



# Sustainability at Sea

With advancements in ship design and technology, today's marine industry has sustainability top of mind.

## PART 1: Sustainable at Work

The examples below demonstrate environmental practices used in ship building.

- **Eco-friendly Design:** Whether it's developing environmentally-forward hull designs and architecture, using recycled metal for ship structures, and upcycling materials like plastic, reclaimed leather, and wood for a ship's interior rooms and decor, today's ship designers are implementing sustainable practices.
- **Energy Efficiency:** Today's ships capitalize on energy-saving technologies such as solar panels, hybrid energy systems, and wind-powered turbines to reduce the use of fossil fuels. These technologies allow the marine industry to lower their emissions, reduce their carbon footprint, and apply improved sustainability practices.
- **Waste Reduction:** Managing waste effectively is key to protecting marine ecology. From recycling waste materials and composting to new standards in biodegradable cleaning materials and anerobic digesters that break down organic waste to create renewable energy sources, the field of waste management is ever evolving.



You have the *how*, what about the *who*? People in the roles below apply these sustainability practices in their work to help protect the world's waterways.

Designer	Engineer	Environmental Analyst	Materials Specialist
Integrates sustainable principles into the ship's design.  Designs for energy efficiency, reduced emissions, and minimized environmental impact throughout the ship's lifecycle.	Designs and creates energy-efficient propulsion systems.  Designs the ship's hull and waste management systems and ensures the ship's structural integrity.	Analyzes the ship's potential environmental impact, including emissions and fuel efficiency.  Ensures a ship complies with environmental regulations and standards.	Identifies materials used in a ship's exterior and interior construction.  Identifies and tests sustainable alternatives, including biodegradable and recycled materials.

### THINK ABOUT IT

What practice do you think could have the greatest impact on promoting sustainability in the marine industry? Whose role would this be? \_\_\_\_\_



## PART 2: Carbon Footprint

Now try your hand at calculating a ship's carbon footprint — this is something the people in the roles above need to know.

1. Determine the ship's fuel consumption — the amount of fuel it burns to operate, usually measured in liters or tons of fuel. Smaller luxury yachts have tank capacities of approximately 10,000 gallons. Each gallon of fuel equals approximately 3.78 liters. So a yacht's tank may hold roughly 37,800 liters of diesel fuel.
2. Determine the ship's fuel emission factor. Each type of fuel has a specific fuel emission factor, which determines how much CO<sub>2</sub> is produced when burning it. Diesel fuel, used in many luxury yachts, has a typical emission factor of 2.54 kg per liter of fuel.
3. Multiply the ship's fuel consumption by its emissions factor to calculate its carbon footprint.

What is the carbon footprint for the yacht in the example above?

\_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_ carbon per tank of fuel

**Learn more!** Check out The International Seakeepers Society for information about ocean protection: [seakeepers.org](http://seakeepers.org)





# Apprentices Ahoy!

Reproducible Master



Apprenticeship programs are an excellent way to get started in the marine industry. They offer hands-on training and mentorship, and often lead to certification or qualification in specific trades for marine jobs on land and at sea.

## PART 1: Find a Match

Explore some land-based jobs in the boating industry. Start by circling the statement below that best describes you.



**A.** You enjoy troubleshooting complex systems. You can work patiently and methodically, and you enjoy using a variety of tools.



**B.** You are good at visualizing how parts fit together. You can maintain concentration for long periods and have an eye for detail.



**C.** You like combining artistic creativity with technical skills. You are detail-oriented and comfortable working with measurements and calculations.



**D.** You enjoy building and fixing things and are mechanically-inclined. You like working with a team and communicate and coordinate effectively with others.



**E.** You enjoy working with your hands and have strong problem-solving skills. You enjoy reading technical manuals and are comfortable working in enclosed spaces.

Based on your choice, check out the apprentice career path that might interest you.

A. Plumber	B. Welder	C. Fabricator	D. Mechanic	E. Propeller technician
Responsible for installation, maintenance, and repair of ship plumbing systems, including water supply and waste management.	Responsible for work on all metal components of a ship, from hulls and frames to girders and tanks.	Interprets blueprints and technical drawings to build metal components (frames, supports, etc.) essential to ensuring the structural integrity of a ship.	Responsible for inspecting and repairing marine engines, electrical systems, and other equipment. Coordinates with crew members to perform maintenance efficiently.	Conducts inspections of propellers to identify damage, performs repairs to improve performance, and conducts sea trials to test new equipment.

## PART 2: Explore the Role

Research apprenticeship opportunities for the job you matched with above or another land-based marine career. Identify key details such as:

- Eligibility requirements
- Length of the apprenticeship program
- Potential job opportunities after completing the program
- Pay/salary and benefits
- Career advancement opportunities

To get started, check out these resources:

- Maritime Professional Training: [mptusa.com](http://mptusa.com)
- Maritime Institute for Technology: [mitags.org](http://mitags.org)
- Yacht Services Technician Apprenticeship Program: [miasf.org/apprentice-program](http://miasf.org/apprentice-program)
- Mercury Marine: [mercurymarine.com/us/en/about-us/careers/apprenticeship](http://mercurymarine.com/us/en/about-us/careers/apprenticeship)
- Kingsborough Community College Marine Technician Apprenticeship Program: [bcc.cuny.edu/academicdepartments/maritime/MTAP/index.html](http://bcc.cuny.edu/academicdepartments/maritime/MTAP/index.html)



## PART 3: Report Back!

Write a journal entry describing a "day in the life" at your job. Mention the skills you will learn as an apprentice and how you will use them on the job. When done, share your journal entry with your class, so you can compare notes about career paths you all explored.



Captain Sandy's Charities



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