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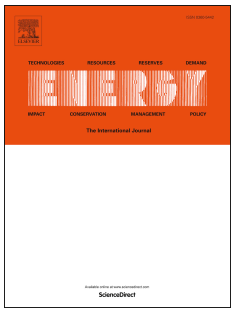

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Resilience oriented water and energy hub scheduling considering maintenance constraint

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Abstract

In this paper resilience oriented water and energy hub scheduling for a remote area is presented. The optimal operation scheduling considering maintenance programming and reliability indices are presented. Demands which include electricity, heat and drinking waters are supplied by diesel generators, boilers, combined heat and power units, and drinking water sources such as desalination units and transferring water. The considered system contains renewable energy resources such as wind turbine and photovoltaic arrays as well as electrical storage units. In order to enhance resiliency of system against forced outages of components and regular maintenance programs, maintenance constraints and reliability of supply have been addressed. The proposed formulation aims at taking the best use of the beneficial degrees of freedom associated with these units for decreasing total costs and increasing reliability subject to maintenance constraints and feasible operating region of components. The effectiveness of the proposed method is validated by implementation on a real remote region using mixed integer linear programming. The mathematical problem is solved in GAMS optimization package using CPLEX solver.

Keywords: Energy and water hub, Resilient optimization, Reliability, Operation and maintenance scheduling

1. Introduction

Throughout the world, many developing regions confront inadequate electric and thermal energy supply and the shortage of drinking water. Especially, remote regions depend extremely on standalone infrastructures and as the result, on the import of fossil fuels. As a preparative work for remote regions, the focus is on renewable energies. Due to the effects of high transportation costs and increasing oil prices, which would usually range two or three times above onshore market prices, energy supply systems based on renewable energies can easily compete successfully with fossil-fuel based supply systems [1].

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