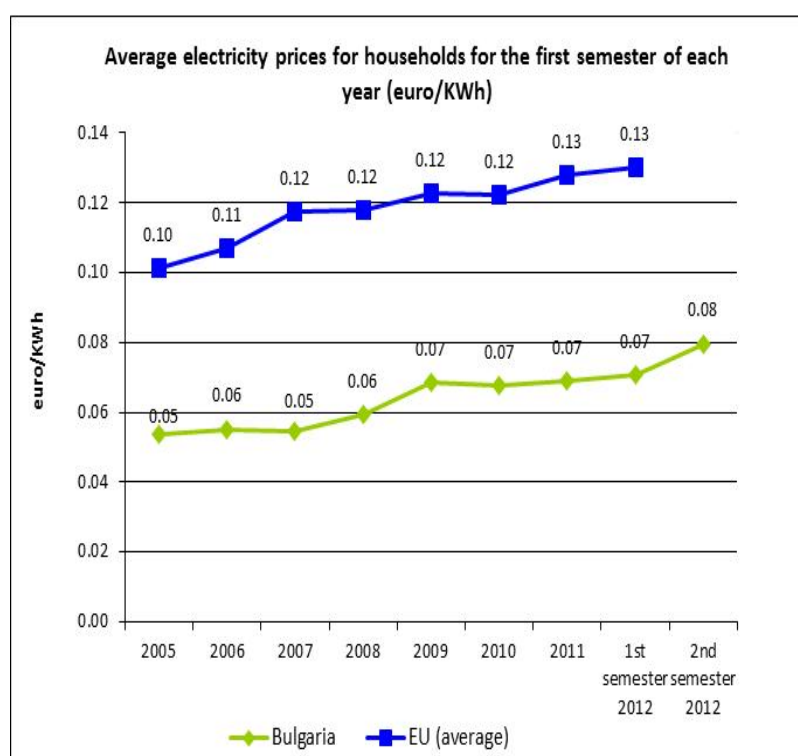


Energy saving technologies in the Bulgarian residential sector

The growing consumer prices of electricity have remained at the center of public debates over the past months, especially following their increase last year by 13%. Even though the regulated market suppresses their growth, prices have steadily increased since 2005, both in Bulgaria and in the EU. The main problems directly affecting electricity prices in Bulgaria are:



- Bad governance and corruption within state owned enterprises and regulatory authorities in the energy sector;
- The introduction of more production facilities from renewable energy sources than initially planned over the period 2011-2012;
- The execution of long-term energy contracts with the privatised TPP Maritsa Iztok 1 and TPP Maritsa Iztok 3, regardless of the electricity price they offer.

Source: Eurostat & National Statistical Institute, 2013

The fixed components of electricity prices, such as the cost of raw materials and the transmission and distribution tariffs, reduce the possibility of keeping electricity prices artificially low for political reasons, a manoeuvre which will be even more difficult as the European energy markets move towards full liberalization. In Bulgaria, the liberalization will most likely cause an additional short-term increase in consumer prices, before open competition exerts enough pressure on the market to perform better and eventually bring prices down.

In the context of these developments, measures aimed at improving the energy efficiency of buildings are becoming increasingly popular. According to an assessment of the European Commission from 2012, the EU is only half way to achieving its goal of reducing

its energy consumption by 20% and if current levels are maintained, consumption will only be reduced by 9% by 2020. Bulgaria is lagging behind in introducing the EU legislative requirements in this field, which prompted the European Commission to issue at the beginning of 2013 a reasoned opinion, according to which the main problem areas are:

- Introducing energy efficiency requirements for new and old buildings;
- Performing regular assessments of heating and cooling systems;
- Issuing energy certificates and setting up rules which will guarantee that by 2021 all new buildings will have nearly zero-energy consumption.

The introduction of these measures requires a significant financial commitment by the government, business enterprises and population, as well as significant legislative changes. Given the harsh economic climate in the country, it is not surprising that national authorities are avoiding the introduction of these measures, as this would require additional spending for the population, probably causing public outcry. Furthermore, creating new regulatory requirements will take much longer in Bulgaria where the administrative basis in this sphere is missing, compared to other member states, where energy efficiency has been integrated in national legislation for several years.

