ENERGY COOPERATION BETWEEN THE EU, THE LITTORAL STATES OF THE BLACK & CASPIAN SEAS AND THEIR NEIGHBOURING COUNTRIES

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European best practice regarding to the connection to the grid, connection tariffs

TABLE OF CONTENTS

1. INTRODUCTION 3

2. EUROPEAN BEST PRACTICE REVIEW WITH REGARDS TO THE CONNECTION TO THE GRID PROCEDURE AND CONNECTION TARIFFS 3

2.1 GRID CONNECTION & ACCESS 3
2.1.1 Understanding the notion of Third Party Access 3
2.1.2 The ERGEG GGPs on Electricity Grid Connection and Access 4
2.2 OVERVIEW OF TECHNICAL REQUIREMENTS 5
2.3 CONNECTION CHARGES 5
2.3.1 Definitions 5
2.3.2 Discussion on charging methodologies. 6
2.4 SUMMARY OF THE EU BEST PRACTICES 8

1. Introduction

ThisreportpresentstheoverviewofEUlegislation, includingthelatestEUDirectivesapproved in 2009 (The 3rd Package), as well as the EU best practices on the procedure of connection to the grid. Thissectionprovides adescriptionofrecommendedprocedureson electricity grid connection and accessdeveloped by the European Regulators Group for Electricity and Gas, as well as a detailed consideration of the approaches to tariff setting used in the EU.

2. European best practice review with regards to the connection to the grid procedure and connection tariffs

2.1 *Grid Connection & Access*

2.1.1 Understanding the notion of Third Party Access

The European Council initiated the liberalisation of the electricity and gas market with the implementation of directives 96/92/EG and 98/30/EG. They were followed by the new Directives 2003/54/EC and 2003/55/EC. The aim of the liberalisation of the energy markets is to offer end-users a choice between suppliers so that they can profit from lower prices for energy and a better quality of services. In addition, these directives guide the creation of the internal markets for electricity and gas by setting up a framework for harmonisation.
A keystone of the reform process was the so-called Third Party Access (TPA) scheme. Directive 96/92/EC devoted articles 16, 17 and 18 to the organisation of access to the system, which was then depended on the wholesale market model and allowed for both a negotiated and regulated procedure. Article 20 the repealing Directive 2003/54/EC practically defines TPA and relates the procedure only with the one referring to the regulated type. Last but not least the so-called "3rd Package" Directive 72/2009/EC Article 5 provides for:

> "*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."*

The provision practically abolishes any other option 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 third party wishing to be granted access to the relevant network.
Pursuant to the above, and having in mind that familiarisation with the term TPA outside the EU is not really developed, one should attempt to discriminate 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
- 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.

2.1.2 The ERGEG GGPs on Electricity Grid Connection and Access

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 towards this direction has been initiated by the European Regulators Group for Electricity and Gas (ERGEG).

On 24 March 2009, ERGEG launched a public consultation on Draft Guidelines of Good Practice (GGP) on Electricity Grid Connection and Access (Ref: E08-ENM-09-03). The draft GGP outlined a number of proposals to ensure consistent grid connection and access across Member States. Following this procedure ERGEG has developed another document (Ref: E09-ENM-16-04) which contains the Final GGP on Grid Connection and Access after evaluation of the responses and comments presented during the public consultation process. The final GGP on Electricity Grid Connection and Access could in the future contribute to the work of the newly established Agency for the Cooperation of Energy Regulators (ACER) when exercising its duties as regards to future framework guidelines.

The Guidelines deals with the following aspects:

- Responsibilities of stakeholders (Ministry, TSO, Regulator, Users, etc)
- General provisions (procedure, information exchange, access rights, etc)
- Technical framework per category of User (Generation, Demand customers, DNOs)

The full text of the GGP on Grid Connection and Access is presented in Appendix II.

