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The development of superefficient air conditioning system to meet GSAS energy standards for FIFA 2022

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The Gulf Region countries have extreme climatic conditions and impose a heavy reliance on cooling, mostly electricity-based, and thus a strong and structural dependency of a high energy resource. In Doha-Qatar, the average highest outdoor temperatures during a year is 37°C however, high-temperature values that exceed 46°C could be observed in summer. As shown in Fig. 1, the temperature exceeds the 40°C for more than 300 hours which is anticipated to be doubled when considering Doha climate change 2025. The design and construction of buildings in hot-humid climates requires high energy consumption typically for air conditioning due to higher thermal loads. Regionally, there is a rising concern on the current rate of energy consumption due to air conditioning. Considering the wider impacts of carbon emissions on our climate, and the need to reduce these emissions, effective energy efficiency solutions are necessary in order to achieve the overall goal of reducing carbon emissions. This paper presents the simulated and measured efficiencies of the “All in One” 15 TR (52 kW) fully integrated HVAC systems driven by-product of rejected brine, waste heat and solar absorption chiller. The tested system is locally manufactured and installed in a testing facility at Qatar Science and Technology Park (QSTP). The system has shown more than 60% reduction in energy consumption compared to conventional systems.

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