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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16.0 Latvia

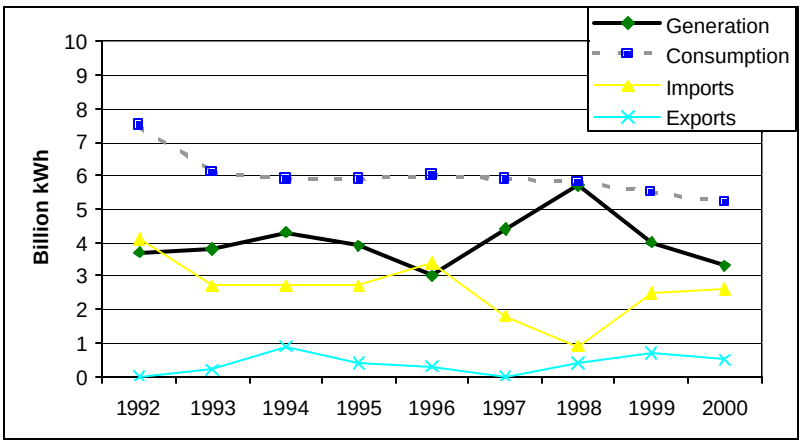
16.1 Overview of Electricity Supply

The state-owned electric company, Latvenergo, owns 97% of the generation capacity in Latvia. The primary source of electric generation is hydroelectric power with a cascade of dams on the Daugava river. All of which have recently undergone modernization and reconditioning. Additional generation and district heating is made up with two large thermal plants, and several smaller, privately owned facilities.

Table ____
Installed Generation Capacity

Fuel	Number of Facilities	Capacity (MWe)	Percent of Total
Nuclear	--	--	
Coal	--	--	
Natural Gas/Peat	1	129.5	6.4%
Natural Gas/Fuel Oil	1	390	19.2%
Hydro	3	1,510	74.4%
Other Renewables	--	--	
Total	5	2,029.5	100%

The hydroelectric facilities provide about 75% of electric generation in Latvia, however, these dams are only capable of meeting demands for about one third of the year. Thus, for most of the year, Latvia is a net importer of electricity from Lithuania and Estonia.



Transportation of electricity within Latvia is handled by seven regional transmission networks, all owned by Latvenergo. In 1998 utilities in Latvia, Lithuania, and Estonia, as well as surrounding countries, organized the Baltic Ring Electricity Cooperation

(BALTREL) with the goals of interconnecting the individual power markets into a regional exchange, and upgrading production and transmissions system in the region.

Privatization has proceeded gradually since 1994 whn the Latvian Privatization Company was formed. This organization was charged with privatizing all state owned businesses. To date only a small percentage of companies, other than the electricity sector, remain in government hands. The World Bank set a December 2001 deadline for the restructuring of the state-owned electric utility. As the government seeks entrance into the EU, the restructuring is expected to follow the European model by breaking the utility into generation, transmission, and distribution companies. *(Where are they at in July 2002?)*

1.1.1 Wind Resources

Current Status of Wind Energy [1), 2)]

Total installed wind energy capacity in Latvia is about 22.8 MW.

The country has been affected by Chernobyl radioactive cloud and this accident made increased public awareness for the benefits of renewables.

A country wide wind-atlas is available, where several areas with annual average wind speeds over 6 m/s at 30 m height were identified.

Latvia has a unique law providing feed-in tariff, which is double the average electricity price for a period of eight years after grid connection. After that the purchase price shall correspond to the average sale price, which is unfortunately very low at 2.5 € Cents / kWh.

No industry association was identified. Institute of Physical Energetics. Latvenergo-project seems to be the leading institution in wind energy issues. There was one industry manufacturer was identified. There is also great interest towards manufacturing of wind turbines and accessories; Baltaruta of Latvia. Based in the Latvian capital of Riga, the company was founded in October 1990 and grew out of a department of the Riga Aerospace Institute which concentrated on wind energy electro-engineering, manufacturing and testing. Since December 1991 the firm has designed, manufactured and tested small wind turbines and components. Baltaruta offers a 500 W model, the BRC-mini, now in series production, and a BRC-small 3.7 kW unit as well as a BRC-aero 10-18 kW machine, both currently undergoing pre-market testing. They were expected to go into series production in early 1996, but their presence has not been observed in the international market.

