

# Non-cost barriers to renewables – *AEON* study

Romania

Final report

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# 1 Introduction

This document represents the contribution of Green Partners Ltd, Romania in corporation with ECORYS for the “Non-cost barriers to renewables – AEON study” and is focused on the Romanian situation regarding non cost barriers to RES.

The information provided in this document is based on the interviews with stakeholders, which have been carried out in February to April 2010. In order to cover all relevant renewable energy sources and technologies, ca. fifteen interviews have been held with representatives of RES developers, RES associations, NGOs and other relevant stakeholders.

Taking into consideration that most of the barriers found are legislation related, a complete list of the Romanian RES related legislation has been included in Annex 2 to this report

In addition, the publication “*Renewable energy industry roadmap for Romania*” by Gustav R., Panzer C., Busch S., Ragwitz M., Rosende D has been used as support for this study.

## 1.1 Summary of main barriers

The topic of energy from renewable sources has steadily increased in interest over the years in Romania. It is known that Romania has quite some experience with hydroelectric power plants and also several successful wind projects have been implemented in the South over the past three years. Also, there is a good potential for other RES like geothermal, biomass and solar as energy sources.

In order to continue the ascending trend the existing non cost barriers need to be first highlighted and then overcome.

Romania is characterised by a period of political instability and RES projects are difficult to implement because of this. Good RES project ideas or projects in the first stage of development are often disregarded when new political parties come to power.

In Romania there are no specialised agencies for renewable energy. In other EU Member States these kinds of agencies are subordinate to the Prime Minister with the role of assuring the coordination for renewable energy production. This is one of the reasons why Romania has a complicated administrative procedure that can impose serious obstacles in RES project implementation. As much as 15 different bodies are involved in

the permitting procedure. This procedure can lead up to 36 months to obtain all the necessary permits. The possibility of a *one-stop shop* is not foreseen in the near future.

All interviewed stakeholders agreed upon one major barrier: RES is not promoted sufficiently by the existing legislation. Currently, in Romania, RES is promoted by G.D. 1892/2004 modified by G.D. 958/2005. According to these G.D. RES projects benefit of one green certificate for 1MWh delivered to the grid. This imposes a lot of questions regarding the feasibility of RES projects. Law 220/2008 was adopted by Romanian parliament. Interviewed stakeholders agreed that this law will make RES projects feasible because of its green energy promotion system but the approval and publication of its implementation methodology is delayed. Please see Chapter 1 – “*Administrative procedures*” for more details about the promotion system proposed in law 220/2008.

Also due to the fact that the implementation process for the EU RES directive 28/2009 was guided by international consultants, there are many gaps in adaptation of it to the specific situation in Romania. Because RES terminology was not clearly defined in the legislation implemented when entered the EU, knowledge of this subject could use improvement at stakeholders level.

Romania is also lacking in a good legal framework regarding Building Integrated Technologies. The current legislation is too permissive and RES are not taken into consideration when designing a new construction. Law 199/2000 says that a building should use a maximum of 100kW/m<sup>2</sup>/year from conventional sources. This value is too high and if RES should be promoted inside buildings it should be lower then the constructors would be obliged to use RES technologies in order to ensure the necessary need of electricity for a building.

One of Romania’s main priorities, according to the National Strategy for Energy, is infrastructure development. Approximately 65% from the electricity infrastructure is in high degree of physical wear, most of them being build in the 60’s, including substation and transformation stations. The infrastructure is not ready for receiving RES energy.

The same situation applies to the district heating networks; it is in high degree of physical wear and it has not been replaced or refurbished. Romanians prefer individual heating system mainly because they have lost their trust in district heating. This is due to the fact that each individual pays for the energy losses from the system, which can be quite substantial. District heating is like an ongoing loop. People are disconnecting from the system because prices for hot water are constantly rising. The introduction of RES in district heating will result in lower prices for hot water and also the replacing or refurbishing the infrastructure but the existing district heating company regards RES connection to the system as competition. RES producers are required to present an approval for connection to the system from the existing district heating company before delivering RES in the system.

Romania is currently in the process of liberalising the energy market but the National Energy Regulatory Agency - ANRE - is still imposing obstacles in the process. Also, Romanian legislation does not define well the term of “private interest” public authorities may have their own interest in different types of projects.



The grid connection procedure is complicated. It takes a lot of time and money to acquire a connection approval. In order to connect to the electricity grid the requirement is to change the land use destination. This is somehow easy for RES projects under 1 MW (which do not benefit from green certificates) but, for larger projects, change the land use destination is a long and painful process in terms of procedures, time and money that are required to invest.

The Romanian law stipulates that the connection to the grid has to be approved by the transport system operator (TSO) and ANRE. Any connection to the power grid is considered as competition and due to historical reasons, there is a preference for fossil fuels and the lobby for such fuels is still at higher levels than for RES.

When referring to biogas projects that are about to be financed there is always the confusion in terminology especially between biomass and biogas. This may lead to restriction to eligible costs.

Since the production of pellets includes raw materials which come also from agricultural fields, producers need to follow procedures related to agricultural land and crops as well. There is no legal framework yet for energy crops in Romania and there is no permit needed for energy crops.

Geothermal energy concept is not understood nor the technologies required to obtain energy. Also the legislation framework regarding geothermal energy is not clear. This creates a contradiction between the National Mining Authority and National Water Authority on who manages the legislation and who is responsible for the permits. One large obstacle for developing on-shore wind parks is getting the wind parks in the regional spatial planning (PUZ) of the municipalities. This can take few months up to three years before municipalities are convinced to include wind energy in this plan.

## 2 Issue 1 Administrative Procedures

### 2.1 Introduction

While in other EU Member States there often are agencies for renewable energy, subordinate to the Prime Minister with the role of assuring the coordination for renewable energy production, such an **agency is lacking** in Romania.

One of the main barriers for RES projects in Romania is the **complicated administrative procedures** that can lead up to 36 months required to obtain all the necessary permits. As much as 15 different bodies are involved in order to submit all the documentation for approval instead of one-stop shopping. This fact, combined with the lack of a centralised evidence system for documents and permitting, leads to communication problems among the involved authorities.

Further, high **bureaucratic processes** are slowing down the implementation of RES projects.<sup>1</sup>

Romania is currently struggling to implement a clear legal framework that gives RES energy a definitive advantage versus the conventional energy sources. Law 220/2008 was adopted by the Romanian parliament and received with enthusiasm by the RES specialists. They all agree that this law will make RES projects feasible because of its green energy promotion system but the energy regulatory authority is delaying its approval and publication of its implementation methodology. Currently, in Romania, RES is promoted by G.D. 1892/2004 modified by G.D. 958/2005. According to these G.D., RES projects benefit of one green certificate for 1MWh provided to the grid.

