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LOT-SIZING AND PRODUCTION PLANNING FOR ENERGY APPLICATIONS

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The global transition towards renewable energy sources and the increasing complexity of energy management systems present important challenges in the field of energy optimization. Moreover, the increasing penetration of large-scale renewable generation capacity and the rising need for flexible demand-side management, such as smart battery charging and load shedding, have introduced new levels of complexity. These developments require simultaneous optimization of both energy production and flexible consumption. The talk will focus on production planning and lot-sizing problems in the context of energy applications. Starting from some fundamental results on simple lot-sizing problems, we will illustrate two recent applications in this field. The first focuses on energy management, with an emphasis on optimizing storage decisions. We propose mathematical formulations, highlight key complexity issues and discuss structural properties and polynomial algorithms[1]. The second application addresses fair electricity supply planning for collective self-consumption communities[2]. Specifically, we study communities with shared ownership and collective energy storage systems. We explore fairness criteria for the allocation of jointly produced renewable energy and shared resources.

References

[1] Natalia Jorquera-Bravo, Sourour Elloumi, Safia Kedad-Sidhoum, and Agns Plateau. *Fair Energy Allocation for Collective Self-consumption*. In: Combinatorial Optimization - 8th International Symposium, ISCO 2024. Vol. 14594. Lecture Notes in Computer Science. Springer, 2024, pp. 388401.

[2] Sandra Ulrich Ngueveu, Christian Artigues, Nabil Absi, Safia Kedad-Sidhoum. *Lower and upper bounds for scheduling energy-consuming tasks with storage resources and piecewise linear costs*. J. Heuristics 28(1): 93-120, 2022.

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