A new project of 100 MW installed capacity was identified. This project is being developed by 100 MW, Windforce, on the coast at Ventspils.

Latvia has a very good technical potential for wind energy development.

Wind Energy Resource Potential [3)]

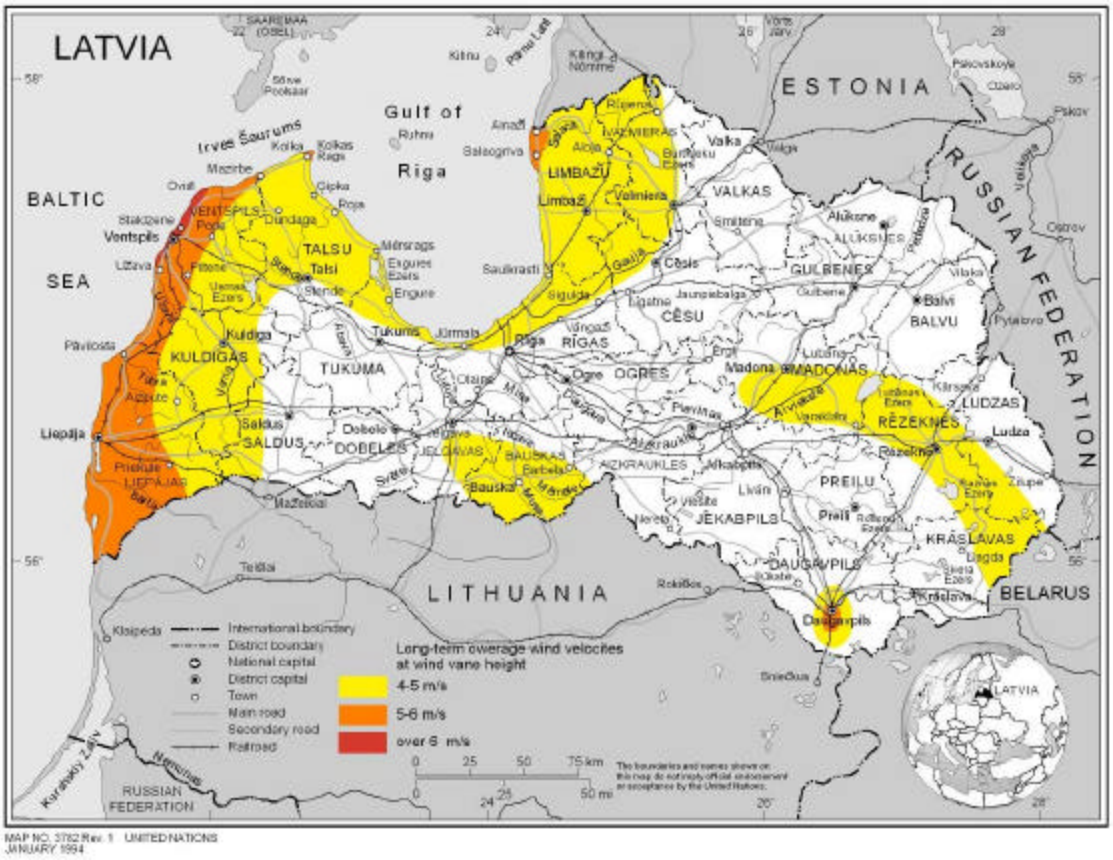
"Master Plan of Wind Power Development of the USSR till 2010", 1989 (MPWD) included a country-level wind map. The Baltic Sea impact dictates the difference in wind regimes on the coastal line and in the inland regions. Wind resources suitable for power utilization are available more than on 10% of the territory in the western region of the country.

If we compare with the findings for Estonia the 11×10^9 kWh/y technical potential estimated in above mentioned study is quite probably not accurate. Therefore we would set the total potential wind power capacity at 550 MW.

