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Promotion of investment into the sustainable energy sector in terms of connection to the electricity grid in Belarus (AHEF.24.BY)

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Abbreviations

The following abbreviations will be used throughout this document:

ACER	Agency for Cooperation of European Regulators
AHEF	Ad Hoc Expert Facility
DCC	Demand connection code
DSO	distribution system operator
EE	energy efficiency
ENTSO-E	European network of transmission system operators - electricity
ERGEG	European Regulators' Group for Electricity and Gas
FIT	feed-in tariff
IEA	International Energy Agency
ITS	INOGATE Technical Secretariat
kVA	kilovolt amperes
kW	kilowatt
kWh	kilowatt hours
LCTAS	Least cost technically available solution
MoE	Ministry of Energy
MoEC	Ministry of Economy
MS	Member States
MW	Megawatt
MWh	Megawatt hours
RB	The Republic of Belarus
RE	renewable energy
RfG	Requirements for generators
RECS	Renewable Energy Certificate System
REHA	Renewable Energy Heat Act
RES	renewable energy sources
RESC	Renewable Energy Support Component
RES-E	renewable energy sources electricity

RET	renewable energy technology
SME	small and medium enterprises
SPA	State Production Association
TA	technical assistance
ToR	terms of reference
TPA	third party access
TSO	transmission system operator
USD	United States dollar

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Executive summary

This report is prepared under the application for the assistance to be provided by INOGATE to the Ministry of Energy (MoE) of Belarus to take the necessary actions in improving existing regulations and procedures in order to speed up and simplify the process of connection of consumers and producers to electrical networks. The main objective of this report is to assist the MoE in revising the existing regulations and set of procedures applicable for connection of electricity consumers and generators to the grid; identifying the existing deficiencies and proposing the best EU practice examples applicable to Belarus.

The report consists of an introduction, three chapters and recommendations. Three annexes show the relevant experiences of the EU member states in connection to the grid.

Chapter 2 contains the analysis of the current situation in the Republic of Belarus regarding rules and procedures regulating connection to electricity networks of consumers and generators. The core document of the secondary legislation setting the connection requirements of consumers/generators to the electrical networks is the Regulations of Electricity Supply approved by the Cabinet of Ministers in 2011. It regulates the process of connecting generators and consumers to the electrical grid and regulates the process of interaction of the applicant with the network owner, from the first application to the completion of the physical connection. The Belarus Law on Renewable Energy Sources (adopted in 2010) obliges the monopoly company in the power sector - Belenergo to connect generators using RES to the grid, but there is no legal document regulating connection of conventional generators to the grid.

Upon the request of the Beneficiary ITS experts provided a specific analysis of scope and timing of connection procedures in Belarus and compared with those reported in the World Bank's report Doing Business 2013 and 2014. It were identified significant improvements done by the MoE in simplifying the connection procedures and reducing the time needed to be connected, and additional measures were proposed by the ITS experts for the further improvement of those procedures.

After analysis of treatment of the connection costs and requirements for covering them in the current practice in Belarus the ITS experts proposed to learn from the best EU practice in setting connection fees and differentiating them.

Chapter 3 outlines the main principles set in the EU Directives and other legal documents applied in determining the grid connection approaches in the EU (third party access, fair, non-discriminatory treatment, support to RES generation, etc.). There are also efforts of the European energy regulatory organisations to harmonise different methods and approaches – ACER developed the Framework Guidelines on Electricity Grid Connections based on good practice.

Chapter 4 comprises analysis of the EU primary legislative framework, discusses the essence and differences with respect to "deep" and "shallow" connection methodologies, the possibility of differentiation of connection approaches for generators and consumers, different payment methods, main approaches applied in connecting customers and generators to the grid, comparison of standard and non-standard payment methods as well as technical issues and procedures applied in EU countries (in Annex 2

one may find examples of connection policy applied in Lithuania, Ireland, Finland and Latvia). Sub-chapter 4.4 summarises the content of a possible connection agreement.

Chapter 5 provides **recommendations** for an improvement of current legislation on connection related issues in Belarus. The ITS recommendations consist of a set of measures aimed at developing separate procedures which determine connections of generators and demand customers; improving some aspects of the recently implemented one-stop-shop principle in connecting customers, providing transparency in charging of connection fees and development and communication of unified advance information.

1. Introduction

This report is the final deliverable of the task carried out under the Ad-Hoc Expert Facility of the INOGATE Technical Secretariat (ITS) project funded by EC/Europeaid. ITS implemented the task in response to an application entitled "Promotion of investment into the sustainable energy sector in terms of connection to the grid in Belarus" of the Republic of Belarus submitted by Ministry of Energy of the Belarus (MoE). The ITS Electricity & Gas Sectors component implemented the task over the period of March - June 2014.

The scope of the work for this assignment, according to the ToR, included the following activities:

- to fulfil a comprehensive analysis of the European practices in connecting consumers and producers to networks and present a report to the Ministry of Energy. The report shall discuss the essence and differences with respect to "deep" and "shallow" connection methodologies, the possibility of differentiation of connection approaches for generators and consumers, payment methods, ownership of the connection assets and rebates;
- to analyse the current legislation framework (primary and secondary legislation) on connection to the grid conditions and charging rules for electricity producers (including those using RES) and consumers. During the first visit consultations should be held with the applicant and relevant stakeholders (the electricity network owner and operator Belenergo, electricity producers, including those using RES);
- to compare the findings of the analysis with EU practice having in mind that EU MS have a diversified approach in connection charging but are obliged by the Electricity Directives to adopt a regulated third party access approach;
- to identify (based on the analysis described above) any gaps in the current legislation and develop proposals for its improvement aiming at connection of electricity producers (including those using RES) and consumers to electrical networks;
- to present the recommendations during the second visit at the workshop organised for all interested stakeholders and evaluate the feedback. To develop a framework of the contract for the connection to the network of consumers and electricity producers;

The methodology used in the assignment was an analytical study and a comparison of the existing connection to the network legal principles and procedures used in Belarus with those existing in the EU MS with the aim of identifying the gaps in the existing legislation and applied procedures and proposing possible ways in increasing efficiency of connection to the grid both consumers and producers. Specific

experience of the neighbouring Baltic states as also of other EU member states were used for comparison and for drawing some recommendations.

The work has begun with the fact finding mission in March, 2014. It gave to the INOGATE experts an opportunity to get acquainted with the local situation; understand the principal legal acts; present an overview of the EU connection principles; and acquire a detailed understanding of the Beneficiary's expectations. The work was finished with a discussion with key stakeholders in Minsk during the second mission of ITS experts in June, 2014 on the specific legal, financial and institutional aspects, with a presentation of preliminary findings and discussion of possible solutions and ITS recommendations.

2. Analysis of the current legislation framework on connection of electricity producers and consumers to the grid in the Republic of Belarus

Electricity sector in Belarus is organised as a vertically integrated monopoly, with the functions of generation, transmission and distribution carried out by the state company Belenergo SPA. Regional Oblenergos – affiliates of the Belenergo SPA - are responsible for the connection of consumers and potential producers to the existing networks. All practical issues related with the connections to the network are managed by the structural units of each Oblenergo - Electrical Networks. Organisational structures of Belenergo and regional Oblenergos are presented in the web pages of Belenergo SPA[1] and Oblenergos[2]. At the same time there is couple of independent generators which produce electricity for their own use and the rest of it supply to the grid of the Belenergo SPA.

There is a Law on Renewable Energy Sources and some normative documents of the Belenergo SPA which form the background for connection of electricity producers (including those using renewable energy sources - RES) and consumers to the electricity network.

The primary legislative act which regulates connection of generation facilities using renewable energy sources to the grid is the Law on Renewable Energy Sources (Law on RES)[3] adopted on December 27, 2010. Article 21 of the Law obliges Belenergo SPA to connect generators using RES to the grid**.** The connection principle used here is a shallow connection where the grid owner has a responsibility of the grid enforcement if necessary, but a customer – a generator - covers all costs needed for the connection to the closest point in the grid. All other specific aspects related to the connection of a generator using RES is determined by the secondary legislation. There are no primary legislative acts regulating the issues of connecting conventional generators to the grid.

The core document of the secondary legislation setting the connection requirements of consumers/generators to the electrical networks is the Regulations of Electricity Supply[4] No. 1394, approved by the Cabinet of Ministers on 17/10/2011 (hereafter Supply Regulations). In the Supply

[1] http://www.energo.by/okon/p23.htm
[2] http://www.minskenergo.by/Struktura_RUP.asp
[3] http://www.pravo.by/main.aspx?guid=3871&p0=h11000204&p2={NRPA}
[4] http://www.pravo.by/main.aspx?guid=3871&p0=C21101394&p2={NRPA}

Regulations there is a section "Terms of connection of consumers' electrical installations to the network", which stipulates the process and obligations of power supply companies for connecting power producers and consumers and regulates all the process of interaction of the applicant with the network owner, from the first application to the completion of the physical connection.

The specific aspect of this document is that the provisions for the connection of customer's premises in these Regulations cover both: consumer's and generator's facilities. Local experts and specialists have explained that according to their understanding it is unnecessary to distinguish these two connection processes. It is done due to complexity of electricity flows within the network and necessity to guarantee security of supply to the customers. By such an interpretation an independent generator (block station) is deemed to be a supplier to its customers and at the same time also the demand customer towards the Belenergo SPA.

EU institutions and countries distinguish these two connection subjects and processes and due to the selected power market structures, the necessity to provide third party access to the power grid and for purposes of simplicity, efficiency and transparency.[5] The EU-wide approach towards a demand and generation connection is presented and paths towards harmonisation are described in Chapter 3.

The other important document determining an administrative procedure of connecting customers to the grid is the Decision of the Cabinet of Ministers from 17/02/2012, No. 156[6] "About approval of unified list of procedures of state organisations" with amendments (Decision No. 156). The pertinent observation of the ITS experts was that Decision No. 156 and the current text of the Supply Regulation both regulate procedural aspects of the connection issue and therefore a harmonisation of the documents would be required to aid clarity of the procedures.

