

Mirzaei, Mohammad Amin, Mehrjerdi, Hassan, and Mansour Saatloo, Amin, 2023, Look-ahead scheduling of energy-water nexus integrated with Power2X conversion technologies under multiple uncertainties, *Sustainable Cities and Society*, vol. 99, Dec. 2023, Article number 104902.

Abstract Co-optimizing energy and water resources in a microgrid can increase efficiency and improve economic performance. Energy-water storage (EWS) devices are crucial components of a high-efficient energy-water microgrid (EWMG). The state of charge (SoC) at the end of the first day of operation is one of the most significant variables in EWS devices since it is used as a parameter to indicate the starting SoC for the second day, which influences the operating cost for the second day. Hence, this paper examines the benefits and applicability of a look-ahead optimization strategy for an EWMG integrated with multi-type energy conversion technologies and multi-energy demand response to supply various energy-water demands related to electric/hydrogen vehicles and commercial/residential buildings with the lowest cost for two consecutive days. In addition, a hybrid info-gap/robust optimization technique is applied to cover uncertainties in photovoltaic power and electricity prices as a tri-level optimization framework without generating scenarios and using the probability distribution functions. Duality theory is also used to convert the problem into a single-level MILP so that it can be solved by CPLEX. According to the findings, the implemented energy-water storage systems and look-ahead strategy accounted for, respectively, 4.03% and 0.43% reduction in the total cost.

Keywords Electric vehicles; Energy-water nexus; Hydrogen vehicles; Look-ahead optimization; Multi-energy microgrid; Risk-constrained optimization