GREEN ENERGY GOVERNANCE IN BULGARIA

AT A CROSSROADS

CENTER FOR
THE STUDY OF
DEMOCRACY

The current report reviews existing policies for energy sustainability in Bulgaria and the EU, the main achievements and challenges in their implementation, and discusses the central issues to Bulgaria's sustainable development agenda. The report presents a summary of the transition to sustainable development in Bulgaria, and offers policy recommendations for improving the governance of the Bulgarian green energy sector.

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LIST OF ABBREVIATIONS

ACER	Agency for the Cooperation of Energy Regulators
BEEF	Bulgarian Energy Efficiency Fund
BEERECL	Bulgarian Energy Efficiency and Renewable Energy Credit Line
BGN	Bulgarian National Currency (leva)
CCS	Carbon Capture and Storage
CHP	Combined Heat and Power Directive
CSD	Center for the Study of Democracy
CSP	Concentrated Solar Power
DFID	Department for International Development (UK)
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEAP	Energy Efficiency Action Plan
EEF	Energy Efficiency Facility
EEP	Energy Efficiency Plan
EMEPA	Enterprise for the Management of Environmental Protection Activities
EPBD	Energy Performance of Buildings Directive
ERDF	European Regional Development Fund
ESD	Energy Services Directive
ESO	Electricity System Operator
ETS	European Emissions Trading System
EU	European Union
EUR	Euro
GHG	Greenhouse Gas Emissions
GDP	Gross Domestic Product
HPP	Hydro Power Plant
KIDSF	Kozloduy International Decommissioning Support Fund
MEET	Ministry of Economy, Energy and Tourism
NAPs	National Action Plans
NEC	National Electric Company
NPP	Nuclear Power Plant
NREAP	National Renewable Energy Action Plan
NSDSs	National Sustainable Development Strategies
OP	Operational Programme
PVs	Photovoltaic Solar Installations
R&D	Research and Development
RES	Renewable Energy Sources
RES-E	Electricity from Renewable Energy Sources
SDS	Sustainable Development Strategy
SEE	South East Europe
SEWRC	State Energy and Water Regulatory Committee
TPP	Thermal Power Plant

UMIS	Unified Information System for Management and Monitoring of the Structural Instruments of the EU in Bulgaria
UN	United Nations
UNDP	United Nations Development Program
USD	US Dollars
WSSD	World Summit on Sustainable Development
kgoe	Kilogram(s) of Oil Equivalent
toe	Tons of Oil Equivalent
ktoe	Kilotons of Oil Equivalent
mtoe	Megatons of Oil Equivalent

EXECUTIVE SUMMARY

A decade after the adoption of the Lisbon Strategy and EU's first Sustainable Development Strategy, **the Union's ambitious objectives are not yet a reality.** The actual implementation of national policies among its Member States remains a challenge. Europe's latest **objectives** are focused on achieving a smart, sustainable, and inclusive growth by 2020 by:

- Reducing greenhouse gas emissions by 20% compared to 1990 levels;
- Increasing the share of renewable energy sources to 20% of final energy consumption;
- Realizing energy savings of 20% through a more efficient use of energy;
- Creating an integrated energy market with stronger relations between EU Member States;
- Achieving energy security;
- Continuing Europe's leadership in energy technology and innovation.

In order to achieve its sustainable energy goals, the Union has prescribed and employed several types of **instruments:**

- Market-based instruments influencing price (taxes & fiscal incentives) and quantities (tradable emissions permit scheme);
- Financial instruments (Framework Programs, etc.);
- Technical instruments (country assessments, Community evaluations, etc.);
- Supporting schemes (feed-in tariffs, a green certificate system, etc.).

Achieving security, sustainability, and competitiveness in the energy sector is a daunting task for a union of twenty-seven states, especially since the issue of **securing the supply of energy has traditionally been a national matter.** In their drive to reach climate change and energy targets during the past decade, European governments have utilized quick fix solutions like turning to nuclear power or replacing coal with gas, thus burdening future generations with nuclear waste disposal and increasing EU's energy dependence on Russia. Yet, **two major events – the gas crisis of January 2009 and the Fukusima nuclear disaster of March 2011 –** have reshaped the thinking and rekindled the debate on the ways of achieving energy security and stability of supply in Europe. The nuclear disaster in Fukusima attested to the fact that **nuclear energy is inherently centralized and bulky, sealed off from independent oversight, and highly susceptible to government capture and governance failures.** The gas crisis of 2009 exposed serious gaps in EU's energy solidarity and some major faults in the Union's energy links. It turned out that, in reality, EU's new Member States are more closely linked to Russia's energy infrastructure than to that of the rest of the EU. The attainment of a common European policy in the area of energy seems to have become more complicated – Germany's exit from nuclear energy vs. France's heavy reliance on nuclear power signal that the European Commission's policy will remain divided.

Moreover, despite a notion to liberalize and create an integrated common energy market within the EU, distorted market competition and **numerous obstacles to consumers taking a full advantage of the liberalization** of gas and electricity markets exist. These obstacles include:

- **high market concentration,** where traditional operators retain their control over electricity generation and gas imports and production;
- a limitation of consumers' choice due to a **single company's domination of a particular region or country**;
- **consolidated market** power that allows traditional operators to freely increase prices;
- **conflicts of interest** stemming from the vertical integration of production, transmission, and distribution.

There are **pressing concerns in Bulgaria with respect to achieving EU's *Energy 2020* objectives** of security, sustainability, and competitiveness. Over the past two decades, Bulgaria has continued to rely on an overly centralized energy system **highly dependent on imported resources.** The energy sector in the country has been plagued by **bad governance, corruption, and oligarchic control,** rendering decision making unpredictable, haphazard, and prone to caving in to lobby interests. The country relies on imports for almost 70% of its gross energy consumption, almost entirely from a single country. In gas, oil, and nuclear energy, the country's dependence on Russia, including technologically, is close to a 100% (i.e. a single gas pipeline, a single Russian-owned refinery, and a single nuclear power plant reliant on Russia for fuel and high-grade waste disposal). The Bulgarian energy sector is characterized by a **low local scientific and technological capacity** concentrated in traditional energy sources like coal and nuclear energy. In terms of competitiveness, the latter implies that a smaller portion of the value added would originate or remain in the country.

Bulgaria faces **critical issues in energy affordability.** The current low prices of electricity owe to the fully depreciated nuclear and coal power plants, and to the absence of significant upgrades to the grid. Still, as a percent of per capita income, electricity prices in Bulgaria are among the highest in Europe. The pressing need to upgrade its aged energy system puts Bulgaria in a tough spot – it will face price increases whatever the investment strategy. At this point, the only feasible low-cost option seems to be extending the life of existing capacities in nuclear and coal energy as long as possible, without breaking safety standards or emissions targets. One is, however, certain – whichever the selected development path, **Bulgarian consumers will be facing rising electricity prices over the next decade.** This will most certainly restrain growth in consumption, which calls for a careful reconsideration of the country's energy policies of investing in large-scale energy generation capacities. Other things being equal, as a net energy importer, Bulgaria should use European funds and knowledge to **give priority to energy efficiency and support for vulnerable social groups,** as control over energy prices in the future liberalized European market is unlikely.

Sustainable Development

Since 2001, **successive Bulgarian governments have failed to deliver a sustainable development strategy** for Bulgaria. One likely reason for the delay is the non-binding character of EU's initiative:

- Sustainable development is a major challenge for countries like Bulgaria, which experienced protracted transition. Reforms are required in all three main pillars of the sustainability concept – economy (production and consumption), society (labor, living and working standards and habits, etc.), and environment. These concepts and ideas are relatively new to the Bulgarian policy making environment, which delayed their public and political acceptance and subsequent implementation;
- The delay of the Bulgarian sustainable development strategy is not only due to a lack of knowledge and understanding of sustainability, but also to uncertainty over what is the best institutional setup for tackling this new development agenda;
- The current government's initiative to focus resources into the transformation of the Energy Efficiency Agency, as an overarching body responsible for sustainable development, seems to be a step in the right direction. However, the expert capacity and resource availability of the agency to deliver and implement a sustainable development strategy are a cause of concern.

A national sustainable development strategy should provide the basis for all economic policies in the country. In its absence, Bulgaria is currently following a path of extensive development of the energy sector through government explicit or implicit guarantees, and with no realistic assessment of future trends in energy demand. Decisions for constructing big energy infrastructure projects, such as a second nuclear power plant, have been taken without an assessment of their long-term economic, social, and environmental impact. **There is no clear framework for taking long-term decisions regarding the energy mix,** energy security, and its price, which leaves decision-makers prone to lobbying and corruptive pressure.

Climate Change

Bulgaria is caught between the ambitious climate change policies of the EU and its own developmental challenges of fossil fuel and nuclear dependent electricity production methods. Bulgaria's predicament in climate change negotiations is that it is formally part of the club of rich industrial countries expected to significantly cut their emissions, while its economy is still dependent on low-cost energy from locally produced coal:

- Bulgaria is both **more CO_2 intensive per capita than China and India,** and more CO_2 intensive per U.S. dollar of DGP than the United States. Bulgaria's energy sector, which is traditionally the biggest emitter of greenhouse gases, is the most energy intensive in Europe;
- A large surplus amount of assigned emission units has obscured Bulgaria's high carbon intensity and unsatisfactory carbon emissions performance. These sav-

ings are largely the result of the shrinking of economic and industrial activity following restructuring and privatization. Policies compensating for carbon emissions through renewable energy and energy efficiency projects have failed to deliver the expected results yet;
- The European Emissions Trading Scheme was introduced in Bulgaria with the country's accession into the EU. However, the system has not yet become fully functional. At present, **Bulgaria has not sold significant quantities of its emissions internationally,** which leaves it in a very unfavorable position, if emission surpluses are indeed to be nullified after 2012;
- Bulgaria was **suspended from trade with assigned emission units at the international and European market in 2010** due to the lack of transparent and trustworthy national system for recording greenhouse gas emissions in the period between 2007 – 2009;
- Bulgaria has not yet devised a new action plan on emissions for 2008 – 2013.

In February 2011, Bulgaria regained permission to trade on the international and European emissions exchanges. There are hopes that the intensification of trading before the end of 2012, when countries or companies that have not fulfilled their obligations will be urged to buy more permits, will provide opportunities for Bulgaria to trade off its surplus. It is, however, unlikely that Bulgaria can make up for the lost opportunities in the period between 2007 – 2010, as the financial crisis has depressed industrial production in Europe and internationally, and demand for emissions permits has declined markedly. Meanwhile, uncertainty over the future of the Kyoto Protocol leaves markets unstable and buyers biased.

Renewable Energy

Bulgaria's legislation on promoting the use of renewable energy sources closely mirrors the developments on EU level. Adopted policies, and the low-carbon sustainable development agenda as a whole, stem from the superficial application of the EU's developmental discourse, rather than from understanding the real benefits of this agenda for Bulgaria's economic development. For this reason, national policies often seem foreign and fail to translate into action. As the country did not have enough experience in developing new energy sources, this has resulted in **frequent changes in legislation, leaving consumers to pick up the costs.**

- **With its accession into the EU, Bulgaria adopted a very comprehensive but badly structured law on promoting renewable energy sources.** Its guaranteed preferential prices for electricity produced from renewables led to a swift and chaotic explosion of wind and photovoltaic projects, with projected installed capacity far exceeding the country's current total installed generation capacity. However, as preferential prices kicked in, electricity prices for consumers started to marginally increase, leading to a **popular public backlash against renewable energy.**
- Until 2009, the country seems to have pursued all RES development strategies simultaneously **without much regard to expenses and opportunity costs.** The economic crisis of 2008 – 2010 has changed this, making price the sole concern of the Bulgarian public. The *Law on Energy from Renewable Sources* adopted

in 2011 tries to correct the existing shortcomings but might have gone in the other direction, stifling RES development.

- Compared to other EU Member States, **Bulgaria seems to be faring well with respect to achieving its 2020 target for 16% share of renewable energy sources** (RES) in its gross final energy consumption. There is also a solid projected increase of capacity mainly from large wind and hydro projects. However, a closer look at the RES share since 2004 shows that the country is making little progress, with the share of RES in gross final energy consumption being the same in 2009 as in 2004. Bulgaria overshot its national goal for RES-E in 2010 with 4 percentage points (15% of final electricity consumption), though it seems depressed consumption has also played a role. Most electricity from renewable sources has been secured from hydropower plants even before the launch of the most recent EU directives on renewables.
- A problem that is becoming increasingly visible is the negligible share of biofuels and the use of renewable energy sources in Bulgaria's transport sector. With a deliberate last minute change before the adoption of the 2011 *Law on Energy from Renewable Sources,* **the ruling majority delayed the requirement for producers to add biofuel to their products until 2012,** on the grounds that this would keep prices down. While the argumentation used is questionable at best, this move will certainly impact Bulgaria's capacity to meets its binding target for the use of renewables in the transport sector in 2020.

Bulgaria's experience in the promotion of RES since 2003 has demonstrated **some common fallacies and governance risks** associated with the development of new energy sources in Europe:

- **RES promotion should be treated systematically** in relation to the other characteristics of the energy system. It should receive clear guidance form a well-informed, data-based strategic vision for the development of the sector.
- There have been concerns related to the **transparency and reliability of environmental assessment procedures** carried out in the course of the implementation of RES-related projects. Impartial feasibility studies demonstrating the financial capacity and technical expertise of potential investors are critical.
- **The boom of renewable energy projects will likely be tempered** by the 2011 *Law on Energy from Renewable Sources* through regulations tightening licensing procedures, thus, allowing the transmission grid to accommodate all the intended additional generation capacity. However, this *post factum* tempering of the RES investment process and abrupt changes in the rules of the game could have high social and economic costs from reduced investment.
- The **introduction of a green energy line** in the electricity bills of customers has focused public attention on the high preferential pricing of RES-E. A similar pattern can be observed in biodiesel production. Traditional fuel lobbies (coal, nuclear, and oil) have manipulatively used this additional transparency to convey the message that RES costs are the only culprits for rising bills, omitting the information that the cost of electricity will increase also in the case of building a second nuclear power plant, for example.
- The nature of RES requires specific grid quality and management capacity (e.g., smart grids), which Bulgaria is still far from achieving. The ***Law on Energy from Renewable Sources*** **shifts the balance of power from RES investors to grid**

operators, which might lead to further significant delays in preparing the gird for "smart" energy.

- As projects for renewable energy generation and requests for access to the grid continue to exceed the available grid capacity, it is likely that electricity distribution companies develop a policy of selectively connecting RES projects to the grid, leaving room for more corruption and paid favors. **The government and the energy regulator should take quick steps on promoting transparency** and consistency in the manner in which grid companies treat requests for connecting to the grid. RES development requires a much higher administrative capacity from national regulators and policy setting bodies than is currently available.
- The high technicality and the specific nature of energy from renewable sources lead to common **concerns about the intermittence and management of some RES** (notably wind and sun). However, the presence of other balancing sources of energy suggests that the issue is not variability or intermittence, but how to predict, manage, and ameliorate variability.
- A major concern for investors from the introduction of the 2011 *Law on Energy from Renewable Sources* is the **unpredictable and non-transparent process of pricing of electricity from RES.** These pricing uncertainties are notably higher for investors that have initiated their projects under the old regulatory framework.

The debate about increasing the share of RES in Bulgaria's energy mix needs to be clearly embedded into ongoing discussions about the energy security of the country. In addition to selecting the most suitable technologies, a key task for the Bulgarian government is the creation of a balanced mix of renewable energy. The current approach outlined in the *National Energy Strategy 2020* of prioritizing almost every energy source is, at best, unrealistic. Bulgarian political leaders still give a preference to the traditional centralized model of the energy system over a more democratized RES-based development.

Energy Efficiency

Bulgaria has **consistently ranked as the most energy intensive economy in the EU.** The need to address energy intensity issues is particularly pronounced in Bulgarian cities, especially in the housing sector. However, successive governments have chosen to focus on large energy generation projects, rather than on the most obvious priority for Bulgaria – promoting energy efficiency. The latter is perceived as a public good offering low immediate measurable benefits, whereas new generating plants benefit few but specific economic agents, whose interests are promoted. Bulgarian regulatory requirements on energy efficiency are based on common EU targets but their implementation seems slow, taking into consideration that the country is a net energy importer and that energy prices are likely to continue rising.

- The financial and economic crisis has resulted in a decrease in the consumption of energy in the country, and the EU as a whole, thus negatively impacting energy efficiency investment decisions at all levels – public, commercial, and personal.
- The decrease of Bulgaria's energy intensity is so far mainly a result of two factors: i) the restructuring of energy demand in the country due to the closure

and privatization of inefficient and energy intensive industries, and ii) the high fleet renewal rate in commercial transportation due to the introduction of EU vehicle standards. However, the country is at a point where **any additional improvement in its energy efficiency would require the promotion of new and novel production technologies,** conversion processes, modes of transportation, etc. At the user end this would mean installing more efficient appliances, buying vehicles that use less fuel, improving the insulation of buildings, lighting improvements, etc. To accomplish these tasks, extensive investment in energy efficiency will have to be made over the next decade.

- So far, measures have been focused primarily on final consumption, rather than the processes of energy production, transformation, and distribution
- **Affordability of market solutions** for consumers is a major stumbling block for furthering energy efficiency in Bulgaria. According to a CSD-commissioned survey, Bulgarian households, and to a lesser extent, Bulgarian businesses are not prepared to foot the bill for more expensive electricity.

The high costs of energy efficiency measures and the high potential public benefits, including higher energy security, **call for the Bulgarian government to take a leading role in promoting and financing energy efficiency measures.** The average Bulgarian household spends a considerable amount of its income on energy. Thus, any future increases in the price of energy will have to be matched by some form of support for vulnerable consumers. Energy efficiency programs should be designed in such a manner and on such a scale, so as to include households at the "bottom of the pyramid". Currently, most households do not undertake energy efficiency measures not because consumers are wasteful, uninformed, or unwilling, but because they cannot afford the required appliance replacements and technology improvements. There is some potential in improving households' energy saving behavior, as a means of reducing the consumption of energy at no extra cost. Still, the bulk of the energy efficiency drive will have to come from government-sponsored programs to make a sizable difference.

Bulgarian energy policy making seems to omit the central role of behavioral change from energy-related public debates by ignoring the role and the involvement of local authorities and individual consumers. Nevertheless, in order to achieve certain objectives, such as improvements in energy efficiency and savings, **the participation of municipalities in transforming the behavior of individual consumers should be given a priority.**

Recommendations

The analysis of the functioning of and the prospects to Bulgaria's green energy system aids the following policy and action recommendations:

- Considering international market uncertainties, Bulgaria needs to **develop a win-win strategy, focusing its resources on substantial improvements in energy efficiency,** the development of selected (prioritized) RES, the modernization of existing capacity, and the upgrade of its national electricity and gas systems;
- A number of energy efficiency measures have already been established and operational; the government's task now is to precisely **assess the impact** of

these programs and use this assessment as the basis for future energy planning in Bulgaria;

- Governmental, scientific, and business support for the implementation of **innovative energy efficient industrial technologies** needs to be broadened, contributing to more sustainable methods of production and providing Bulgarian enterprises with a competitive edge;
- **Energy efficiency efforts** should be **decentralized,** and municipalities and communities should lead by example;
- More public funds, including EU money, should be redirected to priority efficiency projects, such as state and municipal buildings (e.g., hospitals, schools, kindergartens, libraries, social facilities, administrative buildings, etc.);
- The focus of **energy efficiency** measures should be shifted from primarily targeting final consumption, to measures that incorporate the processes of production, conversion, transformation, etc. that primary energy sources undergo;
- There needs to be a focus on stimulating and enabling changes in **consumer behavior** and lifestyles. It is necessary that the gains from energy savings, efficiency, and the use of RES are advertised and, consequently, internalized, rather than perceived as imposed by the EU;
- **The costs of increasing the use of energy from RES should be spread** between producers, consumers, and the state, and should not exclusively burden either of the parties;
- Balance should be sought between guaranteeing the investments of renewable energy producers and reducing the burden on the National Electric Company (NEC) from long-term purchase price agreements;
- **Criteria and procedures** for selecting which producers of renewable energy are added to the grid should be transparent and subject to public scrutiny;
- A scheme for **green certificates** trading should be introduced as soon as possible to stimulate the production of energy from RES form all energy producers;
- Expanding **gasification** should be considered in improving the energy efficiency of the country;
- **"Smart" energy management systems** should be introduced at the macro and micro levels, as well as energy audits and control mechanisms to reduce wasteful energy spending;
- Better bank loan conditions and incentives for improving the energy efficiency of buildings and insulation should be created;
- Selecting and executing wind farm projects that include primarily **adjustable wind aggregates** should be a criteria for the currently ongoing selection process for RES projects;
- **Biofuel** production needs to be assessed in terms of its cost-effectiveness and effect on general agricultural production;
- The stance towards **biomass** in the national policy remains ambiguous. The potential for using biomass in Bulgaria (including agricultural waste) should be carefully considered, including both potentially positive and negative impacts;
- There is a rapidly growing global tendency towards **horizontally integrated energy supply and demand systems** at the local and municipal levels – e.g., large hydro and wind projects are being substituted by localized solutions that enable the existence of **energy independent local communities** (relying on small solar, wind, and hydro projects).

1. INTRODUCTION

A decade has passed now since the *Lisbon Strategy* and the subsequent first *EU Sustainable Development Strategy* for Europe were formulated. The Union has embraced a complex body of legislation and has adopted ambitious policy documents and initiatives, including directives on renewable energy and energy efficiency, energy efficiency action plans, the launching of the European Emissions Trading System (ETS) in 2005, as well as the comprehensive *Energy-Climate Package* in 2007, to name but a few. Yet, a decade later, the outcomes from these efforts vary among Member States and **the European Union has not reached any of its grand objectives proclaimed at the turn of the century.**

Notwithstanding these setbacks, in the period since 2009 the European Commission has embarked on a new ambitious course of action for achieving smart, sustainable, and inclusive growth by 2020.[1] A key element of this strategy are **the 20-20-20 climate/energy targets,** which foresee that by the turn of the next decade Europe would have: (i) reduced its emissions by 20% compared to 1990 levels; (ii) increased the share of renewable energy sources in final energy consumption to 20%; and (iii) improved energy efficiency by 20%. These objectives have been further elaborated in the first strategic document of the newly formed DG Energy – *Energy 2020: A Strategy for Competitive, Sustainable and Secure Energy.*[2] The strategy strives to **increase the EU's collective and Member State's individual energy security** by introducing savings, boosting energy generation from renewable sources, and achieving further integration of the European energy markets in electricity and gas.

The EU's *Energy 2020* strategy has been greatly influenced by the natural gas crisis of 2009, when a number of EU Member States were left in the cold during the winter because of a dispute between Russia and Ukraine. The gas crisis made it clear that Cold War era East – West divisions were still alive and well in the energy sector. The **EU's new Member States** from 2004 and 2007 **were much more closely linked to Russia's energy infrastructure than to that of the rest of the EU.** Though it would have been easy for fellow old Member States to help the most distressed countries such as Slovakia and Bulgaria, this had not been technically feasible because of the lack of infrastructure links.

Achieving security, sustainability, and competitiveness at the same time seem daunting goals by themselves, especially when they pertain to a union of twenty-seven states for which energy has been the linchpin of national sovereignty for ages. The severe and protracted financial and economic crisis of 2008 – 2010 has made things worse, as it:

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[1] EC. COM (2010) 2020 Communication from the Commission, EUROPE 2020: A strategy for smart, sustainable and inclusive growth Brussels, 3.3.2010.

[2] EC. COM/2010/0639 Communication from the Commission, Energy 2020: A strategy for competitive, sustainable and secure energy.

- has made governments and households less prone to supporting costlier energy solutions for reducing adverse climate impact, including renewable energy sources, however beneficial they might appear in the longer run;
- has drastically dampened industrial production, which has skewed climate change statistics, making the reduction of greenhouse gas emissions seem less urgent;
- has reduced gas demand in Europe, making strategic projects like Nabucco less attractive and those offering competitive solutions like South Stream more likely to engage in opposing tactics;
- has rendered capital intensive projects for building new nuclear facilities unmarketable, as strategic investors have quickly moved to focus on core markets of growth (primarily China), while falling demand has pushed breakeven points further into the future.

For years **European governments have tried to reach climate change and energy targets through quick fixes,** such as replacing coal with natural gas. This has led to a gradual increase of energy dependence on Russia. More recently, governments have turned to nuclear in order to meet their greenhouse gas goals and growing energy needs, while simultaneously reducing energy dependence. The Fukushima disaster has reminded the world that nuclear energy can hardly be termed green, although it does not produce greenhouse gases. The tragedy has revealed that nuclear energy is inherently centralized and bulky, and insulated from independent oversight, which creates high risks of government capture and governance failures. Overreliance on nuclear energy also creates considerable risks to the security of electricity supply, as in cases of accidents very large chunks of the system may become non-operational, the effects of which can be very difficult to offset. This is true even for larger countries like Japan and France, yet it is even more so for smaller economies such as, for instance, Bulgaria's or Finland's. As a result, European governments face tough choices. **The attainment of a common European energy policy seems to have become more complicated** after the biggest European economy – Germany – has moved to reinstall its moratorium on nuclear. The latter development increases the chances for faster development of renewable energy sources and energy efficiency technologies in Europe. At the same time, the heavy reliance on nuclear technologies of core EU Members, such as France, signals that the European Commission's policy will remain neutral, while divisions persist. This, in turn, will make policy choices for smaller Member-States with weaker governance systems, such as Bulgaria, much more difficult.

With regard to achieving the EU's *Energy 2020* objectives of security, sustainability and competitiveness, **Bulgaria is one of the countries with the most pressing concerns.** Over the past twenty years, Bulgaria has continued to rely on an overly centralized energy system working on imported resources. The **energy sector in the country has been plagued by bad governance, corruption and oligarchic control,** which have made decision making unpredictable and haphazard, and prone to caving in to lobby interests.[3] The country relies on imports for almost 70% of its gross energy consumption, which almost entirely comes from a single country.[4] In gas, oil, and nuclear energy, the country's de-

[3] *Energy and Good Governance in Bulgaria: Trends and Policy Options,* Center for the Study of Democracy, 2010.

[4] According to the latest available data from the National Statistical Institute of Bulgaria for the year 2009.

pendence on Russia, including technologically, is close to a 100%. Aside from some small-scale local production, Bulgaria gets its gas via a single pipeline. Russia's Lukoil owns the country's only oil refinery. Bulgaria's existing nuclear power plant relies on Russian producers for fuel and high-grade waste management. The Bulgarian energy sector, much like the rest of the economy, is characterized by **very low local scientific and technological capacity,** which is concentrated in traditional energy sources, such as coal and nuclear energy.[5] In terms of competitiveness, this implies that a smaller portion of the value added would originate or remain in the country, which calls for a strong increase in energy-related R&D investment.

Besides high energy dependence and low competitiveness, Bulgaria faces **critical issues in energy affordability.** The country has managed to preserve very low electricity prices for the population thanks to the use of fully depreciated nuclear and coal plants and an aging grid. Still, **as a percentage of per capita income, electricity prices in Bulgaria are among the highest in Europe.** With respect to the need to upgrade its antiquated energy system, Bulgaria faces a tough choice between the option to invest considerable resources in building new coal and nuclear facilities and raise prices, and the option to try to extend as long as possible the life of its existing capacities in nuclear and coal energy, while introducing renewable energy solutions and energy efficiency (as the EU strategy prescribes) and still face price increases. Until 2009, the country seems to have pursued all strategies simultaneously without much regard to expenses and opportunity costs. The economic crisis of 2008 – 2010 has changed this, making price the sole concern of the Bulgarian public. Finding appropriate solutions would require political vision and solid, data-based decision-making.

In 2001, Bulgaria embarked on revamping its only local resource for electricity production – the coal fired plants in the Maritza Iztok basin – in order to meet EU environmental criteria on greenhouse gas emissions. The prices of the electricity derived from the new energy generation facilities were fixed in long-term contracts and were on average 30 to 70% higher than regulated prices of comparable units in 2010. **In 2002, the then Bulgarian government decided to unfreeze the building of a second nuclear power plant in the country.** This move was not based on a strategic analysis, but was rather a political act to placate public opinion and the local nuclear lobby, upset over the already agreed settlement with the EU to close down units 3 and 4 of the Kozloduy NPP upon the country's accession to the Union. In the last few days of 2006, the Russian company *Atomstroyexport* won a tender to build a second nuclear power plant in Bulgaria: namely, Belene NPP. Five years later, and after depleting approximately 1 billion Euros, the project seems unfounded from an economic or energy policy perspective, while its associated management practices are of dubious quality. Though the project's final price tag remains unclear, even the most optimistic assessments would require regulated sales prices from the new nuclear power plant to triple compared to current levels.

