Embassy of the United States of America
Vilnius · Lithuania
Akmenų St. 6

Renewable Energy Sector in Lithuania

Commercial Opportunities for US Companies

M A R K E T R E S E A R C H S T U D Y

PREPARED BY:

UAB "BANKINĖS KONSULTACIJOS"
Gedimino pr. 26, LT-01104 Vilnius
Tel.: 8 5 261 62 74

Vilnius, 2008

Contents

1. GENERAL INFORMATION

Values in this study are presented in USD. The official exchange rate of the USD to the LTL was 2.2154 on 31 July 2008.

1.1. CURRENT MARKET SITUATION

The following are renewable energy sources (RES) used in Lithuania:

- solar energy
- hydropower
- biomass—wood fuel and wood waste fuel, biofuel (bioethanol is used to produce bioETBE (bioethyl tertiary butyl ether), biodiesel), biogas.
- geothermal energy
- wind power

(peat is not considered a renewable energy source).

Wood fuel and wood waste fuel are the most widely used RES in Lithuania — up to 87 percent (2007 data). The remaining 13 percent falls to other RES.

Despite its small capacity, the RES sector is currently undergoing rapid development. In 2001, the sector featured only wood fuel and hydropower. Other resources were not available. All other RES have developed in the past six years.

Table 1.1.

Production of renewable energy sources in Lithuania in 2007, *in Tera Joules (TJ)*

Production of resources		**2003**	**2004**	**2005**	**2006**	**2007**
Solar energy		N/A	N/A	N/A	N/A	N/A
Hydropower		1.170	1.514	1.622	1.430	1.514
BIOMASS	Bio-ETBE (bioethyl tertiary butyl ether)	0	0	0	542	920
	Biodiesel—methyl (ethyl) esther	0	82	260	383	917
	Biogas	78	68	77	83	103
	Bioethanol	0	69	267	367	402
	Wood fuel and wood waste fuel	28.112	29.156	30.131	31.659	30.488

Geothermal energy	124	122	121	70	65
Wind power	0	4	6	49	382
Total RES	**29.484**	**31.015**	**32.484**	**34.583**	**34.791**
Total energy produced	**649.184**	**703.969**	**659.217**	**593.434**	**504.762**
RES share	**4.54%**	**4.4%**	**4.9%**	**5.8%**	**6.89%**

Source: Department of Statistics under the Government of the Republic of Lithuania

In 2007, a total of 504,762 TJ of energy was produced in Lithuania. The majority included automobile diesel (16 percent), gasoline (14 percent), and nuclear power (21 percent). The general reduction in production was caused by the closure of the first unit of Ignalina Nuclear Power Plant and an interruption at Mažeikiai Oil Refinery due to a fire.

Only 34,791 TJ was produced from renewable energy resources. **This made up 6.89 percent of total energy produced in Lithuania in 2007.**

Table 1.2.

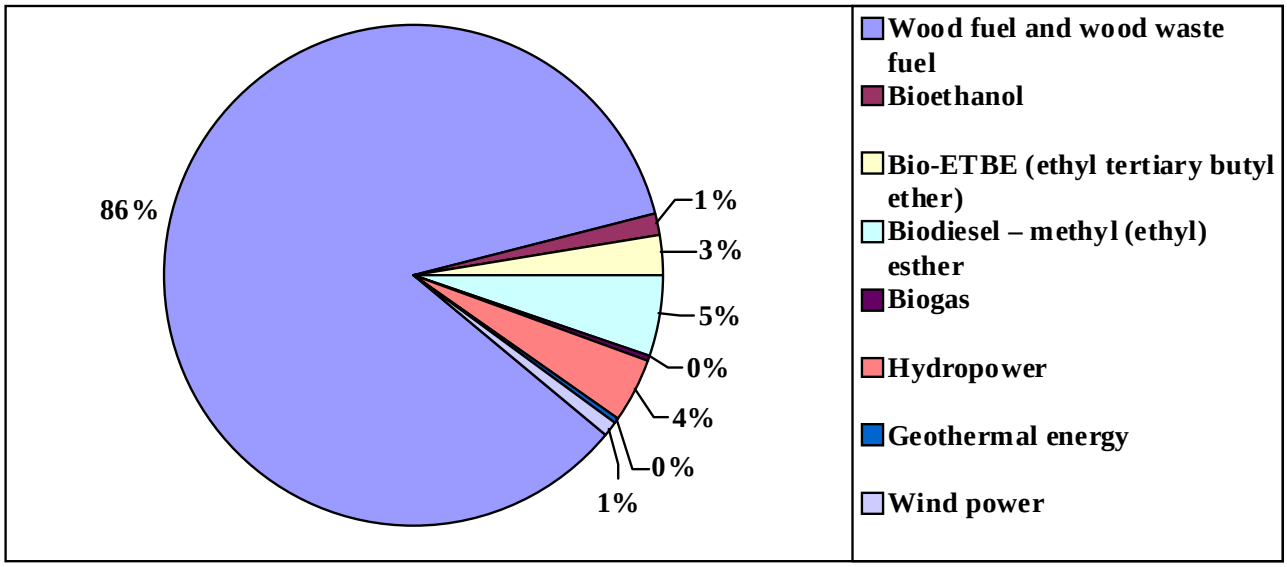
Production of renewable energy sources in Lithuania in 2007

Production of resources		**2003**	**2004**	**2005**	**2006**	**2007**
Solar energy, GWh		N/A	N/A	N/A	N/A	N/A
Hydropower, GWh		325.1	420.5	450.7	397.1	420.6
BIOMASS	Bio-ETBE (bioethyl tertiary butyl ether), *thousand metric tons*	0	0	0	14.7	25.6
	Biodiesel—methyl (ethyl) esther, *thousand metric tons*	0	2.2	7	10.3	24.8
	Biogas, *million cubic meters*	3.9	3.4	3.9	4.2	5.2
	Bioethanol, *thousand metric tons*	0	1.9	7.2	9.9	14.9
	Wood fuel and wood waste fuel, *thousand cubic meters*	3,428.3	3,555.6	3,674.5	3,860.8	3,718
Geothermal energy, GWh		17.2	16.9	16.9	9.7	9
Wind power, GWh		0	1.2	1.8	13.7	106.1

Source: Department of Statistics under the Government of the Republic of Lithuania

Diagram 1.1.

General consumption of renewable energy resources in 2007



Source: Department of Statistics under the Government of the Republic of Lithuania

