Chapter 8
Risk Requirement for Multi-Hybrid Renewable Energy for Marine System

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ABSTRACT

The chapter communicates environmental challenges facing the maritime industry. Efforts to integrate sources of alternative energy with existing systems through holistic proactive risk-based analysis and assessment requirements of associated environmental degradation and mitigation of greenhouse pollution are explored. The chapter also discusses alternative selection for hybridization of conventional power with compactable renewable sources like solar/hydrogen for reliable port powering.

INTRODUCTION

Scale, transportation, language, art, matter and energy remain keys to human civilization. The reality of integration of science and system lies in holistically investigation of efficiency of hybridizing alternative energy source with conventional energy source. This can be achieved with scalable control switching system that can assure reliability, safety and environmental protection. Option for such sustainable system is required to be based on risk, cost, efficiency benefit assessment and probabilistic application.

Green House Gas (GHG) pollution is linked to energy source. Large amount of pollution affecting air quality is prone by reckless industrial development. GHG release has exhausted oxygen, quality of minerals that support human life on earth, reduction in the ozone layer that is protecting the planetary system form excess sunlight. This is due to lack of cogent risk assessment and reliability analysis of systems before building. Moreso, because conventional assessment focus more on economics while environment and its associated cycle is not much considered (Grub, 1991; Henningsen, 2000). Human activities are altering the atmosphere, and the planet is warming. It is now clear that the costs of inaction are far greater than the costs of action. Aversion of catastrophic impacts can be achieved by moving rapidly to transform the global energy system. Sustainability requirement that can be solved through energy conservation (cf. IPCC, 2007: 13) are energy and associated efficiency, devel-

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opment, environment, poverty. Stakeholder from government's consumers, industry transportation, buildings, product designs (equipment networks and infrastructures) must participate in the decision work for sustainable system.

Recently the marine industry is getting the following compliance pressure regarding environmental issues related to emission to air under IMO MARPOL Annex 6. A world without port means a lot to economy transfer of goods, availability of ships and many things. Large volume of hinterland transportation activities import tells a lot about intolerant to air quality in port area. Adopting new energy system will make a lot of difference large number of people residing and working in the port. Most port facilities are powered by diesel plant. Integrating hybrid of hydrogen and solar into the existing system will be a good way for the port community to adapt to new emerging clean energy concept. Hybriduse of alternative source of energy remains the next in line for the port and ship power. Public acceptability of hybrid energy will continue to grow especially if awareness is drawn to risk cost benefit analysis result from energy source comparison and visual reality simulation of the system for effectiveness to curb climate change contributing factor, price of oil, reducing treat of depletion of global oil reserve.

Combined extraction of heat from entire system seems very promising to deliver the requirement for future energy for ports. These chapters discuss available marine environmental issues, source of energy today, evolution of alternative energy due to the needs of the time and the barrier of storage requirement, system matching of hybrid design feasibility, regulations consideration and environmental stewardship. The chapter also discusses holistic assessment requirement, stochastic evaluation, using system based doctrine, recycling and integrated approach to produce energy. With hope to contribute to the ongoing strives towards reducing green house gases, ozone gas depletion agents and depletion of oxygen for safety of the planet in order to sustain it for the right of future generation.

ENERGY, ENVIRONMENT, AND SUSTAINABLE DEVELOPMENT

Since the discovery of fire, and the harnessing of animal power, mankind has captured and used energy in various forms for different purposes. This include the use of animal for transportation, use of fire, fuelled by wood, biomass, waste for cooking, heating, the melting of metals, windmills, waterwheels and animals to produce mechanical work. Extensive reliance on energy started during industrial revolution. For years there has been increased understanding of the environmental effects of burning fossil fuels has led to stringent international agreements, policies and legislation regarding the control of the harmful emissions related to their use. Despite this knowledge, global energy consumption continues to increase due to rapid population growth and increased global industrialization. In order to meet the emission target, various measures must be taken, greater awareness of energy efficiency among domestic and industrial users throughout the world will be required, and domestic, commercial and industrial buildings, industrial processes, and vehicles will need to be designed to keep energy use at a minimum. Figure 1 shows that the use of fossil fuels (coal, oil, and gas) accounted continue to increase.

Various measures must be taken to reduce emission targets. The current reliance on fossil fuels for electricity generation, heating and transport must be greatly reduced, and alternative generation methods and fuels for heating and transport must be developed and used. Sustainable design can be described as system work that which enhances ecological, social and economic well being, both now and in the future. The global requirement for sustainable energy provision is become increasingly important over the next fifty years as the environmental effects of fossil fuel use become apparent. As new and renewable energy supply technologies become more cost effective and attractive, a greater level of both small scale and large scale deployment of these technologies