

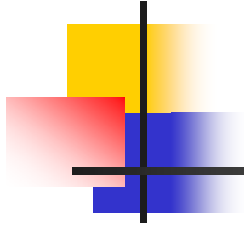
PV in Bulgaria: A young and promising development



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In the period of world economic crisis, continuous depletion of natural resources and increasing necessity of environment protection measures each country had to pay special attention on measures related with environment preservation by the use of *renewable energy sources*.



Why Renewable Energy Sources?

Obligations, following the Kyoto protocol

Necessity to explore new energy sources in order to replace old

ones, that are already very low



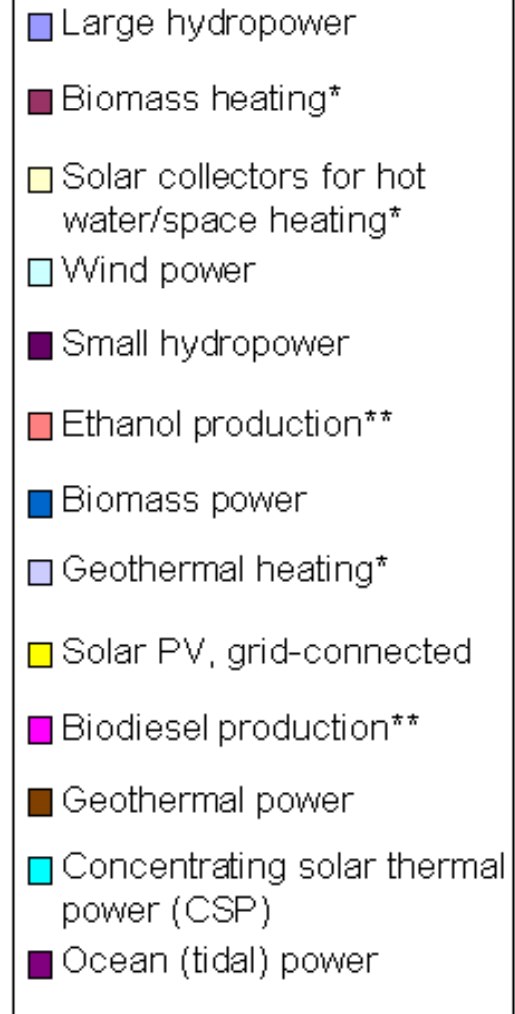
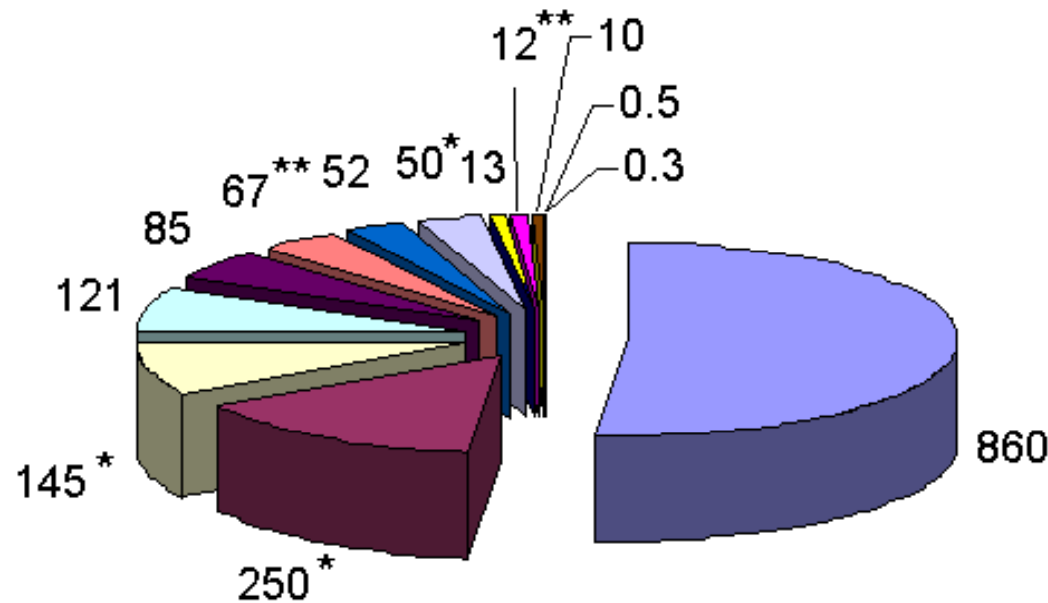
Renewable energy source is...