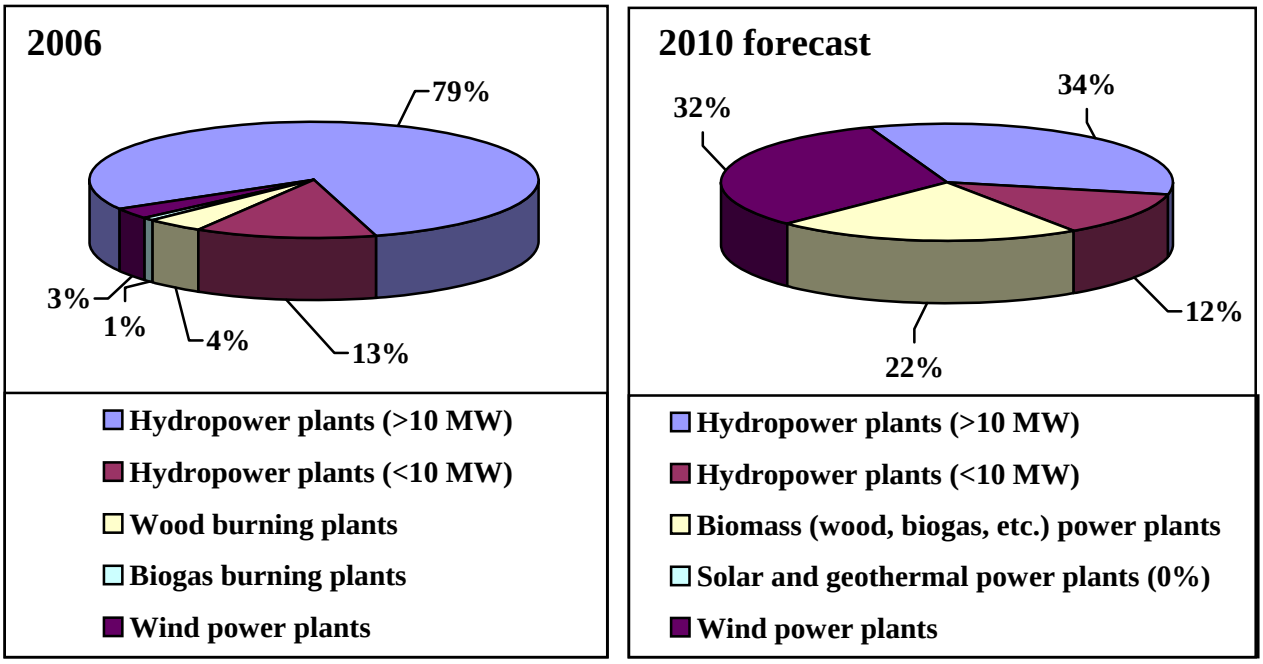
Presently, wood fuel energy is the most accessible RES for consumers. This could be due to the availability of supplies. Production of other RES in Lithuania is far less developed and the capacities are smaller.

At the end of 2009, the unit 2 reactor of Ignalina Nuclear Power Plant will be closed. Thus, Lithuania will experience a large shortage of reasonably priced electrical power. According to an optimistic forecast by the public limited company LEO LT, a new nuclear plant will be built in 2015. Hence, it is anticipated that for at least 6 years demand for reasonably priced electricity will exceed supply, resulting in higher electricity costs.

Lithuania is obligated as a member of the European Union to increase production of electrical energy from RES to 7 percent of all *electricity* production by 2010. As you can see from Diagram 1.2 below, wind power and biomass energy production will be developed the most. The prospects for development of hydropower and solar energy are rather uncertain.

Diagram 1.2.

Production of electricity from renewable energy resources in Lithuania



Source: 1. Public limited company AB Lietuvos Energija (2006). 2. Forecast by the state enterprise Energetikos agentūra (Energy Agency) for 2010.

Lithuania must increase production from RES to 12 percent of all energy produced by 2010. Therefore, in order to avoid fines, Lithuania must, within four years (2006–2010), increase twofold the amount of energy from RES. In addition, in the long term (by 2020) Lithuania must reach the EU level and produce 20 percent of its energy from RES.

Renewable energy resources are generally used for production of electricity and hot water supply.

Table 1.3

Value of production and distribution of electricity and production of steam and hot water supply in Lithuania, *in USD*

	2004	2005	2006	2007
Production and distribution of electricity	1,502,882,549	1,546,128,916	1,578,324,456	1,835,669,405
Supply of steam and hot water	579,616,322	586,240,408	646,035,930	663,553,760
Sum total	**2,082,498,872**	**2,132,369,324**	**2,224,360,386**	**2,499,223,165**
Per inhabitant	**595**	**609**	**636**	**714**

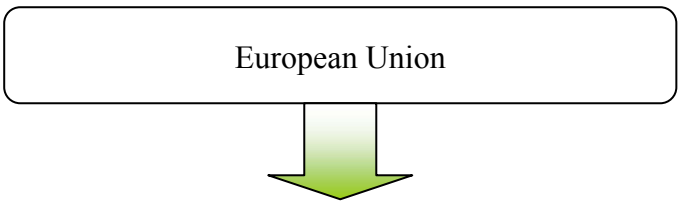
Source: Department of Statistics under the Government of the Republic of Lithuania

As shown in the table above, in 2007 the value of electric and thermal energy produced in Lithuania was 2,499,223,160 USD. Since RES was only 6.89 percent of this amount, its value would be correspondingly 172,200,000 USD. Considering the obligation to increase RES use to 12 percent by 2010, in two year's time this sector could be worth ~300,000,000 USD.

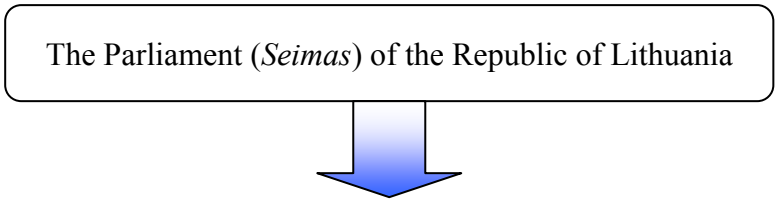
In view of the consumption forecast and current oil prices, the RES market has a potential for development in Lithuania. The major part of the energy market still consumes non-renewable energy that becomes more expensive every day and sooner or later will have to readjust to using renewable power resources. Establishment in the market today could be very important for the future, when demand is forecast to grow considerably.

1.2. LEGAL FRAMEWORK

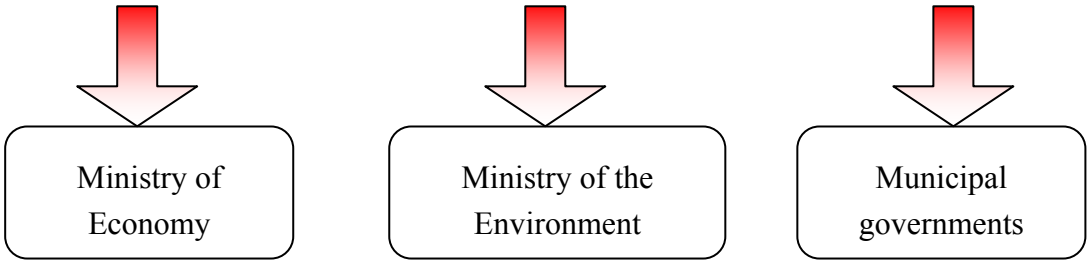
The Department of Energy at the Ministry of Economy is directly responsible for development of the RES sector in Lithuania. The department controls companies operating in Lithuania and monitors the establishment of new firms. The following is the general legal framework that outlines and regulates RES related activities:



- EU strategy for biofuels by 2030. (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0034:FIN:EN:HTML)
- Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market. (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0077:EN:HTML)
- Directive 2003/30/EC of the European Parliament and of the Council on the promotion of the use of biofuels or other renewable fuels for transport. (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0030:EN:HTML)
- Communication of 01/10/2007 from the Commission to the European Council and the European Parliament - An energy policy for Europe. (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0001:FIN:EN:HTML)



- Resolution on approval of the national energy strategy (*Official Gazette*, 2007, No. X-1046) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=292522)
- Law on Biofuel, Biofuels for Transport and Bio-oils (*Official Gazette*, 2000, No. VIII-1875) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=243625)
- Law on Energy (*Official Gazette*, 2002, No. 56-2224) - available only in Lithuanian at time of reporting (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=297894&p_query=&p_tr2=)
- Program for promotion of the production and use of biofuel in 2004–2010 (*Official Gazette*, 2004, No. 133-4786) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=265232)
- National energy efficiency program 2006–2010 (*Official Gazette*, 2006, No. 443) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=305634)



The Ministry of the Environment solves all the issues related to the use of resources. On the basis of the laws adopted by the parliament, the Ministry of Economy identifies rules for economic activities, whereas municipal governments monitor how companies observe the rules.

1.3. EU, NATIONAL SUPPORT AND TAX RELIEF

The RES sector is supported by the European Union. It's one of the priority areas of the economy for the receipt of support.