Law 220/2008 states the following number of green certificates that will be issued for RES electricity:

- 1 GC for 1MWh produced and sold to the grid by a upgraded hydroelectric plant of max 10 MW installed power;
- 1 GC for 2MWh produced and sold to the grid by a hydroelectric plant of max 10 MW installed power;
- GC for 1MWh produced and sold to the grid by a hydroelectric plant of max 1MW installed power;
- GC for 1MWh produced and sold to the grid by an onshore wind plant;
- GC for 1MWh produced and sold to the grid by a biomass plant;
- GC for 1MWh produced and sold to the grid by a solar system plant.

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<sup>1</sup> Interview with Grontmij representatives.

RES energy producers are awarded a mean price of 42 Euro for 1MWh. During 2008 and 2014, the price decided for one green certificate ranges between 27 and 55 Euro.

Because in Romania **spatial planning** does not include areas assigned for renewable energy, investors usually, need to spend a lot of time on preparing studies in order to see if the RES projects are economically feasible.

Depending on the relationship created with the authorities, the impact of the administrative procedure impact on RES deployment may vary from case to case.

## 2.2 Description of barriers & solutions

### 2.2.1 Detailed description of the barriers and solutions

*Barrier 1.1 – Inefficient general administrative procedures (including no/insufficient specific rules for building integrated/small scale RES installations)*

Regarding **RES technologies, in general** the following barriers were identified:

- The Romanian **institutional framework** responsible for RES is not clearly defined and organised. In RES permitting phase as much as 15 different bodies are involved, each of them issuing one type of permit or approval according to their authority competences. These bodies include the Environmental authority, Water management authority, City council, Gas network company, TOS, DOS, etc. For more details regarding this issue please see annex 1. A one-stop shopping solution would be very useful, where one can get all the necessary permits in one proposal. In Romania, it is even possible that before receiving the last permit, other permits previously obtained will be expired;<sup>2</sup>
- In other EU Member States, there are often agencies for renewable energy, subordinate to the Prime Minister with the role of assuring the coordination for renewable energy production. However, such an **agency is lacking** in Romania;
- Due to lack of common understanding about procedures, there can be a lack of **clarity** in the administrative descriptions and requirements. Annex 1 includes an overview on the administrative procedures for RES projects;
- The Romanian legislation is not supporting fast implementation of RES projects. In order to get a permit, lots of papers and documentations must be prepared. Because of this, the **approval time is prolonged** and energy producers are usually discouraged. It can take up to maximum three years to get all the permits necessary for starting a project, but it depends on the technologies;
- At this moment, Law no. 220/2008 setting the system of promoting the production of energy from RES was adopted by the Romanian Parliament. However, the regulatory authority is delaying its approval and publication of its implementation methodology. Thus, investors are reluctant to investment and prefer to wait until the law will be adopted. The status of the Law 220/2008 might be clarified before implementation by introducing the fixed tariff system. Furthermore, maybe local authorities should also be considered as eligible entities for receiving Green Certificates;

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<sup>2</sup> Interview with representatives of IBERDROLA company.

- Financing programmes for producing energy from RES are **very strict, exigent** and demand a lot of time for preparing all the documents. The donors or funding institutions are constantly monitoring the project implementation and post-implementation, asking for many reports;
- The tender documentations do not include a **clear definition of eligible costs** (e.g., costs with development of grid infrastructure are not eligible in EU tenders). Furthermore, the tender guides are sometimes including contradictions and are not very consistent when presenting the evaluation procedure. Also, as an example, the tender documentation for geothermal energy does not include the use of geothermal energy for electricity production (only heating is mentioned);
- Taking into consideration that it takes at least 90 days to get the permits included in the feasibility study that is requested for grants, the period a tender is opened is **too short**. In most of the cases the permitting procedures can be prolonged, going over 90 days, thus having direct consequences over the tendering time framework (for example the tenders for obtaining funds for RES from EU via Ministry of Economy are usually open for maximum 120 days. If you do not get all the permits in this stage, you over cross the time limit);
- People or institutions involved in administrative procedures do not **communicate** or communicate very little among each other. When developing a RES project it is very often that you will have to explain or to get explanations from different authorities and institutions and they might have different opinions on the same issue;
- The donors or funding institutions are constantly monitoring the RES project implementation and post-implementation, asking for **too many reports**. This situation could improve by introducing better and clearer monitoring mechanisms for project implementation;
- Currently, public authorities are not perceived as energy producers thus they are **not entitled for receiving certificates** for produced energy. In addition, public authorities should be considered as energy producers since they can develop RES projects themselves;
- Romanians do not work for the social benefit of the country and are not well educated in this regard. Even more, the public sector does not work for the public even if they are meant to do so and nobody is doing anything to change this mentality. There is also another misconception – the available funds (EU or local) must be spent, rather than thinking that EU funds are there to create a better life, a better environment, etc. Romanians are not thinking of a sustainable society. The correct idea should be that the available funds should be used to build quality projects not just to be absorbed;
- RES project have to be financed. Even if Romania has RES experts, these experts must also understand the financial side of the project. When asking for a grant from a bank they should have the skills necessary to point out the turnover of the project in order to receive the grant and in the end, to have a successful RES project. At this moment, these types of skills could use improvements.

Regarding **solar installations** the following barriers were identified:

- Because Law 220/ 2008 on producing energy from RES does not apply yet, the market is not well organised and hinders the development of long-term market relationships. According to this law for each MW, producers of electricity from photovoltaic systems will receive 4 Green Certificates. Now, investors are reluctant to investments and prefer to wait until the law will become applicable. Photovoltaic

system manufacturers that might decide to invest in Romania get discouraged by the complication of the processes and by the small number of green certificates allocated for each MW produced. Only 1 GC at the moment but 4 in case the new system are approved.<sup>3</sup>

Regarding **biomass installations** the following barriers were identified:

- Since the production of pellets includes raw materials which come also from agricultural fields, producers need to follow procedures related to agricultural land and crops as well. There is **no legal framework** for energy crops in Romania and there is no permit needed for energy crops. This is also possible because there is no need for permits thus, no institution empowered to give such permits. Producers receive different answers and guiding from APIA<sup>4</sup> when dealing with land use issues;
- A management plan on a municipal level is currently missing. This would be very useful, though, in developing **biogas** projects.