Under these circumstances we would rate the technical wind energy resource potential of Latvia as very good.

Identification of Areas/Projects with High Potential for Wind Energy[4]

The most promising sites are Baltic Sea zone, coastal line of Gulf of Riga, Baltic Sea coast from Pavilosta 70km inland and in the eastern part of Riga Bay as far as Ainazi 10 km inland.



Wind atlas of Latvia

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

Project Name and Location	Size (MW)	Description
Baltic Sea zone Coastal line of Gulf of Riga Baltic Sea coast from Pavilosta 70km inland and in the eastern part of Riga Bay as far as Ainazi 10 km inland.		Wide strip of western coastal zone from the town of Ventspils to the boundary with Latvia. This territory is about 10'600 square kilometers large.
Liepaja	19.8 MW	Veja Park, consisting of 33 Enercon E-40 Turbines, installed in April 2002.
6 km from Liepaja	1.8 MW	Single Enercon E-66 turbine, installed in April 2002
Ainazi	1.2 MW	Two Tacke TW-600 turbines, installed by utilities Preussenelktra of Germany and Latvenergo of Latvia in March 1996
?	2.5 MW	10 Nordex 250 kW turbines. Was announced in October 1994, later changed to 800 kW turbines. Seems abandoned.

Barriers/Incentives for Wind Energy

Specific incentives for the implementation of wind projects in Latvia include:

- Particular attention in the country to the environmental safety problems, especially in the zones of resorts.
- Principal possibility of joint operation of wind power plant and hydropower plants of the Daugava Cascade.
- Construction of the wind farms is encouraged by higher electrical energy purchase tariff set by the government. Latvenergo purchases electricity generated by wind farms at a double tariff during the period of eight years after grid connection. After that the purchase price shall correspond to the average sale tariff of power.
- Interest of foreign investors toward joint venture investment on wind energy utilization in Latvia.
- The worldwide implementation of the Joint Implementation system (JI).
- Riga Aerospace Institute which concentrated on wind energy electro-engineering, manufacturing and testing. Since December 1991 the firm has designed, manufactured and tested small wind turbines and components.

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

- Weak transport infrastructure. For the Veja Park project the crane had to be imported from Finland.
- Electricity is cheap – the equivalent of just 2.5 € Cents /kWh – making it difficult for wind to compete in Latvia.

- Preussenelektra's (the German utility company) interest in renewables has shifted from wind to construction of undersea cables to Scandinavia to tap cheap hydro than in wind development.

Table 1-3. Latvia Wind Energy Profile.

Current status of wind energy	
Installed capacity	1.2 MW, Ainazi 1.8 MW, close to Liepaja 19.8 MW, Veja Park, in Liepaja 22.8 MW Total
Projects under construction	No new projects yet
Supporting regulations?	Yes. 8 years 5 € Cents / kWh, later 2.5 Cents / kWh.
Industry association?	No. Institute of Physical Energetics. Latvenergoproject
Wind energy resource potential	
Level of information available	Very Good
Highest wind class	Class 7 (For the Baltic region along the coast of the Baltic Sea the average wind speed at the height of 50m are 7.9..8.1m/s) [4]
Country-level wind atlas available?	Yes.
Estimated potential (MPWD)	$10*10^{12}$ kWh/annum, gross (theoretical) potential $11*10^{9}$ kWh/annum, technical potential
Estimated potential (Interwind)	550 MW
Target established?	N/A
High wind speed locations	Ainazi region Riga Bay
High wind speed locations	Baltic Sea zone
Identification of areas/projects with high potential for wind energy	
Recommended strategic assessments	Study 1 : site specific investigation of identified projects above 10 MW installed capacity Study 2 : an appraisal of legal and economical frame work
Identified areas/projects	100 MW, Windforce, on the coast at Ventspils
Incentives/barriers for wind energy	
Significant incentives	• Double tariff for the first 8 years • High public awareness
Significant barriers	• Small population • Weak transport infrastructure
Overall Prospects	**Good** In spite of its small size Latvia has good prospects for wind energy development. There is a good feed-in tariff scheme in place, the first wind park is on its way, another 100 MW in planning.