1.3.1. 2007-2013 EUROPEAN UNION STRUCTURAL FUND PROGRAMME

Use of biomass. Structural fund support is provided for the use of biomass in the production of energy. The following is supported:

- modernization of boilers that provide central heating by changing the type of currently used fuel to biomass or the construction of new boilers;
- modernization of thermal power plants that provide central heating by changing the type of currently used fuel to biomass or the construction of new plants.

Projects may be implemented by companies (including companies of foreign capital). Approximately 115 million USD is allocated for the program. The maximum amount per project cannot exceed 7.9 million USD. Fifty percent of the project will be funded.

Partial compensation of loan interest. Small and medium size companies will be provided partial compensation of loan interest. It must be an investment loan and cannot exceed 1.13 million USD. Compensation of 50 percent of loan interest is provided for no longer than 36 months.

1.3.2. TAX RELIEF

Law on Pollution Tax. The following individuals and companies are exempt from the ax:

- Individuals and companies are exempt from the tax applicable for environment pollution by transport vehicles using bio-fuel of established standards.
- Individuals and companies are exempt from the tax applicable for environment pollution from stationary sources of pollution for pollutants discharged into the atmosphere when using bio-fuel.

(http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=315265)

Excise Law. Excise relief for energy products from biological materials or materials that include biological additives. The excise tariff is reduced proportional to the amount of biological additives per metric ton of the product. Only a Lithuanian version of the law was available at the time of reporting.
(http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=311521&p_query=&p_tr2=)

2. SOLAR ENERGY

2.1. CURRENT SITUATION

Solar electric energy. No large photoelectric power plants are operating in Lithuania today. There are some small private installations that use solar energy for their needs. Today photo electricity is twice as expensive as that produced by thermal or nuclear power plants. The average electricity price produced by a nuclear plant is 0.089 USD/kWh and that produced by a photoelectric power plant is 0.178 USD/kWh. Due to Lithuania's geographical location, i.e. seasonal, daily, and meteorological changes, it is not expected to make its electricity requirements solely from photo electricity, although this may considerably reduce the consumption of other resources.

Solar thermal energy. Lithuania receives 1,000 kWh/m^2 (total: 65 million kWh) of solar energy per year. But more than 80 percent of it is distributed during the 6 months of April through September. Theoretically, it could be used in agriculture for grain drying and similar purposes. However, there is no widely developed solar thermal energy use in Lithuania.

2.2. LEGAL ACTS

See section 1.2. No other legislation exists.

2.3. EU AND NATIONAL SUPPORT AND TAX RELIEF

No national assistance, tax relief, or support from the 2007–2013 European Union Structural Fund Programme is planned for solar power.

2.4. MAJOR MARKET PLAYERS

No medium or large direct market players producing electricity from photoelectric power plants or other solar energy installations are present in Lithuania. Details of other related companies are provided in the table below.

Company	Contact	Activities
Public limited company AB Vilniaus Ventos Puslaidininkiai	Ateities g. 10, Vilnius. tel.: +370 5 2712200, e-mail: vvp@mail.vvp-uab.lt	The company has developed and produced solar batteries of 13 percent efficiency. Production is based on monocrystal silicon solar battery technology. The plant is trying to develop new technology that would reduce their costs by one-third and increase the efficiency of solar batteries to 15 percent.
Private limited company UAB Saulės Energija	Dubingių g. 3, LT-49362 Kaunas, tel.: +370 688 45876	The company has the capacity to produce solar battery modules by using solar batteries produced in Lithuania.

2.5. MARKET DEVELOPMENT PROSPECTS

The potential of photoelectric power plants is far greater than that of other renewable energy resources. Unfortunately, development of these power plants is impeded by a much higher price per watt of electricity than the price of a traditional power plant. Only new technological principles, new materials or considerable climate changes in Lithuania may substantially change the situation.

2.6. INVESTMENT OPPORTUNITIES

If during the short term (2 years), no new technologies or sources of support are available, production costs will remain high, meteorological conditions in Lithuania will not experience fundamental changes and investment possibilities will remain vague.

In the medium term (5 years), no radical changes are envisaged. There is a possibility that additional EU support sources or more favorable legal framework in the future may make the return on investment more attractive.

According to the Ministry of Agriculture, in 2020, when other types of fuel become more expensive and new technologies develop, the prices of solar energy and standard electric energy will become similar. Thus in the long term (up to 10 years) the price of solar energy may become more attractive than that of other resources. Economic potential includes production of hot water (0.5 TWh), drying of agricultural products (0.8 TWh), and passive heating of premises (1.25 TWh). In the more distant future (more than 10 years), solar energy may be used for central heating in cities and preparation of hot water in the spring and summer.

2.7. SUMMARY

Current situation	
The amount produced, in 2007	Only several private installations for personal needs.
Price	Purchase price of electricity has not been set by the National Control Commision for Prices and Energy; production cost—around 0.178 USD/kWh.
Obstacles	More than 80 percent of solar energy in Lithuania is distributed over a period of less than 6 months.
Prospects	
Two years	Small return on investment, because production costs will remain high.
Five years	No fundamental changes; it is expected that more favorable opportunities will occur with the limitations in the availability of non-renewable energy resources.

For more information, please contact the Lithuanian Energy Institute (http://www.lei.lt/)

Juozas Savickas, tel.: +370 37 401844

3. HYDROPOWER

3.1. CURRENT SITUATION

Currently in Lithuania, around 14 percent of available hydropower resources are being used. This is only 0.3 percent of total energy production in Lithuania. The value of annual production of electricity by all market players in the hydropower sector in Lithuania (in 2007) was 7.45 million USD (see Table 1.3).

Hydropower resources theoretically available in Lithuania total 2.7 billion kWh/year. Eighty percent of the hydropower energy comes from two major rivers—Nemunas River and Neris River. The remaining 20 percent of hydropower resources comes from small hydropower plants (the capacity of under 10,000 kW; hereinafter—SHPP). Large hydropower plants are more economically efficient, but their construction is more complex due to strict ecological and large investment requirements.

Small, fully automated hydropower plants installed on ponds are becoming economical. There are over 20 small hydropower plants in Lithuania. Their total capacity amounts to under 7,000 kW and electricity production is approximately 25 million kWh/year.

3.2. LEGAL ACTS

Production of hydropower is regulated by the many legal acts listed in section 1.2 of this study. The following are additional regulations:

- Water Law of the Republic of Lithuania. (*Official Gazette*, 2003, No. IXP-2175(3SP)) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=207281)

  Only a Lithuanian version of the law was available at the time of reporting.

- Executive order of the Minister of the Environment of the Republic of Lithuania "On the assessment recommendations of the environmental impact of the planned economic activities (installation of hydropower plants)" (*Official Gazette*, 2003, No. 351) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=215779&p_query=hidroenergetika&p_tr2=2)

  Only a Lithuanian version of the order was available at the time of reporting.

3.3. EU, NATIONAL SUPPORT AND TAX RELIEF

No national assistance, tax relief, or support from the 2007–2013 European Union Structural Fund Programme is planned for hydropower. A single large project was completed in this area—

Renovation and modernization of Kaunas Hydropower Plant—could not be implemented without EU support. EU support was allocated because the project was of national significance.