There is a specific document of Belenergo - order **Nr. 99**[7] issued **on 04.04.2012.** This document sets responsibilities of the structural units involved and determines time limits for connection of a customer to the grid after completion of construction works, forming in practice a one-stop-shop principle in serving customers.

Below, in separate sub-chapters, using the structural approach which is common in the EU member states, we demonstrate technical requirements, connection procedures and connection charging principles applied at present in connecting demand and generation customers to the grid in Belarus. In addition Chapter 3.1 covers the principle of the third party access.

2.1 Technical requirements

The Supply Regulations determine the general requirements to be included into the technical connection conditions. The connection application forms are placed in the web page of Belenergo, they list all technical data required to be filled in. Belenergo SPA advices that application forms of demand/ generation

[5] http://www.acer.europa.eu/Electricity/FG_and_network_codes/Pages/Grid-connection.aspx
[6] http://www.energo.by/gl/p105.htm
[7] http://www.energo.by/news/Pr_99.PDF

customers are to be filled by professionals – design companies. However the pre-determined technical requirements related to the connection of demand customers and generators (including RES) to the power grid are not published.

Experiences of EU member states show different possible ways to present technical requirements to the demand and generation customers (including those using RES) in a Grid Code[8] format or in some other documents. More detailed information and links on the EU experience in this subject is provided in Chapter 4.

2.2 Procedures

The requirements to be fulfilled by all electricity supply organisations for connection of consumers to the network are regulated by the Decision of the Cabinet of Ministers from 17/02/2012, No. 156.[9] "About approval of unified list of procedures of state organisations" and amendments (Decision No. 156.) and the President's Decree No. 200 from 26/04/2010 "On administrative procedures performed by the state institution and other organisations by the requests of citizens" (Decree No. 200).

Households. The administrative procedures[10] and application forms[11] applied for connection of households to the electricity network are publicly available and published on the web page of Belenergo SPA.

For connection of households in Belarus there is a one-stop-shop principle and Belenergo SPA carry out all necessary actions to connect a household customer. The maximum time to connect a household customer according to the Decree No. 200 should not exceed 2 months after receiving a customer's application.

Legal entities. The administrative procedures[12] and application forms[13] used for connection of legal entities to the electricity network are also publicly available and published on the web page of Belenergo SPA.

There is no distinction in the Supply Regulation between **demand** and **generation** customers, the form and applied procedures are the same, but in the application forms we can't find any data designed specifically for generators, for instance: production capacity, voltage, requirement for relay protection, tripping devices and others.

During the assignment ITS experts did not find any application forms which could be used for connecting generators. Therefore our recommendation is to introduce separate procedures for demand and generation customers and develop standard application forms for connection of conventional generators and generators using RES. As an example, in the Annexes there are provided procedures used to connect

[8] https://www.ofgem.gov.uk/licences-codes-and-standards/codes/electricity-codes/distribution-code
[9] http://www.energo.by/gl/p105.htm
[10] http://www.energo.by/gl/p113.htm
[11] http://www.energo.by/el/fiz_form.htm
[12] http://www.energo.by/gl/p105.htm
[13] http://www.energo.by/el/jr_form.htm

embedded generators in Latvia and Ireland.[14] [15] Separate procedures are envisaged for connecting micro generators[16].

The application form of Ireland's DSO ESB contains a detailed list of general and technical information to be supplied by an applicant - generator[17] and this could be used to design such a form applicable in Belarus.

By overviewing the randomly selected web pages of the Belenergo SPA network affiliates - Oblenergos, for instance, Vitebsk Oblenergo[18] and Minsk Oblenergo, ITS experts noticed that information which is presented to the customers still guide them to several different places (structural units of Belenergo) to obtain a design approval and a connection approval – Elektircheskije Seti (Electrical Networks), Energonadzor (Energy Inspectorate) and Energosbit (Energy Supply). This is not in line with the one-stop-shop principle. In addition, information presented on web pages of different Oblenergos on administrative procedures devoted to the connection of customers to the grid have different formats, structures and sometimes also variation in content. Therefore it is necessary to prepare united/uniform informative material (with the same structure and content) about the connection of customers to the grid and implementation of that within all Electrical Network units of Belenergo SPA.

2.3 Doing Business – the World Bank Report

Upon request of the Beneficiary ITS experts provided a specific analysis of scope and timing of connection procedures in Belarus and compared with those reported in the World Bank's report Doing Business 2013 and 2014 (Chapter Getting Electricity).[19] Doing Business records all procedures required for a local business to obtain a permanent electricity connection and supply for a standardised warehouse[20], as well as the time and cost to complete them. These procedures include applications and contracts with electricity utilities, permissions from other agencies and the external and final connection works.

Special attention was given to understanding the duration of **179 calendar days** reported by the World Bank team in the Doing Business report 2013 and **166 calendar days** in Doing Business report 2014 as well as how this was justified. Analysis of the Report 2014 indicates only a minor progress indicating decrease of timing by 13 calendar days with the same 7 procedures in place.

[14] http://www.sadalestikls.lv/eng/klientiem/pieslegumi/elektrostacijas_pieslegums/
[15] http://www.esb.ie/esbnetworks/en/generator-connections/gen_connection_export.jsp
[16] http://www.esb.ie/esbnetworks/en/generator-connections/micro_gen_connections.jsp
[17] http://www.esb.ie/esbnetworks/en/commercial-downloads/NC5.pdf
[18] http://www.vitebsk.energo.by/odno-okno/esnab/ur/
[19] http://www.doingbusiness.org/data/exploreeconomies/belarus/~/media/giawb/doing%20business/documents/profiles/country/BLR.pdf, page 33
[20] The deemed warehouse: is located in the economy's largest business city, in an area where other warehouses are located; it is not placed in a special economic zone where the connection would be eligible for subsidization or faster service. Has road access. The connection works involve the crossing of a road or roads, but are carried out on public land. Connection is a new construction being connected to electricity for the first time. The Warehouse has 2 stores, both above ground, with a total surface of about 1,300.6 square meters, and is built on a plot of 929 square meters. The electricity connection is 150 meters long and is a 3phase, 4wire Y, 140-kilovolt-ampere (kVA) connection.

ITS experts provided analysis of all connection procedures present in Belarus during this project implementation time – by the end of May 2014. Here below there is provided a summary of our analysis for each of the reported procedures.

1st Procedure - ***Obtaining technical conditions*** (specification). According to the existing regulatory framework of Belarus i.e. Decision No. 156 issued on 17.02.2012 the maximal duration for obtaining technical conditions is **7 calendar days** and this in general complies with that reported in the DB 2014 report. In addition according to the information provided to us by MoE for the period from 01.01.2013 to 30.09.2013 structural units of Belenergo SPA issued 12448 technical conditions on average within **4 calendar days**.

2nd Procedure – ***Design works and acceptance of the design.*** **In the DB report 2014 this procedure was indicated to be rather lengthy –** 90 calendar days**.** In Belarus it works in a following way. A customer concludes a contract with a project planning organisation for the preparation of the electrical design of the external connection. Approvals and permits for the project design are obtained by the contracted electrical design company from a number of Government organisations.

From May 5, 2013 there is in force an amendment to the resolution of the Council of Ministers of Republic of Belarus No. 1476 from October 8, 2008 (*Resolution No.1476*) which does not require any state design expertise for connection of facilities with a rated capacity below 250 kVA. These changes apply also to the case of Doing Business Getting Electricity example and will save time ~30 calendar days previously used for getting the required permits. Beside changes in the legal framework upon information provided by MoE for the period from 01.01.2013 to 30.09.2013 structural design units of Belenergo SPA carried out **218 design works spending on average only 8.3 calendar days.**

3rd Procedure - *Obtaining excavation permits.* In the DB report 2014 this procedure was indicated to take **7 days.** According to the amendments from September 19, 2012 of the Decision No.156 the maximum time period for obtaining ***excavation*** permits is **5 calendar days**. Local municipalities are in charge of issuing digging permits and according to the monitoring carried out by the Executive Committee of Minsk City in 2013 obtaining permits took 5 days on average.

4th Procedure – *Completing construction works*. In practice, construction works are carried out by an external contractor contracted by a client and in general correspond to the reported 30 calendar days.

5th Procedure - ***Getting a permit on conformity with technical conditions***. In the DB report 2014 regarding this procedure it was an indication that the Minsk Grid Company assesses the completed external connection works and issues a permit certifying compliance with the technical conditions and an act specifying the ownership of the installed equipment and responsibility for servicing the connection. Minsk Grid Company visits the site to assess a finished external part of the connection and issues a permit certifying compliance with the technical conditions and a document which describes an allocation of responsibilities for the maintenance of the line. After entering into force of the Supply Regulations on February 2, 2012 such a permit is not required any more.

6th Procedure – *obtain an operation permit from the State Energy Inspectorate*. In the DB report 2014 regarding this procedure it was indicated that a client should **await and obtain** an assessment from the Energonadzor (Energy State Inspectorate) and receive an operation permit. The customer has to submit

a range of technical documents to the State Energy Inspectorate (Energonadzor). Then Energonadzor visits the site to inspect both the external and internal works and issues an operation permit. Here ITS experts recognised that Energonadzor was mistakenly called Energy Inspectorate, but it is in fact one of structural units of Belenergo SPA.

After adoption of the *Decision No. 156* on the united administrative procedures these actions described in the 6th Procedure are carried within the7th Procedure, its specific details are provided below.

7th Procedure - ***Concluding supply contract.*** In the DB report 2014 regarding this procedure it was indicated that a client **s**hould request the final connection from the supply department (Energosbit), conclude a supply contract, check the meter and await for the final connection. The customer submits to the supply department (Energosbit) a list of technical documents. Then a specialist from Energosbit visits the site to check the meter. The same specialist prepares a supply contract the next day. After checking the meter Energosbit forwards the permission to the Minsk Cable Grid Company to activate the connection and the Minsk Grid Company turns on the power.