Energy efficiency in Bulgarian homes

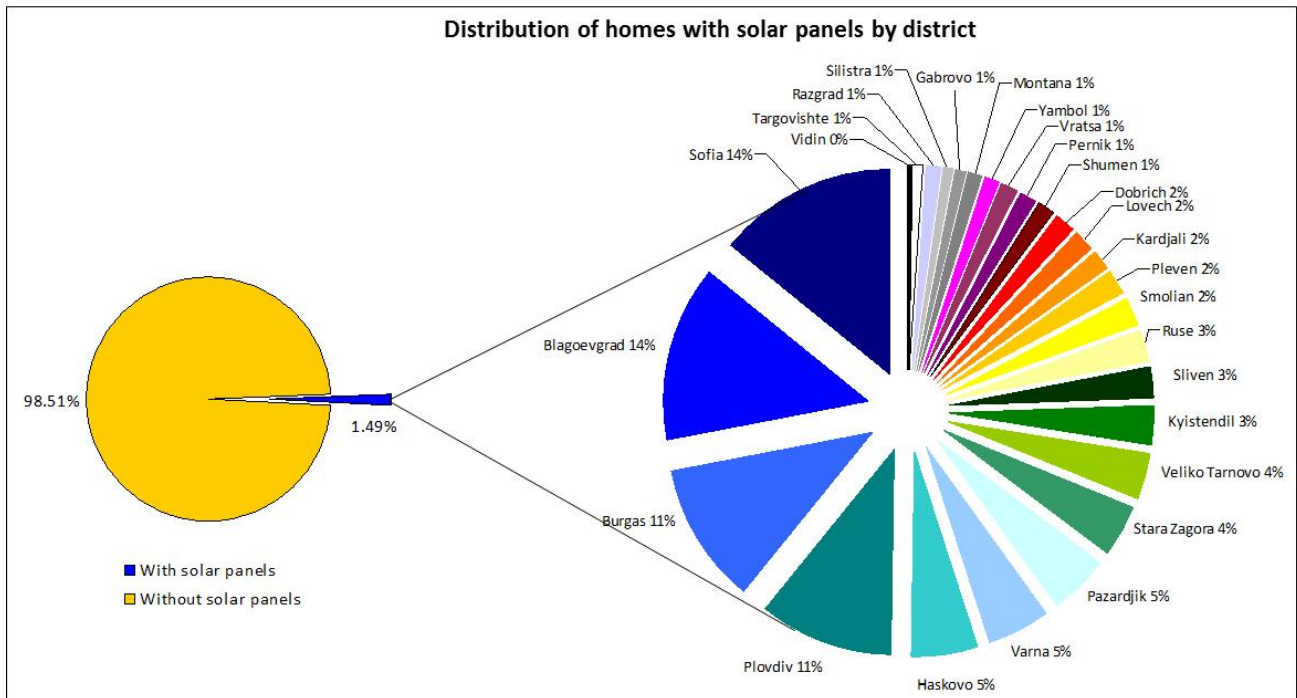
Bulgarian homes can benefit from the combined effect of three main measures to improve their energy efficiency:

- Using energy-efficient electrical appliances;
- Insulating and renovating residential buildings;
- On-site energy generation.

Currently there are two main programmes which finance measures aimed at improving the energy efficiency of residential buildings. In 2012 the Bulgarian Ministry of Regional Development and Public Works launched a three year programme available to associations of home owners in 36 towns and cities, financed by the Operational Programme Regional Development and co-financed by the Regional Development Fund of the EU, for a total of BGN 50 million. Initially, the programme provided a grant of up to 50% of the total cost of renovation, while the Housing Renovation Fund, set up as part of the initiative, would provide loans for the other half of the total cost. During the first year following the programme's launch, only BGN 218,135 were claimed, a sign of low levels of engagement of home owners combined with high administrative costs of participating in the programme. As a result, in April 2013 the size of the grants was increased to 75% of the total cost.