3.4. MAJOR MARKET PLAYERS

There are more than 20 small hydropower plants in Lithuania. The two large hydropower plants and a few small plants are listed in the table below:

Company	Contact	Activities
Kaunas Hydropower Plant	Branch of the public limited company AB Lietuvos Energija. T. Masiulio g. 22A, LT-52439 Kaunas. +370 37 350292. E-mail: khe@lietuvosenergija.lt	The largest power plant in Lithuania that uses renewable energy source.
Kruonis Hydro-accumulation Power Plant	Branch of the public limited company AB Lietuvos Energija. Kruonis 2, LT-56037, Kaišiadorių raj. +370 528 30259. E-mail: khae.office@entra.lpc.lt	The plant is intended for balancing the required electricity supply for the Lithuanian market. It is used during emergencies or outages of Ignalina Nuclear Power Plant. The plant uses hydro resources of artificial water bodies. During excesses of electric energy it pumps water to the water reservoirs located at a higher level, and during shortages of electricity it operates as a standard hydropower plant.
Private limited company Vokė Hydropower Plant	Gižų km. LT-70013, Vilkaviškio raj. +370 698 21521.	SHPP
Private enterprise Padubysio Mill	Lentvario g. 1C, LT-27102, Grigiškės, Vilniaus raj. +370 600 19960	SHPP
Private limited company Angiriai Hydropower Plant	Angiriai, LT-58181. Kėdainių r. +370 37 320518	SHPP. Capacity: 2x625 kW

3.5. MARKET DEVELOPMENT PROSPECTS

In general, SHPP are relatively expensive, in particular smaller ones, but the return on investment is good due to the low cost of electricity. In order to accelerate the development of this market, the

legal/economic policy of the government must come to its aid, because the legal framework still has many shortcomings.

By eliminating the existing bureaucratic obstacles, the government of Lithuania plans to encourage private capital to renovate old hydropower plants and build new small ones on existing ponds. This is one-third less expensive than building them in new locations. In Lithuania there are about 130 possible locations where such plants could be built or renovated. The total power output of plants that could be renovated after renovation would be 16 MW and production would be 60 million kWh/year. All those plants are expected to be renovated in 5–7 years.

3.6. INVESTMENT OPPORTUNITIES

Investment opportunities both for short-term and medium-term investment are similar: investments can be made into the existing infrastructure.

In the long term (over 10 years), it may be possible to build new SHPPs that would produce up to 500 million kWh/year. However, new locations must be thoroughly investigated, environmental impact analyses must be completed, and all environmental protection requirements implemented.

3.7. SUMMARY

Current situation	
Produced amount, in 2007	420 GWh. This is 0.3 percent of the total energy production.
Price	0.089 USD / kWh as of July 31, 2008.
Obstacles	Large hydropower plants are more economically efficient and require a lot of investment; environmental requirements for such plants are of a very high standard. There are no obstacles for the installation of SHPP, but their efficiency is smaller than that of large hydropower plants.
Prospects	
Two years	Investment into renovation of small hydropower plants or building new ones on existing dams.
Five years	Construction of small hydropower plants using modern technologies; exploration of opportunities to build large hydropower plants.

For more information, please contact the Lithuanian Energy Institute (http://www.lei.lt/)

Juozas Savickas, tel.: +370 37 401844

4. BIOMASS

Biomass is one of the most promising types of RES in Lithuania. It consists of various plants and organic substances. Biomass is divided into:

- Biofuel—biodiesel and bioethanol
- Biogas
- Energy crops
- Wood

Each of the groups is detailed below.

4.1. BIOFUEL

There are two basic biofuel products: biodiesel and bioethanol. Tables 1.1 and 1.2 also include bio-ETBE (ethyl tertiary butyl ether). However it is a fuel from bioethanol and will not be detailed here.

CURRENT SITUATION

Biodiesel. In 2007, 1,822,000 metric tons of diesel fuel were produced in Lithuania. Only 24,800 metric tons was biodiesel, with a production value of approximately 4.47 million USD (see Table 1.3). This is 1.36 percent of total diesel amount production. The main obstacles encountered on the market are higher subsidies for diesel producers in neighboring Latvia and cheaper production from the countries in the East, which distorts competition and sale of the products. Biodiesel producers today face rather large problems trying to sell their products and part of the production remains sold lower than market price because of small demand. All the biodiesel produced in Lithuania is exported to the EU, where there is fiercer competition among suppliers.

Bioethanol. In 2007, 14,900 metric tons of bioethanol were produced in Lithuania, which is 0.08 percent of total energy produced with a value of approximately 2 million USD (see Table 1.3). Since 2007, grain prices have been on the rise in the world markets, including Lithuania, but the price of bioethanol has remained unchanged. Therefore the return on investment in the bioethanol production market is rather uncertain, unless the sale price goes up.

Currently, in the retail fuel market, bioethanol E85 is sold only by a single company, UAB Lietuva Statoil, and in only one gasoline station.

Table 4.1.1

Production and development prospects of biofuel in Lithuania in 2004–2010 (*thousand metric tons*)

Year	Production of biodiesel	Production of bioethanol	Total biofuel	Percentage of the total amount of fuel
2004	2.2	1.7	3.9	0.035%
2005	7.0	6.6	13.6	1.1%
2006	10.3	14.3	24.6	2%
2007	24.8	14.9	39.7	4.3%
2008*	150	30	180	10–13%
2009*	190	90	280	15–18%
2010*	190	130	320	18–20%

Source: Ministry of Agriculture of the Republic of Lithuania

** - planned*

LEGAL ACTS

Many legal acts listed in section 1.2 mention biofuel. One other legal document should be mentioned: Order of Ministers of Economy, Environment, and Communications of the Republic of Lithuania "On mandatory approval of quality indices of oil products, biofuels, and liquid fuel used in the Republic of Lithuania" (*Official Gazette*, 2006-08-31, No.: D1-399 / 4-336 / 3-340) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=282263&p_query=biodegalai&p_tr2=2)

EU, NATIONAL SUPPORT AND TAX RELIEF

Direct support from EU funds for the construction of plants for the production of bioethanol and biodiesel is not scheduled. However, separate projects could be developed for the installation of storage or drying facilities for grain and rape seed and receive at least partial support.

The European Commission facilitates financial support to biofuel producers. The Government of Lithuania also provides support from the budget for each metric ton of rape seed and grain used for production. The maximal amount of rape seed and grain for which support is provided is set. Support is distributed among the producers on the basis of their production quantity. Producers of biodiesel and rape seed oil are eligible to receive 72.5 USD/t and producers of bioethanol can receive 51.6 USD/t.

Other types of support and tax relief are described in section 1.3.

MAJOR MARKET PLAYERS

Table 4.1.2 provides a list of the largest ***biodiesel*** producers in Lithuania. The largest company in this industry in Lithuania is the private limited company UAB Mestilla. It operates a methyl esther plant in Klaipėda with European state-of-the-art biofuel production technologies. UAB Rapsoila produces biofuel; its capacity is 10,000 metric tons of methyl esther per year. Biodiesel produced in Lithuania can be used both in summer and winter weather conditions.

Table 4.1.2

Producers of biodiesel and their production capacity (*thousand metric tons*)

Seq. No.	Company	2007	2008	2009*	2010*
1	UAB Mestilla (Kretainio g. 5, Klaipėda. Tel.: +370 697 26500. E-mail: info@mestilla.lt)	100	100	100	100
2	UAB Rapsoila (Ukrinių km., Mažeikių raj. Tel.: +370 443 68022. E-mail: info@rapsoila.lt)	30	30	30	30
3	UAB Baltijos Biodyzelino Centras (Verkių g. 5, Vilnius. Tel.: +370 5 2636267)		30	30	30
4	KB SV Obeliai (Audronių km., Rokiškio rajonas. Tel.: +370 686 09066)	8	20	20	20
5	UAB Arvi Cukrus (P. Armino g. 65, Marijampolė. Tel.: +370 343 97810. E-mail: info@arvicukrus.lt)	12	12	12	12
	Total	**150**	**192**	**192**	**192**

Source: Ministry of Agriculture of the Republic of Lithuania
** - planned*

Biodiesel in Lithuania is predominantly produced from rape seed. Rape seed is cultivated by many farmers, but the special seed for the production of biodiesel is sparsely cultivated.