With Bulgaria's accession into the European Union **in 2007, the country adopted a very comprehensive but badly structured law on promoting renewable**

[5] *Innovation.bg 2011: Competitiveness and Innovation,* Applied Research and Communications Fund, 2011.

energy sources. Its guaranteed high and stable preferential prices for electricity produced from renewables led to a quick and chaotic explosion of wind and photovoltaic projects, reaching 18 GW of projected installed capacity at some point – almost twice as high as the country's current total installed generation capacity.[6] As a result, Bulgaria has overshot its indicative goal of reaching 11% of total final electricity consumption provided by renewable energy sources in 2010 by 4 pp.[7] However, as preferential prices kicked in, electricity prices for consumers started to marginally increase, which, coupled with the introduction of a specific green energy line in monthly electricity bills, created a popular public backlash against renewable energy. This has prompted the current Bulgarian government to adopt a much more cautious approach to renewable energy development in the new *Law on the Energy from Renewable Sources*.[8] The law is also intended to meet the much more ambitious targets set in the EU's latest *Directive on the Promotion of the Use of Energy from Renewable Sources*.[9] According to the latter, Bulgaria will have to reach a share of renewable sources of 16% from its final energy consumption, including a 10% share in final energy consumption for transportation.

Whichever path of development Bulgaria chooses – nuclear and/or renewable energy and/or clean coal – it is certain that **Bulgarian consumers will be facing rising electricity prices over the next decade.** This will most certainly restrain growth in consumption, which calls for a careful reconsideration of the country's energy policies. Other things being equal, Bulgaria should give priority to meeting its European commitments, which will provide more stability to national energy policies. This seems to be the path prescribed by the country's latest *Energy Strategy,*[10] which assigns the highest priority to energy efficiency in efforts to keep bills from further exacerbating energy poverty.

The current report aims to review the existing implementation of sustainability policies in the EU, and more specifically, the progress achieved in the implementation of such policies in Bulgaria. On the basis of these assessments, the report will also provide policy recommendations for reforms and governance in the green energy sector of the country.

The report comprises three sections. The first section outlines existing energy sustainability policies in Europe and Bulgaria, emphasizing the main achievements and challenges in their implementation. The second section singles out more specific issues, which are central to Bulgaria's sustainable development, such as social vulnerabilities and the lack of technical capacity. The concluding section

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[6] Goranova, K. and G. Zhachev. 'Страната на залязващото слънце: Промените в Закона за зелената енергия са на път да зачеркнат този бизнес.' ("The Land of the Setting Sun: The Changes to the Green Energy Law are About to Put an End to Green Business") Capital Weekly, April 22-29, 2011, p. 13.

[7] Directive 2001/77/EC prescribes indicative goals for the share of renewable energy sources in final electricity consumption in EU Member States. According to the Directive, Bulgaria's share was 11%. Its actual share in 2010 came at 15%, according to preliminary data from the Ministry of Economy, Energy and Tourism.

[8] Approved by Decree 92 of May 2, 2011 of the President of the Republic of Bulgaria.

[9] Directive 2009/28/EC of the European Parliament and of the Council of 21 April 2009.

[10] *National Energy Strategy of the Republic of Bulgaria until 2020,* adopted by the Council of Ministers.

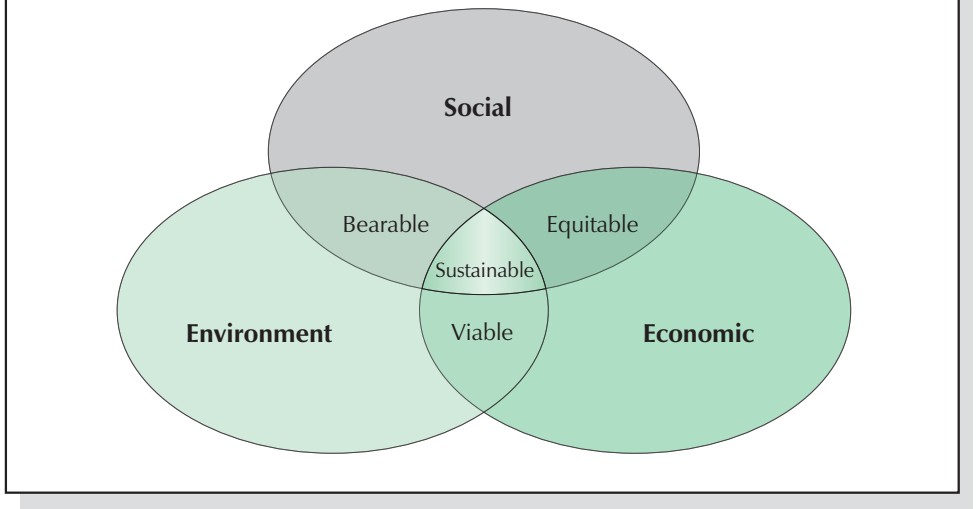
summarizes the transition to sustainable development in Bulgaria and the EU, and provides a list of recommendations for improving governance in the green energy sector. The present report incorporates the opinions and recommendations of a number of Bulgarian energy experts, as expressed in a series of workshops. The data included in this report comprises not only statistical information from external sources, but also data collected via a CSD-commissioned *Energy Survey* conducted in 2009 and 2010 by *Vitosha Research*.

2. EUROPE'S COMMON ENERGY FUTURE

2.1. A STRATEGY FOR SUSTAINABILITY

Since the definition of the term by the World Commission on Environment and Development (Brundtland Commission) in 1987, **"sustainability" has become one of the most prominent political terms in debates on economic development.** The European Union took a leading role in global efforts to enhance sustainability and green policies in a series of meetings on sustainable development and climate change in Rio (1992), Kyoto (1997), Johannesburg (2002), and Copenhagen (2009).

FIGURE 1. THE SUSTAINABLE DEVELOPMENT IDEA



Source: CSD, 2011.

The idea of sustainable development emerged as a key objective for the EU in the *Lisbon Treaty* (2007), subsequently leading to the renewal of a number of Directives to ensure compliance with the Treaty. Since sustainable development is closely tied to both climate change and energy policy, in March 2007, EU leaders endorsed an integrated approach to climate and energy policies aimed at mitigating climate change and increasing the Union's energy security. In order to transform Europe into a competitive, low-carbon economy, a series of climate and energy targets were set for the year 2020. These are known as **the "20-20-20" targets** and include:

- reduction of greenhouse gas emissions by the EU by at least 20%, as compared to 1990 levels;

- 20% reduction in primary energy use compared to projected levels, achieved by improving energy efficiency;
- 20 % share of energy from renewable sources in overall EU energy consumption and a mandatory minimum target for Member States of 10 % share of biofuels in gasoline and diesel consumption for transportation.

In order to implement the "20-20-20" targets, the European Commission introduced binding legislation in 2008 – the *Climate and Energy Package* – which came into force in 2009. The Package stipulates that:[11]

- the Emissions Trading System (ETS), seen as an essential tool for cutting emissions in a cost effective manner, shall be revised and strengthened;
- a cap on emission allowances for the EU is to apply from 2013 onwards, to be cut annually in order to reduce emission allowances to 21% below 2005 levels by 2020; the number of sectors covered by this system will gradually expand;
- emissions from sectors not covered by the ETS (e.g., transportation, housing, waste management, and agriculture) will be managed through an "Effort Sharing Decision", where each Member State has a binding target for national emissions reductions. National targets take into account a country's economic development, thus varying for each Member State, with an overall EU-wide goal to cut emissions from non-ETS covered sectors by 10% by 2020, compared to 2005 levels;
- binding national targets for renewable energy, which vary for each Member State,[12] will collectively result in an average of 20% renewables share across the EU by 2020;
- the accepted targets for the share of renewables will result in a decrease of the EU's dependence on imported energy and a reduction of greenhouse gas emissions;
- the development and safe use of carbon capture and storage (CCS) is to be promoted and managed through a legal framework.

The *Climate and Energy Package* does not address energy efficiency directly. The latter is covered by the EU's *Energy Efficiency Action Plan 2011*. Energy efficiency most commonly emerges as an issue in close association with the EU's 2020 target for saving 20% of primary energy consumption compared to projections. Yet, **for a number of countries that are not rich in energy resources, including Bulgaria, energy efficiency can be seen as the best way for meeting energy demand.** While notable actions were taken towards achieving the objective of increasing energy efficiency (e.g., in the appliances and buildings markets), recent estimates by the European Commission suggest that the EU is on track to achieve only half of its objective to reduce its primary energy consumption by 20%.[13] Thus, while

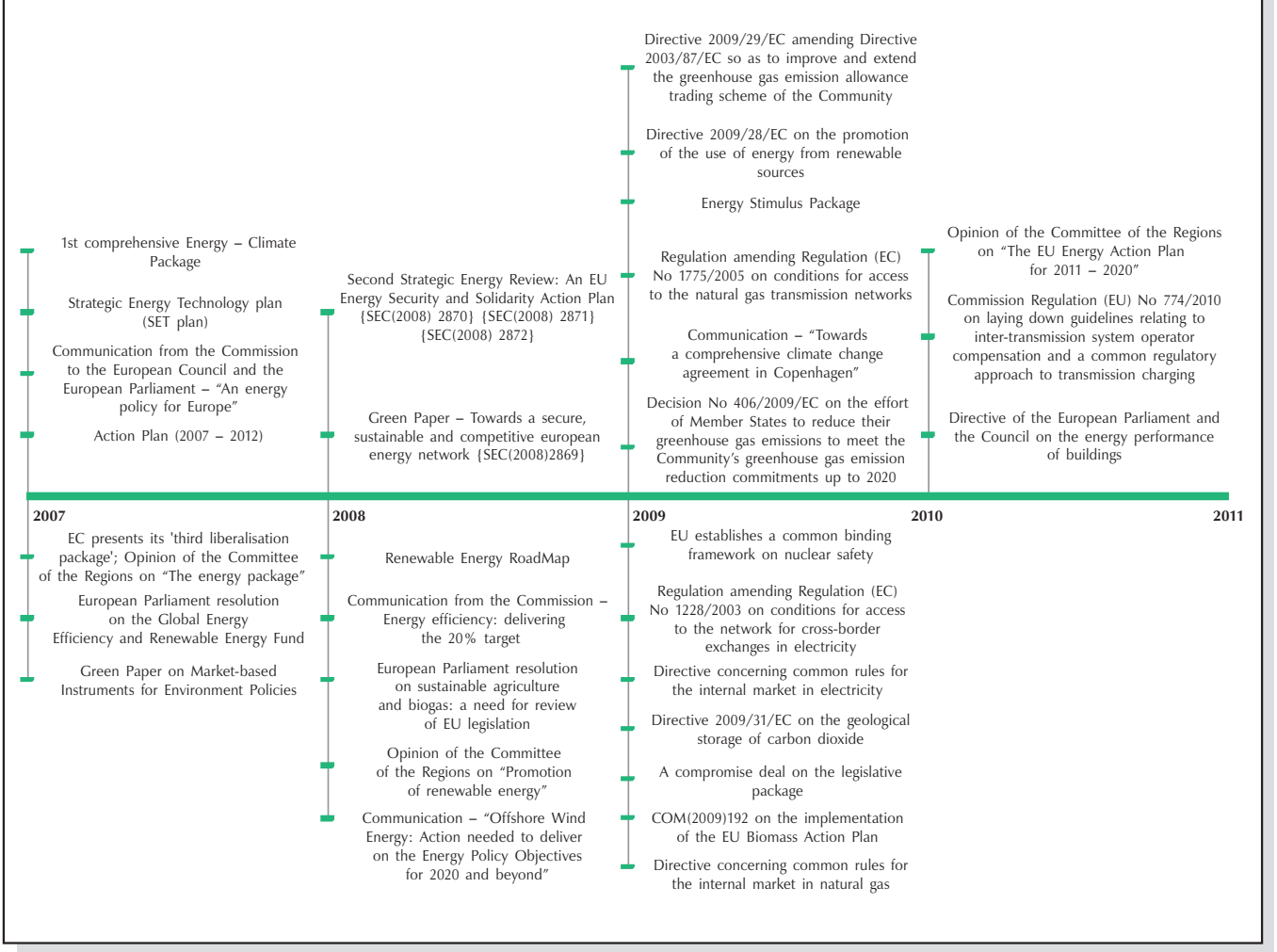
[11] See the European Commission's Climate Action: http://ec.europa.eu/clima/policies/brief/eu/package_en.htm.

[12] The national targets for the share of renewables vary from of 10% for Malta to 49% for Sweden.

[13] EC. COM(2011) "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy Efficiency Plan 2011".

the past few years have been characterized by a number of significant efforts in terms of policy development, the focus should now move onto putting policy into practice. The economic and financial crisis has put a considerable strain on Europe's public finances, which will likely result in a search for more efficient ways of promoting sustainable development. In addition, it is likely that some countries will altogether fail to meet their targets, which may lead to the reconsideration of legislation in 2015.

FIGURE 2. EU ENERGY-RELATED LEGISLATION – TIMELINE

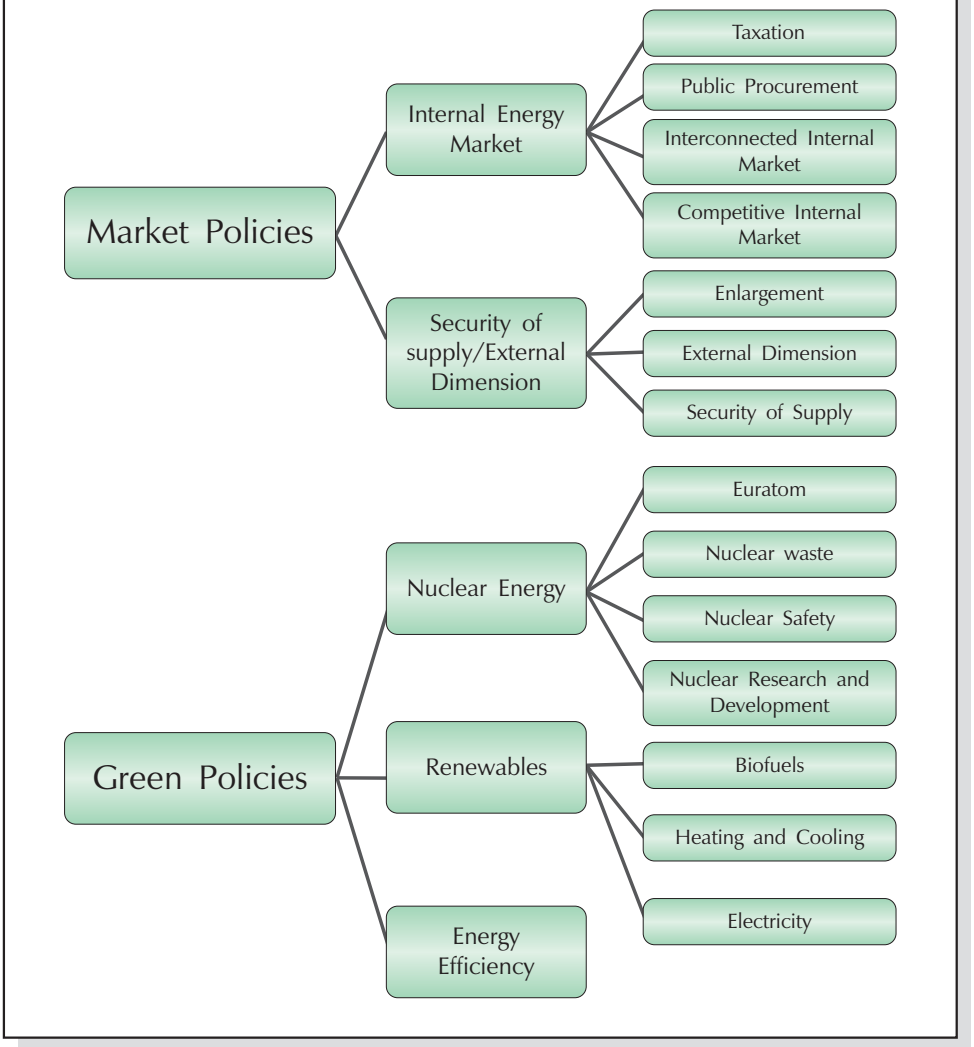


Source: CSD, 2011.

2.2. A VIABLE ENERGY POLICY FOR EUROPE

Operationally, **legislative acts pertaining to energy can be divided into three categories:** legal acts with binding power, such as regulations and directives; advisory acts, such as green papers and working papers (e.g., European Commission communications); and evaluations, such as progress reports on the implementation of certain policies. Aside from this operational categorization, energy acts can be grouped into ones directly linked to policies for a "greener" Europe (documents and acts on energy efficiency, renewables, nuclear energy), and those linked to the political and economic development of the region (internal energy market, security of supply, and external dimensions). These need to be regarded as providing practical guidance via broad generalizations, rather than as a strict theoretical categorization. There are two notable caveats. First, there is clearly no

FIGURE 3. EU POLICIES ON ENERGY



Source: CSD, 2009.

unified external dimension of EU energy policy, with the exception of the Union's enlargement dimension. This was rather visible in the 2009 gas crisis, which triggered the most recent market liberalization drive of the EU. Second, while nuclear energy is compatible with the aims of reducing greenhouse gases, hence is categorized under EU's green policies, it can hardly withstand scrutiny from a sustainability perspective, especially in view of the three nuclear disasters of the past fifty years, or of the lack of a permanent storage solution for nuclear waste. Unlike renewable energy sources, nuclear technologies are also associated with far less market transparency and more comprehensive government regulation, which in a way contradicts EU's market policies.

Market Policies

Market policies in relation to energy in the EU **aim primarily at the better functioning of the Internal Market for energy,** which includes more and better interconnectedness between Member State energy markets, and a common external energy policy. These policies are still in their infancy, as the energy market in the EU remains largely fragmented along national borders. This is particularly true for New Member States, whose systems remain connected to the former supplier of inexpensive energy: namely, Russia. The gas crisis of 2009 following a dispute between Russia and the Ukraine made this division very visible, when Bulgaria and Slovakia remained without natural gas supply, even when Western European Member States had plenty of gas to share.

In 2007, the EC presented its vision for *An energy policy for Europe*.[14] This vision included the establishment of an internal energy market at the Community level, aiming to ensure consumers' choice of suppliers at competitive prices. Legislation to unbundle the supply of electricity and gas from their production was under way at the time and was implemented in 2009. Thus, as of July 2007, households throughout the EU were deemed free to choose their gas and electricity suppliers. However, a successive inquiry into competition in the gas and electricity sectors[15] revealed the existence of distortions in market competition and a number of obstacles to businesses and consumers taking full advantage of the liberalization of gas and electricity markets. These **obstacles** included:

- **high market concentration,** where traditional operators retain their control over electricity generation and gas imports and production;
- a limitation of consumers' choice due to a **single company's domination of a particular region or country**;
- **consolidated market** power that allows traditional operators to freely increase prices;
- **conflicts of interest** stemming from the vertical integration of production, systems, and distribution;
- the **absence of market integration** across countries.

[14] EC. COM(2007) 1, Communication from the Commission to the European Council and the European Parliament of "An energy policy for Europe", 10 January 2007.

[15] EC. COM(2006) 851, Communication from the Commission of 10 January 2007: Inquiry pursuant to Article 17 of Regulation (EC) No 1/2003 into the European gas and electricity sectors.

In 2009, the EC presented its *Third Energy Package* (liberalization), which called for unbundling of energy transmission from supply and production in electricity and gas, and further strengthening and liberalizing the EU Internal Market for energy. Separating the management of networks from energy production or sales is believed to encourage investments in network infrastructure and the entry of new companies into the market, thereby decreasing prices and increasing the security of supply. In addition to increasing competition, **unbundling is also expected to encourage the entry of renewable energy producers into the market.** Besides the advantages intrinsic to unbundling per se, it has been pointed out that a country's internal energy market can benefit from a greater integration into the wider EU market. Currently, the operation of the latter is often obstructed by differences in national technical standards, as well as by the lack of network capacity.

With an understanding of the role of cross-border relations and the interdependence between Member States, the EC developed the EU's *Security and Solidarity Action Plan*.[16] The plan was developed around the goals of building the necessary infrastructure or improving the existing one (e.g., via connecting isolated energy markets in Europe, developing a Southern gas corridor for supplies from the Caspian region and the Middle East, building interconnectors throughout Europe, etc.); improving external energy relations and placing energy supply at the heart of international relations (e.g., with Turkey, Ukraine, Russia, or the Republic of Moldova); improving and updating response mechanisms to crisis situations; utilizing the EU's own energy resources; as well as placing an emphasis on energy efficiency.

In 2010, the European Commission followed up with a focus on the infrastructure required in order to ensure the free movement of energy and security of supply throughout the common market for 2020 and beyond.[17] The Commission's infrastructure blueprint outlined the priorities for the Union and the methods for achieving them, which concern electricity and natural gas grids and storage, heating and cooling networks, the refining and transport infrastructure for oil, CO2 capture, transport and storage (CCS),[18] smart grids, as well as some issues related to the security of supply. In order to speed up the implementation of its priorities, the European market needs to undergo a streamlining of permit procedures and rules for infrastructure developments under the Agency for the Cooperation of Energy Regulators (ACER), which is to manage harmonization and standardization requirements under the *National Energy Strategy of the Republic of Bulgaria until 2020*.[19]

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[16] EC. COM (2008) 781, Communication from the Commission to the European parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Second Strategic Energy Review: an EU Energy Security and Solidarity Action Plan.

[17] EC. COM(2010) 677/4, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European energy network.

[18] The EU proposed to set up a number of CCS demonstration plants by 2015 to enable the assessment of its viability by 2020.

[19] EC. COM(2010) 693, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy 2020 A Strategy for Competitive, Sustainable and Secure Energy, 10 November 2010.

Green Policies

The **EU's green energy policies focus primarily on the promotion of renewable energy sources and energy efficiency** as ways of: (a) reducing the union's dependence on imported fossil fuels; (b) reducing greenhouse gas emissions; and (c) preparing the economy to lead the global market in green technologies. Nuclear energy development has been at the core of EU energy cooperation and has long been considered a quick-fix option for reducing greenhouse gases. However, the Fukusima nuclear power plant disaster of 2011 caused many EU countries, most notably Germany and Italy, to reconsider their nuclear energy stances, which together with the industry's unresolved issue of the safe storage of nuclear waste would likely put nuclear energy outside the EU's green policy options.

The EC's initial energy efficiency policies were focused on encouraging the energy saving behaviour of consumers (i.e. citizens and businesses).[20] More recently, EU leaders have committed to achieving, by 2020, 20% savings in the Union's primary energy consumption, compared to projections for the same period. In order to achieve this objective, in 2007 the EU endorsed the *Energy Efficiency Action Plan 2006 – 2012* (EEAP). The EEAP was developed on a sectoral basis. It emphasized the potential for savings in the **residential and services sectors,** which accounted for about 37% of final energy use in the EU in 2007. Consequently, the EU moved forward with the implementation of key legislation concerning these sectors, such as the *Energy Performance of Buildings Directive* (EPBD),[21] the *Energy Services Directive* (ESD),[22] as well as the *Ecodesign and Labelling Directives*.[23] In the **transport sector,** which in 2007 accounted for 32% of the EU's final energy use, major developments included setting standards for emissions performance for new passenger cars[24] and light-duty vehicles,[25] developing new labelling regulation for tires,[26] promoting clean and energy-efficient road transport through public procurement,[27] as well as including the aviation sector under the Emissions Trading Scheme (upcoming in 2012). The **industrial sector,** which accounted for 27% of the EU's final energy use in 2007 (notably the energy intensive industries), was believed to be largely covered by the EU's ETS. Therefore, no direct measures for this sector were included in the EEAP. **Energy generating industries** were singled out in the 2006 – 2012 EEAP with the objective of improving the efficiency of power generation and distribution. To that end, the European Commission implemented the

[20] EC. COM(2005) 265 Green Paper on Energy Efficiency or Doing More With Less, 22.06.2005.

[21] Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

[22] Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services.

[23] Commission Regulation (EU) No 1016/2010, Commission Regulation (EU) No 1015/2010, Commission Regulation (EU) No 347/2010, Commission Regulation (EC) No 641/2009, Commission Regulation (EC) No 640/2009, Commission Regulation (EC) No 643/2009, Commission Regulation (EC) No 642/2009, Commission Regulation (EC) No 278/2009, Commission Regulation (EC) No 859/2009, Commission Regulation (EC) No 245/2009, Commission Regulation (EC) No 107/2009, Commission Regulation (EC) No 1275/2008, Directive 2009/125/EC.

[24] EC 443/2009.

[25] COM/2009/0593.

[26] EC 1222/2009.

[27] Directive 2009/33/EC.

Combined Heat and Power Directive (CHP)[28] and proposed best practices on energy efficiency. Additional progress was made with the propagation of decentralized generation in the *Third Legislative Package*.[29]

A 2011 impact assessment[30] of the Action Plan, however, states that **the EU is not on track to realize completely its objectives of cost-effective energy savings:** while a break was observed in the trend of ever-increasing energy demand, reductions in energy consumption were not sufficient.[31] Furthermore, the market for energy efficient products, buildings, and services was reported to be developing not as quickly as expected due to a number of market and regulatory failures. Such market failures include the notion that energy market prices do not currently reflect the whole range of environmental costs to society (i.e. in terms of pollution, greenhouse gas emission, the depletion of resources, etc.). An additional obstacle on the way to energy efficiency is the existence of "harmful subsidies, regulated prices and negative incentives" (e.g., fossil-fuel consumption subsidies, regulated prices for gas and electricity in a number of Member States, believed to distort market signals, negative incentives such as the increased value of buildings, and thus taxes due, following energy efficiency improvements).

The new 2011 *Energy Efficiency Plan* (EEP) places energy efficiency at the heart of the *Europe 2020 Strategy.*[32] Measures outlined by the EEP 2011 are intended to close the gap in reaching the EU's 20% energy savings target,[33] and seek to realise the shift to an efficient low-carbon economy. The EEP sees the greatest potential for energy savings in buildings (residential and commercial), and in transportation. Within the housing sector, heating, followed by lighting and electrical appliances are estimated to consume the most energy. The energy efficiency of industries will be addressed through the establishment of efficiency requirements for industrial equipment, energy audits of industries, improvements to power and heat generation, and efficiency measures applied to the entire energy supply chain.[34]

The *White Paper on Renewables* from 1997 was the first to argue that renewable energy sources could help reduce the Community's dependence on imports, increase the security of supply, and positively contribute to cuts in greenhouse gas emissions.

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[28] Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market.

[29] EC. SEC(2011) 277 Impact assessment: Communication from the commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions commission staff working document: Energy Efficiency Plan 2011.

[30] Ibid.

[31] According to the assessment, reductions in energy consumption will amount to only 9% in 2020.

[32] The Europe 2020 Strategy advocates smart, sustainable, and inclusive growth, and outlines five main targets mapping out the EU's development in 2020, one of them related to energy and climate change.

[33] According to the Communication from the Commission COM (2011) 112 final to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "A Roadmap for moving to a competitive low carbon economy in 2050", EU is only halfway to meeting its 20% energy savings target.

[34] EC. COM(2011) 109 final Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "Energy Efficiency Plan 2011," Brussels, 8.3.2011.

A list of measures was proposed to compensate for the little importance attached to renewable energy sources in Community policies, programs and funding at the time. These measures included non-discriminatory access of RES to the electricity market; fiscal and financial incentives; new bio-energy initiatives for transportation, heating and electricity, and specific measures to increase the market share of biofuels, promote the use of biogas, and develop markets for solid biomass; promotion of the use of renewable energy sources (such as solar energy) in the construction industry (both in retrofitting and for new buildings). In 2001, the European Commission followed up on its white paper with a Directive on the Promotion of the Electricity Produced from Renewable Energy Sources.[35] The directive established indicative goals for the share of renewable energy sources in electricity consumption for the EU – 27 as a whole (21%) and for each individual Member State. In its 2011 evaluation the European Commission notes that the overall goal will not be reached, while only seven countries might reach their individual targets.[36]

A milestone in the use of RES was reached in January 2007, when the Commission presented its *Renewable Energy Roadmap* – a long-term strategy for the development of renewables. The strategy called for a mandatory target of attaining a 20% share of renewable energy sources in the EU's energy mix by the year 2020. This target was approved by EU leaders in March 2007 and adopted in a new *Renewables Directive*[37] in April 2009. It sets national targets for the share of energy from renewable sources over the period to 2020 and includes a reference value for the year 2005. The national targets are mandatory and are calculated to jointly contribute to the overall target of at least a 20% share of energy from renewable sources in the EU's gross final energy consumption by 2020.