It is pertinent to realise that the Minsk Grid company is not a separate legal entity and would be better called a structural unit (affiliate) of the Electrical Network. All details about allocation of responsibilities between the different structural units of Belenergo SPA in connecting customers are prescribed in the order No. 99 of Belenergo. With the adoption of the Decision No. 156 the united procedure for setting the maximum time limits to connect a customer to the grid is in place. The united procedure includes all required actions: the site inspection, the preparation of maintenance and ownership documents, tests, compliance check of the measurement equipment and all required seals as also conclusion of the supply agreement. The order **No. 99**[21] of Belenergo SPA issued **on 04.04.2012** sets responsibilities of involved structural units and time limits to connect a customer after completion of the construction works to the grid within 20 days, for a simpler occasion – which is also the case of Doing Business Report example – within 10 days.

In addition, according to the information provided by MoE within the period from 01.01.2013 to 30.09.2013 structural units of Belenergo SPA connected 1766 clients in average within **6 calendar days**.

Conclusion and recommendations on the DB Report issues

Ministry of Energy and Belenergo SPA have made great advances in simplifying the connection process during the last two years. Based on our analysis we recommend to:

A) Delete the 5th Procedure, as such a separate action is not required by legislation and is not carried out by Belenergo or its structural units in reality;

B) Incorporate the 6th procedure into the 7th Procedure due to the fact that all required activities Belenergo SPA implements within one-stop-shop approach and clients are not required visiting several places. All

[21] http://www.energo.by/news/Pr_99.PDF

coordination among Belenergo SPA structural units is carried out by the structural unit - Electrical Networks, it includes coordination with Energonadzor (Inspection) and Energosbit (Electricity Supply) also;

C) Reduce time reported for the 2nd Procedure at least to 30 calendar days as the changes in legislation do not require the state design expertise. Initiate legislative changes to determine the maximum time limitation on the design of electrical connections;

D) In total only **5 procedures to be counted** and the maximum time spent to connect according to the requirements of the DB Getting Electricity requirements **shall not exceed 7+ 60 + 5+ 30 +10 = 112 calendar days**. In addition to that improve monitoring and demonstrate improved efficiency by providing evidences of the real time spent on connecting demand customers.

2.4 Connection costs and fees

Demand. Belarus, due to the strict budgetary constraints, applies a so called deep connection approach when demand customers pay all costs related to the connection of their facilities to the electrify network including also the required reinforcement of the network.

There is some standardisation for connection of household customers; their costs are determined by calculation, but these are not publicly known in advance. Administrative procedure determining connection to the grid states that costs are calculated but does not provide any reference how this is done.

EU member states use different methods to determine connection costs: real market costs or standardised costs which are calculated relying on a data of previous year's average connection costs or a mixture of both. Chapter 3 on EU experience provides more details about the cost related aspects of connecting demand customers.

RES generators. Under the Law on Renewable Energy Sources (RES) the applicant shall bear the cost of connecting to the closest possible network point. All the associated costs of reinforcement (modernisation) required to help connect the applicant to the network should be borne by the state energy supply organisation. The state energy supply organisation ensures a non-discriminatory and unobstructed determination of the nearest connection point and guarantees connection to it. In this case the so called shallow connection principle is applied. This approach is commonly used in several EU countries.

Conventional generators. Taking into account the present text of the Supply Regulation ITS experts noticed some legislative gaps in not providing clarity in all aspects of connection of conventional generators to the grid.

At the same time, assuming that generation facilities are deemed to be the same subject of regulation as the customer's facilities under the present Supply Regulations there are no distinct requirements in place regarding connection to the electricity network.

The legislation presently in force in Belarus does not present any clear principles or approaches to how connection costs are covered by conventional generators. More clarity is required on the relation of the connection costs covered by demand customers with the network's tariff or of the end-user tariff.

2.5 Third party access (TPA) to the power grid

At the time of writing of this Report, there was no legal act in place in the Republic of Belarus that determines third party access (TPA) to the power grid. However, as a first step towards implementation of TPA, there is a resolution of the Ministry of Economics of the Republic of Belarus No. 23 from March 29, 2012 “On distribution and transmission tariff.” The resolution states that the tariff of 354 BYR per kWh is to be applied to transmission and distribution of energy produced by legal entities (later in the text – ‘producers’) which are not part of the Belenergo SPA and which supply electricity to legal persons, individual entrepreneurs and private persons, being situated in the same region as the producer. Determination of the TPA principle in legislative acts is one of the prerequisites for sustainable development of the power sector. The main features of TPA principle used in EU are shown in sub-chapter 3.1..

2.6. Summary of the analysis of the current situation in Belarus

Table 2.1 The current situation with the connection to the grid in Belarus

Cause	*Effect (findings)*	*Implications/proposals*
A. Lack of predetermined technical requirements (demand, conventional generation and generation using RES) ▪ Map with available network capacities ▪ Generation/ demand capacity thresholds at certain voltage levels	The present legal/normative documents do not determine in advance technical requirements for the connection of demand/generation (including also those using RES) which makes difficult to plan connection related activities and makes connection process lengthier Examples of information used by EU countries are provided in Chapter 3. and in Annex 2	Determine technical requirements in advance. The advance information will assist demand/generation (including also those using RES) customers to plan activities and costs, initiate pre-application discussions and clarifications and will save time within the connection process. Availability of information about available network capacities would provide locational signals to demand/ generation
B.Procedure. **B.1 Transparency** The web-page of the Belenergo SPA provides sufficient information on the connection procedures and places application forms Belenergo has developed one-stop-shop principle to the connections of customers and demonstrates it's application in the web pages of Oblenergos'	The present legal/normative documents do not distinguish connection procedures for demand customers and for generators. Please, reconsider implementation of separate procedure in line with the planned restructuring of the power sector. The web pages of some Oblenergos show information which still guides clients to several places for obtaining the required design permissions – does not comply with the one-stop-shop principle Template of the grid connection contract is not available at the web page of Belenergo SPA	Determine separate connection procedures for consumers and generators, this will simplify understanding of the expected requirements. Future changes foreseen in the power sector will force the system operators (TSO and DSO) to plan their work independently from interests of historically incumbent generators. Check all web pages of Oblenergos. Decide on design of uniform information and update information in web pages, implement in practice one stop shop principle where it is still lacking. Advance information will help to formulate questions and get answers prior to the formal application submitted and will facilitate reduction of the time spent within the connection process. Place templates of standard contracts in the web page of Belenergo.

Cause	*Effect (findings)*	*Implications/proposals*
B.2 Doing Business Report Efficiency of connection procedures impacts timing spent to connect a customer to the grid	Ministry of Energy and Belenergo SPA during the last two years did a great job in simplifying the connection process. Update information in the DB Report considering relevant changes in legislation, for example, eliminate requirement for the state expertise in designing connection of the facilities to the network The longest procedure within the connection process as in the DB 2014 in Belarus is design – 90 calendar days Several structures of Belenergo SPA are still involved in contacts with a client within the connection process, that makes process more lengthy	Time reported in the 2nd Procedure will be reduced at least by 30 calendar days. Delete the 5th procedure due to the fact that such requirement no longer exists, update the DB report information. The less of procedures – the faster connection to the grid will take place Reconsider an opportunity to implement a normative regulation by fixing the maximum timing devoted to design of simple connection projects. Time limits allocated to the design will facilitate standardisation and promote efficiency by saving connection time. Implement fully in practice (all Oblenergos) one-stop-shop principle coordinating activities of structural units of Belenergo SPA incorporating the 6th procedure into the 7th procedure. Real implementation of the one-stop-shop principle will save time used to get design approval and will get better ranking in the next DB Report.
C. Connection costs/fees Composition of connection fees should be transparent	The present approach in covers all connection costs by an applicant and reflects the needs of financing however it does not sufficiently demonstrate how it interacts with the tariff setup. Households have some elements of a standardised connection method, but the existing practice would require demonstration of more transparency in terms of cost formation	Provide information showing that connection fees collected from customers are excluded from the network tariff. Make publicly available a methodology for calculation of fees for the connection to the network This information will introduce the customers the costs of services prior to the application.

Cause	*Effect (findings)*	*Implications/proposals*
C.2 Households have some elements of standardised connection method, but the existing practice would require demonstration of more transparency in terms of cost formation	Make publicly available calculations of fees to be paid to connect to the network	This information will introduce the customers the costs of services prior to the application.

3. Core principles of the EU legal framework in connection of consumers

3.1. Grid connection & access in the context of the EU framework

The EU Member States started the liberalisation of the electricity market with the implementation of Directive 96/92/EC, followed by the Directive 2003/54/EC and finally by the Directive 2009/72/EC as part of the so called Third energy package. The aim of the liberalisation of the energy markets is to offer end-users a choice among suppliers so that they can profit from lower prices for energy and a better quality of services. In addition, the Directives guide the creation of the internal market for electricity by setting up a framework for harmonisation.

A keystone of the liberalisation reform was the so-called Third Party Access (TPA) scheme. Article 5 of the Directive 2009/72/EC Article 5 provides for regulated third party access to the grid where the main institution in charge of setting requirements is a regulatory authority:

> "*The regulatory authorities where Member States have so provided or Member States* ***shall ensure that technical safety criteria are defined and that technical rules establishing the minimum technical design and operational requirements for the connection*** *to the system of generating installations, distribution systems, directly connected consumers' equipment, interconnector circuits and direct lines are developed and made public."*

This provision practically abolishes any other option (negotiated) than the regulated type of Third Party Access (r-TPA) whereas it introduces the "minimum technical design and operational requirements" as the compliance interface between the network operator (TSO or DSO) and the any third party seeking an access to the relevant network.

