
I. INTRODUCTION

Energy is the lifeblood of any economy: oil, gas and electricity are critical to a functioning and growing nation. For all nations, economic and social well-being depends on safe, affordable and dependable supplies of energy. It becomes very clear, then, that the question of energy security is not just a question of economic security, but of national security as well.

The Bulgarian energy sector is key for the future development of the country's economy. For the past decade energy exports and imports formed on average 12% (16% in 2008) and 21% (22% in 2008) of the value of the country's outgoing and incoming trade flows respectively.¹ Every fourth public procurement contract is concluded in the energy sector, making it one of the biggest taxpayers' money spenders in the country. In 2008, in a single year, the Bulgarian government committed to energy projects, requiring budgetary investments equal in value to the whole EU funds support for the country for the current European seven-year budget period 2007 – 2013.

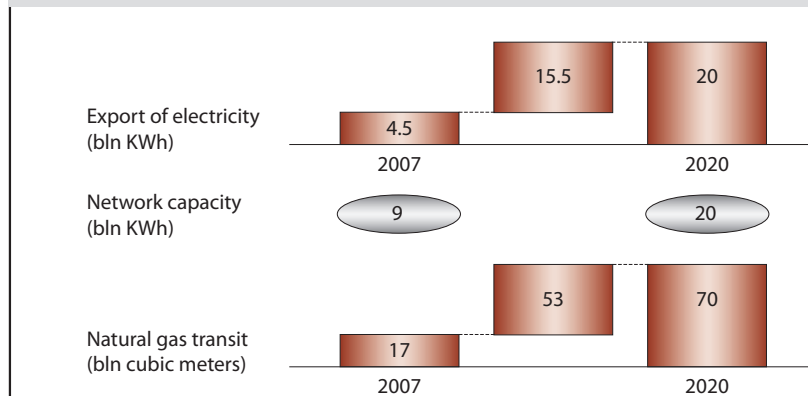
There are also a number of external factors that put pressure on Bulgarian policy makers to pay special attention to the energy sector: **global climate change** and the related European Union (EU) binding targets on capping greenhouse gas emissions, decreasing energy intensity and increasing the share of renewable energy sources (RES); **economic pressures** highlighted by the current economic crisis; **political pressures** caused by foreign geopolitical and economic interests.

1.1. ENERGY AS A STRATEGIC SECTOR

Bulgarian energy sector is relatively small in global terms, but sizeable in the country's industrial portfolio. The sector primarily comprises of electricity generation and transit of oil and gas to western markets. It has traditionally been viewed as strategic for the country's economic development and national security, which partially explains the large investments made in the past 7 – 8 years in building additional capacities, rehabilitating old power plants and expanding the distribution network. Previous governments have seen potential in the growing South East European (SEE) market and the widening energy deficits there. The Bulgarian Energy Strategy 2020 (version – 2008) sets ambitious plans of turning Bulgaria into the leading power exporter in the Balkans.

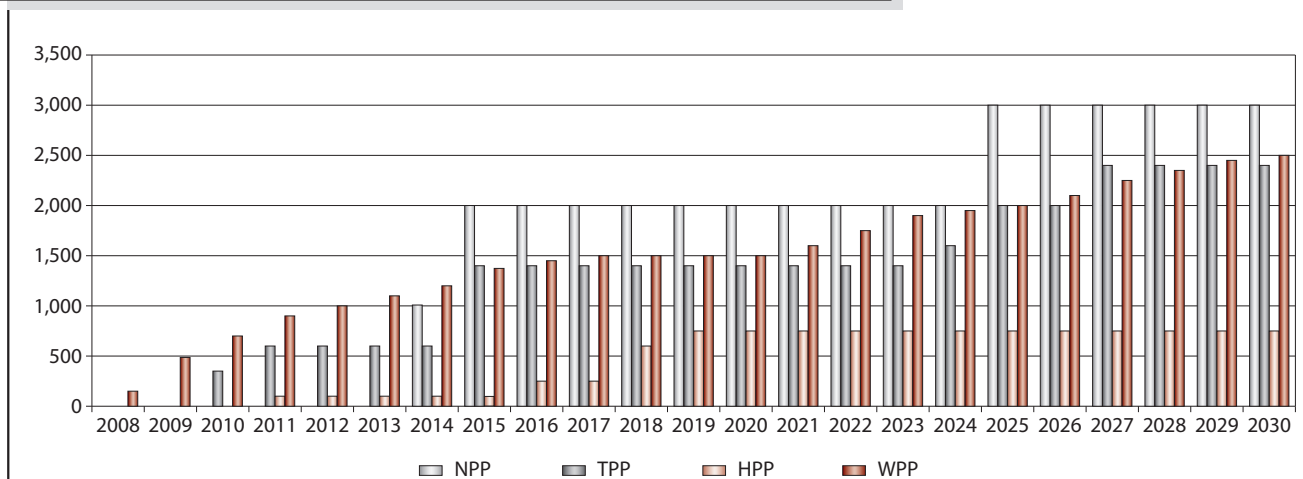
¹ According to Bulgarian National Bank data on final use of exports and imports.

FIGURE 1. GOALS SET BY THE 2020 ENERGY STRATEGY (DRAFT 2008)



Source: Bulgarian Energy Strategy 2020 (2008 proposal)

FIGURE 2. PROJECTED CAPACITY INCREASE BY NATIONAL ELECTRIC COMPANY (NEC)



Source: National Electric Company (NEC) Annual Report 2008

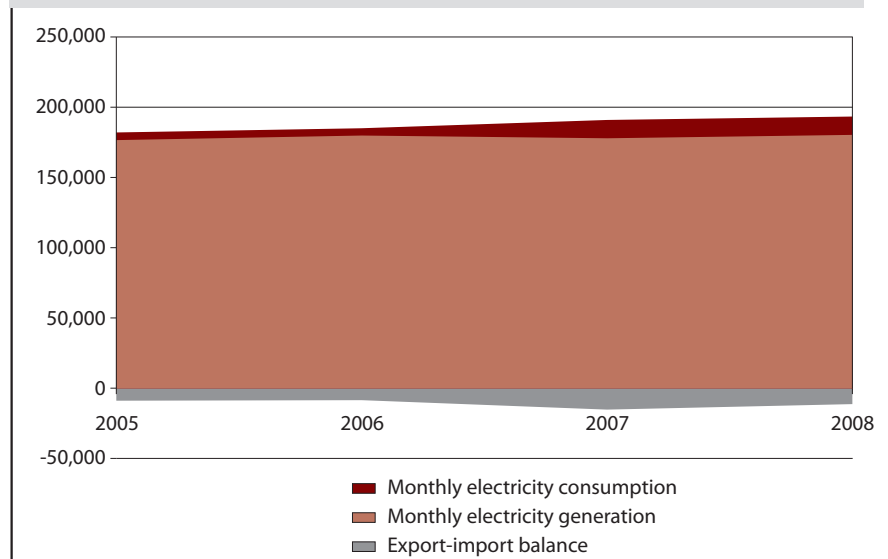
However, available data² shows that already in mid-2007 there is shrinkage of the net export balance of electricity in the Balkan countries, excluding Bulgaria. This process, already under way before the onset of the financial crisis in SEE (actual economic impact of the financial crisis was not felt in SEE before the late fall of 2008) will most likely continue in the next 1 – 2 years. On one hand the **effects of the crisis** seem to ‘lag’ behind approximately 6 months in SEE. Therefore, further shrinkage of disposable income can be expected, as well as increase of energy poverty³ and higher percentage of households switching to biomass, i.e. wood and briquettes for heating in the upcoming heating seasons. Another factor that influences the decrease in energy net export in the region is the improving of **energy efficiency**. As many SEE countries