The national target of each Member State is calculated according to the share of energy from renewable sources in its 2020 gross final consumption. Moreover, Member States should develop the infrastructure necessary for the addition of energy from renewable sources to their energy mix. To this end, Member States are to ensure that operators within the country guarantee the transmission and distribution of electricity from RES and offer priority access for this type of energy to the grid. Additionally, Member States are to achieve a share of energy from renewable sources in their transport sector of at least 10 % of final energy consumption in the sector by 2020.

As the EC envisions steady progress towards the 2020 targets, the Directive outlines a series of interim targets or indicative trajectories. Each Member State has the choice of determining its preferred mix of renewable sources, reflecting the fact that different countries have varying potential for deriving energy from diverse sources. However, Member States are required to present the Commission with their plans

[35] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.

[36] Commission Staff Working Document, Recent progress in developing renewable energy sources and technical evaluation of the use of biofuels and other renewable fuels in transport in accordance with Article 3 of Directive 2001/77/EC and Article 4(2) of Directive 2003/30/EC. Accompanying document to the Communication from the Commission to the European Parliament and the Council Renewable Energy: Progressing towards the 2020 target, COM(2011) 31 final.

[37] Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources.

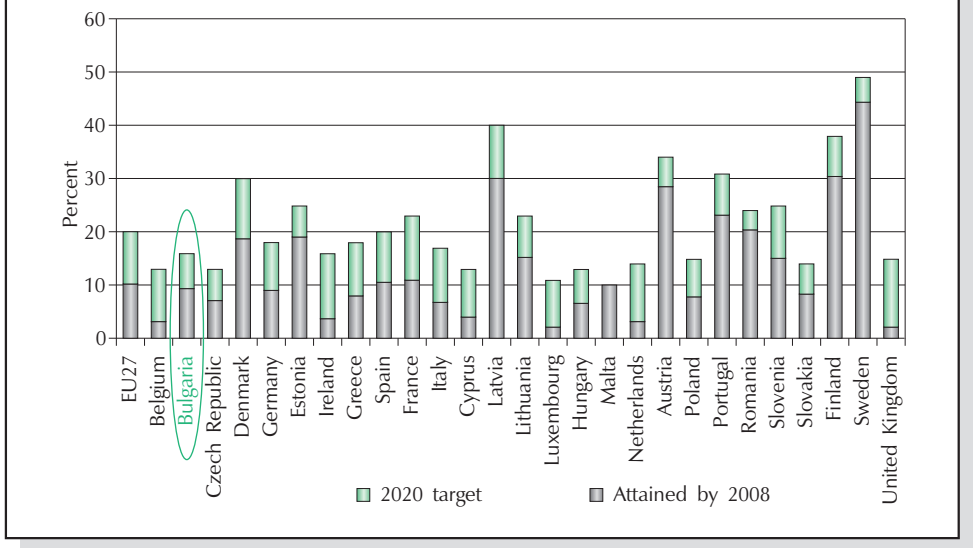
Table 1. Renewable Energy Targets as per the Directive on the Promotion of the Use of Energy from Renewable Sources*

	Reference	Indicative trajectory				Target
	2005 (%)	2011 – 2012 (%)	2013 – 2014 (%)	2015 – 2016 (%)	2017 – 2018 (%)	2020 (%)
Belgium	2.2	4.4	5.4	7.1	9.2	13.0
Bulgaria	9.4	10.7	11.4	12.4	13.7	16.0
Czech Republic	6.1	7.5	8.2	9.2	10.6	13.0
Denmark	17.0	19.6	20.9	22.9	25.5	30.0
Germany	5.8	8.2	9.5	11.3	13.7	18.0
Estonia	18.0	19.4	20.1	21.2	22.6	25.0
Ireland	3.1	5.7	7.0	8.9	11.5	16.0
Greece	6.9	9.1	10.2	11.9	14.1	18.0
Spain	8.7	11.0	12.1	13.8	16.0	20.0
France	10.3	12.8	14.1	16.0	18.6	23.0
Italy	5.2	7.6	8.7	10.5	12.9	17.0
Cyprus	2.9	4.9	5.9	7.4	9.5	13.0
Latvia	32.6	34.1	34.8	35.9	37.4	40.0
Lithuania	15	16.6	17.4	18.6	20.2	23.0
Luxembourg	0.9	2.9	3.9	5.4	7.5	11.0
Hungary	4.3	6.0	6.9	8.2	10.0	13.0
Malta	0.0	2.0	3.0	4.5	6.5	10.0
Netherlands	2.4	4.7	5.9	7.6	9.9	14.0
Austria	23.3	25.4	26.5	28.1	30.3	34.0
Poland	7.2	8.8	9.5	10.7	12.3	15.0
Portugal	20.5	22.6	23.7	25.2	27.3	31.0
Romania	17.8	19.0	19.7	20.6	21.8	24.0
Slovenia	16	17.8	18.7	20.1	21.9	25.0
Slovakia	6.7	8.2	8.9	10	11.4	14.0
Finland	28.5	30.4	31.4	32.8	34.7	38.0
Sweden	39.8	41.6	42.6	43.9	45.8	49.0
United Kingdom	1.3	4.0	5.4	7.5	10.2	15.0

* All percentages originate from Annex I of Directive 2009/28/EC. The indicative trajectory has been calculated from Part B of the Annex.

for reaching their national targets, including their energy mix, in National Action Plans (NAPs) based on the set indicative trajectories. Member States are also required to provide progress reports on achieving their targets every two years. It is at the EC's discretion to enact infringement proceedings in cases where states have not taken adequate measures for achieving their targets. Member States are given flexibility in using national support schemes and linking them to similar schemes in other EU countries. In addition, a system was established allowing the trade of excess renewables credits between Member States. These so-called statistical transfers are only allowable provided that the selling country has reached its interim renewables targets.[38] The Directive's focus is on promoting large-scale installations for generating renewable energy, yet there is a requirement for Member States regarding minimum levels of renewable energy use in buildings. National guidelines on planning new construction projects are available to architects and urban planners. Local and regional authorities are to oversee plans for installations for heating, cooling, and electricity from renewable sources. The certification of technicians installing renewable technologies in buildings is also addressed in the text of the Directive.

FIGURE 4. EU MEMBER STATES' ATTAINMENT OF NATIONAL RES TARGETS



Source: CSD, based on Eurostat data.

A closer look at the progress achieved so far by Member States will reveal that, especially given the recent economic and financial crisis, **it is highly unlikely that all countries will meet their targets.** Most notably, crisis-stricken Greece and Ireland are unlikely to find the public and private resources necessary for making the transformations they strive for. Nuclear reliant countries like Belgium and France, as well as the United Kingdom, also seem unlikely to be able to meet their targets. Hence, it is of paramount importance for the future development

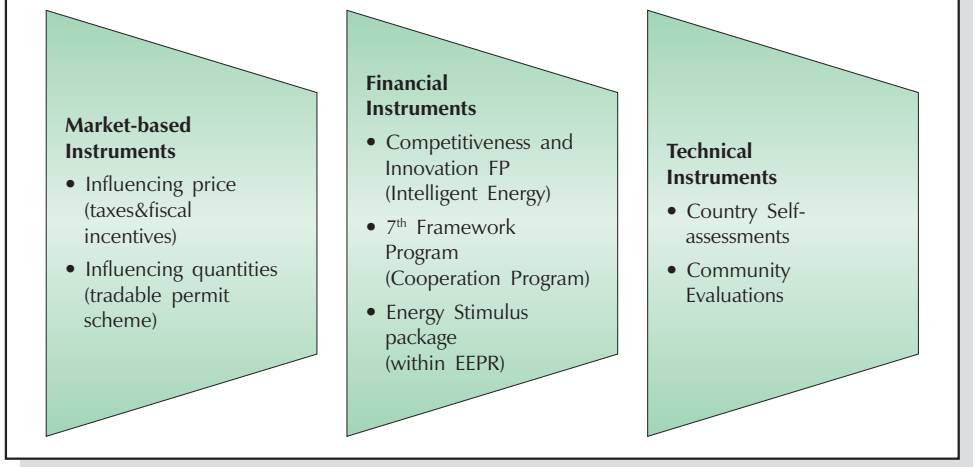
[38] Euractive (2011) EU renewable energy policy, http://www.euractiv.com/en/energy/eu-renewable-energy-policy-linksdossier-188269.

of renewables that the EU should manage to find appropriate instruments for effectively enforcing the transfer of surplus renewable energy from Member States, which meet their interim and final objectives.

2.3. INSTRUMENTS OF THE EU ENERGY POLICIES

In order to achieve its sustainable energy goals, the Union has prescribed and employed several types of instruments, which are the focus of the following section.

FIGURE 5. EU ENERGY POLICY INSTRUMENTS



Source: CSD, 2009.

Market-Based Instruments

Although some mechanisms have already been in place, it was not until 2007 that the Commission summarized existing market-based mechanisms in a single *Green Paper.*[39] Two main types of market-based instruments are employed at the Community level. First, there are **instruments for influencing prices,** thus altering them, such as **taxes** (increasing the price of a product or service)[40] and **financial or fiscal incentives** (reducing the price). The Council authorised Member States to grant tax advantages to businesses that take specific measures to reduce their emissions.[41] Member States may also apply total or partial exemptions, or reductions in the level of taxation to: energy products used under fiscal control in the field of pilot projects for the technological development of more environmentally friendly products or in relation to fuels from renewable sources; biofuels; forms of energy,

[39] EC. COM(2007) 140, *Green Paper on Market-based Instruments for Environment and Related Policy Purposes,* 28.3.2007.

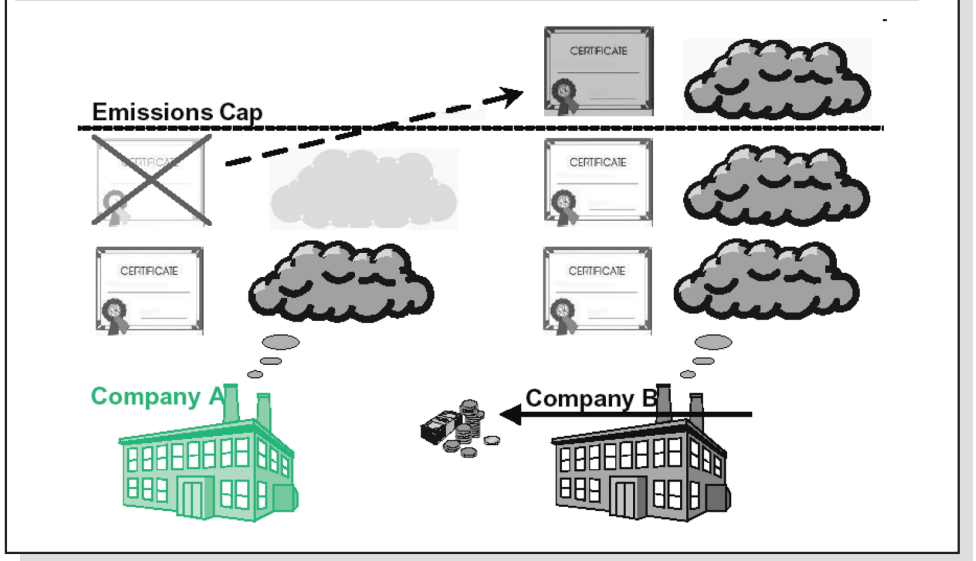
[40] *Council Directive 2003/96/EC of 27 October 2003* restructuring the Community framework for the taxation of energy products and electricity, and the 7 related acts.

[41] Council Directive 2003/96/EC.

which are of solar, wind, tidal, or geothermal origin, or from biomass or waste. The Council has also taken into account the competitiveness of businesses by providing measures to alleviate the tax burden on businesses that attempt to achieve environmental protection objectives or improvements in energy efficiency.[42] It has also allowed Member States to refund, fully or partially, taxes paid by businesses that have invested in the streamlining of their energy use.[43] During the course of 2008, the Commission reviewed the *Energy Taxation Directive*[44] and started an inquiry into how to identify and phase out environmentally harmful subsidies.

Other market-based **instruments influence quantities,** for example, by setting a maximum quantity, which is ultimately the case with **tradable permit schemes** such as the EU's greenhouse gas emissions trading scheme. Under the latter mechanism, a maximum quantity is set for a particular pollutant that may be emitted during a specified period. The quantity is divided between economic operators[45] and traded on a market specifically set up for that purpose and according to the operators' ability to comply with the emissions limits. Those who emit fewer pollutants than they are allowed to can sell their unused quotas, while those who emit more can buy quotas to make up for the shortfall.[46]

FIGURE 6. ILLUSTRATIVE GHG TRADING SCHEME



Source: Global Carbon.

[42] Council Directive 2003/96/EC.

[43] This refund may be as much as 100% in the case of energy intensive businesses, and up to 50% for other businesses.

[44] Ibid.

[45] Oftentimes concerning activities in the energy sector, iron and steel production and processing, the mineral industry and the wood pulp, paper and board industry.

[46] For more on the rules of emission trading, amending act and communications, see the main *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003* establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, and all the 16 related acts.

Instruments that trade quantities offer greater certainty and visibility in terms of achieving specific objectives (e.g., emission limits), while instruments influencing prices offer certainty related to the cost of achieving the objective (e.g., taxes). The latter are, as a rule, easier to implement, though both are prone and vulnerable to fraud and abuse and require strong enforcement administrations.[47] The **advantages of market-based instruments** compared with other instruments are as follows:

- external costs are internalised;
- businesses have greater flexibility in meeting their objectives;
- compliance costs are lower;
- incentives are created to invest in innovations that reduce the impact on the environment;
- employment is boosted in the context of green fiscal reform.

Financial Instruments

One of the key instruments of the Community in dealing with climate change and related energy policy challenges involves **providing funding for innovative thinking and technological progress in the field.** Although sporadic initiatives existed since the very establishment of the Union in the early 1990s, the first comprehensive initiative was the *Framework Program for Actions in the Energy Sector* (1998 – 2002, EUR 175 million), which promoted:

- the development of renewable sources (the ALTENER program worth EUR 77 million);
- increases in energy efficiency (the SAVE program worth EUR 66 million);
- combined heat and power production (co-generation).[48]

The *Intelligent Energy for Europe* Framework Program, (2003 – 2006, EUR 215 million), succeeded these efforts, proposing two additional programs: international cooperation (*COOPENER,* EUR 19 million) and measures on the energy aspects of transport (*STEER,* EUR 35 million) (*ALTENER,* EUR 86 million; *SAVE,* EUR 75 million for the period 2003 – 2006).

After the end of the budget term, *Intelligent Energy for Europe* was incorporated in the new-generation *Competitiveness and Innovation Framework Program* (CIP),[49] which

[47] In addition, taxes are a source of revenue, while tradable permit schemes only generate revenue where the quotas traded are first granted by public tender. Charges do not generate any revenue for public budgets because they only represent payments for services rendered. European Commission, *Green Paper on Market-based Instruments for Environment and Related Policy Purposes,* COM (2007) 140, 28.3.2007.

[48] Along with four other parallel initiatives: ETAP – forward studies and monitoring of the markets (EUR 5 million), SYNERGY – international energy cooperation (EUR 15 million), CARNOT – stimulation of technologies for the clean and efficiency use of solid fuels (EUR 3 million), SURE – cooperation in the nuclear sector, and in particular on safety, industrial cooperation with the NIS and the transport of radioactive material, including the combating of illicit traffic (EUR 9 million).

[49] *Decision 1639/2006/EC of the European Parliament and of the Council of 24 October 2006* establishing a Competitiveness and Innovation Framework Programme (2007 – 2013).

was adopted for the 2007 – 2013 period under the objectives of the revised *Lisbon Strategy*. It aims to strengthen competitiveness and innovation capacity by encouraging the use of information and environmental technologies and renewable energy sources. The sustainable energy part in the CIP was allotted 20% of the funding (EUR 730 million). It supports improvements in energy efficiency, the adoption of new and renewable energy sources, greater market penetration for these energy sources, energy and fuel diversification, increase in the share of renewable energy, and reduction in final energy consumption. An "Eco" element was included in various other program decisions, such as the *Entrepreneurship and Innovation Program,* where one fifth of the total allocation (EUR 430 million) was earmarked for promoting eco-innovation. The *Seventh Framework Program for Research and Technological Development* is also an associated financial instrument to consolidate European research in the energy field.

In the field of energy efficiency, a plethora of financing mechanisms has been envisaged. Innovative financing instruments are being developed by EIB, EBRD, national and private banks. Investments in energy efficiency in the residential sector were made eligible for support in all Member States under the Cohesion Policy. In order to mobilize sustainable energy investments in cities and regions, the Commission and EIB launched the ELENA technical assistance facility in late 2009. Investments in excess of EUR 1 billion have been enabled by the facility so far.[50]

In the context of the global financial crisis, the European Union Council of Ministers has reached agreement on the *Energy Stimulus Package* in June 2009 – an economic recovery regulation aimed at granting financial assistance for projects in the field of energy.[51] The financial instrument was designed to meet the demands of economic recovery, increase energy security, and reduce greenhouse gas emissions by boosting investments in certain strategic sectors.

Technical instruments

The Community prepared a set of technical instrument for green energy policies' support such as regular (annual, biannual) country self-assessments or Community evaluations of Member States' compliance with directives and guidelines. Evaluations of national targets and measures concerning the introduction of RES have been submitted by Members States, as per the old *Renewables Directive*.[52] A new round of evaluations is due to begin following December 2011, as per the new *Renewables Directive*.[53] Each Member State is required to submit a report on its progress in meeting national targets on renewables. These reports are to be initially submitted by December 2011 and every two years thereafter. The reports

[50] EC. COM(2010) 639, *State of play in the EU energy policy,* Annex II, 10.11.2010.

[51] The regulation is part of the European Economic Recovery Plan endorsed by the European Council in December 2008, and provides a framework for measures taken by each Member State in response to its specific circumstances, and also a number of actions to be taken at EU level.

[52] Directive 2001/77/EC.

[53] Directive 2009/28/EC.

should address the promotion and use of RES in the country (and the share of RES by sector), an analysis of support schemes and their impact, an update on administrative procedures and the removal of barriers to the introduction of renewables to the market, an account of the measures taken to allow access to the grid, information on the use of biomass and the production of biofuels, estimations for GHG emissions savings, etc. At the Community level, the Commission is to report biannually to the European Parliament and the Council, starting in 2012. These biannual reports will be based on the submitted national reports assessing the extent to which Member States have progressed towards achieving national indicative targets, thus assessing the overall progress towards achieving the common objectives of the Community.[54]

Another type of self-evaluation reports are the thematic ones, such as those researching the barriers to and difficulties in compliance with administrative and planning procedures required from state institutions and energy producers. Member States are required, for instance, to review their existing legislative and regulatory frameworks concerning authorisation procedures in order to reduce regulatory and non-regulatory obstacles, to rationalise and speed up administrative procedures, and to ensure that the rules are transparent and non-discriminatory.

Supporting Schemes

The technical evaluations and assessments have paved the way for a number of supporting schemes in various Member States, which further help to meet Community goals. A Commission Communication of 2005[55] presented an initial evaluation of efforts to implement the old *Renewables Directive* (2001/77/EC), and some of the alternative supporting schemes.[56] Among these supporting schemes were **feed-in tariffs,** which existed in most Member States and were characterised by specific prices, usually set for a period of around seven years, which electricity companies (usually distributors) are required to pay to domestic producers of green electricity. Another scheme was the **green certificate system.**[57] Under this system, in order to finance the additional costs of producing green electricity and ensure that it was generated in sufficient quantities, all consumers were obliged to purchase a certain number of green certificates from producers of electricity from renewable energy sources (RES-E) in accordance with a fixed percentage (quota) of their total electricity consumption/generation. **Tendering systems** have been in use in two Member States (i.e. Ireland and France), where the state issued a series of invitations to tender for the supply RES-E, to be sold at market prices. Tax incentives have been used exclusively in Malta and Finland.

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[54] Directive 2009/28/EC.

[55] EC. COM(2005) 627, *The support of electricity from renewable energy sources,* 7.12.2005.

[56] Some sixty support schemes for RES-E were already approved by the Commission during the period 2001 to 2004.

[57] Currently in force in Sweden, the United Kingdom, Italy, Belgium, and Poland.

3. BULGARIA'S ROAD TO SUSTAINABILITY

3.1. CLIMATE CHANGE

A critical evaluation of the policy approach towards climate change employed by Bulgaria in the last decade suggests that the country is caught between, on the one hand, the ambitious goals and demanding policies of the EU, and on the other hand, its own challenges of economic development and fossil fuel and nuclear dependent electricity production methods, which largely resemble those of developing countries.

Due to its relatively small size and political leverage, **Bulgaria has not played a significant role in the international consensus building and agreements on climate change.** Bulgaria's position at the Copenhagen and Cancun debates lacked particular originality and was subsumed under the EU's common position in such international negotiations. Bulgaria's dilemma in climate change negotiations is that it is formally part of the club of rich industrial countries, which are expected to cut their emissions drastically and to a much greater extent than developing countries, while at the same its economy is still dependent on low cost energy from locally produced coal. Bulgaria is both more CO_2[58] intensive per capita, compared to China and India, and more CO_2 intensive per dollar of DGP than the US. In this respect, its economy exhibits characteristics more similar to those of Russia than to those of its fellow Western European Member States. Hence, while Bulgaria stands to benefit enormously from the European Emissions Trading System, as it has closed down most of the heaviest polluting industrial enterprises over the past decade, it also stands to lose from closing down coal-based plants or increasing the costs of local coal-based electricity. The average household in the country is so detached from the issues of climate change, that a recent suspension of the trading of emissions permits passed almost unnoticed in the public domain.

Bulgaria ranks 66th out of 216 countries in terms of the amount of carbon dioxide emitted.[59] The data show that substantial carbon emissions in established economies are declining. Meanwhile, as carbon dioxide emissions are related to a country's economic growth, emissions from the "new economic giants" are growing rapidly, and in 2009 China emitted more carbon dioxide than the US and Canada together.[60] Nevertheless, carbon dioxide emissions per capita are much lower in emerging markets than in developed economies.

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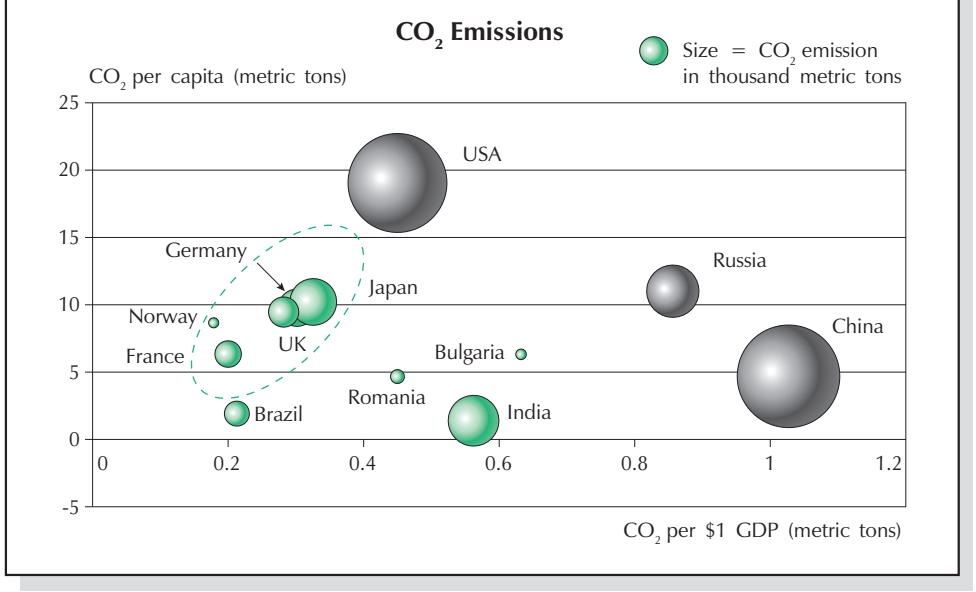
[58] For the sake of clarity, in this report we have used CO_2 emissions also as collective term for greenhouse gas emissions.

[59] See Annex 1 – the latest data currently available is for 2009. The data from the Energy Information Administration show CO_2 emissions from energy consumption, as the latter accounts for the vast majority of Carbon Dioxide produced.

[60] The Guardian, World carbon dioxide emissions data by country: China speeds ahead of the rest, http://www.guardian.co.uk/news/datablog/2011/jan/31/world-carbon-dioxide-emissions-country-data-co2 # data

FIGURE 7. CARBON PERFORMANCE OF MAIN STAKEHOLDERS IN COPENHAGEN (AND COMPARATIVE DATA FOR BULGARIA AND ROMANIA), 2009



Source: CSD, based on UN data.

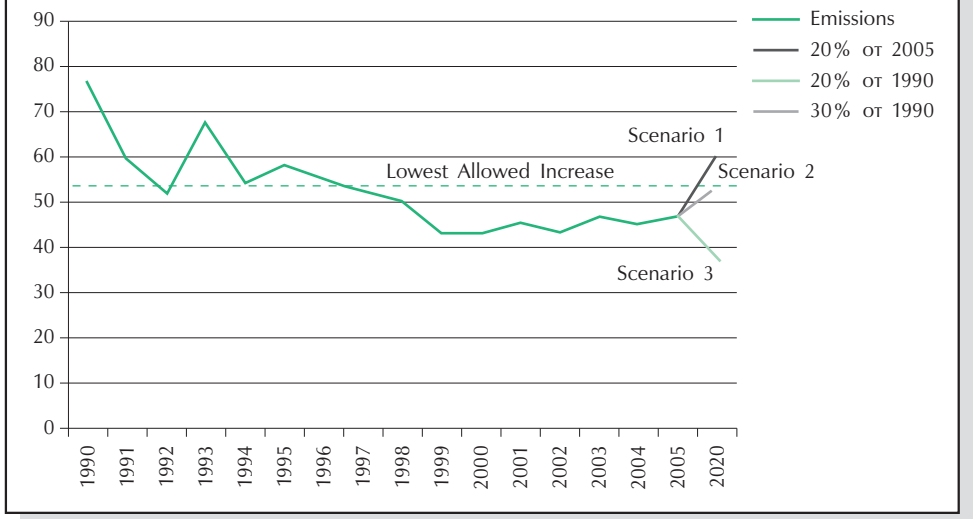
While 192 countries have already adopted the Kyoto protocol, the EU as a negotiating block attempted to avoid supporting a possible Kyoto-like agreement in Copenhagen, pressing instead for a longer-term commitment with binding targets for all sides. The latter triggered a negative reaction from some poor countries, as well as from China and India, which refused to bind their fast growing industrial sectors to specific targets.[61] Amidst these developments, in an attempt to prompt more decisive action by its counterparts, Bulgaria, along with fellow EU Member States, pledged emission reductions of 30% by 2020 on the condition that other industrialized countries take comparable measures amounting to at least 25% in cuts with 1990 as the base year. The 30% reduction commitment has reportedly triggered some differences of opinion among EU Member States, as some industrially advanced European economies might suffer critical competitiveness blows from such an action. Negotiating a common global approach seems to be getting further away from the top of the political agenda, as the economic and financial crisis has left business and government representatives preoccupied with immediate employment and growth concerns.

More recently, the United States, as well as fast developing emerging market countries, have signaled that they would prefer to settle for 2005 as the base year, rather than the EU and UN advocated 1990. This new standard would slow down action on climate change by necessitating changes to the calculations and scientific estimates on necessary cuts in CO_2 emissions worldwide. It would also not be economically beneficial to New Member States, including Bulgaria, since recalculating carbon dioxide reduction goals based on 2005 levels would require much deeper cuts and would threaten the country's short term competitive standing. A 20% cut

[61] *Euractive,* Kyoto pact in the balance in UN climate endgame, 18 December 2009, http://www.euractiv.com/en/climate-change/kyoto-pact-balance-un-climate-endgame/article-188467

with 2005 as the base year seems to be a worse scenario for Bulgaria than a 30% reduction from 1990 levels, as the former would require immediate and extremely effective measures for significant reductions of carbon dioxide emissions from present levels. Bulgaria is not yet well equipped with the necessary effective instruments and qualified administration required in order to meet such challenges.

FIGURE 8. CARBON EMISSIONS IN BULGARIA (1990 – 2020, IN METRIC TONS)



Source: CSD, based on UN data.

Who Should Pay for Climate Change?

Another contentious issue at Copenhagen, on which Bulgaria's national position conformed to that of the EU, was the distribution of financial responsibility for fighting climate change. For Bulgaria, this would mean assuming greater financial responsibility for helping developing countries develop measures against climate change.

