Chapter 8
Evolving Sustainable Green Ship Technology

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ABSTRACT

Man lives in two worlds, the biosphere and the techno-sphere. Over the years, time needs, growth, speed, knowledge, and competition have created demand that necessitated man to build complex institutions. Ship design is not left out of this process. Inland waters are under threat from untreated waste that can feed bacteria and algae, which in turn exhaust the oxygen. The ocean, the seas, and fresh water together cover the largest percentage of planet earth. Many think that everything that runs into it is infinite; the ocean is providing the source of freshening winds and current that is far more vulnerable to polluting activities that have run off too many poisons into them. The ocean may cease to serve these purposes if care is not taking to prevent pollution. The issue of the environment has become so sensitive recently and is linked to infrastructure development work. In the maritime industry, polluting activities from oil bilge to ballast pumping has turned into poison and has an adverse effect on water resources. Some have choked too much estuarine water where fish spawn. In a nutshell, the two worlds of man are currently out of balance and in potential conflict. Man is in the middle, and since the threats are mostly water related, ships are in the middle too. Historical records of a number of calamities that have resulted in heavy loss and pollution call for environmentally sound ships. This has led to a number of regulations that will subsequently affect policy change and procedure interaction with the system. The current situation has an effect on the design of new ships and modification of existing ships. This chapter discuss regulations design, with an emphasis on new system design drive towards processing waste and emissions on board so that discharges are acceptable. The chapter hopes to give insight into need, response, and research directions for green ship technology.

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INTRODUCTION

Human civilization from Stone Age to industrial, computer, and information to multimedia innovative technological era, work has been mostly about building and forgetting the inherited biosphere environment world. Today human sensitivity is aggressively defining this age as an age of sensitivity, safety and environment. Human developmental works for years during era transition have been built with oblivion or lack of consciousness to the environment. The term “environmental issues” usually implies one of two interpretations:

1. Wind, waves, tides, sediment characteristics and or other environmental factors involved in development work.
2. Environmental protection in the sense of reducing the negative impact on water, air, soil quality, infrastructure, health and coastal habitat.

In the first sense of the term, all concerned need to agree that methods for predicting and reporting environmental conditions have greatly improved especially in the dimension of scientific analysis. This can provide directions to connect necessary dots. In shipping and associated industries, ship protection and marine pollution are respectively interlinked in terms of safety and environment, conventionally ship safety is being deal with as its occurrence result to environmental problem.

Pollution from maritime industry seems to be small, currently at approximately 3%, especially considering emission. Today considering the volume of ships in the world ocean, pollution from shipping can be considered to be exponentially rising. Culmination of oversight regarding emission has lead to point form pollution that contribute to impact of ozone layer depletion, incessant flooding, global warming and more unknown calamities whose source is hard to determined seem to be on the way if caution is not exercised in the current ways of doing things. Shipping is not left behind in this, in fact, maritime world seem to be the most to get hit by the next big environmental revolt. Pollutions is about accident and accident is about pollution, because, the latter is the cause of the former. This chapter address environmental impacts to ship design with respect to human, safety, ship, reliability, channel, maneuverability factors and marine environment. The chapter also emphasizes on the need to incorporate in the ship design spiral, the design process regarding the above enumerated factors, for example environmental issues were never part of the ship design spiral.

This chapter collected information and used a risk-based approach to analyze environmental issue, ship system, current practice and regulatory analysis to deduce prospect green technology and practice for ship. (See Figure 1) In respect to the above, current situation is examined, policy, demand, mitigation and way to move forward green ship is addressed. Also addressed is the emphasis on importance of simulation and scientific system based risk analysis, especially for ships complex and dynamic system design, and channel accommodation of large ship and sip movement in port as well as the introduction of marine environment awareness in maritime curriculum. The need to incorporate as much of cybernetic technology in navigational and maritime operations for sustainable and efficient performance is stressed. Actionable marine environment mitigation measures, recommendation for strategies to achieve safe, cost marine ship, navigation and protection of the marine environment cost effective state of art sustainable of ship design at planning stage is advised (IMO, 1978).

Less attention is given to ship life cycle, material properties, variable and frequency matching with the environment. A situation that has lead to unbearable condition like corrosion and other unseen environmental degradation that accumulates into painful catastrophic losses. Also ship scraping and what happens to the environment after ship scraping. In ship recycling little or no
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