Please read the **Flow Chart** after the Table of Contents and the **Instructions** at the end of this document before filling out the template.

Part 1 – Preliminary Information, fill in your company and contact information on the **Contact Information** section. Next, fill in the vessel information in the **Vessel Information** and **Vessel Principal Particulars** sections. Finally, fill in the current engine information in the **Engine Information** section.

Part 2 – Extension type, use the check boxes to indicate the appropriate extension type for the vessel.

Part 3 – Feasibility Analysis Summary, fill in all available Tier 3/Tier 4 Engines for your vessel in the **List of Tier 3/Tier 4 Engines Available** section and all available Diesel Particulate Filters (DPFs) in the **List of DPFs Available** section. Use the check boxes in the **Required Submittal List** to verify that your feasibility analysis includes all the required documentation. Then, using the Technical Feasibility Analysis, fill in the stability and weight impacts, electrical impacts, and any other significant technical and operational modification impacts in the appropriate sections.

**Please complete as much information as possible.**

**If you are uncertain as to an answer, please enter your best estimate.**

Please do not hesitate to contact the California Air Resources Board (CARB) staff for assistance at:

Email: [harborcraft@arb.ca.gov](mailto:harborcraft@arb.ca.gov)

**All documents required under this regulation must be submitted to the Executive Officer as follows:**

Electronically by email:

[harborcraft@arb.ca.gov](mailto:harborcraft@arb.ca.gov)

**OR by**

Hard copy by mail:

CHIEF, TRANSPORTATION AND TOXICS DIVISION

CALIFORNIA AIR RESOURCES BOARD

C/O COMMERCIAL HARBOR CRAFT

1001 I STREET SACRAMENTO, CA 95814

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**Recordkeeping Requirements**

The owner or operator of a harbor craft must maintain these extension records on the vessel or at the vessel’s homeport for the life of each engine. The owner or operator must provide such records for inspection to an agent or employee of CARB upon request for all harbor craft. Records may be provided as a hard copy, electronic, or any alternative reporting strategy approved by the Executive Officer.

# Flowchart



# Template

## PART 1 - Preliminary Information

### Contact Information

|  |
| --- |
| **Contact Information** |

|  |
| --- |
| General |

|  |  |
| --- | --- |
| Submittal Date: |  |
| Owner Company Name: |  |
| Operator Company Name: |  |
| Submitter Company Name: |  |
| Third Party Naval Architect Company Name:  (if applicable) |  |

|  |
| --- |
| Submitter Information |

|  |  |
| --- | --- |
| Submitter Name & Title: |  |
| Mailing Address: |  |
| Phone: |  |
| Email: |  |

|  |
| --- |
| Third Party Naval Architect (if applicable) |

|  |  |
| --- | --- |
| Third Party Naval Architect Name & Title: |  |
| Address: |  |
| Phone: |  |
| Email: |  |

### Vessel Information

|  |
| --- |
| **General Vessel Information** |

|  |  |
| --- | --- |
| Vessel Name |  |
| Previous Vessel Name (if it has changed) |  |
| Vessel Identification Number (IMO or Class) |  |
| Call Sign Number |  |
| Maritime Mobile Service Identity Number |  |
| Vessel Type | Crew and Supply  Commercial Passenger Fishing  Excursion  Ferry (Catamaran)  Ferry (Monohull)  Ferry (Short-run)  Tugboat-escort/ship-assist  Tugboat-push/tow  Tugboat-ATB  Pilot Vessel  Research  Dredge  Barge-ATB  Barge-bunker  Barge-petrochemical  Barge-other  Workboat  Dedicated emergency response  Oil spill response  Other - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Vessel Use (Primary) |  |
| Vessel Use (Secondary) |  |
| Other Vessel Use (if applicable) |  |
| Homebase |  |
| Homebase Address |  |
| Homeport |  |
| Homeport Address |  |
| Year Built |  |
| U.S. Coast Guard Documentation Number |  |
| California Fish and Game License Number (if applicable) |  |
| CARB Unique Vessel Identifier (UVI) Number |  |
| Overall Reason for Requiring an Extension |  |

### Vessel Principal Particulars

|  |
| --- |
| **Vessel Principal Particulars** |

|  |  |
| --- | --- |
| Length Overall (in meters) |  |
| Length Between Perpendiculars (in meters) |  |
| Breadth, Molded (in meters) |  |
| Depth, Molded (in meters) |  |
| Summer Load Line Draft (in meters) |  |
| Deadweight at Summer Load Line Draft (in metric tonnes) |  |
| Lightweight (in metric tonnes) |  |
| Gross Tonnage (in metric tonnes) |  |
| Net Tonnage (in metric tonnes) |  |
| Design Speed Ahead (in knots) |  |
| Design Speed Astern (in knots) |  |
| Hull Type (Single/Double) |  |
| Hull Materials (see note below this table) |  |
| Freeboard Length (in meters) |  |
| Flag State |  |
| Keel Laying Date (if available) |  |
| Vessel Delivery Date (if available) |  |
| Propulsion Fuel (HFO/MDO/Battery/Hybrid etc.) |  |
| SOLAS Applicable (Yes/No) |  |
| MARPOL Applicable (Yes/No) |  |
| Load Line Applicable (Yes/No) |  |
| Classed Vessel (Yes/No)  [Specify Class Notations for classed vessel] |  |

