Specific country information for Romania

Aquatic Renewable Energy Technologies (Aqua-RET)
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Education and Culture
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1. Country resource

With only a short coastline, Romania's primary aquatic renewable resource is hydropower. Romania has 6 TWh potential for small hydropower plants. The resources are located nationwide, except for in the Dobrogea region in the south-east of Romania.

Figures 1D1 and 1D2 illustrate the hydrographical network and key drainage basins.

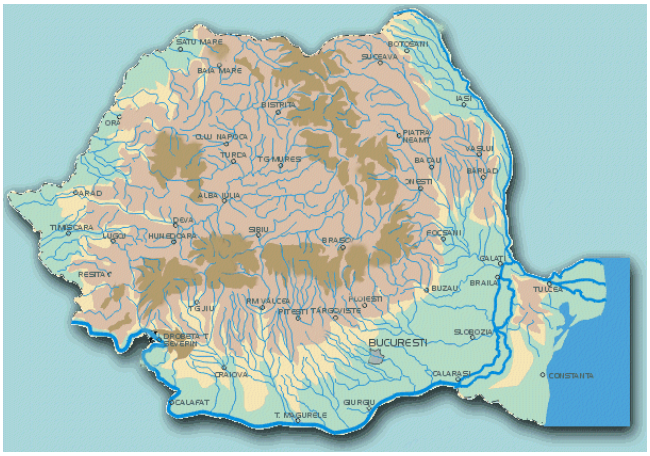


Figure 1D1. Romanian Hydrographical Network with radial distribution of rivers (SC ISPH. SA source: www.isph.ro)

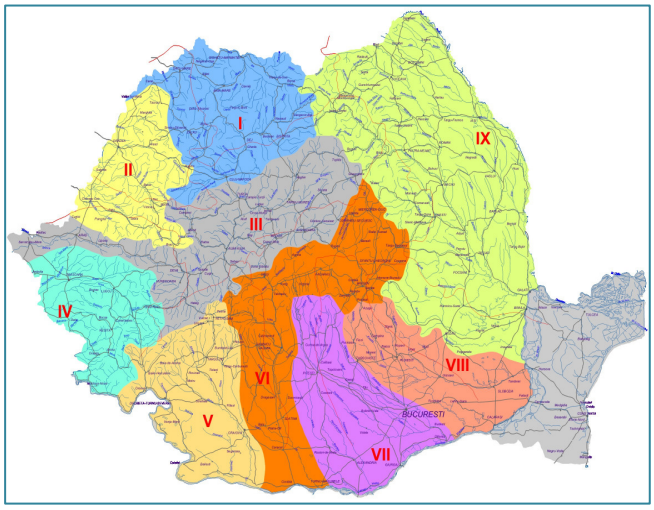


Figure 1D2. Network and main drainage basins: I Tisa-Someş, II Crişuri, III Mureş, IV Timiş-Nera-Bârzava, V Cerna-Jiu, VI Olt, VII Argeş, VIII Ialomiţa, IX Siret-Prut, X Danube (SC ISPH. SA source: www.isph.ro)

2. Development and testing

2.1. Research and development institutions and facilities

There are a number of organisations and institutions in Romania with the capacity for research and development into aquatic renewables. Because of its limited coastline, Romania's primary aquatic renewable energy resource is small hydropower.

The following institutions and organisations are of relevance to R&D: the SC ICPET SA (http://www.icpet.ro/) and SC ICEMENERG SA (http://www.icemenerg.ro/) are developers with a history of renewable energy research and projects; SC ISPH SA (http://www.isph.ro/) is the Romanian Institute which has designed hydropower plants and schemes for hydroelectric development of catchments areas and has provided water courses. The Department of Hydraulic and Hydraulic Machineries at the University Politehnica of Bucharest (http://www.pub.ro/English/eng.htm), is active in this field and in 2005 formed an entrepreneurial group on SHP problems.

2.2. Technology and design testing facilities

With its short coastline, the key aquatic renewable energy resource in Romania is small hydropower. The concepts used in small hydropower generation are relatively mature, although the utilisation of these concepts in small-scale resource environments is a more recent development. The Department of Hydraulic and Hydraulic Machineries at the University Politehnica of Bucharest (http://www.pub.ro/English/eng.htm) may be able to offer information to interested parties on facilities in Romania at which hydropower devices and concepts may be tested.

2.3. Pilot zones and trial projects

There are no designated pilot zones for early-stage aquatic renewable technologies, but the Romanian Government encourages the development of renewable technologies through its national R&D program (www.ancs.ro) which includes supplementary financing projects in conjunction with European structural funds.

3. Power use and transmission

3.1. Power use options

Romania has a short coastline, so its main aquatic renewable resource is hydropower, and small hydropower in particular has growth potential. The primary use of hydropower in Romania is likely to be for electricity purposes, either through the national grid, or at the microgeneration level.

3.2. Grid network

Romania has a quality grid infrastructure to support the development of new small hydropower projects. The potential contribution of new small hydropower in Romania should be considered alongside planning for extensions to the distribution and transmission networks.

A map of the Romanian transmission grid is available here:
http://www.transelectrica.ro/harta_retea.html

Figure 2.B.1 presents information on grid facilities in Romania (www.transelectrica.ro)

	Electrical lines 110 kV	Electrical lines MT	Electrical lines JT	Transformer station 110/MT si MT/MT		Transformer posts and supply points	
Branch	km	Km	km	nr	MVA	nr	MVA
MOLDOVA	2685,32	17110,96	31113,23	134	4178,6	10113	2907,84
DOBROGEA	2169,61	11313,7	10743,61	295	5338,37	5727	2515,91
MUNTENIA NORD	2160,672	15374,107	21765,12	208	5419,15	9157	3031,32
OLTENIA	3536,754	19827,084	27142,18	236	7016,2	9923	3160
BANAT	2014,72	13513,702	18419,02	140	4855,1	6690	2082,992
TRANSILVANIA NORD	2140,192	16687,333	22383,29	114	3916,14	6182	2118,053
TRANSILVANIA SUD	2257,29	12883,75	19256,38	109	4095,8	7142	2359,2
MUNTENIA SUD	784,903	13311,716	21532,08	60	3667,2	5676	2976,976
Total SC ELECTRICA SA	17749,461	120022,352	172354,91	1296	38486,56	60610	21152,291

3.3. Grid connections for aquatic renewables

It is not difficult to obtain a grid connection for a small hydropower project in Romania if there is a nearby grid with distributed generation capability. Costs for connection to the grid are separated into those for power transportation and those for auxiliary services (e.g. reserve and balance). Before connecting, generators should estimate capital costs and other associated project costs, in order to reduce or limit constraint levels on the network.

The integration of aquatic renewable projects into the grid will alleviate difficulties related to localisation of plants, and will also allow the management of aquatic renewable energy production in a market context. However, despite widespread grid coverage in Romania, and the benefits of incorporating small hydropower projects onto the grid, there are regulatory and institutional difficulties for aquatic renewables projects in connecting to the grid. Solutions to grid connection difficulties should be considered within new renewable electricity regulations and proposals in Romania. Solutions should consider new technical interconnection standards.

In order to generate aquatic renewable electricity in Romania, the following licenses are necessary:

- Legal documents issued by the network operator to which the generator will be connected (e.g. location approval; technical condition approval). More detail on the requirements necessary to obtain these permits is available in a guide (http://www.anre.ro/documente.php?id=394) produced by the Romanian Energy Regulatory Authority (ANRE) for renewable electricity generators.