Regarding **geothermal energy**, the following barriers have been identified:

- There is no clear definition of geothermal energy. There are three types of geothermal energy sources: (i) surface hot water; (ii) underground hot water and (iii) hot rocks. Neither these three concepts nor the technologies required to obtain energy, are well understood, nor by the law issuers nor by the authorities. One needs to drill to use geothermal but it is not a substance that is extracted, it is a renewable energy obtained by extracting hot water and replacing with cold water or by heat exchangers/heat pumps. This creates a contradiction between the National Mining Authority and National Water Authority on who manages the legislation and who is responsible for the permits. Because of this, there are few people from both organisations that understand the legal framework for geothermal energy;
- There is a lack of transparency, information disclosure. Some data needed for permits and different other approvals in geothermal sectors are considered as work secrets. They are hard to obtain and one has to buy those data whereas in other domains these types of data are free. This procedure increases the time needed to obtain environmental approvals.

Regarding **hydro installations**, the following barriers were identified:

- There are no simplified procedures for smaller hydro installations (until 100 kW) in the authorization process. A **possible solution** would be to reduce the requirements for small hydro installations. The evaluation of the impact on environment goes beyond the scope of the present study.

### *Barrier 1.2 – Inexistent or insufficient spatial planning*

Spatial planning in Romania **does not include areas** assigned for renewable energy. In order to find a proper location for the installation of energy plants the investors usually need to spend a lot of time on preparing studies in order to see if the investments are feasible on short and long terms. Spatial planning programmes have to be adopted in

<sup>3</sup> Interviews with EnergoBit Holding representatives.

<sup>4</sup> <http://www.apia.org.ro/> ) "Agentia de Plati si Interventie pentru Agricultura" -Agency of Payments and Intervention for Agriculture.

order to allow for the implementation of a RES project in a specific area, especially when there is a high RES potential involved in that particular area.

Regarding **on-shore wind power installations** the following barriers were identified:

- One large obstacle for developing on-shore wind parks is getting the wind parks in the **regional spatial planning** (PUZ) of the municipalities. This can take few months up to 3 years before municipalities are convinced to include wind energy in this plan, as citizens are allowed to object with the project plans for the wind turbines. These objections can be done in public debates but very often the local communities do not participate to these events. In case the wind farm is located inside or interferes with Natura 2000 areas, more permits are required and the permitting procedure gets longer.

#### *Barrier 1.3 – Competing public interests*

There are many market obstacles imposed by the Energy Regulatory Agency – ANRE. ANRE is supposed to play the role of a referee and implement the legislation in order to lead to an open market. Fiscal policies and programmes that stimulate production of energy are currently lacking, and need to be developed. The current mechanisms do not encourage competition.

Regarding **geothermal energy** the following barrier were identified:

- Geothermal energy is taken into account in public projects related to district heating but different interest groups make a better lobby towards their own conventional energy business.

Regarding **onshore wind power** installations the following barriers were identified:

- The public interest is very low in this field, although there are many NGOs active to promote wind power, but sometimes they are considered as activists. In Romania the **offshore wind** potential is not taken into account because there is a large on-shore potential (14,000 MW) that is not yet developed.

#### *Barrier 1.4 – Other Barriers:*

- **Competencies of permitting authorities.** In general, the level of competences of the employees of permitting authorities (knowledge, skills, and attitudes) is low. Permitting authorities are lacking in well-trained personnel, with strong knowledge regarding RES;
- **Electricity pricing.** Electricity produced from RES and sold to the national grid has the same price as electricity produced from other sources. It will be better if the price received for electricity from RES would increase thus eliminating the need for green certificates, which have complicated selling procedure;
- **Corruption.** Because Romanian legislation does not define well the term of “private interest” public authorities may have their own interest in different types of projects. Because of this, Romania does not have an open market for tenders. Public tenders are already designated to a specific company; because of this, the requirements in the tender specifications are difficult to match;
- **Political instability.** Political instability makes RES projects difficult to implement;
- **Complicated financial support system.** The support system for biogas project is complicated (complicated subsidy proposals guides, complicated financial schemes)

and there is no clarity regarding project's feasibility requirements when applying for funds;

- **Communication with authorities.** Communication with authorities – especially the ones at national level – is difficult. They seem to be prepared for implementing the biogas policy and biogas projects but it is a challenge to establish a direct meeting with them. The meetings must be scheduled only by fax (most of them do not respond to e-mails and telephone calls, which forms an extra barrier are also a problem), which means that it takes a lot of time until the fax reaches the desired person. A possible solution would be the development of an online communication service for replying to questions related to RES, operating on national level;
- **Difficult communication between authorities themselves.** Communication with the ministry and local authorities is difficult. In order to obtain an audition or information you need to fill in many documents sent only by fax.

Regarding **hydro energy** the following barriers were identified:

- **Lack in knowledge of involved authorities.** When thinking about micro or macro hydro power stations the authorities involved in public administration people might immediately think about a big dam with a big lake behind.

### 2.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
1.1	All	Is one stop-shopping possible?	No
1.2	All	Amount of money to be invested in the administrative process (including cost of work and costs like fees) (in €)	Up to 50 k (est.)
1.3	All	Time to be spent for the administrative process (duration to get all the main permits) (in months)	Max. 36, average 12
1.4	All	Estimated number of permits required (#)	<20





## 3 Issue 2 Technical Specifications

### 3.1 Introduction

In general the RES terminology is not well known to stakeholders because this is not clearly defined in the legislation implemented in Romania when entered the EU. International consultants guided the implementation process for the EU RES directive 28/2009. Due to this, there are many gaps in adapting it to the specific situation in Romania.

BAT's for RES are not listed in the legislation and examples of efficient technologies from the more advanced countries are not always taken into consideration.

Usually, specific technical condition for RES are not mentioned as requirements when developing a project and applying for funds (in the financing guidelines) thus, technical specification do not impose difficult barriers in RES project implementation.

### 3.2 Description of possible barriers & solutions

#### *Barrier 2.1 – Weak definitions:*

- Confusion may arise because the used terminology is not specifically defined and it may lead to difficulties regarding project implementation;
- Best Available Technologies (BATs) are not listed in the legislation and each tender dossier might, but not always include references for BAT. The contracting authority usually tries to find the best offer and installations with high conversion rates.

Regarding **biomass installations**, the following issues have been identified:

- When referring to biogas projects that are about to be financed there is always the confusion in terminology/definitions especially between biomass and biogas. This may lead to restriction to eligible costs.

