Bilevel optimisation in energy transition: the example of Demand-Side Management and Industrial eco-park

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Multi-Leader-Follower games (MLFG) are complex bilevel optimisation problems in which the upper level problem or the lower level problem (or even both problems) is a Nash game. A lot of theoretical and computational progresses have been done in the analysis of these difficult problems. Our aim in this talk is to present some of our recent works in which applications of MLFG in the domain of energy transition are studied. We will consider in particular the case of Industrial Eco-parks and Demand-Side Management in electricity markets.
Associated papers are [6, 1, 7, 5] but also [4, 3, 2]

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[2] D. Aussel, A. Svensson. *Some remarks about existence of equilibria, and the validity of the EPCC reformulation for multi-leader-follower games.* J. Nonlinear Convex Anal., **19(7)**, 1141–1162, 2018.

[3] D. Aussel, A. Svensson. *Is pessimistic bilevel programming a special case of a mathematical program with complementarity constraints ?* J. Optim. Theory Appl., **181(2)**, 504–520, 2019. doi : 10.1007/s10957-018-01467-7.

[4] D. Aussel, A. Svensson. *Towards tractable constraint qualifications for parametric optimisation problems and applications to generalised Nash games.* J. Optim. Theory Appl., **182(1)**, 404–416, 2019. doi :10.1007/s10957-019-01529-4.

[5] D. Aussel, A. Svensson. *A Short State of the Art on Multi-Leader-Follower Games.* In S. Dempe, A. Zemkoho, eds., *Bilevel Optimization : Advances and Next Challenges*, Springer Optimization and Its Applications, pp. 53–76. Springer International Publishing, Cham, 2020.

[6] M. A. Ramos, M. Boix, D. Aussel, L. Montastruc, S. Domenech. *Water integration in eco-industrial parks using a multi-leader-follower approach.* Computers & Chemical Engineering, **87**, 190–207, 2016. doi :10.1016/j.compchemeng.2016.01.005.

[7] D. Salas, K. C. Van, D. Aussel, L. Montastruc. *Optimal design of exchange networks with blind inputs and its application to eco-industrial parks.* Computers & Chemical Engineering, **143**, 107053, 2020. doi :https ://doi.org/10.1016/j.compchemeng.2020.107053.

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