

## **AREP**

*(Assessment of Renewable Energy Potential)*

The model is developed for assessment of RES potential and implementation of the Renewable Energy Technologies (RET) on local and national level. This is the bottom up model with a wide scope of work. The model covers all main tasks concerning energy assessments (from energy structure defining and RES potential assessments, through energy demand and energy market assessments, to emission reductions and cost price or RE assessments). The model allows forecasts and scenarios to be done for three years ahead.

AREP is a user friendly model, developed to be used by non-experts in this field. The input data are simple and easy to find by the user. The final results are very accurate and can be used as a database, necessary for development of the Investment projects.

With AREP the user is able to compare different RET with the conventional technologies. The model gives information about what will be the end price of the renewable energy (heat and electricity), concerning the energy sources and technologies and to compare this price with the price of the conventional energy.

Final results of the model are accurate enough to be used as a base and respectively to take decision, which RES to select and what RET will be much more efficient.

The model consists of five main categories:

1. Assessment of RES potential (theoretical and technical)
  - a. Solar Thermal Energy (passive and active energy)
  - b. Geothermal energy
  - c. Hydro energy
  - d. Wind energy
  - e. Biomass energy (solid agricultural waste and standing wood)
  - f. Biogas energy
2. Economical Assessments of applicable RET (current heat energy price, on the market, by energy sources)
3. Technical assessment (renewable energy – heat and electricity: cost energy price, NPV, pay back period and etc.)
4. Market potential and market penetration assessment (hot water, heat energy and electricity: conventional and renewable)
5. Environmental Impact Assessment (EIA) – CO<sub>2</sub> emission reduction assessments

**\*\*\*Notes:**

- A) Three years forecasts are available to be done for each one of the categories.**
- B) Graphics and Table view of the results are available.**
- C) Comparative graphs and analysis are available.**

**Other:**

The model was successfully implemented in practice in 6 Bulgarian Municipalities.

This model has been translated in English.

Model can be used in all European countries.

Structure of the model allow additional modules to be added if it necessary.

*The model is available in English and Bulgarian.*

You can see some screen shoots of the model below:

Wind energy potential:

### Technical Energy Potential

Month	Name of the site:	$V_{ref}$ m/sec	$V$ m/sec	$P_r$ kW	$E_a$ MWh/month	$E_{a,r}$ MWh/month
1	January	1	2	2	5,4	10,7
2	February	2	4	4	9,7	19,4
3	March	3	6	6	16,1	32,1
4	April	45	89	25	64,8	129,6
5	May	6	12	12	32,1	64,3
6	June	8	16	16	41,5	82,9
7	July	77	152	25	67,0	133,9
8	August	16	32	25	67,0	133,9
9	September	20	40	25	64,8	129,6
10	October	25	49	25	67,0	133,9
11	November	46	91	25	64,8	129,6
12	December	300	593	25	67,0	133,9

Reference height ( $Z_{ref}$ )

Height ( $Z$ )

Roughness class: 4

Roughness length ( $Z_0$ )

Number of turbines

Area of the site ( $A$ )

Choose a turbine: wind1

Average annual

Total annual

### Wind Energy / Tables

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Site	$P_0$ W/m <sup>2</sup>	$A_0$ m <sup>2</sup>
	300	10000
	300	10000
	100	10000
	150	10000
	210	10000
Year for all points		50000

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Name of the site:	$V$ m/sec	$P_r$ W	Kavarna
Month			
	1		0
	2		0
	4		33,5
	55		850
	7		236,6
	10		669,7
	94		850
	19		850
	24		850
	30		810

