WATER FOOTPRINT ASSESSMENT FOR A PROPOSED INTEGRATED SOLID WASTE MANAGEMENT FACILITY: AN APPLICATION TO BERUWALA UC

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Water can be considered one of the essential resources to sustain life on earth. For human use, reliable access to clean and affordable water is regarded as one of the humanitarian goals. It is alarming to note that humans consume freshwater resources at a rapid rate, which is unarguably considered as unsustainable. Hence, the global concern is focused on more effective means to protect and conserve freshwater resources for all the current and future needs.

During their entire life cycle, buildings and civil engineering structures consume large amounts of freshwater, leading to various strategies adopted for conserving it. However, most of these strategies are only used at the facility operating stage, while the water utilized in the construction phase is grossly overlooked and ignored. This research investigates the significance of pre-operational embodied water through analysing a case study of a proposed integrated solid waste management (ISWM) facility at Beruwala UC and attempts to establish the importance of innovative and sustainable design practices. To compute water embodied in the construction materials, five types of materials, which are soil/rockfill, brick, concrete, steel, and ceramic tiles, were considered. To compute the inherent embodied water content, the quantities of building material extracted from the Bill of Quantities were multiplied by the embodied water coefficients of each material from past literature. Operational water usage was calculated considering all the activities at the period of operation of the ISWM facility. After that, it was converted to a 30-year life cycle period. To determine the significance of embodied water, it was compared with water consumed during the operational period. The study determined the pre-operational embodied water as 7 kL/m^2. This represents 22% of operational demand for water, considering a life cycle of 30 years. Also, few strategies to reduce water usage in pre-operational and operational stages were identified in this research. The study indicates that the water embodied in producing the construction materials is significantly greater than the actual water usage during construction. Sustainable strategies for construction, in general, and sustainable on-site water use, in particular, are relatively low priority sectors in the construction industry. However, with the increasing scarcity of freshwater resources, strategies should be implemented to reduce water usage in the construction industry. Choice of materials and their water efficiency plays a significant role in the total embodied water density of any construction. In practice, determination of total embodied water density ignores specific components of buildings, however, proper attention should be paid to each element in the design to ensure sustainable practices for saving freshwater sources.

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