#### *Barrier 2.2 – no EU standards applied*

Regarding **biomass installations** the following issues have been identified:

- **No efficiency certificates for biomass equipment are currently in use.** There are no specific certificates for biomass equipment. The equipment used within a biomass plant needs to respect only safety national standards. Usually the number of certifications needed depends on the complexity of the energy installation;

- For a water boiler that works with temperatures over 90 degrees Celsius only ISCIR<sup>5</sup> regulations need to be respected.

#### *Barrier 2.3 – Specified locations for testing and/or certification*

No barriers have been identified.

#### *Barrier 2.4 – Barrier to trade*

No barriers have been identified.

#### *Barrier 4.5 – Other Barriers*

**Standardisation** is an issue. A standard technical solution should be used for small RES projects and technologies. In Romania, all projects are built from scratch. This takes a lot of time for implementing them. The technical specifications have to follow all the EU standards. There is no specification regarding the origin of the technology.

Regarding **hydro-energy** projects, the following issue has been identified:

- When thinking about micro or macro hydropower stations the involved authorities might immediately think about a big dam with a big lake behind.

Regarding **thermal energy** projects, the following issue has been identified:

- High efficient heat exchangers are not yet in use. Turbines are used for electricity production but they are also not very efficient.

Regarding **Solar energy** projects, the following issue has been identified:

- Solar panels have to be accompanied by certificates issued by an independent body that proves that the producer is respecting quality standards like ISO 9001:2000 or equivalent. Photovoltaic panels need to respect European technical standards and these are stipulated very clear in tenders. TUV Certificate, IEC 61215 Certificate and other type of certificates used at EU level are usually required within each project.

### 3.2.1 Best Practice Elements and Indicators

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

<sup>5</sup> Inspectia de Stat pentru Controlul Cazanelor, Recipientelor sub Presiune si Instalatiilor de Ridicat – National Inspectorate for Boiler Control, Pressurised Containers and Lifting Installations, [www.iscir.ro](http://www.iscir.ro).

## 4 Issue 3 Building integrated technologies

In general, Romania is lacking a good **legal framework** regarding the Building integrated technologies. The current legislation is too permissive and RES are not taken into consideration sufficiently when designing a new construction.

Regarding old buildings, most of the project proposals are rejected because of safety reasons. Moreover, the tenancy agreement is playing a definitive role in installation of RES.

### 4.1 Description of barriers & solutions

#### 4.1.1 Detailed description of the Barriers and solutions

##### *Barrier 3.1 – Inefficient general administrative procedures*

No barriers have been identified, other than mentioned in chapter one.

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

Romania lacks a good legal framework regarding Building integrated technologies. Still, for promoting energy efficiency in buildings, in 2002 The European parliament and the EU Commission adopted Directive 2001/91/EC on building energetic performance transposed in Romania through Law 372/2005. The use of RES is mentioned in Article 10 of the law. This stipulates that for buildings with a functional area of over 1000 square meters, the local or district public administration authority - through the zoning permit (*certificatul de urbanism*) given in order to receive a building permit - requests a technical feasibility, economic and environment study. This study will identify the possibilities of using alternative systems of producing energy such as for example decentralised energy systems based on RES. This has direct consequences on the time framework for implementing such a project and the costs. Moreover, Law 199/2000 says that a building should use a maximum of 100kW/m<sup>2</sup>/year. This value is too high and if RES should be promoted inside buildings it should be lower. Doing so, the constructors would be obliged to use RES technologies in order to ensure the necessary need of electricity for a building.

##### *Barrier 3.3 – Competing public interests*

No barriers have been identified.

##### *Barrier 3.4 – Renewables obligations insufficient*

There are no RES obligations.

### *Barrier 3.5 – Exemplary role of public buildings neglected*

The exemplary role of public buildings may be neglected. For example, Alba Iulia is a city of over 60,000 people situated in the centre region of Romania. In 2007, the municipality started to implement a project for producing energy using solar panels. The total installed capacity of the PV panels is 250 kW. They are located on four of the public buildings in the city. They are fully functional at this moment but they do not benefit of sufficient publicity and are not distributed as an example by the authorities.

### *Barrier 3.6 – RES deployment hindered by spatial planning matters*

No barriers have been identified.

### *Barrier 3.7 – Tenancy law and ownership law impede development of building integrated RES technologies*

In order to install RES systems in buildings the owners have to approve the placement of RES systems in their buildings. In case of more owners for one building they all have to give their permission for building such energy systems. This is usually one of the most challenging parts of the project and might influence the time framework of the project. In case of public buildings, the approval is done by the municipality.

### *Barrier 3.8 – Other Barriers*

In case of old buildings, based on the feasibility, permits can be refused due to **safety** reasons.

## 4.1.2 Best practice elements and indicators

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

## 5 Issue 4 – Promotion of energy efficient renewable energy equipment

### 5.1 Introduction

The decisive support scheme for RES is certainly lacking in Romania. Green certificates, which are currently the main support for green energy, favour opportunists and do not encourage a sustainable development of this sector.

In the EU, the energy efficiency of equipments refers to efficiency standards. In Romania these standards are either lacking or not well defined, when referring to all RES equipments (biomass equipments, wind power equipment, etc.).

RES it is not sufficiently promoted in Romania, thus this subject it is not yet well disseminated among the population. In addition, there is no specific support for each separate type of RES equipment.

### 5.2 Description of barriers & solutions

#### 5.2.1 Detailed description of the Barriers and solutions

##### *Barrier 4.1 – Non-compliant promotion schemes*

Legal framework for promoting efficient renewable energy equipment. In Romania at this moment the system of green certificates for energy produced from RES is in use. This system represents a system for opportunists and is not a system that encourages a sustainable development of this sector. The solution might be the use of fix tariffs.

##### *Barrier 4.2 – Lack of substitution of existing inefficient systems*

No barriers have been identified.

##### *Barrier 4.3 – Use of national procedures*

No barriers have been identified.

##### *Barrier 4.4 – Insufficient information*

No barriers have been identified.

##### *Barrier 4.5 – Insufficient information*

Often, projects are one-way oriented (looking at only one end product). Many times the focus is only on electricity production and very often heat is neglected.

### 5.2.2 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)	N/A

## 6 Issue 5 Information/awareness raising

### 6.1 Introduction

Broadly speaking information regarding RES is missing at the local/regional level. While a lot is available at national level, the information does not flow to the local level.

Because of this, there are no programmes in action with respect to awareness raising. Moreover, it is difficult for people to find information about RES. There is not enough information regarding RES and people do not know the advantages of RES technologies. The so called **Not In My Backyard**-issues raises problems in Romania.

A few meetings have been organized where stakeholders could ask the necessary questions but there are certainly not enough of them.