Industrialized countries already made a public pledge before the Copenhagen meeting, to mobilize USD 100 billion (EUR 69.75 bn) per year by 2020 under a new Copenhagen Green Climate Fund to help developing countries cope with climate change. Some USD 30 billion (EUR 21 bn) were to be available for the poorest countries between 2010 and 2012. In December 2009, the EU set for itself a goal of USD 10.5 billion over the following three years.

Initially the Bulgarian government issued a bold statement of intent to participate financially in the fight against climate change, which it eventually limited to EUR 20,000. This was in line with the position of other Eastern European countries, which insisted that national contributions be calculated on the basis of their GDP. The main argument for these actions was that Eastern European countries themselves experienced economic hardship as a result of the global financial crisis, thus counting on scarce financial resources for their own recovery and climate change actions.

Reaping the Fruits of Kyoto?

Similar to other Eastern European countries, **Bulgaria could benefit from the low hanging fruits of banking its emissions surplus credits under the Kyoto agreement.** During the early 1990s, the country gained large windfall surpluses of assigned amount of units after many of its dirtiest (heavy) industries ceased to exist, not due to climate change mitigation concerns, but due to bankruptcy. It is, however, unlikely that these climate change credits would ever be transformed into hard cash. It has been estimated that Russia, Ukraine, and other East European countries are holding a potential 10 billion tonnes of unused greenhouse gas emission in credits.[62] Such surpluses have made many of the former communist countries appear, at least on paper, as champions in achieving their Kyoto targets. If transformed into actual money, these resources could be used to tackle many of the ecological problems of pollution and unsustainable development visible and persistent in these countries. However, the enormous amount of the credits renders them obsolete, as it is unlikely that any industrial country would agree to buy them out and they are more likely to flood the market and become worthless.

These huge emission credit holdings are another contentious issue that is likely to hold back talks on a new global emissions reduction scheme. Developing countries have been pushing former communist states to give up cashing these credits after 2012, when the Kyoto agreement expires. The players most affected from such a decision would be bigger countries like Russia, Poland, and the Czech Republic. Bulgaria has about 200 million tons of emissions credits in surplus, which amounts to a revenue of an estimated EUR 1 billion. Bulgaria should join its former allies in advocating for finding a reasonable way to use these credits to develop green technologies and energy efficiency in industry and transport, as well as ease emission restrictions to critical energy enterprises at home to reduce electricity price pressures on the most vulnerable households. Surplus revenues could also be auctioned to business projects that reduce CO_2 emissions, supporting such projects via as much as an 80% grant component. **Bulgaria should adopt a clear national position on tackling its emissions credit surplus.**

On paper, Bulgaria has devised a set of legal, financial, prescriptive, and public awareness measures in order to comply with its obligations under the *Climate Change Convention* and the *Kyoto Protocol*. In practice, concrete actions are usually undertaken as required by Bulgaria's commitments under EU's green legislation, rather than by national policies.

The official government position is that, with the present levels of carbon dioxide emissions, Bulgaria will fulfill its Kyoto commitment of cutting down emissions by 8% by 2010, as compared to 1990, as well as the EU target of 20% decrease by 2020 compared to 2005 levels. Meeting the targets should be fairly easy, as under the Kyoto agreement, Bulgaria currently holds a surplus of approximately 57% in emissions reductions.[63] With transparent and sound management of this potential,

[62] Euratcive, Russian 'hot air' threatens UN climate deal, 22 October 2009, http://www.euractiv.com/en/climate-change/russian-hot-air-threatens-un-climate-deal/article-186633

[63] National Inventory Report for Greenhouse Gas Emissions 2011, Executive Agency on the Environment, April 2011.

the Bulgarian governments could receive financial benefits in the form of revenues from direct sales on carbon markets, while benefiting from the know-how of other countries through technical exchanges under mechanisms such as the Kyoto Protocol's Joint Implementation projects. Such exchanges could include the supply of high-tech environmental equipment and the modernization of the energy sector, which, in turn, would help meet the requirements stipulated in EU legislation.

TABLE 2. BULGARIAN INSTRUMENTS FOR MEETING OBLIGATIONS ON CLIMATE CHANGE

Type	Instruments	Concrete steps or opportunities
Legal	Laws and ordinances	Multilateral and bilateral international agreements; EU legislation on the environment, pollution, promotion of energy efficiency and renewables, etc.
Financial	Incentives and funding opportunities for promoting carbon cuts among economic operators and for improving energy efficiency	Agriculture Fund, Energy Efficiency Fund,[64] EU Structural Funds, Kyoto Mechanisms (Joint Implementation and Emission Trading), etc.
Prescriptive	Strategies and action plans	The Bulgarian National Strategy for the Environment and Second National Action Plan (2005-2014), Bulgarian National Energy Efficiency Plan
Publicity	Education and public awareness campaigns	

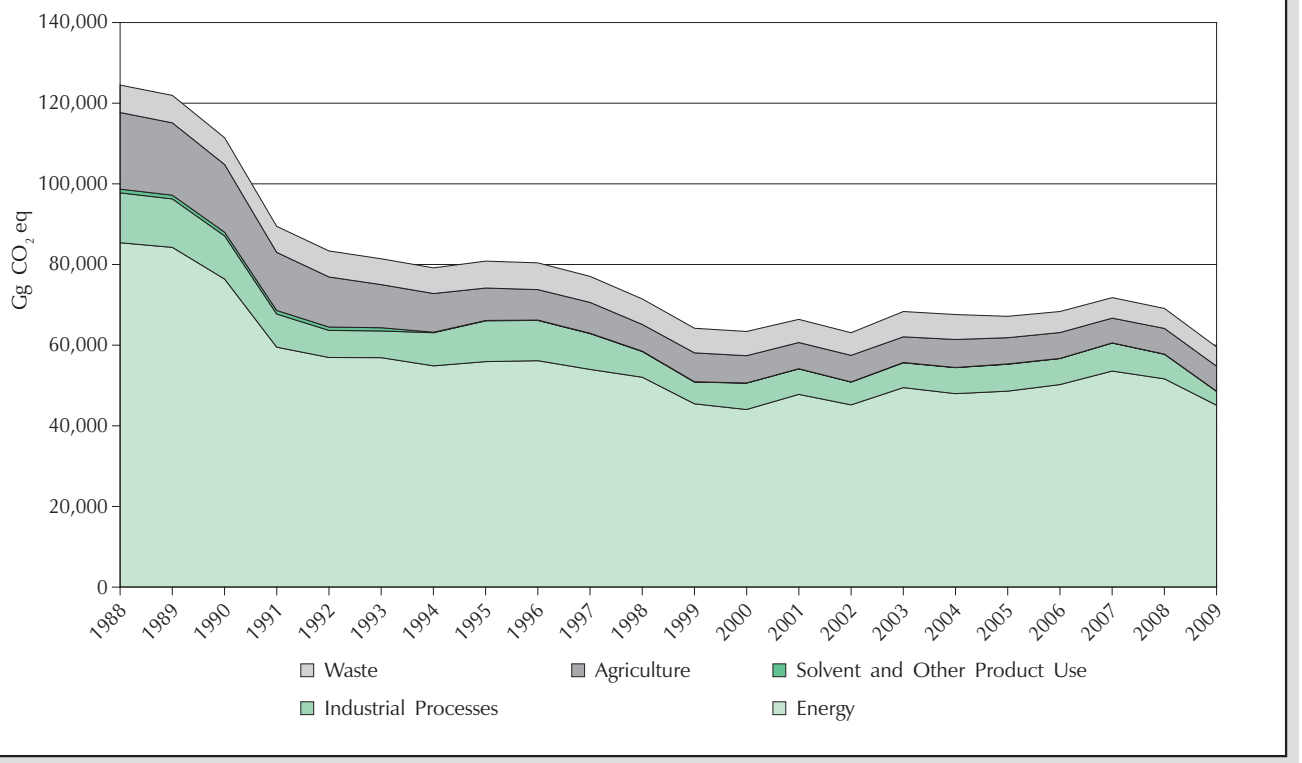
Source: CSD, 2010.

The large surplus amount of assigned units has obscured Bulgaria's high carbon intensity and unsatisfactory carbon emissions performance. These savings have been largely attributed to shrinking economic and industrial activity, including following the economic and financial crisis of 2009 – 2010. Bulgaria remains one of the most carbon-intensive countries per unit of GDP within the EU, and policies to compensate for carbon emissions by renewable energy and energy efficiency projects have largely failed to deliver the expected results. Bulgaria's energy sector, which is traditionally the biggest emitter of greenhouse gases, is the most energy intensive in Europe. The energy intensity of the country is discussed further in this report in the section dealing with Bulgaria's energy efficiency.

The European Emissions Trading scheme was introduced in Bulgaria simultaneously with the country's accession to the EU (in 2007). However, the system has not been functional during the past three years because of the lack of expertise and experience with such systems in the country. At present, **Bulgaria has not yet sold**

[64] As, for instance, the 60 million euro credit line for energy efficiency, created by the European Bank for Reconstruction and Development.

FIGURE 9. TOTAL GREENHOUSE GAS EMISSIONS IN CO_2-EQ. PER IPCC SECTOR, 1988 – 2009



Source: National Inventory Report for Greenhouse Gas Emissions 2011, Executive Agency on the Environment.

a single ton of its emissions internationally, which leaves it in a very unfavorable position if emission surpluses are indeed to be nullified after 2012. The fact that Bulgaria was suspended from trade with assigned emission units at the international and European market in the summer of 2010 due to the lack of a transparent and trustworthy national system for recording greenhouse gas emissions, is evidence of the lack of capacity of Bulgarian agencies responsible for climate change policies. In addition, Bulgaria has not yet devised a new action plan on emissions for the 2008 – 2013 period, which is also a setback for Bulgarian institutions' efforts to implement national climate change policies. **In February 2011, the Bulgarian authorities managed to regain permission to trade on the international and European emissions exchanges,** and the Bulgarian Ministry of Environment and Waters has pledged to intensify climate change actions in 2011.[65] There are hopes that the intensification of trading before the end of 2012, when countries or companies that have not fulfilled their obligations will be urged to buy more permits, will provide opportunities for Bulgaria to trade off its surplus. It is, however, unlikely that Bulgaria can make up for the lost opportunities in the 2007 – 2010 period, as the financial crisis has depressed industrial production in Europe and internationally, and demand for emissions permits has declined markedly.

[65] Priorities for the Ministry of Environment and Waters for 2011.

3.2. RENEWABLE ENERGY

Bulgaria's policy and national strategy regarding renewable energy sources (RES) is defined along the lines of EU green regulations. According to the current *Renewables Directive,*[66] each country is assigned an individual target for renewable energy sources (RES) to be reached by 2020, set on the basis of the country's GDP, its RES potential, and the share of energy from renewable sources in gross final consumption of energy in the base year 2005. Bulgaria's binding target, as per the Directive, is for 16% of gross final energy consumption in the country to come from renewable sources by the year 2020. Bulgaria received the second lowest increase (i.e. target gap of 6.6 pp from the base year 2005) compared to other Member States. Romania has the lowest target gap of 6.2 pp. The target gap seems sizable in comparison to those of other new EU Member States with a much higher level of economic development, such as the Czech Republic, Estonia, and Poland. Yet, it seems manageable in comparison to those of highly indebted Greece (11.1 pp) and Ireland (12.9 pp), or renewables laggards such as Malta (10 pp, starting from 0% renewables) or the United Kingdom (13.7 pp, starting from 1.3%).

The EU obligatory targets have been incorporated into the *National Energy Strategy of the Republic of Bulgaria until 2020,* the new *Law on the Energy from Renewable Sources,* and their achievement has been outlined in detail in the *National Renewable Energy Action Plan.*[67] **Bulgaria was one of only fourteen other Member States to submit its action plan on time by July 2010.** The Bulgarian plan was among the ones with the fewest reported problems upon its transfer to a public summary database.[68] It is envisioned that the national target on renewables will be achieved via: 1) boosting the production of electricity from RES; 2) increasing renewable energy's share in cooling and heating; and 3) bolstering the use of RES in transportation. Within the various sectors of the economy, only the transport sector is characterized by a mandatory target of 10% share of energy from RES in the consumption of energy. A successful achievement of the national objectives is deemed feasible only when matched by simultaneous improvements in energy efficiency (notably in final energy consumption, the transmission and distribution of electricity and heat, etc.) and energy intensity.[69]

National Legislation and Regulation Encouraging the Use of RES

Bulgaria's legislation on promoting the use of renewable energy sources closely mirrors developments at the EU level. As the country has not had much experience in developing new energy sources, this has resulted in frequent changes of

[66] Directive 2009/28/EC.

[67] Under the EU's *Renewables Directive* (2009/28/EC) all member states have to publish such a plan outlining in detail the steps the country will take to reach its 2020 target.

[68] Beurskens L.W.M., M. Hekkenberg, (2011) Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States Covering all 27 EU Member States, Energy Research Centre of the Netherlands and the European Environment Agency, 1 February 2011.

[69] *National Energy Strategy of the Republic of Bulgaria until 2020,* p. 15-16 (www.mee.government.bg/doc_vop/ENERGY.STRAT-240610.doc).

the legislation. For the past eight years, Bulgaria has adopted three legal acts on promoting energy from renewable sources, each of these changing the rules of the game. **The pattern has been to adopt a very liberal regulation with regards to promoting energy from renewable sources on the basis of EU directives, and then start changing it to reduce the stimulus provided.**

In 2003, Bulgaria adopted the *Law on Energy*[70] and introduced a separate section in it on the Production of Electricity from Renewable Energy Sources. Following the guidelines of the EU's Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market,[71] the law provided for preferential treatment for electricity from renewable energy sources (RES-E). The law introduced:

- the adoption of a ten-year indicative target of the share of RES-E in final gross electricity consumption, which was subsequently reduced to five years in 2006;
- a system of green certificates for promoting RES-E – grid operators were obliged to buy the whole certified quantity of RES-E. The system was in effect not operational until September 2006, when the law provided for a more detailed regulation on the issuance of certificates;
- preferential pricing for RES-E: the law did not stipulate how the preferences would be determined but left this to the discretion of the State Water and Energy Regulatory Commission.

The *Law on Energy* was followed up by the *National Long-Term Programme for Encouraging the Use of Renewable Energy Sources 2005 – 2015,* which took into account the regulations of the then new Directive on the promotion of the use of biofuels or other renewable fuels for transportation.[72] The program was developed in December 2005 by the Agency for Energy Efficiency in accordance with the requirements of the *Law on Energy* for a ten-year target for promoting RES-E. The program never took off in practice, but its findings were subsequently used in other programming documents.

In 2007, Bulgarian policy-makers adopted a separate *Law on Renewable and Alternative Energy Sources and Biofuels,*[73] aimed at introducing a system that would regulate public relations in the course of promoting and developing the generation of electricity, heating, and cooling from RES. The law also addressed the use and production of alternative fuels (e.g., biofuels) in transportation, which was required by EU directives but had not been introduced in Bulgaria by then. The law boosted enormously the incentives for producing energy from RES, primarily photovoltaic and wind power, without introducing clear mechanisms for access to the grid. It not only guaranteed preferential pricing for RES, but also provided for a maximum of 5% annual downward change in regulated prices, which the State Energy and Water Regulatory Commission could introduce. In effect, the law created a very liberal preferential market without developing proper regulation or outlining the

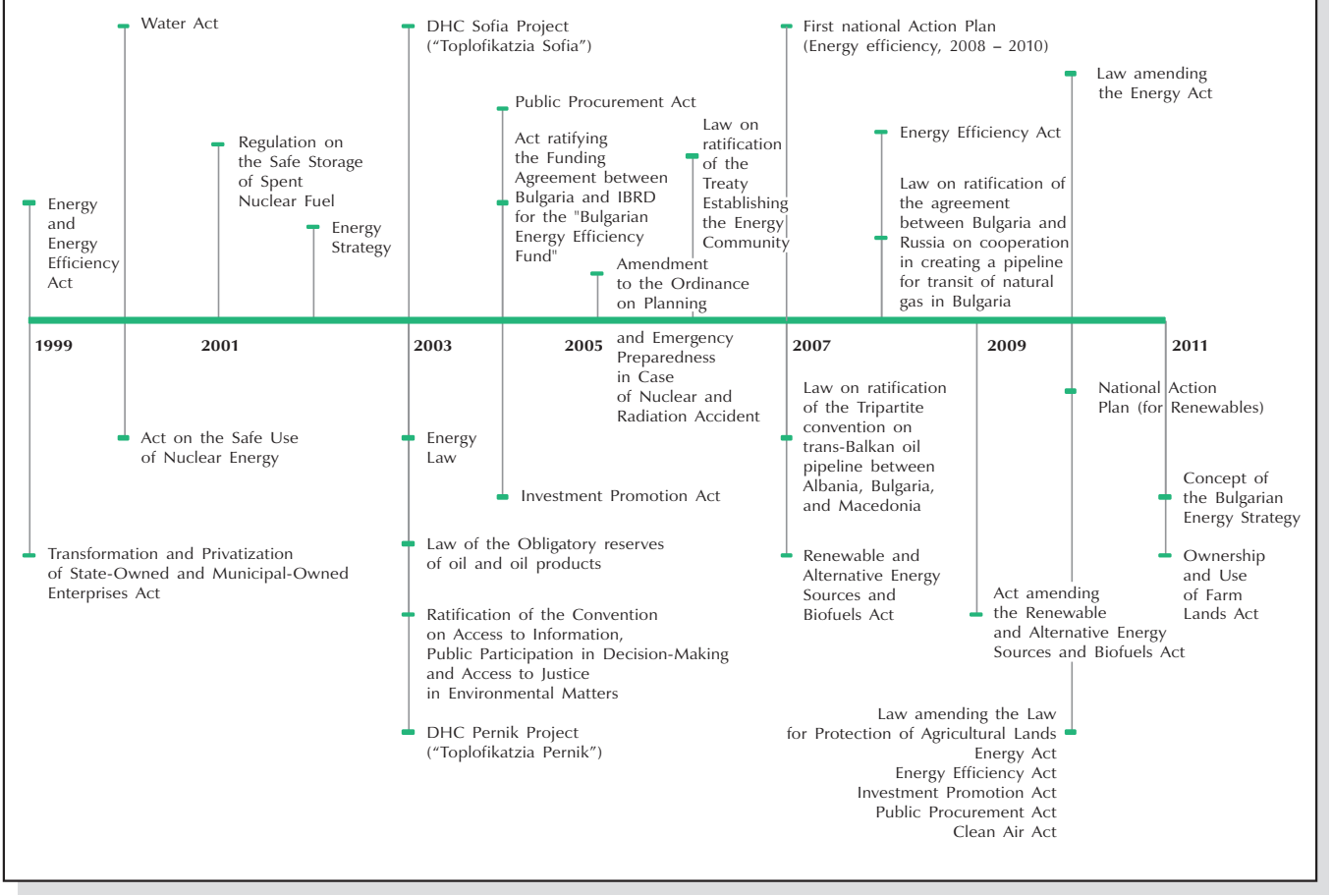
[70] Promulgated in State Gazette Nr. 107 of 9 December 2003.

[71] Directive 2001/77/EC.

[72] Directive 2003/30/EC.

[73] Promulgated in State Gazette Nr. 49 from 19 June 2007.

FIGURE 10. BULGARIAN ENERGY-RELATED LEGISLATION – TIMELINE



Source: CSD, 2011.

roles of market players. The result was **the explosion of RES projects after 2007,** which subsequently forced electricity distribution companies to stop connecting RES to the grid (which under the law was mandatory). With the real estate boom coming to an abrupt end in 2008, many investors (including such with dirty cash at hand) lined up to exploit the loose provisions of the law. At some point, stated investment interest in RES reached 18 GW, which was almost twice as high as the total installed capacity for electricity production in the country. The Law provided for **a National Public Information System on RES development that never took off,** precluding the Bulgarian government from verifying how far along the road to achieving its national objectives for RES development it had gotten.

The National Energy Strategy of the Republic of Bulgaria until 2020 developed by the Ministry of Economy, Energy and Tourism in 2010, was the first to signal a change in attitude towards RES development, and **called for introducing better planning in the system.** It was developed in accordance with the more recent *Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources*. The strategy outlines two scenarios for meeting national targets. The first scenario addresses the national strategic goal of a 50% increase in energy efficiency and foresees a

RES national target of 2.2 Mtoe in quantitative dimensions (including the obligatory 10% target for biofuels in the transport sector and generation of biomass, wind, solar, hydro, and geothermal energy). This estimation is based on assumptions for a 31% increase in total final energy consumption from 2005 to 2020, national GDP growth of 130% over the same period, and on the existence of working mechanisms to improve energy efficiency. The second scenario assumes uninterrupted growth in total energy consumption and GDP (i.e. an average of 5.5% annually) by 2020 and aims to illustrate the gains from achieving a 50% increase in energy efficiency by 2020, resulting in a reduced amount of energy from RES needed to reach the national target on renewables.[74] The concise description of the two scenarios provides no specifications about the assumptions used; nor does it provide any specifics as to the means for achieving the target set for energy efficiency. However, it clearly foresees more moderate RES growth.

The National Renewable Energy Action Plan of June 2010 is also based on the *Directive 2009/28/EC,* and **for the first time provides explicit biannual targets for developing RES** and each type of energy until 2020. It is clear from the plan that the amount of energy foreseen (for example for photovoltaics) for 2020 has already been achieved in 2010.[75] The Plan presents two development scenarios – one based on energy efficiency and energy savings measures in place prior to 2009, and a second one based on additional future measures to improve efficiency in energy consumption post 2009. The first scenario (hereafter the comparison scenario) forecasts an increase in gross final energy consumption in the country by about 27%, compared to consumption in the baseline year 2005. In the second scenario (hereafter the additional efficiency scenario) the increase in gross final energy consumption is merely 1%. The difference is explained with the active use of additional measures for energy efficiency (e.g., in conversion, transmission, and distribution processes) in all sectors of the economy (industry, transport, services, agriculture, and households), as per EU energy efficiency directives.[76] If these energy efficiency measures are correctly implemented, it is expected that Bulgaria would need 429 ktoe less energy from renewable sources in 2020, while still achieving its national target.[77] Forecasts of the technical potential for utilizing renewable energy sources in Bulgaria are based on specific assumptions about the country's economic development by 2020. Projections from December 2009 estimate this potential at 4,495 ktoe.[78] The contribution of the various types of renewable sources is not balanced, with hydropower and solid biomass accounting for the biggest share (29% and 34%, respectively), while the potential contribution of wind power is assessed at 7%.

The latest development in Bulgarian legislation related to the generation of energy from renewable sources is the ***Law on Energy from Renewable Sources***[79] adopted in

[74] National Energy Strategy of the Republic of Bulgaria until 2020, p. 28-31.

[75] Report on Reaching the National Indicative Targets for Consumption of Electricity Produced from RES in 2020, Ministry of Economy, Energy and Tourism, March 2011.

[76] Directive 2006/32/EC.

[77] Under the additional efficiency scenario, the mandatory 2020 national target for 16% share of energy from RES in the gross final energy consumption amounts to 1,666 ktoe energy from RES.

[78] Forecast Document in Accordance with Directive 2009/28/EC, (http://ec.europa.eu/energy/renewables/transparency_platform/doc/bulgaria_forecast_english.pdf)

[79] Promulgated State Gazette Nr 35 from May 3, 2011.

2011. The Law states explicitly the national targets of 16% share of energy from renewable sources in gross final energy consumption, including a 10% share of energy from RES in the transport sector, and provides a schedule for achieving them. The law **resolves a number of issues pertaining to improved regulation of the access to the grid and sifting out excessive demand for RES development.** The law strengthens the role of the State Energy and Water Regulatory Commission and the grid operators in the planning and rationing out of the spare capacity for RES, which the grid allows. It regulates better the RES investment process and divides more clearly responsibilities between potential producers and grid operators. The law has also **increased the financial burden on RES investors/producers** through introducing pre-connection fees of BGN 25,000 for small projects (less than 5 MW installed capacity) and BGN 50,000 for larger projects (more than 5 MW). In addition, the law provides a more detailed outline of the National Public Information System on RES, which is intended to provide a clear grip of SEWRC and the Ministry of Economy, Energy and Tourism. It is still too early to assess the potential impact of the law on the development of RES, but it seems to be a step in the right direction to introduce more regulation and control in the sector, since it enjoys many preferences and public sponsored financing.[80] The law also **introduced better balance between RES types by adding biomass** to the preferential treatment. Investors have, however, voiced concerns that it **shifts much of the burden of RES development away from the grid and towards producers,** which, if left unattended, might lead to setbacks in RES promotion. This is further exacerbated by the shortening of the periods of the long-term contracts for buying RES-E – from 25 to 20 years for PV (this period also applies to geothermal and biomass electricity production) and from 15 to 12 years for wind.

BOX 1. CONCERNS WITH RESPECT TO THE COMPATIBILITY BETWEEN THE LAW ON THE ENERGY FROM RENEWABLE SOURCES AND CERTAIN EU DIRECTIVES

There are concerns with respect to the compatibility of the *Law on the Energy from Renewable Sources* with certain EU directives that critics of the law have voiced.

1. Connection of energy plants to the grid

Article 22 and Article 23 of the *Law on the Energy from Renewable Sources* introduce a maximum capacity for connection of renewable energy plants and bar connection applications, when that capacity is exhausted, in violation of *Directive 2009/72 Concerning Common Rules for the Internal Market in Electricity** regarding the connection of new energy plants to the transmission grid. Article 23, it. 2 of Directive 2009/72, explicitly provides that the grid operator cannot refuse to connect a producer on the basis of potential future restrictions on the existing capacity of its grid.

2. Connection agreements

The provisions of Article 29 of the RES law provide that, upon conclusion of a preliminary connection agreement, the producer of electricity from renewable sources shall make an advance payment of BGN 50,000 for every megawatt (MW) installed capacity of the future energy plant, when installed

[80] See Annex III Financial Support Schemes and Credit Lines for RES.

Box 1. Concerns with Respect to the Compatibility between the Law on the Energy from Renewable Sources and Certain EU Directives (Continuation)

capacity is greater than 5 MW, respectively BGN 25,000 for every megawatt (MW) installed capacity of future energy plant, when installed capacity is up to 5 MW. It must be noted that it is not clear how these amounts are calculated, especially since actual connection costs are typically minimal. Moreover, in case of rescission of the agreement due to default of the investor the transmission, respectively the distribution company is entitled to keep the advance payment. All this contradicts Article 16 of *Directive 2009/28/EC On the Promotion of the Use of Energy from Renewable Sources,*** which recommends that transmission and distribution grid operators in Member States should bear the costs of technical adaptations, including costs for connecting to the grid. The provisions of Article 29 are in conflict with several other provisions of the EU legislation:

- The provisions of Article 29 are, in fact, *discriminatory* against the producers of energy from RES compared to producers of energy from conventional sources, since only renewable energy producers are required to make such advance payments of the connection price. This contravenes Section 62 of the preamble to Directive 2009/28/EC, according to which the costs of connection to the grid of new producers of energy from renewable sources should be transparent and *non-discriminatory*.
- The advance payment will likely discourage SMEs involved in RES development, and create conditions for the monopolization of the renewable energy market by large enterprises. This would violate section 4 of the preamble to Directive 2009/28/EC, according to which the promotion of renewables must take into account and ensure the positive impact on SMEs.

3. Setting the preferential price

Article 31 paragraph 1 of the RES law states that the purchase price of the generated electricity will be determined at the time of completion of the construction of the energy plant. At this stage of the development of a renewable energy plant, all investments will already have been made. Since there can be no clarity with regard to the applicable purchase price until all investments in a project are made, the financing of renewable projects will become very difficult, if not altogether impossible.

As for calculating the preferential price, Article 32, Paragraph 2 of the RES law, lists as mandatory applicable criteria the type of the technology, the installed capacity and the method of installation of the facilities. These newly-introduced criteria violate Section 45 of the Preamble to Directive 2009/28/EO stating that support schemes for renewable energy sources should not set technical specifications.

Notes: * Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.