Table 4.1.3

Producers of rape seed used for biodiesel and their capacity (*thousand metric tons*)

Seq. No.	Company	Production capacities
1	KB SV Obeliai (Audronių km., Rokiškio rajonas. Tel.: +370 686 09066)	13.4
2	UAB Pasvalio Agrochemija (Mūšos g. 19, Pasvalys. Tel.: +370 451 34123. E-mail: pasvalioagrochemija@takas.lt)	6.1
3	Cooperative Raupaičių ūkis (Guragių km, Šiaulių raj. tel.: +370 686 78248. E-mail: raupaiciai@erdves.lt)	5.3

4	UAB ‚Arvi Cukrus (P. Armino g. 65, Marijampolė. Tel.: +370 343 97810 E-mail: info@arvicukrus.lt)	5
5	UAB Žvalguva (Rėkyvos g. 21, Šiauliai. Tel.: +370 41 540616)	4
6	Cooperative Jaros Rapsas (Vilniaus g. 3, Anykščiai. Tel.: +370 381 59084.)	2
7	Farmers the Maksvyčiai (Šalčininkai)	1.6
	Total	**37.4**

Source: Ministry of Agriculture of the Republic of Lithuania

To date, ***bioethanol*** is produced in Lithuania by a single company, UAB Biofuture. However, this monopoly will not last long. Another company UAB Bioetan LT has a new factory under construction. It will have a full production capacity of 100,000 cubic meters and start to produce in the third quarter of 2009. More companies had plans to engage in production, but some larger ones, like UAB Alfabioetanolis (Teatro g. 9a, Vilnius. Tel.: +370 5 2122473. E-mail: adolfas.s@delfi.lt) and UAB Nordetanolis (Pramonės g. 8, Klaipėda. Tel.: +370 46 347485) are now withdrawing from the market due to the reduction in market prices for the product.

Table 4.1.4

Current and planned producers of bioethanol in Lithuania and their production capacity (*thousand metric tons)*

Seq. No.	Company	2007	2008	2009*	2010*
1	UAB Biofuture (Šilo g. 4, Šilutė. Tel.: +370 44 161121)	20	40	40	40
2	UAB Bioetan (A. Goštauto g. 12a, Vilnius. Tel.: +370 6565 9007. E-mail: roman@bioetan.com)			40	85
3	UAB Pasvalio Agrochemija (Mūšos g. 19, Pasvalys. Tel.: +370 451 34123. E-mail: pasvalioagrochemija@takas.lt)			18	18
4	UAB Arvi Cukrus (P. Armino g. 65, Marijampolė. Tel.: +370 343 97810. E-mail: info@arvicukrus.lt)			16	16
	Total	**20**	**40**	**114**	**159**

Source: Ministry of Agriculture of the Republic of Lithuania
* - pla*nned*

Table 4.1.5

Company that embraces all the biofuel market

Company	Contact	Activities
UAB BioNovus	Konstitucijos pr. 7, Vilnius. tel.: +370 5 2394930. E-mail: info@bionovus.lt	Biofuel producer/ecology business company that efficiently uses renewable energy resources. It is the largest waste management operation in the Baltic States and runs several biofuel production plants and waste management plants.

Source: LITBIOMA

The Association of Lithuanian Biofuel Producers and Suppliers "LITBIOMA" (Konstitucijos pr. 7, Vilnius. tel.: +370 5 2394800. E-mail: asociacija@biokuras.lt) has 23 members, including producers of biofuel and all through to research institutions. Their focus is on the implementation of innovations and research. The association is a member of the European Biomass Association (AEBIOM).

MARKET DEVELOPMENT PROSPECTS

Market growth predicted by the Ministry of Agriculture is provided in Table 4.1.1.

INVESTMENT OPPORTUNITIES

In the short term (up to 2 years), investment into newly built biodiesel plants with surplus capacity, instead of building new plants, would be a rational decision, because presently the number of market players is increasing and total market capacity is increasing.

The available production capacity of bioethanol is 1.5 times larger than its current use. The sale of ethanol produced from surplus grain can be discussed with the oil refinery AB Mažeikių Nafta and used there in production.

In the medium term (up to 5 years), it is worth researching the opportunities of building new biodiesel and bioethanol production capacities because current plants may not satisfy the demand.

SUMMARY

Biodiesel	Current situation
Produced amount, in 2007, *thousand metric tons*	24.8 metric tons, which is 0.18 percent of all energy produced.
Price	~1,718 USD/t
Obstacles	Strong competition, problems selling the production.

Prospects	
Two years	Increase in production by 40,000 metric tons is planned due to the growth of production capacity. Possible to invest in the existing plants because the output of such plants may be insufficient
Five years	With increasing oil prices, demand for this product and its price will grow, therefore it is worth investigating opportunities of building new plants.
Bioethanol	**Current situation**
Produced amount in 2007, *thousand metric tons*	14.9 metric tons, which is 0.08 percent of all energy produced.
Price	Retail price of bioethanol E85– 1.35 USD/l
Obstacles	Currently the price of grain is rising, whereas the price of bioethanol remains unchanged. Several companies have already withdrawn from this business.
Prospects	
Two years	A new large plant will open. There will be favorable conditions for investment into the existing capacity.
Five years	With increased demand, there may be a lack of production capacity and thus possibilities for investment in new plants.

4.2. BIOGAS

CURRENT SITUACION

In 2007, approximately 5.2 million cubic meters of biogas was produced in Lithuania with a value of around 0.497 million USD (see Table 1.3). Around 1 million metric tons of industrial and household waste is produced in Lithuania each year. Biodegradable waste is half that amount. Separated biodegradable waste could be used for the production of energy, but no possibilities for production exist in Lithuania presently. Animal manure could be used in approximately 30 pig farms, 343 various companies, and 704 large cattle farms. The annual production potential is 87.4 million cubic meters of biogas or 524.4 GWh. The market players face the following problems:

- Regulatory collision. Three ministries are responsible for this area, but there is no clear cut sharing of responsibilities, and decision-making is complicated.
- Lithuanians are still skeptical of this business. The majority of companies dispose of manure without any interest in producing biogas energy.

- Construction of bio power plants requires a large investment (approx. 695,000 USD per one unit reactor), and only farmers can obtain EU support.
- Due to regulations, it is complicated to sell electricity or heat energy from RES to the state.
- Only power plants built for agricultural purposes are supported.

EU, NATIONAL SUPPORT AND TAX RELIEF

Biogas can be used only for the needs of the farm, but not for commercial purposes. Farmers or companies engaged in the production of agricultural products and willing to build small power plants (15, 20, 30, and 50 kW) are eligible for support. Forty to fifty percent of all expenses eligible for support are compensated. The largest amount per single beneficiary cannot exceed 623,388 USD or per single project—141,680 USD.

Tax relief is also applied as described in section 1.3.2.

MAJOR MARKET PLAYERS

Currently, seven biogas power plants operate in Lithuania and recycle city sewer sludge, pig manure, and a variety of organic waste (see Table 4.2.1). The biogas plants are capable of recycling approx. 350,000 metric tons of organic waste per year. Total capacity of the plants is approx. 16 MW. The majority of them use biogas to produce electricity. The amount of electricity produced is sufficient to satisfy their company (for example UAB Rokiškio sūris) needs for electric energy.