According Directive 2001/77/EC:

'renewable energy sources' shall mean renewable non-fossil
energy sources

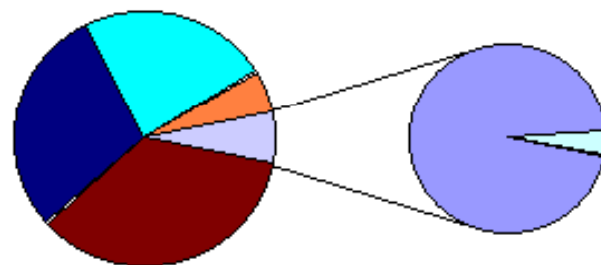
(wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases)

Renewable energy, end of 2008 (GW)

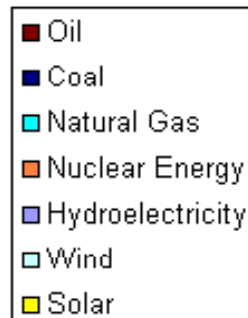


* GWth

** Billion liters/year



Total vs. Renewable



Electricity from Renewable Source Gross Electricity Consumption for 2006 (in %)

| | Total Share | Hydro | Wind | Biomass | Solar | Geothermal | 2010 OBJECTIVE |
|------|-------------|-------|------|---------|-------|------------|----------------|
| EU27 | 14,6 | 9,2 | 2,5 | 2,7 | 0,074 | 0,2 | 21,0 |
| EU25 | 14,3 | 8,8 | 2,5 | 2,8 | 0,076 | 0,2 | 21,0 |
| BG | 11,2 | 11,1 | 0,1 | | | | 11,0 |

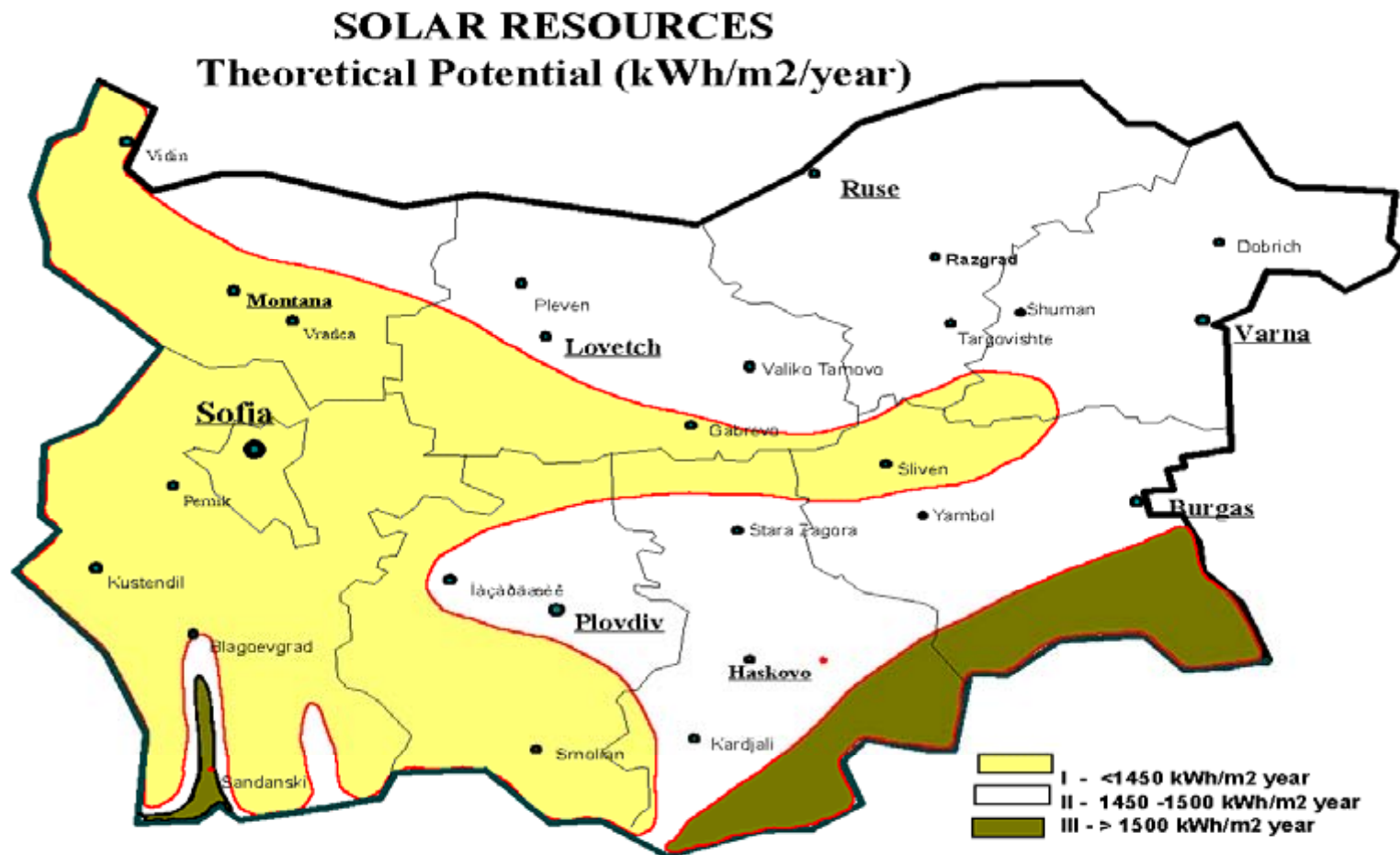
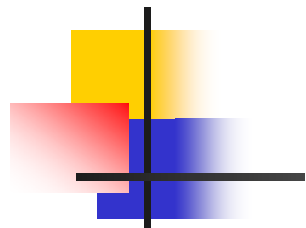
Source: Eurostat, December 2008 and Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market.