Homeowners can also benefit from the joint project of the Bulgarian Sustainable Energy Development Agency, the European Commission and the European Bank for Reconstruction and Development through the 'Residential Energy Efficiency Credit Facility'. The programme will last until 31.07.2014 and is worth € 40 million, while an additional € 14 million in grant financing has been made available by the Kozloduy International Decommissioning Support Fund. Borrowers can benefit from up to a 35% incentive towards the cost of their energy saving projects, once an independent consultant

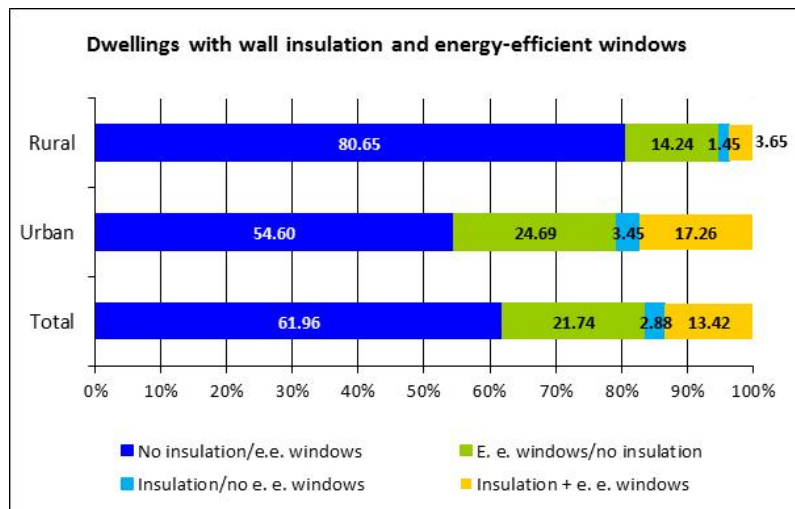
has assessed their eligibility. Over the period 2006-2012 the programme has committed to 41,496 energy efficiency loans, while € 11,903,952 have been issued as incentive grants. A recent report of the European Commission suggests that data regarding the introduction of energy-efficient technologies in buildings and their subsequent effects is very limited. Bulgaria's progress with regards to improving the energy efficiency of its building stock and the residential sector in particular can be assessed primarily through the data of the latest national census, carried out by the National Statistical Institute in 2011.



Source: National Statistical Institute, 2013

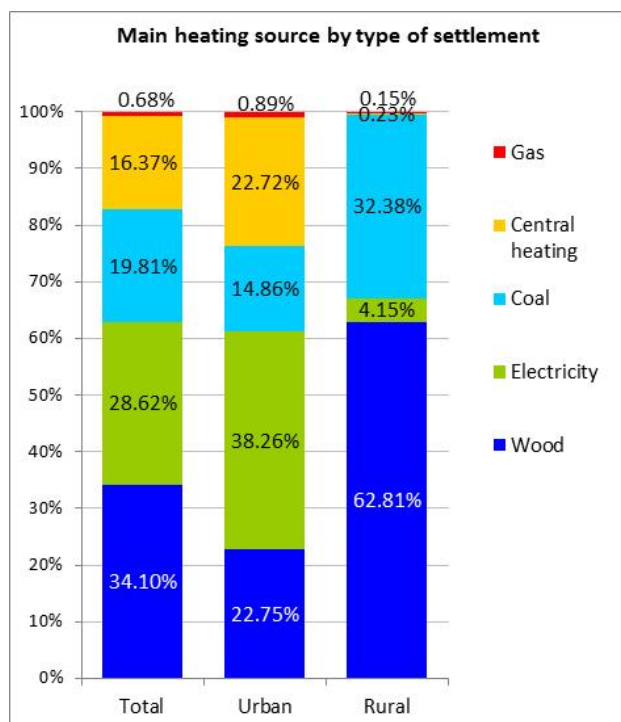
Photovoltaic panels are among the most efficient renewable energy sources that can be used for on-site electricity generation in individual homes. They don't produce any harmful emissions and can be installed in small generation units in both rural and urban areas. The European Commission has estimated that in urban areas a Bulgarian home can produce on average 1600 KWh/m² every year, amounting to 30% of the average household electricity consumption. The census data shows that this potential remains largely untapped as only 1.5%, or 30,629 out of the total 2,060,745 residential buildings in the country, had installed solar panels at the beginning of 2011. More than half of them - 60% are in urban areas. The majority of solar panels - 87% are installed in single family homes. The highest percentage of buildings with photovoltaic panels is registered among state- and municipality-owned buildings (e.g. orphanages and old people's homes) - respectively 7% in urban areas and 8% in rural areas.

Wall insulation and energy efficient windows are much more widespread tools used to optimise Bulgarian households' energy performance compared to the installation of on-site electricity generation technologies such as solar panels. Numerous studies show that about half of the heat lost by a household goes through the walls and windows. An average Bulgarian home could save up to a third of its energy consumption for heating simply by installing proper insulation.