Pursuant to the above, and having in mind that the application of term TPA outside the EU is not really developed, we could distinguish the following elements of TPA with a view to increase the clarity and understanding. Likewise, the terms:

- Connection conditions: shall herewith refer to the "minimum technical design and operational requirements", which in most jurisdictions across the EU usually form part of the Grid (Connections) Code or other document;
- Connection Charges: shall herewith refer to the "first connection fees" or simply the amount the party seeking for connection is entitled to pay for connecting its physical assets to the Grid. The amount of course depends on the technical solution and the methodology for estimating the relevant costs for the connection;
- Connection arrangements: shall herewith refer to the combination of the above with due regards to the procedural and administrative parts (applications handling);
- Access: shall mean the ability to exchange energy products of any type (energy, capacity, ancillary services, etc) after the completion of the connection.

3.2 EU legal framework on integration of renewable electricity sources (RES-E) to the power grid

The main legal document related to the promotion of renewable energy sources (RES) in EU is the Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of

energy from renewable sources. Article 16 of RES Directive describes legal obligations of countries towards promotion of RES integration into power grid. The core provisions of the RES Directive are given below.

3.2.1 Access rights of RES generators

Priority access and guaranteed access for electricity from renewable energy sources are important for integrating renewable energy sources into the internal market in electricity, in line with the Article 11(2) and developing further Article 11(3) of the Directive 2003/54/EC. Requirements relating to the maintenance of the reliability and safety of the grid and to the dispatching may differ according to the characteristics of the national grid and its operational standards.

3.2.2 Connection procedures for RES

To the extent required by the objectives set out in this Directive, the connection of new renewable energy installations should be allowed as soon as possible. In order to accelerate grid connection procedures, Member States may provide for priority connection or reserved connection capacities for new installations producing electricity from renewable energy sources.

3.2.3 Connection charging for RES

The costs of connecting new generating facilities using renewable energy sources to the electricity grids should be objective, transparent and non-discriminatory and due account should be taken of the benefit that embedded producers of electricity from renewable energy sources bring to the electricity grids. The technical and procedural aspects in majority of cases are covered by Grid Codes of the MS operators and/ or specific regulations issued by responsible authorities. The requirement related to the procedure are common as for other conventional generator with similar capacity, some specifics are added depending on the generation profile and load curve. The full text of the RES Directive is available on the website of DG ENER.[22]

3.3 ERGEG and ACER harmonisation work on Electricity Grid Connections

Whilst there is a lack of harmonisation amongst the EU Member States with regards to the content, limits and other aspects in their industry codes (i.e. Grid Code) a substantial effort has been initiated towards this direction by the European Regulators Group for Electricity and Gas (ERGEG) and has been followed on by the successor organisation called the Agency for the Cooperation of Energy Regulators (ACER).

After adoption of the so-called Third Package the tasks of ERGEG since March, 2011 were transferred to the Agency for the Cooperation of Energy Regulators (ACER). ACER has developed, consulted and finalised a set of new framework guidelines i.e. the ACER's Framework Guidelines on Electricity Grid Connections[23] based on good practice guidelines on Electricity Grid Connection and Access.

[22] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF

[23] http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Framework_Guidelines/Framework%20Guidelines/FG%20on%20Electricity%20Grid%20Connections.pdf

These Framework Guidelines on Electricity Grid Connections set the guiding principles over which the Network Codes should be developed. An excerpt from the Framework Guidelines presenting the Scope and Application has been included in this chapter in order to showcase its significance in relation of the EU Internal Electricity Market.

Demand Connection Code (DCC)

The Demand Connection Code has been developed as part fulfilment of the requirements set forth by the ACER's Framework Guidelines on Electricity Grid Connections as mentioned above. The Network Code on Demand Connection will help to accomplish the tasks of facilitating the increase of RES, ensuring system security and implementing the internal electricity market, also by means of smart grid models, DCC has been initiated to define common functional requirements and will mainly focus on the connection of industrial loads and distribution networks. The DCC requirements complement those of the Network Code on Requirements for Generators, lowering barriers for consumers to provide demand response, and setting basic requirements on large consumers and distribution network connections to efficiently cope with Europe wide changes in the power system.

This Network Code defines a common set of requirements for demand facilities in distribution. The Network Code sets up a common framework for Network Connection Agreements between Network Operators and the demand facility owner or Distribution Network Operator.

On 27 March 2013, ACER issued a recommendation to the European Commission to adopt the Demand Connection Code (DCC). The recommendation comes jointly with the ACER's reasoned opinion which positively acknowledges the code's full compliance with the framework guidelines, ENTSO-E's engagement with stakeholders and NRAs (National Regulatory Authorities), and the European wide direction given in supporting demand side response. Text of DCC is available in web page of ENTSO-E.[24]

Network Code on Requirements for Grid Connection applicable to all Generators (RfG)

Similarly to the DCC the Requirements for Grid Connection applicable to all Generators has been developed as complement the requirements set forth by ACER's Framework Guidelines on Electricity Grid Connections as also mentioned above. The Network Code on Requirements for Generators is seen as one of the main drivers for creating harmonized solutions and products necessary for an efficient pan-European (and global) market in generator technology. The purpose of this network code is to bring forward a set of coherent requirements in order to meet these challenges of the future.

This Network Code defines a common framework of grid connection requirements for Power Generating Facilities, including Synchronous Power Generating Modules, Power Park Modules and Offshore Generation Facilities. It also defines a common framework of obligations for Network

[24] https://www.entsoe.eu/major-projects/network-code-development/demand-connection/

Operators to appropriately make use of the Power Generating Facilities' capabilities in a transparent and non-discriminatory manner ensuring a level playing field throughout the European Union.

On 27 March 2013, ACER issued a recommendation to the European Commission to adopt the Network Code on "Requirements for Generators" (NC RfG). The recommendation follows the conclusion of ENTSO-E's extensive process to amend the code based on topics addressed in ACER's earlier reasoned opinion. In its recommendation, ACER touches on two items (national scrutiny and transitional arrangements for emerging technologies) which the EC may take into consideration when initiating the legislative adoption process of this code. The text of RfG is available in web page of ENTSO-E [25]

4. Analysis of the European practices in connection of consumers to the electricity grid

4.1 Technical requirements for distribution level demand connection

The technical rules determine technically precise requirements and allow different system elements to interact in a mutually safe manner. Certain technical characteristics: voltage levels, allowed capacity ranging at exact voltage level, grounding resistance, required short circuit current to activate protection devices, isolation resistance and others have to be kept within a certain range. Customer connection to the grid have an impact on these parameters and therefore it is extremely important to define requirements for demand integration with the grid taking into account possible fluctuation of grid parameters due to different internal and external impacts.

Depending on the context of the legal system, traditions and historical development in each country, different approaches have emerged in relation to the enforcement of requirements for the planning, design and operation of electricity distribution systems. Some of them i.e. Ireland and UK have detailed descriptions on the previously discussed technical requirements within their Grid Codes[26] and Distribution System Security and Planning Standards[27]. Other countries, on the contrary, use their own legal practices and instruments and may have organised the same (or equivalent) set of rules on other parts of their secondary legislation or even (in most cases) have a simple requirement for distribution companies to develop and publicise the rules subject to the approval of the National Regulatory Authority.

All these technically complex documents set the main guidelines that need to be followed by DSOs in network planning. They incorporate technical, security of supply, continuity, system design and other specific aspects of electricity network. One of the most common examples illustrating the particular context of technical requirements set forth (ex-ante) relates to the pre-determined customer capacity ranges that have obligatory connection at certain voltage levels. The purpose of this and

[25] https://www.entsoe.eu/major-projects/network-code-development/requirements-for-generators/

[26] http://www.esb.ie/esbnetworks/en/downloads/Distribution-Code.pdf

[27] http://www.esb.ie/esbnetworks/ga/downloads/220903_publication_distribution_system_security_and_planning.pdf

other similar requirements mentioned above are used in order to provide clarity and in some extent standardisation (i.e. a common basis for design and cost appraisal except of some specific cases).

Generally the voltage level at which demand customer connection will be made is dependent on the load range. The typical connection voltage levels for various load ranges applied for instance by Irish DSO - ESB are shown in the table below.

Table 4.1 Standardisation of demand connections as per the Irish Distribution Code

Load range	*Typical voltage level*
Up to 200kVA	LV
Up to 500kVA	LV, MW
500kVA to 5MVA	MW
5MVA – 15MVA	MW, 38KV,110KV
>15MVA	110kV

Source: ESB

In other jurisdictions for instance in Finland, Lithuania and Latvia there is no developed and/or publicised document with detailed and ex-ante described technical set of rules. In these cases the respective conditions are set out by definition in traditional internal practices (technical/design documentation) of DSO and based on the experience of professional conduct. Thus the part of technical requirements relevant to demand connection in these countries is determined by issuing technical conditions on a case basis after having received a customer's application.

4.2 Technical requirements for distribution level generation connection

The generator' s connection to the grid have always an impact to the grid stability and therefore it is extremely important to define requirements for generation integration with the grid taking into account possible fluctuation of grid parameters due to different internal and external impacts.

Table 4.2 Standardisation of generators' connections by the Latvian DSO

Load range	Typical voltage level
Up to 11kVA*	LV line
Up to 250 kVA*	LV busbar, MW
Up to 2 MVA*	6, 10,20kV line
Up to 10MVA*	6, 10,20kV busbar, 110KV substation

*the connection point may be changed if it is not possible to ensure the voltage quality requirements or the existing network capacity does not allow it.

Source: web page of the Latvian DSO – Sadales Tikls[28]

As an example illustrating a possible way of presenting information on the available grid capacity is selected the Belgium TSO – ELIA. The company publishes indicative capacities for the main substations in the ELIA grid on the web page[29] and as well possible access points[30] and from time to time updates information. Where possible, ELIA prefers to connect to the existing high/mid-voltage substations so as to avoid a need for expansion of the grid.

Data provided are indicative. The given indicative connection capacities can never be used as a substitute for the orientation study phase or the connection request. Available connection capacity must always be confirmed by an orientation study or detailed study, based on the most recent assumptions known to ELIA.

Certain sites are subject to the capacity reservation[31] requested by customers and authorised by the federal minister for energy. One can find the list of sites on the forecast changes in the generation capacity page. Comparisons with other published or unpublished values are only possible with full knowledge of the scenarios and data used in each study.

