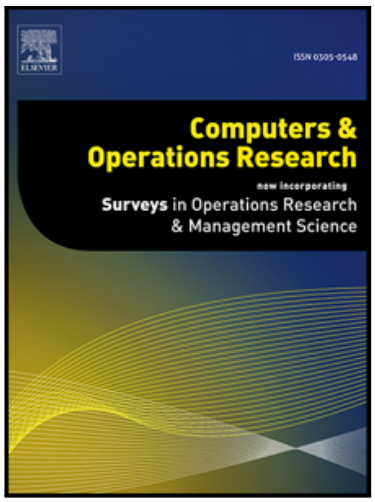

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Abstract

The paper focuses on the optimal management of distributed energy resources aggregated within a coalition. The problem is analyzed from the viewpoint of an aggregator, seen as an entity called to optimize the available resources so to satisfy the aggregated demand by eventually trading in the Day-Ahead Electricity Market. Both a full and a residual perspective in the management of the integrated resources is investigated and compared. The inherent uncertainty affecting the optimal decision problem is dealt by adopting the stochastic programming framework as modeling paradigm. Two recourse formulations (different for the full and residual case) are defined and included within a rolling horizon scheme so to account for the dynamic nature of the problem. The overall approach has been preliminary tested on test instances designed starting from a real aggregation of prosumers. The analysis of the numerical results clearly shows the effectiveness of the approach as support tool in a real-setting.

Keywords: Energy Market, Stochastic Programming, Distributed Energy Resources, Aggregator

1. Introduction

In the last decades, electricity systems are facing significant changes as a result of the deployment of information and communication technologies (ICTs), power electronics and distributed energy resources, such as gasfired distributed generation, photovoltaic (PV) systems, small wind farms, electric vehicles, energy storage and demand response tools.

Distributed Energy Resources (DERs), unlike centralized generating units that typically exploit non-renewable sources (i.e. fossil fuels), offer the potential to integrate several renewable and non-renewable energy sources that are usually close to energy consumers. Moreover, they allow to overcome the disadvantages of the intermittent and unpredictable nature of the renewable energy sources and the possible mismatch with the energy demand.