

Preface

In recent years, the search for alternative energy sources to the traditional fossil fuels (e.g. coal, crude oil and natural gas) has been on the increase. The three (3) main triggers for this search are Sustainability, Environment and Security (SES).

Fossil fuels have powered the world's economies since they were first discovered in the 1700s. Their discovery led to the industrial revolution that started in Europe during 1700-1800. The world relied and still relies heavily on fossil fuels to power homes and large factories; and to run vehicles. Lately, scientists have been warning that these fuels are not sustainable; they cannot be readily replenished because they take long periods of time to form. In other words, they are not renewable. Hence, there is the need to look for "alternative" sources that can be easily replenished.

With the industrial revolution of the 1700-1800 came the release of deleterious substances to the environment - land, air and water. The factories powered by fossil fuels pollute and degrade the environment having negative impacts on the health and safety of humans, animals, and plants. Environmental spills worsened situations. The Gulf Oil War Spill (~380-520 million gallons) in Kuwait 1991; the Exxon Valdez Spill (~10.8 million gallons) in 1989; and the most recent BP Deepwater Horizon oil spill (~200-250 million gallons) in the Gulf of Mexico, all had devastating consequences on health, safety and the environment. Environmental concerns have been heightened by the outcome of the studies conducted by the United Nations Framework Convention on Climate Change (UNFCCC), which concluded that human industrial activities, involving the use of fossil fuels, generate "Greenhouse Gases (GHGs)" which contribute to global temperature rise (Global Warming). Global warming is believed to be causing or

contributing to several events such as sea level rises/flooding, hurricanes, drought, wildlife extinction, water pollution and so on. These environmental challenges have necessitated the search for alternative cleaner fuel sources to the fossil fuels.

Some countries see security as the trigger for the search for alternative fuels. United States of America (USA) and the European countries are the largest consumers of fossil fuels (e.g. crude oil). However, crude oil is available in abundance in other countries, mostly in Africa and the Middle East. Hence, the “consumer nations” depend on the “oil producing nations” to meet their energy needs; a situation the former believe makes them vulnerable to the later. To reduce the dependence and hopefully make their nations secure, the “consumer nations” are searching for home grown energy alternatives.

Though security trigger may be nations’ specific, sustainability and environmental triggers affect everyone worldwide. Hence, the search for cleaner and alternative energy sources is global.

This first edition of “Clean Energy Fuels” has been written to provide information on available alternative fuels. The main focus is biomass (solid, liquid and gaseous biofuels). The book also contains excellent information on fossil and nuclear (fission and fusion) fuels. It is a good resource for students, instructors, workers and company owners, and diverse groups of people interested in renewable and clean energy. Comments are welcome for improvements on future editions.

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