**Renewable Energy Country Profile**
**Version 0.6b**

These profiles are a work in progress. They are presented to the international community for review and comment. The profiles are undergoing continual updating for technical content, formatting, grammar, and other issues. Each country profile will be modified on a continuous basis as new information is made available.

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# 1.0 Albania

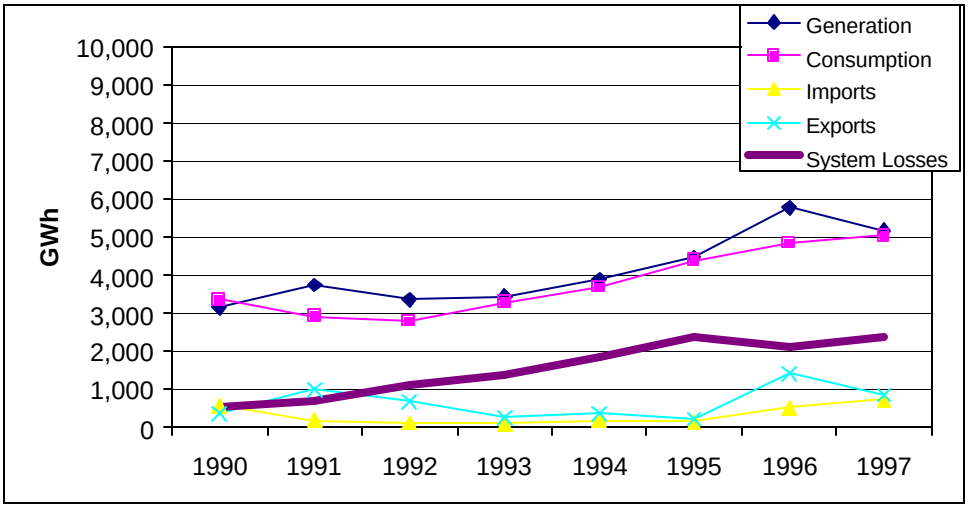
## 1.1 Overview of Electricity Supply

Electricity generation in Albania is dominated by large hydroelectric facilities, Vau I Deges, Koman and Fierze with a combined capacity of 1,350 MW. Thermal generation makes up the balance of power generation.

Table 7-5
Installed Generation Capacity

| Fuel | Number of Units | Capacity (MWe) | Percent of Capacity |
|---|---|---|---|
| Nuclear | | | |
| Thermal | N/A | 200 | 12.1% |
| Hydro | N/A | 1,450 | 87.9% |
| Other Renewables | | | |
| **Total** | N/A | 1,650 | 100% |

The production of power has been nearly sufficient to meet the demands throughout the 1990's. However, the consumption of power, not always legally, and system losses from damage and illegal connections has weighed a heavy toll on KESH. Despite these problems, KESH has continued to maintain a healthy power trade, with many years as a net exporter of power.




State and international efforts have intensified to restructure the state-owned electricity company, KESH. In an effort to reduce electricity shortages and excessive

demand, a two-tiered tariff structure was adopted. As a result of losses and system damage resulting from electricity theft strong penalties are beginning to be implemented. Additionally, strong penalties for non-payment of electricity bills are being implemented in an effort to bring KESH back to profitability. These efforts are making slow progress, but the originally planned privatization in 2001 has been postponed for the foreseeable future while KESH is brought back to financial health.

### *1.1.1 Wind Resources*

**Current Status of Wind Energy**

The level of information available for this country was poor. There are no operational wind energy power plants and none known projects in planning. There are some old wind mills still used for grinding wheat or other grains, as well as water pumping. The total number of such turbines, or the current operating conditions are not known.

In Albania electricity is produced exclusively by hydro power. The total capacity is 1'542 MW and the total production is 5 Mio. kWh/y. However, this production is not sufficient and Albania imports 15% of its electricity from Greece. In 2000 there were plans to build a 250 MW conventional power plant, because the authorities are convinced that they cannot afford renewables [1)]

Average electricity price is very low at around 3.5 € Cents / kWh (2000 Figure).

A country wide wind-atlas is not available.

There was no information available on legal frame work, nor the average electricity tariff.

No industry association or manufacturer was identified.

Due to insufficient data it is not possible to make a statement about the potential for wind energy development.

**Wind Energy Resource Potential**

The available data is insufficient to estimate wind energy potential of the country. However, in a country which is in an economical crisis and which produces 97% of its electricity production from a renewable energy source (hydro) it is difficult to imagine development of wind energy in the short to mid-term.

**Identification of Areas/Projects with High Potential for Wind Energy**

The most promising sites will probably be on the along the Adrian coast, as well as on hills and ridges running in the north to south direction along this coast. It is also highly probable that are isolated locations in the mountain passes and the two big lakes at the Macedonian border.

**Wind atlas of Albania is not available.**

**Table 1-2.** Armenia Areas/Projects with High Potential for Wind Energy..

| Project Name and Location | Size (MW) | Description |
|---|---|---|
| None | N/A | |

## Barriers/Incentives for Wind Energy

There are no specific incentives for the implementation of wind projects known in Albania

Specific barriers to the implementation of wind projects in Armenia include:

- Lack of any previous studies on wind energy resource potential
- Difficult economical conditions
- Low electricity prices

**Table 1-3. Albania Wind Energy Profile.**

| | |
|---|---|
| **Current status of wind energy** | |
| Installed capacity | N/A |
| Projects under construction | N/A |
| Supporting regulations? | N/A |
| Industry association? | None. |
| **Wind energy resource potential** | |
| Level of information available | Poor |
| Highest wind class | Class 1 - 7 |
| Country-level wind atlas available? | No |
| Estimated potential | N/A |
| Estimated potential (Interwind) | 50 MW |
| Target established? | No |
| High wind speed locations | • Adrian Coast<br>• Isolated mountain areas<br>• Coast of two big lakes at the Macedonian border |
| **Identification of areas/projects with high potential for wind energy** | |
| Recommended strategic assessments | Study 1 : Country wide resource assessment<br>Study 2 : an appraisal of legal and economical frame work |
| Identified areas/projects | None |
| **Incentives/barriers for wind energy** | |
| Significant incentives | None |
| Significant barriers | • Low electricity prices<br>• Lack of knowledge of wind energy resource potential |
| **Overall Prospects** | **Poor**<br>Technical potential of Albania is probably good, but the authorities lack awareness of renewables. Electricity prices kept artificially low for political reasons and lacking knowledge of country's resource potential reinforce this attitude. |

[1)] Hoffman, Karl ; Neue Energie 8/2000; Sonderfall in Südosteuropa, Albanien's Wasserkraft reicht nicht mehr aus um den Strombedarf zu decken.

## 1.1 Solar Resources

The climate of Albania is a typical Mediterranean one, with a hot and dry summer. This climate is a good precondition for use of solar energy (about 129.3 Kcal/$cm^2$ per year).

Currently, a UNDP Demonstration Project on using solar energy is under implementation in Albania. The project name is "Solar Panels for heating Administration and Education Centre at the Prespa National Park". The main aim of the project is to invest at the Administration and Education Centre at Prespa National Perk with particular attention shifting in solar energy use. This area is considered favorable in terms of geographical position for implementing such an idea. Six solar panels for heating and other additional necessary equipment will be purchased to ensure the general heating of the Centre.

The global annual radiation varies between 3.2 kWh/$m^2$/day in the North East part of Albania and 6 kWh/$m^2$/day in Fier, with a country average of 4.0 kWh/m2/day what must be seen as a country with a good solar energy regime. The largest solar thermal heating system currently operating in Albania consists of three sets of solar panels totaling 48 $m^2$, that are installed from Center of Energy Efficiency ( founded by EU and National Energy Agency) on the roof of Hospital No 5 to provide hot water for personal hygiene. Some private solar thermal housing applications have started recently based on private initiative. There are also some spontaneous efforts in design field such as the ASPIRE project (Archaeological Site Protection Imple menting Renewable Energy Resources on Butrinti archaeological site – south of Albania ) financed through PECO Program by 1995-1997 DG XII of EC.

| | |
|---|---|
| **Current status of solar energy** | |
| Installed capacity | NA |
| Projects under construction | Aspire Project |
| Supporting regulations? | No. No specific regulation exists except that of the one on renewables. |
| Industry association? | No. |
| **Solar energy resource potential** | |
| Level of information available | Poor |
| High range of solar insolation | 4.0 kWh/m2/day |
| Country-level solar atlas available? | NA |
| Target established? | NA |
| High solar insolation locations | Fier |
| **Identification of areas/projects with high potential for solar energy** | |
| Recommended strategic assessments | Technical and economical feasibility of introducing highly advanced solar energy technologies where periods with lack of solar energy is not very significant. |

| | |
|---|---|
| Identified areas/projects | Fier |
| **Incentives/barriers for solar energy** | |
| Significant incentives | NA |
| Significant barriers | NA |
| **Overall Prospects** | Poor. Solar energy does not seem to be on the leading renewable energy source and the level of information from the country is poor. Although EU has some projects going on in Albania, the solar energy systems are still in the introductory phase. |

## 1.2 Geothermal Resources

There are many thermal springs and wells in Albania, which represent a real potential for geothermal energy. To date in Albania, the geothermal sources have never been used as a source of energy.

The geothermal situation in Albania offers two directions for exploitation of geothermal energy:

1. The use of thermal water springs and wells of low enthalpy which cover a wide territory from South, near the Albanian-Greek border to the Northeast districts in Diber region. The water temperatures reach values of up to $60^0$C. The table below shows the water temperature of some thermal water springs in Albania.

**The Thermal Water Springs in Albania**

| No. | Location of the Springs | $^0$ C |
|---|---|---|
| 1 | Lixha Elbasan | 60 |
| 2 | Peshkopi | 5-43 |
| 3 | Krane-Sarande | 34 |
| 4 | Langareci-Permet | 6-31 |
| 5 | Shupal-Tirana | 29.5 |
| 6 | Sarandoporo-Leskovik | 26.7 |
| 7 | Tervoll-Gramsh | 24 |
| 8 | Mamurras-Tirane | 21 |

2. The use of hot thermal waters, brought out from deep doublet abandoned oil and gas wells and single wells, for geothermal energy in a form of a "Vertical Earth Heat Probe". At 2000 m depth the waters temperature reaches a value of about $48^0$C.

In many deep oil and gas wells there are thermal water fountain outputs with a temperature that varies from 32 to $65.5^0$ C (see the table below). These waters come from different depth levels (800-3000 m) of limestone reservoirs (wells No. 1, 2, 3, 4) and sandstone reservoirs (wells No. 5, 6, 7 and 8).

**The Oil & Gas Wells that have Self-Discharge of Thermal Water**

| No. | Wells Name | $^0$C |
|---|---|---|
| 1 | Kozani 8 | 65.5 |
| 2 | Ishmi 1/b | 64 |
| 3 | Galigati 2 | 45-50 |
| 4 | Bubullima 5 | 48-50 |
| 5 | Ardenica 3 | 38 |
| 6 | Ardenica 12 | 32 |
| 7 | Semani 1 | 35 |
| 8 | Verbasi 2 | 29.3 |

Presently in Albania, the thermal waters of the springs No. 1, 2, 4, 6 and wells No. 1, 2, 3 are used only for health purposes. These waters could be used for heating purposes and greenhouses as well.

The thermal springs and wells in Albania are located in three areas:

1/ Kruja geothermal area

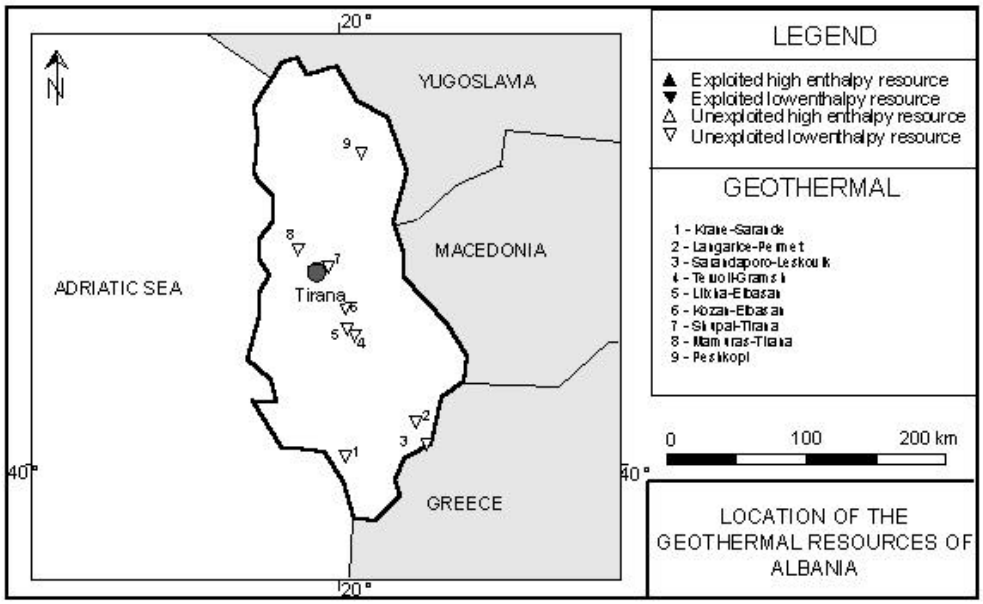
2/ Ardenica geothermal area

3/ Peshkopia geothermal area

Kruja geothermal area is the zone, which has the biggest geothermal resources in Albania, with a length of 180 km and a width of 45 km. It starts on the Adriatic coast, northern of Rodoni Cape in Ishmi region, continues with Tirana, Elbasani up to southeastern Albanian-Greek border and extends to the Konica district in Greece.

The Ardenica geothermal area is situated 40 km North of Vlora. The Ardenica geothermal area extends on that part of the peri-Adriatic Depression where the Vlora-Elbasan-Diber transverse passes.

The Peshkopia geothermal area is situated in northeastern Albania, in the Korabi hydrogeologic zone.




The most important resources explored until now are located in the northern part of the Kruja geothermal area, from Lixha Elbasan in the south to Ishmi north of Tirana. The values of the specific reserves vary between 38.5 and 39.6 GJ/m$^2$. The southern part of the Kruja area has resources of 20.63 GJ/m$^2$.

In the Ardenica geothermal area the specific reserves amount to 0.39 GJ/m$^2$.

Geothermal resources of Peshkopia area have been estimated similar to those of the northern half of the Kruja geothermal area.

The deep wells Ishmi 1/b and Kozani 8 are in good technical condition. They are located in the northern part of Kruja geothermal area. They have been drilled for oil and gas exploration but brought out only hot water. The Ishmi 1/b and Kozani 8 wells yield respectively 3.5 and 10.3 l/sec of hot water, which could be used for greenhouse heating, as well as for industrial and scientific purposes.

The utilisation of the thermal water of the Ishmi 1/b well (located in the plain near Tirana) is supported by a relatively good infrastructure (socially and economically relatively developed area), a geographically favorable position (connected with the national road, close to the future route of an international highway, which will link Yugoslavia, Albania and Greece).

Moreover, the advantage of the Kozani 8 well is the higher temperature of the thermal water and the relatively short distance from the West-East Interbalkan highway that will cross the town of Elbasan.

In the peri Adriatic Depression, there are areas with a geothermal gradient of 18-20$^0$C/m where there are several abandoned oil and gas wells which could be used for single or doublet ground-source heat pump installations. They are located in the plain area

of the country, e.g. in Divjaka and Kolonja where greenhouses could be built to use the hot water for heating them.

More detailed and complex hydrogeological and geophysical investigations should focus on the exploitation of new thermal springs in the Kruja and Peshkopia geothermal areas.

The same refers to the Tirana area, which is situated between Ishmi 1/b and Kozani 8 wells, to Elbasani Lixha as well as to the Galigati-Langarica-Sarandaporo area close to the Albanian-Greek border, and to the Peshkopia area in northeastern Albania.

Actually in Albania the study of the possibilities of exploitation of the geothermal energy has begun. The aims of the projects are to examine, demonstrate and disseminate the positive technical and financial opportunities for transfer and utilisation of innovative geothermal energy technologies in Albania. Exploitation of geothermal energy will have direct impact to the development of the regions by increasing their per capita income and, at the same time, by ameliorating the standard of living of the people.

The exploitation of the geothermal resources could be realized through integrated scheme based on geothermal energy, heat pumps and solar energy utilisation. This scheme has an environmental benefit by using renewable energies (geothermal and solar), new technologies (heat pumps) and energy savings (cascade scheme). The cascade scheme should be used in order to get the maximum advantage from the geothermal energy with the minimum energy supply from heat pumps.

**Table -1. Albania Geothermal Energy Profile.**

| | |
|---|---|
| **Current status of geothermal energy** | |
| Installed capacity (electric) | NONE (electric and thermal) |
| Installed capacity (thermal) | NA |
| Projects under construction (electric) | NA |
| Supporting regulations? | NA |
| Industry association? | No. |
| **Geothermal energy resource potential** | |
| Level of information available | Poor |
| Country geothermal atlas available? | NA |
| Estimated potential (electric) | NA, economic potential |
| Target established? | NA |
| High enthalpy geothermal locations | NA |
| **Identification of areas/projects with high potential for geothermal energy** | |
| Recommended strategic assessments | A detailed geothermal atlas (could not be determined whether a country atlas exists)<br>Countrywide economical feasibility study and planning . |

| | |
|---|---|
| | The exploitation of the geothermal resources through integrated scheme based on geothermal energy, heat pumps and solar energy utilisation. |
| Identified areas/projects (electric) | NA |
| **Incentives/barriers for geotherm al** | |
| Significant incentives | NA |
| Significant barriers | Lack of information and know-how<br>Economic reasons<br>Technical reasons<br>Financing barriers<br>Legal constraints |
| **Overall Prospects** | Fair<br>Although Albania has really good potential for geothermal energy, the country government profile may slow down all kinds of project development and implementation. |

## 1.3 Biomass Resources

*Biomass Energy* could be important in the future consisting of the following four main resources *Urban* wastes potential of the main Albania n cities (approx calculated 405615 Toe-ton oil equivalent predicted to be on year 2010) *Energy potential of agricultural* residues (approx.calculated 43004 GJ on year 1995.)

*Forestry biomass resources* approx calculated 460 millions of GJ in1995 4. Energy potential of animal residue's approx. calc. 12 740 GJ in 1995 with a trend to be increased in the future. When it comes to the validity of the numbers above, a through study shall be carried out.

**Table** Error! No text of specified style in document.**-2. Albania Biomass Energy Profile.**

| | |
|---|---|
| **Current status of biomass energy** | |
| Installed capacity | NA |
| Projects under construction | NA |
| Supporting regulations? | NO. |
| Industry association? | No. |
| **Biomass energy resource potential** | |
| Level of information available | Poor |
| Relative biomass potential (total / density) | Total: 0-100; Density: 0-100 |
| Country-level biomass investigations available? | Yes/No. Very brief information. |
| Estimated potential | NA |
| Target established? | No. |
| High density biomass areas | NA |
| **Identificati on of areas/projects with high potential for biomass energy** | |
| Recommended strategic assessments | The study for the determination of the potential for biomass energy and its market.<br>Feasibility study as to the type, locations and capacity of plants. |
| Identified areas/projects | NA |
| **Incentives/barriers for biomass energy** | |