### 6.2 Description of barriers & solutions

#### 6.2.1 Detailed description of the Barriers and solutions

##### *Barrier 5.1 – Insufficient availability of information on support measures:*

- People have difficulty in **finding information about RES** and how it can be used and to understand opportunities in this sector. There is no clear guidance for where and how to get information. Few info-meetings were organised where people were able to ask questions and receive answers. A lot of people are attending these meetings in order to address questions and many subjects are avoided or lost in details;
- The level of knowledge is very low. There are **no action programs with respect to awareness raising**. Although there are funds for information and awareness raising it is still very hard to obtain them due to their selection criteria;
- **Lack of transparency**. Some data needed for permits and different other approvals in geothermal sectors are considered as work secrets. They are hard to obtain and one has to buy those data whereas in other sectors these types of data are free. These procedures increase the time needed to obtain environmental approvals;
- **Information flow**. RES are not very well promoted at local level. If at national level, information is circulating among different groups, and reaches some of the main stakeholders, this is not happening at local level. Information flow should be increased.

##### *Barrier 5.2 – Insufficient public funding for campaigns/programmes*

No barriers have been identified.

### *Barrier 5.3 – Insufficient campaign-/programme-design*

There is no annual awareness raising campaigns regarding RES where people could benefit of the information. An example is Germany's "Week of the sun".

Regarding **onshore wind power** installations the following barriers were identified:

- The public does not know enough about wind energy. Wind energy is the cheapest source of RES and represents the largest RES with over 14.000 MW potential in Romania. Almost all wind potential of Romania is concentrated in the South East part of Romania (SE Dobrogea and SE Moldova) and the grid capacity of Transelectrica is at maximum. In these conditions, only new investments can conduct to a fully exploitation of the wind potential;
- The public's perception in general is too critical with regard to wind energy, especially if the wind park is situated within a nature conservation area;
- The wind energy industry does have a lobby group in Romania, called the Association of Wind Energy Producers in Romania (APEER). This Association is supposed to lobby for the further implementation of wind energy in Romania and helps members with advices and experts in order to develop wind energy projects.

Regarding **solar installations** the following barriers were identified:

- **NIMBY -not in my back yard - syndrome.** Some awareness raising and information campaign reached a large target group and the responds expressed their interest in solar systems but they are not very open towards implementing such projects.

Regarding **photovoltaic systems** that use solar electric panels or solar heat panels:

- Clients can be intentionally misinformed about how they can provide electricity to the network in summer or may use heat pump in winter.

Regarding **geothermal energy** installations the following barriers were identified:

- There are situations in which the mass media and responsible authorities are obliged to communicate the effects of using geothermal energy technology. For example, small-scale earthquakes may accrue when exploiting for the first time the energy from hot rocks. Because sometimes these secondary effects were not communicated to the population, the projects were abandoned.

### *Barrier 5.4 – Other barriers*

There is too much emphasis on wind and hydro energy compared to other RES. Romania has a good biomass potential all over the country and, in south, good potential for solar system but these potentials and technologies are not promoted. All focus goes on wind and hydro energy.

## 6.2.2 Best Practice Elements and Indicators

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



*Example:*

In order to increase the level of information and awareness of public, a local agency from Alba Iulia started a long term programme for informing locals about RES. ALEA - <http://www.alea.ro/> (Agentia Locala a Enegiei Alba), the Local Energy Agency from Alba –Iulia is very active in information and awareness. They develop awareness raising campaigns through European Funds because there are no local funds available for this or the budget is not sufficient. Unfortunately, there should be more agencies like this one.



## 7 Issue 6 Certification of installers

### 7.1 Introduction

An engineer needs a certificate issued by ANRE, the Romanian Energy Regulatory Authority<sup>6</sup>. Starting from November 2009, there are new regulations developed by ANRE.<sup>7</sup> According to this, you can participate to an exam in order to receive an electrician certification only if you can demonstrate that you have followed a theoretical course for electric installations. These courses are organized by AREL – Electricians Romanian Association.<sup>8</sup>

ANRE is not interested in RES that is regarded as competition thus, not willing to give certification for installers as much as it could possibly give. Therefore, ANRE is not very open to communication regarding the certification procedures.

There are no specific trainings schemes for technicians or installers of RES technologies; i.e. training has to be provided by the private sector.

### 7.2 Description of barriers & solutions

#### 7.2.1 Detailed description of the Barriers and solutions

##### *Barrier 6.1 – Lack of a Certification body:*

- The certification procedure is complicated. In the past, for example, certification for photovoltaic panel installers was given by the Ministry of Environment. (This information was provided by more interviewees, but not confirmed by the Ministry up till now). At present, in order to perform any kind of work, an engineer needs a certificate issued by ANRE – Romanian Energy Regulatory Authority;
- At national level, there are accreditation bodies for persons involved in working with RES. These accreditation bodies are part of the general accreditation system from ANRE. Therefore, are not very open and do not communicate very well the certification procedures;
- Besides ANRE there are no other Accreditation bodies in Romania.

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<sup>6</sup> <http://www.anre.ro/>.

<sup>7</sup> Autoritatea Nationala de Reglementare in domeniul Energiei.

<sup>8</sup> Asociatia Romana a Electricienilor - <http://info-arel.blogspot.com/>, <http://asociatielectricienilor.ro/>.

#### *Barrier 6.2 – Lack of guidelines:*

- **No clear training, evaluation scheme, lacking in a standardisation system.** Because there are no specific trainings schemes for technicians or installers of RES technologies, training has to be provided by the private sector. There is no evaluation and no standardization system for renewable energy experts. For example, if one wants to install photovoltaic panels one only needs to have a certificate from the regulatory authority in the domain that proves one is an electrician installer or engineer and not a specific certificate for renewable;
- **Absence of certification organisations.** There is no professional organisation on geothermal energy that could certify experts; this issue is still in development. Because of this, the knowledge of the geothermal experts could use improvements.

#### *Barrier 6.3 – Lack of training:*

- **Lack in RES courses.** In Romania there is a lack of courses for renewable energy installers. An institution like REIA<sup>9</sup> could be a solution for Romania as well;
- **Lack of training courses for private sector.** RES companies do not always offer their employees training courses regarding RES. Often, installers adopt the learning-by-doing method and get specialised while working.

Regarding **photovoltaic systems**, the following issues have been identified:

- Absence of training centres. Lacking training centres for solar energy that could improve the knowledge should be developed;
- In the case of photovoltaic panel installers, they need to have a certificate of an electrician or electric engineer from ANRE - ANRE does not want RES into the national system.