### Engine Information

|  |
| --- |
| **Existing Engine Particulars** |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Engine No.** | **Engine Type (Main/ Auxiliary)** | **Engine Manufacturer** | **Engine Model** | **Engine Tier** | **U.S. EPA Engine Family Number/Emission Family Number** | **Engine Model Year** | **Engine Serial Number** | **Rated Brake Horsepower** | **Duty Cycle Rating** | **Liters Displaced Per Cylinder** | **Number of Cylinders** |
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| --- |
| **Engine Operations in Regulated California Waters** |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Engine No.** | **Annual Hours of Operation per Engine** | **Fuel Type** | **Annual Fuel Consumed by Each Engine (Gallons)** | **Current Hour Meter Reading** | **Percentage % Annual Hours of Operation 0 to 3 miles** | **Percentage % Annual Hours of Operation >3 to 24 miles** | **Percentage % Annual Hours of Operation >24 miles** |
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**Note: Total of the last 3 columns in the Engine Operations in Regulated California Waters must equal 100%**

|  |
| --- |
| **Existing Control Equipment (if applicable)** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Engine No.** | **Type of Diesel Emission Control Strategy (DECS)** | **Manufacturer of DECS** | **Model of DECS** | **DECS Installation Date** | **DECS Serial Number** | **NOx Reduction Percent** | **PM Reduction Percent** |
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## PART 2 - Extension Type

**Please check applicable extension types in each section.**

|  |
| --- |
| Non-Vessel-Specific Third-Party Naval Architect Analysis Select one of the following:  This is my initial extension request and I qualify for including a non-vessel-specific third-party naval architect analysis in accordance with CCR Section 93118.5 (e)(12)(E)3.b.iii. Hence, I do not need to submit an additional technical feasibility.  I have submitted a detailed technical feasibility study in accordance with CCR Section 93118.5 (e)(12)(E)3.b.iii.  General Note:The2019 Cal Maritime Tier 4 Feasibility Study can be found here: <https://ww2.arb.ca.gov/sites/default/files/2019-10/cmafeasibilityreport09302019.pdf> |

|  |
| --- |
| Extension Request This is a request for: (select all that apply)  Extension to Repowering Engine –  technical feasibility analysis demonstrating that no certified Tier 3 marine, Tier 4 marine or Tier 4 Final off-road engine can be used to repower engines meeting performance standards on the vessel(s)  Extension to Installing DPFs –  technical feasibility analysis demonstrating that no DPF can be used to retrofit Tier 3 or Tier 4 engines on the vessels  Extension to Repowering Engines or Installing DPFs –  technical feasibility analysis provided by a third-party naval architect demonstrating that no modifications are feasible to repower and retrofit the vessel    Extension to Repowering Engines or Installing DPFs resulting in a passenger capacity reduction of 25% or more –  supporting documentation demonstrates that reducing passenger capacity will operationally result in increased emissions |

Note: California Code of Regulations (CCR) Section 93118.5 (e)(12)(E)3.b.iii. - *...Non-vessel-specific third-party naval architect analyses for vessels with hull materials of wood, fiberglass, or fiberglass-reinforced plastic can only satisfy this requirement for the initial two-year extension.*

## PART 3 – Feasibility Analysis Summary

### List of Tier 3/Tier 4 Engines Available and Assessed for Subject Vessel

|  |
| --- |
| **List of Tier 3/Tier 4 Engines Available and Assessed for Subject Vessel**  (Specify the following: Engine make, model, year, U.S. EPA Engine Family Number/Emission Family Number, EPA Tier level, aftertreatment (as applicable), torque, rated horsepower, rpm, exhaust backpressure limit specification and whether that engine is assessed for repower or retrofit) |

|  |  |
| --- | --- |
| Repower/Retrofit Option 1 |  |
| Repower/Retrofit Option 2 |  |
| Repower/Retrofit Option 3 |  |
| Repower/Retrofit Option 4 |  |
| Repower/Retrofit Option 5 |  |
| Repower/Retrofit Option 6 |  |
| Repower/Retrofit Option 7 |  |
| Repower/Retrofit Option 8 |  |
| Repower/Retrofit Option 9 |  |
| Repower/Retrofit Option 10 |  |
| Repower/Retrofit Option 11 |  |
| Repower/Retrofit Option 12 |  |

### List of DPFs Available and Assessed for Subject Vessel

|  |
| --- |
| **List of DPFs Available and Assessed for Subject Vessel** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **DPF Make and Model** | **OEM Integrated or Retrofitted Aftertreatment System** | **Active or Passive DPF** | **OEM Maximum Backpressure Rating** | **Calculated Maximum Backpressure** |
| DPF Option 1 |  |  |  |  |  |
| DPF Option 2 |  |  |  |  |  |
| DPF Option 3 |  |  |  |  |  |
| DPF Option 4 |  |  |  |  |  |
| DPF Option 5 |  |  |  |  |  |
| DPF Option 6 |  |  |  |  |  |
| DPF Option 7 |  |  |  |  |  |
| DPF Option 8 |  |  |  |  |  |
| DPF Option 9 |  |  |  |  |  |
| DPF Option 10 |  |  |  |  |  |
| DPF Option 11 |  |  |  |  |  |
| DPF Option 12 |  |  |  |  |  |

