International Scientific Conference "Environmental and Climate Technologies", CONECT 2016,
12–14 October 2016, Riga, Latvia

Urban planning needs. Clustering of energy end users

Antra Kalnbalkite*, Dace Lauka, Dagnija Blumberga

Institute of Energy Systems and Environment, Riga Technical University, Azenes iela 12/1, Riga, LV–1048, Latvia

Abstract

The main goal for energy efficiency is to reduce energy consumption in all ways – in production, transmission and consumption. The European Union has the main role in energy reduction and has set many key instruments to reduce energy consumption. The methodology which is used in this paper specifies energy loads using appropriate indicators in the next years. In this paper three types of indicators are used – total heat energy consumption, MWh/year; specific energy performance of buildings consumption, kWh/m^2 year; heat supply tariff, EUR/MWh. Once the indicators are set, the next step is to show results. In this case the ArcGIS program which is very suitable for visualizing data between different regions is used.

1. Introduction

The vision of the future in the context of urban planning is connected to reducing (minimizing) energy final consumption for energy end consumer. Various factors affect it, such as a country's regional development perspectives, climate change and adaptation, changes in population, and increased opportunities for energy efficiency [1, 2].

Together with other member states of the European Union, Latvia tries to reach the EU energy power politics defined goals in the short-term and long-term. The fundamental role is to reach the goal set in March 2007 by the EU

---

* Corresponding author. Tel.: +371 67089908.
  E-mail address: antra.kalnbalkite@rtu.lv

Council for increasing the energy efficiency (increase energy efficiency by 20 % till 2020) [3]. Three key instruments were defined to reach the aforementioned goal:

- Energy Performance of Buildings Directive [4] is an ambitious tool to improve energy efficiency of the building sector and foresees minimum building efficiency standards for newly built and restored buildings and their parts, also it foresees implementation, at the national level, of a requirement to have almost zero energy levels for buildings;
- Energy Labelling Directive [5] and Ecodesign Directive [6] foresees general requirements for product labelling and minimal energy efficiency indicators;
- Energy efficiency Directive [7] foresees that the EU energy efficiency goal is to achieve that all the EU member countries consume no more than 1474 Mtoe energy in 2020, for each country setting indicative primary energy saving target. The Directive determines various objectives: mandatory energy saving target for each member country, responsibility for the country on a yearly basis to renovate 3 % of building area owned and used by the state.

In accordance with the European Commission announcement [8], starting from year 2020 it will be possible to increase energy efficiency by 18–19 %. The Energy Efficiency Directive undertakes activities that comprise all energy supply infrastructure, including energy generating, management and distribution, and it includes a significant role of the public sector in the energy efficiency industry, building and machinery, manufacturing as well as the necessity to provide a possibility for the end consumers to manage their own energy consumption.

Interactivity between economy and energy is characterized by various factors, however, primary, end consumption energy or electro energy intensity shows how energy intensive the country's economy is. Energy intensity is measured by energy consumption for 1 gross domestic product unit that is converted into monetary units and constant prices (for instance, toe for one unit NDP for one Euro in the prices of year 2005 (toe/Eur (2005)). Primary energy intensity trend changes are measured in general energy consumption productivity in the country (see Fig. 1).
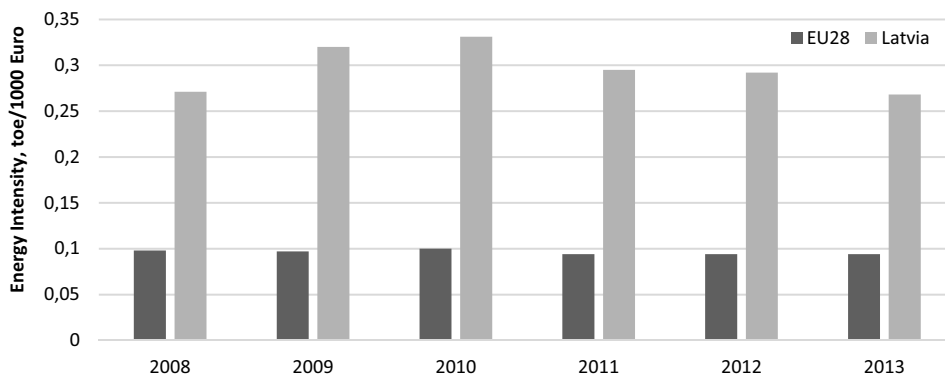

Fig. 1. Final energy intensity in EU28 and Latvia [9].

In the time frame 2000–2013, primary energy efficiency in Latvia has reduced by approximately 30 %. The explanation behind this is more effective energy resource usage, structural changes in the economy as well as general economic growth. Primary energy efficiency reduction is explained also with investments in the energy transformation sector for machinery change, energy loss reduction in energy management and distribution networks. Nevertheless, energy intensity in Latvia is twice as high as the average in the EU (see Fig. 3).

Activities defined in the legislative documents to improve energy efficiency will allow Latvia to move towards the set goal within the national reform program by year 2020 to reach energy savings up to 0.67 Mtoe. In recent years, gross for the domestic energy consumption has reduced by 0.16 Mtoe (from 4.6 Mtoe in 2008 to 4.31 Mtoe in 2013).