This study is motivated by the need to increase energy efficiency in existing buildings. Around 33% of the energy used in the world is consumed in the buildings. Identifying and investing in the right energy saving technologies within a given budget helps the adoption of energy efficiency measures in existing buildings. We present a mathematical programming approach to select the right energy efficiency measures among all the available ones to optimize financial or environmental benefits subject to budgetary and other logical constraints in single- and multi-period settings. We also present a business model to offer energy efficiency measures as a service. By using a real case study of a university campus, all the relevant energy efficiency measures are identified and their effects are determined by using engineering measurements and modelling. Through numerical experiments using the case data, we investigate and quantify the effects of using environmental or financial savings as the main objective, the advantages of using a multi-period planning approach to a single-period approach, and also feasibility of offering energy saving technologies as a service. We show that substantial environmental and financial savings can be obtained by using the proposed method to select and invest in technologies in a multi-period setting. We also show that offering energy efficient technologies as a service can be a win-win-win arrangement for a service provider, its client, and also for the environment.

Short Bio:

Professor Baris Tan is the Vice President for Academic Affairs at Koç University. He received a B.S. degree in Electrical and Electronics Engineering from Bogazici University in 1990. He received a master's degree in Industrial and Systems Engineering (1991), a manufacturing systems engineering degree (1993), and a doctor of philosophy degree in operations research (1994) from the University of Florida.

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