

Factors Affecting Residential, Commercial and Industrial Energy Consumption

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Abstract

Global energy consumption continues to grow, and the combined residential, commercial and industrial energy demand is projected to rise significantly in the future due to population and economic growth. There are many factors affecting the amount and timing of energy consumption. Climate and physical building characteristics (e.g., total floor, window type) are among the most critical factors that impact energy consumption. In terms of residential energy consumption, daily usage of different household appliances, demographic, and socio-economic factors such as family composition and income lead to different consumer profiles. Consumers' daily life routines, habits, social life and energy-saving actions also shape energy consumption profiles in identical houses and over different times of the day. Additionally, trends in people's lifestyles and the rise in remote working after the COVID-19 pandemic results in variations in overall residential energy consumption. From the commercial building and industrial energy consumption perspective, building characteristics, and type of commercial and industrial activities are driving forces of energy consumption dynamics. The aim of this study is to explore the main factors influencing residential, commercial and industrial energy consumption. A holistic approach will be utilized to draw a comprehensive picture by covering physical, social, demographic and environmental perspectives. This study will provide a basis for the researchers working on energy data analytics, energy consumer segmentation and energy-efficient solutions.

Keywords

Energy consumption, Energy consumer profile, Industrial energy consumption, Literature review, Residential energy market.

Acknowledgements

The authors acknowledge the contributions of Istanbul Gas Distribution Industry And Trade Joint Stock Company.

Biographies

Huseyin Biyikci received a B.S. degree in petroleum and natural gas engineering from Istanbul Technical University and He received an M.S. degree in Industrial and System Engineering from Istanbul Sehir University. He is studying for a PhD degree in Industrial Engineering at Marmara University. He held IT and R&D projects in IGDAS. He is currently working as a project coordinator in the smart grid area for 10 years. His primary research areas are smart grids, smart metering, innovation, digitalization and manufacturing strategies, and project management and scheduling.

Merve Er is an Assistant Professor in the Department of Industrial Engineering at Marmara University, Turkey. She holds BS, MS and PhD degrees in Industrial Engineering. She was a Postdoc at Heriot-Watt University in UK between April 2018 - March 2019 and supported by the international post-doctoral research scholarship program of the Scientific and Technological Research Council of Turkey (TUBITAK). Her main research interests include Data Mining, Modelling and Simulation of Complex Systems, and Risk Management. She has published many articles, chapters, and conference papers. She has also participated in several industries and government projects.