Installed capacities for the production of electricity from RES in Bulgaria

| RES type | Unit of measurement | 2005 | 2006 | 2007 |
|---------------------------|---------------------|-----------------|-----------------|-----------------|
| Hydropower plants | MW | 2 743.40 | 2 747.40 | 2 740.30 |
| Small hydropower plants | MW | 164.30 | 175.70 | 197.70 |
| Wind power plants | MW | 7.50 | 25.50 | 40.70 |
| Photovoltaic power plants | MW | 0.00 | 0.00 | 0.03 |
| Total | MW | 2 915.20 | 2 948.60 | 2 978.73 |

Solar potential in Bulgaria



Source: Energy Efficiency Agency, Bulgaria



National policy on the development of renewable sources of energy – regulatory documents

National Long-Term Programme to Encourage the Use of Biomass 2008 -2020

Energy Act

Energy Efficiency Act

Renewable and Alternative Energy Sources and Biofuels Act

National Long-Term Programme to Encourage the Use of Biofuels in the Transport Sector 2008-2020



National policy on the development of renewable sources of energy (2)

RENEWABLE AND ALTERNATIVE ENERGY SOURCES AND BIOFUELS ACT

Preferential prices of electricity generated from PV Renewable Energy Sources:

- 782 BGN/MWh (399.83 EUR/MWh) for electricity, produced by photovoltaic plants with power less than 5KWp;
- 718 BGN/MWh (367.11 EUR/MWh) for electricity, produced by photovoltaic plants with power more than 5KWp. (The prices do not include VAT.)

Mandatory purchase of energy produced by PV systems for 25 years



National policy on the development of renewable sources of energy (2)

The terms for the mandatory purchase shall start:

- After the renegotiations, but not later than 31 March 2009 – for all existing producers of electricity generated from renewable energy sources except for hydroelectric power plants with installed capacity which exceeds 10 MW.
- As from start of generation of the electricity, but not later than 31 December 2015 – for all new producers of electricity generated from renewable energy sources except for hydroelectric power plants with installed capacity which exceeds 10 MW.
- Not later than 31 December 2011, the Minister of Economy and Energy shall prepare and submit for approval by the Council of Ministers a bill on the market mechanisms for encouraging production of electricity and heating power from renewable energy sources, which may not necessarily be applicable to producers of energy from renewable energy sources



Investment process stages in Bulgaria

- Investment design;
- Permits and licenses;
- Building and installing;
- Building termination. Permission for exploitation;

Sources: Energy efficiency agency, Law of the spatial planning, Property Act



Investment design

1. **Investment project:** The investor determines and assigns the design phases and project parts for each individual phase depending on the type and specificity of site.
2. **Collection of the output data, documents and preparation of project terms of reference - allotment of site for the construction of installation:**
 - 2.1. **Clarifying the platform ownership,** intended for the site under the reinvestment research.