[1]Wind Power Monthly, various issues

[2]Smoked fish and a great catch, How wind power development is catching sail in Estonia and floundering in Latvia; New Energy 4/2002

[3] "Master Plan of Wind Power Development of the USSR till 2010", 1989

[4] "Development of wind energy utilization in Latvia", P.Shipkovs & D. Kashkarovs Institute of Physical Energetics, Riga Latvia, M. Shipkovs, Energi-R, Riga Latvia, R. Arajs J/S/C Latvenergo Projekts, Riga Latvia

5.14 Latvia Renewable Energy Profile

5.14.3 Solar Resources

Current Status of Solar Energy

At present the using of solar energy in Latvia has practically no spreading.

Solar Energy Resource Potential

The solar energy resource potential is small due to the climatic conditions and the northern latitudinal location of the country (between 56^0 and 58^0 north). It is characterized by the data presented in Tables 1 and 2 for one point (Riga).

Table 1

Monthly and annual total solar radiation incident on horizontal surface, MJ/m^2

Name of place	I	II	II	IY	Y	YI	YII	YII	IX	X	XI	XII	Yearly
Riga	43	98	254	376	566	589	593	458	288	131	43	25	3464

Table 2

Monthly and annual direct solar radiation incident on surface normal to sunlight beams, MJ/m^2

Name of place	I	II	II	IY	Y	YI	YII	YII	IX	X	XI	XII	Yearly
Riga	53	112	312	374	542	565	547	431	304	147	50	30	3467

The data of Tables 1 and 2 were taken from [1]. The averaged values for observations period of many years are presented.

Identification of Areas/Projects with High Technical Potential for Solar Energy

Area of the country is small. The climate is homogeneous at the overall territory of Latvia. Therefore the data of Tables 1 and 2 characterize the solar energy potential practically for the total territory of Republic. Zones or regions with a high solar energy potential, which are suitable for the efficient using, are absent. Correspondingly there are not any noticeable projects on using solar energy.

Barriers/Incentives for Solar Energy

The main barrier preventing the usage of solar energy is a climatic one. The creation of any large plants on converting the solar energy into electricity in Latvia is not expedient. It doesn't exclude a possibility of seasonal application of photovoltaic plants with small power and water-heating solar plants.

Table 14-3. Latvia Solar Energy Profile.

Current status of solar energy	
Installed capacity	Is practically absent.
Projects under construction	No data.
Supporting regulations?	Are absent
Industry association?	Are absent
Solar energy resource potential	

Level of information available	Fair
High range of solar insolation	0.5 – 0.8 kWh/m2/day [2] (worst month); up to 2.6 kWh/m2/day (year average [1])
Country-level solar atlas available?	No.
Target established?	No data.
High solar insolation locations	The solar climate is homogeneous. There are no regions or points with the higher level of solar radiation.
Identification of areas/projects with high potential for solar energy	
Recommended strategic assessments	Technical-and economic analysis of possibilities of commercial application of seasonal solar plants for different consumers.
Identifiedareas/projects	Due to the unfavorable climatic conditions, the allocation of any significant projects in the field of solar energy is not expedient.
Incentives/barriers for solar energy	
Significant incentives	Shortage of own energy resources.
Significant barriers	Unfavorable climatic conditions.
Overall Prospects	Poor mainly because of unfavorable climatic conditions.

References

1. Applied scientific reference book on climate of the USSR. Hydrometheoizdat, L., Issue 5, 1990.
2. Internet site: www.bpsolar.com/ContentDocuments/17/PV System Sizing Tools.zip.

5.14.4 Geothermal Resources

Current Status of Geothermal Energy

Geothermal resources in Latvia are presented by geothermal brines with temperature up to 55°C and TDS up to 150g/l [1]. Up to the present geothermal resources were not used. Investigations of the expediency of creating geothermal heat supply systems with heat pumps have been recently carrying out [2]. Taking into account the supposed growth of heat tariffs, the payback period of such systems can constitute 8-10 years. It is planned to obtain the overall 16 MWt-thermal power of such systems.