### Required Submittal List for Feasibility Analysis

|  |  |
| --- | --- |
| **Vessel Specific Technical Feasibility Study** | **Financial Analysis** |
| General Note 1: All plans, arrangements and drawings and information listed below are to be submitted in PDF or 3D format.  General Note 2: Additional drawings aiding in the feasibility study may be submitted.  Entire vessel specific feasibility study provided by a third-party naval architect, which is to also include a summary and conclusions of vessel specific feasibility study provided by a third-party naval architect  General Arrangement drawing  Machinery arrangement drawing  Electrical Arrangement drawing  Electrical load analysis  Stability booklet and lines plan (showing before and after installation of new engines and DPF)  Tank arrangement (including any tank modifications for DEF tank)  Propulsion drawings  Piping drawings in engine room (including fuel oil, lubricating oil, compressed air, bilge, ballast, firemain, vents, exhaust system etc.)  Fire control plans  Tonnage calculations (including change in tonnage)  Structural drawings (indicating significant structural changes)  Exhaust backpressure calculations for each engine evaluated with a given DPF model | General Note: Financial submittals are not part of this template and only provided for guidance   * Vessel Replacement Cost * Current Vessel Annual Fuel Cost * Capital costs * Installation costing was broken down into five sub-categories:   + Structural Alterations   + Mechanical Alterations   + Engine Room Access   + Testing & Commissioning   + Vessel Haul Out & Shipyard Costs * Fuel Savings * Maintenance Costs Associated with Retrofit and OEM Tier 4 SCR * DEF Cost * DPF Regeneration Fuel Cost   CARB staff will conduct ability-to-pay evaluations. |

An independent feasibility study submitted for review is to be in line with the CCR Section 93118.5 (e)(12)(E)3.b.

*The applicant must demonstrate that no suitable engines (Tier 3 or Tier 4 marine, or Tier 4 Final off-road) or CARB-verified DPFs physically fit within the existing vessel structure, and no amount of modifications can be made to the vessel structure without compromising its structural integrity or stability, to meet requirements of subsection (e)(12).*

1. *For extensions to repowering engines, technical feasibility analysis demonstrating that no certified Tier 3 marine, Tier 4 marine or Tier 4 Final off-road engine can be used to repower engines meeting performance standards on the vessel;*
2. *For extensions to installing DPFs, technical feasibility analysis demonstrating that no DPF can be used to retrofit Tier 3 or Tier 4 engines on the vessel;*
3. *For extensions to repowering engines or installing DPFs, vessel-specific technical feasibility analysis provided by a third-party naval architect demonstrating that no modifications are feasible to repower and retrofit the vessel. Non vessel-specific third-party naval architect analyses for vessels with hull materials of wood, fiberglass, or fiberglass-reinforced plastic can only satisfy this requirement for the initial two-year extension;*
4. *For extensions to repowering engines or installing DPFs, modifications resulting in a passenger capacity reduction of 25 percent or more are considered not feasible if supporting documentation demonstrates that reducing passenger capacity will operationally result in increased emissions;*

### Significant Technical and Operational Modification Impacts due to Repower/Retrofit/DPF

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Repower/Retrofit/DPF Option #** | **Significant Technical Modification Impacts** | **Significant Operational Modification Impacts** | **Other Impacts** | **Summary Regarding Non-Feasibility** |
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For each repower/retrofit/DPF option listed on Part 3.D of this template, list of all impacts to vessel

|  |
| --- |
| Repower/Retrofit/DPF Option #\_\_\_\_ |

|  |  |  |
| --- | --- | --- |
| Impact | List of Impacts | Feasibility study summary to also include (as applicable) |
| Significant Technical Impacts | weight impacts  structural design limits  performance/range impacts  stability  vessel arrangement  tonnage  auxiliary power generation and distribution capacity  safety issues  Other technical impact: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * % Change in weight in lightship displacement * Distance shift in the longitudinal center of gravity (LCG) * % Change in vessels length between perpendiculars (LBP) * Change in structural design * Change in performance/range * Change in stability * Change in vessel tonnage * Change in power requirements * Added safety concerns |
| Significant Operational Impacts | facilities impact  manning  vessel operation  maintenance  crew licensing  certification and training  regulatory compliance  passenger capacity reduction  Other operational impact: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * Change in facilities * Change in manning procedures * Change in vessel operation * Change in maintenance schedules * Additional crew licensing requirements * Additional certification and training requirements * Additional regulatory requirements * Percentage of passenger capacity reduction |
| Other Impacts | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Detailed explanation of all other impacts. |

Please reprint this page for listing the impacts of each repower/retrofit/DPF option

# Instructions for Completing the Template

**Part 1 – Preliminary Information**

1. **Contact Information**
2. Enter the date this report will be submitted to the CARB Executive Officer.
3. Enter the company names of the **owner** and **operator** of the vessel.
4. Enter the contact information for the person who is submitting the reporting template.
5. Enter the contact information for the third-party naval architect (if applicable).
6. Enter the submitter information including the name, title, mailing address, phone number and email address in the appropriate rows.
7. If a third-party naval architect and their report is part of the submission process, please include their name, title, address, phone and email address as well in the appropriate rows.
8. **Vessel Information**

