Non-cost barriers to renewables – *AEON* study

Lithuania

Ms. Nora Mzavanadze, MSc

- Confidential -

Client: DG TREN
ECORYS Nederland BV
Contact author: Jeroen Daey Ouwens: Jeroen.DaeyOuwens@ecorys.com

Rotterdam, 10 May 2010

ECORYS Nederland BV
P.O. Box 4175
3006 AD Rotterdam
Watermanweg 44
3067 GG Rotterdam
The Netherlands

T +31 (0)10 453 88 00
F +31 (0)10 453 07 68
E netherlands@ecorys.com
W www.ecorys.com
Registration no. 24316726

ECORYS Macro & Sector Policies
T +31 (0)10 453 87 53
F +31 (0)10 452 36 60

Table of contents

1 Issue 1 Administrative Procedures

1.1 Introduction

The lack of a comprehensive legislative and administrative structure in Lithuania for the development of renewable energy sources (RES) is generally considered as a barrier and many areas of improvement have been identified in this chapter. The obstacles to the development of RES installations in Lithuania are the absence of legal regulations and associated administrative procedures.

The main barriers in development of RES facilities in Lithuania are the following:

- gaps in national regulation of RES;
- long lasting, unclear and troublesome administrative procedures;
- weak spatial planning enforcement;
- limited consideration of environmental and community matters in planning RES development e.g. no requirement for Environmental Impact Assessment (EIA) studies for RES developments;
- long and complex process for obtaining permits.

The majority of renewable energy developers interviewed for this study have largely agreed that the administrative procedures are inefficient and complicated; especially those procedures related to the new renewable energy types (in particular wind). Spatial planning procedures are too lengthy and competing public interests are present.

The absence of a comprehensive legal framework is perceived as the most important barrier for Lithuania as it creates further problems and confusion at the administrative level.

1.2 Description of barriers & solutions

1.2.1 Detailed description of the barriers and solutions

Barrier 1.1 – Inefficient general administrative procedures

In Lithuania the RES sector is not regulated by means of a single act dedicated to RES. The legal framework consists of a number of articles in common law on energy and in resolutions of the government.

Below are examples of legislative acts which regulate RES issues at present:

- Law on Energy (2002);
- Lithuanian National Energy Strategy (2007);

- Law on Electric energy (2000);
- Law on Heat Economy (2003).

Before 2008, the Ministry of Economy was assigned the responsibility for renewable energy development in Lithuania. In 2008, Ministry of Energy was created with a renewable energy resources department. It is the main driving force of new legislation and regulation on renewable energy today.

The legislative base for renewable energy is incomplete, there are gaps and inconsistencies. The absence of a comprehensive legal framework creates problems at the administrative level as lower tier regulations are consequently incomplete.

The following **legislative** barrier was identified:

Incomplete legislative base for renewable energy development. The majority of stakeholders interviewed for the purpose of this study have emphasized that the single most important non-cost barrier for renewable energy in Lithuania is its incomplete legislative base for renewable energy, which consequently is followed by difficulties at administrative level.

The completeness level of legislation differs for the technologies as indicated below.

Regarding **biomass** systems:

- The legal framework for biomass and biofuel (for transportation) technology is relatively well developed as there is more practical experience for these types of renewables (Law on Biofuel, Biofuels and Transport and Bio-Oils, 2000).

Regarding **wind, solar, geothermal** installations:

- The legal framework for wind, solar and geothermal technology, considered to be newer forms of renewable energy in Lithuania, are not well defined in legislature.

The regulatory framework has been perceived as a barrier for the development of renewable energy in Lithuania. However the new renewable energy law is being prepared and eventually administrative barriers for renewable energy might be minimised.

In 2009 a draft renewable energy sources law has been prepared by a multi-stakeholder group (Board of the Lithuanian parliament 2009). The draft RES law outlines the general administrative requirements for renewable energy producers and suppliers, technical conditions for connection to the network, energy prices calculation, etc. The draft RES law has been presented to the public and the members of the Parliament in February 2010 and it is expected that it will take around six months to accept it. The interviewed stakeholders in general expressed their positive attitudes that this initiative may reduce the obstacles for renewable energy development in Lithuania. The law and the following regulations may create a more efficient administrative base for renewable energy development. **Possible solution:** Implement the single act on RES that has been drafted for Lithuania in 2010. The proposed single act dedicated specifically to RES regulations may reduce the administrative barriers that are identified below.

The following general **administrative** barriers were identified:

Long lead time to obtain necessary permits. One of the reasons for the low renewable energy deployment in Lithuania is a long time required to obtain all the necessary permits. In Lithuania it can take many years to obtain all the permits necessary to construct a RES plant. Also it may be unclear how long procedures will take, the number of institutions involved and etc.

Regarding **wind energy** installations:

- Delays of administrative institutions are common in Lithuania. Issuing one permit might take up to 4 months and the total number of permits varies; in some cases exceeding 15 permits per one development. Situations have been encountered where permits for the construction of the wind turbine are in place, however the permit for construction of the transformer station is delayed or not received.

In total the administrative process is reported to take minimum 3 years. The initial process relating to necessary permits and spatial planning may take up to 2 years. The process of obtaining permits implies administrative costs, however none of the respondents was able to estimate these total costs of the administrative procedure. The costs are generally perceived as high.

Regarding **biogas** installations:

- The authorisation process is also reported to be long in the case of biogas energy installations. In this case, spatial planning procedure is required and it takes approximately 1 year. The municipality issues the technical conditions and the developer has to prepare a project according to the specifications. Finally, the project must be presented to the municipality and the permit for construction may be issued. Preparation of the project takes an additional year. Therefore, the total procedure takes at least 2 years.

Regarding **hydroenergy systems:**

- In the case of small-scale hydroelectric station, the total process of getting the final permit for construction takes around 2-2.5 years, out of which 1 year is devoted for the preparation of the project according to the technical conditions issued by the municipality.

Regarding **solar** energy installation:

- Solar systems (for electricity or heat) are generally being built to satisfy household's needs in Lithuania today and there are no permits required for that. There are no larger, commercial solar energy installations or cases of excess energy sales to the grid from solar energy installations yet.

Regarding **photovoltaic solar** energy installation:

- If it is the case of photovoltaic solar energy installation when the surplus electricity is planned to be fed to the grid, in total there are 4 permits needed. According to the solar energy developers interviewed for this study, this process would take around 3-6 months. It is worth mentioning that there are no solar power installations connected to the grid in Lithuania to date. (Pinigų karta 2010).

Possible solution. Develop a one-stop shop for coordinating all steps of the permitting procedure for different types of RES technology. Currently in Lithuania one-stop shop is not possible. Clear guidelines for authorization procedures are recommended, and obligatory response periods for the authorities involved should be incorporated in these procedures.

Complexity of administrative procedures. Another barrier correlated with the long lead time barrier described above is the complexity of administrative procedures. In Lithuania the number of authorizations and authorities involved is perceived as too large and might pose a barrier in the application process.

According to the interviewees, too many different institutions are involved in the authorisation process. In Lithuania it is the municipality that is responsible for issuing a list of institutions to be involved in the permitting process at each specific case. There are no clearly defined rules for issuing a permit. The number of permits and the process of the administrative procedure largely varies depending on the municipality, on the exact location of the proposed development and on specific features and objects in the vicinity of the proposed development location. The final permit is issued at the municipality level and it has been reported by interviewees that 10-15 institutions are usually involved in the process.

Regarding **wind energy** installations:

- For instance, if the land plot proposed for the development of a wind farm includes natural gas network, a permit from the gas distribution company is required. If there are objects of national security and objects of military importance in the vicinity of the site, a permit from the defence ministry is required. In some cases the aviation agency and airports might be involved in this process if an airport is nearby. **Possible solution:** a considerable improvement could be made by reducing the number of local, regional and national administrations involved in the authorization process for permits.

Administrative procedures do not take fully into account the particularities of individual RES technologies. The administrative procedures do not take into account the particularities of individual RES technologies in Lithuania. The necessary health and environmental regulations are not defined as to avoid damage for local inhabitants and the environment. This might not seem as a barrier of RES installers in short-term because the administrative process is easier. However it is argued in this study that the lack of consideration of environmental and social aspects in the permitting process particular to individual RES technologies may pose social concern barriers in long-term.

Regarding **wind energy** installations:

- Environmental Impact Assessment (EIA) studies are not required in Lithuania for any RES developments e.g. for wind farms proposed in a bird zone areas (Paplauskis 2009). It is not allowed to build wind farms in protected areas, however there are no regulations on the buffer zones for the protected areas. In this case there is a risk of environmental damage and the local environmental authorities are not involved in the process. The local communities also start to protest against renewable energy project in their neighbourhood and one of their most significant concerns is health. As a

result the decision-making process on approval of a RES development is non-transparent and does not take into account relevant environmental and social considerations.

Regarding **shallow geothermal** – heat pump installations:

- There are no authorisation procedures, no permits required for heat pump installations. A few stakeholders have expressed their concerns over the safety and environmental performance of shallow geothermal installations. **Possible solution:** National legislation and administrative regulations for renewable energy sources should include specific requirements on safety, health and environment. Currently they are either non-existent, poorly implemented and in-consistent. Special spatial planning procedures at national or municipal level should be launched that would foresee renewable energy developments in the area and would map environmentally sensitive areas and buffer zones for the inhabitants. Public consultation should be part of this process.

Barrier 1.2 – Competing public interests

Competing public interests represent another barrier related with the administrative procedures. During the administrative procedure, different competing interests must be balanced, for example environmental protection, neighbours interests, etc.

The following competing public interests were identified:

Competing energy interests at a strategic energy policy level. The political situation has become more favourable for the development of renewables in Lithuania when a coalition of the right wing conservative and liberal parties took the wheel of the government in autumn 2008. The 15th programme of the government declares special attention for renewable energy development and raises targets (PoGoL 2008). Before that the social democrats were behind the wheel of the government two terms in the row. The rule of the right wing coalition also coincided with the closure of the Ignalina Nuclear Power Plant in the end of 2009.

Most of the interviewed stakeholders feel that the climate for renewable energy development is improving due to these political changes and also the impact of Ignalina nuclear power plant closure. Similarly to other EU Member States, there is uncertainty and ongoing discussions concerning the future of the energy sector, especially with regards to nuclear energy continuation.

The majority of stakeholders interviewed agreed that the future of the renewable energy for electricity is going to depend on the future of the Lithuanian nuclear energy policy. A decision on building a new nuclear power plant in 2016-2020 has been made. However the process is slow and there huge uncertainties at the very initial level of investment and organizational issues (Law on Nuclear Power Plant 2007).

Lithuania currently has a political incentive to develop renewable energy due to the closure of the largest electricity producer – Ignalina Nuclear Energy Plant. However, quantitative limits for each type of renewable energy re planned to be imposed by the new law on renewable energy sources (the limits of installation capacities are in the draft

version of the law). Interviewees expressed opinions that the quantitative limits are too low and identified a barrier of competing interests with lobby groups from the conventional energy sector – nuclear and fossil fuel. At the same time, competition is felt among the different renewable energy producers (wind, solar etc.) over the quotas that are being determined by the new law.