Investment design (2)

2.2. **Acquisition of property right or land usage for construction of installation:** The investor of the proposal submits to the competent body for making a decision report for Environmental Impact Assessment (EIA). The costs for EIA are at the expenses of the investor of the proposal. The investor of the proposal provides the needed information for accomplishment of EIA, as well as any other additional information connected with the investment proposal.

2.3. **Design visa:** Assigner or his authorized person may ask for a project visa. The visa is issued by the chief municipal architect within 14-day term after the entrance of the application.



Investment design (3)

3. Design terms of reference shall include:

- a) main technical, economic, technologic, functional and planning composition parameters to the site.
- b) main functional and composition parameters of site.

The output data and documents should be applied to the design terms of reference (design contract).

4. Design comprises:

- a) project idea
- b) technical project
- c) working project



Investment design (4)

Project idea is elaborated in conformity to the layout (visa) for the design and the terms of reference for design (the design agreement).

In case there is no terms of reference elaborated, the project idea is playing also the role of terms of reference for the next stage of the design.



Investment design (5)

The scope and contents of the **project idea** should be sufficient for its usage:

1. as a basis for the elaboration of the next design stage;
2. for the selection of architectural – special solution, construction – building solution, installation and technological solutions, safety systems, etc. when such are required in conformity to the terms of reference for design (the design agreement);
3. for the purposes of the coordination.



Investment design (6)

The **project idea** concerns the following parts (according Regulation № 4 for the scope and content of the investment projects):

- ✓ Architectural
- ✓ Constructive
- ✓ Installations and grids for the technical infrastructure
- ✓ Park-arrangement and urbanization
- ✓ Geodesic
- ✓ Technological



Investment design (7)

The **technical project** is worked out for the scope and content of the investment projects and contains the following parts:

- ✓ Architectural
- ✓ Constructive
- ✓ Electro technical
- ✓ Water supply and sewerage
- ✓ Heating. Thermal supply, ventilation and air conditioning
- ✓ Thermal technical efficiency
- ✓ Park arrangement and urbanization
- ✓ Geodesic
- ✓ Technological



Investment design (8)

The **working project** is worked out for the scope and content of the investment projects and related the following parts:

- ✓ Architectural
- ✓ Constructional
- ✓ Electro technical
- ✓ Water supply and sewages
- ✓ Thermal supply, heating, vent and air conditioning
- ✓ Thermal technical efficiency
- ✓ Park arrangement and urbanization
- ✓ Geodesic
- ✓ Technological



Permits and licenses

Step 1 - Written request for the study of conditions and way of connecting to the electrical grid:

To connect a new photovoltaic installation to the electric grid it is necessary the person, constructing the plant, to submit a written request for the study of conditions and the way of connecting. The study for connection is done after the issue of visa for design, in cases when the issue is obligatory.

For plants with installed power equal or less than 5 MW, the written application is submitted to the distribution company located near the place of the plant, while for plants with installed power more than 5 MW – to the regional sub-unit of the transmission unit located near the place of the plant. The study is financed under a pricelist of the services of the related transmission or distribution company.



Permits and licenses (2)

Step 2 - The transmission and related distribution company prepares and proposes preliminary agreement for connection to the electric plant of the person, who has applied a request for connection conditions study, within the term of up to 30 days for the distribution and up to 90 days for the transmission company, considered since the date of the submitted request for conditions study. The preliminary agreement for connecting is signed before the elaboration of the investment project.



Permits and licenses (3)

Step 3 - The permission for construction is issued by the chief expert of the municipality, while for the cities with regional divisions – after a decision of the municipal council – from the chief architect of the region.

The permission for construction is issued to the assigner on the basis of technical or working investment project approved.

The construction permission is issued in 7-days duration since the submission of the written application when there is an investment project approved.