Source: National Statistical Institute, 2013

However, only 18% of all households are currently reaping the benefits of insulation. Urban homes are significantly more active in this regard with 40% having energy efficient windows, of which a further 41% also have wall insulation. In rural areas on the other hand, where residential buildings are significantly older, less than 4% of all households have installed energy-efficient windows and wall insulation. Overall, it appears that if a family must choose between the two measures, energy efficient windows prevail with 22% of all households, while 2.8% of all homes only have wall insulation.



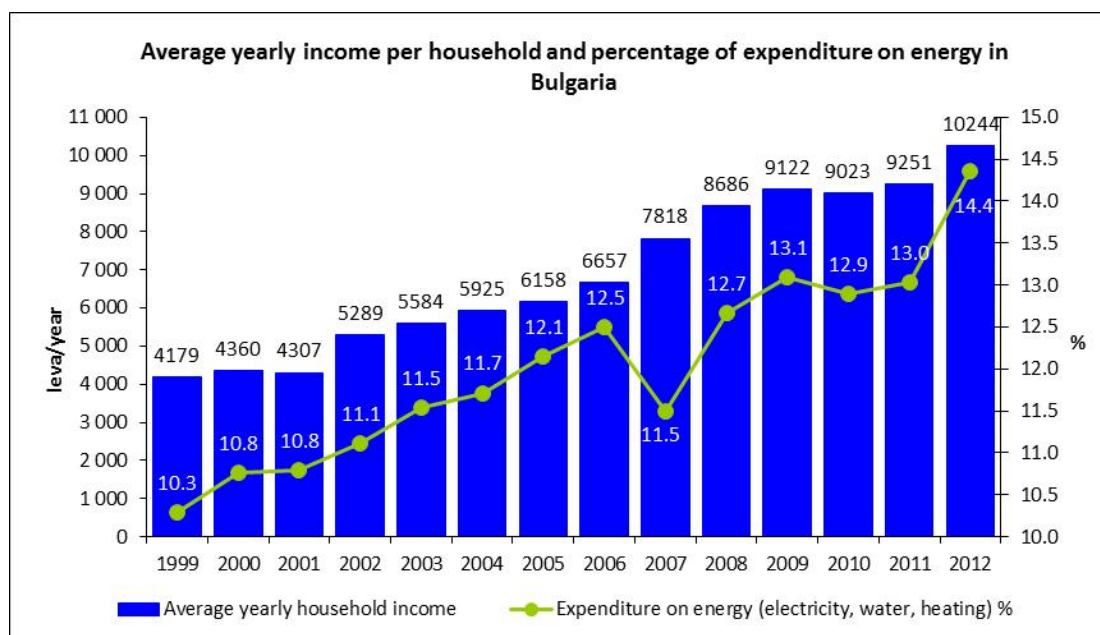
While there is no readily available data about the proportion of the overall energy consumption of Bulgarian households used for heating, data concerning other countries can be used as a point of reference. For example, in Poland, 66% of the total energy consumption in households is used for heating. Therefore, choosing the most energy efficient and clean source can have a great impact on households' finances, as well as reduce their greenhouse emissions.

Source: National Statistical Institute, 2013

The most popular heating fuels used in Bulgaria are wood and electricity, used by 31.1% and 28.6% of households respectively. Only 0.7% of households use gas, which is a result in part of the low levels of gasification even in urban areas.

The energy mix varies significantly between urban and rural areas. 38.3% of urban households use electricity for heating, followed by wood and central heating. The vast majority of rural households on the other hand use wood (62.8%) and coal (32.4%).

The widespread use of wood and coal for heating is indicative of energy poverty among the population. According to EU statistics on income and living conditions, more than 30% of households in Bulgaria are unable to keep their homes heated during the cold winter months. This is particularly worrying given that Bulgaria has one of the lowest energy consumption rates for space heating in Europe, with only 0.54 tonnes of oil equivalent per dwelling compared to the EU average of 0.94 tonnes of oil equivalent per dwelling. Furthermore, the average Bulgarian household is spending an increasing proportion of its income on energy sources, including heating and electricity. This implies that despite using comparatively less energy to heat their homes, Bulgarians spend a higher proportion of their incomes on electricity than households in other EU member states.



Source: Eurostat, 2013