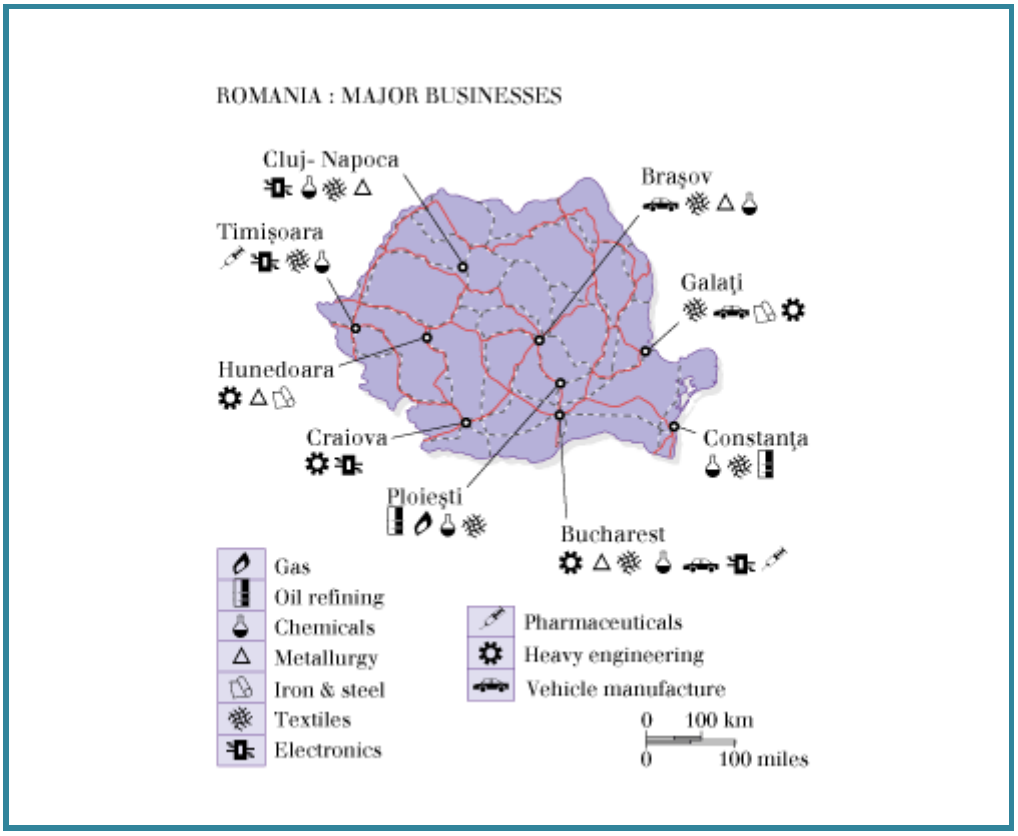
The Romanian Transmission and System Operator (TSO) is Transelectrica (http://www.transelectrica.ro). Projects wishing to connect to the Romanian transmission grid should contact Transelectrica. Projects wishing to connect to the Romanian distribution networks should also contact Transelectrica because certain approvals from Transelectrica are also required for distribution-linked projects. The "Services" page of the Transelectrica website outlines the process for connection to the Romanian transmission grid (http://www.transelectrica.ro/2en.php).

4. Industry and skills

4.1. Manufacturing capacity

The key aquatic renewable resource in Romania is hydropower, due to the country's short coastline. In order to further the development of the hydropower industry in Romania, skilled workers and technology from the existing manufacturing and construction base may be useful. In 2006, manufacturing accounted for 25.5% of Romanian GDP, and was growing at an annual average rate of 6%. Traditionally, the manufacturing sector in Romania has focused on machine tools and automobiles. Approximately two thirds of the Romanian workforce is employed by small- to medium-sized manufacturing firms. These individuals may be able to contribute to the hydropower sector in the future.

The Figure below demonstrates the location of different industries within Romania, including heavy engineering, iron and steel, and automobile manufacturing.



4.2. Support facilities and vessels

Romania's key aquatic renewable energy resource is hydropower. Infrastructure for the deployment and development of other aquatic renewable sources such as tidal stream, tidal barrage, wave and offshore wind, is not of relevance. Romania has sufficient capacity and a quality transport infrastructure for the development of hydropower projects.