Environmental protection. Public interests in the area of environment protection have come across as a barrier in Lithuania mainly in case of small hydropower plants and wind farms.

Regarding **small hydropower plants** the presence of protests proves competing interests with reference to environmental protection. In 2009 the government's strict approach towards protection of rivers became seriously questioned by scientists, hydroenergy specialists and policy-makers. Environment protection has been identified as a barrier in the development of small hydropower plants.

The government's resolution (No 1144 from 2004) to conserve ecologically and culturally valuable rivers with a natural riverbed impedes the development of RES installations on rivers (GoRoL 2004). The Water Law forbids building dams on ecologically and culturally valuable rivers. However 90% of the protected rivers are identified as most attractive rivers for small-scale hydroelectric development. As a result the legal circumstances in Lithuania freeze further development of RES installations on the rivers mentioned under resolution No 1144 from 2004. In 2009 there was an initiative to amend the regulations on protected rivers in order to enable hydropower development.

In 2009 strong public opposition was organized against the abolition of the government's resolution with a public petition and campaigning on environmental grounds. The environmental movement argued against increasing the share of hydroelectric energy and interrupting protected ecosystems, landscapes, cultural heritage, fisheries and biodiversity (Juknys 2009, Mėlynas vingis). As to date (March 2010) it is against the law to develop small-scale hydropower plants on the protected rivers and it is not likely that small-hydropower development will accelerate.

Regarding **wind farms**, environmental protection interests and protests also hinder the administrative decision making process. The absence of clearly elaborated government rules increases the significance of this barrier. Local communities and environmental groups oppose the development of wind energy projects in Western Lithuania (area renowned for the best wind energy potential). Protests are based on environment protection reasoning (e.g. absence of the sanitary zones, bird migration areas) health concerns, conflicting development interests (especially tourism) and landscape damage (Paplauskis 2009).

Local protests also focus on restricting development of wind farms on the Lithuanian seaside under the protected area regime (Kuršių Nerija National Park and Pajūris regional Park). Environmental Impact Assessment is not required by law for wind energy projects hence there is a general environmental concern of the public. The pressure groups urge for environmental responsibility shown by the developers. **Possible solution:** Establish a consultation forum for spatial planning at the state level with a multi-stakeholder dialogue

between RES developers, environmentalists and strategic planners. The process could bring new possible solutions for developing RES-specific administrative procedures that take environment protection into account. Social responsibility of RES developers could be promoted as well and this issue has been raised by several stakeholders during interviews. For instance, Lithuanian wind power association is currently developing ethics code.

Cultural heritage and monumental protection. Public interests in the area of cultural heritage protection have come across as a barrier mainly in case of solar installations.

The barrier of public conflicts on cultural heritage issues regarding the installations of solar energy on the roofs has been observed in Lithuania. Solar energy installations on the roofs are not allowed or are restricted in protected areas (cultural heritage) and also in historical old towns of Lithuania for the purposes of protecting the cultural heritage and authenticity of landscape. The cultural heritage and monumental protection problem regarding RES installations fall under monument protection laws and regulations. This problem crosscuts with the issue 3 Building Integrated Technologies and hence is discussed further in section 3.

Possible impacts of this barrier are increasing probability to interrupt RES projects and increasing probability of rejection of RES projects. **Possible solution.** Amend the monument protection law in Lithuania and where possible, allow compromises.

Barrier 1.3 – Inexistent or insufficient spatial planning

Weak spatial planning enforcement represents another barrier related with the administrative procedures issue in Lithuania. The spatial planning process, although relatively well developed in Lithuania, is associated with corruption, gaps in legislature, poor implementation and control. Therefore, the view which prevailed amongst interviewees was that renewable energy plants may be built in any area regardless of spatial plans (Paplauskis 2009).

If the renewable energy development is proposed in Lithuania in a location that is assigned under a different purpose/activity then the process of changing the purpose of the land is initiated by the developer. For example the spatial planning procedure in case of a biogas facility usually takes 1 year. Once the spatial plan is changed the municipality issues the technical conditions and the developer prepares a project according to the specifications.

The Law on Spatial Planning (Nr. I-1120 from 2009) recently provided basis for simplified spatial planning procedures in Lithuania. According to the legislation, renewable energy installations are exempted from preparing a detailed spatial plan in the following cases:

- a single wind power plant up to 250kW capacity with a sanitary zone of 1.5 height of the plant;
- solar energy plants up to 100kW capacity;
- biogas installation up to 1 MW capacity being built on the premises of meat and diary farms.

The following barrier in the area of spatial planning was identified: weak enforcement of spatial planning and poor incorporation of potential RES developments into spatial planning procedures at an early stage.

Insufficient guidance and guidelines on environmental and community matters. Insufficient guidance and guidelines on environmental aspects of spatial planning for RES development has been identified as a barrier. The spatial planning procedure does not take into consideration the issues related to sanitary zones. This invokes community concerns and non-transparent decision making which slows down the administrative process of approving the RES development.

Currently sanitary zones are not defined by law or guidelines in Lithuania. For example in the case of wind energy installations, according to the law, the distance requirement for wind turbines is equivalent to the height of the wind turbine. This requirement has been put in place to avoid damage on neighbouring objects in case of collapsing wind turbines.

Based on the currently binding national regulations, large wind power plants with high noise levels are allowed to be built in the vicinity of residential areas.

It is not allowed to build wind farms in protected areas, however there are no regulations on the buffer zones for the protected areas. The absence of these regulations may create negative attitudes towards wind energy and may lead to local community and environmental protests and non-transparent decision-making. **Possible solution.** Consider the possibility of developing RES installations at early spatial planning stage, in the phase of the general planning procedures. As a result the number of lengthy procedures and environmental and community concerns might be avoided or reduced at later stage (Rosende et al 2010). Potential areas for RES development should be decided in official spatial plans taking into account residential areas and environmental aspects. Currently spatial planning activities do not take into account the potential of renewable energy development

Barrier 1.4 – Other Barriers

Competing business interests at a local level. Wind energy development in Lithuania was found to be in competition with recreational business. It is especially relevant in Western Lithuania, where the seaside is near and a good potential exists for rural tourism. Wind energy development in the vicinity of the planned recreational and rural tourism has proved to decrease the land price and also to decrease the attractiveness of the area for these activities. **Possible solution:** these conflicts can be solved or at least minimised, if the government intervenes. Clear rules on sanitary zones might minimise the barrier. Potential areas for wind energy development should be decided through spatial planning or other strategic planning procedures taking into account multiple criteria: residential areas, environmental aspects and etc.

1.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
1.1		Is one stop-shopping possible?	NO*
1.2		Amount of money to be invested in the administrative process (including cost of work and costs like fees) (in €)	high**
1.3		Time to be spent for the administrative process (duration to get all the main permits) (in months)	3-30
1.4		Estimated number of permits required (#)	0-15***

*relevant for all RES technologies.

**the interviewees were not able to give an estimate and no values were available in literature.

***0 permits are required for shallow geothermal – heat pump installations.

1.2.3 RES technology specific indicators

1.3	Wind	Time to be spent for the administrative process (duration to get all the main permits) (in months)	max 36
1.4		Estimated number of permits required (#)	Up to 15

1.3	Solar	Time to be spent for the administrative process (duration to get all the main permits) (in months)	3-6
1.4		Estimated number of permits required (#)	4

1.3	Biomass	Time to be spent for the administrative process (duration to get all the main permits) (in months)	24
1.4		Estimated number of permits required (#)	3

1.3	Hydro	Time to be spent for the administrative process (duration to get all the main permits) (in months)	24
1.4		Estimated number of permits required (#)	3

1.3 Literature

Paplauskis, Erlandas. 2009. Companies make use of the wind (Vėjų naudą UABai gaudo). Atgimimas, October 23-29, 2009, No 37 (1051). URL: http://www.atgimimas.lt/articles.php?id=1256155960.

National Control Commission for Energy and Prices. 2010. Prices for electric energy that corresponds to the public interests of the Lithuanian energy sector (Elektros energijos, atitinkančios viešuosius interesus elektros energetikos sektoriuje, kainos). URL: http://www.regula.lt/lt/elektra/tarifai/elektros_energijos_kainos.php.

Ūkio žinios. 2009. EU financial support opens up the gates for green energy (ES parama atkelia vartus „žaliajai“ energijai)., November 10, 2009.

URL: http://ukiozinios.lt/es-parama-atkelia-vartus-%E2%80%9Ezaliajai%E2%80%9C-energijai.

Pinigų karta. 2010. A.Kiškis: what should a person do if he or she decides to build his own power plant? (A.Kiškis: Ką reikia daryti žmogui, nusprendusiam statytis savo jėgainę?). Lithuanian National Television. URL: http://www.pinigukarta.lt/naujienos-nuomones/energetika-naujienos/a-kiskis-ka-reikia-daryti-zmogui-nusprendusiam-statytis-savo-jegaine/comment-page-1.

Government of the Republic of Lithuania (GoRoL). 2004. Government's resolution on the approval of the list of culturally and ecologically valuable rivers (Dėl ekologiniu ir kultūriniu požiūriu vrtingų upių ar jų ruožų sąrašo patvirtinimo). September 8, 2004, No 1144, Vilnius. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=241086&p_query=&p_tr2=.

Juknys, Romualdas. 2009. Will we sacrifice Lithuanian rivers for the sake of 0.5% of additional electricity?(Ar aukosime Lietuvos upes dėl pusės procento papildomos elektros energijos?). Published in the portal of the Association of Lithuanian State Parks and Reserves. URL: http://www.parkai.lt/show/lt/news/id_406.html.

Mėlynas Vingis. The official website of the environmental campaign against the daming of the protected rivers. URL: http://www.melynasvingis.lt/.

Law on Spatial Planning. Nr. I-1120, 2009. Accepted December 22, 2009 and entered into force January 1, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=364067.

Rosende, Daniel; Klingel, Michael; Ragwitz, Mario; Resch, Gustav and Panzer, Christian. 2010. Guidelines for renewable energy industry for Lithuania. Background document for a seminar "Renewable energy policy paving the way towards 2020". Prepared by Fraunhofer Institute for Systems and Innovation Research ISI and Vienna University of Technology Energy Economics Group. Vilnius, March 4, 2010.

Draft Law on Renewable Energy Sources. 2010. Opened up for discussion in the parliament of Lithuania on February 18, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.rezult_l?p_nr=xip-1749&p_nuo=&p_iki=&p_org=&p_drus=&p_kalb_id=1&p_title=&p_text=&p_pub=&p_met=&p_lnr=&p_denr=&p_es=0&p_rus=1&p_tid=&p_tkid=&p_t=0&p_tr1=2&p_tr2=2.