Table 4.2.1

Largest biogas power plants

Company	Capacity	Contact
UAB Sema	7.8 MW	Respublikos g. 82, Panevėžys. Tel.: +370 45 461327. E-mail: sema@sema.lt
Kauno nuotekų valymas (Kaunas Waster Treatment)	3.8 MW	Marvelės 199a, Kaunas. Tel.: +370 37 201723.
Noreikiškių biodujų jėgainė (Noreikiškės Biogas Power Plant)	1.05 MW	Owner: UAB Kauno energija. Respublikos g. 82, LT-5319, Panevėžys. Tel.: +370 37 305650
UAB Vyčia	0.9 MW	Patalmusėlių km., Kauno raj. Tel.: +370 37 436057
UAB Lekėčiai	0.6 MW	Sirvydų k., Lekėčių sen., Šakių raj. sav. Tel.: +370 345 47888
UAB Rokiškio sūris	0.48 MW	Pramonės g. 3, Rokiškis. Tel.: +370 458 55353. E-mail: rokiskis@rsuris.lt
Utenos nuotekų valymas (Utena Waste Treatment)	0.4 MW	Naujasodžio km., Utenos raj. Tel.: +370 8389 65097

MARKET DEVELOPMENT PROSPECTS

This sector has great potential for development in the future, but in order to improve the situation biogas production technologies, energy efficiency, and laws regulating this sector must be improved.

INVESTMENT OPPORTUNITIES

The best option in the short term (up to 2 years) would be to install biogas boilers for farmers and monitor the situation.

In the medium term (up to 5 years), expectations are that the regulations for support will change and support will be provided for more than energy produced for personal needs. It is possible to plan the construction of a boiler unit with an ensured supply of cheap raw materials, but competition is expected to grow in this sector.

SUMMARY

Current situation	
Produced amount in 2007, *thousand*	5,200,000 m^3, which is 0.02 percent of all energy produced.
Price	Raw materials are free or very cheap. No data about the prices of biogas is available, because it is not sold (consumed for personal needs).
Obstacles	Regulatory collision; large investment; negative attitude of Lithuanians; and it is difficult to sell energy. Only those involved in the production of agricultural products are eligible for support.
Prospects	
Two years	No significant changes; opportunities are in the installation of biogas boiler units for farmers.
Five years	Research work will be completed on improvement of the energy efficiency of biogas, which is expected to increase the return on investment. Lobbying must be done in order to bring this issue to the attention of the ministries of the Republic of Lithuania.

4.3. ENERGY CROPS

CURRENT SITUATION

Energy crops are agricultural plants and short rotation coppiced shrubs (e.g., various types of willows (*Salix*)) cultivated as a raw material for biofuel production. Rape seed is used in Lithuania for biodiesel production. In 2007, 120,229 hectares of rape seed fields were declared cultivated for biofuel. Wheat is mostly used for bioethanol production. Approximately 39,000 hectares of wheat were declared to be cultivated for the bioethanol production in 2007. In 2007, 300 hectares of fast-

growing shrubs (willows) were declared to be used as raw material for the production of electricity and thermal energy. There are about 0.5 million hectares of unused land; part of it is perfectly suitable for cultivating energy crops.

The key problem in this sector in Lithuania is decreased EU support, the high price of uncultivated plots of land, lack of support for the acquisition of special equipment, and bureaucracy.

STRAW. There are seven boiler units in Lithuania that use straw fuel. Total output of the units is around 4.49 MW. About 1 percent of straw resources are used for energy purposes. One of the largest engineering companies Cowi Baltic states that up to 15 percent of straw harvest could be used for fuel. The annual potential of straw production in Lithuania is approximately 400,000 metric tons. Current annual output of energy from straw fuel in Lithuania is 50 MWh; by 2020 this figure could reach 1,500 MWh per year.

LEGAL ACTS

Apart from the legal acts listed in section 1.2, the following is the legal framework on energy crops:

Order of the Minister of Agriculture of the Republic of Lithuania "On direct payments for agricultural land and crop fields and payment of support for an energy crop in 2007" (2008, No. 3D-160) (http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=316722).

Order of the Minister of Agriculture of the Republic of Lithuania "On the confirmation of administration and the rules of control of support payment for an energy crop intended for the production of biofuel" (2008, No.: 3D223).
(http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=321753&p_query=biodegalai&p_tr2=2)

EU, NATIONAL SUPPORT AND TAX RELIEF

Direct payment for an energy crop (European Union support and payments from the budget of the Republic of Lithuania) annually amounts to 257 USD per hectare of land.

Production of biomass by growing fast rotation shrubs is also supported. Maximal expenses for cultivating willows (*Salix*) and shrub willows (*Salix* subgen. *Caprisalix)* eligible for funding amount to 2,338 USD/ha, and for common osier (*Salix Viminalis*) this figure reaches 1,634–3,737 USD/ha. The support cannot exceed 623,388 USD per single beneficiary and 141,679 USD per single project. Beneficiaries: individuals and companies that own agricultural land. Forty to fifty percent of all expenses eligible for support are compensated.

Support available for the construction or modernization of boiler units is described in section 1.3.1. It is also possible to apply all tax relief instances listed in section 1.3.2.

MAJOR MARKET PLAYERS

To date, there are not many players in this market, but several companies cultivate energy crops and several purchase these crops.

Many farmers cultivate rape seed and corn for biofuel. Usually they are cultivated by medium-sized farms with several hundred hectares of land with only some of the production devoted to crops for energy production.

Company	Contact	Activities
UAB Renergija	Žirmūnų 38a-30, Vilnius. Tel.: +370 698 11 300, e-mail: donatas@renergija.lt	Cultivation of energy crops.
Farm "Gamtos turtai"	Žingių km., Sužionių sen., Vilniaus raj., tel.: +370 682 10 884, e-mail: info@gamtosturtai.lt	Cultivation of willows and other plants.
UAB BioNovus	Konstitucijos pr. 7, LT-09308, Vilnius. Tel.: +370 5 239 49 30, e-mail: info@bionovus.lt	Purchase, production, and supply of osier biofuel.
UAB Žaliasis Kuras	http://www.zaliasiskuras.lt/kontaktai.html	Cultivation and distribution of an energy crop.

Currently, the majority of biofuel power plants are located around the city of Kaunas (seven plants). Four boiler units that use straw operate in the Panevėžys district.

In the near future, Lithuanian heating supply companies are planning to implement projects that will call for a rather large investment: reconstruction of Petrašiūnai Power Plant for the consumption of biofuel (11.2 million USD) and the construction of a biofuel cogeneration power plant in Utena (8.9 million USD).

MARKET DEVELOPMENT PROSPECTS

A 500 percent growth in biodiesel production is forecasted starting from 2008. Therefore, the demand for rape seed will increase from 135,000 metric tons to 570,000 metric tons per year. According to the calculations made by the scientists of the Lithuanian Academy of Agriculture, as many as 400,000 hectares of land could be allocated for the cultivation of rape seed. This would fully satisfy the demand for biodiesel. The Ministry of Economics believes that by 2009 the production of bioethanol in Lithuania will increase fourfold and that the demand for grain will therefore increase respectively.

Table 4.5.1

Demand for energy crops for the production of biofuel (*thousand metric tons*)

Crop	2007 (consumed)	2008*	2009*	2010*
Rape seed	75	450-500	500	500
Corn	52	100	300	450

Source: Ministry of Agriculture of the Republic of Lithuania.

- *- planned*

INVESTMENT OPPORTUNITIES

In the short term (up to 2 years), cultivation of various crops could be done as this does not require a large investment, but, according to the laws of the Republic of Lithuania it is necessary to own the land. Since the EU set an objective for Lithuania to increase the production of electricity from RES to 7 percent by 2010, this would considerably contribute to the development of this sector.

In the medium term (up to 5 years), establishment of willow plantations should be welcome and the support of investors and the EU is expected.

SUMMARY

Current situation	
Produced amount in 2007	159,489 hectares. On average 3.6 metric tons per hectare, which amounts to approx. 574,000 metric tons.
Price	Rape as energy crop: approx. 626 USD/t; willows: 1 m^3 of wood approx. 10 USD.
Obstacles	No support for the purchase of equipment, long procedures and bureaucracy acquiring land for crops, declarations, etc.
Prospects	
Two years	No large investment required, therefore it possible to investigate opportunities to purchase suitable plots of land, though the selection of large plots is very limited.
Five years	Depends on the situation in the future, but the conditions for the development of this industry are favorable, and the market for the products is expected to grow.

