

Modern Industry Practice

ELEC5032M

**Sustainability Development
In
Engineering Applications**

Introduction

In 2013, renewables energy has contributed one-fifth of the world's final energy consumption [1]. In contra, energy has acted as the opposite of the philanthrope fact before, where it is also the main reason for climate change, taking account of up to 60% of total global greenhouse gas emissions [2]. Sustainable development was first introduced in 1992 by Gro Harlem Brundtland, the Prime Minister of Norway, he claimed it as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs." [3]. This ubiquitous phenomenon has been aligned with engineering diversity over the last two decades with the ideology of its viable with the natural environment, the importance in economic development, notable impacts towards the engineering advancements and socially nurturing in communities. For instance, the Jubilee River which was constructed in 2003 to fits environmental, engineering, and social aspects. That design has curtailed the flood menace in Maidenhead, Windsor, and Eton to over 3,000 prop-



Figure 1: The Jubilee River. Source: <https://race-check.com/races/jubilee-river-swim/>

erties [4]. Simultaneously, the road traffic and rail connections were also improved alongside the communications and surrounding utilities [5]. This is the roleplay in achieving the sustainability concept through the development that dwells in the engineering aspect with the environment.

Sustainable Development Scheme

Sustainable development has become quite a jargon around the world as the main discourse in the evolution of engineering technology, the catchphrase as the environmental activists speaks about the effects on nature and study feature for academia which involves advancement for a better human life, society and generation. Considering this, obviously engineering sustainability's framework is bound to the ultimate goals which relate to three extents where it begins with environmental feasibility, economic growth and social inclusion through sustainable concepts as shown in Fig-

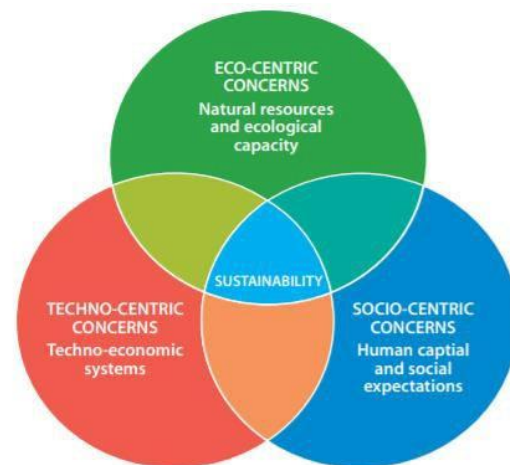


Figure 1: The Three Dimensions of Sustainability Concepts. Source: <https://www.raeng.org.uk/publications/reports/engineering-for-sustainable-development>

ure 2 [1]. According to a report, sustainability in the environment is the relation between the ecological system and its natural environment encompasses [2]. The demands on natural resources grow greater and faster than it can be regenerated for harvesting purposes. Due to this constraint, serious indications are being illustrated in publications or activist's awareness campaign arguing for the needs of a sustainable natural and built environment. This is how engineering involves in sustainable applications where such requires technologies and processes to yield and alter the resources, transform it for utilization of engineering products from transportation, energy, storage or even supplies. Alternatively, by exploiting

renewable energies such as wind, solar and water in the integration of numerous engineering fundamentals resulting in the solution and protection for other natural sources to remain productively constant and resilient for the growth of the future generation. As for the 2nd content which the main objective is related closely to the community and their perception in sustainable ideas. The coordination between both is the key to a satisfactory level in the prospect of qualities in life, health, and education. An article stated that humanity is afflicting the system by leading some negative trends inter alia population pressure, over-consumption of natural resources, pollution, and biodiversity loss [3]. The 3rd extent implies the economic coefficient which represents the incitement of system production continues to support the ecosystem. Of course, the natural resources are not infinite considering the regenerate progress is slow nor renewable because of that the productivity outcomes must be maintained without causing significant economic problems from uncontrolled inflation, inequality or poverty, labour issues, trade difficulties and sources shortage. In another word, implying the traditional approach from an eco-centric view is keeping the goals of human freedom, investment, and equality of distributions [4]. In such a manner, engineering devotes alongside all the patterns by innovating the substitution of the non-renewable resources starting with foster coherence between society and economy with a renewable product or design. Through that, it can be advanced into a facility, infrastructure or system which is engaging amid the society and environment. An author claimed the importance of engineering in sustainable transition is awareness of the society which holds the account in promoting the topology of sustainability [5]. Explained from an article, engineering sustainability comprises the provision of technical services, which certainly bounded to a sustainable basis, in effect that it will deliver services in any manner,