Programme of the Government of Lithuania (PoGoL). 2008. Accepted on December 9, 2008, No XI-52, Vilnius. URL: http://www.lrv.lt/bylos/vyriausybes/15_vyr_programa.pdf.

Law on Nuclear Power Plant. 2007. Accepted on June 28, 2007, No X-1231. New version of the law accepted on August 4, 2009. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=350515&p_query=&p_tr2=.

National Strategy for Sustainable development of Lithuania. 2003. Accepted on September 11, 2003, No 1160. URL: http://www3.lrs.lt/pls/inter2/dokpaieska.showdoc_l?p_id=217644.

Board of the Lithuanian Parliament. 2009. A decision to create a working group for the preparation of the draft renewable energy sources law (Dėl darbo grupės atsinaujinančių energijos išteklių įstatymo projektui parengti sudarymo). January 15, 2009, No SV-S-190, Vilnius. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=363953&p_query=saul%EBs&p_tr2=2.

Lithuanian Environmental Investment Fund. 2010. URL: www.laaif.lt.

Order of the Minister of Environment. 2003. On the approval of the order and finance for the public institution Lithuanian Environmental Investment Fund (Dėl viešosios įstaigos Lietuvos Aplinkos Apsaugos Investicijų Fondo investicijų finansavimo ir priežiūros tvarkos patvirtinimo). August 29, 2003, No 437, Vilnius. Last amendment on September 12, 2008. Vilnius. URL: http://www.laaif.lt/index.php?-2112318559.

2 Issue 2 Technical Specifications

2.1 Introduction

This chapter analyses if the provisions of the renewables Directive 28/2009/EC concerning technical requirements are fulfilled in Lithuania. Member States shall clearly define any technical specifications which must be met by renewable energy equipment and systems in order to benefit from support schemes.

The main mechanism of state support for renewable energy are feed-in tariffs, which a developer must secure through a feed-in quota auction. The other programme of state support for renewable energy is carried out through the Lithuanian Environmental Investment Fund that provides subsidies for private and public entities (LEIF 2010, OoMoE 2003).

There are no support schemes in Lithuania for developing small-scale renewable energy installations in buildings. An exception is the financial support for RES in buildings available for agriculture developers. RES (solar energy installations) for agriculture buildings are supported in Lithuania through the European Union funding schemes. The subsidy partially covers the cost of the installation and may range up to 40-65% of net price (Ūkio žinios 2009).

The financial support for renewable energy in Lithuania has focused mostly on larger scale renewable energy projects, where potential developer among other documents and permits would need to present a bank statement confirming the existence of the necessary funds for the planned renewable energy investment in order to compete in the public auction for energy quotas.

Provisions applied in technical specifications were not identified as a barrier during the interviews with stakeholders. Legislature for renewable energy in Lithuania is still in the process of being developed and does not impose technical specifications to financing schemes. It is likely that it will contain some detail on technical specifications in the future. Therefore, it is not considered as a barrier at the moment, but it may develop into one in the future.

2.2 Description of barriers & solutions

2.2.1 Detailed description of the barriers and solutions

Barrier 2.1 – Weak definitions
Technical specifications which must be met by renewable energy equipment and systems in order to benefit from support schemes are not clearly defined however this is not perceived as a barrier by support programme applicants.

Barrier 2.2 – no EU standards applied
Technical specifications are usually not expressed in terms of European standards (including eco-labels, energy labels and other technical reference systems), though such European references exist however this is not perceived as a barrier by support programme applicants.

Barrier 2.3 – Specified locations
These specifications prescribe, explicitly or de facto, where the equipment and systems are to be certified, for instance because that specific certification is de facto only available in that specific country. This barrier is not present in Lithuania.

Technical specifications do not set a necessity of introducing certified equipment or systems however it is common in Lithuania that investors choose to use certified systems because then the investor is more likely to get a grant from the support scheme.

Barrier 2.4 – Barriers to trade
These specifications generally do not impede the operation of the internal market in any other way. Technical specifications are generally not perceived as a barrier by support programme applicants.

2.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
2.1		Are specifications expressed in terms of European standards (including eco-labels, energy labels and other technical reference systems), though such European references exist?	No

2.3 Literature

Lithuanian Environmental Investment Fund. 2010. URL: www.laaif.lt.

Paplauskis, Erlandas. 2009. Companies make use of the wind (Vėjų naudą UABai gaudo). Atgimimas, October 23-29, 2009, No 37 (1051). URL: http://www.atgimimas.lt/articles.php?id=1256155960.

Ūkio žinios. 2009. EU financial support opens up the gates for green energy (ES parama atkelia vartus „žaliajai“ energijai)., November 10, 2009. URL: http://ukiozinios.lt/es-parama-atkelia-vartus-%E2%80%9Ezaliajai%E2%80%9C-energijai.

Pinigų karta. 2010. A.Kiškis: what should a person do if he or she decides to build his own power plant? (A.Kiškis: Ką reikia daryti žmogui, nusprendusiam statytis savo jėgainę?). Lithuanian National Television. URL: http://www.pinigukarta.lt/naujienos-nuomones/energetika-naujienos/a-kiskis-ka-reikia-daryti-zmogui-nusprendusiam-statytis-savo-jegaine/comment-page-1.

Rosende, Daniel; Klingel, Michael; Ragwitz, Mario; Resch, Gustav and Panzer, Christian. 2010. Guidelines for renewable energy industry for Lithuania. Background document for a seminar “Renewable energy policy paving the way towards 2020”. Prepared by Fraunhofer Institute for Systems and Innovation Research ISI and Vienna University of Technology Energy Economics Group. Vilnius, March 4, 2010.

3 Issue 3 Building integrated technologies

3.1 Introduction

There are no legal regulations in Lithuania on renewable energy in buildings so far and no financial support is allocated for their installation. Renewable energy in buildings is essentially a small-scale venture and the policy makers have not yet considered it in a systematic and structured way. The support scheme of the housing renovation programme does not include support for renewable energy. Only energy efficiency measures are taken into account for renovation of buildings in Lithuania.

Installation of building integrated technologies is not common in Lithuania. Only enthusiasts install small systems or private house owners in remote locations in some cases install autonomous electricity generation plants as an alternative to expensive connection to the national electricity grid.

The main barriers identified in this area are cost barriers and absence of support schemes for RES development on buildings. Without structured support the RES development is lagging and is virtually non-existent in Lithuania. Therefore the non-cost barriers are of little importance.

The main non-cost barriers identified are the following:

- Lack of structured control and guidance system within administrative procedures and spatial planning;
- Lack of exemplary public building installations;
- Absence of renewable obligations.

The situation of renewable energy in the building sector is likely to change with the new law on renewable energy resources. As of March 2010 the law has not yet been approved by the parliament. The draft version of the law has a chapter devoted to renewable energy in buildings. The government plans to prepare measures to increase the deployment of renewables in buildings and to encourage construction of passive and zero energy housing. From December 31st, 2014 new buildings and renovated buildings will have to comply with renewable energy use requirements (the requirements will be elaborated later). From January 1st, 2012 all newly built and renovated public buildings will have to comply with the renewable energy use requirements. Municipalities are also planned to be involved in the process. A separate programme on energy production on the roofs of buildings is also planned to be elaborated (Draft Law on Renewable Energy Sources 2010).

3.2 Description of barriers & solutions

3.2.1 Detailed description of the barriers and solutions

Barrier 3.1 – Inefficient general administrative procedures

There are no administrative procedures developed for renewable energy development in buildings and it includes all types of categories: new buildings, private houses, multi-storey apartments, private and public buildings. This is perceived as a barrier in developing a structured support and control system for building integrated technologies. A permit is not required for the installation of solar panels on the roof of an office building nor for the instillation of a heat pump at a single house property. Private initiatives are only regulated by administrative procedures in the uncommon case of connection to the electricity grid. **Possible solutions:** the new law on renewable energy resources is expected to bring more clarity and is likely to establish administrative procedures for support schemes for renewable energy development in buildings (Draft Law on Renewable Energy Sources 2010). Following the approval of a legal framework, official guidance and guidelines on building integrated RES technologies should be developed so that local authority officials apply a common approach.

Barrier 3.2 – No/insufficient specific rules for building integrated/small scale RES installations

Official rules on building integrated RES technologies have not been developed in Lithuania to date. The draft renewable energy resources law includes a section on projected design and promulgation of these rules (Draft Law on Renewable Energy Sources 2010) however it has not been approved by the parliament to date. Electricity created at building level is rarely fed into the grid system. **Possible solutions:** Implement the draft renewable energy resources law in Lithuania.

Barrier 3.3 – Competing public interests

The RES equipment is rarely installed on any type of new or renovated buildings. It is either too expensive or restricted due to cultural value of buildings. Solar energy installation on the roofs are not allowed or their use is restricted in protected areas for cultural heritage and in historical old towns in Lithuania. The general cultural and environmental concerns and regulations are identified as a potential future source of competing public interest however currently the later is not perceived as a barrier because the use of building integrated technology is very uncommon hence unpopular and does not provoke community dialogue on competing interests.

Barrier 3.4 – Renewables obligations insufficient

Renewables obligations with regards to buildings are non-existent both on a national and on regional level, but this situation is expected to change if the law on renewable energy resources will be accepted with the current specifications for the building sector (Draft Law on Renewable Energy Sources 2010). The draft legislation specifies that new buildings and renovated buildings will be required to use renewable energy however the requirements have not yet been specified in detail and will be elaborated in upcoming proposals for regulations. No concrete numbers for RO have been published or reported to date in Lithuania.

Barrier 3.5 – Exemplary role of public buildings neglected

No demonstrational buildings were identified through stakeholder interviews. According to interviewees public buildings do not fulfil their exemplary role concerning the integration of RES in buildings because RES is not used in public buildings.

The reasoning behind this barrier is that renewable energy is not being sufficiently promoted or financially supported via programme initiatives for public buildings. It is possible to apply for funding for renewable energy projects through Lithuanian Environmental Investment Fund (LEIF 2010) however interviewees could not report a exemplary success story in this area.

The draft renewable energy resources law foresees new renewable energy obligations for newly-built and renovated public buildings (Draft Law on Renewable Energy Sources 2010). The specific regulations will be elaborated later after this law is passed. No concrete upcoming initiatives and programmes for public buildings have been published or reported to date in Lithuania.

Barrier 3.6 – RES deployment hindered by spatial planning matters

Spatial planning matters are not a barrier for RES installations on buildings because the spatial planning process is weak in its enforcement and because the procedure does not take into consideration RES in general. This is not perceived as a barrier because a permit or/and communication with local authorities is not required prior to installation of RES on building.

RES are also not fully considered in case of newly designed buildings. New buildings are not designed for an integration of RES at a later point in time (e.g. optimal orientation for the use of solar technologies, roofs/buildings designed to support additional weight). This is due to limited interest of the public in RES and limited demand for such design.

Barrier 3.7 – Tenancy law and ownership law impedes development of Building Integrated RES technologies

This is not a significant barrier in Lithuania yet .