² Balkan Energy News.

³ Energy poverty is defined as ‘spending more than 10% of household income on energy and water bills’.

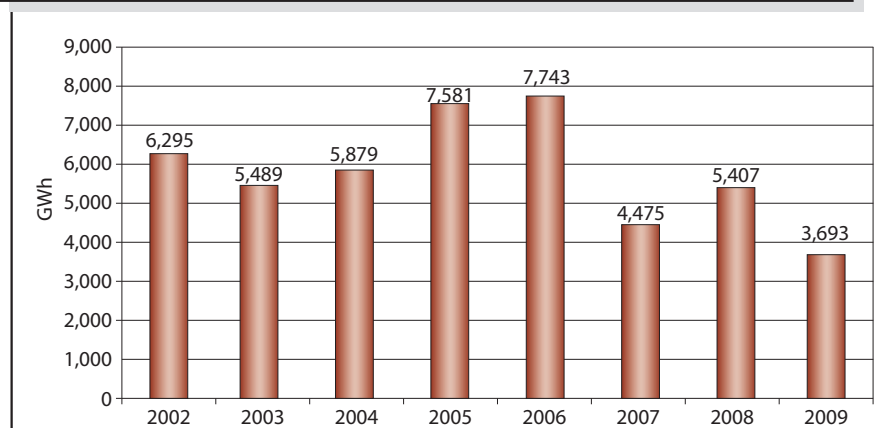
are traditionally far from best practice when it comes to household and industrial energy intensity, they are forced to step up their energy efficiency measures in order to meet their 2020 targets. However, what will have the biggest effect on the process of closing of the energy deficiency gap in the Balkans is the fact that **many traditional importers from Bulgaria are now planning or already building their own power plants** – nuclear, traditional and renewable.

FIGURE 3. MONTHLY ELECTRICITY PRODUCTION, CONSUMPTION AND NET EXPORTS: ALL BALKAN COUNTRIES EXCEPT BULGARIA AND ALBANIA (GWh)



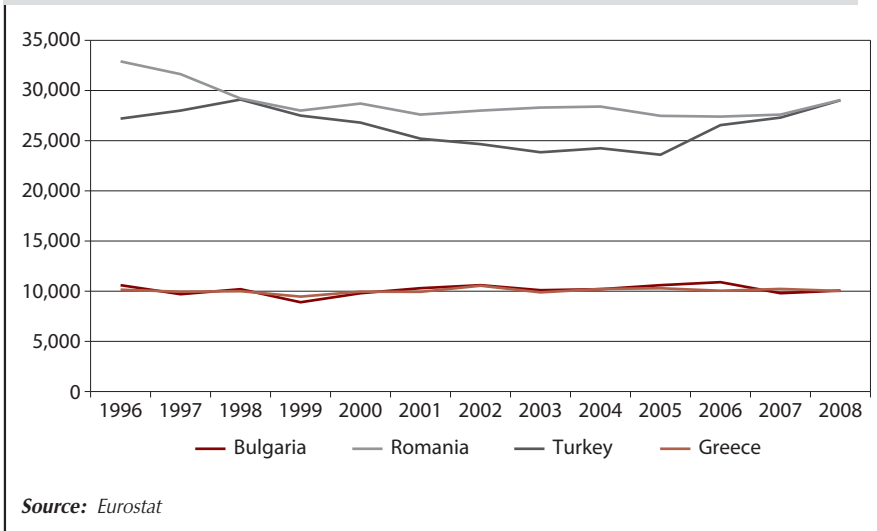
Source: Balkan Energy News

FIGURE 4. ANNUAL ELECTRICITY EXPORT OF BULGARIA



Source: Electricity Operation System (ESO) Annual Report 2008, NEC Annual Report 2009

FIGURE 5. TOTAL PRODUCTION OF PRIMARY ENERGY – (1 000 TOE)



Bulgaria’s neighbors, of which Greece is Bulgaria’s main export market with 50.21% as of 2008, are increasing their generation capacities.

TABLE 1. STRUCTURE OF BULGARIA’S ELECTRICITY EXPORTS

2009 export structure

	GWh	%
Bulgarian-Greek border	2,318	62.77
Bulgarian-Serbian border	616	16.68
Bulgarian-Romanian border	149	4.03
Bulgarian-Macedonian border	610	16.52
Total	3,693	100

Source: NEC Annual Report 2009

Putting the large ongoing and planned capacity investments in Bulgaria in the perspective of a potentially shrinking export market, it might be more cost-efficient and environment-beneficial to channel public funds into energy efficiency programs – both industrial and household-focused.

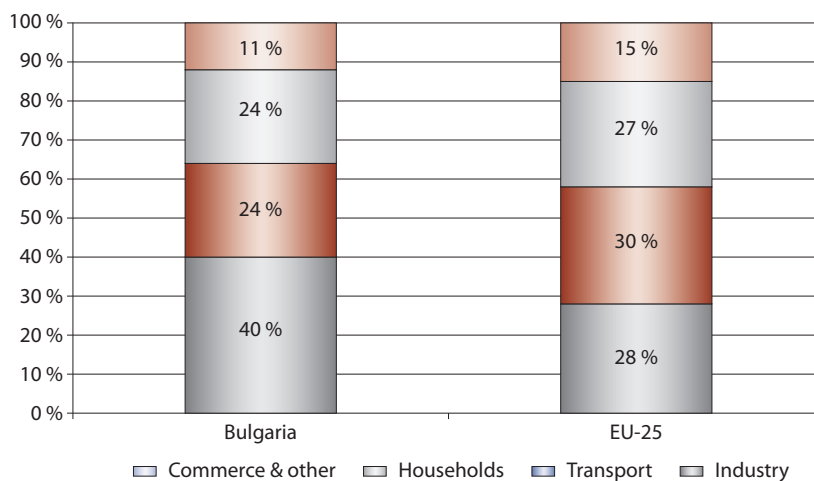
TABLE 2. NUCLEAR REACTORS UNDER CONSTRUCTION, PLANNED AND PROPOSED BY JULY 1, 2009