Permits and licenses (4)

Step 4 - Agreement for connection to the electrical grid:

The agreement for connection is signed after the approval of the investment project and issue of a construction permission.

Submission of s written request for signing an agreement for connection.

The transmission or proper distribution company agrees the delivered parts of the working projects, prepares the agreement and sends a written invitation to the assigner for its conclusion in the duration of 60 days since the date of the application submission for conclusion an agreement for connection.

The transmission or the respective distribution company, after the connection agreement conclusion, elaborates and coordinates the building connection equipment working plans at own expenses.

Any consumer pays to the transmission or the respective distribution company a connection price for the power plant connection to the electrical grid.



Permits and licenses (5)

Step 5 - Commission Licenses:

For generation of electric and/or heat energy by photovoltaic installations with total installed electrical capacity over 5 MW (except of cases where the heat energy is generated for own purposes only), the respective producer is to hold license.

The license issuing procedure is open by written statement to The State Energy and Water Regulatory Commission .

Licenses are issued for a term not exceeding 35 years (the energy facility construction period not included) in accordance with the respective license activity assets timing resource and after the applicant financial condition.



Building and installing

- ✓ Contracts between construction process participants.
- ✓ Building site opening and building line and level determining.
- ✓ Construction designing and building Insurance.



Building termination. Permission for exploitation

- ✓ **Working plans.**
- ✓ **Installations suitability establishment.**
- ✓ **Connection to the electrical grid:** The equipment connection to the electrical grid is implemented by stages, according to Ordinance 6 of 9.06.2004.
- ✓ **Bringing into operation:** Within 7-day period from the demand application, the Administration issued the building permit, registers the construction bringing into operation and delivers the respective certificate after reviewing the sufficiently supplied construction documentation.



Education in the fields of PV systems in Bulgaria

Universities teaching engineers in the field of Electrical Power including PV systems are:

- Technical University – Sofia
- Ruse University
- Technical University – Varna
- Technical University – Gabrovo
- University of Mining and Geology – Sofia
- Higher School of Transport – Sofia

In every town, center of region, (In Bulgaria they are 28) there is professional secondary school training up crafts-men.



Competitors on the Bulgarian market

- Most of the PV companies on the Bulgarian market offer design, delivery and mounting of photovoltaic systems. Some of the local competitors are: Elprom Energy, IVATERM, NES – New Energy Systems, STS Solar, SOLAR BG, ESD Bulgaria, SIM INVEST, ERATO etc.
- Some of the implemented PV projects are:
- PV pilot project No.1 - village of Topolitsa, Aitos municipality (Installed capacity: 4,8 kWp);
- PV pilot project No.2 - village of Topolitsa, Aitos municipality (Installed capacity: 400 kWp);
- Company owned PV project - village of Topolitsa, Aitos municipality (Planned nominal capacity: 4000 kWp);

Photovoltaic project - village of Ivanovo, Rousse region (26 kWp)





Financial support mechanisms

- ✓ Operational Programme "Development of the Competitiveness of the Bulgarian Economy"
- ✓ Operational Programme "Regional Development" 2007-2013
- ✓ Rural Development Programme (2007-2013)
- ✓ Bulgarian Energy Efficiency Fund (BEEF)
- ✓ Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL)
- ✓ Residential Energy Efficiency Credit Line (REECL)



Operational Programme

“Development of the Competitiveness of the Bulgarian Economy”

This is the main programme document of the implementation of the policy of economic and social cohesion and the improvement of competitiveness of the Bulgarian economy. OP Competitiveness is based on five thematic priority axes for the 2007-2013 programming period. Priority Axis 2 “Increasing efficiency of enterprises and promoting a supportive business environment” is focused on the support of micro-, small and medium-sized enterprises with a development potential, where the modernization of technologies and quality management will be assisted, as well as the improvement of the consultancy and information services offered to business, improving energy efficiency of enterprises and encouraging business co-operation and networking.



Operational Programme

“Development of the Competitiveness of the Bulgarian Economy”

Under the Priority Axis 2 Group of Actions 3 includes:

Introduction of energy-saving technologies and renewable energy sources. The indicative actions envisaged under this area are introducing energy-saving technologies in enterprises and introduction of renewable energy resources satisfying the needs of the enterprise. The budget of the Priority Axis 2 is 60% of the total OP budget.