Regarding **thermal systems** the following issues have been identified:

- **Insufficient knowledge.** Geothermal energy is not understood accordingly and/or not well defined in the legislation, therefore the procedures for accreditation are unclear and time consuming;
- **Lack of specialised experts.** Usually, it is not easy to find professionals on geothermal energy on the Romanian market. When searching for such persons, you might find people specialised in geology, thermal energy or electricity;
- **Professional trainings for drilling experts.** There are few places in Romania where training sessions can be held. Drilling experts need a special certification from National Agency for Mineral Resources. This is because the geothermal resources are considered as mineral resources and thus follow under the mining laws.

Regarding **biogas**, the following issues have been identified:

- Romania lacks biogas specialists;
- Currently, Romania does not offer courses specialised in biogas, neither at university level nor by other entities specialised in biogas accreditation.

#### *Barrier 6.4 – Other Barriers*

No barriers detected.

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<sup>9</sup> Renewable Energy Installer Academy – <http://www.reinstalleracademy.org/site/home.asp>.

### 7.2.2 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



## 8 Issue 7 Infrastructure Development

### 8.1 Introduction

Presently a significant part of the electricity infrastructure is in high degree of physical wear, most of it being build in the 60's, including substations and transformation stations. However, the national grid is in a process of modernisation in order to cope with the EU standards, which will allow an increase in safety and new opportunities for transboundary trading. Romania's national grid is connected to its neighbours, excepting Moldavia. At this moment, the Romanian infrastructure is not ready for RES and consequently forms definitely an obstacle in the development of RES projects.

The most favourable areas for RES projects, for example on-shore wind installations, are in remote areas where the infrastructure is undeveloped. Usually the investors have to take in consideration also the costs for the infrastructure development, which is necessary for the project implementation. Often, this inconvenience weighs heavily on the feasibility of the project.

Because Romania lacks a good legislative framework for RES the costs regarding grid infrastructure are beard by the RES producer entirely. Further, G.D 443/2003 states at Article 8, point 3 that the grid connection procedure of RES producers is according to the Regulation of connection for all users of the public electricity supply network. Amongst others, users are producers, consumers, TSO, etc.

Despite the fact that the European Union has a good development strategy for the power grid, Romania is several steps behind and it lacks in a good development strategy.

### 8.2 Description of barriers & solutions

#### 8.2.1 Detailed description of the Barriers and solutions

##### *Barrier 7.1 - Problems concerning connection to existing electricity networks*

For this issue, we refer to power grid issues (next Chapter).

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

- Lack in infrastructure development support. Due to the fact that the new law (220/2008) is not yet applied, the TSO is not participating at any projects;
- The rules for the development of the power grid are not always very clear. Producers need to pay for the development of the infrastructure;

- **Undeveloped infrastructure.** Large capacity systems of producing energy from RES bring inconveniences because they bring fluctuations to the grid. The market should develop towards small plants with many access points. The grid must be balanced by installing more small capacity power plants. Smart grids are in use in Romania but only on a small scale and are in the national strategy for energy as a necessary measure for RES so they could present a solution for the grid fluctuation. Romania should follow European case studies;
- There is **no storage capacity** for renewable energy.

Regarding **hydro systems** the following issues have been identified:

- **No or badly developed infrastructure in isolated areas.** The infrastructure is not well developed or is missing in isolated areas. This leads to restricted access or no grid access where projects can be implemented. The lack of infrastructure leads also to a longer period for construction and also demands more efforts from the beneficiary.

Regarding **onshore wind systems** the following issues have been identified:

- **Undeveloped infrastructure.** Locally, grid access is in many cases a large problem. Because the wind potential is larger in areas that are not easily accessible, the infrastructure is undeveloped. In case of a new wind farm, the investor needs to assure the development of a new infrastructure system as well;
- **Geographical barriers.** The infrastructure might be a problem because of the terrain. In order to transport, install the wind turbines and grid infrastructure, investors need to discuss with the municipalities and people involved and get their approval;
- **No study was conducted by the government** in order to find infrastructure development necessities.

Regarding **geothermal systems** the following issues have been identified:

- **Insufficient support for infrastructure.** In many cases, the infrastructure is inexistent or in a very bad shape and producers need to invest a lot of effort in construction or rehabilitation programmes.

*Barrier 7.3 - Problems concerning development of a Trans-European Electricity Network*  
No data available.

### 8.2.2 Best Practice Elements and Indicators

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



## 9 Issue 8 Power Grid Issues

### 9.1 Introduction

Barriers related to power grid access and connection is one of the strongest barriers in Romania. The Romanian energy market is still under a transition period from a closed system to an open market. Due to historical reasons, there is a preference for fossil fuels and the lobby for such fuels is still at higher levels than for RES.

Complicated grid access procedures are in place, which also involves ANRE - the national authority. A grid connection project has to be made by an engineer authorised only by ANRE. In order to obtain the connection permit a connection proposal has to be submitted to ANRE. ANRE and the national grid local operator have to approve this proposal.

The communication between TSO-DSO-ANRE is inefficient and makes the connection permit difficult to obtain. Taking into consideration that the validity of the grid access permit is limited at 6 months, we can say that this is a major barrier in RES development.

Small- or large-scale projects have the same permitting procedures. A standard procedure should be available for small-scale RES projects. In addition, the term small-scale should be clearly defined.

Due to unclear legislation regarding promotion of RES and grid access, DSOs are not interested in providing support in grid connection. Also they are not interested in developing the necessary grid infrastructure to make grid access and connection possible.

Clear lines cannot be drawn in order to say that one type of RES project is easier to implement than another. On shore wind parks and hydroelectric power plant have provided more electricity to the grid simply because Romania has a long tradition in working with hydropower and in case of wind parks, the energy is harnessed directly from the environment through the wind, not as in case of biomass power plants that are dependable on the agriculture or economy.

Also, the electricity obtained from biogas does not benefit from a special subsidy system. It is benefitting of the same financial promotion system as the electricity from the other type of RES projects. This can be one reason why there are no biomass projects currently implemented that provide electricity to the grid.

## 9.2 Description of the barrier

### 9.2.1 Detailed description of the Barriers and solutions

#### *Barrier 8.1 - Problems concerning grid connection:*

- ANRE is the national authority that is dealing with grid access. ANRE imposes a complicated procedure that has to be followed in order to obtain the connection certificate, which must be done only by accredited experts from National Energy Authority. In addition, this procedure also must be approved by the local operator of the national grid;
- **Validity of grid access permits.** One of the main issues related to grid access is the validity of the grid access permit. This permit is valid either for 6 months or for 1 year. Afterwards it needs to be renewed;
- **Difficult communication between electricity stakeholders.** Due to the fact that electricity from RES is prior in the system, TSOs and DSOs have to communicate with conventional electricity producer when to decrease (or increase) the production of electricity. This applies only to a great amount of electricity. This communication is not done properly and RES producers may suffer losses.