World Ranking:	Country:	Amount:
19	Bulgaria	0 (planned: 2, proposed: 0)
20	Czech Republic	0 (planned: 0, proposed: 2)
23	Hungary	0 (planned: 0, proposed: 2)
29	Lithuania	0 (planned: 0, proposed: 2)
32	Poland	0 (planned: 0, proposed: 5)
33	Romania	0 (planned: 2, proposed: 1)
34	Slovenia	0 (planned: 0, proposed: 1)
40	Turkey	0 (planned: 2, proposed: 1)
41	Ukraine	0 (planned: 2, proposed: 20)

Source: Europe's Energy Portal (www.energy.eu)

1.2. ENERGY EFFICIENCY

FIGURE 6. FINAL ENERGY DEMAND BY SECTOR (2006)



Source: Eurostat

Bulgaria consistently ranks as **the most energy intensive economy in the EU** – measured by ‘gross inland consumption of energy/GDP’. Some analysts are willing to deflate the figures given by Eurostat with the presumption that official GDP does not account for a large share of gray economy (estimates⁴ show that gray economy could amount to up to 30%). However, even if such adjustment is applied the energy intensity of Bulgaria would still be much higher than the average EU-27.

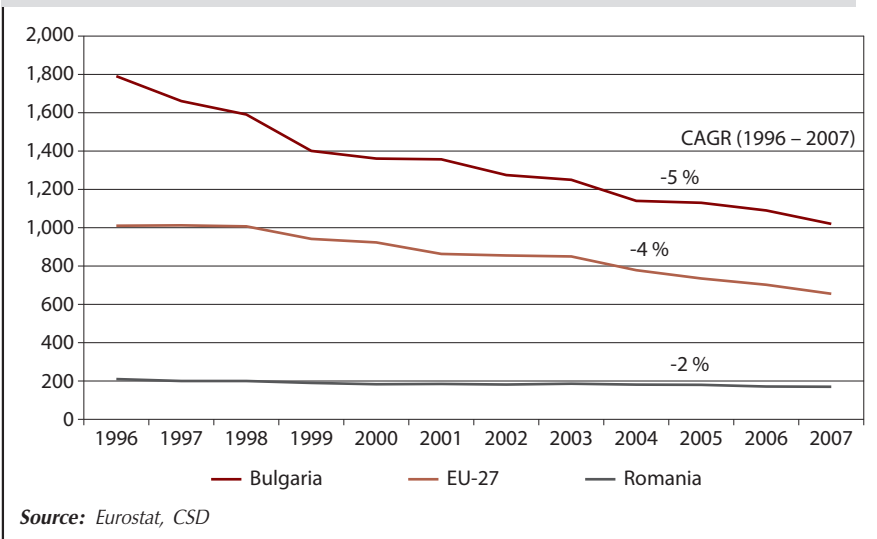
Energy consumption in Bulgaria is driven primarily by the **industrial sector**, especially energy-intensive sectors such as metallurgy and the energy sector itself.

Bulgaria improves its energy efficiency with a higher rate than that of EU – 27, and if sustained it will allow the country to reach the EU

⁴ *The Hidden Economy in Bulgaria*, Center for the Study of Democracy, 2004.

mandated target of 20% decrease by 2020. Neighboring Romania has a similar success in improving its energy efficiency, although coming from a much lower starting point.

FIGURE 7. ENERGY INTENSITY OF THE ECONOMY – GROSS INLAND CONSUMPTION OF ENERGY DIVIDED BY GDP (KILOGRAM OF OIL EQUIVALENT PER 1000 EURO)



Historically the GDP growth has outstripped energy demand growth, therefore reducing the energy intensity. The energy intensity of the industrial production sector, after a fall in the 1997 – 2002 period has been on the increase. Inefficient use of energy, particularly in the **power sector, where transmission losses are significant**, has been blamed for that – industrial energy intensity in Bulgaria remains with 40% higher than EU average of (0.13 koe/\$95).⁵

1.3. ENERGY DEPENDENCY

TABLE 3. ENERGY CONSUMPTION BY EU-MEMBER STATES, THEIR NET IMPORTS AND DEPENDENCY RATE IN 2008 – RANKED BY ENERGY DEPENDENCY

Rank	EU Member State	Gross Energy Consumption	Net imports	Energy Dependency
10	Greece	31.5	24.9	71.90%
13	Slovakia	18.8	12.0	64.00%
14	Hungary	27.8	17.3	62.50%
15	Germany	349.0	215.5	61.30%
16	Finland	37.8	20.9	54.60%
17	EU27	1825.2	1010.1	53.80%
18	Slovenia	7.3	3.8	52.10%
19	France	273.1	141.7	51.40%
20	Bulgaria	20.5	9.5	46.20%
21	Netherlands	80.5	37.2	38.00%

Source: Europe's Energy Portal (www.energy.eu)

The country is highly dependent for its energy supplies on foreign sources, especially Russian gas, which was severely felt in the recent 'gas crisis' (2008/2009) when disputes between Ukraine and Russia lead to gas shortage in some of the coldest months of the year. The 2020 Energy Strategy (draft 2008) shows energy dependency of up to 70%, which is much higher than the figures given by Eurostat (46%). This is due to different methodology, which counts nuclear energy production as indigenous. However, considering that the only supplier of nuclear fuel, with long-term binding contracts is Russia, then the 70% figure seems more realistic. In Section

⁵ Kilogram of oil equivalents; Source: Ministry of Economy, Energy and Tourism – Agency for Energy Efficiency, National Long-term Program for Energy Efficiency until 2015, 2005

If the nuclear fuel contract is discussed in detail – how the supplier was chosen and why Bulgaria pays approximately 20% premium to the current market price.