In general the development of RES installations on buildings can affect other private parties e.g. neighbours and can therefore cause conflicts with other private stakeholders. In Lithuania the number of buildings with RES installations is nearly non-existent and even solar panels are rarely observed. The tenant's approval for renovations which include the installation of building integrated RES systems is not a noticeable problem. Only some obstacles have been reported by media to date in applying energy efficiency programmes to multi-storey apartment with multiple owners. The tenancy and ownership legal regulations are also not perceived as a barrier. There is no public discussion yet on distribution of costs in tenancy law relating to RES and similar topics.

Barrier 3.8 – Other barriers

Limited or nonexistent financial support for RES development in buildings.

Renewable energy in buildings today is still a matter of private enthusiasm and private funding in Lithuania. Limited support programmes exist for the business and public sector and no programmes exist for individual household owners who are willing to make

use of building integrated technologies on their property. The cost at the development stage greatly exceeds maintenance costs throughout the lifetime of the equipment. Lack of information on financial support and the small number of support schemes available has been reported as a barrier. This is a cost barrier hence will not be further discussed in this study. **Possible solutions:** develop structured support schemes for building integrated technologies.

3.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
3.1		Is this installation type in normal cases exempted from an authorization procedure (building permit)?	YES
3.2		Are legal-administrative requirements adequate for this installation type?	NO
3.3		Number of administrations that must be contacted (#)	0*

*only in the case of connection to the grid a number of administrations have to be contacted.

3.3 Literature

Dubovičienė, Irma. 2010. Choosing household energy autonomy (Renkasi būsto energetinę autonomiją). Valstiečių laikraštis. Republished in the news portal Delfi.lt on February 6, 2010. URL: http://www.delfi.lt/news/economy/energetics/renkasi-busto-energetine-autonomija.d?id=28660537.

Draft Law on Renewable Energy Sources. 2010. Opened up for discussion in the parliament of Lithuania on February 18, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.rezult_l?p_nr=xip-1749&p_nuo=&p_iki=&p_org=&p_drus=&p_kalb_id=1&p_title=&p_text=&p_pub=&p_met=&p_lnr=&p_denr=&p_es=0&p_rus=1&p_tid=&p_tkid=&p_t=0&p_tr1=2&p_tr2=2.

Ūkio žinios. 2009. EU financial support opens up the gates for green energy (ES parama atkelia vartus „žaliajai“ energijai)., November 10, 2009.

URL: http://ukiozinios.lt/es-parama-atkelia-vartus-%E2%80%9Ezaliajai%E2%80%9C-energijai.

Lithuanian Environmental Investment Fund. 2010. URL: www.laaif.lt.

Ministry of Environment of Lithuania (MoEoL). 2010. List of legal regulations for construction (Statybos teisinių reglamentų sąvadas). URL: http://www.am.lt/VI/index.php#a/4958.

4 Issue 4 – Promotion of energy efficient renewable energy equipment

4.1 Introduction

The issue of promotion of energy efficient renewable energy equipment seems to be emerging for the future legislature in Lithuania however is not present in current regulations.

This issue is related to the provisions of article 13 (6) of the Directive:

> "With respect to their building regulations and codes, Member States shall promote the use of renewable energy heating and cooling systems and equipment that achieve a significant reduction of energy consumption. Member States shall use energy or eco-labels or other appropriate certificates or standards developed at national or Community level, where these exist, as the basis for encouraging such systems and equipment.
>
> **In the case of biomass**, Member States shall promote conversion technologies that achieve a conversion efficiency of at least 85 % for residential and commercial applications and at least 70 % for industrial applications.
>
> **In the case of heat pumps**, Member States shall promote those that fulfil the minimum requirements of eco-labelling established in Commission Decision 2007/742/EC of 9 November 2007 establishing the ecological criteria for the award of the Community eco-label to electrically driven, gas driven or gas absorption heat pumps.
>
> **In the case of solar thermal energy**, Member States shall promote certified equipment and systems based on European standards where these exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies.
>
> In assessing the conversion efficiency and input/output ratio of systems and equipment for the purposes of this paragraph, Member States shall use Community or, in their absence, international procedures if such procedures exist."

In Lithuania the current legal regulations do not reflect the presented above provisions as set in the Directive 2009/28/EC. Currently (as of March 2010) there are attempts to implement the requirements imposed by Directive 2009/28 by means of the new draft renewable energy law however no concrete initiatives have yet been agreed on to date.

The new draft renewable energy law (Draft Law on Renewable Energy Sources 2010) seems to give a start for the energy efficiency and other certificates for renewable energy

technologies. Article No 42 mentions restrictions for biomass energy installations. Financial support schemes will be available for biomass installations only if their efficiency is not lower than 85% for household and commercial installations and not lower than 70% for industrial installations. Secondly, heat pumps and solar heat energy installations will receive support only if they have relevant European Union efficiency and ecological labels.

4.2 Description of barriers & solutions

4.2.1 Detailed description of the barriers and solutions

Barrier 4.1 – Non-compliant promotion schemes

Promotion schemes in Lithuania are poorly developed and according to the interviewees, the insignificant number of existing support schemes does not fulfil the requirements of Art, 13(6). No major energy efficient renewable energy technology promotion schemes have been developed to date in Lithuania. **Possible solution:** the issue of promotion of energy efficient renewable energy equipment seems to be emerging in the future legislature in Lithuania. As a result financial support schemes ought to be tailored so that support can only be obtained by standardised, efficient and environmentally friendly technologies. However, it is important to emphasise that the law is still in not accepted and may change.

Barrier 4.2 – Lack of substitution of existing inefficient systems

In Western Europe there is, for historical reason, a wide use of RES installations that do not fulfil the requirements of Article 13(6), however this is not the case in Lithuania as most of the RES installations have been developed within the last 5 years in accordance with EU standards and by the use of modern technologies. No barrier has been identified in this area with the exception of biomass boilers .

Regarding **biomass** installations:

- In Lithuania the existing biomass boilers are old and inefficient. There are European Union funding schemes in Lithuania that are devoted for modernisation of the district heating sector and solve this problem of inefficiency. The interviewed stakeholders report that there are no energy efficient technologies compliant with Art, 13(6) currently available on the market. Consumers therefore install inefficient biomass technologies and are not aware of the efficiency issue. **Possible solution:** scientific research and development in this field must be encouraged, especially having in mind that Lithuania's biomass potential is considered as the most promising among renewable energy types.

Barrier 4.3 – Use of national procedures

No information on assessing the conversion efficiency and input/output ratio of systems and equipment has been available at the time of this study for Lithuania. The Member State should use Community or, in their absence, international procedures for assessing conversion efficiency and input/output ratio.

The national energy efficiency programme (GoRoL 2006) does not entail any specifications for energy efficiency of renewable energy technologies. It only elaborates on expansion of the use of renewable energy sources. **Possible solution:** national energy efficiency programme eventually should be revised to include procedures for assessing conversion efficiency and input/output ratio.

Barrier 4.4 – Insufficient information

In Lithuania sufficient information about the availability of renewable energy equipment with different levels of efficiency is not provided to the relevant stakeholders or no information exists at all. This is perceived as a barrier.

Majority of interviewed stakeholder agreed that there is a lack of information in efficiency of renewable energy technologies. In Lithuania there were no significant campaigns for renewable energy (see chapter 6 for detailed description), therefore there is a lack of general information on renewable energy technologies. The current state of information and awareness on efficiency of renewable energy technologies can be described as relatively non-existent. **Possible solution:** provide sufficient information to the relevant stakeholders about the availability of renewable energy equipment with different levels of efficiency.

4.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
4.1	Are the requirements of Art 13 (6) of the Directive concerning the promotion of efficient bioheat and heat pumps fulfilled? (yes/no)	NO

4.3 Literature

Government of the Republic of Lithuania (GoRoL). 2006. Resolution on the approval of national energy efficiency programme. Approved on May 11, 2006, No 443, Vilnius. Revised and approved on January 12, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=363850.

Draft Law on Renewable Energy Sources. 2010. Opened up for discussion in the parliament of Lithuania on February 18, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.rezult_l?p_nr=xip-1749&p_nuo=&p_iki=&p_org=&p_drus=&p_kalb_id=1&p_title=&p_text=&p_pub=&p_met=&p_lnr=&p_denr=&p_es=0&p_rus=1&p_tid=&p_tkid=&p_t=0&p_tr1=2&p_tr2=2.

Ministry of Economy of Lithuannia. 2010. Solar energy industry starts in Lithuania (Lietuvoje skelbiamas saulės energetikos pramonės startas). Press release, January 26, 2010. URL: http://www.ukmin.lt/lt/dokumentai/ziniasklaidai/detail.php?ID=27450.

5 Issue 5 Information/awareness raising

5.1 Introduction

Information and awareness campaigns on RES are organised to some extent however financial support for such events is minimal. In general none of the interviewed stakeholders could identify any significant and wide reaching public campaigns for renewable energy promotion. State institutions are also reported not to be involved in a systematic promotion campaign.

This is probably due to gaps in legislative base for renewable energy, however, the current government is probably the first one openly declaring its support for renewable energy development in Lithuania. The draft law on renewable energy sources has a separate section on Information and awareness raising (Article 46, Draft Law on Renewable Energy Sources 2010). Here municipalities, ministries and other public institutions become responsible for information dissemination and awareness raising.

The main barriers identified in this area are cost barriers and the lack of support schemes for RES development and promotion. Without a structured strategy for the support of RES development and information campaigns the awareness raising will not bring expected results. Therefore the non-cost barriers are of little relevance.

The main non-cost barriers identified are the following:

- absence of significant and wide-reaching information campaigns;
- lack of exemplary information campaigns design;
- absence of university programmes on renewable energy.

5.2 Description of barriers & solutions

5.2.1 Detailed description of the barriers and solutions

Barrier 5.1 – Insufficient availability of information on support measures

This is generally not perceived as a significant barrier. None of the interviewed renewable energy developers indicated that the ability to find information about support measures for renewable energy in Lithuania is a barrier. However, all agreed that the information could be more widely spread and it should be easier to find. In general all interviewed stakeholders agreed that the society is not sufficiently aware of renewable energy options and benefits. However, it has been indicated that an active group of the society is present in Lithuania that is up to date with current RES options and schemes even if the public

information is scarce. **Possible solution:** there should be more efforts devoted to general information raising campaigns.

Barrier 5.2 – Insufficient funding for campaigns/programmes

The prevailing opinion amongst interviewees was that there are too few campaigns and that there is insufficient funding provided for information platforms/media or awareness raising campaigns and programmes. Limited funding is a significant barrier for organizations interested in renewable energy promotion.

The limited funding opportunities available in Lithuania at present originate from the following institutions:

- Ministry of Energy;
- Ministry of Environment;
- different renewable energy associations;
- different international institutions e.g. British Council, Nordic Council of Ministers;
- various European Union funding schemes;
- Global Environmental Facility.