### Utilization of wind energy pote

### Energy potential

### Selection of wind turbines

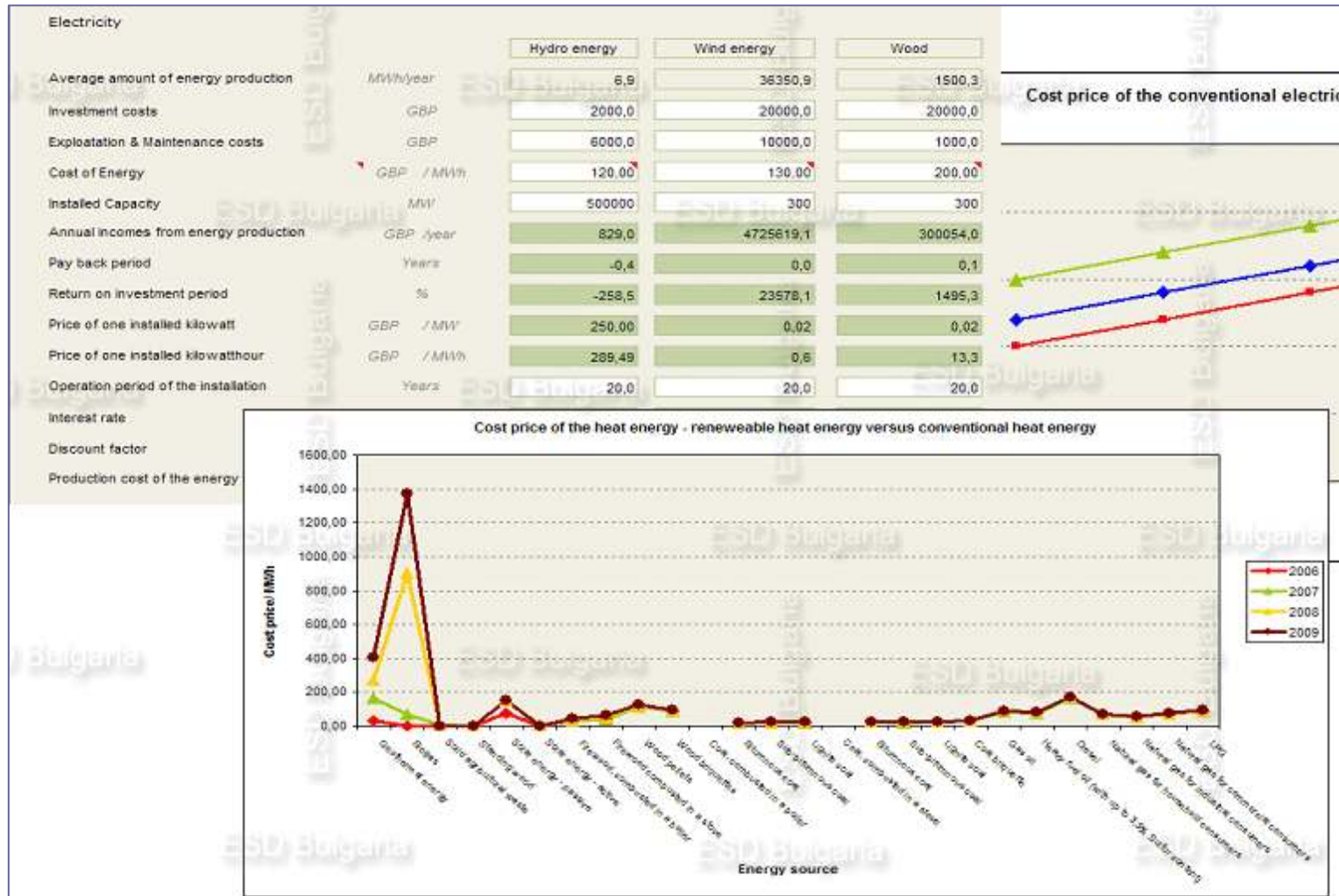
#### Power curve of the turbines

Capacity, kW

Average monthly wind speeds, m/sec

- Encon-500
- Talwin-600
- Mini-700
- Encon-810
- Genes-0-000
- Sutin-950
- WD-1000

Technical assessments:



Environmental benefits:

