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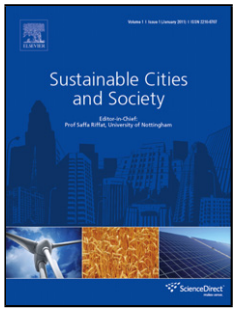


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# Algorithms for Smart Grid Management

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**Abstract**

In this paper, we will consider a modelization of Smart Grid on three subcomponents: local level, microgrid level and $T\&D$ level. Thus and on one hand, we will propose an algorithm that manages its local level. Our algorithm is paired with Branch and Bound algorithm to solve Knapsack Problem. The main goal of this algorithm is to regulate consumption peaks and manage the priority of domestic appliances, by spreading at best the energy depending on the priority and consumption without exceeding the total energy received.

Furthermore, we will introduce an asynchronous distributed max-flow algorithm to resolve the routing problem in order to optimize the $T\&D$ level. This algorithm uses a local computation to compute max-flow. Nodes communicate only by exchanging messages and no global information is needed. Our algorithm uses more than one augmenting path at each iteration allowing optimization of the execution time required for computing the max-flow.

*Keywords:* Smart Grid Modelization, Knapsack Problem, Branch and Bound Algorithm, Routing Problem, Distributed Max-Flow Algorithm, Optimization

## 1. Introduction

Smart Grid is presented as an intelligent power grid to optimize production [1], distribution and consumption of electricity. It helps to balance its delivery and demand through the introduction of the ICT (**I***nformation and*

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