4.2 Connection charges

4.2.1 Definitions

Connection works and associated costs are generally split between the users' installations and the TSO or DSO. The boundary between the separate charging zones is often termed the "***Charging Boundary"***. This is a point of allocating financial responsibilities between the DSO/TSO and the customer.

With respect to the works that need to be performed for the implementation of the connection the following types of assets may be considered:

- **Reinforcement assets,** which are upgrades to the existing DSO/TSO system. Sometimes extensions to the existing system are also termed reinforcements (i.e. the super shallow case).
- **Extensions** of the existing system to the user's installations. Sometimes extensions are termed augmentations.
- Works to connect the customer's owned equipment to the extended DSO/TSO system, usually within the project commercial boundaries. These are sometimes termed the (immediate) Connection Assets or **Direct Assets**.

[28] http://www.sadalestikls.lv/rus/klientiem/pieslegumi/elektrostacijas_pieslegums/

[29] http://www.elia.be/en/grid-data/grid-development/capacity-new-generation-units

[30] http://www.elia.be/en/grid-data/lists-and-codes/list-of-access-points

[31] http://www.elia.be/~/media/files/Elia/Products-and-services/ProductSheets/R-Aansluiting/R2_F_Etudes_Racc.pdf

Depending on the location of the Charging Boundary a methodology referring to "**deep**", "**shallow**" or even a "**hybrid"** methodology may be developed. The basic variants of the connection charging policies comprise:

- **Shallow Policy** does not charge the applicant project for reinforcements to the existing system but often charges for system extension, and usually will charge for the immediate connection assets, whereas the
- **Deep Policy** will charge for reinforcements to the existing system along with extension and immediate connection assets, i.e. everything.

There are also intermediate situations aiming to promote specific interests (i.e. promotion of RES), which create the so-called "hybrid" charging policies, including:

- A **Semi-Shallow** in which the costs of reinforcements and extensions are shared. Rules for sharing are often based on theoretical allocations (i.e. capacity share)
- **Super Shallow Policy** draws the charging boundary at the immediate connection assets with the DSO/TSO paying for the reinforcements, system extension, and sometimes part of the immediate connection assets.

4.2.2 Discussion on the charging methodologies

It is true that EU Member states have not adopted a harmonised approach with respect to connection charging. It seems that the issue is largely left to the regulatory authorities, which at the end of the day have to balance the interests between the parties while allocating the costs for connections and subsequent grid reinforcements. Within this frame of allocating the costs, several issues apart from the "up-front" equipment and works' costs have to be considered (particularly referring to the case where the "deep" charging policy is selected). More specifically, it should be considered that:

- With Deep Policy the process is chronological which means that in the future we will not be able just to look at a set of assets and state which are system assets, deep connection or shallow connection assets – it will depend upon the order that they were built and paid for. With Shallow Policy only the cases of shared infrastructure (i.e. possibly extension works only can be shared in the event of neighbouring a large and the small-scale user) between uses would require this type of treatment.
- With Deep Policy new users using part of the deep assets paid by another user in the past should pay for the residual value of the share of the assets they are using (rebates).
- Annual O&M costs should be shared on the basis of a record kept by the TSO. This effectively means that the TSO may charge (on a term basis) the user O&M subject to what is included in its asset base or not.
- TSO cannot claim return-on-assets for those which haven't been paid (deep).

The merits and drawback of each policy have been analysed under various perspectives. The deep connection pricing approach obliges the generator to pay all the connection costs plus the cost related to the enlargement and strengthening of the network. This deep connection pricing approach is cost-reflective and provides a good "locational" signal, commonly required for an efficient and reliable transmission grid. The shallow connection pricing policy means that the customer pays only the cost of connection assets, which are the features for connecting the grid; all reinforcement costs being shared among networks users. This approach does not provide a location signal and is less

cost-reflective. The hybrid model tends to take advantages from the two previous policies: offering a shallow connection approach in providing a location signal through a capacity charge. Concerning the renewable energy power plants' connection, it seems that the shallow connection pricing policy or a hybrid one have to be favoured; all reinforcement costs being shared among users the viability of wind power project is improved and the connection pricing does not constitute a market entry barrier as the deep connection policy does.

4.2.3. Standard and non-standard connection charges

The connection charges can also be divided into standard and non-standard in relation to their degree of standardisation of technical solutions. The **"Standard"** types are those which are predetermined by regulation or DSO. The charges are normally based on average costs calculated for predetermined grid elements (i.e. cable, poles, metering devices, etc.) and refer to a certain radius from the grid supply point. The grid supply point is in turn dependent on the predefined connection capacity (see above in section 0.1). The higher the demand capacity the more grid elements from low voltage upstream towards the higher voltage level will be involved in the calculation of shared network assets deemed of serving the particular customer. Standard charges could have fixed part and variable part. The variable part could be arranged as a function of distance, capacity and other measurable parameters. An illustrative example[32] of a standardised connection implemented via an underground cable in a peri-urban region is presented below:

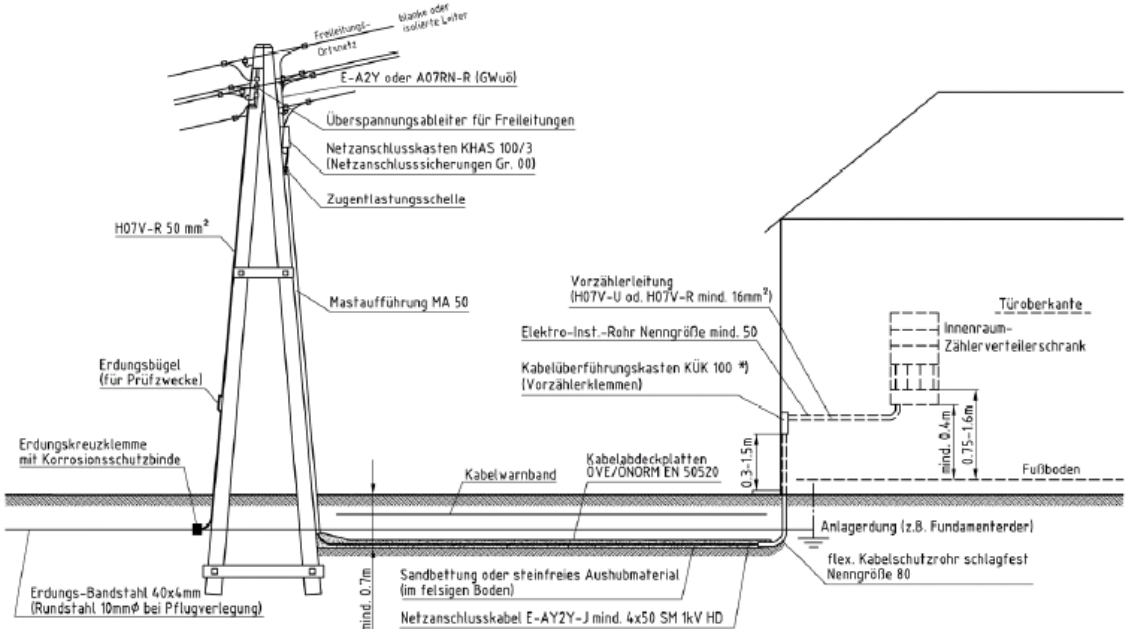


Figure 4.1: Typical standardised connection scheme in Austria

Source: Technical Implementing Regulations (Netz Niederösterreich GmbH, 2013)

[32] http://www.netz-noe.at/getattachment/d2a0d87d-e7e1-4c3e-8855-cb64cd3f2eaf/EVN_TAB_2007.aspx

The **"Non-standard"** charges are those which are calculated on a case-by-case basis reflecting the real costs of connecting a particular customer, but also within defined grid border depending on the required connection capacity.

Selection of charging method has an immediate impact on procedural arrangements related to the construction of a new connection. If a standard connection is applied for a customer group, then the connectee has no impact on selection of a contractor and all control towards costs is automatically decided and regularly reviewed by the NRA. In some EU countries like Austria[33], construction of a standard connection is provided only by the DSO. The effect of such "in house" and "single-point" responsibility for construction can be translated into an opportunity to save time and costs. Yet, such an approach requires standardisation of connection schemes and precisely pre-determined charges.

When companies apply the standard charging methods the consumer qualifies for a standard rate but has no idea about real costs of his/her connection. Nevertheless if a tight regulatory oversight on costs is assumed, this method has a clear benefit over the real costs method; it is simpler, easy to be followed by customers and reduces the time spent for the establishment of a connection.

A counterargument to the application of this method may arise considering a (hypothetical) customer who is closer to the network and has higher consumption level as an average. Since part of the remainder of the standard costs (up to the point of full recovering the real connection costs) is recovered usually through the energy tariff there are reasonable grounds to claim that overpay is exercised comparing with the customers of the same connection category that present a below-than-average energy consumption. In other words considering the fact that the difference between the real and standard connection cost is included in the bundled energy price (€/kWh) then the above-than-average consumption customers are subsidising the below-than-average consumption customers of the same category.

In spite of the weak points related to the "standard" connection charging approach it seems to be the most preferable approach in many EU jurisdictions since it combines a range of procedural benefits. The rationale for application of standard charges is argued of providing clarity and simplicity in connecting customers. The customer knows how much he/she should pay for the connection, if location is within the defined border. It also relates with the standardised technical solutions which are in turn dealt with similarly when it comes to work permits.

Setting up standard charges as the rule for connection charging is based on a certain degree of assumption on costs and the relative cost-drivers. EU countries use different methods to allocate costs among existing and new customers. Some countries use shared costs for pre-determined standard connections to all customers, some of them for simple connection and household customer only or to the customer with a certain capacity. In order to minimise the costs of connection charges some countries apply the Least Cost Technically Acceptable Solution (LCTAS) for standard connections. The LCTAS is the solution which is technically acceptable and which results in the least

[33] http://www.doingbusiness.org/reports/global-reports/~/media/giawb/doing%20business/documents/profiles/country/AUT.pdf, page 40

cost being incurred by the DSO in implementing the solution and which facilitates the long term development of the electricity network in the area. The process of choosing the LCTAS is specific to each case and is detailed in the Distribution System Security and Planning Standards document[34].

