a logbook or a recognized application (such as Whale Alert and Whale Report). <u>Note:</u> If sightings are recorded in a logbook, they should be recorded according to a protocol provided by Green Marine. Logbook data should be shared with a recognized central database.</p> <p>3.2. Develop and adopt a Marine Mammal Management plan (MMMP) in order to reduce the potential adverse effects of vessels, especially within known sensitive marine areas, as identified in Criterion 2.2. <u>Note:</u> See Annex 6-B.</p>
LEVEL 4
<p>4.1. Incorporate applicable vessel quieting technologies during retrofits and new vessel construction. <u>Note:</u> Refer to published documents like the IMO and the SNAME MVEP Guidelines, available in the Members section of the Green Marine website. This criterion is applicable only for ship owners ordering/designing new vessels (keel laid after Jan 2018) or conducting retrofits of propulsion systems or other equipment that contributes significantly to underwater noise.</p> <p>AND, fulfill one of the following 3 criteria:</p> <p>4.2. Work with ports to estimate relative ship noise levels for at least one vessel in their fleet.</p> <p>OR</p> <p>4.3. Estimate relative ship noise levels of at least one vessel in their fleet by using a dedicated hydrophone. <u>Note:</u> Collaboration with a bioacoustician is essential to obtain reliable data.</p> <p>OR</p> <p>4.4. Support / collaborate on scientific research on underwater noise allowing the estimation of relative ship noise levels for at least one vessel in their fleet.</p>

LEVEL 5

Fulfill one of the following 3 criteria:

5.1. Work with ports to estimate relative ship noise levels **for 15% of the vessels** in their fleet, with a minimum of 3 vessels measured.

OR

5.2. Estimate relative ship noise levels **of 15% of the vessels** in their fleet, with a minimum of 3 vessels measured, using a dedicated hydrophone.

Note: Collaboration with a bioacoustician is essential to obtain reliable data.

OR

5.3. Support / collaborate on scientific research on underwater noise allowing the estimation of relative ship noise levels **for 15% of the vessels** in their fleet with a minimum of 3 vessels measured.

AND, fulfill the following criterion:

5.4. Proceed to an in-depth analysis of vessel noise footprint on at least one ship in order to identify main noise sources. Solutions to be identified and implemented to reduce noise output.

Note: ANSI/ASA S1 2.64-2009 or ISO 17208-1:2016 underwater noise standard measurement methodology should be used where at all possible.