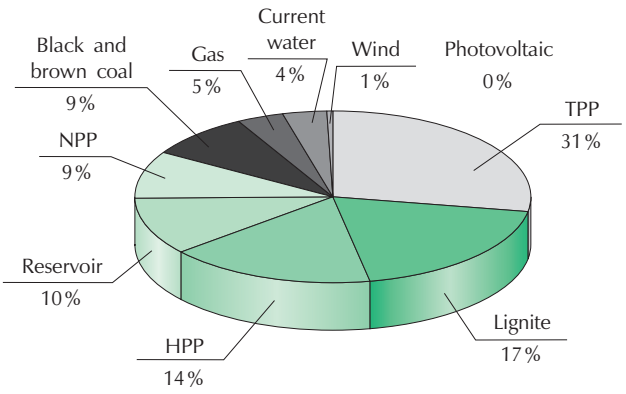
** Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

Progress in the Implementation of Bulgaria's Renewable Energy Action Plan

During 2010, 5,509 GWh of the electricity was generated by means of RES, namely HPPs, wind, photovoltaics, and biomass. The bulk of the electricity

generated from RES has originated from large HPPs with a total installed capacity of 1,918.9 MW. Meanwhile, the latest tendency in the country is building smaller HPPs (with less than 5 MW of installed capacity). In 2010, these smaller HPPs constituted 241 MW of installed capacity, while wind farms accounted for 465 MW of installed capacity, and photovoltaic installations – for another 21.4 MW. There are two functioning plants for a combined production of heating and electricity from biogas (from sewage sludge) with a total installed capacity of 3.5 MW.[81] In addition, latest data from the State Energy and Water Regulatory Commission show that, as of the end of 2010, there are licenses issued for the construction of projects with the following capacity: 2,017 MW for wind turbines, approximately 230 MW for photovoliatics, and 15 MW for power plants using biomass (a total of about 2,262 MW).

FIGURE 11. INSTALLED GENERATION CAPACITY (MW), BULGARIA, 2008



Source: CSD, based on ESO's annual report, 2008.

The latest assessment of the *National Renewable Energy Action Plan* reveals that **Bulgaria would rely largely on biomass, hydro, wind, and biodiesel for the achievement of its RES national objectives for 2020.** The biggest gains in terms of allotted development would go to: (a) wind power, electricity generation from which is envisioned to rise almost four times between 2010 and 2020; (b) biomass; and (c) biodiesel. On the other hand, deep geothermal electricity and renewable energy from heat pumps are excluded as options from the Bulgarian Action Plan, while the use of renewable electricity in the transport sector is negligible.[82]

[81] Ministry of Economy, Energy and Tourism (2011) "Report on the achievement of the national indicative targets for electricity generation from RES in 2010" (in Bulgarian)

[82] Beurskens L.W.M., M. Hekkenberg, (2011) Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States Covering all 27 EU Member States, Energy Research Centre of the Netherlands and the European Environment Agency, 1 February 2011.

Table 3. Projected Total Electricity Generation (GWh) for the Period 2005 – 2020

	2005	2010	2015	2020
Hydropower, all capacity ranges excluding pumped storage	4,336	3,260	3,534	3,951
Solar, including photovoltaic (PV) and concentrated solar power (CSP)	0	12	263	454
Wind power, including onshore and offshore wind power	5	605	1,672	2,260
Biomass, all biomass input categories	0	2	656	871

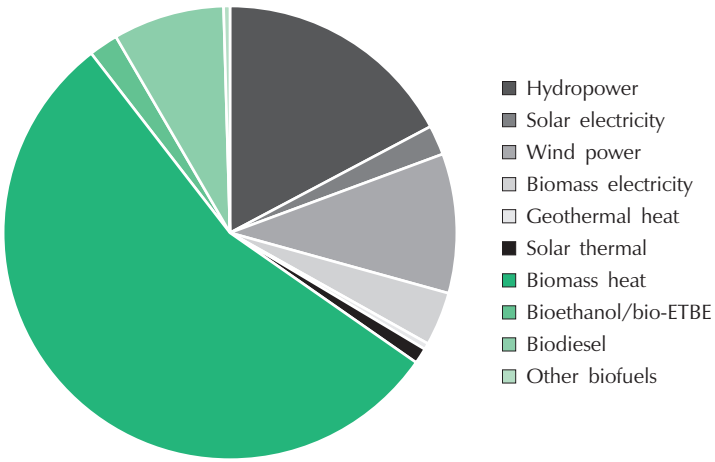
Source: National Renewable Energy Action Plan prepared by the Ministry of Economy, Energy and Tourism in accordance with Directive 2009/28/EC, Bulgaria, 30 June 2010.

Table 4. Projected Total Biofuel in Renewable Transport (ktoe) for the Period 2005 – 2020

	2005	2010	2015	2020
Bioethanol/bio-ETBE in renewable transport	0	0	15	42
Biodiesel in renewable transport	0	30	100	154

Source: National Renewable Energy Action Plan prepared by the Ministry of Economy, Energy and Tourism in accordance with Directive 2009/28/EC, Bulgaria, 30 June 2010.

Figure 12. Bulgaria: RES Share in 2020, as per NREAP



Source: Energy Research Centre of the Netherlands and European Environment Agency 2011 report on the National Renewable Energy Action Plans, covering all 27 EU Member States.

Compared to other EU Member States, **Bulgaria seems to be faring well with respect to prospects for achieving its 2020 target** for the share of Renewable Energy Sources (RES) in gross final energy consumption. Relative to its indicative target of 16%, 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 were in the pipeline for 2010. However, a closer look at the RES share since 2004 shows that the country has been making little progress, with the share of renewable energy sources in gross final energy consumption being the same in 2009 compared to 2004 levels. Most electricity from renewable sources had been secured from hydropower plants even before the launch of EU directives on renewables.

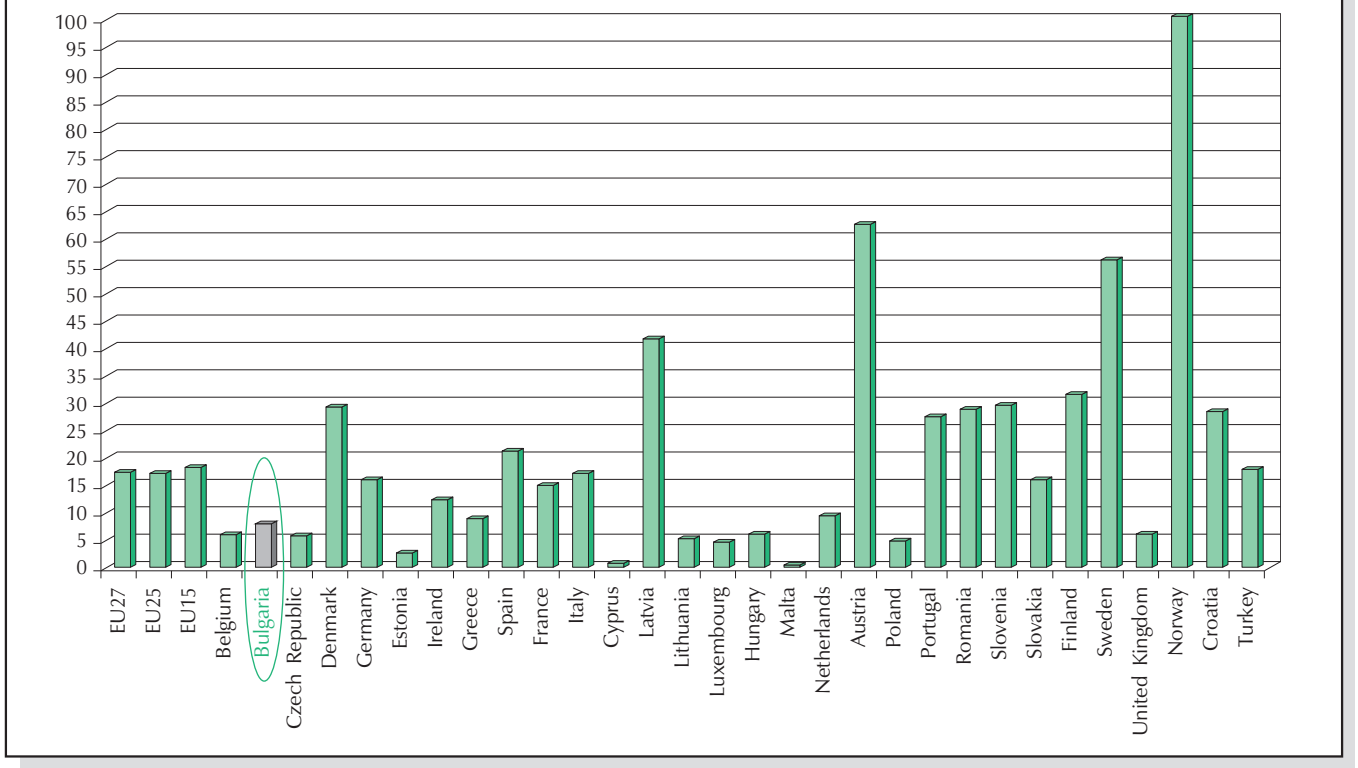
TABLE 5. RENEWABLE ENERGY IN FINAL ENERGY CONSUMPTION (2020 TARGETS)

	EU Member State	2008 Figure	2020 Target	% To cover:
1	United Kingdom	2.2%	15%	12.8%
2	Ireland	3.8%	16%	12.2%
3	France	11.0%	23%	12.0%
4	Denmark	18.8%	30%	11.2%
20	Poland	7.9%	15%	7.1%
21	**Bulgaria**	**9.4%**	**16%**	**6.6%**
22	Hungary	6.6%	13%	6.4%
23	Estonia	19.1%	25%	5.9%

Source: CSD, based on Eurostat data, 2011.

A problem that is becoming increasingly visible, as green energy developments unfold, is **the negligible share of biofuels and of renewable electricity in Bulgaria's transport sector.** The rise in the standard of living and in disposable income in the country over the past decade has led to a dramatic increase in the use of personal vehicles, and the overall annual mileage covered by them. The latter has led to a total increase in the consumption of fuel, while the use of biofuels remains insignificant. With a deliberate last minute change before the adoption of the *Law on Energy from Renewable Sources,* **the ruling majority delayed the requirement for transportation fuel producers to add biofuel to their products until 2012,** on the grounds that this would keep prices down. While the argumentation used is questionable at best, this move will certainly impact Bulgaria's capacity to meets its binding target for biofuels used in the transport sector until 2020.

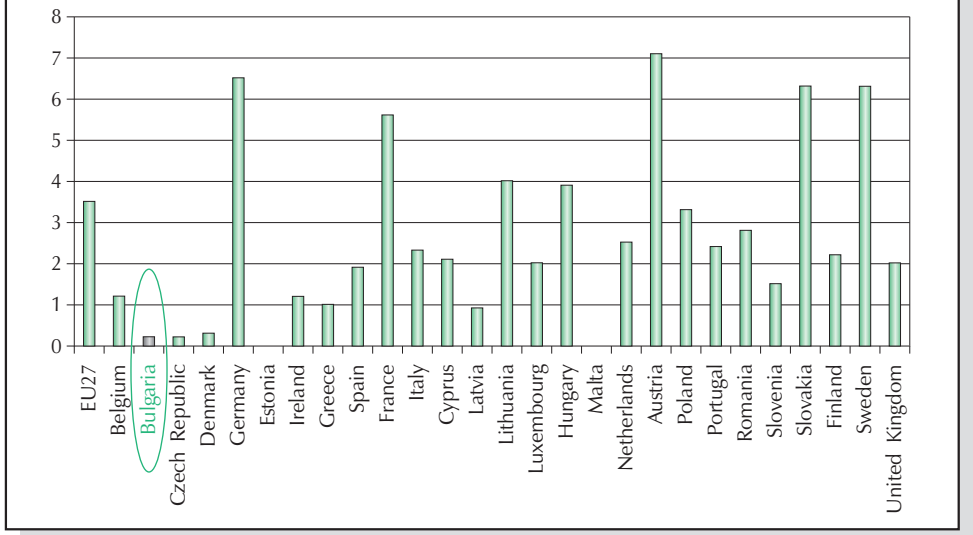
FIGURE 13. SHARE OF RES: CONTRIBUTION OF ELECTRICITY FROM RENEWABLES TO TOTAL ELECTRICITY CONSUMPTION, 2008 (%)



Note: Norway's share of renewable energy is 109.4%, as the graph displays the contribution of electricity from renewables to the total electricity consumption in the country.

Source: CSD, based on Eurostat data.

FIGURE 14. SHARE OF RENEWABLE ENERGY IN FUEL CONSUMPTION OF TRANSPORT, 2008 (%)



Source: CSD, based on Eurostat data.

Governance Risks and Challenges Associated with RES

Bulgaria's experience in the promotion of RES since 2003 has demonstrated some **common fallacies and governance risks** associated with the development of new energy sources:

- **RES promotion should be treated systematically** in relation to other components of the energy system. It should receive clear guidance stemming from a well-informed, data-based strategic vision for the development of the sector. The high number of incentives (e.g., pricing mechanisms, obligatory purchase of the electricity from RES, long-term agreements, etc.) for the production of energy from renewable sources introduced by the Bulgarian government in the period between 2003 and 2009 was not matched by an adequate monitoring and control system and lacked strategic and policy documents underpinning. As a result, these support measures led to a stampede of investment interest, which overburdened the public administration, creating corruption pressures, and reached a point beyond the capacity of the national energy grid. In addition, it attracted speculative and criminal money, following the real estate bust in 2008. The final outcome was a practical blockage of grid access for RES projects and a public backlash against renewables.

  A substantial number of the investors submitting applications for feasibility studies could not demonstrate serious investment intentions or the necessary financial capacity and technical expertise allowing them to realize the projects. In addition, investors have started submitting requests for the conversion of agricultural land into land used for nonagricultural purposes (e.g., for the construction of wind farms and photovoltaic plants). Funding for such projects is often not secured beforehand, which leaves fertile land idle. Finally, there have been concerns related to the transparency and reliability of environmental assessment procedures carried out in the course of implementing RES-related projects.[83]

  The boom of renewable energy projects will likely be tempered by the regulations adopted in the *Law on Energy from Renewable Sources* and the national regulator's plans to tighten licensing controls, thus allowing the power transmission grid to accommodate all the intended additional generation capacity. However, this ***post factum*** **tampering with the RES investment process and abrupt changing of the rules of the game comes at great social and economic costs,** as changes in the law have created investment uncertainty and a bad reputation for Bulgaria as an investment destination for RES projects. At the same time, the Bulgarian public has started viewing RES investments as speculative and harmful to the natural environment, akin to the real estate bubble before 2008.

- **The green line fallacy.** The introduction of a green energy line in the electricity bills of customers has **focused public attention on the high preferential pricing for RES-E.** A similar pattern can be observed in biodiesel production.

[83] National Renewable Energy Action Plan, http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_bulgaria_en.pdf

Traditional fuel lobbies – coal, nuclear, and oil – have skillfully used this additional transparency to convey the message that RES costs and prices are prohibitively high and that they are the only culprits for rising bills. In particular, this has been used in an ongoing debate about the price of energy from renewable sources, as compared to the price of nuclear energy, as Bulgaria plans to build a new nuclear power plant over the next decade. Such a comparison is misleading for a number of reasons. In the first place, it compares apples to oranges, as nuclear energy constitutes baseload capacity, while renewable energy constitutes peak, flexible capacity. Nuclear power is also erroneously seen by some as a green energy source, hence the price comparisons to RES. The recent disaster in Fukushima has clearly demonstrated that, while nuclear power plants emit almost no greenhouse gases, in the wake of accidents they can be extremely harmful to the environment. Even in the absence of such "black swan" calamities, the nuclear industry has not yet found a way to solve the problem of long-term (permanent) storage, which was one of the reasons for its loss of popularity in the 1990's. While **RES costs and hence prices are expected to come down over the next six decades** (the claimed useful life of a new generation nuclear power plant), nuclear generated capacity is not only likely to generate more costs for safety reasons, but might also suffer a regulatory shortening of life for the same reason. Bulgaria was already forced in the past to shut down two nuclear units before their planned exploitation period had expired. Bulgarian consumers should be forewarned – new nuclear facilities will also be characterized by higher electricity prices, which are likely to be comparable to or higher than that of the current preferential pricing for wind power. If a new NPP was built, its significant and essentially unclear fixed cost would have to be added to consumers' energy bills, translating into an increase in the price of electricity of between three to ten times, as compared to the current price of nuclear energy.[84]

- **The nature of RES requires specific grid quality and management capacity.** The high technicality and the specific nature of energy from renewable sources commonly lead to certain initial reservations and concerns. It is frequently argued that sources such as wind and sun, and less so water, are intermittent, and are thus harder to manage. The ups and downs of wind and sunlight are said to result in vacillations of the network current, while longer-term storage of produced energy remains a distinct challenge. In addition, inconsistencies between optimal RES power generation and actual demand are also commonly noted in the debate on renewables (e.g., wind is strongest at night, while consumer demand drops drastically around the same time period). However, treating renewable energy sources in isolation, when assessing the nature of the resource, seems erroneous. Similar to electricity generation from other sources, **the process of producing energy from RES has its distinctive technical features.** For example, nuclear power and some of the gas and coal-fired power plants are characterized by substantial inflexibility and operate by constantly generating energy. Thus, if the nature of these sources is assessed in isolation (i.e. not considering the existence of other balancing sources), their propensity to be maintained as constantly operating seems an undesirable feature, since

[84] Kotev and Ondrich (2010) Кто кого – Why Bulgaria Should Abandon NPP Belene? Candole Research.

electricity demand varies significantly throughout the day. Yet, other coal, gas, and hydro plants are more flexible and their output can be changed more rapidly, thus having the potential to balance out the system. It is, therefore, the combined effects of all technologies, as well as the demand patterns, that need to be assessed in relation to the grid operation.

Describing wind power as an intermittent energy source is misleading, since wind power does not start and stop at irregular intervals at the power system level. Wind is a technology of variable output, yet electricity systems in general (i.e. energy supply and demand) are inherently variable. This feature of the system is not new, and system operators need to balance out planned and unplanned changes in constantly changing supply and demand in order to maintain the integrity of the system. The issue, therefore, is not variability or intermittence, but how to predict, manage, and ameliorate variability, and what tools to use in order to improve efficiency. The variability in output from wind power can be predicted, while it is also important to note that variations in the output of a single wind turbine or wind farm are not a threat to the operation of the entire grid. What matters is the net output of all wind turbines or large groups of wind farms to the system, considering that reliable energy supply can be provided even though wind is not present at all times at any one site (it is however present within the same timeframe at another site that can compensate for this variability). A similar argument can be made for solar power as well.

It should also be noted that **RES (wind and PV) are inherently more "democratic"** and create more local ownership than other, more bulky production facilities, such as coal and nuclear. It is important to keep this in mind when deciding on the strategic options for developing Bulgaria's energy system in the future. Coal and nuclear power plants tend to concentrate construction benefits and harmful effects much more than wind and PV.

- **RES require smart grids.** If left unattended, the explosion of RES development could impact adversely the stability of the grid and its management. Bulgaria has not taken adequate measures to upgrade its grid in relation to the boom in RES projects in 2008 – 2009. There are well-founded concerns over the capacity of Bulgaria's outdated electricity grid and the inability and unwillingness of the transmission system operators to connect RES to the grid, in spite of the obligatory clauses in national regulations. Viable solutions for the system stability and management issues have yet to be found. One possible avenue is to increase the capacity of the high voltage network by utilizing EU infrastructure-related funds.

  Intended projects for renewable energy generation and **the requested access to the grid are likely to continue exceeding the available grid capacity.** Though the *Law on Energy from Renewable Sources* has created preconditions for alleviating this problem, it is likely to persist if left without independent oversight. Electricity distribution companies might develop a policy of selectively connecting "prime", or particularly beneficial RES projects, leaving room for more corruption and paid "favors" for making the "right" selections among their employees and at a corporate level. This risk has been exacerbated by the latest changes

in the legislation, which will render obsolete many projects that fail to connect to the grid in 2011. The government and the energy regulator should take quick steps in promoting transparency and consistency in the manner in which grid companies treat requests for connections to the grid, in particular in 2011.

- **The management of the investment process should be improved.** Although Bulgaria has embedded preferential clauses and guarantees for RES-E in its legislation and energy policies, these rules were largely adopted because they had to be adopted as part of the EU acquis, and not because of a genuine policy and rational decision-making process in the country. They also tend to change often. Furthermore, it seems that the adopted policies, as well as **the low-carbon sustainable development agenda as a whole, commonly stem from the superficial application of the EU's developmental discourse,** rather than from an understanding the real benefits of this agenda for Bulgaria's economic development. For this reason, the above policies often seem foreign, and legal and regulatory rules commonly fail to translate into action. The latter is crucial for investment decisions.

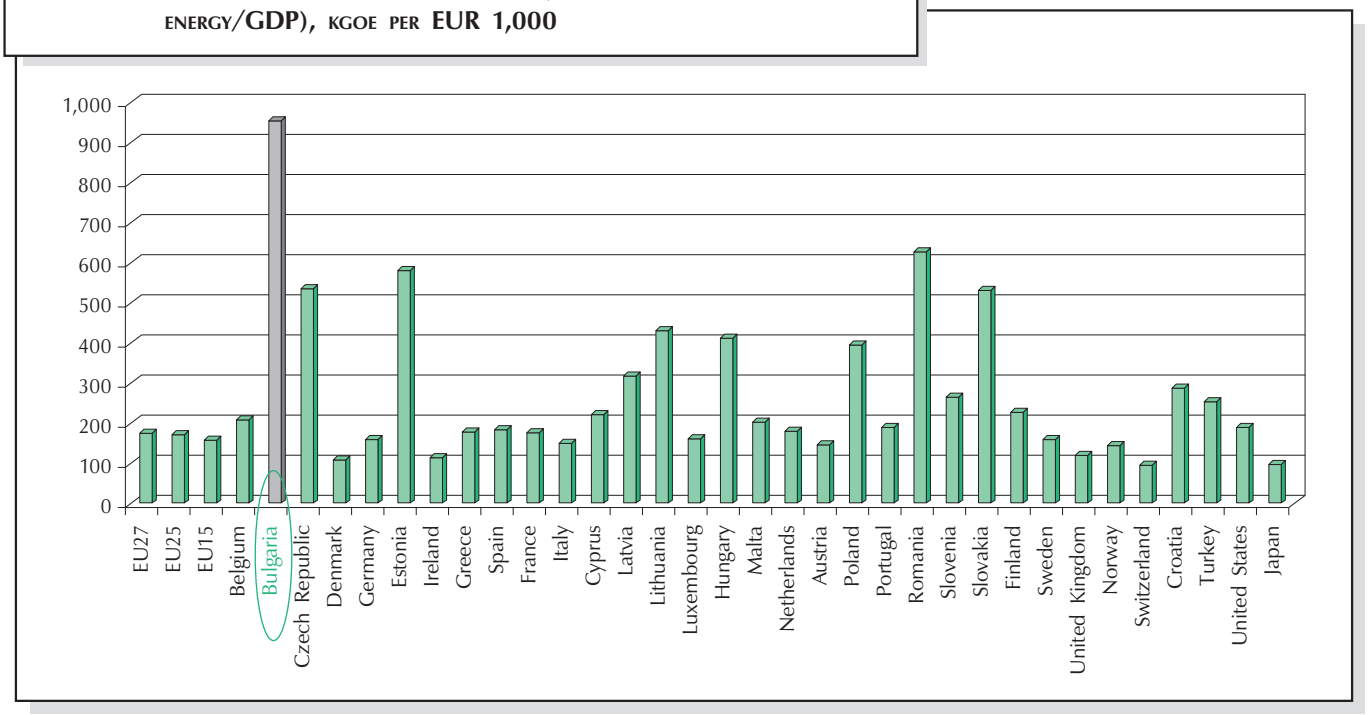
  A major concern for investors still remains the **unpredictable and non-transparent process of pricing of electricity from RES,** which discourages investors to take the associated risks, and makes banks unwilling to lend money for RES projects. These pricing uncertainties are notably related to the fact that there is no free competitive market for electricity in the country, whereby market prices could be genuinely ascertained. The regulation of prices is a monopoly domain of SEWRC, which is prone to influence from the executive and from lobby groups. The government and the regulator should carefully analyze the effect of the latest changes of the law on RES. They provide for fixing the price for electricity produced from RES (like solar or wind) only after a project has been completed. If banks fail to find reasonable ways of imputing the price of future energy from a RES project under these rules, it is likely that the law might lead to inverse selection of investors – reputable RES investors might be pushed aside by capital of questionable origin (for the purposes of money laundering, it suffices that around 50% of the original investments are laundered, while no actual profits are needed).

- **RES require higher administrative capacity.** The primary reason for the failure of regulation to adequately support RES development in Bulgaria has been the lack of administrative capacity to formulate and implement policies. The possibility for everyone to construct RES in any form at any location, including not only arable land, but also environmentally protected areas, is evidence of administrative incapacity of the highest order, which has given RES a bad name, much like real estate development in the past. **Administrative delays are also frequently observed in the process of connecting RES to the grid,** but also in providing incentives under the various available instruments. Investors and entrepreneurs have also expressed dissatisfaction with the higher connection fees applied to producers of renewable energy. The administrative procedures are still perceived as highly burdensome and resource consuming, especially in the case of wind farms and other smaller RES installations. Administrative deficiencies have been overshadowed by corruption, particularly with respect to public procurement and permit issuing procedures.

3.3. ENERGY EFFICIENCY

Energy efficiency is seen as one of the main routes for achieving the common EU goal of 20% GHG emissions reduction by 2020 compared to 1990 levels. Bulgarian regulatory requirements concerning energy efficiency are based on that common EU target, including a 10% reduction in emissions from installations not covered by the EU ETS, as compared to 2005 levels, and a 21% reduction of emissions from installations covered by the EU ETS (i.e. all large industrial installations, including the aviation sector) compared to 2005 levels. **The financial and economic crisis** has resulted in a decrease in the consumption of energy in the country, and the EU as a whole, and **has negatively impacted energy efficiency investment decisions at all levels** – public, commercial, and personal.

FIGURE 15. ENERGY INTENSITY OF THE ECONOMY (GROSS INLAND CONSUMPTION OF ENERGY/GDP), KGOE PER EUR 1,000



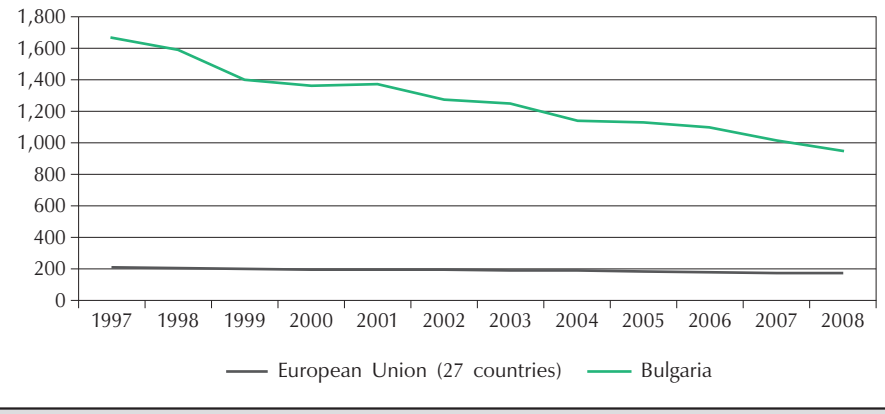
Source: CSD, based on Eurostat data.

Bulgaria has consistently ranked as the most energy intensive economy in the EU: it uses much more energy than other Member States to produce equivalent units of output. This makes Bulgaria's economy and its competitiveness more vulnerable to energy price swings. The country's actual energy intensity might be somewhat lower because official numbers do not take into account the existence of a sizeable hidden economy. According to most recent assessments, hidden economic activity could add up as much as 25% to Bulgaria's GDP.[85] Yet, even if this hidden part of the economy is accounted for, it is clear that Bulgaria remains highly energy intensive. The need for addressing energy inten-

[85] *The Hidden Economy in Bulgaria after the Economic Crisis,* CSD Policy Brief No 28, Center for the Study of Democracy, April 2011.