Any additional costs to be over and above the LCTAS are borne in full by the customer. It means that the connection has predetermined technical parameters, such as capacity, distance form connection point, voltage level, requirements for continuity of supply and other. Within EU there is generally a lack of publicly available information justifying selection of approaches towards demand customers' contribution of connection charges. A set of references which is publicly available and quite useful for one to get acquainted with the background on allocation of capital contributions to customers originates from Australia[35]

Table 4.3 Comparison of the main features of the load connections

COUNTRY	Applied principle of standard connection or not	Differentiation of standard charges is base only on technical parameters or others features (households, block houses, industrial)	Standard connection has geographical restrictions	Setting Standard connection distance measured from closest line or substation	Standard fee is a bulk sum or has also variable components (EURO/kVA, Euro/m)
IRELAND	Yes	No	Yes	line	Bulk ,for households
FINLAND	Yes	Yes	Yes	substation	Bulk to certain capacities within defined zones
LATVIA	No, except specific[36]	Yes	Not applicable	Not applicable	Not applicable
LITHUANIA	Yes[37]	Yes	Yes	line	Variable for all

[34] http://www.esb.ie/esbnetworks/ga/downloads/220903_publication_distribution_system_security_and_planning.pdf

[35] http://www.auroraenergy.com.au/Electricity-network/Your-supply/New-connections-and-alterations/Changes-to-Aurora-s-Customer-Contributions-Policy 2.4 Chapter page 4

http://www.propertyoz.com.au/library/05%20SA%20Allen%20report%20Connection%20to%20Electricity.pdf page 2.1

[36] Fixed fees are applied only when connecting customer to the present asset with no need of construction works, the charges are based on average cost of DSO , not subject of approved by regulator.

					standard
SWEDEN	Yes	Yes	Yes	substation	Bulk to certain capacities within zones

Source: web pages of DSOs of EU countries

Other examples on application of charging principles in some of EU countries are provided in the Annex 2.

4.3 Connection procedure

The connection process starts when a consumer submits an application. Data and information required to be submitted by the application is determined and available either in web pages of DSO or regulators. Majority of the DSOs' of EU countries accept an electronic submission of documents also. Iberdrola in Spain, EDF in France, Enel in Italy, EDP in Portugal - they all accept online applications. The most probable information to be included in application for connection at low voltage is as follows:

- Maximum kVA requirements.
- Type and electrical loading of equipment to be connected, such as number and size of motors, cookers, showers, space and water electrical heating loads and nature of disturbing loads e.g. welding equipment.
- The date when the connection is required.

Other necessary typical documentation also includes:

- Tax identification
- Property rights
- Contact details
- A copy of the planning permission for the development and/or construction project.
- The site plan of the land within the municipality, stating the limits of the plot.
- The ground plan, which shows the proposed development of the site in terms of access to public roads and connections to the network, and specifies the location of the individual circuit breaker box accessible from the highway and the if applicable, the cabinet power monitored.

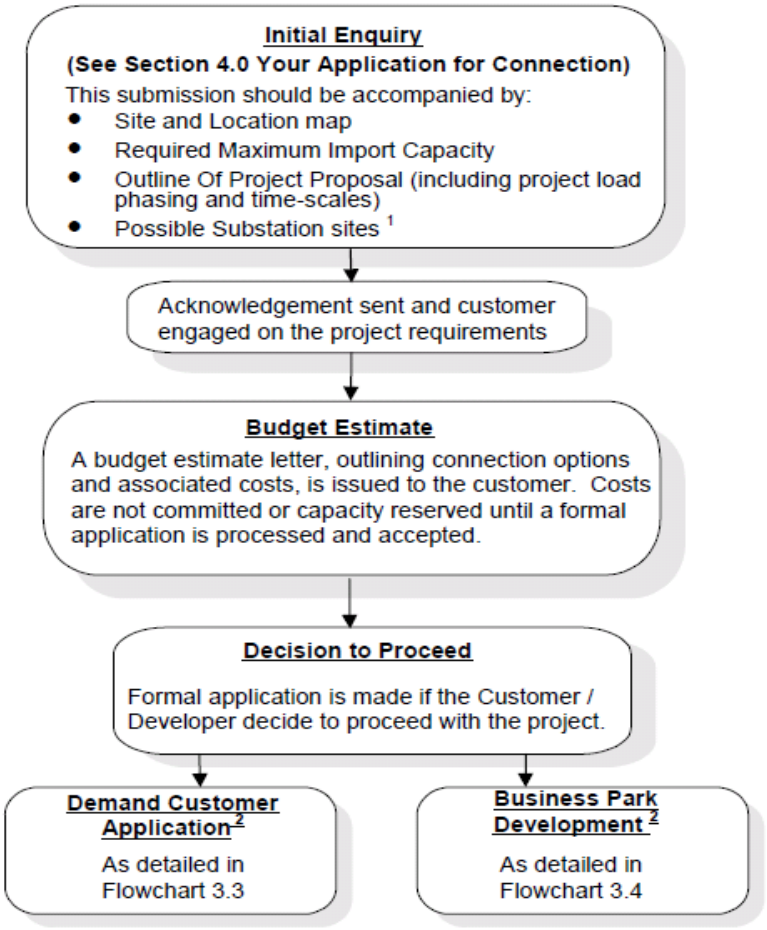
For connections at High and Medium Voltages additionally, the following information may be required:

- All types of demand
- Maximum active power requirements.
- Maximum and minimum reactive power requirements.
- (Type of load and control arrangements (e.g. type of motor start, controlled rectifier or large motor drives).

[37] Only for connected capacities below 500Kw, detail, please see in Annex 1.cases.

- Maximum load on each phase.
- Maximum harmonic currents that may be imposed on the Distribution System.
- Details of cyclic load variations or fluctuating loads (as shown below).

Some countries, for instance Ireland[38] have established procedures providing an opportunity for a customer to have preliminary consultations well in advance of the connection decision. In these consultations DSO informs a customer about the connection process and expected connection costs. In some cases, more detailed information may be required to allow a full assessment of the effect of the customers' load on the distribution grid.

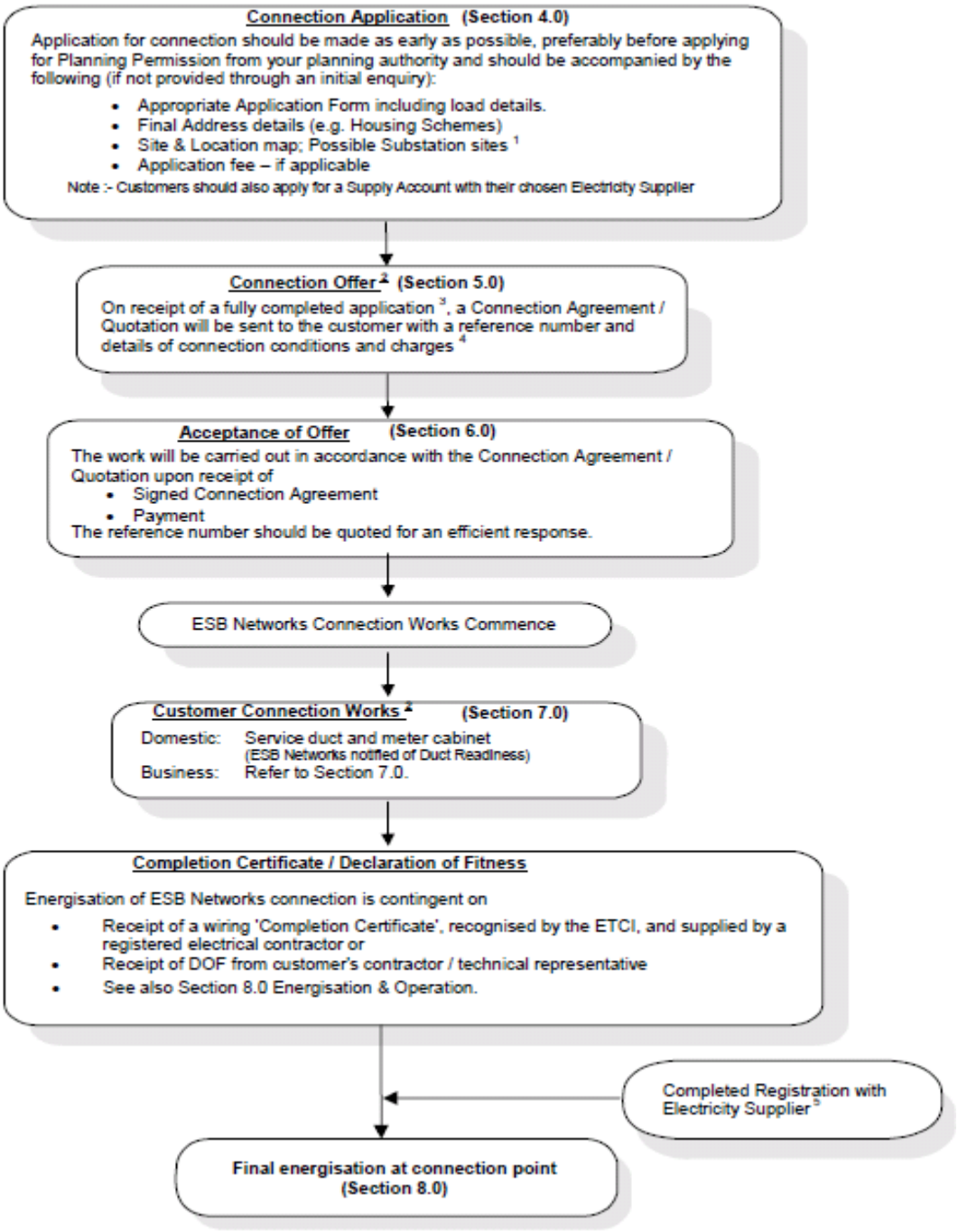


Source: "Guide to the Process for Connection of Demand Customers to the Distribution System" (ESB Networks, 2009)