4.3. Workforce

The expansion of aquatic renewable energy will stimulate the economy of local communities. Using renewable energy technologies creates employment at higher rates as compared to other energy technologies. This has been shown through the growth of the state-owned hydropower company Hidroelectrica. There is an indigenous workforce employed at Hidroelectrica which may be available to support the development of aquatic renewable energy projects. This includes employees involved in maintenance, operation, and construction. An outline of the services provided by Hidroelectrica is available on their website: http://www.hidroelectrica.ro.

The engineering capacity of Romania is well illustrated by the Society of Power Engineers in Romania (www.sier.ro).

4.4. Educational institutes

There are a number of institutes in Romania which have expertise in hydropower and could be approached for training purposes.

The SC ICPET SA and SC ICEMENERG SA are developers with a history of renewable energy research projects. SC ISPH SA is a Romanian institute with a proven history in the design of hydropower plants, a facilitator of schemes for hydroelectric development of catchments areas, and training provider of water courses. The Department of Hydraulic and Hydraulic Machineries at the University Politehnica of Bucharest is active in the hydropower field, and in 2005, formed an entrepreneurial group on SHP challenges.

5. Regulation

5.1. Leasing

A developer must purchase or lease the river from the owner of the land. The owner of river land space could be a physical person, the local community, the town hall or local department of forest administration. Sea space could be leased from the Romanian Waters Agency (www.rowater.ro).

Hidroelectrica (www.hidroelectrica.ro) and the Romanian Waters Agency are public organisations which provide advice to developers of hydropower plants, and could specify land owners and indicate lands available for purchase or lease.

5.2. Consenting

The Romanian Energy Regulation Authority (ANRE) indicates on their website (http://www.anre.ro) the steps a developer should take to install a renewable energy project and become a renewable electricity producer that contributes to the electricity market.

In order to develop an aquatic renewable energy project, there are a number of consents required for building and establishing the project. These would be additional to the purchase of land, licence for connection to the grid, and other environmental considerations. These include:

- Legal documents issued by the local administration authorities (e.g. city planning certificate; building authorisation)
- Legal documents issued by ANRE (e.g. setting-up authorisation for power units with capacity greater than 1MW; an E-RES generation licence; qualification certificate for the electricity priority production)

A guide for renewable electricity producers on the ANRE website (http://www.anre.ro/documente.php?id=394) outlines more detail on these licences.

It may take between five and seven months to obtain the required number of licences for a renewable electricity project, which may prove to adversely affect the developer.

5.3. Environment

It is best practice to consider environmental impacts when developing an aquatic renewable energy project.

There are several Ministries of the Romanian government from which advice may be sought on environmental compliance:

- Ministry of Environment and Sustainable Development (http://www.mmediu.ro/index_en.html)
- Ministry of Agriculture and Rural Development (http://www.madr.ro/)
- Ministry of Development, Public Works and Housing (http://www.mdlpl.ro/)

5.4. Health and Safety

In terms of health and safety, developers of aquatic renewable energy projects in Romania should be aware of, and comply with, the ANRE (Romanian Energy Regulatory Authority – www.anre.ro) maintenance regulations. Developers should contract for technical assistance with Hidroelectrica (www.hidroelectrica.ro), the state-owned hydropower company.

6. Drivers of industry

6.1. Political drivers

There is political support for renewable energy production in Romania, which was one of the first EU candidate countries to transpose the provisions of Directive 2001/77/EC, on the promotion of renewable electricity, into its own legislation (i.e. GD no. 443/2003 with modification of GD no.958 / 2005). Its indicative target for renewable electricity production by 2010 is fixed at 33% of gross national electricity consumption.

Currently, depending on the hydrological factors, 25 – 30% of green electricity in Romania is from hydro sources. Approximately 96% is generated in large hydro power plants and 4% in small hydro power plants. Only 1% of total electricity production in Romania comes from wind generation.

Though political support does exist, stronger regulation is needed to overcome barriers preventing targets from being met. In order to stimulate widespread generation from small-hydropower in Romania, new regulations could be implemented to address technical interconnection standards, and mitigate regulatory and institutional barriers to generation. Any new regulation should consider challenges to the development of aquatic renewable projects in Romania, including services for producers, validation of produced energy, and grid connection issues.