General Vessel Information

1. Enter the vessel name.
2. If the vessel name has changed since a previous extension or report, please enter the previous vessel name.
3. Enter the vessel identification number (IMO or class), the call sign number, and the maritime mobile service number in the appropriate rows. Enter NA for any that are Not Applicable.
4. Select or enter the vessel type.
5. Enter the primary vessel use, secondary vessel use, and any other vessel use in the appropriate rows.
6. Enter the vessel homebase and homebase address.
7. Enter the vessel homeport and homeport address.
8. Enter the year the vessel was built.
9. Enter the U.S. Coast Guard Document Number. Enter NA if Not Applicable.
10. If applicable, enter the California Fish and Game License Number. Enter NA if Not Applicable.
11. Enter the CARB Unique Vessel Identifier (UVI) Number.
12. Enter the overall reason for requiring an extension.
13. **Vessel Principal Particulars**
14. Enter all the listed principal particulars of the vessel.
    1. Length Overall
    2. Length Between Perpendiculars
    3. Breadth, Molded
    4. Depth, Molded
    5. Summer Load Line Draft
    6. Deadweight at Summer Load Line Draft
    7. Lightweight
    8. Gross Tonnage
    9. Net Tonnage
    10. Design Speed Ahead
    11. Design Speed Astern
    12. Hull Type (Single/Double)
    13. Hull Materials (please reference the note below the table, particularly for initial extensions)
    14. Freeboard Length
    15. Flag State
    16. Keel Laying Date if it is available
    17. Vessel Delivery Date if it is available
    18. Propulsion Fuel, here indicate the type of fuel used, in case of dual fuel vessels, indicate all fuels used, for hybrid and battery-operated vessels indicate this as well, if there are any novel propulsion types, indicate as much detail as possible.
    19. Indicate if the vessel falls under SOLAS, MARPOL, Load Line or Class in the appropriate rows. For Classed vessels enter all the class notations the vessel is carrying
15. **Engine Information**

Existing Engine Particulars

1. Enter the number of engines on the vessel in column 1 “Engine No.”.
2. Enter the manufacturer of each engine on the vessel.
3. Enter the model of each engine on the vessel.
4. Enter the Engine Tier.
5. Enter the U.S. EPA Engine Family Number/Emission Family Number (EFN) on the vessel. Enter NA if there is no applicable family.
6. Enter the engine model year.
7. Enter the serial number of each engine on the vessel.
8. Enter the rated brake horsepower of each engine on the vessel.
9. Enter the duty cycle rating of each engine.
10. Enter the displacement per cylinder in liters of each engine on the vessel. Liters = cubic inches divided by 61.
11. Enter the number of cylinders in each engine on the vessel.

Engine Operations in Regulated California Waters

1. Enter the number of engines on the vessel in column 1 “Engine No.”.
2. Enter the annual hours of operation per engine.
3. Enter the fuel type for each engine.
4. Enter the estimated annual fuel consumed by each engine in gallons.
5. Enter the total annual operation for commercial purposes in Regulated California Waters based upon readings of the non-resettable hour meters for previous (reporting) calendar year for each engine on the vessel.
6. Estimate the percentage of operating time spent less than 3 miles from shore for each engine on the vessel.
7. Estimate the percentage of operating time spent more than 3 miles and up to 24 miles from shore for each engine on the vessel.
8. Estimate the percentage of operating time spent more than 24 miles from shore for each engine on the vessel.

Existing Control Equipment (if applicable)

1. Enter the number of engines on the vessel in column 1 “Engine No.”.
2. Enter the type of diesel emission control strategy (DCES) that is installed on each engine on the vessel. Enter NA if there is no installed DECS.
3. Enter the manufacturer of DECS installed on each engine on the vessel. Enter NA if there is no installed DECS.
4. Enter the model of DECS installed on each engine on the vessel. Enter NA if there is no installed DECS.
5. Enter the installation date of DECS on each engine. Enter NA if there is no installed DECS.
6. Enter the serial number of DECS on each engine. Enter NA if there is no installed DECS.
7. Enter the NOx percent reduction on each engine on the vessel. Enter NA if there is no installed DECS.
8. Enter particulate matter percent reduction on each engine on the vessel. Enter NA if there is no installed DECS.

**Part 2 – Extension Type**

1. **California Maritime Feasibility**
2. Please check the appropriate box for your situation. If additional information is needed, the California State University Maritime Academy (CMA) study can be found here: <https://ww2.arb.ca.gov/sites/default/files/2019-10/cmafeasibilityreport09302019.pdf>
3. If an independent feasibility study is required to be submitted, please use the checklist in Part 3.C to verify that all necessary information has been included.
4. **Extension Request**
5. Please check the appropriate extension for the subject vessel. Information for each extension can be found in CCR Section 93118.5 (e)(12)(E)3.b.