Figure 4.2: Connection enquiry process description

The application as the rule in all countries is deemed to be accepted after the required information is submitted. Then within a short period of time the DSO informs the customer about preliminary construction costs, if country does not apply the standard connection charges or send quotation. The procedure for "standard connections" in Ireland is presented below for illustrative purposes:

[38] http://www.esb.ie/esbnetworks/en/commercial downloads/Guide_to_the_Process_for_Connection.pdf



Source: "Guide to the Process for Connection of Demand Customers to the Distribution System" (ESB Networks, 2009)

Figure 4.3: The Irish demand connection process flowchart (standardised charges)

The major milestones of the connection procedure across all EU countries involve:

1) Application for connection - usually online and on the basis of pre-defined documentation
2) Application documentation is considered complete and DSO commences internal design study for the preparation of the Connection Offer
3) Upon the acceptance of the Connection Offer by the Customer and the payment of the necessary fees a Connection Agreement is concluded.
4) Connection works commence
5) Connection works are complete and accepted by DSO

6) Energisation of the connection

The other example of connection procedure applied by the DSO Sadales Tikls in Latvia is provided in the link here: http://www.sadalestikls.lv/files/newnode/pieslegumi/pieslegumieur/2014-04-

4.4 Connection contract

The content of the contract depends on the existing legislation, institutional system, of the structure of the electricity sector, of the court practice and of other specific features of the country. Here we propose (based on the EU best practice) some general items usually included into a connection contract.

The Contract may be more or less detailed, but usually it contains such main chapters: 1) Parties of the Contract, entry into force and termination of the Contract, 2) Procedure and conditions for the provision of connection services, 3) Obligations and rights of the Contract parties, 4) Connection charges and payments of them, 5) Responsibility of the parties for misconduct, 6) Settlement of disputes. We will further analyse the potential contents of each chapter.

The first chapter shall define the parties of the Contract (the Operator and the User, introduce the distribution networks operator's name, phone number, office contact information, etc., the user's name, address, other contact information, a bank account, etc.). The Contract should specify the planned to connect user's characteristics and other information related to the connection service. The Contract usually enters into force on the date of its conclusion or if agreed, on the later date. Termination of the Contract depends on the existing legislation.

The second chapter shall describe a procedure for the connection to the network. The distribution network operator (further, Operator) may coordinate and organise the design work associated with the User's connection to the electrical network, but the User may organise this work itself, and in some cases the design may be unnecessary. The Contract should clearly fix the time limit for the connection to the network, depending on the complexity of the connection work. The Contract shall discuss the options when, due to various reasons, the planned terms are not followed. After the completion of all the works for the connection of the User to the network, the agency responsible for the safety and quality of the work (State Energy Inspection or similar) issues a permission to connect the assets of the User to the network. Then the last connection procedure should be implemented during a short time period (2-5 days) and the User may start using electricity at the given capacity limits and with the agreed category of reliability.

The third chapter shall define the obligations and rights of the Contract parties. The User is obliged: to pay the connection fee in terms and amount defined in the Contract, to prepare the User's appliances to be ready to connect to the network, to supply the Operator with all information needed for the connection to the network, etc. The User has the following rights: to terminate the Contract unilaterally in the way allowed by the legislation, receive all information about the connection terms and conditions from the Operator before the connection to the network, and so on. The Operator is obliged: to connect to the network all consumers living in the licensed area (the license fixes the Operator's service area), to organize and coordinate the connection work (it could be organized by the User himself as it was defined in the first chapter), to invoice the User for the connection according to the connection fee calculation principles, inform the User about completion

of the connection works, etc. The Operator has the right to stop the connection works or do not start them in case if the User does not pay the connection fee.

Connection charges are calculated according to existing legislation, usually there are the rules for the calculation of the fee, approved by the national regulatory authority or by the sectorial ministry. The Contract sets the payment terms and conditions.

If any of the parties breached the Contract this party should compensate losses to the other party in a way defined in the law. If the Operator did not fulfill all the work in time due to his fault or the fault of the third parties contracted by him, the Operator shall pay a penalty (compensation) to the User, the amount or percentage is agreed in the Contract. If the User delays the payment of the connection fee, the Operator may ask him to pay a penalty agreed in the Contract. The parties are not responsible for the breach of the Contract in case of force majeure or when the conditions were not fulfilled due to the third independent parties.

Settlement of disputes between the Contract parties is dealt according to the existing legislation. The Operator shall maintain a record of the User complaints or requests and decisions concerning them shall be laid down by the Operator. Any dispute between the User and the Operator, which could not be resolved by an agreement between the parties, in accordance with the legislation shall be settled in a court. Annex 3 provides the template of a contract for connection of demand customers used in Estonia.

5. Recommendations

Technical

The existing legal/normative documents in Belarus do not determine in advance technical requirements for the connection of demand/generation customers (including also those of using RES) to the grid which makes it difficult to plan connection related activities and prolongs the connection process. Determine in advance all technical requirements. Advance information will assist demand/ generation (including RES generators) customers to plan activities and costs, initiate pre-application discussions and clarifications will save time within the connection process.

Procedural

During implementation of the project the ITS experts have identified that the Decision No. 156 and the present text of the Supply Regulation somehow in parallel regulate procedural aspects of the connection issues and therefore a certain harmonisation would be required to provide complete clarity to the customers.

Determine separate connection procedures for demand and production customers, it will simplify understanding of the expected requirements. Future changes foreseen in the power sector will require the system operators (TSO and DSO) to plan their work independently from interests of historically incumbent generators.

Place standard contracts' templates on the web page of Belenergo SPA.

The Doing Business Report

Update information in the DB Report considering relevant changes in legislation, for example, eliminate the requirement of the state expertise for the design of connections of network users. As a result the time reported in the 2nd Procedure of the DB Report will be reduced by 30 calendar days at least.

Delete the 5th procedure due to the fact that such a requirement no longer exists, update the DB report's information. The less procedures – the faster connection to the grid will take the place

Reconsider opportunity of implementation of normative regulation in fixing the maximum timing spent to design simple connection projects. Time limits allocated to the design procedure will facilitate standardisation and promote efficiency by saving connection time.

Fully implement in practice (at all Oblenergos) the one-stop-shop principle by coordinating activities of structural units of Belenergo SPA, incorporate the 6th connection procedure into the 7th procedure. Real implementation of the one-stop-shop principle will save time required to get design approval and will assure a better ranking in the next DB Report.

Connection fees

The present approach in covering all the connection costs by an applicant reflects needs of financing of this activity; however it does not demonstrate how it interacts with the tariff setup. There are some standard elements in the households' connection method, but the existing practice should be improved by demonstration of more transparency in terms of the cost formation. Information should be provided showing that connection fees collected from customers are excluded from the network tariff. Make publicly available the methodology of fees' calculation or fees to be paid to connect to the network. This information will introduce to customers the costs of services prior to the application and will assist in taken a decision on the scale/capacity of the connection.

Annex 1. Normative documents regulating connection to the grid in the Republic of Belarus

1. Law of the Republic of Belarus on Renewable Energy Sources of 27 December 2010 (No 204-W)
2. Regulations of Electricity Supply[39] approved by the Cabinet of Ministers on 17/10/2011, No. 1394.
3. Decision of the Cabinet of Ministers from 17/02/2012, No. 156.[40] "About approval of unified list of procedures of state organizations" with amendments.
4. The order Nr. 99[41] of Belenergo SPA issued in 04.04.2012

[39] http://www.pravo.by/main.aspx?guid=3871&p0=C21101394&p2={NRPA}
[40] http://www.energo.by/gl/p105.htm
[41] http://www.energo.by/news/Pr_99.PDF

Annex 2. EU Case Studies Review

Demand connection – specifics of applied connection fee methods.

Finland

In Finland the transfer from the cost based method towards a standard one started in early 2000 by cooperation between the Finnish regulator and the Association of the Finnish electricity distribution companies. In 2005 this resulted in a new national zone method for connection fees in Finland. The zone method contains three different price zones which all have a fixed fee for the connection size (fuse or demand related). The connection fee is calculated based on the average network construction costs per connection in each price zone.

- Zone 1 - in the city planned areas. (All connection fees are fixed)
- Zone 2 - outside the city planned areas, within 400 m from an existing substation. (Fixed fees up till 3x63A)
- Zone 3 - outside the city planned areas, between 400-600 m from an existing substation. (Fixed fees up till 3x35A)

Outside zone 3 the fee is based on an area pricing method where the connection fee is determined for a specific geographical area. The area-price calculation takes into consideration all the potential connections in that specific area.

Sweden

In Sweden discussion about a new model has been going on for some years. The introduction of a new national model is delayed. In order to facilitate the handling of these complaints the Swedish regulator simplified the calculation of the individual cost by using standard costs. The initial proposal was to have a new legislation from 2012 with demands for a zonal method for connection fees. Two of the largest network companies, EON and Vattenfall, have introduced the zonal methods in 2008. By the observation of an expert preparing 2009 CIGRE report[42]likely outcome is that experiences from zone methods in Finland and Sweden could result in spreading it to all Sweden.

Zonal method applied by Vattenfall Sweden

The connection fees are based on average costs and have a fixed price for each connection size (fuse or demand related) in four different zones:

- Zone 1 - in city planned areas. (All connection fees are fixed)
- Zone 2 - outside city planned areas, within 400 m from an existing substation. (Fixed fees up till 3x63A)
- Zone 3 - outside city planned areas, between 400-600 m from an existing substation. (Fixed fees up till 3x63A)

[42] http://www.cired.net/publications/cired2009/pdfs/CIRED2009_0710_Paper.pdf

- Zone 4 - outside city planned areas, between 600-1000 m from an existing substation. (Fixed fees up to capacity 3x63A)

Latvia

The Procedure of connection of new customer and methodology of connection fees' calculation are determined by the Public Utilities Commission (Regulator) in cooperation with DSO's. The connection fee could contain two parts: real construction costs where grid capacity is not available and part which implies allocated costs of already commissioned asset based on average construction costs of previous year. In daily routine connection fees are calculated by the DSOs. The DSOs have obligations annually publish[43] applicable connection fees (allocated part) and real average connection costs of previous year. Those categories of customer which can receive preferential status are determined by the Regulation of Cabinet of Ministers and they are low voltage customers.

