



Conferencia del Seminario de Métodos Estadísticos

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Applications of Bilevel Optimization in the Energy Sector

The energy sector is characterized by inherently hierarchical decision-making processes involving regulators, system operators, market participants, aggregators and consumers. Bilevel optimization provides an adequate framework to model these leader–follower interactions, particularly in liberalized electricity markets and emerging smart grid environments. This presentation offers an overview of application areas of bilevel optimization in the energy sector, including electricity market design and strategic bidding, transmission and renewable investment planning, demand response programs, integrated energy systems, carbon markets, and congestion management.

Special emphasis is placed on demand-side flexibility aggregation, where an energy aggregator acts as a leader by designing financial incentives, and multiple consumers respond as followers by optimally scheduling their energy consumption and distributed resources. A detailed bilevel multi-follower model is presented to capture this interaction, accounting for realistic residential loads, storage, electric vehicles and comfort constraints.

The presentation highlights the relevance of bilevel optimization as a decision support tool for modern energy systems facing increased decentralization, renewable integration and active consumer participation.

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Hora: 13:00 horas

Lugar: Seminario Rubio de Francia (Edificio de Matemáticas, Planta 1ª)

Online: <https://meet.google.com/dcd-yctw-dpq>