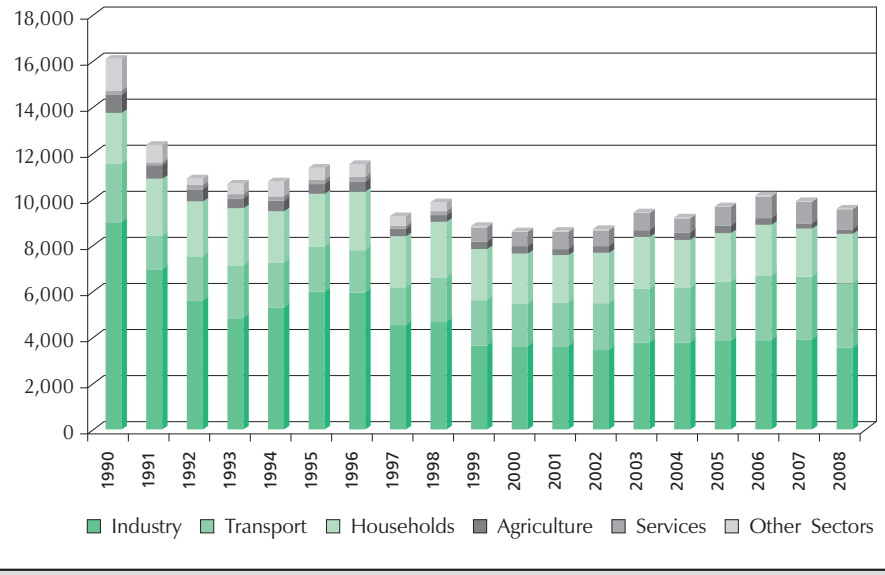
sity issues is particularly pronounced and visible to the naked eye in Bulgarian cities, especially in the housing sector. However, **successive governments have chosen to focus on large energy generation projects, rather than on promoting energy efficiency more vigorously.** Supply management is preferred to demand optimization for a variety of reasons, yet, this policy choice is apparently highly influenced by the higher short term political and economic gains from procuring new generation capacities and by the lack of a clear interest or lobby group behind energy efficiency promotion. Energy efficiency is perceived as a

FIGURE 16. GDP ENERGY INTENSITY (KGOE PER 1,000 EURO AT MARKET EXCHANGE RATES)



Source: CSD, based on Eurostat data.

FIGURE 17. FINAL ENERGY CONSUMPTION BY SECTOR (1,000 TOE)

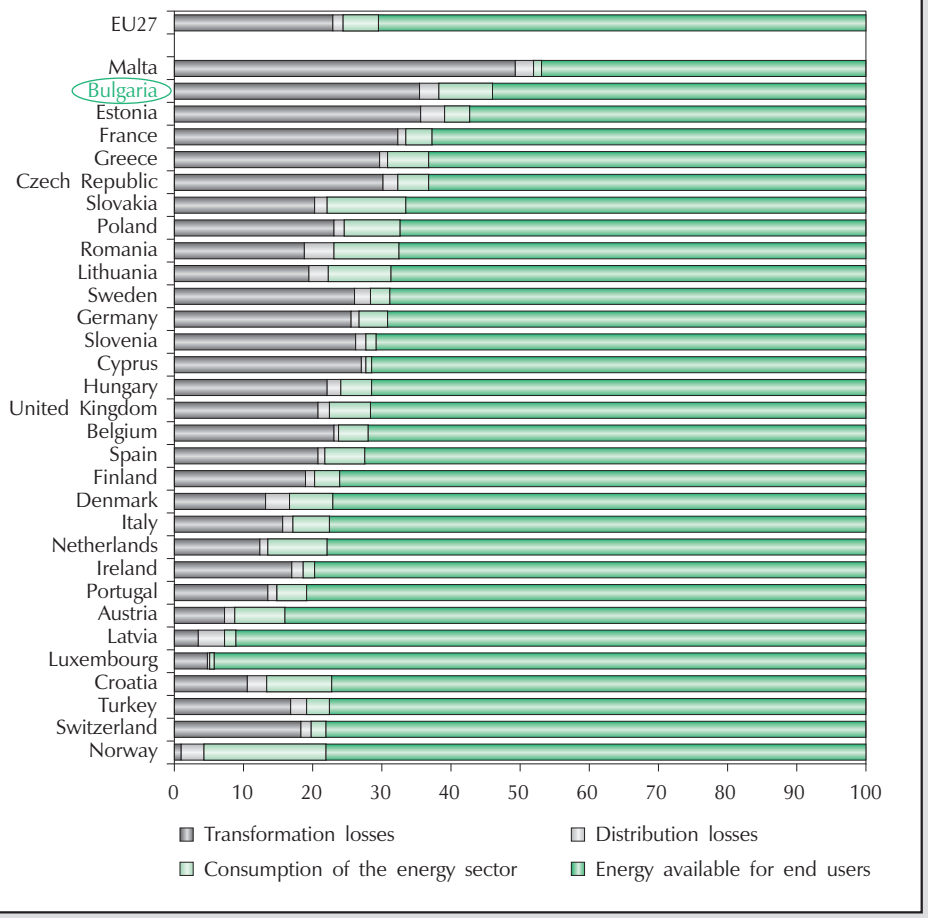


Source: CSD, based on Eurostat data.

public good offering low immediate or specific benefits, whereas new generating plants benefit few but specific economic agents, for whom the stakes are high to secure their interests.

Bulgaria's energy intensity has been decreasing by about 5% a year since 1996. This has primarily been a result of the restructuring of energy demand in the country from the closure and privatization of inefficient and energy intensive industries, notably metallurgy and the production of chemicals. As metallurgy's share in the industrial portfolio of Bulgaria has decreased, so has heavy industry's share in final energy consumption. Another important reason for this **"windfall" decrease in energy intensity** is the high fleet renewal rate in commercial transportation pushed by the introduction of EU vehicle standards. The situation resembles the case with the country's CO_2 emissions, which also notably fell after the beginning of the transition in 1989 with the collapse of the former Soviet-type heavy industrial complexes.

FIGURE 18. ENERGY LOSSES IN THE PROCESSES OF TRANSFORMATION, DISTRIBUTION, AND CONSUMPTION, 2008 (%)

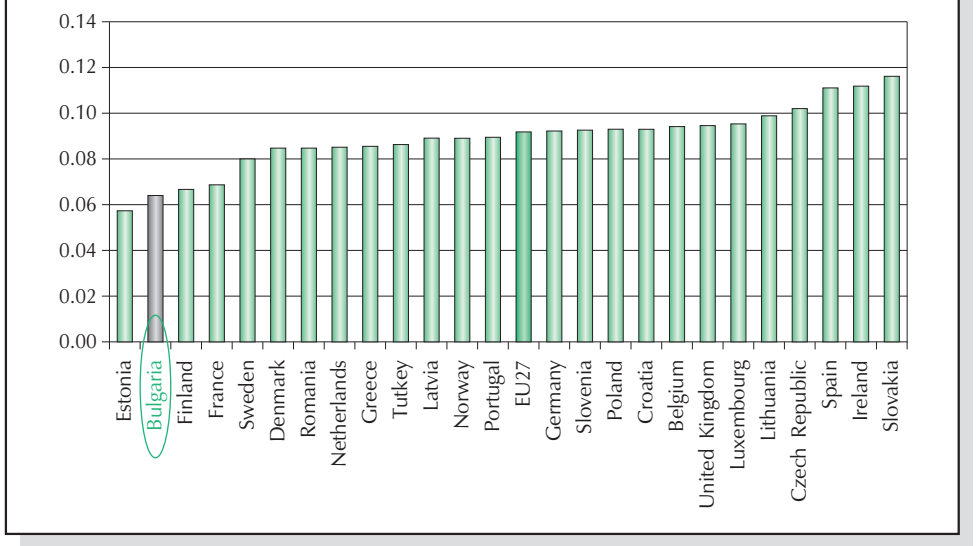


Source: Eurostat's energy statistics: Supply, transformation, consumption – all products – annual data.

However, the country is at a point where **any additional improvement in its energy efficiency would require the promotion of new and novel production technologies, conversion processes, modes of transportation,** etc. At the user end, this would mean installing more efficient appliances, buying vehicles that use less fuel, improving the insulation of buildings, improvements in lighting, and deploying more efficient production technologies and procedures. Thermal power plants, boilers, and a plethora of other hardware devices will have to be replaced or upgraded, along with production methods and procedures. In energy transportation, smart grids, more efficient district heating networks, and other solutions will have to be implemented. To accomplish these tasks, extensive investment in energy efficiency will have to be made over the next decade.

Bulgarian policy makers and the public face a tough dilemma in promoting energy efficiency via market instruments. A major factor determining both consumer behavior in terms of savings in final energy consumption and investing in energy efficiency is the price of energy. In absolute terms (Euro per 100 KWh), Bulgaria ranks among the countries with the lowest prices of electricity in the EU. Bulgarian consumers still enjoy regulated subsidized electricity prices, which distorts energy choices and consumption behavior. This fact is often used to justify further increases in the price of electricity for households and industrial consumers. However, price increases are putting considerable strain on consumers. If prices are measured in purchasing power parity, Bulgaria is one of the countries with the heaviest burden of electricity bills in the consumer basket.

FIGURE 19. PRICE OF ELECTRICITY FOR INDUSTRIAL CONSUMERS, 2010 (EUR/KWH)



Note: Countries for which no data were available for 2010 were excluded.

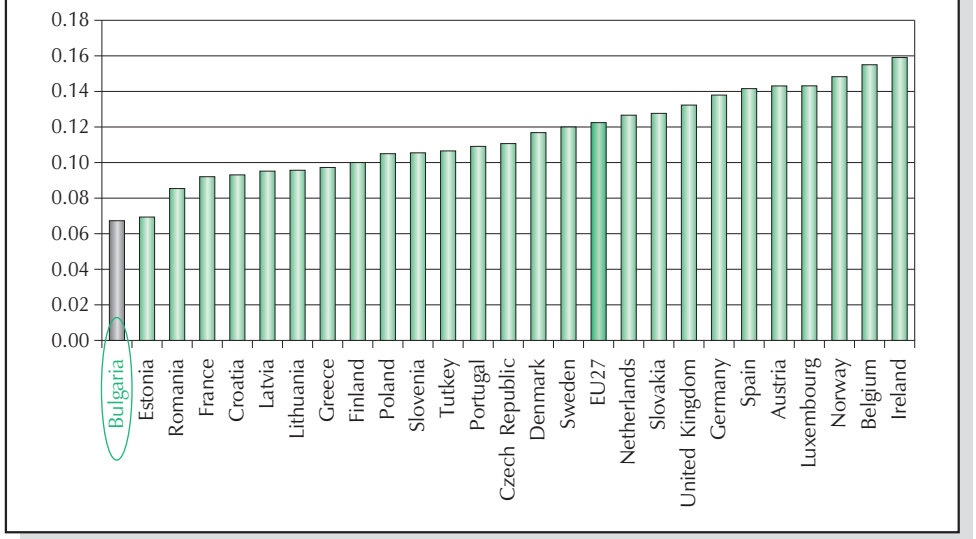
Source: CSD, based on Eurostat data.

The average Bulgarian household spends a considerable amount of its income on energy. Thus, any future increases in the price of energy will have to be matched by some form of support for vulnerable consumers. In the same context,

energy efficiency programs should be designed in such a manner and on such a scale, so as to include households at the "bottom of the pyramid". Currently, most households do not undertake energy efficiency measures not because consumers are wasteful, uninformed, or unwilling, but because they cannot afford the required appliance replacements and technology improvements. There is some potential in improving households' energy saving behavior, as a means of reducing the consumption of energy at no extra cost. But the bulk of the energy efficiency drive will still have to come from government sponsored programs to make a sizable difference.

Affordability of market solutions for consumers is a major stumbling block for furthering energy efficiency in Bulgaria. Much of the country's progress in improving energy efficiency could be wrecked over the next few years if the required fleet and technology replacements and improvements continue to be unaffordable for the majority of the population. While increasing the price of energy may seem like an appropriate tool for pushing consumers to improve energy efficiency (particularly as regards electricity and heat used by residential customers), it is likely that this would not produce the desired outcome, since many consumers are already spending excessively large portions of their incomes on electricity and heating. Therefore, higher electricity and heating prices would further strain consumer budgets without providing the means to implement upgrades and replace inefficient installations. Price increases may also further reduce the already unacceptably low collection rates of heat distributing companies, though no direct relation between these two phenomena has been observed in the past. A switch to more efficient sources (e.g., natural gas) of energy for heating, hot water, and cooking is also difficult to implement, since the residential gas network is not well developed and, where that option is available at all, the required investment for connecting and switching to gas is still beyond the means of most residents. In fact, higher electricity and heating prices may lead to the increased use of wood (not coal, since its price has also gone up) for heating purposes.

FIGURE 20. PRICES OF ELECTRICITY FOR HOUSEHOLD CONSUMERS, 2010 (EUR/KWH)



Source: CSD, based on Eurostat data.

Energy efficiency is a top ranking priority in the new *National Energy Strategy of the Republic of Bulgaria until 2020*. Bulgaria's energy efficiency policies are developed and managed by the Directorate for Energy Efficiency and Environmental Protection within the Ministry of Economy, Energy and Tourism, while policy implementation is the responsibility of the Energy Efficiency Agency specifically established for the purpose in 2002 by the *Law on Energy Efficiency*.[86]

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

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

The Energy Charter Secretariat has noted that **Bulgaria has made good use of the EU accession process to improve its energy efficiency policy framework.**[87] The country has developed clear objectives and targets, and is working to introduce clear and specific policies and progress monitoring mechanisms. However, the challenge for policy makers remains the actual implementation of energy efficiency policies, as well as improving the coherence among various instruments. So far, measures have been focused primarily on final consumption, rather than the processes of energy production, transformation, and distribution. Substantially exceeding EU's 20% target for reduction in gross energy consumption is vital for the sustainability of the Bulgarian economy, as well as for achieving higher energy security. Achieving more ambitious reduction targets largely depends on emphasizing energy efficiency and energy savings in Bulgaria's strategic energy policy documents.

The *National Energy Strategy of the Republic of Bulgaria until 2020* foresees improvements in energy efficiency amounting to 50% savings of primary energy. The latter translates into annual savings from imports of energy resources amounting to EUR 6 billion: the equivalent of the costs for constructing a new nuclear power plant.[88] While it is not immediately obvious how these savings are to be achieved, actions in two areas are anticipated:

- Energy savings in final consumption (that includes households, industry, as well as the transport and the service sectors);
- Energy saved during the processes of its generation and transformation (e.g., improving the energy efficiency of TPPs and a larger share of energy generated from co-generation).

[86] Promulgated in State Gazette nr. 98 of November 14, 2008.

[87] Bulgaria: In-Depth Energy Efficiency Review, Energy Charter Secretariat, 2008.

[88] It should be noted that EUR 6 billion is an optimistic price tag for a new nuclear power plant in Europe after Fukusima.

While its policy and administrative framework is assessed as sufficient, **Bulgaria's public investment in energy efficiency has remained extremely modest in comparison to the challenges faced by the country.** The few existing funding instruments are in effect public-private funding mechanisms supported by international institutional investors, which provide assistance in the low tens of millions of euros. While these have provided a good ground for piloting energy efficiency measures, rolling them out on a national scale would require a much higher financial firepower. A 2004 study[89] set the value of the investment required to bring a residential property up to modern insulation (energy efficiency) standards at up to 30% of the value of the property itself. Such an investment is significantly beyond the means of most Bulgarian households, which renders unrealistic the expectation that individual private investments would fill the gap between the funding provided by existing instruments and the total investment required. Even if insulation upgrading could be carried out at a cost equaling 10% of the value of properties, this would translate in an investment of EUR 8 billion,[90] surpassing many times the capitalization of all other financial instruments supporting energy efficiency that are currently available in Bulgaria.

The very high costs of energy efficiency measures and the very high potential public benefits, including in terms of higher energy security, require **the Bulgarian government to take a leading role in promoting and financing energy efficiency measures,** in particular in the housing sector, but also in small and medium-sized enterprises. This can be achieved through the better use of **available energy efficiency resources** under EU funds operational programs:

- OP Competitiveness currently provides BGN 403 million for the "Introduction of energy saving technologies and renewable energy sources" in the business sector. The launch of the funding mechanism is set for the second half of 2011. Activities eligible for funding would include the delivery, installation, and utilization of energy saving technologies and equipment improving the energy efficiency of production lines; the use of alternative energy sources in industry; renovation and/or repair of equipment; actions to improve the energy management of buildings (e.g., heating and electricity systems); projects utilizing energy efficient materials and products; etc.
- OP Regional Development provides: (a) BGN 83 million for "Support for implementation of energy efficiency measures in municipal educational infrastructure in urban agglomerations"; (b) BGN 117 million for "Access to Sustainable and Efficient Energy Resources"; (c) BGN 27 million to "Support the implementation of energy efficiency measures in municipal educational infrastructure of 178 small municipalities".

[89] Draganinska, T. (2004). "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).

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

4. THE BULGARIAN SOCIETY AND SUSTAINABILITY

4.1. ARE BULGARIANS ABLE OR WILLING TO PAY FOR SUSTAINABILITY

A critical factor for developing sustainable energy in Bulgaria remains the question of the social price to be paid for the introduction of RES, energy efficiency, and climate change policies. The social burden of energy bills, especially in the context of the ongoing financial crisis, is a central concern for households. Bulgarian households pay the lowest price for electricity in Europe in absolute terms. Price increases are inevitable to cover the costs of new investments in generation (nuclear, coal) and transmission. Bulgaria has signed binding agreements within the EU legal framework to achieve 16% of gross final energy consumption from renewable energy sources by 2020, which will bring additional upward pressure on prices for final consumers.

However, **Bulgarian households are not prepared to foot the bill for more expensive electricity.**[91] A mere 17% of the households indicate they are willing to pay extra for clean energy but they would only bear a modest increase (of up to 10%) in their electricity bills. The willingness to pay a "green energy premium" seems directly linked to the income level of the consumers. Low-income households support cheaper, albeit "dirtier" energy: about 60% of households use wood for heating, which currently remains the cheapest source of energy. This indicates an overall unwillingness and inability to pay higher electricity prices. Bulgarian consumers are unlikely to support any generation solution that would imply an increase in prices higher than 10%, which means that Bulgarians do not have a preference towards specific solutions in the energy sector. This leaves the responsibility for decisions on the energy mix entirely in the hands of Bulgarian politicians. The only binding constraint is that it should lead to the smallest possible increase in prices.

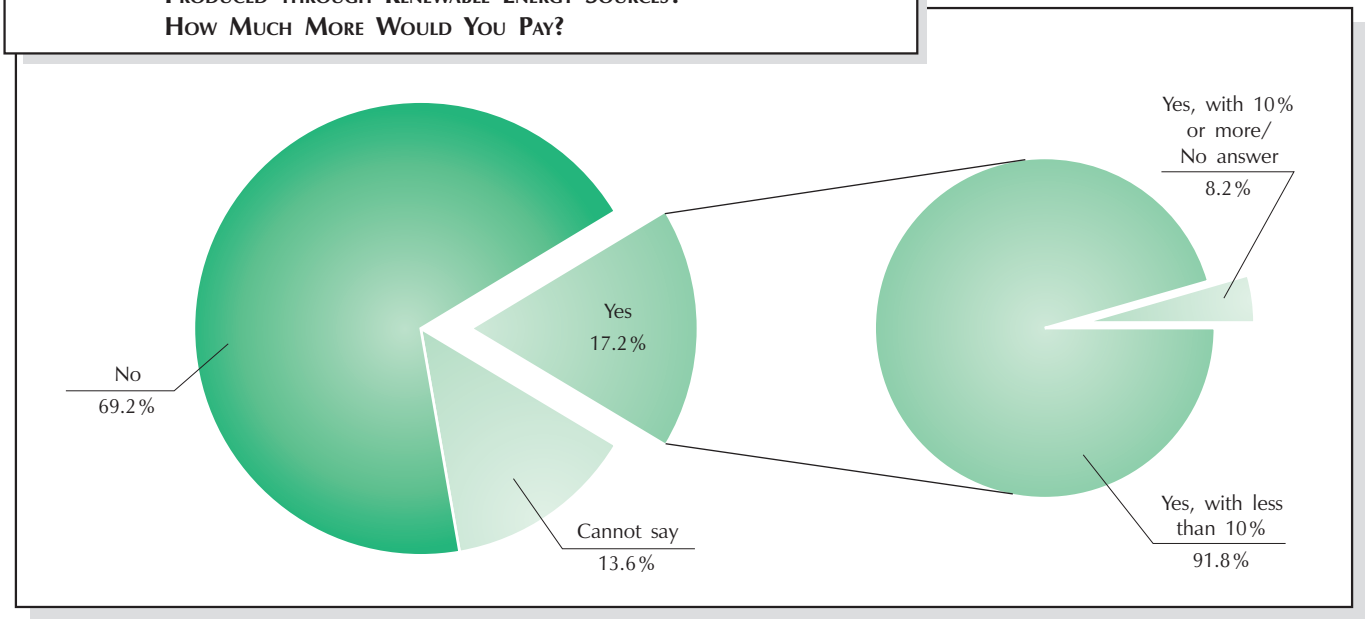
In contrast to the population, **the willingness of Bulgarian businesses to pay higher prices for electricity produced from RES is significantly higher.** Approximately a third of the businesses surveyed report a readiness to incur the extra costs of "greener" energy,[92] yet there is little sense among both the population and businesses as to what constitutes a manageable price increase. This greater readiness to pay for green energy among businesses might be the result of a combination of a greater ability to pay, a better understanding of the long-term implications of green energy for business, and the better position of businesses to take advantage of existing green energy stimuli. Thus, Bulgarian consumers seem to not readily support sustainable development through RES.

[91] According to surveys commissioned by the Center for the Study of Democracy in 2009 and 2010.

[92] According to surveys commissioned by the Center for the Study of Democracy in 2009 and 2010.

Therefore, the Bulgarian government needs to carefully consider which types of RES it would promote to reach its green energy targets and to balance between new investments and the effects of price increases on vulnerable segments of the population.

Figure 21. Would You Pay a Higher Price for Electricity if it Were Produced through Renewable Energy Sources? How Much More Would You Pay?



Source: CSD Energy Survey, 2010.

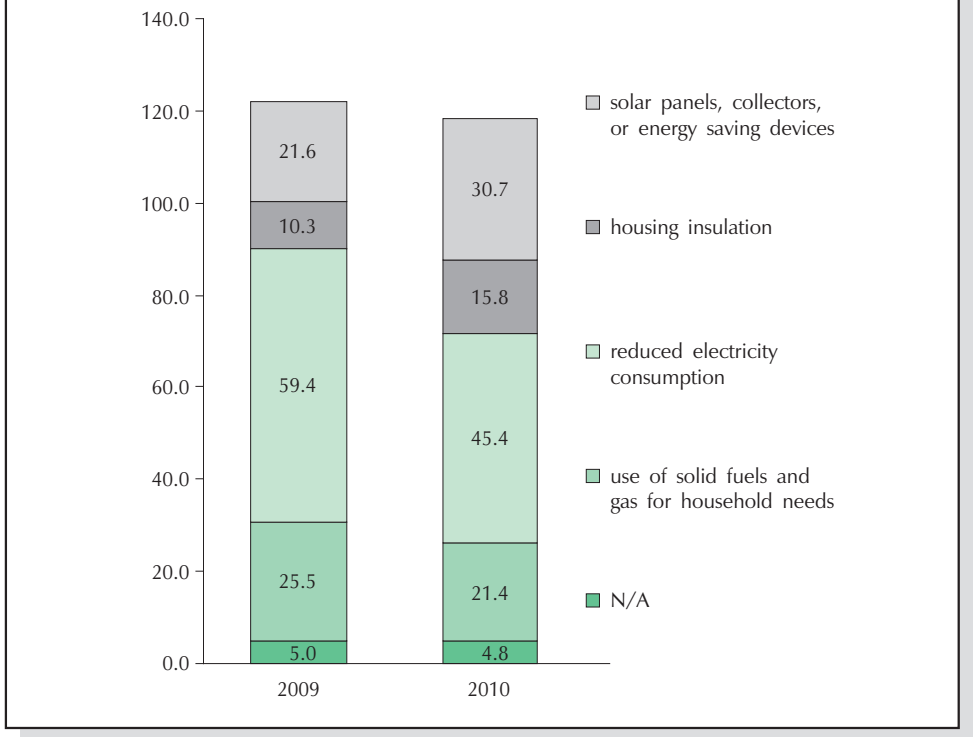
4.2. NECESSARY CHANGES IN CONSUMER BEHAVIOR

A major problem with the promotion of sustainable energy in Bulgaria is the **still alien nature of the concept of energy efficiency and savings to the country's consumer culture.** The excessive and wasteful use of energy due to the currently subsidized price of electricity and the history of wasteful consumption during the years of central planning indicate that energy savings are rather unpopular with the Bulgarian population. In spite of the existence of numerous instruments to stimulate energy efficiency in Bulgaria, these tools are seldom accompanied by targeted and well thought out public awareness campaigns and do not deliver the expected results.

Bulgarian energy policy making seems to omit the central role of behavioral change from energy-related public debates by ignoring the role and involvement of local authorities and individual consumers. Nevertheless, in order to achieve certain objectives, such as improvements in energy efficiency and savings, the participation of municipalities in transforming the behavior of individual consumers should be given a priority. Presently, Bulgarian political leaders still give a preference to the traditional centralized model of the energy system over a more democratized RES-based development.

However, EU-backed efforts to promote sustainable development measures like improvements in energy efficiency seem to slowly trickle down and take hold onto the Bulgarian society. **In 2009 – 2010, there was an increase in the number of households attempting to reduce their expenses on energy** (45.7% of the households reported doing so in 2010, compared to 41.9% in 2009).[93] Measures most often used were those pertaining to energy savings, as well as to the use of solid fuels and gas, and insulating residential housing. There have been two tendencies in this respect. On one hand, the share of households using electricity saving measures has decreased from 48.1% in 2009 to 37.1% in 2010. On the other hand, the share of households using energy efficiency measures has increased at the same rate from 25.9% to 38% over the same period. It is important to note that the cumulative effect of energy efficiency behaviors is more likely to produce tangible effects in the longer rather than the shorter run. In 2010, 16.2% of the population reported putting in place additional insulation in their residential houses. The latter has resulted in a 10% savings, on average, in the heating bills of 85% of the above households.

FIGURE 22. MEASURES ADOPTED BY HOUSEHOLDS TO INCREASE ENERGY SAVINGS AND EFFICIENCY (% OF THOSE, WHO RESPONDED)

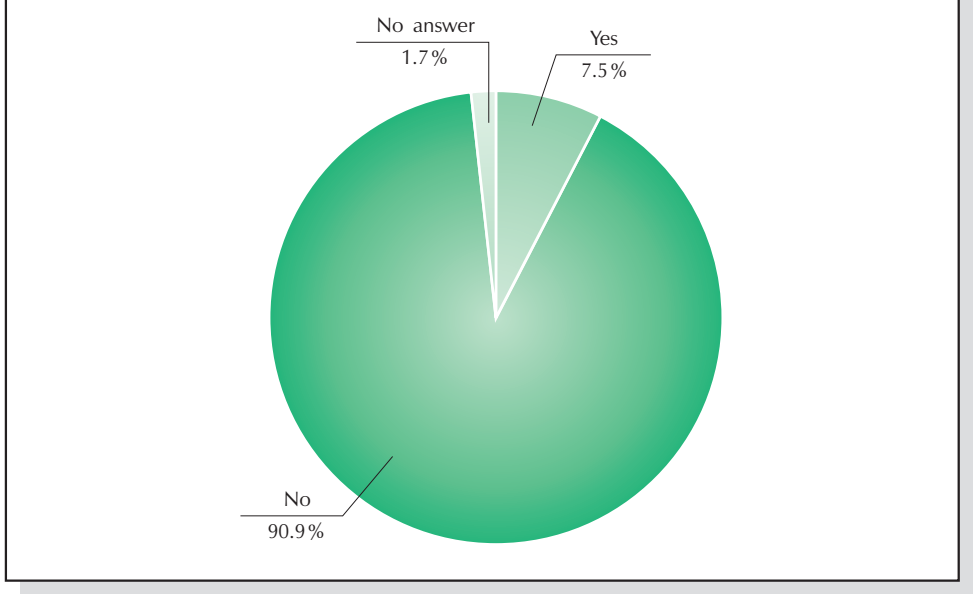


Note: Answers exceed 100%, as some respondents have given more than one answer.

Source: CSD Energy Survey, 2010.

[93] According to surveys commissioned by the Center for the Study of Democracy in 2009 and 2010.

Figure 23. Have You Used a State Subsidy or Special Bank Credit Line for the Insulation of Your House?