Geothermal Energy Resource Potential

The most prospective geothermal reservoirs were discovered in Devonian and Cambrian high permeable sandstones at the depths up to 1400 m (Riga region) and 2100 m (south-western Latvia). The local estimates of extracted heat with full reinjection of waste brine were fulfilled, but the total thermal power was not determined.

Identification of Areas/Projects with High Potential for Geothermal Energy

The fields with high temperature thermal water are absent in Latvia .

Barriers/Incentives for Geothermal Energy

The main incentive for using thermal water in Latvia is a shortage of own fuel resources.

Specific barriers to the implementation of geothermal projects in Estonia include:

1. Absence of experience on maintenance of geothermal fields with full reinjection.
2. Low tariffs for heat.

Table 14-4. Latvia Geothermal Energy Profile

Current status of geothermal energy	
Installed capacity (electric)	0
Installed capacity (thermal)	0
Projects under construction (electric)	0
Supporting regulations?	No
Industry association?	No
Geothermal energy resource potential	
Level of information available	Fair
Country geothermal atlas available?	No.
Estimated potential (electric)	0
Target established?	Yes
High enthalpy geothermal locations	Absent
Identification of areas/projects with high potential for geothermal energy	
Recommended strategic assessments	No
Identified areas/projects (electric)	No
Incentives/barriers for geothermal energy	
Significant incentives	**1. Shortage of own fuel resources.**
Significant barriers	1. Absence of experience on maintenance of geothermal fields with full reinjection. 2. Low heat tariffs.
Overall Prospects	Fair. Existence of geothermal brines together with supposed growth of heat tariffs can make profitable the geothermal heat supply.

References

6. A Strategic Plan for the Development of European Geothermal Sector. *Blue Book on Geothermal Resources*, European Communities, 1999.
7. E.Eihmanis. Incorporation of Geothermal Heat Sources in Latvian Heat Supply Systems. *Proceedings World Geothermal Congress 2000*, Tokyo, 2000.

5.14.5 Biomass Resources

Current Status of Biomass Energy

The wooden fuel is mainly used in small and, as a rule, low -efficient boilers in the private household utilities.

"National program of managing the domestic waste" that was confirmed in 1998 is now realizing in the Republic.

Biomass Energy Resource Potential

Table shows the overall biomass resource data for Latvia.

Latvia Biomass Resource Data (FAO 2002a, FAO 2002b).

Biomass resource type	Total production	Production density
Primary crop production, tonne	(avg. 1999-2001, tonne)	(tonne /1000 Ha)
Total primary crops (rank among COO)	22,546,497 (10)	3,634 (3)
Top 10 primary crops		
Grasses (misc), Forage & Silage	14,833,333	2,391
Mixed Grasses, Legumes	5,200,000	838
Potatoes	749,433	121
Sugar Beets	435,133	70
Wheat	398,565	64
Barley	249,954	40
Vegetables and Roots, Fodder	226,567	37
Rye	102,539	17
Oats	78,662	13
Cabbages	60,902	10
Animal units, number	(number)	(number / 1000 Ha)
Cattle	406,398	65
Poultry	3,223,000	519
Pigs	413,006	67
Equivalent animal units	603,830	97
Forest products, cubic meters	(avg 1999-2000, cu m eters)	(cubic meters /1000 Ha)
Wood fuel and charcoal	2,093,750	337
Wood residues	2,631,000	424

The technical potential of using biomass (timber waste) for energy purposes constitutes 700 thousand t per year or 4700 TJ.

Identification of Areas/Projects with High Technical Potential for Biomass Energy

The references of information don't contain the data on new projects for using biomass for energy purposes in Latvia..

Barriers/Incentives for Biomass Energy

The main restricting factor for production and construction of new biogas plants (especially in agriculture) consists of the relatively high investment expenses per a unit of power.

Table 14-5. Latvia Biomass Energy Profile.