There are a number of renewable energy associations in Lithuania e.g. Renewable Energy Information And Consultation Center (ATEIK). The renewable energy associations hold various events, conferences, training courses and etc., but none of them is a far-reaching campaign due to limited resources.

Barrier 5.3 – Insufficient campaign-/programme-design

Due to the reasons explained below (absence of significant and wide-reaching information campaigns and limited funding), insufficient campaign-/programme-design is a significant barrier in Lithuania.

Barrier 5.4 – Other

Lack of higher education programs on renewable energy. Not a single university programme in Lithuania offers a comprehensive course on renewable energy technologies. This has been identified as a barrier by some respondents. **Possible solution:** A strategic decision on national level in respect to higher education programs emphasizing the need for renewable energy specific lines of studies could encourage individual universities to initiate education programs accordingly.

Emerging negative opinion on renewable energy. The opinion on renewable energy development is generally positive in Lithuania however, recent negative issues raised by the local communities and environmentalists (e.g. hydropower plants on protected rivers or wind farms in the vicinity or protected areas as presented in Section 1) raises emerging negative opinions on renewable energy.

This issue has particularly visible in the context of the wind energy sector. There are views expressed in the media that the current model of renewable energy development does not benefit the society. Wind energy tends to be associated with corruption and lack of social responsibility among wind energy developers. The emerging public opinion is that RES benefits the politicians and business developers, as the current financial support schemes are not suitable for household owners (essentially small scale installations). **Possible solutions:** codes of ethics should be agreed on, considered in practise and

propagated by RES developers. There are three wind associations in Lithuania and one of them i.e. Lithuanian wind power association is currently developing an ethics code. Small scale RES should be promoted along large scale projects to eliminate the social injustice and preferential treatment of big businesses that is felt nowadays.

Absence of small scale funding schemes for renewable energy. A significant barrier reported by interviewees is the lack of funding schemes for small scale RES installations. In Lithuania such installations in are developed without support of the state and emerge as a private initiative. The latter is a cost related barrier hence is not further discussed in this study. **Possible solutions.** Building balanced and local support schemes where the beneficiaries are individual households might promote RES and encourage awareness raising (Paplauskis 2009).

5.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
5.1	Is sufficient information on support measures available?	NO

5.3 Literature

Paplauskis, Erlandas. 2009. Companies make use of the wind (Vėjų naudą UABai gaudo). Atgimimas, October 23-29, 2009, No 37 (1051). URL: http://www.atgimimas.lt/articles.php?id=1256155960.

Renewable Energy Information and Consultation Center. URL: http://www.ateik.info.

Draft Law on Renewable Energy Sources. 2010. Opened up for discussion in the parliament of Lithuania on February 18, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.rezult_l?p_nr=xip-1749&p_nuo=&p_iki=&p_org=&p_drus=&p_kalb_id=1&p_title=&p_text=&p_pub=&p_met=&p_lnr=&p_denr=&p_es=0&p_rus=1&p_tid=&p_tkid=&p_t=0&p_tr1=2&p_tr2=2.

6 Issue 6 Certification

6.1 Introduction

In Lithuania certification procedures are not in place and there is very limited information and activities in this field as defined by Directive 2009/28/EC. None of the interviewed stakeholders were able to identify a relevant certification procedure for renewable energy specialists. The barriers identified in this section i.e. lack of a certification body, lack of guidelines and training for planners and architects are only described broadly below because there is a significant gap in this field and the process of eliminating this gap in Lithuania is at its initial stage.

Some relevant aspects are mentioned in the Order of the Minister of Economy on energy audits in buildings (OoMoE 2009). The order sets up the legislature around energy audits in buildings and also sets up a general framework for the education and certification of energy auditors. The order also enlists a number of subjects that a certified energy auditor must be trained in and renewable energy is among the subjects i.e. general knowledge on renewable energy sources, use of renewable technologies in buildings, assessment of renewable energy use, preparation of renewable energy projects. This legislation is quite recent hence it has not yet been reported how the newly certified specialists are currently contributing to renewable energy developments.

6.2 Description of barriers & solutions

6.2.1 Detailed description of the barriers and solutions

Barrier 6.1 – Lack of a Certification body

There is no certification body for renewable energy specialists established yet.

The new renewable energy law (Draft Law on Renewable Energy Sources 2010) covers certification of renewable energy specialists. The draft law identifies the need for certification for the following renewable energy specialists: (1) biomass heat installations, (2) solar heat and electricity installations, (3) geothermal installations and heat pumps. These renewable energy specialists will be certified by a relevant state agency and transparency of this process will be ensured. There is no specific agreements on the relevant state agency to date.

Barrier 6.2 - Lack of guidelines

There are no government guidelines on the certification of renewable energy specialists. The lack of guidelines for planners, architects, etc. on optimising the use of renewable energy and energy efficiency has been identified as a barrier. There are also no guidelines for planners and architects on how to use building integrated technologies in their designs.

Barrier 6.3 Lack of training

Another barrier in Lithuania (which is actually a combination of the two barriers mentioned above) is the lack of sufficient training of RES during the education of installers, planners, architects, etc. There are no established training courses for certification of renewable energy specialists and no university departments specialised in renewable energy.

6.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
6.1	Are certification schemes or equivalent qualification schemes available for installers?	No
6.2	Is sufficient training on RES provided during the standard education curriculum of installers?	No

6.3 Literature

Draft Law on Renewable Energy Sources. 2010. Opened up for discussion in the parliament of Lithuania on February 18, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.rezult_l?p_nr=xip-1749&p_nuo=&p_iki=&p_org=&p_drus=&p_kalb_id=1&p_title=&p_text=&p_pub=&p_met=&p_lnr=&p_denr=&p_es=0&p_rus=1&p_tid=&p_tkid=&p_t=0&p_tr1=2&p_tr2=2

Order of the Minister of Economy (OoMoE). 2009. On energy audits in buildings, technological processes and equipment and on conditions and order of energy audit specialists certification (Dėl energijos varojimo pastatuose, technologiniuose procesuose ir įrenginiuose audito atlikimo tvarkos ir sąlygų ir energijos vartojimo pastatuose, technologiniuose procesuose ir įrenginiuose auditą atliekančių specialistų rengimo ir atestavimo tvarkos aprašo patvirtinimo). May 26, 2009, No 1-75, Vilnius. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=344950&p_query=atestavimas%20atsinaujinant*&p_tr2=2

7 Issue 7 Infrastructure Development

7.1 Introduction

In Lithuania the issue of infrastructure development has to be considered in two dimensions; national grid development and international grid connection development. The international dimension of the problem is emphasised to greater extent in Lithuania as compared to internal grid development and more public pressure is placed on progress in this field. The reason behind this is noticeable energy supply isolation of the Baltic States from the rest of Europe and dependence on energy supply from Russia. The situation in Lithuania is similar to that of Latvia and Estonia, because all three form an energy deficient island in the European Union. All three countries are isolated from the European electricity grids and gas networks. The integration of the Baltic states into the European energy systems is one of the priorities in energy infrastructure development projects of the European Union.

The second dimension is the internal grid infrastructure in Lithuania which is perceived as outdated and poses a barrier relevant to this study. With the practical implementation of the upcoming renewable energy law (Draft Law on Renewable Energy Sources 2010) an increased demand for connecting RES to the grid infrastructure is expected. Therefore optimisation and expansion of the grid in the short term will need to take place. Network optimisation or expansion planning in Lithuania has either not yet begun, or is behind schedule. Grid capacity problems are most visible in western Lithuania where most of wind projects are currently being carried out. This chapter looks at the most common origins of these delays. The main barrier in the development of the grid infrastructure is inefficiency in overall system management in Lithuania.

7.2 Description of barriers & solutions

7.2.1 Detailed description of the barriers and solutions

Barrier 7.1 - Problems concerning connection to existing electricity networks

The current situation of the grid infrastructure in Lithuania is poor. Existing electricity networks typically have insufficient grid capacity and are centralized. Renewable electricity generation is typically not situated in the same places as conventional electricity production and has, in general, a different scale of generation. For instance Western Lithuania has a good potential for wind energy, but its electricity grid infrastructure is insufficient and limited. The infrastructure has not been modernised and hence it has the potential to be overloaded. In the last years the development of the grid infrastructure has become a pressing issue for wind farm operators in particular and will become even more pressing with the planned growth of renewables

For many renewable electricity generation projects in Lithuania connection to the electricity network represents a financial barrier difficult to eliminate, especially when it is necessary to undertake technical adaptations and extensions of the existing grid e.g. wind projects in Western Lithuania. The distribution of costs for enabling access of the RES plant is an important factor for the feasibility of the whole project. The plant operator bears the costs of connecting the plant to the most closely located point of the grid (connection point). The grid operator bears the costs for the development of the grid however the distribution of costs depends on the exact location of the connection point. The grid operators have no financial incentive to invest in the construction of an innovative grid infrastructure from technical point of view. The grid operator has to bear the costs for the expansion, which will be distributed among all final customers by apportioning the costs to the grid usage fees.

In remote locations private house owners in some cases install autonomous electricity generation plants as an alternative to expensive connection to the national electricity grid. The cost of building a connection with the national electricity grid was reported to be 37500 EUR. The cost of an autonomous solar and/or wind energy electricity plant was reported to be lower, therefore, remote dwellers would choose this option (Dubovičienė 2010).

Main reasons for costly connection to existing electricity networks are the following:

- Existing electricity networks often have no storage facilities
  The grid infrastructure in Lithuania is old and overloaded and was mainly built when the electricity sector was publicly owned and has been designed without consideration of RES grid connection and energy storage
- Insufficient grid capacity
  The lack of grid access for the volumes of energy produced from renewable sources currently as reported by media in Lithuania and foreseen in the future is a growing problem. The existing condition of the transmission and distribution infrastructure is not sufficient to allow grid access for current and future RES applicants.
- Inadequate overall management system
  There is no overall structured management system nor national legislation on allocation of existing capacity of the infrastructure in Lithuania.

Possible solution: The establishment of law that defines maximum costs of grid connection on the basis of plant size is generally perceived as a way forward. The fee for the connection of a RES unit specified in the terms and conditions for grid connection should be determined on the basis of actual expenditure incurred to construct the service line.

Barrier 7.2 - Problems concerning development of electricity network infrastructures according to a long-term strategy

Problems in grid reinforcement planning and overall management have been reported as barriers in Lithuania. One of the issues mentioned most often by interviewees was deficient grid capacity related to wind energy development in Western Lithuania. This proves that development of electricity network infrastructures according to a long-term strategy is non-existent or at early stage of development in Lithuania. There is no official

concrete long-term strategy, in terms of an overall master plan that takes all priorities of grid development into account. The extension of existing electricity networks and their development into smart networks is a key element for achieving a better integration of renewable electricity generation projects.