Regarding **onshore wind** systems, the following issues have been identified:

- No separate connection procedures for large and small projects. For every on-shore wind park, – whether large or small – the same type of permits and approvals for connection are needed. This again leads to the construction of transforming posts that leads to more investments, more procedures and more time.

#### *Barrier 8.2 - Problems concerning grid access:*

- **Complicated connection grid procedures.** The grid connection procedure is complicated. It takes a lot of time and money to acquire a connection approval;
- The Energy producing companies in Romania wants to have market monopoly and they are not interested in RES. They consider it as a threat. Therefore, they have built the necessary barriers in time to prevent RES development. For example: to connect to the electricity grid the requirement is to change the land use destination. This is somehow easy for RES projects under 1 MW (which do not benefit from green certificates) but, for projects larger than 1 MW a ridiculously high fee is required in order to change the land use destination;
- Also conflicts of interest between policy sector and energy sector may arise;
- **Unequal grid development.** Recently legislation has been developed including priority for renewable energy to access the grid. The network is capable of absorbing the wind energy in most places in the country but is developing more in Dobrogea area because of the large wind potential presented in this area close to the seaside.

#### *Barrier 8.3 - Problems concerning TSOs and DSOs:*

- Lack of interest from TSO to provide grid access. The Romanian law stipulates that the connection to the grid has to be approved by the national TSO. This process is time consuming and RES producers just start the investment from their own budget and hope that the connection is approved;
- At this moment, the company who owns the wind park and wants to get access to the network to distribute their electrical energy is assuring the grid access;

- **The grid has low capacity for receiving and transportation energy.** The capacity for receiving and transporting energy of the National Energetic System is low, although Law no. 220/2008 stipulates that the Transmission System Operator (TSO) and Distribution System Operators (DSO) are obliged to guarantee the transport and distributions of electricity produced from RES and assure the long life and safety of the electricity grid;
- The connection to the grid especially in isolated areas is difficult. There is no support from the Transmission System Operator and Distributor with respect to this issue.

Regarding **solar power systems** the following issues have been identified:

- Mechanism for receiving the produced electricity. The contract with Electrica describes exactly the mechanisms for receiving the produced energy by PV panels and the calculation method for energy consumption of the producers. Also, the contracts include the compensation procedure between these two values. Using an electric energy meter, the producer is measuring the produced energy. This quantity of produced energy is then reported to Electrica that calculates the difference between the energy used and energy produced by using the same energy equivalent for the quantity of energy produced from RES.

### 9.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
8.1	All	Are the rules on cost sharing and bearing of grid connection objective, transparent and non-discriminatory ?	No
8.2	All	Is the denial of grid connection by TSOs and DSOs a common problem, constituting an important barrier for RES development?	Yes
8.3	All	Number of months for getting grid connection (considering also approval of grid connection)	1-6
8.4	All	Estimated connection costs in Euros (in case producer pays)	71 - 580



## 10 Issue 9 Gas Network Issues

### 10.1 Introduction

This issue is not applicable, there are no biomass projects or initiatives that inject biogas into the national natural gas network.

### 10.2 Description of barriers & solutions

#### 10.2.1 Detailed description of the barriers and solutions

*Barrier 9.1 – Problems related to the upgrading process*

Not applicable.

*Barrier 9.2 – Lack of information*

Not applicable.

*Barrier 9.3 – Inefficient authorisation procedures*

Not applicable.

*Barrier 9.4 – Insufficient cooperation of grid operators*

Not applicable.

#### 10.2.2 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?	N/A
9.2	Are the costs of grid connection for producers of gas from renewable energy sources objective, transparent and non-discriminatory?	N/A
9.3	Do transmission and distribution tariffs discriminate against gas from renewable energy sources?	N/A
9.4	Average time needed for grid connection approval (from application for grid connection to formal approval) in months (#).	N/A



# 11 Issue 10 District Heating

## 11.1 Introduction

Some of the old district heating network still exists, it has not been replaced nor refurbished. This means that there are losses in the network. These losses are being paid by the people connected to the network and because of this Romanians have lost their trust in district heating. In most of the cases individual heating systems are preferred. This resulted in more and more disconnection from the network which hinders the development of district heating networks.

District heating development projects are expensive and the necessary funds are difficult to access. Project co-financing is also difficult in this period of economic incertitude.

The constant increase of the hot water price is another cause that led to disconnection and to individual heating systems.

In order to modernize the district heating systems clear measures necessary. Romania lack in these type of measures.

Any connection to the district heating network is considered as competition by the existing district heating company. Due to historical reasons, there is a preference for conventional fuels, thus barriers might be created for RES.

## 11.2 Description of barriers & solutions

### 11.2.1 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:*

- **Instability in the promotion/financing schemes for RES district heating.** Funding programmes for heating projects are available but it is very hard to access them because the funding programmes are chaotic and eligibility conditions are not clearly defined. The conditions are changing constantly and delays are frequently occurring;
- A concrete example of such a funding programme is the programme for replacing classical heating systems with systems that use RES and other systems that lead to the improvement of air, water and soil quality ([http://www.afm.ro/program\\_casa\\_verde.php](http://www.afm.ro/program_casa_verde.php)). This funding programme is managed by the National Environmental Fund, under the Ministry of Environment and Forestry.

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

Regarding geo-thermal system installation the following issues have been found:

- **Network incompatibility.** Current district heating network is not capable supporting geothermal energy branching. Between the old existing heating network and the new geothermal technology technical incompatibilities may arise;
- **Market competition.** Any connection to the district heating network is considered as competition by the existing district heating company. . Permission to connect to the network is required by the district heating company. Due to historical reasons, there is a preference for conventional fuels, thus barriers might be created for RES;
- **Bad state of existing network.** In most of the cases, district heating systems are in bad conditions and cannot be used for geothermal energy.

*Barrier 10.3 – Other Barriers*

No barriers detected.