4.4. WOOD

CURRENT SITUATION

The annual volume of tree felling in Lithuania is around 6 million cubic meters. The consumption of wood fuel and wood waste fuel is around 3.7 million cubic meters. Wood accounts for 6 percent of the total energy produced in Lithuania and amounts to approximately 148.9 million USD (see Table 1.3) per year. Most wood fuel is sawmill waste. Forestries have started selling logging waste and an increasing number of boiler operators use it for fuel. Timber potential has nearly been exhausted; but there is still a lot of wood/logging waste available

EU, NATIONAL SUPPORT AND TAX RELIEF

Support for afforestation. Seventy to eighty percent of all expenses for afforestation are compensated. Beneficiaries: land owners. They receive payment for planting, 5-year maintenance and protection payment, and annual compensation for lost revenue. Payment for farmers: 177 USD/ha; payment for all others: 39.7 USD/ha.

All the measures listed in section 1.3 can be applied for RES from wood.

MAJOR MARKET PLAYERS

There are many boiler units in Lithuania that use wood fuel. They are scattered throughout the country. The main companies that supply and use wood chips are listed in the table below.

Company	Contact	Activities
UAB Vertma	Vertimų km., Anykščių raj. Tel.: +370 610 01248, e-mail: vytautas@vertma.lt	Production of wood chips for biofuel.
UAB BioNovus	Konstitucijos pr. 7, LT-09308, Vilnius. Tel.: +370 5 239 49 30, e-mail: info@bionovus.lt	Purchase, production, and supply of wood biofuel raw materials.
AB Simega (boiler units)	Gedimino g. 85, LT-4880, Kupiškis. Tel.: +370 459 35173.	Wood waste boiler unit. Power: 16.5 MW.
AB Panevėžio Energija	Boiler unit in Rokiškis. Tel.: +370 45 501059, e-mail: taucikas@pe.lt.	Wood waste boiler unit. Power: 7 MW.
AB Jonavos Šilumos Tinklai	Boiler units in Rukla. Tel.: +370 616 06562, e-mail: jst.centras@jonava.net.	Wood waste boiler unit. Power: 2.8 MW.

Lithuanian heating supply companies plan to reconstruct several boiler units to take wood fuel. Therefore, they will require a fair amount of private investment. Boiler units are described in section 4.3 major market players. (Support for reconstruction is described in section 1.3).

MARKET DEVELOPMENT PROSPECTS

Currently, forest logging waste has started to be used for boiler units, but not many boilers are established. The available resource of this waste is around 1 million cubic meters. In order to consume this in a year, a total capacity of 300 MW boilers would be required.

INVESTMENT OPPORTUNITIES

In the short term (up to 2 years), opportunities exist in the cultivation of straw and forests, the collection of wood waste or the acquisition, renovation, and development of available boiler units.

In the medium term (up to 5 years), construction of a power plant or a boiler unit might be possible. This will be a low cost operation.

SUMMARY

Current situation	
Produced amount in 2007, *thousand*	3,718,000 m^3, this is 6 percent of the total energy produced.
Price	Wood fuel is sold at approx. 20 USD/m^3.
Obstacles	Timber potential has nearly been exhausted due to the large furniture industry; only waste or straw is available; collection of straw can be done in a short time.
Prospects	
Two years	Due to limited supply, there may be an increase in the price of timber, and timber will be more difficult to obtain. Amounts of wood/logging waste and straw will increase. Investments into the construction of boiler units could therefore be possible.
Five years	No considerable increase in raw materials, but the price of energy may go up and the conditions for this kind of business will improve.

For more information, please contact the Association of Lithuanian Biofuel Producers and Suppliers LITBIOMA. Remigijus Lapinskas, president. Tel.: +370 5 2394901. E-mail: asociacija@biokuras.lt

5. GEOTHERMAL ENERGY

5.1. CURRENT SITUATION

Geothermal energy in Lithuania is produced from a water basin horizon at a depth of up to 100 meters in Klaipėda and in Vilnius. Thermal output is 0.114 MWt. Geothermal electric energy may be produced from hot dry rock available only in Western Lithuania, at a depth of 2.5–4.5 kilometers. The temperature of the rock must be 100–145^{o}C.

In 2007, 9GWh of geothermal energy was produced, which is around 0.013 percent of the total energy produced. According to the results provided in Table 1.3, this could amount to 2.98 million USD.

One of the pioneering geothermal systems uses underground water as a thermal source from the Žemaitija–Dainava Quarternary inter-morainic water basin horizon. The depth of the wells are around 60 meters, the temperature is +12^{o}C, and water yield is 3.5–5 m^{3}/h.

A sample project has been implemented in Klaipėda (on the Baltic coast), for the centralized city heating supply. Four wells are operating (two production and two injection). The temperature of the underground water is +39^{o}C. A heat pump is used to raise the temperature to the requirements of the consumers.

In Vydmantai (close to the Baltic coast), two geothermal wells were drilled. They were intended for the operation of the hydrogeothermal complex using Cambrian water basin. The temperature of the underground water was +73^{o}C. Due to lack of financing, this project was not completed, and the wells were sealed. If money becomes available, the project could be completed. The Vydmantai-1 well is the deepest in Lithuania, reaching 2.564 km.

Geothermal energy for heating private houses can be produced by installing heat pumps. At a depth of 1–1.3 m, pipes are installed that collect energy. Eighty percent of the required heat energy of households could be produced in this way. The price for a system like this is approximately 18,000 USD.

5.2. LEGAL ACTS

See section 1.2. No additional legal acts exist.

5.3. EU, NATIONAL SUPPORT AND TAX RELIEF

No national assistance, tax relief, or support from the 2007–2013 European Union Structural Fund Programme is planned.

5.4. MAJOR MARKET PLAYERS

There is only one direct market player that provides energy to half of the city of Klaipėda; all others are equipment producers.

Company	Contact	Activities
UAB Geoterma	Lypkių g. 53, Klaipėda. Tel.: +370 46 326163	Supplier of geothermal energy for the city of Klaipėda heating network.
UAB Kauno Hidrogeologija	Rinkūnų km., Kauno raj. tel.: +370 37 393353. E-mail: kaunas@hidrogeol.lt	Design and installation of geothermal heating systems
V. Pudžiuvis service company "Kompresina"	Dariaus ir Girėno g. 14A, Tauragė. Tel.: +370 446 46962. E-mail: info@kompresina.lt	Geothermal heating for private houses
E. Gedminčius company "Sanresta"	Dubysos g. 62, Klaipėda. Tel.: +370 46 397880. E-mail: info@sanresta.com	Geothermal heating for private house

5.5. MARKET DEVELOPMENT PROSPECTS

There are many opportunities and ways to use geothermal energy in Lithuania. Dr. Povilas Suveizdis and Dr. Vita Rasteniene from the Institute of Geology and Geography maintain that an assessment about producing electricity from geothermal energy is available, and calculations have been made about satisfying the demand for energy of the entire city of Klaipėda with geothermal energy.

5.6. INVESTMENT OPPORTUNITIES

In the short term (up to 2 years), no fundamental changes in the market are expected. The easiest investment opportunity is to establish a company for the production and installation of geothermal systems for heating private houses (or small residential communities).

In the medium term (up to 5 years), production of electricity from geothermal resources should be considered by an investor or a boiler station should be built to supply a city with heat.

As mentioned above, it is possible to invest in the deepest well in Lithuania (which is in Vydmantai, close to the Baltic coast and is currently not in operation). The community of Baisogala (central Lithuania) has also made an assessment of the geological conditions of the area and hopes to find investors for the implementation of a geothermal project in their town.