If the size of customer's connection does not exceed 40A the new customer covers 60% of real costs associated with the new connection/extension and DSO accordingly - 40%. The new customer covers 80% and DSO cover 20% of real costs, if connection size is above 40A, but does not exceed 100A.

All other DSO customers cover – 100% of real costs related with the set-up of new connection. The regulator has determined the upper threshold of grid elements to be included in the customer's cost calculation based on the required capacity. The real investment cost for each case is determined by open negotiation or a tender procedure.

In case where the grid is already present and some spare connection capacity available - the new customer pays previously determined rate **…. Euro/Amperes** based on the allocated costs - depending on the connection place and required capacity. The DSO can collect the allocated costs from new customers within 5 years of the moment when the investment has been commissioned. Preferential treatment applies also to these allocated costs connection voltage not exceeds 400V.

The design costs of new connection/ capacity expansion in full are covered by customer. If connection agreement is signed, the customer fulfils its obligation to pay and connection is completed in the final balance payment for design costs are taken into account. If customer fails to fulfil obligation then the design fee is not recoverable.

Lithuania

The connection fee methodology and connection fees are determined by the Energy Regulatory Commission of Lithuania. There are two ways applied in Lithuania to determine connection to the grid price:

Public procurement. This method is applied if increased permissible capacity exceeds 500 kW. In that case household consumers pay 20 %, other consumers (except households) – 40 %, producers of electricity – 100 % of contractor's working price. Also, for project preparation household consumers get 20 %, other consumers – 10 % discount.

Formula and Commission approved fees. This method is applied if increased permissible capacity does not exceed 500 kW. Formula:

[43] http://www.st.latvenergo.lv/portal/page/portal/Latvian/files/vid_izm_300311.pdf

Price = (Fee for 1 kW x Increased permissible capacity) + (Fee for 1 m x Shortest geometrical distance from connection point to the consumer's facilities).

Table A1. Connection fees approved by the Commission (100 %)

Consumer group	Fee for 1 kW of increased permissible capacity (PC) without VAT	Fee for 1 m of electricity network without VAT
I group (PC < 30 kW, no network reconstruction or project needed)	110 LTL	72 LTL
II group (PC < 30 kW, network reconstruction and project needed)	653 LTL	72 LTL
III group (30 < PC < 100)	315 LTL	82 LTL
IV group (100 < PC < 500)	239 LTL	63 LTL

Source: Lithuanian NRA

Table A2*. Household customers who pay 20% of the approved connection fee*

Consumer group	Fee for 1 kW of increased permissible capacity (PC) without VAT		Fee for 1 m of electricity network without VAT	
I group (PC < 30 kW, no network reconstruction or project needed)	22 LTL		14,4 LTL	
II group (PC < 30 kW, network reconstruction and project needed)	130,6 LTL	104,48 LTL*	14,4 LTL	11,52 LTL*
III group (30 < PC < 100)	63 LTL	50,4 LTL*	16,4 LTL	13,12 LTL*
IV group (100 < PC < 500)	47,8 LTL	38,24 LTL*	12,6 LTL	10,08 LTL*

Source: Lithuania NRA

*Fee for household consumers who prepare project themselves.

Example:

Permissible capacity – 15 kW
No reconstruction or project needed
Shortest geometrical distance – 20 m
Connection fee = 22 Lt * 15 kW + 14,4 Lt * 20 m = 618 LTL

Table A3. Other consumers except household consumers who pay 40% of the approved connection fee

Consumer group	Fee for 1 kW of increased permissible capacity (PC) without VAT		Fee for 1 m of electricity network without VAT	
I group (PC < 30 kW, no network reconstruction or project needed)	44 LTL		28,8 LTL	
II group (PC < 30 kW, network reconstruction and project needed)	261,2 LTL	235,08 LTL*	28,8 LTL	25,92 LTL*
III group (30 < PC < 100)	126 LTL	113,4 LTL*	32,8 LTL	29,52 LTL*
IV group (100 < PC < 500)	95,6 LTL	86,04 LTL*	25,2 LTL	22,68 LTL*

Source: Lithuania NRA

*Fee for all other consumers (except household consumers) who prepare project.

Example:
Permissible capacity – 15 kW
Network reconstruction and project needed
Shortest geometrical distance – 20 m
Project is prepared by consumer
Connection price = 235,08 * 15 kW + 25,92 Lt * 20 m = 4044,6 LTL

2.2 Examples of RES connections

Lithuania

In Lithuania the grid operator is obliged to connect RES plants to the grid even if the connection requires the grid to be optimised, boosted or expanded. Renewable electricity generation plants which capacity does not exceed 6 MW shall be connected to the distribution grid only. If the capacity of a plant exceeds 6 MW, it shall be connected either to the distribution grid or the transmission grid, depending on the technical specifications.

The standard connection process for RES plants is defined in the Law on Energy from Renewable Sources and it includes the following steps:

- **Application for preliminary connection requirements.** The plant operator submits an application requesting specifications on initial requirements for connection. These preliminary connection requirements shall contain only those requirements which are necessary to ensure the appropriate quality, reliability and safety of an electricity installation as well as of the grid.
- **Application for signing a letter of intent.** The plant operator shall submit evidence on the compliance of the installation with municipal construction obligations to the grid operator. In addition, both parties sign a Letter of Intent, committing themselves to construct and to connect an installation. The Letter sets out the capacity, the energy source that will be used in the plant as well as the respective deadlines for the project.

- **Application for a permit for the expansion of electricity production capacity**. The plant operator submits an application to the Ministry of Energy, requesting a permit for the expansion of electricity production capacity. This permission is issued by the Ministry of Energy within 30 calendar days from the receipt of all required application documents The permit is not required where extended or installed electricity generating capacity does not exceed 10 kW and the generated electricity is used for own needs. In such cases, the plant operator shall inform the Government or its authorised institution about the planned extension or installation of electricity generating capacity
- **Financial guarantee.** The plant operator submits to the grid operator a financial guarantee obliging the former to install a plant or otherwise pay a fine. The amount of guarantee to be provided depends on the generation capacity of the plant (1 kW x LTL 50 (LTL 50 = approx. € 14.47)). The operators of plants whose capacity does not exceed 30 kW are not obliged to provide a financial.
- **Construction permit.** Upon the receipt of the permission for an increase in output by the Ministry of Energy, a plant operator has to apply for a construction permit, issued by the director of administration of the competent municipality (or an authorised municipality official). Construction permits are issued according to the "one-stop shop".
- **Connection agreement.** The plant operator and the grid operator sign an agreement on the connection of the installation to the grid.
- **Permission to generate electricity.** When the construction of new power generation facilities is completed, the plant operator has to obtain permission from the Ministry of Energy for the generation of electricity This permission is issued by the Ministry of Energy within 30 calendar days from the receipt of all required application documents
- **Statement of verification.** The RES plant operator shall submit to the grid operator a statement of verification of the technical performance of the electricity equipment by the National Energy Inspectorate
- **Connection.** The grid operator is obliged to connect the RES plant to the grid within 18 months from signing the agreement on the connection of the installation to the
- **Offshore wind farms.** In case of offshore wind farms, applicants have to take part in a tender in order to acquire the permits to use territorial sea, the exclusive economic zone in the Baltic Sea and (or) coastal areas for the development and maintenance of the wind farm
- **Plants above 10 kW.** The operators of RES plants whose total installed capacity exceeds 10 kW must participate in an auction to receive a feed-in tariff, which will be paid only for a limited amount of their electricity. For each RES technology, separate auctions are organised in every region, as defined by the National Commission for Prices and Energy (NCC). An operator of an RES plant may participate in an auction only if he has signed a letter of intent with the grid operator and provided a financial guarantee.

The winner of an auction is the one who has proposed the lowest preferred guaranteed tariff. The winner also obtains the right to be connected to the grid in the region in which the auction was held). Capacity auctions will be held in a particular region until the new generation capacity for that region has been allocated. The winner of an auction shall not, after the auction, change the connection point and increase the plant capacity specified in the letter of intent or the grid operator's technical requirements.

The transmission system operator must connect a RES plant within 18 months or within the period during which the producer undertakes to build a plant, if this period exceeds 18 months. This

connection period starts at the moment when the agreement for connection services is signed and ends when the RES plant is connected to the grid and ready for technical tests. The period of connection, which must not exceed 18 months, is specified in the letter of intent.

The grid operators must provide a RES producer with all information on the connection procedure as well as on the planned deadlines for grid development works. The grid operators must submit a cost estimate of the connection services on the request of a producer. All this information has to be submitted to the plant operator within 30 calendar days from the submission of an application for preliminary connection.

Detailed information about RES grid integration in other MS of EU could be obtained in RES LEGAL portal.44http://176.9.160.135/home/

Annex 3. Draft contracts

The content of connection contracts depends on a subject of contract: demand or generator, the size of connected capacity as well on as specifics of legislation of concerned member state and other aspects. Here below are provided links to the publicly available examples of contacts and general condition used in some of member states of EU:

- Generator connection contract to high and medium voltage of **ELIA** Belgium's transmission system operator in Belgium http://www.elia.be/~/media/files/Elia/Products-and-services/Aansluiting2/20130627-Connection-Contract_update-B10.pdf
- General Conditions for Connection of Industrial and Commercial Customers and Generators to the Distribution System. These requirements applying to Import Customer Connections of Capacity of 100 kVA or Greater, Embedded Generators, Autoproducers and CHP Producers http://www.esb.ie/esbnetworks/en/commercial-downloads/General-conditions-greater-than-100kVA.pdf

[44] http://176.9.160.135/home/