capable to supply essential needs, accessible, society and environmentally friendly [6]. Nowadays, heap efforts have been made to strike on the goals of sustainable development, taking on a good example of “Farming in the desert” by Charlie Paton. This project was piloted from a mini coolhouse in Tenerife, to all year summer countries of Abu Dhabi and Oman with different approaches yet the same prospect which is to counter a greater sustainable economic development for humankind. Naming it the Seawater Greenhouse, built on the coastal region of Somaliland in the Horn of Africa, using the sunlight and wind as the leverages to muse a new type of farming technique. Ideally, by utilising wind and sun to generate a system of evaporative cooling, subsequently, the farming can obtain the visible light and heat during the day, also a cool temperature which may lead to better growth [7]. This design shown in the figure below is formed with layered “soggy walls of cardboard” with corrugated angles as the panel based on the air-conditioning’s evaporator. Physically, cooling the greenhouse with abundant sources of sunlight and wind, yet freshwater is scarce, hence lies on its name by using the seawater would be

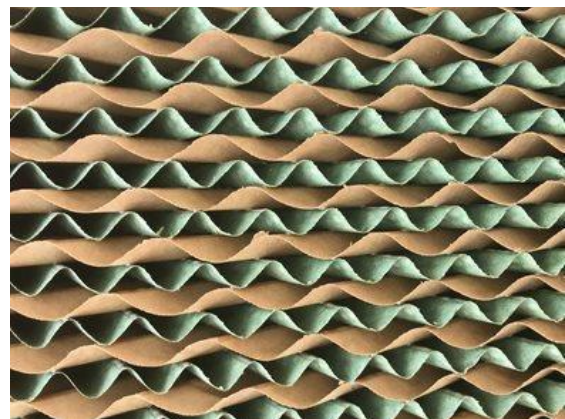


Figure 3: The structure of the cardboard used for cooling the seawater. Source: <https://www.ingenia.org.uk/Ingenia/Articles/0dcfbb73-b634-487a-93ec-669c2f3ac2bc>

the alternative to suit the process. The diversity in engineering has been a support in this project, from the wind for the cooling process, solar as the electricity generator to pump the

seawater up. and the resulting greenhouse is an absolute success and a good example of sustainable development.



Figure 4: The "Seawater Greenhouse in Somaliland".
Source: <https://www2.gaston.ac.uk/business/develop-your-business/case-studies/seawater-greenhouse-ltd>

The utmost ambitions of sustainable development lie within the three pillars, confronting humankind's challenges today from climate change, water scarcity, global warming, poverty, inequality and the lists go on.

Conclusion

As for the future concerns, engineering with sustainable development need to be more profound on the technical issues related to the environment and society, ideas or concrete solutions with more integrated, flexible and engageable techniques. The role in these paradigms reflect on public involvement, acknowledgment of the humankind survival depends on everyone's behaviour towards stabilizing the needs, surrounding and each other. The aspects such as environmental conservation, investment in renewables, saving on consumptions, supporting the innovation of sustainable designs are the keys to sustainable development to preserve nature and the next generations. A constant education, practical and investment can be governed to ensure that sustainability can foster the evolutionary nationally, regionally, and globally. Certainly, these contributions, participation and investment should be resulting in the equal distribution in economic resources for humankind.

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