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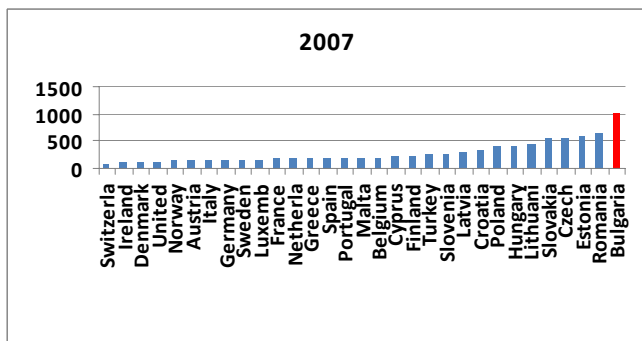
ENERGY EFFICIENCY IN BULGARIA: THE CASE FOR MARKET-BASED APPROACH AND TRANSPARENCY

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Background

Measured by using market currency exchange rates, Bulgaria has consistently ranked as the most energy intensive economy in the EU: in 2007, it used over a ton of oil equivalent to produce 1,000 Euro worth of gross product (Figure 1). Measured by using purchasing power parity, Bulgaria's energy intensity is still dismal, around 600 kg of oil equivalent per 1,000 Euro of product.

Figure 1. Energy intensity of GDP in Bulgaria and other EU countries, kg oil equivalent per 1,000 Euro at market exchange rates

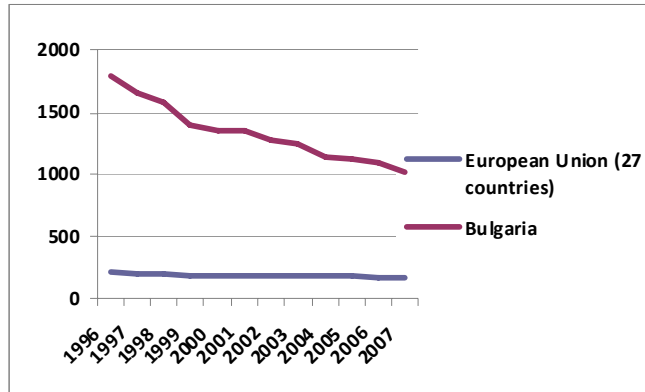


Source: Eurostat



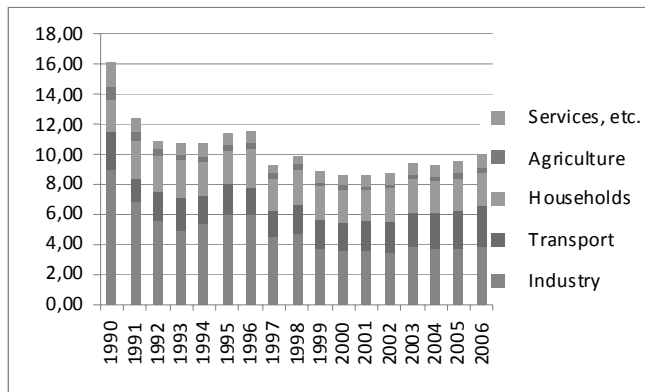
Even though still negligible by any standard, Bulgaria's energy efficiency has actually improved by about 50% since 1996 and has been on an uninterrupted path to a change for the better by about 5% per year (Figure 2). One of the reasons for the improvement is the restructuring of energy demand, which has been dominated by a very inefficient and energy intensive industry focusing on metallurgy and chemicals; another one is the high fleet turnover rate in transportation. Internal losses in the energy sector also account for a significant share of the energy waste. As metallurgy's share in the industrial portfolio of Bulgaria waned over the recent years, so did industry's share in final energy consumption. Between 1996 and 2007, energy demand in all sectors of the economy apart from industry and transportation exhibited little change in absolute numbers (Figure 3).

Figure 2: GDP energy intensity, kg oil equivalent per 1,000 Euro at market exchange rates



Source: Eurostat.