**Part 3 – Feasibility Analysis Summary**

1. **List of Tier3/Tier 4 Engines Available and Assessed for Subject Vessel**
2. Please list all Tier 4 Engines that are available for the subject vessel. All these engines must be assessed and included in the Technical Feasibility Study in terms of space, weight, stability, operational, and safety.
3. It is the responsibility of the applicant to verify that all available EPA Tier 3/4 engines are assessed. For the convenience of the applicant, the United States EPA Tier 4 certified Clean Air Act compliant marine engines in 2020 that could have applicability to CHC operating in California and compliant with the CARB Amended CHC Regulation Order are listed in Appendix 2. This list was created in 2020 and updated in October 2023. This is not a comprehensive list and may change over time. Please ensure that all applicable engines are assessed and are listed in the Table as applicable to the subject vessel.
4. Please reprint tables as needed.
5. **List of DPFs Available and Assessed for Subject Vessel**
   * + 1. Please list all available Diesel Particulate Filters (DPFs) for the subject vessel. Each available DPF must be assessed and included in the Technical Feasibility Study.
       2. Please list whether each DPF is an OEM Integrated or OEM Retrofitted Aftertreatment System, whether it is an Active or Passive DPF, and the OEM Maximum Backpressure Rating.
       3. DPF means a CARB Level 3 Verified Diesel Emission Control Strategy (VDECS). The CARB Level 3 VDECS list can be found at the link provided below. <https://ww2.arb.ca.gov/diesel/verdev/vt/cvt.htm>
       4. Please reprint tables as needed.
6. **Required Drawing Submittal List for Feasibility Analysis**
7. Use the checklist to verify that all required drawings have been submitted with the technical feasibility study. The United States Coast Guard (USCG) Marine Safety Center (MSC) Plan Review Guidelines are to be followed to ensure completeness of drawings, arrangements and plans - <https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Commercial-Regulations-Standards-CG-5PS/Marine-Safety-Center-CG-MSC/Plan-Review-Guides/>
8. While not required for submittal with this template, please use the Financial Analysis checklist as a reference.
9. Feel free to include additional information and drawings which will aid in determining feasibility, even when these are not included in the checklist.
10. When a 3D scan is submitted, an infrared or LIDAR scanner of at least 300,000 points per second is to be used. Obstacles in the path of the scanner are to be accounted for to ensure a comprehensive image is obtained which does not block essential details. Acceptable file formats include E57 (preferable), LAS and LAZ. Scan accuracy of at least 1 inch per 40 feet is to be maintained. Navisworks, Autodesk Recap or Autodesk Revit might be used to infer the data submitted.
11. **Significant Technical and Operational Modification Impacts due to Repower/Retrofit/DPF**
12. For each repower/retrofit/DPF option assessed, enter any additional significant technical and operational modification impacts that were found in the technical feasibility study that you believe should be noted and considered for the extension.
13. State a quick summary as to why the option is non-feasible.
14. For technical modification impacts, this could include additional weight impacts, structural design limits, performance/range impacts, stability, vessel arrangement, tonnage, auxiliary power generation and distribution capacity, safety issues, etc. (For safety issues, please specify how safety is affected and categorize the safety hazard such as chemical, thermal, electrical, ergonomic, mechanical, environmental, energy etc.)
15. For operational modification impacts, this could include facilities impact, manning, vessel operation, maintenance, crew licensing, certification and training, regulatory compliance, for passenger vessels – capacity reduction, etc.
16. Provide the existing vessel lightship displacement, longitudinal center of gravity (LCG), vertical center of gravity (VCG), and the total cargo/passenger capacity.
17. Provide the existing vessel normal operating electrical load conditions.
18. Select all impacts that apply for repower/retrofit/DPF option.
19. Please reprint tables as needed.

# Appendix 1 – Background

The California Air Resources Board (CARB) Commercial Harbor Craft (CHC) Regulation was adopted in 2007 and amended in 2010 to reduce diesel particulate matter (PM) and criteria pollutant emissions from diesel powered engines on commercial harbor craft vessels. The regulation applies to all commercial harbor craft vessels including, but not limited to, ferries, excursion vessels, tugboats (including ocean-going tugs), towboats, push boats, crew and supply vessels, barge and dredge vessels, work boats, pilot vessels, and commercial passenger fishing vessels, and commercial fishing boats. To further reduce emissions, CARB staff has amended the CHC Regulation.

The amended CHC regulations require all CHC except for the commercial fishing vessels to meet performance standards. To address the challenge in case of the lack of feasibility of repowering and installing engines or DPF aftertreatment, the CHC amendments allow the vessel owners or operators who claim that they are not able to comply with the performance standards to apply for compliance extensions by submitting an application along with a technical feasibility analysis provided by a third-party naval architect demonstrating that no modifications are feasible to repower and retrofit the vessel for extensions to repowering engines or installing DPFs.

The amended Commercial Harbor Craft Regulation (CHC Regulation) is in effect beginning January 1, 2023. As part of the implementation, technical feasibility assessment reports are to be reviewed and a determination would need to be made for the compliance extension applications. This document allows submission of extension requests to CARB from vessel owner/operators for compliance extensions and allows for streamlining of extension request submissions.

