Energy efficiency gains through modelling and site measurements for Nazarbayev University Technopark

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The paper will present the strategies to minimise energy consumption of Technopark, which is a building located near the Main building of Nazarbayev University. It incorporates space for laboratories, offices and prototyping centre. Its annual energy consumption will be modelled using the software package BIM HVAC, based on the operation of building as well as taking into consideration of all the installed civil, mechanical and electrical systems. For the mechanical and electrical systems, equipment ratings and actual energy consumption will be collected and examined. The simulation data will then be compared with measured consumption. Various methods of energy minimisation, which will be mainly focused on modifying the operations of the system and, to a lesser extent physical modification of the system, will be modelled and suggested.

Convenience of Efficiency Measures applied to Envelop of Laboratory Facility located in Burabai, Kazakhstan

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A large portion of primary energy consumption in the world is associated to building sector; i.e. residential sector. Most studies agree on blaming space heating-cooling as the main reason of such high consumption, especially enhanced by excessive heat losses through windows and walls. Despite it is well known that proper selection of wall insulation and windows may minimize this issue, an economic assessment is needed to demonstrate the viability on a case-by-case basis. Therefore, the aim of this paper is to assess the techno-economic viability of using higher thermal-resistance insulation and windows instead of ordinary planned ones for an environmental laboratory, which will located in the region of Borovoe, Kazakhstan.

The environmental laboratory is originally planned to be insulated by mineral basalt wool and 3-chamber profile double layer windows. The proposed energy efficiency measures enclose two scenarios: (a) wall insulation using extrusion polystyrene; and (b) wall insulation using polyisocyanurate. In both proposed scenarios windows were changed to 5-chamber profile, triple-layer glass. Technical and Life cycle cost analyses resulted in substantial energy savings, but a negative Net Present Value in both scenarios, being extrusion polystyrene the less critical one. Therefore, despite energy efficiency measures demonstrated their potential energy savings, their implementation in the present case study is only favored under government policies, such as initial grants or subsidies.