Figure 3: Energy demand by sector, MTOE



Source: Eurostat

Challenges

Overall, the Bulgarian economy seems to have completed the transition from heavy industry to less energy intensive light industry¹ and thus already picked the low hanging fruit of natural gains in efficiency. The country is probably at a point, as some experts² argue, from which onwards any additional gain in efficiency will have to be attained through advances in technologies of energy production, conversion, transportation, and use which will call for

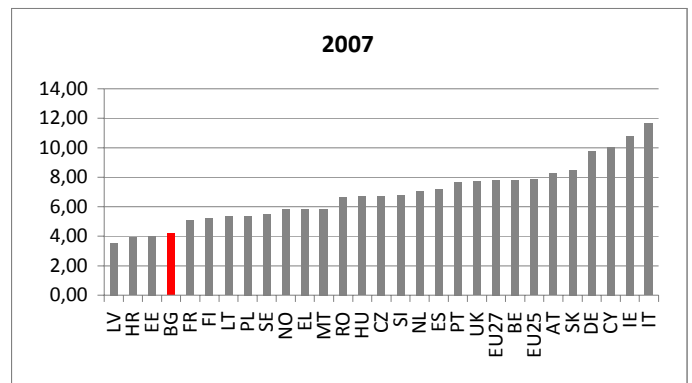
¹ In recent years heavy industry plants have either been closed (Kremikovtzi metallurgic complex) or have been operating at very low capacity utilization rates.

² Tasko Ermenkov, Executive Director, Energy Efficiency Agency

cost-effective approach and a strong incentive system. At the user end this means fleet replacement by installing more efficient appliances, buying less thirsty vehicles, improving insulation of buildings, lighting improvements, and deploying more efficient production technologies and procedures. In conversion, thermal power plants, boilers, and a plethora of other hardware devices will have to be replaced or updated, along with production methods and procedures. In energy transportation, smart grids, more efficient district heating nets and other solutions will have to be implemented. To execute the tasks, extensive investment in energy efficiency will have to be made over the next decade.

A major factor determining both consumer behavior in terms of efficiency of final consumption and the feasibility of investing in energy efficiency is the price of energy. In the key electricity sector, Bulgaria consistently ranks in absolute terms (Euro per 100 kWh) among the cheapest countries in the EU (Figures 4 and 5), a circumstance often used as an argument for the need to increase electricity prices, both for household and for industrial consumers.

Figure 4: Electricity prices in Bulgaria and other EU countries (industry, at market rates of exchange), Euro cents per kWh

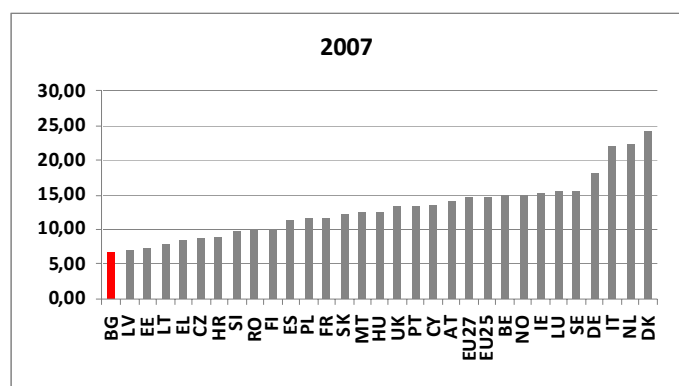


Source: Eurostat

However, on purchasing power parity basis Bulgaria is one of the countries with heaviest burden of electricity bills in the consumer basket. Measuring the burden of electricity prices on consumers in terms of energy poverty, with poverty threshold defined as '10% of income spent on sufficient

energy supply,³ Bulgaria consistently ranks as one of the countries in the EU with highest levels of energy poverty. The average Bulgarian household spends around 16% of its income on electricity⁴. For this reason, future energy price increases will have to be paired with support for vulnerable consumers. In the same context, energy efficiency programs should be designed in such a manner and of such a scale as to include 'bottom of the pyramid' households. At this time, energy efficiency measures are not undertaken by most households not because they are energy profligate, uninformed or unwilling, but simply because they cannot afford the required fleet and technology improvements.