Main reasons for problems concerning the development of electricity networks according to a long-term strategy, taking account of the integration of renewable energy resources are the following:

- Lack of national laws and codes
  There is no overall structured management system nor national legislation on regulation and standardization covering grid issues. In Lithuania insufficient long term strategic thinking and planning for grid development is a barrier in grid infrastructure development. Spatial planning documents exist on local level (county or municipality) however they do not consider RES development and grid connection.
- Increasing social opposition to new installations for environmental reasons
  The opposition of local communities and environmental groups to the development of wind energy projects in Western Lithuania are growing. Protests are based on environment protection reasoning e.g. absence of the sanitary zones (Paplauskis 2009).
- Lack of mechanisms that oblige TSOs and DSOs to provide (economically reasonable) solutions to the problems that led to the denial of grid connection
  A foreseen barrier is the lack of legal regulations that oblige the operators to modernise or expand the grids. TSOs and DSOs in Lithuania plan to develop the transmission and distribution assets according to their needs. Insufficient investments on the side of the distribution system operators are a barrier. The lack of incentives for TSOs and DSOs for developing electricity infrastructures (in terms of clear, appropriate and predictable rules on authorisation of new investments) has been observed as a barrier in Lithuania.

Possible solution: A long-term strategic plan for the transmission and distribution network development in Lithuania should be developed and should be consistent with the national plan on use of RES.

Barrier 7.3 - Problems concerning development of a Trans-European Electricity Network

Slow and insufficient development of a Trans-European Electricity Network in Lithuania is perceived as a significant barrier. Lithuania is isolated in terms of energy supply from the European electricity grids and gas networks. In 2009 a memorandum of understanding was signed by eight Baltic Sea member states and the European Commission on Baltic Energy Market Interconnection Plan (BEMIP 2009). The three Baltic states have committed to further liberalization of their energy markets and removal of existing barriers for the creation of a regional Baltic energy market.

Within the framework of this plan, there are three electricity links planned: Lithuania-Poland, Lithuania-Sweden and Estonia- Finland. The Estonia- Finland link is already in place. The link between Lithuania and Sweden is planned to be built between 2014-2016. The European Union provides partial financial support for these projects as well as electricity infrastructure modernization projects (Gudavičius 2009).

7.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
7.1		Presence of an efficient (in terms of capability of achieving its stated objectives) plan for the reinforcement of the interconnection capacity with neighbouring countries.	YES
7.2		Presence of an efficient plan for the reinforcement of the connection capacity within the country.	NO

7.3 Literature

Gudavičius, Stasys. 2009. Latvians will receive a compensation (Latviai išpešė kompensaciją). Diena, April 28. URL: http://www.diena.lt/naujienos/lietuva/latviai-ispese-kompensacija-214673

Baltic Energy Market Interconnection Plan (BEMIP 2009). URL: http://ec.europa.eu/energy/infrastructure/bemip_en.htm

Paplauskis, Erlandas. 2009. Companies make use of the wind (Vėjų naudą UABai gaudo). Atgimimas, October 23-29, 2009, No 37 (1051). URL: http://www.atgimimas.lt/articles.php?id=1256155960

Ūkio žinios. 2009. EU financial support opens up the gates for green energy (ES parama atkelia vartus „žaliajai“ energijai)., November 10, 2009. URL: http://ukiozinios.lt/es-parama-atkelia-vartus-%E2%80%9Ezaliajai%E2%80%9C-energijai

Pinigų karta. 2010. A.Kiškis: what should a person do if he or she decides to build his own power plant? (A.Kiškis: Ką reikia daryti žmogui, nusprendusiam statytis savo jėgainę?). Lithuanian National Television. URL: http://www.pinigukarta.lt/naujienos-nuomones/energetika-naujienos/a-kiskis-ka-reikia-daryti-zmogui-nusprendusiam-statytis-savo-jegaine/comment-page-1

Rosende, Daniel; Klingel, Michael; Ragwitz, Mario; Resch, Gustav and Panzer, Christian. 2010. Guidelines for renewable energy industry for Lithuania. Background document for a seminar “Renewable energy policy paving the way towards 2020”. Prepared by Fraunhofer Institute for Systems and Innovation Research ISI and Vienna University of Technology Energy Economics Group. Vilnius, March 4, 2010.

8 Issue 8 Power Grid Issues

8.1 Introduction

All renewable energy developers interviewed noted problems in connection to the power grid in Lithuania. It is probably the second most important barrier for renewable energy development in Lithuania; second after the poorly developed legislative baseline.

In Lithuania problems of grid connection, grid access and problems concerning Transmission System Operators (TSOs) and Distribution System Operators (DSOs) linked to grid connection and access are slowly emerging. They are not well known and rarely present in major public discussions due to the fact that an insignificant number of RES installations has been connected to the grid in Lithuania to date. At present very few developers actually apply for grid connection due to enormous cost. As a result the most significant barrier identified in this chapter are financial limitations of developers and high costs of grid connection imposed by DSOs. Additionally lack of structured market operational measures and legal framework regulating access to power grid have been identified as barriers.

8.2 Description of barriers & solutions

8.2.1 Detailed description of the barriers and solutions

Barrier 8.1 - Problems concerning grid connection

In general the RES industry indicates that the conditions for the connection to the grid are very poor in Lithuania. RES plants are not discriminated as compared to conventional energy sources however they come across several barriers. In Lithuania the procedure of connection to the power grid is complicated, time consuming and costly. The grid authorities are late with their responses. The procedure was especially hostile before 2009 when Ignalina Nuclear Power Pant was in operation. Complaints regarding difficult and time consuming procedure and high cost burden were expressed among stakeholders interviewed.

Main reasons for problems concerning connection of RES to power networks are the following:

– Costly procedure of grid connection
  In Lithuania there are no public rules that define maximum costs of grid connection on the basis of plant size. The cost sharing burden has been changing in legislature and currently the renewable energy producer has to pay 60% total cost for grid connection (OoGoL 2001). After the connection is established, the equipment becomes the

property of the electricity grid operator. The stakeholders also mentioned other fees related to connection: reservation and balance of source.

- Poor legal framework
  The legal basis is poorly developed and poses barriers even if relevant support schemes are present e.g. financial support for RES (solar energy and biogas installations) is available for agriculture buildings in Lithuania but connection to grid and selling of electricity to the grid is not feasible European Union Structural Funding for Agriculture regulations (these are not Lithuanian laws). Agriculture RES developers are allowed to produce renewable energy only for own needs.
- Lack of guaranteed grid connection
  The uncertainty and complexity of applying for the grid connection in Lithuania often discourages developers to invest in large-scale RES installations.
- Long average lead time for getting grid connection;
  Connection to the grid in Lithuania takes from 12 to 24 months. The procedure is complex, in some cases reported as discriminatory and not transparent.
- Heterogeneous situation for connection conditions
  The conditions and financial implications for grid connection differ depending on the local authority and specifics of locality where RES is to be developed. The total cost of the connection depends on the location and equipment available and therefore varies greatly.

Possible solution: The establishment of a national plan including practical solutions for minimising costs of grid connection is perceived as a possible solution.

Barrier 8.2 - Problems concerning grid access

The denial to get a connection to the grid is not reported to be a problem, because very few developers apply for this connection due to cost implications however, there are cases reported by media and interviewees on access denials in Lithuania.

Grid access denials in Lithuania is a barrier both for small and large projects. The applicant cannot review procedures and requirements of grid operators on access to the grid.. The uncertainty of future available access discourages developers to invest in both small and large-scale RES installations. RES plants face particular problems concerning grid issues as compared to conventional power plants due to the characteristics of some RES plants including for example the intermittency of power output (Wind, PV), smaller plant sizes or decentralized character. Biogas facilities and hydropower plants have faced less difficulties in grid connection as compared to wind farms .

Main reasons for problems concerning access of RES to power networks are the following:

- Limited renewable energy expansion allowed in the new law (Draft Law on Renewable Energy Sources)
  Many stakeholders have complained about the quantitative limitations for renewable energy producers being introduced in the electricity sector by the new renewable energy law. Each type of renewable energy is assigned a limited capacity to be developed. The target of the government is to increase wind energy generation installations until 500MW capacity; solar installations – until 50 MW; hydroenergy stations – until 250MW, biomass installations – until 150MW. Although the date until

when the capacities should be reached is not specified, most probably it relates to Lithuania's 2020 target (Draft Law on Renewable Energy Sources).

- Lack of guaranteed grid access
  The uncertainty of receiving regular access to the power grid in Lithuania often discourages developers to invest in small and large-scale RES installations.
- Grid and market operational measures do not minimise curtailment of electricity from renewable energy sources.
  The operational measures were especially hostile before 2009 when Ignalina Nuclear Power Pant was in operation.

Possible solution: The establishment of a national regulation imposing guaranteed grid access for RES operators could be a possible solution.

Barrier 8.3 - Problems concerning TSOs and DSOs

In practice, RES investors depend prevailingly on the capacity of local distribution systems (DSOs), and to a lesser degree on the condition of high-voltage nationwide transmission.

The cost sharing for connection to the grid between RES investor and DSO is different in each case. This is identified as a barrier present on the side of the DSO. The different costs are due to the distance to the infrastructure and grid capacity. The cost of connection may exceed the cost of the actual renewable energy installation by a few times. In addition, the infrastructure installed on site (transformer station, etc.) becomes the property of the DSO.

The main issue concerning transmission system operators and distribution system operators in Lithuania is that the energy system is still highly centralized and monopolized. Officially Lietuvos energija (TSO) is separated from distribution system operators and the energy market liberalization program is still an ongoing process. There are two distribution system operators (DSOs) and operations management of the two DSOs differ as reported by the stakeholders.

A barrier has been observed with reference to the insufficient consideration of RES in grid development by TSOs and DSOs in Lithuania. The operators do not prioritise RES specific grid development in their strategic planning because of low awareness of their benefits.

Possible solution: The rules adopted by TSOs and DSOs on cost sharing and bearing of grid connection should be agreed on amongst TSOs and DSOs and published by them.

Barrier 8.4 – Other Barriers

Speculative behaviour

Similar to the case of Latvia, , there appear to be renewable energy developers who bid for feed-in quotas, get them and eventually do not proceed with the actual investment. They might be looking for opportunities to resell the quota for higher price. In practice this results in delays and restrictions. Connection terms might not be issued for new applications due to the speculative behaviour (Soros Foundation 2010).

Possible solution: Requiring advances for connection to grid might prevent speculative behaviour and limitations in connection approvals in the future when RES electricity production increases.

8.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
8.1		Are the rules on cost sharing and bearing of grid connection objective, transparent and non-discriminatory ?	No
8.2		Is the denial of grid connection by TSOs and DSOs a common problem, constituting an important barrier for RES development?	No

8.3		Number of months for getting grid connection (considering also approval of grid connection)	12-24
8.4		Estimated connection costs in Euros (in case producer pays)	37500*

* The estimated value mentioned most often in interviews is provided here. The value differs for each investment and was reported to be significant.

