# Robust bilevel approach to energy management in smart grids

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A plethora of bilevel optimization approaches to demand response management in smart grids has been proposed in the scientific literature. Yet, all classical deterministic approaches assume that the Leader is perfectly aware of the decision problems of the Followers. This assumption can hardly be satisfied in practice. To overcome this limitation, this talk proposes a *robust bilevel programming* approach, which assumes that the parameters of the Followers are known imperfectly.

A robust bilevel model is introduced with uncertainty in the Followers' objective function coefficients in the form of polyhedral uncertainty sets. The Followers' problem is encoded into a linear problem with the Leader's variables appearing as parameters in the bilinear objective. For solving the robust problem, a *column-and-constraint generation* technique is proposed, which iteratively solves relaxations of the original problem with relevant discrete samples from the original uncertainty set. Experimental results are presented and the possibilities of generalizing the solution method to other robust bilevel problems with similar structure are discussed.

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