Figure 5: Electricity prices in Bulgaria and other EU countries (households, at market rates of exchange), Euro cents per kWh



Source: Eurostat

There needs to be a connection between climate change policies and energy efficiency. Corrections in the electricity prices should help finance energy efficiency measures, including support of the development and production of local energy saving technologies – otherwise the price increases will only help the profitability of energy companies.

³ Broadly accepted definition, first introduced by Ireland and the UK

⁴ National Statistical Institute – 16% on average spent on electricity, water and rent. It is assumed that a very small part of households pays rent and that water bills are on average a very low share.

Market Structure

The main responsibility for energy policy design and implementation rests with the Ministry of Economy, Energy and Tourism (MEET). A National Energy Strategy was drafted in 2002 and is currently under review; it is expected to be adopted by parliament in the summer of 2010. Energy efficiency is likely to be a major element of the new draft of the Strategy, since improving energy efficiency is seen as the most cost-efficient method for achieving energy security and sustainability of the sector.

Energy efficiency activities are overseen by the Energy Efficiency Agency and the special administration Directorate for Energy Efficiency and Environmental Protection, both within MEET. The Energy Efficiency Agency is an executive agency established in 2002 and its mandate is governed by the Energy Efficiency Act.

One of the major instruments for funding energy efficiency activities is the revolving Bulgarian Energy Efficiency Fund. The initial capitalization of BEEF is entirely with grant funds, its major donors being the Global Environment Facility through the International Bank for Reconstruction and Development (the World Bank, \$10 million), the Government of Austria (Euro 1.5 million), the Government of Bulgaria (Euro 1.5 million) and several private Bulgarian companies. BEEF has the combined capacity of a lending institution, a credit guarantee facility and a consulting company. It provides technical assistance to Bulgarian enterprises, municipalities and private individuals in developing energy efficiency investment projects and then assists their financing, co-financing or plays the role of guarantor in front of other financing institutions. The underlying principle of BEEF's operations is a public-private partnership.

The Fund pursues an agenda fully supported by the Government of Bulgaria, but it is structured as an independent legal entity, separate from any governmental, municipal and private agency or institution⁵. However, the amount of such soft term financing available in Bulgaria pales in comparison with the value of the required investment. For

⁵ Source: BEEF.

example, a 2004 study⁶ puts the value of the investment required to bring a dwelling up to just modern insulation energy efficiency standards (and not replacing devices) at up to 30% of the value of the dwelling itself, which is clearly beyond the means of most Bulgarians. Even if the insulation updates could be implemented at 10% of the value of the dwelling, this would translate in an investment of 8 billion Euro⁷, surpassing many times over the capitalization of BEEF and other energy efficiency financial instruments available in Bulgaria. Consequently, the only way to raise the funds needed for improving energy efficiency is making energy efficiency not just profitable, but also affordable.

A main priority during the recent years for these administrative bodies has been the harmonization of the energy efficiency framework of Bulgaria with EU's acquis. Main program documents concerning energy efficiency implementation are:

- National Long-Term Energy Efficiency Program (2005–2015) and the National Short-Term Energy Efficiency Program (2005–2007) instituted by the Energy Efficiency Act;
- First National Energy Efficiency Action Plan (2008–2010) adopted in 2007;
- National Program for Renovation of Multi-Family Buildings Insulation for Energy Efficiency Improvement (2006–2020)
- National Short-Term Energy Efficiency Program in the Transport Sector (2006–2008).

The Energy Charter Secretariat notes that Bulgaria has made a good use of the EU accession process to improve its energy efficiency policy framework. The country has developed for all end-users clear objectives, tasks and targets and is working to introduce policy and progress monitoring

⁶ Draganinska, T. Energy Efficiency in the Bulgarian residential Sector: Technical, Legislative, and Socio-Economic Issues (http://www.lumes.lu.se/database/Alumni/03.04/theses/draganinska_tanja.pdf)

⁷ Assuming 2.5 million dwellings and average market value of 40,000 Euro per dwelling, with 80% of dwellings in need of thermal insulation as indicated by Draganinska, op. cit.