1.4. HOW GREEN IS BULGARIA?

TABLE 4. RENEWABLE ENERGY IN FINAL ENERGY CONSUMPTION (2020 TARGET)

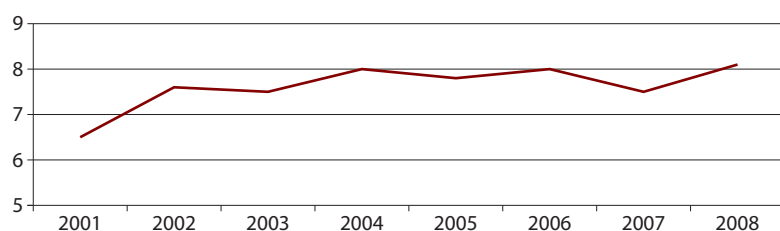
	EU Member State	2006 Figure	2020 Target	% To cover:
1	United Kingdom	1,5 %	15 %	13,5 %
2	Ireland	2,9 %	16 %	13,1 %
3	Denmark	17,2 %	30 %	12,8 %
4	France	10,5 %	23 %	12,5 %
25	Bulgaria	8,9 %	16 %	7,1 %
26	Romania	17,0 %	24 %	7,0 %
27	Czech republic	6,5 %	13 %	6,5 %

Source: Eurostat

Compared to most EU member states Bulgaria seems to be faring well in the prospects of achieving its 2020 target of 16 % for the share of Renewable Energy Sources (RES) in its final energy consumption. Relative to its indicative target Bulgaria has one of the smallest 'gaps' to fill. There is also a solid projected increase of capacity, mainly from large wind and hydro projects that are in the pipeline for 2009 and 2010 (discussed in Section IV). However, a closer look at RES shares since 2002, will show that the country is making little progress with data wavering between 7.5% and 8.5%. This trend actually puts Bulgaria in

the 'under-achiever' group, with an increasing number of experts questioning the certainty of attaining the 16% 2020 goal.⁶

FIGURE 8. SHARE OF RENEWABLE ENERGY – FINAL ENERGY CONSUMPTION (%)



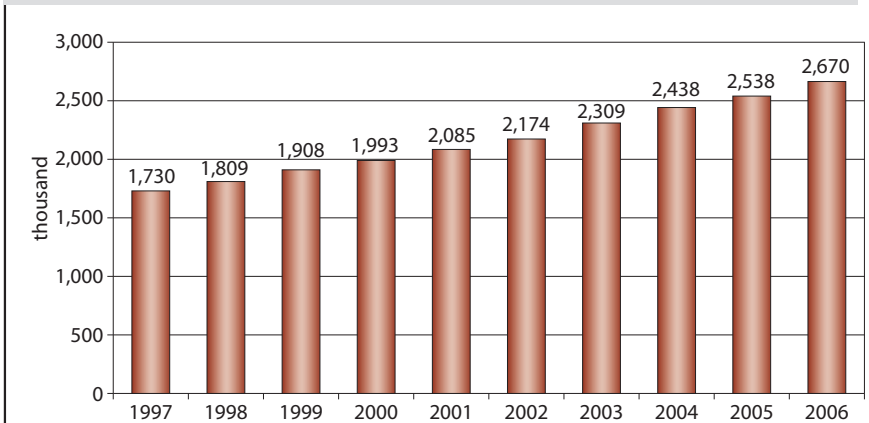
Source: National Energy Balance, NSI (2009)

Bulgaria also ranks at the bottom in terms of **biofuels consumption**. The increase in the standard of living and disposable income in the last few years has led to dramatic increase in personal vehicles (many of them old and fuel-inefficient), as well as to increase in annual mileage covered by them, hence to total increase of fuel consumption, but the share of biofuels remains negligible. Further research and

investments are needed in the right type of biofuel production that is cost-effective and does not distort general agricultural production.

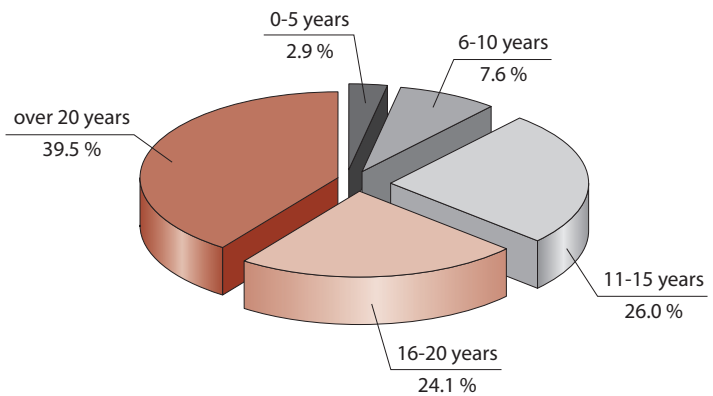
⁶ Center for the Study of Democracy, interviews with experts conducted July – December 2009.

FIGURE 9. STOCK OF PASSENGER CARS IN BULGARIA



Source: Energy Charter Secretariat: In-depth Review of Energy Efficiency Policies and Programs (Bulgaria 2008)

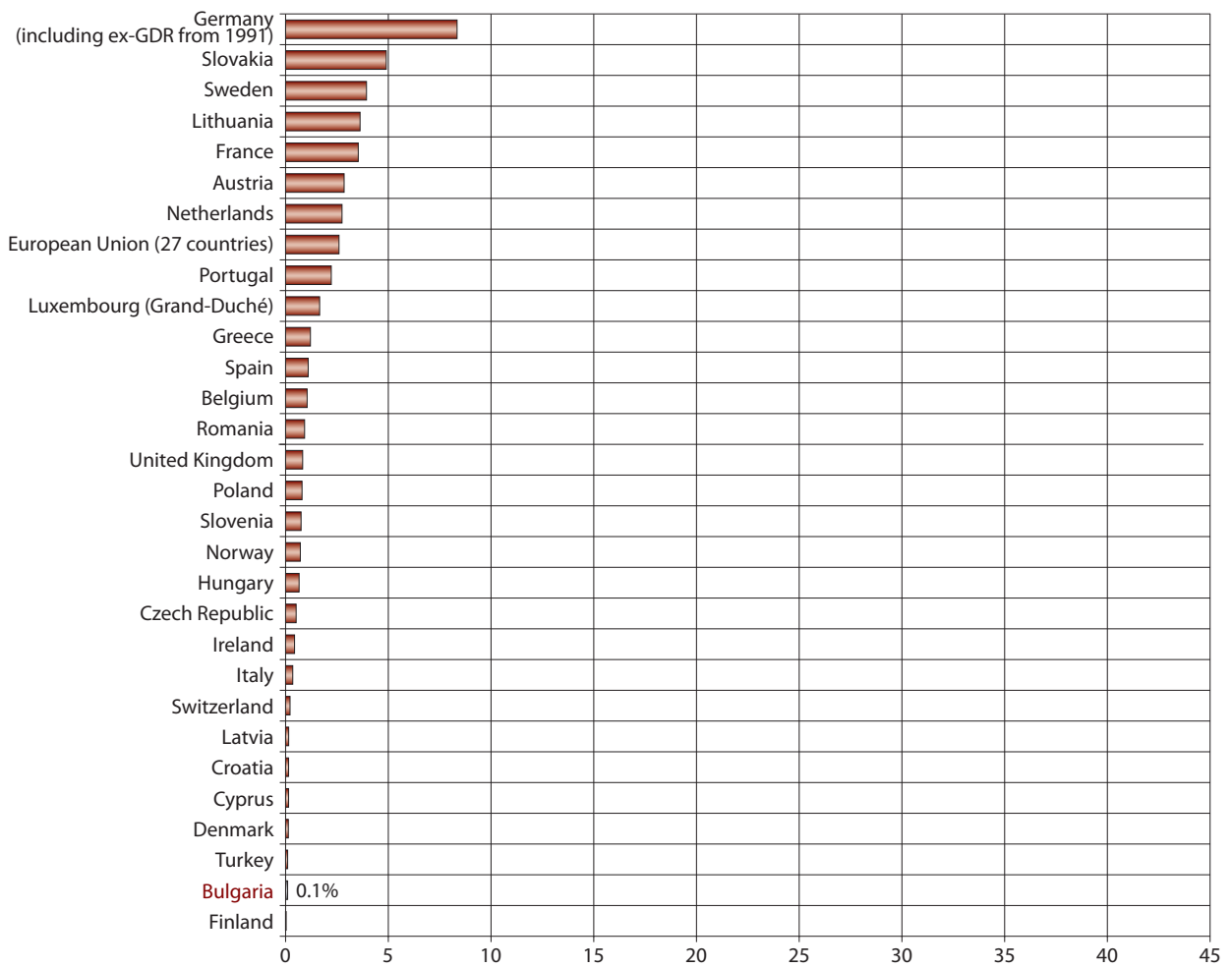
FIGURE 10. STOCK OF PASSENGER CARS BY AGE