The applicant must demonstrate that no suitable engines (Tier 3 or Tier 4 marine, or Tier 4 Final off-road) or DPFs physically fit within the existing vessel structure, and no amount of modifications can be made to the vessel structure without compromising its structural integrity or stability, to meet the final regulation (<https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/chcfro.pdf>).

1. For extensions to repowering engines, technical feasibility analysis demonstrating that no certified Tier 3 marine, Tier 4 marine or Tier 4 Final off-road engine can be used to repower engines meeting performance standards on the vessel;
2. For extensions to installing DPFs, technical feasibility analysis demonstrating that no DPF can be used to retrofit Tier 3 or Tier 4 engines on the vessel;
3. For extensions to repowering engines or installing DPFs, vessel-specific technical feasibility analysis provided by a third-party naval architect demonstrating that no modifications are feasible to repower and retrofit the vessel. Non vessel-specific third-party naval architect analyses for vessels with hull materials of wood, fiberglass, or fiberglass-reinforced plastic can only satisfy this requirement for the initial two-year extension;
4. For extensions to repowering engines or installing DPFs, modifications resulting in a passenger capacity reduction of 25 percent or more are considered not feasible if supporting documentation demonstrates that reducing passenger capacity will operationally result in increased emissions;

This document provides a template the vessel owners can provide to their naval architect to follow in order to satisfy the criteria above. The template includes all the information needed for CARB staff to assess whether the third-party naval architect has evaluated the feasibility of installing Tier 3/Tier 4 engines and/or DPF systems. The template describes the level of detail required for each item required in the third-party naval architect’s assessment report.

# Appendix 2 – California Air Resources Board (CARB) Listing of Certified Tier 4 Marine Engines and Marinized Tier 4 Final Non-Road Engines

Source: <https://ww2.arb.ca.gov/sites/default/files/2024-02/FAB23-084%20-%20List%20of%20Tier%204%20Marine%20Engines%20Updated.pdf>

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Note: This list [in Appendix 2] reflects information compiled by CARB staff to provide commercial harbor craft owners/operators a list of Certified Tier 4 Marine Engines and Marinized Tier 4 Final Non-Road Engines. It does not constitute an endorsement of the listed engines and is intended as a resource only. This list is regularly updated by CARB staff [at <https://ww2.arb.ca.gov/our-work/programs/commercial-harbor-craft/resources>]. Manufacturers with Tier 4 engines not listed may contact HarborCraft@arb.ca.gov to request being added.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Manufacturer | Model | U.S. EPA Category | Power Range (kW) | Engine Weight (kg) | Engine Specifications Links | Date Added to List |

