

Sustainable Manufacturing Industries and Energy-Water Nexus Approach

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Abstract : The significant population growth and climate change issues have contributed to the natural resources depletion and their sustainability in the future. Manufacturing industries have a substantial impact on every country's economy, but the sustainability of the industrial resources is challenging, and the policymakers have been developing the possible solutions to manage the sustainability of industrial resources such as raw material, energy, water, and industrial supply chain. In order to address these challenges, nexus approach is one of the optimization and modelling techniques in the recent sustainable environmental research. The interactions between the nexus components acknowledge that all components are dependent upon each other, and they are interrelated; therefore, their sustainability is also associated with each other. In addition, the nexus concept does not only provide the resources sustainability but also environmental sustainability can be achieved through nexus approach by utilizing the industrial waste as a resource for the industrial processes. Based on energy-water nexus, this study has developed a resource-energy-water for the sugar industry to understand the interactions between sugarcane, energy, and water towards the sustainable sugar industry. In particular, the focus of the research is the Taiwanese sugar industry; however, the same approach can be adapted worldwide to optimize the sustainability of sugar industries. It has been concluded that there are significant interactions between sugarcane, energy consumption, and water consumption in the sugar industry to manage the scarcity of resources in the future. The interactions between sugarcane and energy also deliver a mechanism to reuse the sugar industrial waste as a source of energy, consequently validating industrial and environmental sustainability. The desired outcomes from the nexus can be achieved with the modifications in the policy and regulations of Taiwanese industrial sector.

Keywords : energy-water nexus, environmental sustainability, industrial sustainability, natural resource management

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