6.2. Financial drivers

There is strong financial support for aquatic renewable energy deployment in Romania. The main source is through the generic renewables support scheme, which consists of a mandatory quota system and trade system, with minimum and maximum price limits for the green certificates (GC) produced.

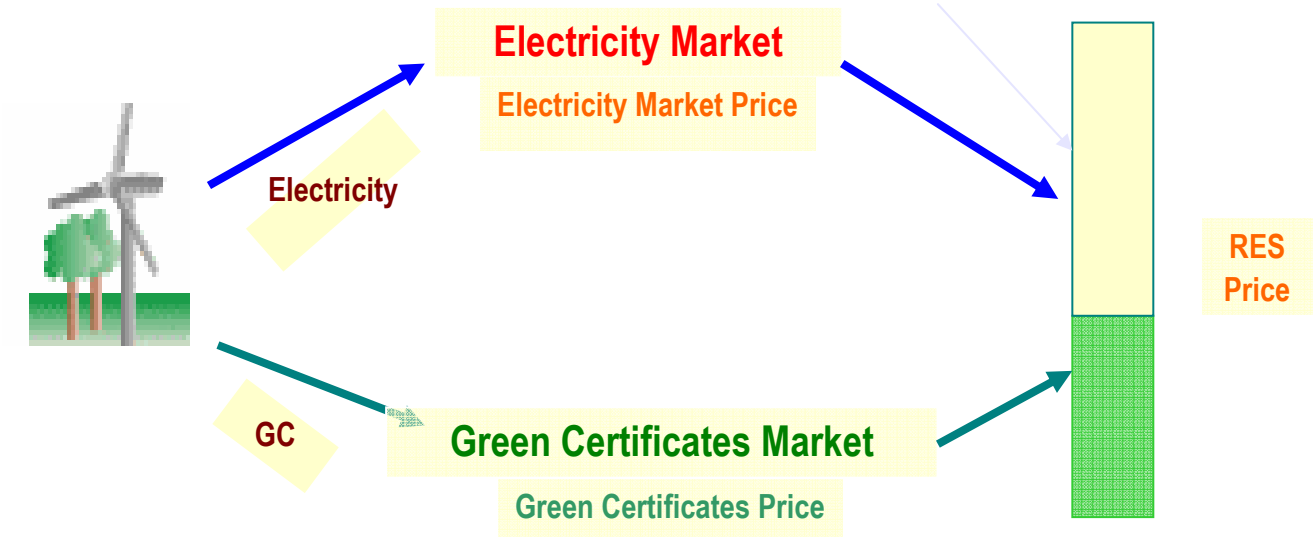
Each year, electricity suppliers are obliged to comply with mandatory quotas for renewable electricity supply. These quotas are established through legislation for each year between 2005 and 2012.

A renewable electricity generator may sell electricity on the electricity market, like any other electricity producer, obtaining the market price. In order to fund the higher generation costs for renewable electricity, and to ensure a reasonable profit, the generator receives a GC for each MWh of electricity supplied in the electricity network. This GC may be sold to electricity suppliers within legally set price limits, and are currently at a minimum of 24€ per certificate, and a maximum of 42€ per certificate. The renewable electricity generator may sell their electricity through a bilateral contact or on the day-ahead market (DAM).

Electricity suppliers demonstrate compliance with the quota system by the number of GCs they buy each year. This number must equal the mandatory quota value multiplied by supplied electricity quantity.

If suppliers do not comply with the annual mandatory quota, they will pay to the TSO (CN TRANSELECTRICA SA, www.transelectrica.ro) a fee related to the value of the GCs they were unable to buy. From 1st January 2008, this fee has been set at a value representing double the maximum trade value of GCs.

The following diagram illustrates this mechanism:


Electricity Market
Electricity Market Price
Electricity
GC
Green Certificates Market
Green Certificates Price
RES
Price