Current status of biomass energy

Installed capacity	No data
Projects under construction	No data
Supporting regulations?	No data
Industry association?	No data
Biomass energy resource potential	
Level of information available	Poor
Relative biomass potential (total / density)	Total: 7%; Density: 99%
Country-level biomass investigations available?	Yes
Estimated potential	Technical potential of using biomass (timber waste) in energy purposes constitutes more than 150 thousand toe.
Target established?	Yes
High density biomass areas	No data
Identification of areas/projects with high potential for biomass energy	
Recommended strategic assessments	Study 1 Formation of a list of investment projects for using biomass in energy purposes. Study 2 Selection of priority investment projects.
Identified areas/projects	??? ??????
Incentives/barriers for biomass energy	
Significant incentives	1. Limited reserves of organic fuel. 2. Considerable agricultural wastes
Significant barriers	The main restraining factor for production and construction of new bio-gas plants especially in agriculture consists of the relatively high invest-ment expenses per a unit of power.
Overall Prospects	Good

References

1. Energy Efficiency and Sustainable Development. Document by the Republic of Latvia. Strategic Issues of Energy System Reforms in Central and Eastern Europe. Round Table, 4-6 December 1995, Paris.
2. The Third National Communication of the Republic of Latvia Under the UN Framework Convention on Climate Change, 2001.

Renewable Energy Profile (draft)

REPUBLIC OF LATVIA

HYDRO POWER POTENTIAL FOR DEVELOPMENT OF SMALL AND MEDIUM SIZE HYDRO

According to the adopted classification, small HPPs are of capacity up to 30 MW, medium-size HPPs are of capacity up to 100 MW.

1. Current State of Hydro Power

Hydropower accounts for 74% of total generating capacity. Hydro installed capacity totals 1.5 million kWh. There are three large HPPs in the Daugava cascade and more than 70 small HPPs.

Existing Hydro Power Plants in Latvia

Hydro power plants	Installed capacity, MW	Share of HPPs in hydro power, %
Large HPPs	1469	96
Including: Riga	384	
Kegum	260	
Plavinas	825	
Small HPPs	64.5	4

2. Hydro Power Resources of Latvia

By absolute indices of potential hydro resources Latvia is on one of the last places among the CIS countries.

Characteristics	Indices		Share of HPPs, % from the total
	Total	Including small HPPs of capacity up to 30 MW	
Gross theoretical hydropower potential, - Billion kWh/year - concentration of power resources on the territory, thou.kWh/km^2	7.2 113.0	1.5	20.8
Technically feasible hydropower capability, Billion kWh/year	4.0	0.7	17.5
Economically feasible hydropower capability, Billion kWh/year	3.9	0.5	12.8
Power generated by existing HPPs, - Billion kWh/year - per cent of economic potential, %	2.8 72.0	Data are not available	

At estimation of total hydropower potential of Latvia small hydropower were singled out. Small hydropower potential is spread over the whole territory of the Republic.

3. Plans for Development of Hydropower Potential

Programs of small hydropower development in Latvia include reconstruction and renovation of previously constructed small HPPs, adding small HPPs to water management projects with already existing water-retaining structures with the aim of utilizing waste releases, and construction of new small HPPs.

Proposed Program of Small Hydro Development (by documents prepared of 1990s)

Type of construction	Quantity	Installed capacity, MW	Average overyear power output, Million kWh	Note	Region
Rehabilitation of previously constructed small HPPs	20	4,7	12,6	Mostly former rural HPPs of capacity within 0.168-1.55MW	Mainly Eastern regions of Latvia
Adding HPPs to water management projects	1	0.95	2.25		Uzvaras project on the Musa River, south of Latvia
New construction	1	0,1	0,25		
Total	22	5,75	15,1		

4. Favorable Factors for Development of Hydro Potential:

- Own fuel resources are actually not available;
- Power system deficiency

Bibliography

1. Power Resources of the USSR. Hydropower Resources. A.N.Voznesensky et al.,1967
2. Small Hydropower, L.P.Michailov et al, 1989
3. Periodicals: Hydraulic Construction, Power Stations, etc