|  |
| --- |
| EPA Certified Tier 4 Marine Engines |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Yanmar | 6AYEM-GTWS | 1 | 670-749 | 2,418  (engine only) | [Specifications Sheet](https://www.yanmar.com/global/marinecommercial/products/propulsion_engine-high_speed/6ayeseries/) | 10/11/2023 |
| Mitsubishi | S12-R | 1 | 940 | 5,350  (engine only) | [Specifications Sheet](https://labordeproducts.com/wp-content/uploads/2020/10/LABO_spec-sheet_S12R-Y4MPTAW-3.pdf)  Note: Only the S12-R is Tier 4 | 10/11/2023 |
| Cummins | QSK38 | 1 | 746-1,119 | 5,270 | [Specifications Sheet](https://www.cummins.com/engines/qsk38-tier-4-imo-iii#:%7E:text=General%20Specifications%201%20Configuration%3A%20V-12%20cylinder%2C%204-stroke%20diesel,flywheel%206%20Fuel%20System%3A%20Modular%20Common%20Rail%20%28MCRS%29) | 10/11/2023 |
| Cummins | QSK60 | 1 | 1,491-2,013 | 10,154 | [Specifications Sheet](https://www.cummins.com/engines/qsk60-epa-tier-4-imo-iii#:%7E:text=General%20Specifications%201%20Configuration%3A%20V-16%20cylinder%2C%204-stroke%20diesel,facing%20flywheel%206%20Fuel%20System%3A%20Modular%20Common%20Rail) | 10/11/2023 |
| Caterpillar | 3512E | 1 | 1,000-1,901 | 8,193 | [Specifications Sheet](https://www.cat.com/en_US/products/new/power-systems/marine-power-systems/commercial-propulsion-engines/1000031003.html) | 10/11/2023 |
| Caterpillar | 3516E | 1 | 1,865-2,525 | 9,620 | [Specifications Sheet](https://www.cat.com/en_US/products/new/power-systems/marine-power-systems/commercial-propulsion-engines/1000031000.html) | 10/11/2023 |
| Caterpillar | C32 | 1 | 746-1,081 | 3,248 | [Specifications Sheet](https://www.cat.com/en_US/products/new/power-systems/marine-power-systems/commercial-propulsion-engines/15970456.html) | 10/11/2023 |
| Caterpillar | C280-8 | 2 | 2,460-2,530 | 19,000 | [Specifications Sheet](https://www.empire-cat.com/equipment/power-systems/marine-power-systems/commercial-propulsion-engines/c2808-tier-4#:%7E:text=C280-8%20Marine%20Propulsion%20Engine%20%28U.S.%20EPA%20Tier%204%29,1000%20rpm%20Emissions%20EPA%20Tier%204%2C%20IMO%20III) | 10/11/2023 |
| Caterpillar | C280-12 | 2 | 3,700-4,060 | 26,035 | [Specifications Sheet](https://www.empire-cat.com/equipment/power-systems/marine-power-systems/commercial-propulsion-engines/c28012-tier-4) | 10/11/2023 |
| MTU | 12V-4000M 05 | 1 | 1,119-1,932 | 8,000  (engine only) | [Specifications Sheet](https://penske.com.au/wp-content/uploads/2021/04/3083211_Flyer_4000M05_1504853877.pdf) | 10/11/2023 |
| MTU | 16V-4000M 05 | 1 | 1,840-2,576 | 9,300  (engine only) | [Specifications Sheet](https://penske.com.au/wp-content/uploads/2021/04/3083211_Flyer_4000M05_1504853877.pdf) | 10/11/2023 |
| MTU | 20V-4000M 05 | 1 | 2,300-3,220 | 11,600  (engine only) | [Specifications Sheet](https://penske.com.au/wp-content/uploads/2021/04/3083211_Flyer_4000M05_1504853877.pdf) | 10/11/2023 |
| MAN Diesel | D2862 Series | 1 | 749 | 2,270 | [Specifications Sheet](https://pasch.es/pdfs/Naval/Motores/MAN/INTERMITENTE/data%20sheet%20D2862LE428.pdf) | 10/11/2023 |
| Baudouin | 6M-26.3 | 1 | 441-599 | 2,185 | [Specifications Sheet](https://meo.net.au/6-m26-3/) | 10/11/2023 |
| Baudouin | 12M-26.3 | 1 | 883-1,214 | 3,615 | [Specifications Sheet](https://baudouin.com/wp-content/uploads/2021/04/10707_12M26.3_Spec-Sheet_revD.pdf) | 10/11/2023 |
| GE (Wabtec) | 6L250 MDC | 2 | 1,700-1,900 | 19,944 | [Specifications Sheet](http://www.oissco.com/Downloads/L250_V250.pdf) | 10/11/2023 |
| GE (Wabtec) | 8L250 MDC | 2 | 2,250-2,500 | 23,356 | [Specifications Sheet](http://www.oissco.com/Downloads/L250_V250.pdf) | 10/11/2023 |
| GE (Wabtec) | 12V250 MDC | 2 | 3,150-3,500 | 27,080 | [Specifications Sheet](http://www.oissco.com/Downloads/L250_V250.pdf) | 10/11/2023 |
| GE (Wabtec) | 16V250 MDC | 2 | 4,200-4,700 | 35,788 | [Specifications Sheet](http://www.oissco.com/Downloads/L250_V250.pdf) | 10/11/2023 |
| EMD 710 Series | 8E 23 | 2 | 1,250 | 14,742 | [Specifications Sheet](https://s7d2.scene7.com/is/content/Caterpillar/CM20230728-f64d1-70164) | 10/11/2023 |
| EMD 710 Series | 12E 23 | 2 | - | 19,414 | [Specifications Sheet](https://s7d2.scene7.com/is/content/Caterpillar/CM20230728-f64d1-70164) | 10/11/2023 |
| EMD 710 Series | 12E 23B | 2 | - | 23,133 | [Specifications Sheet](https://s7d2.scene7.com/is/content/Caterpillar/CM20230728-f64d1-70164) | 10/11/2023 |
| EMD 710 Series | 16E 23 | 2 | - | 22,589 | [Specifications Sheet](https://s7d2.scene7.com/is/content/Caterpillar/CM20230728-f64d1-70164) | 10/11/2023 |
| EMD 710 Series | 20E 23 | 2 | 3,729 | 25,719 | [Specifications Sheet](https://s7d2.scene7.com/is/content/Caterpillar/CM20230728-f64d1-70164) | 10/11/2023 |

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| --- |
| Marinized EPA Certified Tier 4 Final Non-Road Engines |

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| --- | --- | --- | --- | --- | --- | --- |
| M&H Engineering | M&H John Deere 4045MD | 1 | 55-130 | 570 | [Specifications Sheet](https://marineandhazardousengines.com/marine-engines/4045-2/) | 10/11/2023 |
| M&H Engineering | M&H John Deere 6068MD | 1 | 169-224 | 750 | [Specifications Sheet](https://marineandhazardousengines.com/marine-engines/6068-2/) | 10/11/2023 |
| M&H Engineering | M&H John Deere 6090MD | 1 | 205-317 | 1,056 | [Specifications Sheet](https://marineandhazardousengines.com/6090-2/) | 10/11/2023 |

The table in Appendix 2 shows the currently certified Tier 4 marine engine models, as of February 15, 2024. The Cummins, CAT, EMD, MTU, MAN, and Baudouin Tier 4 marine engines are all utilizing SCR technology to meet the Tier 4 Marine NOx emissions standards (1.3 g/bhp-hr or 1.8 g/kW-hr). The GE 250 MDC Series Tier 4 engines are utilizing EGR technology and do not require SCR aftertreatment. There are currently only a few Tier 4 engines rated below 600 kW because U.S. EPA does not have requirements for marine emissions to meet Tier 4 standards below 600 kW. However, some marine diesel engines rated under 600 kW have been certified to meet Tier 4 standards. Therefore, this demonstrates the ability to meet the Tier 4 marine standards on engines rated below 600 kW in marine applications.

