CIRRELT

Séminaire du CIRRELT Seminar

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OPTIMIZATION OF DISTRICT HEATING SYSTEMS

Résumé / Abstract :

"District heating systems provide the heat generated in a centralized location to a set of users for their residential and commercial heating requirements. Heat distribution is generally obtained by using either hot water or steam flowing through a closed network of insulated pipes and heat exchange stations at the users locations. The heat is generated by complex plants involving several machines (e.g., co-generators, which produce also electrical energy, heat pumps, boilers, …) and different renewable sources (Waste-to-Energy, geothermal, solar thermal, biomasses …). The use of optimization techniques, both for the strategic design of such networks and plants, as well as for their operational management is still at an early stage and is strongly motivated by the high cost and complexity of the required infrastructures. However, these problems turn out to be particularly challenging because of the technical characteristics, e.g., due to the high temperature of fluids and the joint product of thermal and electrical energy, as well as the size of the real world applications."

"We present an overview of the main optimization problems in district heating, both at a strategic and at an operational level, and describe mathematical models for their solution. In particular, at the strategic level we address the incremental evolution of an existing network along time. In this problem the optimal set of potential customers to be connected to the network must be selected, together with the corresponding pipes and plants extensions. As to mid-term problems, we examine the best strategies to be used to operate plants and control the energy dispatching, so as to minimize the costs or maximize the revenues. Finally, at the operational level (i.e., day-before and within-day in real-time) we address the optimal dispatching of heat and electricity to the network. For the most important of them we describe mathematical models developed to support district heating system design and operations and for the operational manage. The models have been within a long lasting collaboration with major italian multi-utility companies and are incorporated in advanced decision support systems. Results on real and randomly generated problems are discussed. We also provide an overview of the future developments and challenges, in particular related with design and real-time operations of smart thermal and electrical grids."

Note : Daniele Vigo is Professor at the Department of Electrical, Electronic and Information Engineering (DEI).
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JEUDI / THURSDAY

18 juillet 2013 / July 18th, 2013
10h00

Salle / Room 5441
Pavillon André-Aisenstadt
Université de Montréal

Ouvert à tous / Open to all

Organisateur / Organizer
GILLES SAVARD

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