mechanisms. However, the challenge before policy makers remains the sufficient implementation of energy efficiency policies as well as improving the coherence among the various sector instruments. In particular, Bulgaria adheres to the Energy Efficiency Action Plan adopted by the European Commission in 2006, which contains measures aiming to reach the target of 20% reduction of gross domestic energy consumption by 2020. The key energy saving measures (outside the Emission Trading Scheme) in the generation, transport and consumption of energy include:

- Improving the efficiency in the generation of electricity and heat energy;
- Reducing the losses in energy transmission and distribution;
- Stepping up the use of fuel efficient vehicles for transport and more intensive use of public transport;
- Introducing taxes and environmental fees for vehicles based on CO2 emission levels as per European standards and best practices;
- Introducing stricter standards and better labeling for appliances and devices;
- Timely upgrading of the energy saving characteristics of existing buildings and introducing stricter energy standards for new buildings;
- Consistent taxation policy to achieve more efficient use of energy⁸.

The draft Bulgarian Energy Strategy 2020 sees the main potential for energy savings in the following areas:

- In final consumption, including by households, transport, industry and services;
- In energy generation and conversion, including developing gas distribution networks, reducing transmission and distribution losses, improving the efficiency of thermal power plants, increasing the share of energy generated at high efficiency co-generation plants.

⁸ Draft Bulgarian Energy Strategy by 2020.

What is missing in the draft strategy is a focus on smart grids that will allow decentralization of energy generation and make connection to final consumers more direct, which will create new opportunities for energy efficiency.

Major Risks

I. **Affordability – Short to Medium Term (1-5 years) – High Probability**

Much of Bulgaria's effort to improve energy efficiency will be wrecked over the next few years if the required fleet and technology replacements and improvements continue to be simply unaffordable for much of the population. While raising energy prices may seem to be a major part of the answer (particularly for electricity and heat used by residential customers), it will likely not produce the desired outcome since most already spend unusually large parts of their budgets on electricity and heat. Raising electricity and heat prices will simply strain consumer budgets further without providing the means to implement upgrades and replace equipment. Price increases will also further exacerbate the already unacceptably low collection rates of the heat distributing companies. Besides, switching to more efficient sources of energy for heating, hot water and cooking (natural gas) is also difficult, since the residential gas network is not well developed and - where gas is available - the required investment for connecting and switching to gas use is still beyond the means of most. In fact, higher electricity and heat prices have in the past years lead to using more wood (not even coal since it also became more expensive) and some deforestation. Providing soft-terms financing may help alleviate the risk of derailing energy efficiency programs due to their being beyond the means of most, but maybe the most important factor for assuring success of energy efficiency at the consumer end is economic development, improvement in employment levels, and raising incomes.

II. **Insufficient Interfuel Competition Due to High Barriers to Entry and Impossible Switching – Short to Medium Term (1-5 years) – High Probability**

Much of Bulgaria's energy efficiency potential remains unrealized because the various energy sub-markets are insulated and monopolized. The result is captive customers and few incentives for the supplier to improve quality of service or invest in energy savings and efficiency at the supply end, since any excessive loss or inefficiency can easily be charged to the captive customer. Captive markets and customers are also an incentive to court the regulator (and most energy prices in Bulgaria are regulated) with requests to raise tariffs and allow the cramming of fees into bills without undertaking the relevant investment in the efficiency of supply or transmission of energy. A corollary is the discouragement of users who do have the financial means to spend on energy efficiency, as they do not readily see the potential return on their investment behind the constantly moving target of regulated (and not free market) prices, fees and "allowable" costs.

III. **Lack of Clear Strategy for Fuel Mix in Power and Heat Generation – Medium Term (5-10 years) – High Probability**

To this day, it remains unclear how a least-cost strategy will be implemented in Bulgaria in power and heat generation and to what extent and by what instruments this least-cost strategy should accommodate various targets such as reduction of energy consumption, improving energy efficiency, achieving emission targets, improving energy security, system reliability and availability, sustainability, and other important criteria. Without clear signals for investors, it remains likely that some decisions will be made to the detriment of overall energy efficiency.