

The Energy Water Nexus: Coupled Infrastructure Modelling Opportunities

Water and energy systems are inherently coupled. Water infrastructure system operations can create significant electrical energy consumption and electricity production often relies on water availability. However, despite inter-sector dependencies and existing coordination opportunities, planning and operating water and electrical infrastructure is often conducted independently. This work explores opportunities to improve power and water system planning and operations by representing both sectors in coordinated and co-optimized models. On the energy supply side, bulk power system scheduling is co-simulated with a detailed stream flow model to improve the representation of river network constraints. On the energy demand side, water distribution system pumping schedules are co-optimized with power distribution network schedules to adjust electrical demand patterns. We demonstrate that coordination can provide benefits, however the computational and regulatory challenges are non-trivial.