8.3 Literature

Order of the Government of Lithuania (OoGo). 2001. Approval of necessary regulations for the implementation of energy law (Dėl teisės aktų, būtinų Lietuvos Respublikos Elektros Energetikos Įstatymui Įgyvendinti Patvirtinimo). Amended on June 8, 2005. URL: http://www3.lrs.lt/pls/inter2/dokpaieska.showdoc_l?p_id=257441

Gudavičius, Stasys. 2009. Latvians will receive a compensation (Latviai išpešė kompensaciją). Diena, April 28. URL: http://www.diena.lt/naujienos/lietuva/latviai-ispese-kompensacija-214673

Paplauskis, Erlandas. 2009. Companies make use of the wind (Vėjų naudą UABai gaudo). Atgimimas, October 23-29, 2009, No 37 (1051). URL: http://www.atgimimas.lt/articles.php?id=1256155960

Ūkio žinios. 2009. EU financial support opens up the gates for green energy (ES parama atkelia vartus „žaliajai“ energijai)., November 10, 2009. URL: http://ukiozinios.lt/es-parama-atkelia-vartus-%E2%80%9Ezaliajai%E2%80%9C-energijai

Pinigų karta. 2010. A.Kiškis: what should a person do if he or she decides to build his own power plant? (A.Kiškis: Ką reikia daryti žmogui, nusprendusiam statytis savo jėgainę?). Lithuanian National Television. URL: http://www.pinigukarta.lt/naujienos-nuomones/energetika-naujienos/a-kiskis-ka-reikia-daryti-zmogui-nusprendusiam-statytis-savo-jegaine/comment-page-1

Rosende, Daniel; Klingel, Michael; Ragwitz, Mario; Resch, Gustav and Panzer, Christian. 2010. Guidelines for renewable energy industry for Lithuania. Background document for a seminar “Renewable energy policy paving the way towards 2020”. Prepared by Fraunhofer Institute for Systems and Innovation Research ISI and Vienna University of Technology Energy Economics Group. Vilnius, March 4, 2010.

9 Issue 9 Gas Network Issues

9.1 Introduction

In Lithuania the development of biogas for energy needs is still at the very initial state and only a very small percentage of the total potential is currently being used (NAOoL 2010). Injection of biogas into the natural gas network does not take place as there are no regulations developed for this area.

In Lithuania there are seven biogas installations, five of them are in operation and none of them is connected to the gas networks (NAOoL 2010, Štiormer 2009). Biogas energy is mostly used in Lithuania for satisfying in-house needs - electricity and heat in agricultural, food production companies, other industrial companies and wastewater treatment facilities (Štiormer 2009). A few biogas installations are in the phase of construction/project design. In general the resources for biogas production are located further away from cities and their district heating systems. This aspect causes difficulties for utilisation of biogas in district heating systems and the future connection to the gas networks.

Limited information on barriers is available since the technology is at its initial stage of development. The natural gas network operators are not familiar with the problem. The single most important obstacle for the development of biogas energy is an incomplete legislative base.

9.2 Description of barriers & solutions

9.2.1 Detailed description of the barriers and solutions

Barrier 9.1 – Problems related to the upgrading process
This is not an identified barrier in Lithuania yet.

Grid operators have not come across the problem of requiring technical minimum standards concerning the biogas quality as a prerequisite for grid injection. Specific regulations need to be developed.

Barrier 9.2 – Lack of information
A lack of information about multipurpose use and production of biogas energy has been identified as a barrier. Currently the Lithuanian Biogas Association and the related research institutions are the only institutions actively engaged in the promotion of biogas use in Lithuania.

Possible solution: A comprehensive assessment should be made about biogas potential in the country: reviewing multiple resources (straw, manure, wastewater treatment sludge, landfill gas etc.) and multiple uses (heat energy, electricity, biogas insertion, composting).

Barrier 9.3 – Inefficient authorisation procedures

No information is available on the authorisation procedures due to absence of regulation and elaborated rules on the connection to the gas networks.

There still are no regulations for biogas energy financial support programmes and for biogas insertion into the gas network. All existing biogas plants are not connected to the gas network. Support for biogas installations is available through European Union Structural funds. Therefore, for the start it is important to set up the necessary legislative base for biogas utilisation in Lithuania and regulations on its insertion into the network of natural gas.

Barrier 9.4 – Insufficient cooperation of grid operators

No information is available on the authorisation procedures for grid access because local authorities are unfamiliar with this problem and operators in Lithuania do not have experience in this area. There are regulations and elaborated rules on the connection to the gas networks to date.

Barrier 9.5 – Incomplete legal base for biogas energy use and insertion to gas networks

The incomplete legislative base has been identified as the biggest barrier for the development of biogas energy in Lithuania. Regulations for connection to the gas network have not been defined.

Currently the state regulations only determine the price of biogas electricity for purchasing through National Control Commission for Prices and Energy. The National Control Commission for Prices and Energy determines only tariffs for electricity from biogas, which is the same as electricity for biomass (Mano ūkis 2008). Biogas energy installations are not profitable under these conditions. There are cases when surplus electricity is supplied to the electricity grid and also cases when heat energy supply from biogas facilities contributes to the district heating systems (Mano Ūkis 2008 and Gaižauskas 2005).

Possible solution: Regulations for connection to the gas network have to be defined and the legislative base on biogas energy use has to be completed. Insertion of biogas into the gas network is still an undefined novelty.

9.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
9.1	If green certificates and/or subsidies for biogas are in place, do they de facto make unattractive to feed green gas into the grid due to the high level of subsidy for biogas used for electricity generation?	NO
9.2	Are the costs of grid connection for producers of gas from renewable energy sources objective, transparent and non-discriminatory?	NA

9.3	Do transmission and distribution tariffs discriminate against gas from renewable energy sources?	NA
9.4	Average time needed for grid connection approval (from application for grid connection to formal approval) in months (#).	NA

9.3 Literature

National Audit Office of Lithuania (NAOoL). 2010. Use of Renewable Energy Sources Potential in Lithuania. State audit report No VA-P-20-2-1, January 15, 2010. Vilnius. URL: http://www.vkontrole.lt/auditas_ataskaita.php?4007

Mano ūkis. 2008. Biogas wending its way to the Lithuanian energy market (Biodujos skinasi kelią į Lietuvos energijos ūkį). URL: http://www.manoukis.lt/index.php?s=7219&m=2&t=25

Gaižauskas, Vytautas. 2005. 'Kauno energija' invested into a biogas power plant ('Kauno energija' investavo į biodujų jėgainę). Verslo Žinios, March 14, 2005, page 9. URL: http://archyvas.vz.lt/show_file.php?file=vez20050314_09.pdf

Štiormer, Virginijus. 2009. Biogas market in Lithuania and its development (Biodujų rinka Lietuvoje ir jos plėtra). President of the Lithuanian Biogas Association. Presentation at the international conference 'The use of renewable energy sources for the production of electricity and heat: biomass, biogas and cogeneration', November 17, 2009. Vilnius. URL: http://www.lsta.lt/files/events/091117_Vok_prek_rumai/6_stiormer.pdf

10 Issue 10 District Heating

10.1 Introduction

Lithuania has inherited a well-developed infrastructure of district heating from its Soviet past. Central heating is supplied for 73,5% of residential buildings, most of them are multi storey apartment blocks in cities and towns (Statistics Lithuania 2009). Two thirds of Lithuania's inhabitants use district heating services (Kaminskaitė 2003) and Lithuania is among leaders in Europe according to district heating sector development (Stasiūnas 2009). District heating expansion happens incrementally with new buildings being built and connected to the centralized system, but there are no additional plans for extending this network.

There is a tendency to break away from district heating systems due to rather expensive heating services. The Law on Heat Economy (2003) elaborates conditions for disconnecting from central heating however, in practice this has proven to be nearly. The rules for disconnection are especially difficult to comply with in the case of multi–storey apartment buildings. On the other hand the media and consumer organizations alarm about monopolistic behaviour and interests of district heating operators (Kaminskaitė 2003) who hindering disconnection and increasing energy prices.

The main barriers identified in this chapter is the absence of a national strategy with the aim of initiation and expansion of DH systems largely based on renewables and the insufficient awareness of consumers in the area of RES in district heating. If the awareness amongst consumers was higher then the support for development of RES in district heating systems would also be greater.

10.2 Description of barriers & solutions

10.2.1 Detailed description of the Barriers and solutions

Barrier 10.1 – Lack of positive conditions for the increase of the share of renewables in existing DHC systems

One of the purposes of the Heat Economy Law issued in 2003 is to encourage the use of renewable energy sources (article 1, point 5; Heat Economy Law 2003). Articles 4 and 10 describe the conditions for renewable heat energy suppliers. Article 10 proclaims that heat energy from independent suppliers must be bought for a price that is lower than that of the centralised suppliers. Therefore, the price of energy unit supplied by the independent producers and renewable heat energy suppliers (case of 'Geoterma') must be

lower than the price of energy unit produced from natural gas by the main supplier in the area.

The price for energy paid to independent suppliers depends on gas price fluctuations. At certain times when natural gas price is low, renewable energy suppliers may be forced to sell the energy for lower price than the costs experienced when producing it (case of 'Geoterma'). If the independent heat energy producer is not satisfied with the price paid for a unit of energy by the main heat energy supplier, than the independent producer has the right to file a complaint against the latter to the National Control Commission for Prices and Energy. The National Control Commission for Prices and Energy is able to force the main heat energy supplier to pay a higher demanded price.

This discriminatory price setting towards independent heat producers was later fixed in the Heat Economy Law in 2009. The updated law entered into force in 2010 and it proclaims that if there is one independent producer of heat energy in the area or if independent producers supply more than 50% of the heat energy in the area, then energy pricing scheme becomes the same as to other main energy suppliers (Heat Economy Law 2009). Basically, the law does not oblige independent producers to supply heat energy below the cost price of energy produced from natural gas.

Possible solution: The current government (PoGoL 2008) states that it will aim to diversify the energy sources used for district heating with increasing the share of biomass and reducing the share of natural gas from 80% to 40%. However, in practice the responsibility for implementation of this change falls on the municipalities, who are poorly involved in this process. Municipalities are the owners of local district heating systems. The possible solution would be to give the municipalities a financial driver to increase share of RES in their district heating facilities.

Barrier 10.2 –Lack of positive conditions for the initiation and expansion of DH systems largely based on renewables

Consumers are not sufficiently informed about the share of renewable energy in their district heat services and its advantages.

There are no intentions of expansion of district heating systems, neither any plans to have them expanded largely on renewables in Lithuania. The share of district heating in the total stock of buildings is high and stable due to limitations imposed by disconnection regulations (mainly for multi-storey apartment buildings).Modernization of the district heating systems is planned and executed through the European Union structural funds support.

Case studies 10.3

Biomass for district heating systems. 17.3% of heat energy produced by district heating systems comes from biomass in Lithuania (LDHA 2009). This number is much higher for private heating systems (in private houses) – around 70 %.

