Design Workshop | Design Innovation in Urban Energy

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"The greenest buildings are the ones already built". 3Rs – Reduce, Reuse, Redesign could be a motto and design praxis, and energy retrofits holds potentials. As a socio-economically responsible agenda, energy retrofits in the form hardcore architectural redesign and adaptive retrofits could be beneficial economically in the process of incremental renovation in building design and construction process over a period of time. Further, soft retrofits in the form of addition of equipment to harness the wind, sun, water from the atmospheric air humidity condensation, etc., are potential innovations in urban energy sustainability. Transition to net zero is for and about people, and the implementation of such innovations in existing or new buildings are expected to be user-centric, and a move forward towards energy equity for all. India aims to reach net zero by 2070 (Govt. of India, 2022). To limit global warming to less than 1.5 °C, as called for in the Paris Agreement, entails reduction of emissions to 45% by 2030 and reach net zero by 2050. Out of the 17 SDGs of the UN, various energy concerns include:

SDG 6: Clean water and sanitation

SDG 7: Affordable clean energy

SDG 11: Sustainable Cities and Communities

Various energy agencies core missions have been to promote secure and affordable energy supplies to foster economic growth, and fair and inclusive clean energy transitions. The transition to net zero is for and about people. Nobody should be left behind in this transition. (IEA, 2021).

With the aforementioned socio-economically and environmentally responsible agendas, the CEO and Founder of TRD Studios, Hyderabad introduced the USP's of the design firm's praxis that includes: business lifecycle management, focus on scalable solutions and sustainability through multi-sector expertise to cater to a diverse industry need.

The workshop delves into both theory and projects praxis, such as project VAYU which aims to provide renewable energy, potable water, and environmental adaptability. Project VAYU combines innovative wind and water technologies to create sustainable solutions for both urban and rural environments. It explores the design and development process, key features, and potential impacts. The project VAYU incorporates various product designs, such as: vertical axis wind turbines (VAWT) to harness wind energy efficiently in various environments, Atmospheric Water Generators (AWG) systems to produce potable water from atmospheric moisture and addressed water scarcity issues. The VAYU project is an integrated solution combining VAWT and AWG technologies with the objective of creating a comprehensive approach to sustainable energy and water production. Further, in view of the contexts of use and versatile applications, solutions are designed to work effectively in both urban and rural settings, adapting to diverse environmental conditions. The projects are adequately equipped with researches on the natural elements: wind, water, air, etc., in specific climate zones and complemented by international and national case studies. The workshop also explores the double diamond's design process that follows: discover, define, develop, and deliver as a way to highlight the effectiveness of divergent and convergent design thinking process. The design artefacts were envisioned to be integrated into the urban forms and contexts. For instances, VAWT's various design thoughts including compact design, omnidirectional capability, noise reduction, aesthetic integration were the parameters considered. In the same vein, VAWT's design considerations for rural deployment includes: modular design, scalability, durability, low maintenance. In Urban Context, AWG design's objective is to blend seamlessly into urban building facades while complementing the aesthetics, utilize Peltier coolers that enables efficient water generation even in low-humidity atmospheric conditions, compact design in urban settings where spaces are limited. AWG Design in rural context incorporates passive collection system to minimize energy use, community integration, solar panels to power AWGs, scalability to fit the needs of the rural community sizes. The students were led through various process of design from user research, concept design, prototypes to user testing in various conceptual models. The workshop also highlighted key challenges, such as:

fluctuating wind speed, low humidity levels, integration or retrofitting into existing infrastructures, cost optimization, etc. The students were introduced to integration of VAWT and AWG technologies, as well as the design and entrepreneurship collaboration possibilities between various cognate design disciplines including designers, architects, planners, engineers, etc. Further, as a user-centric approach, highlights were made on community outreach to engage with local communities to understand their specific needs and concerns regarding energy and water access. Govt. collaboration and consultation could be beneficial to existing sustainability initiatives, industry partnership could facilitate wider adoption and integration of VAYU technologies, while engaging with academic institutions could foster research and development opportunities related to Project VAYU. Last, but not the least, the project VAYU's educational and academic value were discussed. It is expected that the project VAYU could foster interdisciplinary learning, hands-on experience with sustainable technologies and their practical implementation in real-world diverse settings, nurture innovation and encourages students to think creatively and develop innovative solutions to global sustainability challenges, and offers entrepreneurship exposure for students to learn about the process of taking an innovative idea from concept to market-ready product.