Source: Energy Charter Secretariat: In-depth Review of Energy Efficiency Policies and Programs (Bulgaria 2008)

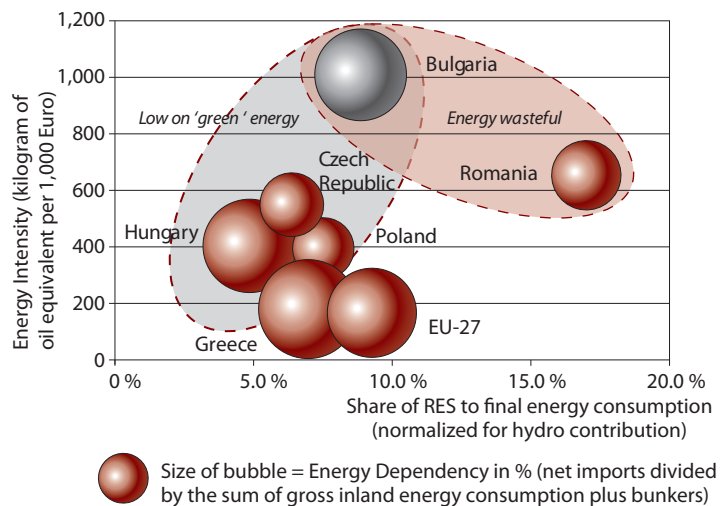
The overall conclusion is that Bulgaria needs to ‘catch up’ compared to other SEE countries and EU-27 in a number of areas: decrease in energy intensity, increase in ‘green’ production and decrease in dependency on foreign energy sources. Bulgaria could be seen as an outlier when those multiple factors are taken into account – it is the most energy intensive economy in the EU, highly energy dependent and a follower in its RES share.

FIGURE 11. SHARE OF BIOFUELS IN FUEL CONSUMPTION OF TRANSPORT (%) (2007)



Source: Eurostat

FIGURE 12. THE 'TRIPLE HELIX' OF ENERGY SECTOR DEVELOPMENT – EFFICIENCY, SUSTAINABILITY AND INDEPENDENCY (2007)