The main incentive for biomass energy use expansion in district heating systems is investment in technological equipment that allows the use of biomass for heat energy generation (NAOoL 2010). Today Lithuania lacks legislation that would make incentives

to convert natural gas-powered power plants into biomass powered plants. As stakeholders have indicated in practice everything depends on the municipalities. Neither district heating operators (private or public), nor municipalities have enough incentives (economic or legal ones) to make these significant investments into biomass use expansion in district heating systems. However, financial support for biomass equipment installations in district heating systems is available through European Union structural funds (NAOoL 2010). On the other hand, the price incentives are quite obvious. District heating prices per kW/h for consumers are nearly 50% lower in municipalities where more than 85% of heat energy comes from biomass compared to those where more than 90% of heat energy is produced from natural gas (NCCEP 2010). Therefore, the municipalities should be more involved in the process of renewable energy promotion and should be assigned targets for renewable use.

Deep geothermal for district heating systems. Good potential for deep geothermal energy development exists in the Western part of Lithuania. 'Geoterma' is the only deep geothermal installation in Lithuania established as an experimental project in 1995 with the help of subsidies from the Global Environmental Facility (GEF), Danish Environmental Agency and a loan from the World Bank. Together with Klaipėdos energija 'Geoterma' is responsible for supplying the city of Klaipėda with heat energy. 'Geoterma' started supplying heat energy in 2001 and the amount of energy supplied grew each year. In 2002 it supplied 20% of total Klaipėda's energy needs (Vakarų ekspresas 2002).

However, the company found itself in a difficult financial situation. The plant was experiencing financial problems due to low price of heat energy sold to 'Klaipėdos energija'. In 2002 'Geoterma' sued 'Klaipėdos energija' for exercising a dominant power in the market and paying lower price for energy supplied than the one that the National Control Commission for Prices and Energy has determined (Vakarų ekspresas 2002). However, its claim was rejected due to article 10 in the Heat Economy Law: the price of heat energy delivered by independent suppliers must be lower than that of centralised heat suppliers. Therefore, the price per unit of heat energy paid by 'Klaipėdos energija' to 'Geoterma' would constantly depend on gas prices. And during the period in question gas prices were low and 'Geoterma' was forced to sell heat energy for a price lower than its actual costs to produce it. The critical point came in 2007 when 'Geoterma' was no longer able to manage its finance. The plant had to pause energy production due to technical problems and it needed finance to fix them while also repaying the World Bank's loan (Zinevičius 2007; Bajoraitė 2007). The government decided to bailout 'Geoterma' raising its capital stock, however, the company was only able to start supplying heat again in 2009 after two years of pause (Klaipėda 2007).

There are no other plans to establish deep geothermal energy plants in Lithuania. The potential for that would be favourable in the cities of Western Lithuania. There are also talks about the expansion of 'Geoterma': extending the installations more into the depth would also allow electricity generation. According to the views of stakeholders, geothermal energy is supported the least in Lithuania, although its potential large and the energy supplied would be stable (unlike solar or wind energy). Geothermal energy is not even mentioned in the National Energy Strategy of Lithuania (NESoL 2007). While other forms of renewable energy receive some kind of support through feed in tariffs or

investment plans (wind, solar, biomass), geothermal energy does not receive any support (except for the financial bailout of 'Geoterma' in 2007). Therefore, it is important to review the existing policies and to design support for the use of geothermal energy.

In general, the view in the society towards geothermal energy is mixed. The case of 'Geoterma' may have put a tag on deep geothermal as too expensive. At the time when it was designed, its capacity was planned much bigger on theoretical assumptions. However, when implementing the project, it appeared that its projected capacity was overestimated and this entailed negative financial implications. It is important to mention, that at the time of its design this type of renewable energy was even at the experimental stage in Denmark as well (Danish technologies were used). Therefore now, the situation would be different if another geothermal installation would be planned – there are lessons learned and this technology field is much more advanced than before.

10.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
10.1	Are there policies to promote the increase of the RES share in existing DH networks? (yes/no)	Yes
10.2	Are there policies to promote the initiation / expansion of DH networks? (yes/no)	No
10.3	Percentage present renewable share	17,7% (LDHA 2009)
10.4	Percentage CHP share (idem)	45% (LDHA 2009)

10.3 Literature

National Audit Office of Lithuania (NAOoL). 2010. Use of Renewable Energy Sources Potential in Lithuania. State audit report No VA-P-20-2-1, January 15, 2010. Vilnius. URL: http://www.vkontrole.lt/auditas_ataskaita.php?4007

Order of the Minister of Economy of Lithuania No 398, December 29, (OoMoEoL) 2001. A Code for electricity networks, electricity supply and electricity use (Dėl elektros tinklų kodekso bei elektros energijos tiekimo ir naudojimo taisyklių patvirtinimo). URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=157875

Department of Statistics of the Government of the Republic of Lithuania (Statistics Lithuania). 2009. Fund of residential buildings: 24.9 square meters per inhabitant of Lithuania (Gyvenamasis fondas: vienam Lietuvos gyventojui teko 24,9 kvadratinio metro naudingojo ploto). Press release, June 12, 2009. URL: http://www.stat.gov.lt/lt/news/view/?id=7015&PHPSESSID=.

Kaminskaitė, Evelina. 2003. Nepriklausomoj šaly – šilumos tinklų diktatas (Dictate of district heat operators in an independent country). Vakarų Ekspresas. October 21, 2003 issue. URL: http://www.ve.lt/?data=2003-10-21&rub=1065924812&id=1066663573

National Control Comission for Prices and Energy (NCCPE). 2010. Comission provides heat energy price statistics in Lithuania for January 2010. (Komisija pateikia 2010m. sausio mėn. šildymo kainų Lietuvoje statistiką) Press release, February 9, 2010. URL: http://www.regula.lt/lt/naujienos/index.php?full=yes&id=4459

Zinevičius, Feliksas. 2007. Use of geothermal energy and Klaipėda's demosntrational geothermal plant (Geoterminės energijos panaudojimas ir Klaipėdos parodomoji geoterminė jėgainė). Mokslas ir technika No9. URL: http://neris.mii.lt/mt/straipsniai/200709/geotermo.doc

Bajoraitė, Augustė. 2007. Geothermal plant – just a simple energy production plant (Geoterminė jėgainė - kol kas tik paprasčiausia katilinė). Verslo Žinios, August 10, 2007, No 150, page 5. URL: http://archyvas.vz.lt/news.php?id=758234&strid=1002&rs=0&ss=&y=2007%2008%2010

Vakarų ekspresas. 2002. Klaipėda's geothermal plant experiences financial losses (Klaipėdos geoterminė jėgainė patiria nuostolius). October 18, 2010. URL: http://www.ve.lt/?rub=1065924812&data=2002-10-18&id=1034869323

Klaipėda. 2007. Government bails out 'Geoterma' (Vyriausybė imasi gelbėti bankrutuojančią „Geotermą"). October 6. 2010
URL: http://klaipeda.diena.lt/dienrastis/ekonomika/vyriausybe-imasi-gelbeti-bankrutuojancia-geoterma-149821

Lithuanian District Heating Association (LDHA). 2009. Economic activity overview of heat supply companies in 2008 (Šilumos tiekimo bendrovių 2008 metų ūkinės veiklos apžvalga). Vilnius. URL: http://www.lsta.lt/files/statistika/2008metu_ukines%20veiklos%20apzvalga.pdf

Heat Economy Law. 2003. Accepted on May 20, 2003, No IX-1516, Vilnius. URL: http://www3.lrs.lt/pls/inter2/dokpaieska.showdoc_l?p_id=211524

Heat Economy Law. 2009. Accepted on May 20, 2003, No IX-1516, Vilnius. New version of the law accepted on December 21, 2009 and comes into force on January 5, 2010. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=363113

Programme of the Government of Lithuania (PoGoL). 2008. Accepted on December 9, 2008, No XI-52, Vilnius. URL: http://www.lrv.lt/bylos/vyriausybes/15_vyr_programa.pdf

National Energy Strategy of Lithuania (NESoL). 2007. Accepted on january 18, 2007, No X-1046, Vilnius. URL: http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=291371

Stasiūnas, Vytautas. 2009. Biomass, district heating and cogeneration in Lithuania (Biokuras ir centralizuotas šilumos tiekimas Lietuvoje, kogeneracija). President of the Lithuanian district heating association. Presentation at the international conference 'The

use of renewable energy sources for the production of electricity and heat: biomass, biogas and cogeneration', November 17, 2009. Vilnius. URL: http://www.lsta.lt/files/events/091117_Vok_prek_rumai/3_Stasiunas.pdf

11 List of interviewees

1. Paplauskis, Erlandas. Senior ecologist at the Seaside Regional Park, Klaipėda. Telephone interview on February 23, 2010. http://www.pajuris.info/
2. Tirūnas, Dainius. Director of the Lithuanian Hydropower Association, Kaunas. Telephone interview on February 24, 2010. http://www.hidro.lt/
3. Paulauskas, Stasys. Director of the Lithuanian Wind Energy Association, Klaipėda. Telephone interview on February 24, 2010. http://www.lwea.lt
4. Švanys, Vytautas. Senior geologist at Geoterma heat power station, Klaipėda and head of Gedminai community. Telephone interview on February 24, 2010. http://www.geoterma.lt/
5. Pikšrys, Saulius. Director of Lithuanian Wind Power Association, Kaunas. Telephone interview on February 24, 2010. http://www.lvea.lt/
6. Velička, Darius. Project manager at Archstudija architecture and renewable energy development company, Vilnius. Telephone interview on February 25, 2010. www.archstudija.lt
7. Žukauskas, Dangyras. Head of Design Standartization Division, Construction and Housing Department, Ministry of Environment of Lithuania, Vilnius. Telephone interview on February 25, 2010. www.am.lt
8. Lapinskas, Remigijus. President of the Lithuanian Biomass Energy Association, Vilnius. Telephone interview on February 25, 2010. www.biokuras.lt
9. Štiormer, Virginijus. Head of the Management Board, Lithuanian Biogas Association, Kaunas. Telephone interview on February 25, 2010. www.lbda.lt
10. Juškevičius, Romualdas. Director of a private company 'Solarwind' selling solar energy installations, Vilnius. Telephone interview on February 25, 2010.
11. Užšilaitytė, Lina. Head of Sustainable Energy Development division, Lithuanian Energy Agency, Vilnius. Telephone interview on February 26, 2010. www.ena.lt
12. Jakimavičius, Gintautas. Head of Renewable Energy Sources Division, Ministry of Energy of Lithuania, Vilnius. Telephone interview on February 26, 2010. www.enmin.lt
13. Milutienė, Edita. Director of Renewable Energy Information and Consultation Center, Vilnius. E-mail communication on February 26, 2010. www.ateik.info
14. Indriulionis, Audrius. Owner of a private shallow geothermal installation, Vilnius. Telephone interview on March 2, 2010.
15. Vajauskienė, Virginija. Marketing director at 'Erdonas', member of Lithuanian Solar Energy Association, Kaunas. E-mail communication on March 3, 2010.