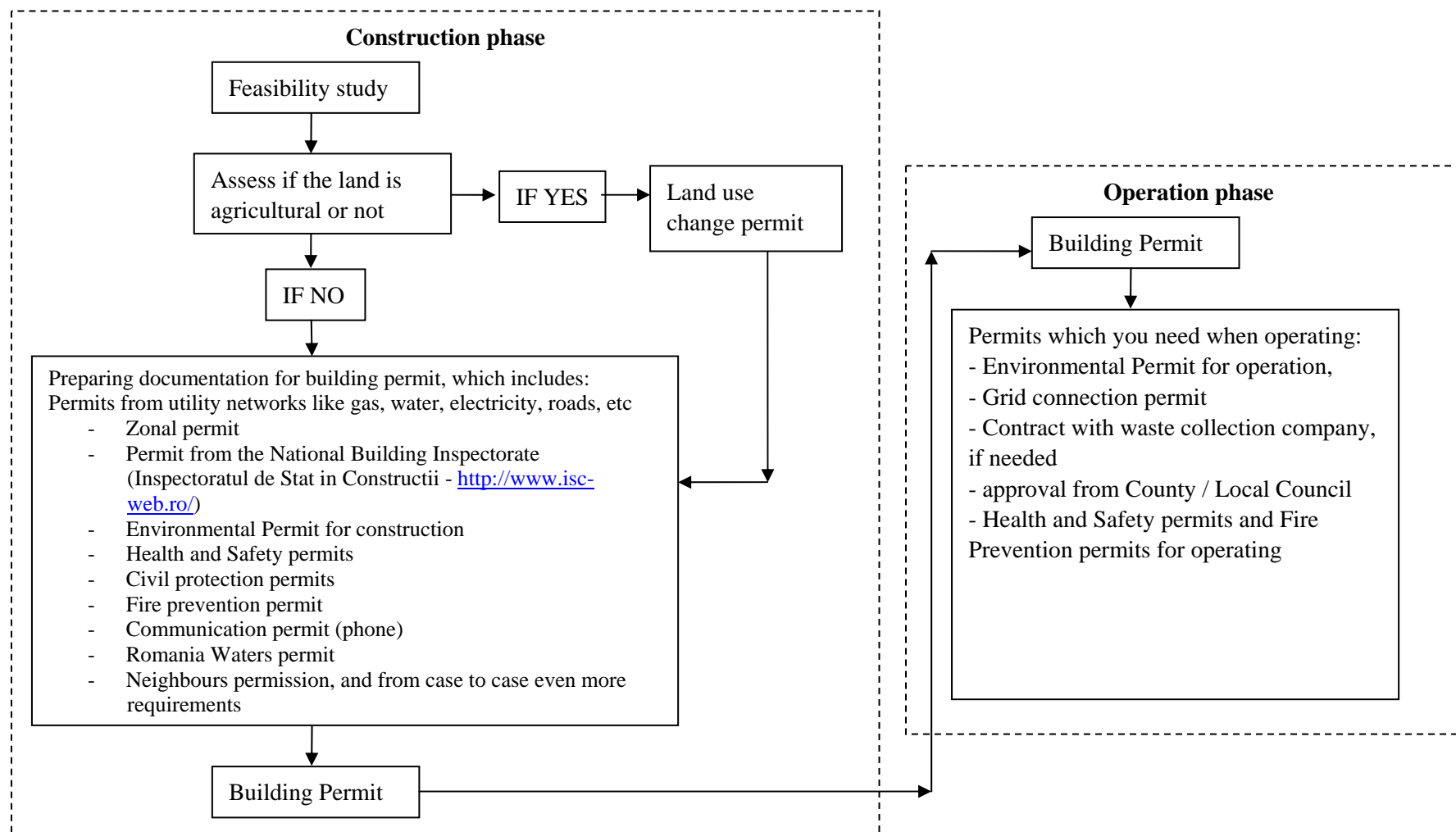
## 11.2.2 Best Practice Elements and Indicators

Please fill in here the results of the Benchmark 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)	Yes
10.3	Percentage present renewable share (see ECOHEATTOOL)	insignificant
10.4	Percentage CHP share (idem)	N/A



## Annex 1 The permitting procedure in Romania – general overview





## Annex 2 List of literature and interviews

### *Legislation and other reports:*

1. GD (Governmental Decision) 1535/2003 – National strategy for renewable energies;
2. GD 443/2003 – National strategy for promotion of electricity production from RES;
3. GD 1892/2004 with GD 958/2005 – Application procedures for promotion of electricity production from RES combined with Green Certificates system;
4. GD 1069/2007 – National strategy for energy for the period 2007 – 2020;
5. Law 13/2007 – electricity law;
6. GD 219/2007 – promotion of cogeneration systems based on thermo energy demand;
7. GD 750/2008 – Stat support scheme for RES;
8. Law 220/2008 – law for promotion of energy production from RES (not yet applied);
9. GD 1661/2008 – National action plan for increasing the energy efficiency and use of RES in the public sector for 2009 – 2010;
10. GO (Governmental Ordinance) 22/2008 – promotion of RES for energy end users;
11. GD 90/2008 – rules for electricity grid access;
12. Gustav R., Panzer C., Busch S., Ragwitz M., Rosende D., *Renewable energy industry roadmap for Romania*, Vienna University of Technology, Energy Economics Group, Fraunhofer Institute Systems and Innovation Research, Karlsruhe, January 2010.

### *Websites:*

1. [www.mmediu.ro](http://www.mmediu.ro) – Ministry of Environment and Forestry;
2. <http://oie.minind.ro> – Ministry of Economy, National Management Authority for Energy Funds;
3. [www.anpm.ro](http://www.anpm.ro) – National Environmental Protection Agency;
4. <http://www.energieregenerabila.org/> - Renewable energy info website;
5. <http://energie-verde.ro/> - Renewable energy info website;
6. <http://www.green-report.ro/> - Romanian Environmental magazine.

### *Interviews:*

1. Marcel Rosca, University of Oradea, Romania, Faculty of Geothermal Energy;
2. Hans Aaroe, Grondtmij-Carl Bro, Romania;
3. Daniel Nistor, EnergoBit Holding, Romania;
4. Gabriel Pop, Andrei Ciuca, EnergoBit Holding, Romania;
5. Florin Fleseriu, LP Electric, Alba Iulia, Romania;
6. Benko Sandor, Phoenix Company, Miercurea-Ciuc, Romania;

7. Daniel Stefan, Egger Company, Radauti, Romania;
8. Mihai David, Hidroelectrica, Romania;
9. Simon Petre, Romanian Association of Biogas, Romania;
10. Manuel Draghicescu, SUNE – Trade Union for RES, Bucharest, Romania;
11. Silvia Moldovan, Alba Iulia Municipality, Romania;
12. Catalin Seichea, Foradex, Bucharest, Romania;
13. Adrian Goicea, Iberdrola, Romania;
14. Ciprian Remetean, REMECA Solar, Romania;
15. Damian Constantin, Kematronic Company, Romania.