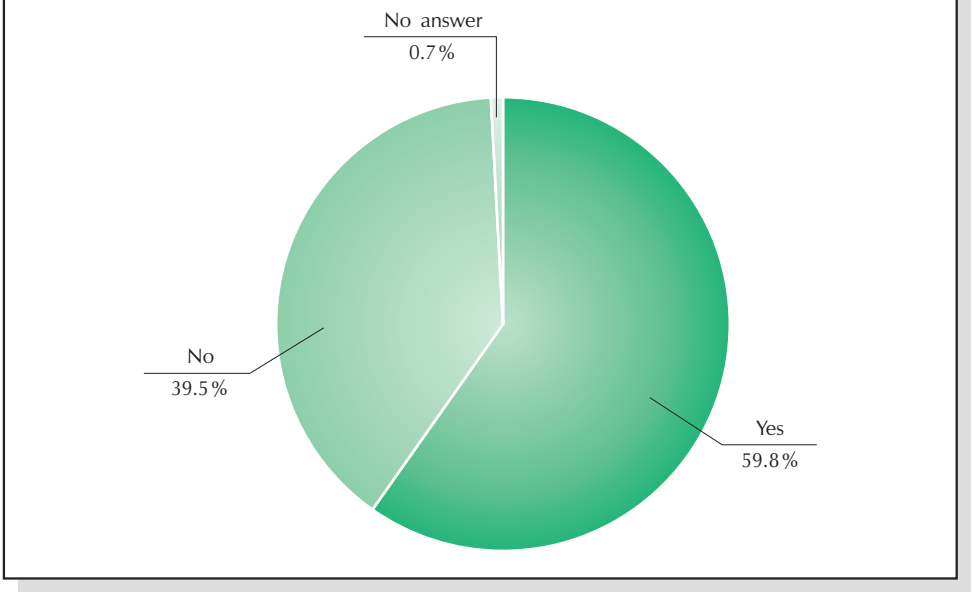
Source: CSD Energy Survey, 2010.

A notable shift in consumer attitudes and behavior are needed if Bulgaria is to stay on track with its national targets for achieving a more sustainable development. At a practical level, one of the critical issues in changing consumer behavior relates to the need to reduce the use of wood as biomass. Despite the above-mentioned tendencies towards increasing energy efficiency in residential housing, **over half of the population (63% in 2009 and 59.8% in 2010) continues to rely on solid fuels, primarily wood, as a source of energy for residential heating.** Moreover, wood consumption (mainly for heating) has been on the increase since the 1990s. The reason is simple – central heating facilities are only available in bigger cities, and Sofia is the only area where the majority of households use central heating (i.e. 400,000 households). As a result, two thirds of the gas used for heating is consumed in Sofia. Central heating facilities in other cities (30,000 – 100,000 inhabitants) use oil rather than gas. It is important to note that the use of wood as biomass is sustainable only when accompanied by reforestation, which is not the case in the country. In addition, most of the biomass currently in use by Bulgarian households is burned using very inefficient technologies.

According to the CSD survey, the production of wood for heating amounts to about 12-13 million cubic meters, while according to the Ministry of Agriculture, annual production is significantly lower at about 4.5 million cubic meters. This discrepancy can be explained with a reference to the grey and black markets in this sector; clearly **illegal wood-cutting is much more prevalent than indicated by the official records of the forestry authorities.** The existence of such "grey" markets drives prices down and makes heating from wood cheaper than heating which relies on gas. The price for 1 cubic meter of wood for heating varies between the range of BGN 50-60. The estimated production of about 13 million cubic meters of wood for heating would eliminate approximately 180 square km of forest area and is in stark

violation of environmental rules and regulations. Hence, the introduction of more incentives for the use of biomass, as foreseen in the *Law on Energy from Renewable Sources,* should be balanced with an increased control and regulation. Otherwise the incentives could cannibalize the country's forests.

FIGURE 24. DID YOUR HOUSEHOLD USE WOOD FOR HEATING DURING THE LAST YEAR?



Source: CSD Energy Survey, 2010.

4.3. A SUSTAINABLE DEVELOPMENT STRATEGY FOR BULGARIA?

Successive **Bulgarian governments since 2001 have failed to deliver a sustainable development strategy for Bulgaria.** One likely reason for the delay is the non-binding character of the EU initiative,[94] since no concrete document obliges EU Member States to adopt national strategies. This strategy should provide an overall policy framework for the targets on climate change mitigation, RES development and energy efficiency, and the economic and social costs at which these targets can be achieved. In June 2001, the Gothenburg European Council invited "Member States to draw up their own national sustainable development strategies."[95] The necessity for such strategies came from the political commitment to the text of *Agenda 21* of the 1992 Rio de Janeiro's Earth Summit, recommending the development and implementation of national sustainable development strategies (NSDS). The 1997 Special Session of the UN General Assembly specified the target date of 2002 for the elaboration of the strategies.

[94] The Union's vision for sustainable development has been incorporated into a number of its policies, more notably, the fight against climate change and the promotion of low-carbon economic development.

[95] Gothenburg European Council Presidency Conclusions, 15-16 June 2001.

The World Summit on Sustainable Development (WSSD) in Johannesburg again urged countries to make progress in the formulation and elaboration of NSDS and to begin their implementation by 2005.

Starting from September 2007, every two years the Commission has had to submit progress reports on the implementation of the SDS in the EU and the Member States. Member States elaborating their first national sustainable development strategies (NSDSs) had to complete these by June 2007. Voluntary peer reviews of NSDSs had to be conducted in each Member State in order to feed into the Commission's progress reports. The unclear conditions for adopting national SDS have led to the largely voluntary and random preparation of such strategies across the EU. Nevertheless, by 2010, most of the EU Member States had developed their own strategies, with the exception of Bulgaria and Hungary.

Table 6. Date of Adoption of National SDS in Relation to the Adoption of EU SDS in 2001

Before 2001	After 2001	Under preparation/revision
The Netherlands (1), Sweden, Finland, United Kingdom (1) and (2), Luxemburg, Belgium (1) Poland	Austria, Denmark, Ireland, Germany, Sweden Italy, France, The Netherlands (2) Portugal, Slovakia, Lithuania, Latvia, *Cyprus,* Romania	Spain, Belgium (2) Hungary, Estonia, Czech republic, Slovenia, Malta, Bulgaria

Source: European Commission Working Document National Sustainable Development Strategies in the European Union, April 2004.

Table 7. Focus and Scope of National SDS

Environment	Three dimensions (social, economic, environment)	Three dimensions + additional
Italy, Hungary	Austria, Germany, Finland, Denmark, Greece, Ireland, Luxemburg, Portugal, Spain (draft), Sweden, UK, Cyprus (NDP), Estonia (Draft), Slovenia (NEDS)	France (cultural, regional, governance), Belgium (governance), the Netherlands (governance), Slovakia (cultural) Slovenia (cultural) Poland (cultural) Lithuania (regional) Czech Republic (cultural)

Source: European Commission Working Document National Sustainable Development Strategies in the European Union, April 2004.

Sustainable development is a major challenge for countries like Bulgaria, which are experiencing a protracted transition. **Reforms are required in all three main pillars of the sustainability concept –** economy (production and consumption), society (labour, living and working standards and habits, etc.), and environment. Significant resources and social efforts were needed for the comprehensive transition from centrally planned, energy and resource intensive industrial economy to a greener and more environmentally friendly market-based model.

These concepts and ideas are relatively new to the Bulgarian policy making environment, which delayed their public and political acceptance and subsequent implementation. However, the main reason for the delay of the Bulgarian SDS remains not only the lack of knowledge and understanding of sustainability, but primarily the institutional uncertainty over what state agency or department should lead on this new development agenda. The expert capacity and resource availability of state agencies to deliver and implement a SDS are also causes for concern.

Though the EU's main principles and postulates are embedded in national legislation, and projections indicate that Bulgaria has the potential to achieve its national green energy targets by 2020, the projected results from the current policies and their effectiveness are not properly assessed and calculated. **A national SDS would provide the basis for all economic and political developments in the country,** as they relate to achieving greater sustainability. In its absence, Bulgaria is currently following a path of extensive development of the energy sector through government guarantees and with no realistic assessment of future trends in energy demand. In addition, decisions for constructing big energy infrastructure projects, such as a second nuclear power plant, have been taken without proper assessment of their long-term economic, social, and environmental impacts. Moreover, there is **no clear framework for taking long-term decisions** with respect to the energy mix, energy security, and energy prices, which leaves decision-makers prone to lobbying and corruption pressures. A national SDS could put Bulgaria's transition to sustainability and low-carbon development into perspective, as it would demonstrate the full impact that the actual implementation of such policies will have on the country.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

For the past two decades the EU has systematically developed a sophisticated and detailed regulatory base for promoting and facilitating the sustainability of the energy sector in Europe. With its ambitious goals, **the Union has been a leader in global efforts to foster a greener world economy** and counteract climate change. The stringent self-imposed measures, however, have found certain EU countries, notably in Eastern Europe, not well equipped for fulfilling the demanding goals. Although the adoption of national laws approximating EU regulations has largely been completed in most EU Member States, implementing these policies effectively via specific measures remains a challenge rather than a reality.

Success in **the use of green instruments has varied across countries in the EU,** and both positive and negative trends have been observed. Negative developments have included consumer electricity price hikes, as well as RES investment bubbles (e.g., in Spain). The global financial crisis and the failure of climate change negotiations have infused additional uncertainty to the EU's complicated policy and regulatory framework. With measures from the first decade of sustainable development policies not fully implemented or evaluated, and with 2020 being only a decade away, European leaders have decided to stay on target by introducing even more ambitious goals into the new strategy for growth and jobs – *Europe 2020*.[96] A key element of the strategy is the 20-20-20 energy initiative, which aims for the EU to reduce energy intensity by 20%, increase the share of RES in final energy consumption to 20%, and reduce GHG by 20% by 2020.

Many EU Member States have yet to come up with the right sustainable energy mix for their domestic socio-economic environments in view of achieving *Europe 2020* targets. The energy mix needs to take into consideration the trade-offs between security of supply, competitiveness, and environmental sustainability. For example, oil and gas are subject to price volatility and political leveraging; coal is relatively cheap but dirty; nuclear energy produces negligible levels of CO_2, yet requires large sunk cost investments, is environmentally harmful, and does not reduce dependency on imports; renewables are highly technical and likely to drive energy prices up, etc.[97]

Bulgaria has adopted the *Europe 2020* strategy in its policy and legal documents, but its implementation remains in its infancy. Bulgaria needs to catch up with other EU Member States in a number of areas: decreasing energy intensity, expanding green energy production and developing smart grid solutions, increasing its energy security, etc. **Bulgaria is an outlier in Europe** when those multiple fac-

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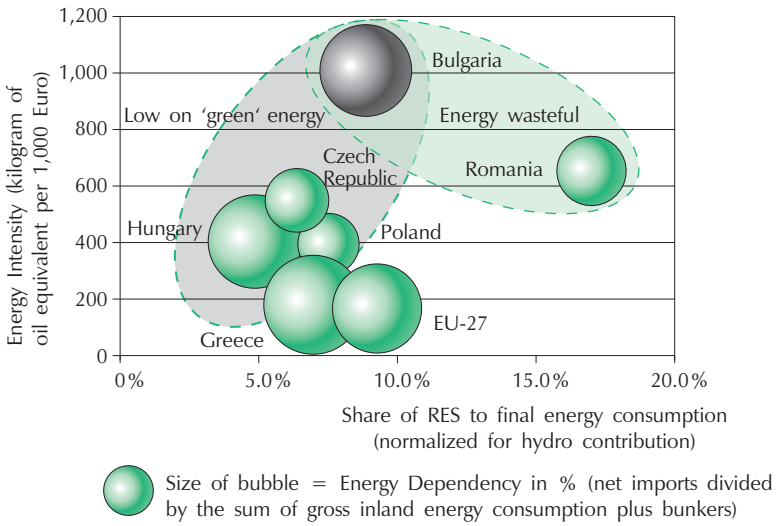
[96] European Commission, *Europe 2020: A strategy for smart, sustainable and inclusive growth,* COM(2010) 2020, 3.3.2010.

[97] Juan Delgado, Hans W. Friederiszick, Lars-Hendrik Röller, Energy: Choices for Europe, Bruegel Blueprint Series, 2007, p. 45.

tors are taken into account – it is the most energy intensive economy in the EU, it is highly energy dependent, and has a relatively small share of RES in overall energy generation. Bulgaria needs to step up its efforts in developing smart energy solutions in all three areas of the EU energy policy agenda: renewable energy sources, energy efficiency, and countering climate change.

Figure 25. The 'Triple Helix' of Energy Sector Development – Efficiency, Sustainability, and Independency



Source: CSD, based on Eurostat data.

RENEWABLE ENERGY SOURCES

There is a benefit to the delayed timing of introducing RES into the Bulgarian energy system, as the EU's earlier attempts have been focused on first generation biofuels and other measures that have now been significantly improved. Therefore, the country should take into account the latest developments in the field of RES and **determine a realistic scale of investment in the right type of biotechnology:**

- **Biofuel** production needs to be assessed in terms of its cost-effectiveness and effect on general agricultural production;
- **Wind** farm projects ought to be assessed in terms of their maneuverability or flexibility, as the latest wind power technologies are adjustable and allow for power regulation. Therefore, the goal should be to select and execute wind farm projects including primarily adjustable wind aggregates. Such criteria should be included in the currently ongoing selection process for RES projects;
- A review of the latest *National Renewable Energy Action Plan* submitted to the Commission and reviewed in 2010 suggests no planned action on the use of **biomass.** This has been corrected in the *Law on Energy from Renewable Sources,* but the stance towards this source of energy in the national policy remains

ambiguous. The potential for using biomass in Bulgaria (including agricultural waste) should be carefully considered, including both potentially positive and negative impacts.

In addition to selecting the most suitable technologies, a key task for the Bulgarian government is the creation of a balanced mix of renewable energy in the country. Currently, the *National Energy Strategy of the Republic of Bulgaria until 2020* seems to prioritize almost every possible energy source. The development of all "prioritized" sources seems unrealistic.

In addition, there is a **rapidly growing global tendency towards horizontally integrated energy supply (including RES) and energy demand systems** at the local and municipal levels. This process is associated with the decentralization of state governance. For example, large hydro and wind projects, just like traditional coal and nuclear facilities, may be costlier and could face greater hostility from local communities and environmental groups than localized solutions that enable the existence of energy independent local communities. Such communities rely on small solar, wind, and hydro projects, and are quite common and successful in countries like Denmark and the Netherlands.

The development of RES in Bulgaria cannot be discussed, nor achieved, without the concurrent **development and modernization of the electrical grid, and by extension, the gas system.** Adequate investments and notable improvements of the national grid system are required in order to overcome the difficulties of large-scale introduction of renewable energy sources and improvements in the energy balance structure. Currently, incentives for investing in the grid for upgrading it to the needs of more flexible RES are lacking. The *Law on Energy from Renewable Sources* has introduced some incentives in this direction but implementing them would require further efforts:

- The issues relating to the flexibility of electricity generating capacities and the sustainability of the power system need to be prioritized. The current inability to connect all renewable energy producers to the grid is indicative of the grid's lack of sustainability and inability to maintain security and service quality in the face of interruptions. **Grid management has not been adequately analyzed** in the light of stronger RES development. Instead, it seems that limitations are imposed on the total installed RES capacity, while nuclear power, which is inflexible and cannot adjust to fluctuations in demand, is favored. In light of recent RES developments and the obligation of the national operator with respect to the prioritization of connecting renewable energy producers to the grid, it is recommended that improvements to the transmission and distribution network should occur simultaneously with the development of electricity production from RES;
- Criteria and procedures for selecting which producers of renewable energy are added to the grid should be transparent and a subject to public scrutiny;
- The **costs for increasing the use of energy from RES** should be spread between producers, consumers, and the state, and should not exclusively be burdening either of the parties;
- A **scheme for green certificates** trading should be introduced as soon as possible to stimulate the production of energy from RES form all energy producers;

- Balance should be sought between guaranteeing the investments of renewable energy producers and reducing the burden on the National Electric Company (NEC) from long-term purchase price agreements.

The debate about **increasing the share of RES in Bulgaria's energy mix needs to be clearly embedded into ongoing discussions about the energy security** of the country. As noted above, Bulgaria is poor in energy resources and imports 70% of the resources for its gross energy consumption (including 100% of oil, gas, and nuclear fuel) from a single country. Exports of electricity from Bulgaria to other countries are less than 4% of the gross energy consumption in the country. The latter, and the fact that the country is largely dependent on imports of energy resources, debunks the popularly used myth in nuclear energy debates among Bulgarian politicians that Bulgaria could become an energy hub on the Balkans if only it created enough generation capacity. A more logical and obvious step for Bulgaria would be to discontinue the extensive development of generating capacities with government guarantees (which, among others, carries a substantial investor risk for the country), and to focus instead on sustainable production of energy to meet internal demand.

Finally, the question about **the compatibility of the national energy system with the European energy system** and strategy needs to be taken into consideration in the context of a liberalized market for electricity and natural gas. In light of international market uncertainties, Bulgaria needs to develop and choose activities profitable for all scenarios (a win-win strategy), focusing its resources on substantial improvements in energy efficiency, the development of selected (prioritized) RES, the modernization of existing capacity, and the upgrading of its national electricity and gas systems. Joint projects and statistical transfers between Bulgaria and other Member States, which provide flexibility and ease reaching individual EU targets, should also be carefully considered.

ENERGY EFFICIENCY

There is one clear overriding priority for Bulgaria's energy strategy and that is the need to stimulate energy efficiency, in particular in the household sector and with the help of EU funds. For example, committing to energy efficiency the same amount of financial resources and only a fraction of the political and social attention which Bulgaria has spent on developing a second nuclear power plant, would result in saving the energy produced from such a plant. Moreover, it would provide revenues to the ailing construction sector throughout the country, creating sustainable job opportunities in Bulgarian SMEs. In comparison, constructing a new nuclear power plant would involve primarily larger construction companies, which would be selected by the foreign contractor in charge of the project. In addition, in contrast to introducing technologies that produce energy from RES, which require significant investments and new business skills, **energy savings can be achieved utilizing the existing capacity already created from pilot measures:**

- The differentiation between energy savings and energy efficiency (as one element of energy conservation) needs to be emphasized. The former includes a

number of options, some of which require the propagation of certain behavioral changes;

- Improving energy efficiency should apply to and be considered for all processes and systems of production, transformation, conversion, transmission, and distribution of energy. This would aid the process of integrated energy planning;
- Energy efficiency measures and the use of RES should be applied to heating and cooling;
- **Energy efficiency efforts should be decentralized.** Municipalities and communities should lead by example (e.g., via executing energy saving and efficiency measures, such as installing energy saving lighting, insulation, etc., in community buildings);
- There needs to be a focus on **stimulating and enabling changes in consumer behavior and lifestyles.** In this context, it is necessary that the gains from energy savings, efficiency, and the use of RES should be publicized and, consequently, internalized, rather than perceived as imposed by the EU;
- **Expanding gasification** should be considered as an alternative in improving the energy efficiency of the country. Currently, the meager share of Bulgarian households that have access to natural gas is a major shortcoming of the energy mix and a factor for the low energy efficiency of the country. Only 1.5% of Bulgarian households have access to natural gas, while the average for Europe is 55%. Meanwhile, a significant portion of households' electricity consumption is spent on heating and household needs, while it is estimated that the energy efficiency of electricity for these purposes is much less that of gas, taking into account that efficiency in the whole value added chain of production, transmission, distribution, and use of electricity is around 24-26%. Therefore, Bulgaria should focus on accelerating the development of its gas distribution network;
- Better bank loan conditions and incentives for improving the efficiency of building and insulation should be created;
- More public funds, including EU money, should be redirected to priority efficiency projects, such as state and municipal buildings (hospitals, schools, kindergartens, libraries, social facilities, administrative buildings, etc.);
- The focus of intended energy efficiency measures should be shifted from primarily targeting final consumption to measures that incorporate the processes of production, conversion, transformation, etc. that primary energy sources undergo;
- In the **long run, governmental, scientific, and business support should be broadened for the implementation of innovative energy efficient industrial technologies,** which should contribute to more sustainable methods of production and give a competitive edge to Bulgarian enterprises in the new context of low-carbon development;
- While a number of energy efficiency measures have already been established and are operational, the government's task now is to precisely assess the impact of these programs in the country. Such an assessment should be the basis for future energy planning in Bulgaria;
- **"Smart" energy management systems** should be introduced at the macro and micro levels, as well as energy audits and control mechanisms to reduce wasteful energy spending.

CLIMATE CHANGE AND SUSTAINABILITY

Bulgaria has harmonized its legislation with the EU's "Climate – Energy" package, and has set up an institutional framework to implement climate change policies. In addition, the development of a national legal framework on climate change has already been launched under the auspices of the Bulgarian Ministry of Environment and Water. However, **Bulgaria is lagging behind in the development of a national sustainable development strategy.** The adoption of a sustainable development strategy would provide the broader framework for the overall economic development (including in the energy sector) of the country. Moreover, a clear vision for the country's development would provide a foundation and steer progress towards achieving national goals (e.g., Bulgaria's energy security) that will not change with changes in government. For example, such a strategy would provide impetus for **diversifying the country's imports of energy resources** by prioritizing the construction of gas interconnectors and key projects like NABUCCO. A sustainable development strategy should also be the lens through which to examine questions regarding the energy mix of the country by developing different scenarios and picking the one that would ultimately provide the greatest energy security.

However, **Bulgaria lacks the capacity and the vision for developing a comprehensive national policy on climate change and sustainable development.** Bulgaria's 2005 – 2009 coalition government failed to replace the long expired national plan for CO_2 emissions from 2008, while the current government has further delayed its adoption. In the context of financial difficulties amidst the financial and economic crisis, Bulgaria has missed various opportunities to provide financing for its green policies through banking of emissions surpluses and finding the best deals on international and regional emissions trading markets. Intentions to use revenue generated from emissions trading for developing renewable energy sources and implementing energy efficiency measures have not delivered tangible results yet. Last but not least, in spite of its aspirations for more pro-active global participation, the Bulgarian government has never thoroughly explored alternative methods of international contribution to developing countries to aid their adaptation to climate change, such as the transfer of technologies, know-how, or financial revenues from emissions trading.

Against this background, **there is already a long list of good practices of effective climate change policy implementation instruments in fellow Member States,** which demonstrate the original approaches and alternative methods for implementing climate change mitigation measures employed in these countries. Bulgaria should learn from these good practices and, if necessary, modify them in a manner that best fits the local socio-economic and environmental conditions. It should use the existing EU partnership and funding mechanisms at the national, regional and local level.

TABLE 8. BEST PRACTICES IN EFFECTIVE CLIMATE CHANGE POLICIES

Member State	Good Practice
Austria	Forestry policies in accordance with climate protection
Belgium	Tax rebates for investments in energy efficiency
Cyprus	Obligation to use solar-thermal power for heating in buildings; high coverage already achieved
Czech Republic	Support for retrofitting of buildings coupled with building standards
Denmark	Leader in grid integration of renewable energy sources, highest combined heat and power (CHP) share in EU
Estonia	Consistent land use strategy implemented
Finland	Large CHP share in industry and building sector
France	Bonus system for cars encouraging lower emissions
Germany	Well-functioning feed-in tariff for electricity from renewable sources
Ireland	Ambitious agricultural and forestry policies
Italy	Well functioning feed-in tariff for photovoltaics
Latvia	Ambitious forestry policies: all state forests are FSC certified
Lithuania	Ambitious CHP goal in place
Luxembourg	Early feed-in tariff for renewable electricity
Malta	High financial support for solar water heaters
Netherlands	Target to have 5% electric cars running by 2020
Portugal	Ambitious feed-in system for RE power generation; target to reach 45% by 2020
Slovenia	Spatial Development Strategy with several aspects of sustainable transport which enables integrated planning
Spain	Obligation to use solar thermal energy (30-70% of warm water demand)
Sweden	Long-term experience with a general CO_2 tax
UK	Comprehensive Climate Change Act with long-term binding emissions reduction targets and independent oversight and reviews

Source: Climate Policy Tracker, WWF Report 2010.

ANNEX I. TOTAL CARBON DIOXIDE EMISSIONS FROM THE CONSUMPTION OF ENERGY

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
	World	**30,493.23**	30,398.42	4.49	**-0.3**
	Asia & Oceania	**12,338.41**	13,264.09	3.53	**7.5**
1	China	6,803.92	7,710.50	5.83	13.3
	North America	**6,885.07**	6,410.54	14.19	**-6.9**
2	United States	5,833.13	5,424.53	17.67	-7.0
	Europe	**4,628.98**	4,310.30	7.14	**-6.9**
	Eurasia	**2,595.86**	2,358.03	8.32	**-9.2**
	Middle East	**1,658.55**	1,714.09	8.22	**3.3**
3	India	1,473.73	1,602.12	1.38	8.7
4	Russia	1,698.38	1,572.07	11.23	-7.4
	Central & South America	**1,228.65**	1,219.78	2.57	**0.7**
	Africa	**1,157.71**	1,121.59	1.13	**-3.1**
5	Japan	1,215.48	1,097.96	8.64	-9.7
6	Germany	823.07	765.56	9.30	-7.0
7	Canada	598.46	540.97	16.15	-9.6
8	Korea, South	521.77	528.13	10.89	1.2
9	Iran	510.61	527.18	6.94	3.2
10	United Kingdom	563.88	519.94	8.35	-7.8
11	Saudi Arabia	455.62	470.00	18.56	3.2
12	South Africa	482.88	450.44	9.18	-6.7
13	Mexico	452.05	443.61	3.99	-1.9
14	Brazil	421.60	420.16	2.11	-0.3
15	Australia	425.34	417.68	19.64	-1.8
16	Indonesia	403.74	413.29	1.72	2.4
17	Italy	449.75	407.87	7.01	-9.3
18	France	428.54	396.65	6.30	-7.4
19	Spain	360.13	329.86	7.13	-8.4
20	Taiwan	301.94	290.88	12.66	-3.7
21	Poland	294.78	285.79	7.43	-3.0
22	Ukraine	355.48	255.07	5.58	-28.2

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
23	Thailand	253.55	253.38	3.80	-0.1
24	Turkey	272.90	253.06	3.29	-7.3
25	Netherlands	249.50	248.91	14.89	-0.2
26	United Arab Emirates	195.85	193.43	40.31	-1.2
27	Egypt	185.85	192.38	2.44	3.5
28	Kazakhstan	168.48	185.06	12.02	9.8
29	Argentina	172.47	166.92	4.08	-3.2
30	Venezuela	164.31	161.96	6.04	-1.4
31	Singapore	161.23	161.12	34.59	-0.1
32	Malaysia	148.30	148.01	5.32	-0.2
33	Pakistan	139.71	140.29	0.77	0.4
34	Belgium	154.76	137.36	13.19	-11.2
35	Uzbekistan	127.10	115.16	4.17	-9.4
36	Algeria	107.28	113.92	3.33	6.2
37	Iraq	100.00	103.70	3.58	3.7
38	Greece	106.04	100.37	9.35	-5.3
39	Vietnam	103.86	98.76	1.12	-4.9
40	Czech Republic	99.10	95.32	9.33	-3.8
41	Hong Kong	77.92	85.98	12.19	10.3
42	Kuwait	79.83	84.87	31.52	6.3
43	Romania	96.56	80.52	3.66	-16.6
44	Korea, North	69.57	79.55	3.51	14.3
45	Nigeria	100.16	77.75	0.52	-22.4
46	Philippines	74.57	72.39	0.74	-2.9
47	Israel	67.26	70.48	9.74	4.8
48	Colombia	64.99	70.15	1.61	7.9
49	Austria	71.01	69.24	8.43	-2.5
50	Qatar	63.45	66.52	79.82	4.8
51	Chile	68.30	65.70	3.96	-3.81
52	Belarus	66.93	60.57	6.28	-9.5
53	Syria	53.60	56.88	2.61	6.1
54	Turkmenistan	57.48	56.78	11.62	-1.2
55	Portugal	55.74	56.55	5.28	1.5
56	Bangladesh	50.39	55.13	0.36	9.4

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
57	Libya	57.24	55.03	8.70	-3.9
58	Serbia	54.08	52.33	5.70	-3.2
59	Finland	54.86	52.15	9.93	-4.9
60	Sweden	54.77	50.56	5.58	-7.7
61	Hungary	56.05	50.03	5.00	-10.7
62	Denmark	54.22	49.56	9.01	-8.6
63	Oman	44.56	48.96	16.83	9.9
64	Trinidad and Tobago	49.89	47.82	38.88	-4.1
65	Switzerland	45.34	45.81	6.00	1.0
66	**Bulgaria**	**50.46**	**44.46**	**6.17**	**-11.9**
67	Ireland	45.37	40.27	8.79	-11.2
68	Norway	39.69	39.58	8.49	-0.3
69	New Zealand	39.51	39.07	9.28	-1.1
70	Peru	36.71	38.19	1.29	4.0
71	Morocco	37.30	36.49	1.17	-2.2
72	Azerbaijan	39.69	36.16	4.39	-8.9
73	Slovakia	37.42	35.75	6.54	-4.5
74	Puerto Rico	34.37	33.26	8.38	-3.2
75	Bahrain	30.63	31.10	42.68	1.6
76	Cuba	29.01	30.37	2.65	4.7
77	Ecuador	28.24	28.71	1.97	1.7
78	Angola	23.57	24.00	1.88	1.8
79	Yemen	20.19	22.92	1.00	13.5
80	Tunisia	21.67	22.90	2.18	5.7
81	Croatia	22.60	21.54	4.80	-4.7
82	Jordan	19.54	20.02	3.19	2.4
83	Dominican Republic	19.45	19.86	2.05	2.1
84	Bosnia and Herzegovina	21.81	18.35	3.98	-15.9
85	Estonia	19.83	17.49	13.46	-11.8
86	Slovenia	17.28	17.37	8.66	0.5
87	Lithuania	18.07	15.75	4.43	-12.8
88	Panama	15.20	15.46	4.60	1.7
89	Lebanon	14.32	14.84	3.62	3.6
90	Bolivia	14.27	13.89	1.42	-2.7