| | |
|---|---|
| Significant incentives | NA |
| Significant barriers | Lack of information and know-how<br>Economic reasons<br>Technical reasons<br>Financing barriers<br>Legal constraints |
| **Overall Prospects** | Poor . Not enough interest is given to biomass in the country. It is highly likely for the use of this type of energy not to be on the country's energy agenda for a while unless a specific incentive is given by the EU or some other finance source. |

## 1.4 Hydroelectric Resources

The Albanian Power System (APS) was created in 1957, but its origins come long before. The total installed capacity is about 1650 MW from which 1446 MW (87.2 %) are HPP-s providing more than 95 % of total energy supply. Three HPP-s constructed on Drini River (north of Albania) compose 80 % of the country's installed capacity. The annual generating capacity of the country has been approx. 3300 – 3500 GWh, reaching 5800 GWh in 1996. With an average rainfall of 1500 mm and an average available head of about 600 m, there is still an enormous potential to be developed.

The energy production is highly dependent on the hydrological situation. The system faces great difficulties in dry years (especially the recent one).

Actually KESH, the operator of the APS, is also encountering big problems with the technical and "non-technical" losses. The electricity demand has increased considerably over the last 10 years. The residential sector consumes over 60 % of electricity production.

Apart from the large and medium sized HPP-s, there are 83 small hydropower plants (SHPP-s) in Albania (owned by KESH) ranging from 0.05 to 1.2 MW. Their installed capacity is 14 MW (this represent 1 % of the APS hydropower capacity) and the average annual production has been about 50 million kWh. Their utilisation scheme is often incorporated for electricity generation and irrigation. Most of them are connected to the national grid. Actually these SHPP-s are in poor working conditions or out of work because of the outdated technology, lack of spare parts and poor maintenance. The production level in recent years is about 12 GWh.

Their rehabilitation is necessary and is expected to increase of the electricity output up to 80 GWh/year. (To this aim, during 1995, the European Bank financed a feasibility study on these SHPP-s which pointed out that 15 of them were more interesting to be rehabilitated.) This will be done through their privatisation.

Apart from the. According to this law the privatisation model will be the auction or concession.

A Working Group is established on this purpose at the Ministry of Public Economy and Privatisation. The privatisation procedures are expected to begin soon.

Other potential small hydro plants are target of private business but Energy law and incentives are not in proper place to promote the process.

**Table** Error! No text of specified style in document.**-3. Albania Hydro Energy Profile.**

| | |
|---|---|
| **Current status of small to medium hydro** | |
| Installed capacity (small < 30 MW) | 14 MW, in total |
| Installed capacity (medium 30-100 MW) | NA |
| Projects under construction (small < 30 MW) | NA |
| Projects under construction (medium 30-100 MW) | NA |
| Supporting regulations? | None |
| Industry association? | No. |
| **Hydro energy resource potential** | |
| Level of information available | Poor |
| Country-level hydro atlas available? | NA |
| Estimated potential | NA |
| Target established? | NA |
| **Identification of areas/projects with high potential for hydro energy** | |
| Recommended strategic assessments | A hydro power management plan and a feasibility study for parts of country with a higher potential for the private concerns. |
| Identified areas/projects | NA |
| **Incentives/barriers for hydro energy** | |
| Significant incentives | NA |
| Significant barriers | Economic reasons<br>Technical reasons<br>Financing barriers<br>Legal constraints |
| **Overall Prospects** | Fair. After the privatization laws really take place, the use of hydro power will inevitably increase in the country since the resource exists and the know-how is there. |

## 1.5 Other Resources

## 1.6 Contact Information

Contacts made in the preparation of this assessment are gratefully thanked for their contribution to this report. Contacts include:

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