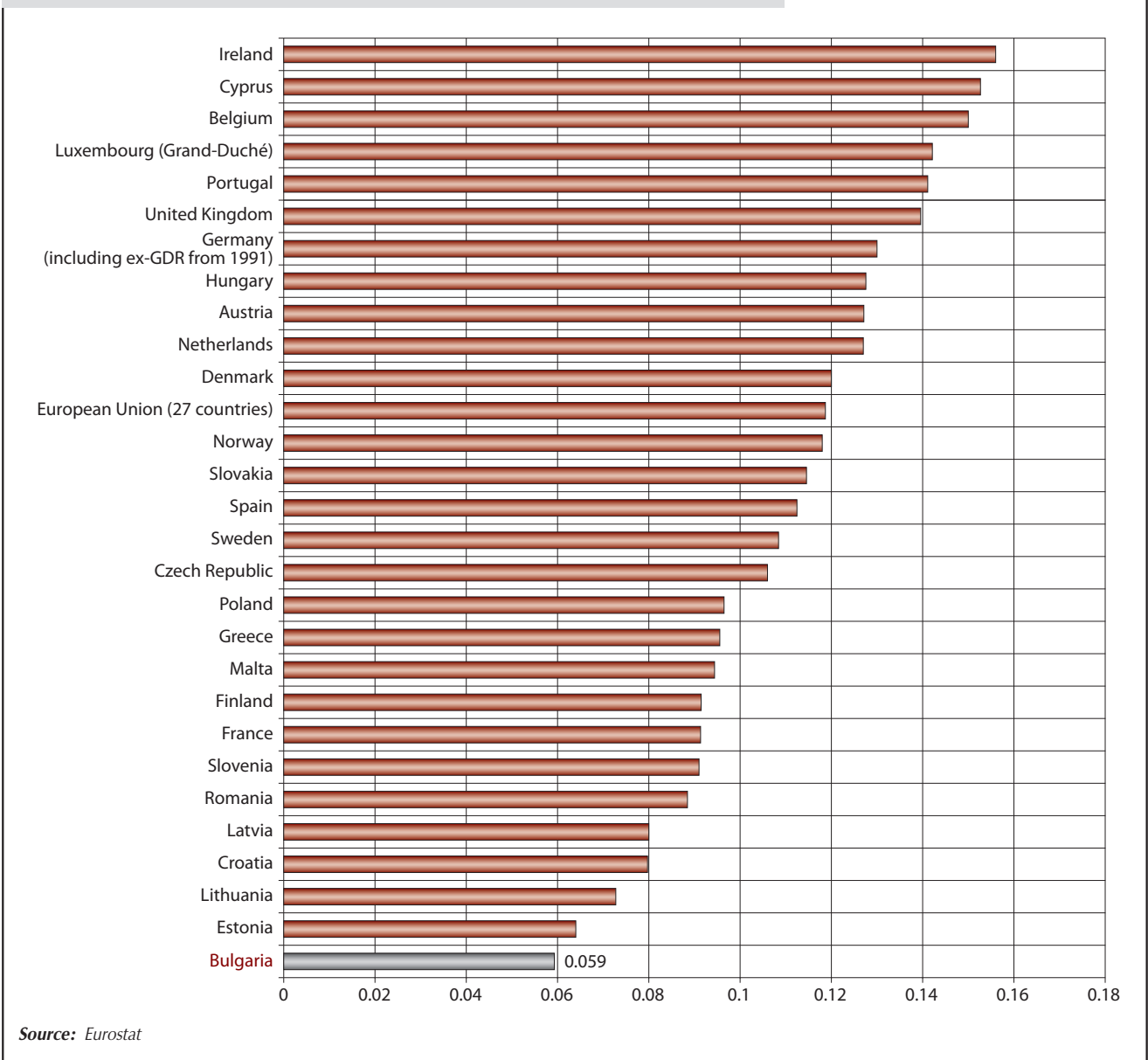


Source: Eurostat, Center for the Study of Democracy

1.5. PRICING: COST COVERAGE, TRANSPARENCY AND FAIRNESS

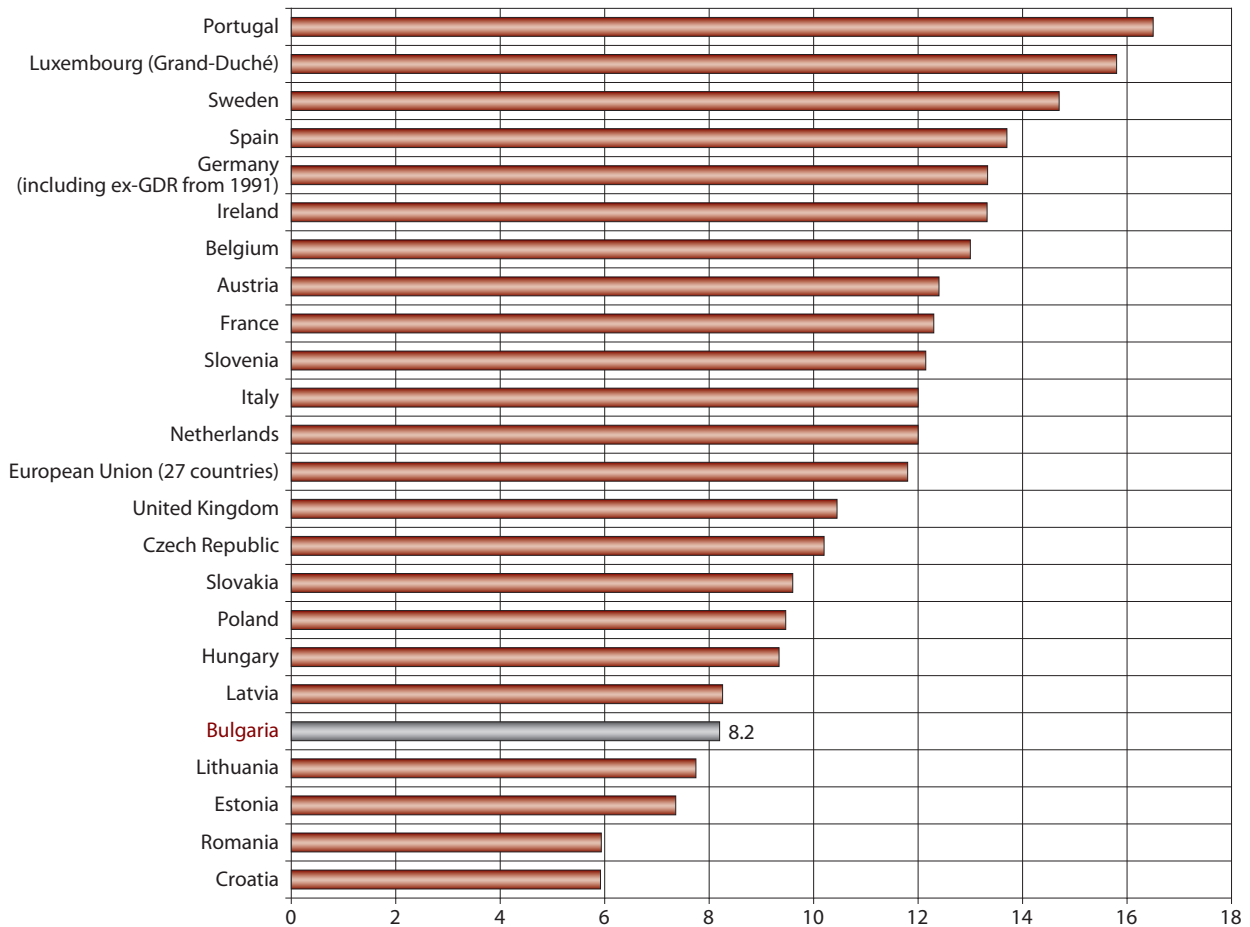
Bulgaria remains an outlier also in terms of prices that the final consumer pays for the use of energy. Bulgarian energy ranks consistently among the ‘cheapest’ in EU.

FIGURE 13. ELECTRICITY PRICES OF FINAL CONSUMPTION – EURO PER kWh (2008)



Source: Eurostat

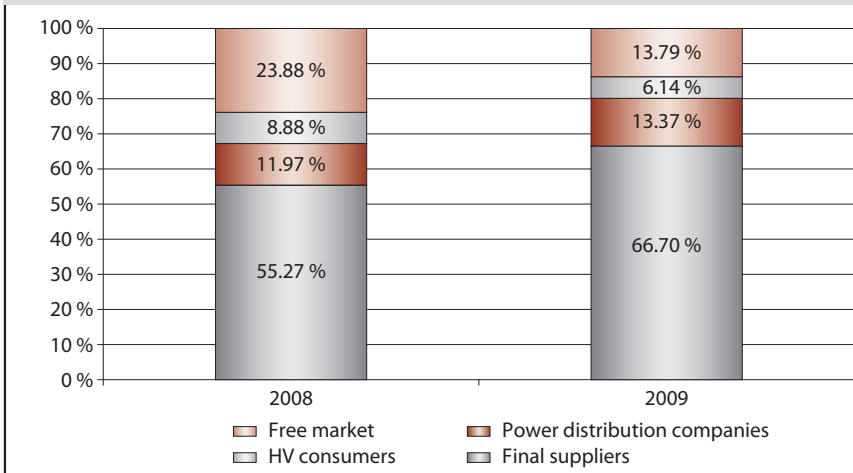
FIGURE 14. GAS PRICES OF FINAL CONSUMPTION – EURO PER GIGAJOLE (2008)



Source: Eurostat

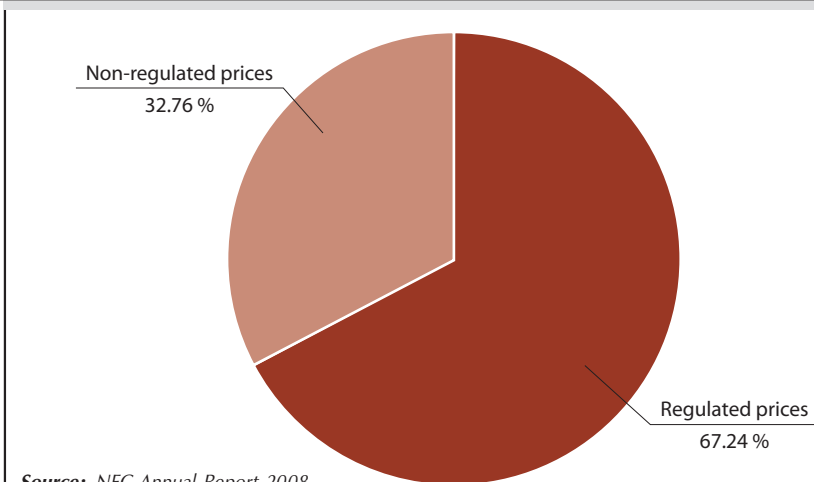
There are a couple of factors that produce that relative price level. First come the **low fixed consumption prices for gas and electricity set by the national regulator**. On the regulated market electricity companies often have to sell on sub-cost levels. The losses, which annually amount to dozens of millions, are partially compensated by the higher prices on the 'free' market. However, the electricity sold on the regulated market is still the predominant share which puts heavy burden on the National Electrical Company (NEC). The issue is especially grave when we consider the **'negative' margin between the purchase price that NEC is obliged to provide to renewable energy producers and the final sale price to consumers**.

FIGURE 15. BREAK-UP OF NEC'S 2008 AND 2009 SALES REVENUE BY CONSUMER TYPE



Source: NEC Annual Report 2008

FIGURE 16. SHARE OF NEC'S REVENUES – REGULATED AND FREELY NEGOTIATED PRICES 2008



Source: NEC Annual Report 2008

Second comes the **social burden of energy bills**, especially in the context of the ongoing economic crisis. Although Bulgaria ranks in top position for energy 'cheapness' in Europe, it also has a considerable share of 'energy poor' consumers. In Bulgaria the households pay approximately 14%⁷ of their income for water and energy bills. If the UK energy poverty threshold of 10% is assumed, then a large share of the Bulgarian population will be categorized as energy poor. One part of these households, or 360,000 from a total of 2,9 million, rely on social support for their energy needs. Those needy consumers who do not make it to the poverty bracket supported by the government, appear on the growing 'bad accounts receivables' of the energy distributing companies. There is a clearly discernible trend of decreasing collectability of accounts, which for Toplofikacia Sofia EAD is as low as the critical 50%.

⁷ National Statistical Institute (NSI) (2008).

The price of electricity is also low compared to the sector's investments in: rehabilitation of old plants, construction and installation of new capacities and improvements in the transportation and distribution network. During the course of 2008 and 2009 large investments were made by NEC.

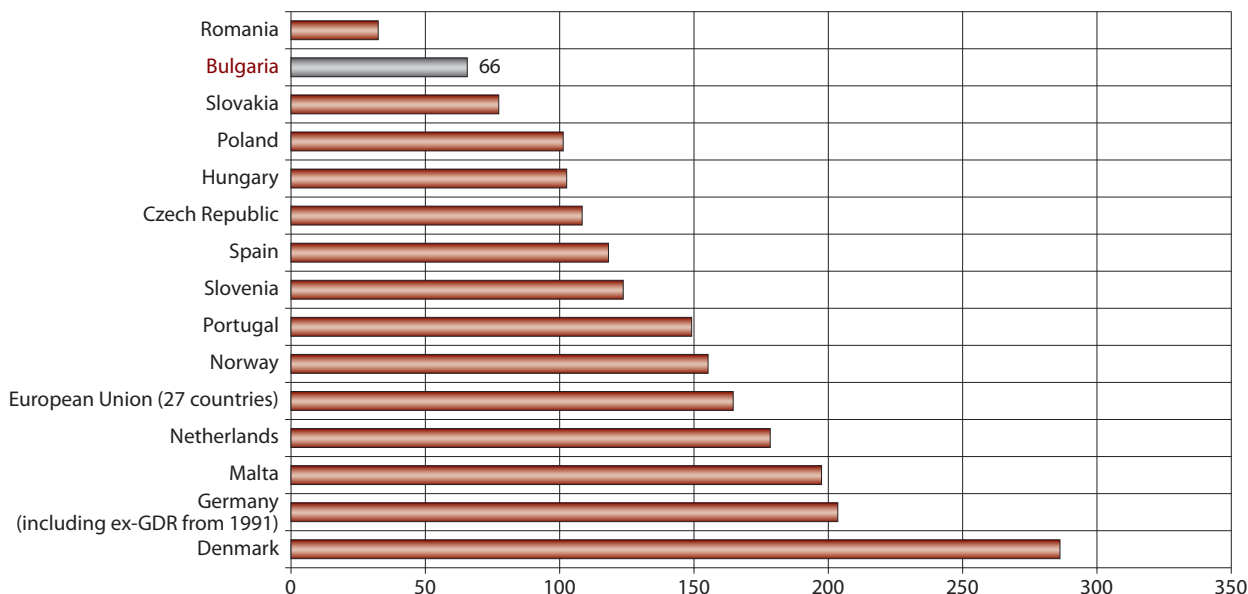
TABLE 5. INVESTMENT EXPENDITURES OF NEC IN 2008 AND 2009 (MLN BGN)

	2008	2009	
Electricity distribution network	168.3	97.0	<ul style="list-style-type: none"> • Rehabilitation and reconstruction of substations and electricity grids • Construction of new substations and grids
Hydro Power Plants	246.4	236.8	<ul style="list-style-type: none"> • Rehabilitation and modernization of HPPs • Construction of new HPPs
Others	3.2	6.5	<ul style="list-style-type: none"> • Supply of specialized transport equipment, information technology, construction and reconstruction of sites

Source: NEC Annual Report 2008, 2009

In addition, Bulgaria also lags in **implicit tax rate** on energy compared to the rest of EU.

FIGURE 17. IMPLICIT TAX RATE ON ENERGY⁸ – RATIO OF ENERGY TAX REVENUES TO FINAL ENERGY CONSUMPTION, DEFLATED (EUR PER TOE) (2007)



Source: Eurostat

⁸ This indicator is the ratio between Energy Tax Revenues and Final Energy Consumption calculated for a calendar year. It measures the taxes levied on the use of energy which contributes to foster energy efficiency. Energy Tax Revenues are measured in 1,000 EUR and the Final Energy Consumption as TOE (thousands tons of oil equivalent). The ratio is measured in EUR per TOE.

Taking all factors into account, corrective price increases will be inevitable in the near term, and energy companies are already signaling that. The regulating body seems to give mixed signals to that respect and there have been many speculations in the press. In any case the issue of **electricity pricing** is crucial not only for the well being of consumers but for the sustainability of the sector itself. Some key elements in the future pricing process should be:

- Full transparency into the methodology and reasoning for price formulation;
- Prices should allow companies to cover their cost of production (with the disclaimer that production cost itself could be optimized by increase in efficiency, decrease in energy stealing, improved technologies and general leaning of operations);
- Alternative energy producers as well as consumers should pay their fair share for adding RES capacities to the grid. Ideally final consumers will receive invoices showing what % of their bill goes to the 'green' energy sector, including what type – wind, hydro, etc. Another possible solution is the sale of the so called 'green certificates' on the common EU market;
- Prices for industrial consumers should be increased to mirror EU standards of industrial/household price balance;
- Consumers at the bottom of the energy poverty pyramid should be protected either through preferential prices/discounts or through inclusion in tailored energy efficiency programs;
- Revision of the tax burden should be made and if the analysis shows possibility for increase without distorting market efficiency, such increase should be made in a transparent and clearly communicated manner. The additional revenue could be used for energy efficiency programs;
- Calculating production cost for nuclear plants should factor in waste management;
- Pricing should also factor in CO₂ emissions. In the 2008 consolidated financial statements of Bulgarian Energy Holding (BEH) there could already be seen 'provisions for exceeding quotas for green house gas emissions' worth almost 40 million BGN. A detailed review of the accounting practices would show whether this is the most correct and efficient way to manage the participation of state owned companies in emissions trading. At Net Profit after provisions of ~85 million BGN, provisions of 40 million are a considerable share. This raises the much bigger question of how 'cheap' in reality coal based electricity is;
- As a further step, cost-benefit analysis could be made that takes into account other estimable environmental and social damages. Such detailed cost-benefit analysis would be beneficial for the design of the overall sustainable energy strategy with a balanced mix of energy sources.

TABLE 6. NOTES ON PROVISIONS, TAKEN FROM THE CONSOLIDATED 2008 FINANCIAL STATEMENT OF BEH

Provisions (in 1000 BGN)	2008	2007 (unaudited)
<i>Provision – long term</i>		
Provision for environmental protection	1,169	1,326
Provision for re-cultivation	35,940	29,012
Provision for going over greenhouse gas emissions quotas	-	-
	37,109	30,338
<i>Provision – short term</i>		
Provision for environmental protection	979	485
Provision for recultivation	1,611	1,611
Provision for going over greenhouse gas emissions quotas	38,585	-
Constructive liabilities	306	-
Legal liabilities	320	-
	41,801	2,096
Total for the group	78,910	32,434

Source: BEH Consolidated Financial Statement 2008

1.6. GOING FORWARD

The growing effects of the global economic crisis put increasing pressure on the ambitious energy sector projects. As **demand** (domestic and foreign) **shrinks**, **access to funding squeezes and price of funding increases** (partially to reflect the increased risk of such investments in itself), the **risks of large-scale projects** become even more sizeable. At the same time the financial and technical conditions weaved in the **contracts signed by the previous government** for projects such as the nuclear power plant (NPP) Belene seem to not only lack transparency but also sound financial judgement. In addition, a closer look into the **efficiency and strategic management of the state-owned energy companies**, now part of BEH, shows that there are many operational, financial and efficiency gaps that need to be filled. Adding to the complexities of the energy sector in Bulgaria are the processes of **full market liberalization** and **joining the international green house gas trading**.

At the same time, the interest in small and medium-sized **'green' energy production projects** is not only stable but markedly increasing in the last few years. There are a number of planned and ongoing projects, especially using wind and hydro power. Solar technology seems to be off the radar for the moment, due to the relatively high production cost per MWh. The boom of 'green' energy projects will likely be tempered by the plans of the national regulator to tighten licensing control as the power transmission network might not be able to accommodate all planned additional generation capacity. The **cost of additional equipment needed to add 'green' producers to the grid** is a valid argument, so is the **high fixed price for purchase of 'green' energy** stated in the long-term binding contracts.

TABLE 7. FEED-IN TARIFFS BY SOURCE APPROVED BY THE STATE REGULATORY COMMISSION, WITHOUT VAT (MARCH 2008)

	Feed-in Tariffs		Germany		
	BGN/MWh	Euro/MWh	Euro/MWh	Notes	
HPP with installed capacity lower than 10 MW	85.19	43.35	126.7 76.5	Up to 500 kW 2-5 MW	
Biomass plants with installed capacity lower than 5 MW			116.7 77.9	Up to 150 kW 5-20 MW	
• Wood residues	215.00	109.41			
• Agricultural residues	162.00	82.44			
• Energy crops	184.00	93.64		(Cost regression 1%/a)	
Wind power generators			79.5	Onshore-wind (Cost regression 1%/a)	
• with installed capacity lower than 800 kW	120.00	61.07			
• with effective working hours less than 2,250 h and installed capacity of 800 kW and higher	175.00	89.06			
• with effective working hours more than 2,250 h and installed capacity of 800 kW and higher	156.00	79.39			
Photovoltaics				(Cost regression 8%/a)	
• with installed capacity lower than 5 kW	782.00	397.96	424.8	Up to 30 kW	
• with installed capacity higher than 5 kW	718.00	365.39	344.8	Over 1,000 kW	

Source: In-depth Review of Energy Efficiency: Bulgaria 2008, Energy Charter Secretariat

There are also fears that these current conditions for renewable energy producers could be attracting **'speculative capital'** to the market.

The global macroeconomic conditions, the changed dynamics and size of the Balkan energy market, the necessary revision of the financial standing of current and planned large investment projects, the pressure from EU regulators and the growing need to scrutinize public procurement, domestic market interactions and state companies' management – all these will necessitate **a full-scale revision of the energy sector and its key players** – how they operate and how they develop in the future.