Operational Programme “Regional Development” 2007-2013

Based on five thematic priority axes for the programming period. Priority Axis 2 “Regional and Local Accessibility”, Operation 2.3. is “Access to sustainable and efficient energy resources”.

The specific objective is: To provide certain areas with access to sustainable and efficient energy resources promoting energy efficiency in service of better investment attractiveness, regional competitiveness and better quality of life.



Rural Development Programme (2007-2013)

Measures 121, 123, 311, 312 and 321 support also the utilization of renewable natural resources and the improvement of the effectiveness of used resources, leading to a reduction in fossil fuel consumption.



Rural Development Programme (2007-2013)

Measure 121

Will support projects that lead to improvement of the overall performance of the agricultural holdings through Increasing implementation of renewable natural resources and improving the effectiveness of used resources.

Type of eligible investments (tangible-intangible) is purchasing and/or installing of new machinery and equipment/instruments for improvement of agricultural production process, including for: processing of electricity and/or heating using bio-mass to meet the needs of the holding for its agricultural activities; improving energy efficiency.



Rural Development Programme (2007-2013)

Measure 123

Support will be provided for investments for production of energy from renewable energy sources are eligible if they concern the energy needs of the manufacturing enterprise, and/or the production of energy for sale through processing of plant and animal products from primary and secondary biomass.

All projects for bio-energy production for sale should include feasibility studies.



Rural Development Programme (2007-2013)

Measure 311

The indicative list of areas of diversification includes production and sale of renewable energy:

- solar, wind, water, geothermal energy, etc. except bio-fuel production;
- bio-energy in case of processing of raw materials coming from the own agricultural holding.

The capacity of the installations under this measure should not exceed 1 MW.

Aid intensity

- 70% of the total eligible expenditure, subject to the limits and conditions imposed by the de minimis rules.



Rural Development Programme (2007-2013)

Measure 312

Support will be given to investments and related external marketing and management services to develop business activity in non-agricultural sectors such as renewable energy production:

- production of bio-energy to meet the micro-enterprises own energy needs;
- production of bio-energy for sale in case of processing products (raw materials) not covered by Annex I to the Treaty;
- production of energy for sale from renewable energy sources (solar, wind, water, geothermal energy, etc.).

The capacity of the installations under this measure should not exceed 1 MW.



Bulgarian Energy Efficiency Fund (BEEF)

Established through the Energy Efficiency Act adopted by the Bulgarian Parliament in February 2004.

BEEF has the combined capacity of a lending institution, a credit guarantee facility and a consulting company. The underlying principle of BEEF's operations is a public-private partnership. The Fund pursues an agenda fully supported by the Government of Bulgaria, but it is structured as an independent legal entity, separate from any governmental, municipal and private agency or institution. The BEEF provides three main categories of financial products: loans, Partial Credit Guarantees, Portfolio Guarantees and Co-financing.



Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL)

Developed by the European Bank for Reconstruction and Development (EBRD) in 2004 in close co-operation with the Bulgarian Government and the European Union.

The facility extends loans to participating banks for on-lending to private sector companies for industrial energy efficiency and small renewable projects. The Bulgarian banks participating in the BEERECL include: Bulgarian Postbank, DSK Bank, Raiffeisen Bank, UniCredit Bulbank, Unionbank, United Bulgarian Bank, Piraeus Bank.



Residential Energy Efficiency Credit Line (REECL)

Provides loans for financing of energy saving measures in households.



Useful links:

InvestBulgaria Agency

www.investbg.government.bg

Ministry of Economy and Energy

www.mee.government.bg

Ministry of Environment and Water

www.moew.government.bg



Useful links:

Energy Efficiency Agency

www.seea.government.bg

State Energy and Water Regulatory Commission

www.dker.bg

Structural Funds in Bulgaria

www.eufunds.bg

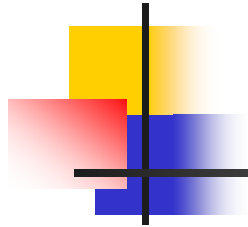


Useful links:

University of Ruse

- ✓ Faculty of Electrical and Electronic Engineering
- ✓ Faculty of Business and Management

www.ru.acad.bg



Thank you for attention!