# Appendix 3 – 2019 Cal Maritime Tier 4 Feasibility Study - Summary of Feasibility Findings

|  |  |  |  |
| --- | --- | --- | --- |
| Vessel Category | Repower:  Tier 4 Marine Engines | Retrofit:  DPF+SCR | Retrofit:  DPF |
| Tank Barge  - Cargo Pump  - Ballast Pump  - Generator | N/A  N/A  N/A | Feasible Fitment  Feasible Fitment  Feasible Fitment | Feasible Fitment  Feasible Fitment  Feasible Fitment |
| Dredge  - Pump Engine  - Thruster Engine  - Generator | Feasible Fitment  N/A  N/A | Moderate Reconfiguration  Feasible Fitment  Feasible Fitment | Moderate Reconfiguration  Feasible Fitment  Feasible Fitment |
| Commercial Fishing | N/A | No Fitment Identified | No Fitment Identified |
| Charter Fishing | N/A | No Fitment Identified | No Fitment Identified |
| Excursion | Feasible Fitment | Feasible Fitment | Feasible Fitment |
| Slow Speed Ferry | Feasible Fitment | Moderate Reconfiguration | Moderate Reconfiguration |
| High Speed Ferry | Substantial Reconfiguration | Substantial Reconfiguration | Substantial Reconfiguration |
| Ship Assist Tug | Feasible Fitment | No Fitment Identified | Moderate Reconfiguration |
| Push Tug | Moderate Reconfiguration | Substantial Reconfiguration | Moderate Reconfiguration |
| Crew and Supply | Moderate Reconfiguration | Substantial Reconfiguration | Substantial Reconfiguration |
| Pilot Boat | Substantial Reconfiguration | Substantial Reconfiguration | Substantial Reconfiguration |
| Work Boat | N/A | Substantial Reconfiguration | Substantial Reconfiguration |
| Special Use | Feasible Fitment | Moderate Reconfiguration | Moderate Reconfiguration |

Source: <https://ww2.arb.ca.gov/sites/default/files/2019-10/cmafeasibilityreport09302019.pdf>

In the 2019 Cal Maritime Tier 4 Feasibility Study, ‘Feasibility’ is defined as follows:

* Feasible Fitment – The addition of the Tier 4 repower or retrofit aftertreatment equipment can be installed with minimal vessel modification and will likely not impact stability beyond the thresholds determined by USCG to require stability evaluation/review. This determination was made using existing vessel stability documents, lines drawings, equipment data provided by engine manufacturers, emission control technology companies, and thorough analysis by a third party naval architect.
* Moderate Reconfiguration – The addition of the Tier 4 repower with ancillary components or aftertreatment retrofit equipment to the existing vessel design may require changes to machinery/component locations, vessel mechanical/electrical subsystems, bulkhead penetrations, and moderate structural reinforcement to the existing vessel design in component hanging/mounting locations. These changes may have an effect on stability beyond the USCG review thresholds depending on the existing vessel design and the dimensions and weight of the equipment being installed in the vessel. Effect on stability is determined from vessel design and stability data provided by vessel owners and component data from OEM engine manufacturers, retrofit emission control technology companies, and naval architect analysis.
* Substantial Reconfiguration– The addition of the Tier 4 repower or aftertreatment retrofit equipment will require most if not all of the alterations described under the “Moderate Reconfiguration” determination plus the addition of more significant or extensive redesign and structural fabrication to accommodate the equipment and/or to overcome apparent stability issues. Substantial design changes and structural fabrication may include moving existing bulkheads, creating new bulkheads, augmenting buoyancy by fabricating additional hull structure (up to and including cutting and lengthening the vessel), and/or more substantial structural reinforcement/augmentation to safely support installation of added Tier 4 components in locations. Depending on several business considerations, vessel owners with this scenario may consider replacing their vessel with a new-build Tier 4 powered replacement vessel instead of repowering or retrofitting their in-use vessels.
* No Fitment Identified – This designation indicates that despite thorough analysis of feasibility, the study authors were not able to identify repower or retrofit solutions that would be successful for the combination of vessel design, vessel build material, and physical characteristics of Tier 4 engines and retrofit aftertreatment systems. Additional re-analysis could be performed to identify workable modifications; however, identification of unequivocal modifications through subsequent analysis are not expected.
* Not Applicable (N/A) – This is the designation for indicating that there are no currently available Tier 4 repowers or retrofit DPF or SCR solutions available for the power and service of the vessel studied. For example, U.S. Environmental Protection Agency (EPA) Tier 4 marine emission standards are only required for engines with a rated power greater than 600 kW therefore there are few marine Tier 4 engine options available in the horsepower subcategories below 600kW.

This 2019 Cal Maritime Tier 4 Feasibility Study evaluation focuses on repowering or retrofitting main propulsion engines only, with the exception of Barge and Dredge categories where a diverse set of auxiliary engines perform key functions.