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
91	Sudan	12.19	13.04	0.30	7.0
92	Sri Lanka	12.54	12.76	0.60	1.7
93	Burma	13.87	12.54	0.24	-9.5
94	Virgin Islands, U.S.	12.93	12.49	113.71	-3.5
95	Jamaica	12.70	12.11	4.29	-4.6
96	Netherlands Antilles	12.13	11.64	51.26	-4.1
97	Kenya	11.23	11.50	0.29	2.4
98	Guatemala	11.46	11.30	0.85	-1.4
99	Armenia	11.06	11.23	3.79	1.5
100	Zimbabwe	8.95	10.61	0.93	18.6
101	Luxembourg	11.92	10.58	21.51	-11.2
102	Cyprus	9.77	9.42	8.68	-3.5
103	Latvia	7.89	8.53	3.82	8.1
104	Ghana	7.40	8.11	0.34	9.6
105	Honduras	8.13	7.94	1.01	-2.4
106	Brunei	10.40	7.58	19.53	-27.1
107	Cameroon	7.63	7.48	0.40	-1.9
108	Mongolia	7.65	7.36	2.42	-3.8
109	Macedonia	9.18	7.34	3.55	-20.1
110	Uruguay	8.06	7.24	2.07	-10.2
111	Moldova	7.36	7.05	1.63	-4.1
112	Ethiopia	6.42	6.88	0.08	7.1
113	Costa Rica	7.14	6.83	1.53	-4.4
114	Tanzania	6.25	6.69	0.16	7.1
115	Cote dIvoire (IvoryCoast)	6.49	6.63	0.32	2.2
116	Congo	6.09	6.32	1.57	3.8
117	Senegal	6.14	6.25	0.52	1.8
118	Tajikistan	6.84	6.13	0.83	-10.4
119	El Salvador	5.91	5.91	0.98	0.0
120	Kyrgyzstan	5.67	5.65	1.04	-0.4
121	Georgia	5.60	5.32	1.15	-4.9
122	Bahamas	5.09	5.25	NA	3.1
123	Papua New Guinea	4.50	4.81	0.81	6.7
124	Albania	4.45	4.62	1.55	3.8

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
125	Equatorial Guinea	4.71	4.61	7.28	-2.1
126	Gabon	4.72	4.57	3.02	-3.2
127	Mauritius	4.60	4.55	3.55	-1.0
128	Botswana	4.20	4.52	2.27	7.7
129	Nicaragua	4.60	4.47	0.76	-2.9
130	Gibraltar	4.55	4.38	151.96	-3.8
131	Namibia	3.92	4.06	1.93	3.7
132	Paraguay	3.83	3.97	0.63	3.7
133	Cambodia	4.11	3.86	0.27	-6.1
134	Benin	3.33	3.47	0.39	4.3
135	Nepal	3.31	3.44	0.12	3.8
136	Iceland	3.68	3.41	11.12	-7.4
137	Palestine	3.08	3.21	0.80	4.3
138	Madagascar	2.77	3.15	0.15	13.4
139	Malta	3.20	3.12	7.71	-2.5
140	New Caledonia	3.04	3.04	12.23	0.0
141	Togo	2.70	2.85	0.44	5.6
142	Reunion	2.82	2.82	3.68	0.0
143	Mauritania	2.61	2.75	0.88	5.3
144	Zambia	2.25	2.67	0.20	18.8
145	Congo, Dem Rep	2.72	2.65	0.04	-2.6
146	Martinique	2.46	2.61	6.13	6.3
147	Macau	2.41	2.44	4.36	1.3
148	Mozambique	2.24	2.35	0.11	4.6
149	Guadeloupe	2.30	2.18	4.91	-5.1
150	Haiti	2.00	2.06	0.21	2.9
151	Suriname	1.96	2.04	4.24	4.0
153	Fiji	2.06	1.93	2.22	-6.2
152	Uganda	1.99	1.93	0.06	-3.0
154	Montenegro	1.81	1.88	2.80	4.3
155	Djibouti	1.70	1.76	2.43	3.4
156	Guam	1.77	1.71	9.60	-3.5
157	Guyana	1.51	1.51	2.01	0.0
158	Burkina Faso	1.40	1.43	0.09	2.1

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
159	Seychelles	1.34	1.42	16.21	6.1
160	Barbados	1.44	1.39	4.87	-4.0
161	Swaziland	1.18	1.38	1.03	17.0
162	Niger	1.29	1.34	0.09	3.5
163	Guinea	1.35	1.33	0.13	-1.2
165	Malawi	1.26	1.31	0.09	4.6
164	Sierra Leone	1.24	1.31	0.26	5.9
166	Laos	1.23	1.24	0.20	1.1
167	Wake Island	1.28	1.23	NA	-4.3
168	French Guiana	1.06	1.12	5.87	6.1
169	Aruba	1.05	1.09	10.62	4.2
170	French Polynesia	0.99	1.07	3.73	7.7
171	Belize	0.99	0.94	3.06	-5.4
172	Maldives	0.89	0.92	2.31	3.4
173	Somalia	0.87	0.90	0.09	3.4
174	Afghanistan	0.85	0.83	0.03	-2.9
175	Faroe Islands	0.75	0.80	16.36	6.4
176	Eritrea	0.72	0.77	0.14	6.4
178	Rwanda	0.74	0.74	0.07	0.0
177	Mali	0.70	0.74	0.06	6.4
179	Bermuda	0.69	0.71	10.53	4.2
181	Antigua and Barbuda	0.66	0.69	8.04	4.4
180	Liberia	0.68	0.69	0.19	2.2
182	American Samoa	0.65	0.67	10.20	2.2
183	Timor-Leste (East Timor)	0.58	0.63	0.56	8.7
184	Greenland	0.64	0.61	10.62	-4.8
185	Guinea-Bissau	0.46	0.46	0.30	0.0
186	Gambia	0.38	0.44	0.25	15.4
187	Cayman Islands	0.49	0.43	8.86	-11.8
188	Saint Lucia	0.41	0.41	2.57	0.0
189	Burundi	0.35	0.37	0.04	4.0
190	Cape Verde	0.32	0.34	0.68	4.5
191	Bhutan	0.37	0.33	0.48	-11.1
192	Western Sahara	0.32	0.32	0.67	0.0

Rank 2009	Country or region	2008 mil tonnes	2009 TOTAL mil tonnes	2009, per capita, tonnes	% change 2008 to 2009
193	Antarctica	0.26	0.31		17.6
195	Grenada	0.28	0.30	2.78	4.8
194	Saint Kitts and Nevis	0.27	0.30	6.09	11.1
199	Chad	0.26	0.29	0.03	11.1
198	U.S. Pacific Islands	0.29	0.29	1.20	0.0
197	Solomon Islands	0.23	0.29	0.54	25.0
196	Central African Republic	0.34	0.29	0.06	-13.0
201	Saint Vincent/ Grenadines	0.23	0.27	2.53	17.6
200	Lesotho	0.26	0.27	0.14	5.9
202	Nauru	0.19	0.20	21.96	9.1
210	Montserrat	0.09	0.15	28.73	58.7
209	Samoa	0.18	0.15	0.77	-16.7
208	Virgin Islands, British	0.12	0.15	6.00	25.0
207	Vanuatu	0.12	0.15	0.68	25.0
206	Sao Tome and Principe	0.13	0.15	0.86	11.1
205	Comoros	0.12	0.15	0.20	25.0
204	Cook Islands	0.09	0.15	12.71	66.7
203	Tonga	0.20	0.15	1.28	-23.1
211	Dominica	0.13	0.14	1.93	11.1
212	Saint Pierre and Miquelon	0.09	0.11	17.78	16.7
213	Turks and Caicos Islands	0.08	0.08	3.37	0.0
214	Falkland Islands	0.05	0.05	14.57	0.0
215	Kiribati	0.04	0.04	0.45	0.0
217	Niue	0.01	0.01	2.59	2.9
216	Saint Helena	0.01	0.01	1.93	11.2

Source: International Energy Statistics, EIA, 2011.

ANNEX II. FEED-IN TARIFF RATES BY RES TYPE, BULGARIA, 2010

RES Type	Feed-in tariff rates for 2010 (BGN/MWh)	RES Type	Feed-in tariff rates for 2011 (BGN/MWh)
WPPs with up to 2,250 work hours and of 800 kW or more installed capacity	190.59	WPPs with up to 2,250 work hours and of 800 kW or more installed capacity	191.00
WPPs with over 2,250 work hours and of 800 kW or more installed capacity	174.44	WPPs with over 2,250 work hours and of 800 kW or more installed capacity	173.06
WPPs of less than 800 kW installed capacity and asynchronous cage rotor generator	148.79	WPPs of less than 800 kW installed capacity and asynchronous cage rotor generator	137.06
PVPPs of up to 5 kWp* installed capacity	792.89	PVPPs of up to 30 kWp installed capacity	576.50
PVPPs of over 5 kWp installed capacity	728.29	PVPPs of over 30 kWp installed capacity	567.41
PPs of up to 5 MW installed capacity using forestry waste. etc.	217.19	PPs of up to 5 MW installed capacity using forestry waste. etc.	255.51
PPs of up to 5 MW installed capacity using residues from agriculture	168.74	PPs of up to 5 MW installed capacity using residues from agriculture	195.03
PPs of up to 5 MW installed capacity using energy crops	188.69	PPs of up to 5 MW installed capacity using energy crops	185.99
PPs of up to 150 kW installed capacity indirectly using biomass from vegetable and animal substances	–	PPs of up to 150 kW installed capacity indirectly using biomass from vegetable and animal substances	432.81
PPs of 150 kW to 500 kW installed capacity indirectly using biomass from vegetable and animal substances	183.56	PPs of 150 kW to 1 MW installed capacity indirectly using biomass from vegetable and animal substances	405.61
PPs of 500 kW to 5 MW installed capacity indirectly using biomass from vegetable and animal substances	168.08	PPs of 1 MW to 5 MW installed capacity indirectly using biomass from vegetable and animal substances	335.19
PPs of up to 150 kW installed capacity indirectly using energy from municipal waste	272.29	PPs of up to 150 kW installed capacity indirectly using energy from municipal waste	263.83
PPs of 150 kW to 500 kW installed capacity indirectly using energy from municipal waste	261.84	PPs of 150 kW to 1 MW installed capacity indirectly using energy from municipal waste	253.03

RES Type	Feed-in tariff rates for 2010 (BGN/MWh)	RES Type	Feed-in tariff rates for 2011 (BGN/MWh)
PPs of 500 kW to 5 MW installed capacity indirectly using energy from municipal waste	251.39	PPs of 1 MW to 5 MW installed capacity indirectly using energy from municipal waste	243.86
PPs of up to 150 kW installed capacity indirectly using energy from municipal sewage sludge	150.69	PPs of up to 150 kW installed capacity indirectly using energy from municipal sewage sludge	158.05
PPs of 150 kW to 500 kW installed capacity indirectly using energy from municipal sewage sludge	136.44	PPs of 150 kW to 1 MW installed capacity indirectly using energy from municipal sewage sludge	132.05
PPs of 500 kW to 5 MW installed capacity indirectly using energy from municipal sewage sludge	119.34	PPs of 1 MW to 5 MW installed capacity indirectly using energy from municipal sewage sludge	119.27
HPPs of less than 10 MW installed capacity	110.79	HPPs of less than 10 MW installed capacity using pumps	112.10

Note: * *kWp – kilowatts-peak.*

As of June 2011, new preferential prices have been introduced for power plants 1 MW to 5 MW indirectly using biomass from vegetable and animal substances, and for various types of PVs installed on rooftops.

Source: *SEWRC.*

ANNEX III. FINANCIAL SUPPORT SCHEMES AND CREDIT LINES FOR RES

Financial Incentives for RES

The development of RES in Bulgaria is encouraged and supported via a number of financial and fiscal incentives:

1. Government guaranteed feed-in tariffs and fixed-term contracts

The main support scheme aiming to encourage the production of energy from renewable sources are the feed-in tariffs stipulated in the *Law on Renewable Sources of Energy,* which apply to renewables producers, excluding hydropower plants with installed capacity of over 10 MW and biomass-fired power plants exceeding 5 MW in capacity. The State Energy and Water Regulatory Commission determines feed-in tariff rates (BGN/MWh) annually based on a review of technological developments and certain technical parameters.

In addition to the preferential feed-in-tariffs, the law foresees long periods of mandatory purchase of energy from RES from grid operators: twenty years for solar, geothermal and biomass, and twelve years for other RES such as hydro and wind. The preferential tariffs in Bulgaria are set at levels comparable to those in Western countries and should therefore be sufficient to promote renewables (the most current information on feed-in tariffs in the country is presented in Appendix II).

Furthermore, the *Excise Duties and Tax Warehouses Act* regulates financial incentives encouraging the use of biofuels specifically (e.g., reduced or zero excise duty rates for some biofuels).

2. Green Certificates Trading

The *Ordinance on Issuance of Green Certificates and Trading* should introduce a common system after 2012 allowing RES producers to trade green certificates with conventional energy generators. The regulation will determine the minimum mandatory quotas of renewable electricity that public providers must supply as a percentage of their total annual electricity production.

3. Revenues from Carbon Reductions

As per the revised ETS Directive in 2009,[98] the CO_2 emission allowances allocated to electricity generators will not be free of charge from 2013 onwards. Instead, allowances will need to be purchased at auctions, and the generated revenues would go directly to Member States, which could decide on how to spend them. However, the Directive stipulates that Member States should dedicate at least 50% of the generated revenues to specific activities, such as RES promotion,

[98] Revised EU Emission Trading Directive (Directive 2009/29EC).

"environmentally safe capture and geological storage of CO_2" (CCS), energy efficiency, and remedying the social impact of climate change. Member States are only required to inform the Commission about the disbursement of revenues from allowances and the type of actions undertaken.[99]

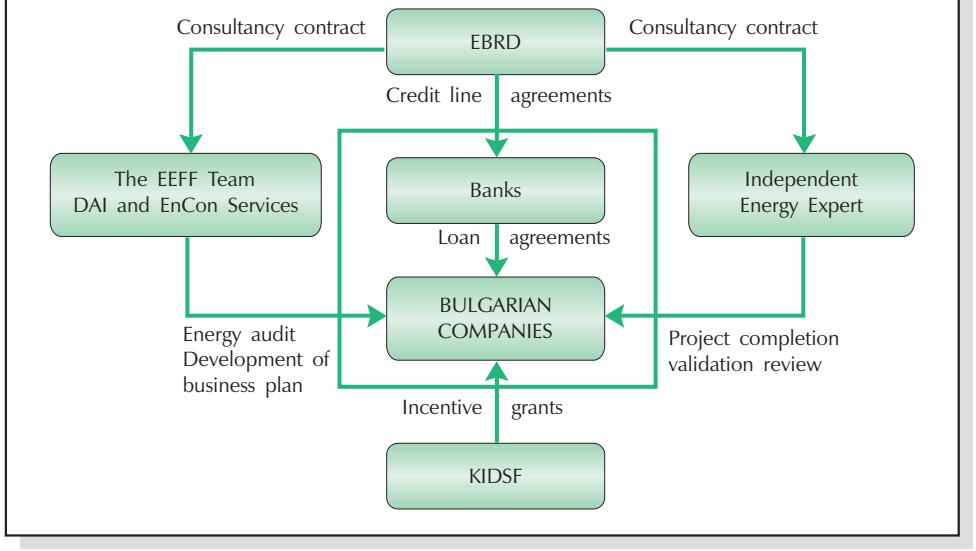
4. Financial Support Schemes and Credit Lines

The *National Renewable Energy Action Plan* presents the financial instruments utilized in promoting the production and consumption of energy from RES in Bulgaria:

- The Bulgarian Energy Efficiency and Renewable Energy Credit Line subsidize RES-E production. The credit line is part of the Kozloduy International Decommissioning Support Fund (EUR 10 million), which became operational in March 2004. The credit line provides funding to eligible Bulgarian banks for lending to local businesses that wish to invest in renewable energy and RES-related projects. The subsidy is provided via a 20% grant component of the bank loan.
- Investing in energy efficiency and renewable energy can be secured via the Energy Efficiency Fund, which offers free technical assistance and lower than the prevailing market interest rates on loans for projects related to energy efficiency improvements or the use of RES. Eligible projects have to have a total budget of BGN 30,000 to BGN 3 million and a payback period of up to five years.
- The European Investment Bank and the Kozloduy International Decommissioning Support Fund are financing the Energy Efficiency Facility (EEF), which aims to promote energy efficiency and support the use of renewable energy in Bulgaria. The Facility provides a combination of loans and grants, in addition to technical assistance, for the planning and implementation of projects. Eligible projects must have a budget of EUR 40,000 to EUR 25 million.
- The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) provides grants to private companies, in addition to offering free technical assistance. The Credit Line finances a wide range of private companies' energy efficiency and RES projects through grants for up to 15 % of the capital borrowed by the companies. The BEERECL is being financed through the European Bank for Reconstruction and Development (EBRD) and the Kozloduy International Decommissioning Support Fund. EBRD and the Kozloduy International Decommissioning Support Fund offer credit lines to banks in Bulgaria, which, in turn, offer loans to private holdings participating in energy efficiency and RES-related projects.
- The Enterprise for the Management of Environmental Protection Activities (EMEPA), a state-owned company, was established under the *Law on Environmental Protection* to provide funding for a wide range of environmental projects. In the field of renewable energy, EMEPA provides funding for the construction of small HPPs through interest-free loans for up to five years. These loans can comprise up to 70% of the total project costs and may not exceed BGN 1.5 million.

[99] UCL's Legal Resources, (http://www.ucl.ac.uk/cclp/ccsfinancing-europe-ETS.php).

FIGURE 26. STRUCTURE OF THE BULGARIAN ENERGY EFFICIENCY & RENEWABLE ENERGY CREDIT LINE



Source: http://www.beerecl.com/cms/?q=en/about_structure

Additional funding to stimulate the production of energy from renewable sources is also provided via EU Operational Programmes, the financial instruments by means of which EU funding is distributed in the country. The optimal use of local renewable energy potential was set as a priority of the National Strategic Reference Framework for 2007 – 2013 and support is provided under Operational Programs "Development of the Competitiveness of the Bulgarian Economy", "Regional Development", and the Rural Development Programme for 2007 – 2013.

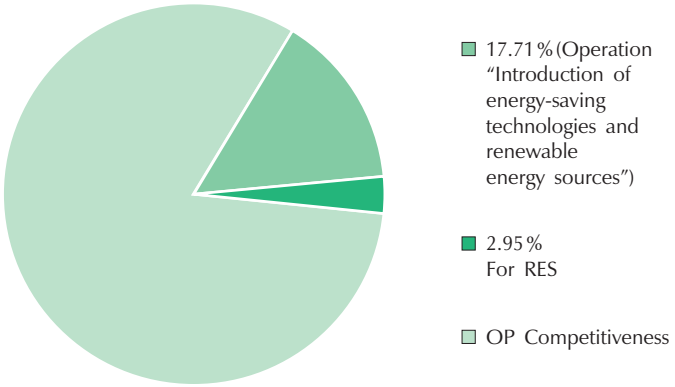
According to the *Unified Information System for Management and Monitoring of the Structural Instruments of the EU in Bulgaria (UMIS),* OP "Development of the Competitiveness of the Bulgarian Economy" (hereafter OP Competitiveness) has total funding of BGN 1.9 billion. OP Competitiveness foresees the spending of BGN 403 million on the "Introduction of energy saving technologies and renewable energy sources". Some 3% of the latter funds are set aside for encouraging the use of RES.[100]

OP Regional Development has total funding amounting to BGN 3.1 billion. BGN 83 million (or 6%) of the funds is earmarked for a sustainable development scheme entitled "Support for implementation of energy efficiency measures in municipal educational infrastructure in urban agglomerations".

In addition, OP Regional Development foresees that BGN 117 million will be spent on "Access to Sustainable and Efficient Energy Resources". The operation accounts for 4% of the total indicative funding of OP Regional Development.

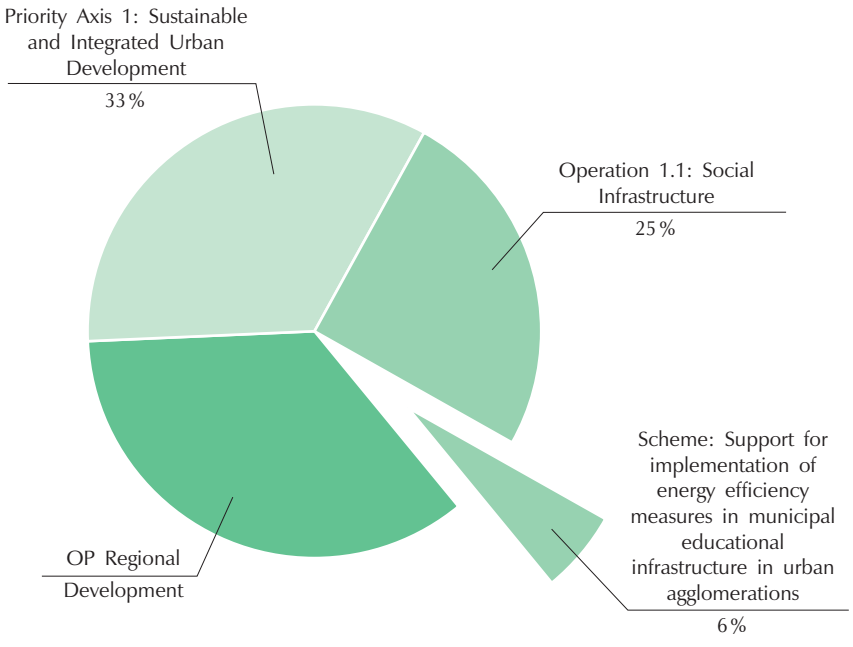
[100] Data used is from: http://umispublic.minfin.bg/ and http://www.eufunds.bg/bg/page/96

FIGURE 27. SHARE OF INDICATIVE FUNDING FOR RES FROM OP COMPETITIVENESS



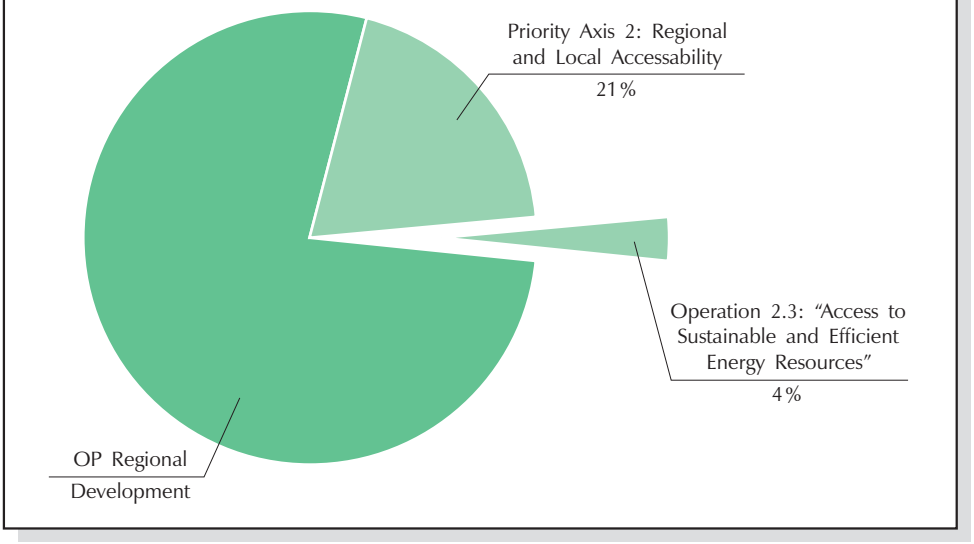
Source: CSD, 2011.

FIGURE 28. SHARE OF CONTRACTED FUNDING FOR THE SCHEME "SUPPORT FOR IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES IN MUNICIPAL EDUCATIONAL INFRASTRUCTURE IN URBAN AGGLOMERATIONS" FROM OP REGIONAL DEVELOPMENT



Source: CSD, 2011.

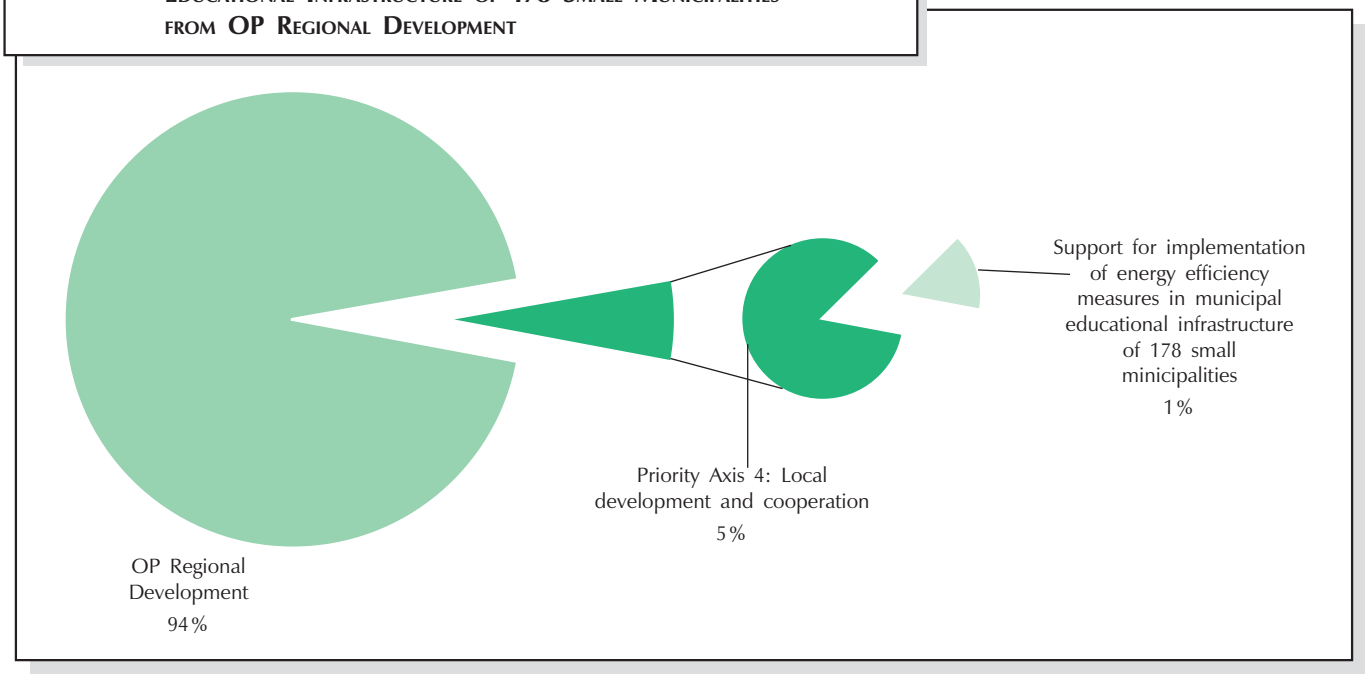
FIGURE 29. SHARE OF INDICATIVE BUDGET FOR OPERATION "ACCESS TO SUSTAINABLE AND EFFICIENT ENERGY RESOURCES" FROM OP REGIONAL DEVELOPMENT



Source: CSD, 2011.

Finally, OP Regional Development foresees BGN 27 million (or 1% of the whole OP budget) for a scheme to "Support the implementation of energy efficiency measures in municipal educational infrastructure of 178 small municipalities" (see the Figure below).

FIGURE 30. SHARE OF INDICATIVE FUNDING FOR THE SCHEME "SUPPORT FOR IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES IN MUNICIPAL EDUCATIONAL INFRASTRUCTURE OF 178 SMALL MUNICIPALITIES" FROM OP REGIONAL DEVELOPMENT



Source: CSD, 2011.

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