5.7. SUMMARY

Current situation	
Amount produced, in 2007.	9 GWh. This is 0.013 percent of all energy produced.
Price	No trade of geothermal energy takes place. Installation of an individual system costs around 18,000 USD.
Obstacles	Environmental conditions are not very favorable to produce this energy. No understanding by businesses of the importance of geothermal energy and no funding from EU Structural Funds is available.
Prospects	
Two years	Investment into companies that install geothermal systems for private houses.
Five years	Possibility of producing electricity from this energy or supplying energy from thermal wells. Lobbying must be done in order to bring this issue to the attention of the ministries of the Republic of Lithuania.

For more information, please contact the Lithuanian Energy Institute (http://www.lei.lt/)

Juozas Savickas, tel.: +370 37 401844

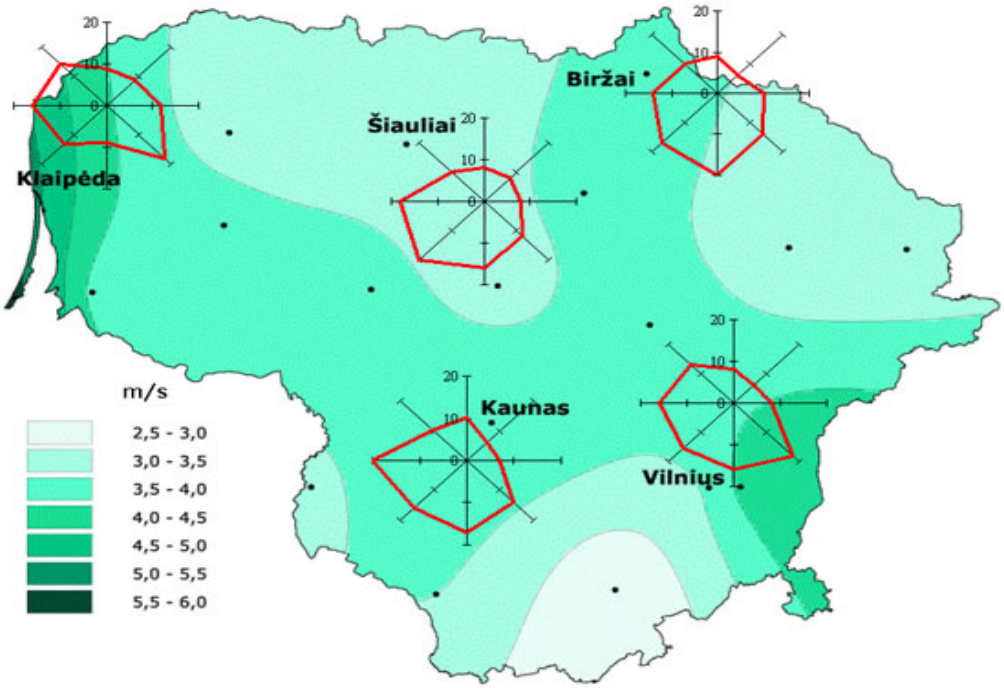
6. WIND POWER

6.1. CURRENT SITUATION

For the production of wind power, a primary assessment of wind power resources was carried out by the Lithuanian Energy Institute by using many years of meteorology station data. This assessment shows that the use of wind power in Lithuania is possible and economically viable.

Picture 6.1

Wind speed at a height of 10 meters above the surface (meters per second)



Source: Lithuanian Hydrometeorology Service

The appropriate use of wind power in Lithuania is the production of electricity (wind power plants). In 2007, 106.1 GWh of electric energy in Lithuania was produced by wind turbines. This was only 0.08 percent of the total energy produced (according to Table 1.3, the approximate value would be 19.86 million USD). At the beginning of 2008, the total capacity of 36 wind power plants in operation in Lithuania was 52.3 MW. There are two wind power parks connected to the 110 kV transmission lines of electric energy provider AB Lietuvos Energija. The Republic of Lithuania participates in a power project aimed at creating proper conditions for efficient development of wind power production in the Baltic Sea region.

Following a decision of the Government of the Republic of Lithuania, starting from January 1, 2009, the purchase price of electric energy produced at wind power plants will be increased to 0.135 USD/kWh.

6.2. LEGAL ACTS

See section 1.2. No additional legal acts that affect wind power production exist.

6.3. EU, NATIONAL SUPPORT AND TAX RELIEF

Support is available on the basis of the EU Rural Development Program, 2007–2013 measures for construction of wind power plants. Support is provided according to the second set of activities of "Modernization of land holdings"—the construction of small capacity (up to 250 kW) wind power plants. The power plant must be used for the production of agricultural products or for personal needs. A small capacity wind power plant costs around 361,400 USD, around 1,559 USD per one kW.

6.4. MAJOR MARKET PLAYERS

Two large wind power parks operate in Lithuania (both in the coastal area), the rest are individual wind turbines. The larger of the two is UAB Vėjo Spektras Park with the capacity of 30 MW, and the other—Laukžemės Wind Power Park—has a capacity of 16 MW. All other power plants are linked to the 0.4–10 kV network of Vakarų Skirstomieji Tinklai (VST, Western Distributions Network). Total capacity of these other plants is under 5.5 MW.

Company	**Contact**	**Activities**
UAB Vėjo Spektras	Dvaro g. 4A, Kretinga. Tel.: +370 687 81120	Wind Power Park
Laukžemės Wind Power Park	Achemos grupė. Jonalaukio km., Jonavos raj. tel.: +370 349 56237. E-mail: sekretoriatas@achema.com	Wind Power Park

The Lithuanian Wind Energy Association (Baltijos pr. 123-61, Klaipėda. Tel.: +370 46 350560) aims to create and develop full cycle wind energy operations in Lithuania as an ecological and technologically advanced area of the energy sector.

6.5. MARKET DEVELOPMENT PROSPECTS

Lithuania's National Energy strategy plans that by 2010 total power of wind plants will reach 200 MW and will amount to 2.5–3 percent of the total energy produced due to obligations imposed by the EU to increase the share of electricity produced from renewable energy resources to at least 7 percent. Geographical zones are allocated for the producers willing to build wind power plants as well as total output capacity for the plant. According to Lithuanian law, all territories are divided

into six zones with an open tender procedure put forward for each of them; wind power plants can be built just in these zones. All zones, where wind power plants can be built, are in Klaipėda County near the Baltic Sea.

Lithuania plans to implement wind power projects in its territorial waters. Unfortunately, the coast line is only 99 km and is allocated for various types of use. The Strategic Committee for Energy made a decision that wind power facilities in the sea will be developed starting from 2010. Currently, a feasibility study is being prepared for this type of activity and an environmental impact assessment is being carried out to balance the interest of those engaged in sea transportation, fishing, and wind power production.

6.6, INVESTMENT OPPORTUNITIES

In the short term (up to 2 years), investment is expected in the expansion of wind power parks in the coastal territory. The best option is to build small wind plants of up to 250 kW that will give a more rapid return on investment than the large parks, but the small plants can supply energy only to a few land holdings.

In the medium term (up to 5 years), the construction of large wind power parks should be considered with connection to high voltage transmission lines of AB Lietuvos Energija. In addition, construction of more powerful and efficient wind power plants in the Baltic Sea could be considered because of new available technologies.

6.7. SUMMARY

Current situation	
Amount produced	106.1 GWh. This is 0.08 percent of the total energy produced.
Price	0.135 USD/kWh from 01/01/2009
Obstacles	Construction of wind turbines is confronted by the opposition of local residents who do not want have such facilities in the vicinity of their homes; limited territory where strong winds prevail (only 99 km).
Prospects	
Two years	Opportunities to build small wind plants of up to 250 kW.
Five years	Construction of large wind power parks or projects for sea wind power plants.

For more information, please contact the Lithuanian Wind Energy Association. Aleksandras Paulauskas

Tel.: +370 46 350560. E-mail: info@lwea.eu.