2.2 *Overview of Technical requirements*

With a view to ensuring non-discriminatory treatment of all applications, detailed and common rules with regard to connection should be available ex-ante to all prospective new entrants. The Connection Code should therefore be enhanced with provisions that relate to:

- The connection procedure, relation between the connection rules and individual 'Connection Agreements', the standard connection boundary points that apply to each customer category (generator, distribution company, etc.) and relate the connection conditions with the relevant charges to be applied on the basis of a connection charges methodology.
- Connection conditions commonly applied to all prospective new entrants that are compatible with the system design characteristics and operational parameters (active and reactive energy requirements, frequency and voltage requirements, communications, quality standards, performance data, drawings, etc). Generators and in particular RES generators may be required to submit extra data and satisfy specific requirements with regard to output, voltage and frequency regulation.
- Ancillary services requirements based on the type of plant, capacity and linking to other relevant documents such as relevant sections of the Grid Code and Ancillary services Agreement (if applicable)
- Commissioning Testing and Inspection procedures, Access, Disconnection and Reconnection

2.3 *Connection Charges*

2.3.1 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 discrimination for allocating financial responsibilities between the TSO and the applicant (connectee).

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

- **Reinforcement assets,** which are upgrades to the existing 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 applicant's owned equipment to the extended TSO system, usually within the project commercial boundaries. These are sometimes termed the (immediate) Connection Assets, or **Direct Assets**.

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** or Shared-Shallow Policy 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** shallow policy draws the charging boundary at the immediate connection assets with the TSO paying for the reinforcements, system extension, and sometimes part of the immediate connection assets.

It is worthwhile to be noted that "hybrid" charging methodologies may indicate whether the tendency is towards the "deep" or "shallow" direction. In such cases the respective charging principles may be referred to as "deepish" or "shallowish"

2.3.2 Discussion on charging methodologies.

It is true that the EU Member states have not adopted a harmonized 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 market actors 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 who 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 generator 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 locationalsignal 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 locationalsignal 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.

The perspective itself represents the sum of interests that each market actor envisages to promote and the regulator usually needs to balance. An interesting summary table (Ref. HIROUX, 2005) presents in a tabular format some merits and drawbacks of the three primal charging policies in respect of each marker actor perspective.

Table 3.1: Connection Approaches Summary

	Deep Connection	*Shallow Connection*	*Hybrid Connection*
Generator	High upfront payment impacting the financial project	Low connection costs	Low connection costs plus an annual charge
Network Operator	Low risk approach Low business expenditure	Increase of the business expenditure Riskier approach (stranded assets)	Medium business expenditures Recovery of some reinforcement expenditures through different charges
Performances	Cost reflective: efficiency of network use Locational signal In accordance with competition: liability of each stakeholder	Easy to apply Mutualisation of reinforcement costs Network seen as a common facility Do not represent a market barrier for renewable technologies	Easy to apply but need to well assess the overrunning charge Mutualisation of some features of the reinforcement costs Locational signal (even if lower than deep approach)
Problems	Difficult to apply First mover disadvantage Reinforcement benefits to other network users Entry Market Barrier for small-scale units and renewable units	At variance with the notion of competition Any locational signal and no cost-reflective: problem of inefficiency of the network	Less cost-reflective than deep policy Assessment of the added charge

Source: The integration of Wind Power into competitive electricity Markets: The case of transmission grid connection charges, C. HIROUX, 2005

2.4 *Summary of the EU best practices*

There is no common ground in the European countries for the choice of the gridintegration cost allocation approach. The situation in the EU-15 countries issummarized in Table 3.2 (Knight et al., 2005). This table indicates that allapproaches are represented in the EU-15. However, the deep cost approach isdominating the EU-15 as it is the choice of more than half of the countries.

Table 3.2 indicates that there are very few countries in EU-15 having a high level of system transparency. Furthermore, there are also only a few countries with available literature about the connection cost calculation methods. All the countries with low system transparency are also lacking the publications of cost calculation.

Table 3.2: Grid connection cost parameters for EU-15 countries (taken from Knight et al., 2005)

Country	Cost allocation approach	Level of transparency	Published connection cost calculation methods?
Austria	Deep	Low	No
Belgium	Shallow	High	Yes
Denmark	Shallow	High	Yes
Finland	No Standard	Medium	No
France	Shallowish	Medium	No
Germany	Shallow	Low	No
Greece	Deep	Low	No
Ireland	Deep	High	No
Italy	Deep	Low	No
Luxembourg	Deep	Low	No
Portugal	Deep	Medium	No
Spain	Deep	Low	No
Sweden	Deep	Low	No
The Netherlands	Shallow	High	Yes
United Kingdom	Shallowish	High	Yes

Source: Knight, R. C., Montez, J. P., Knecht, F., Bouquet, T., 2005, Distribution connection chargeswithin the European Union - Review of current practises, future options and European policyrecommendations, Project Report, EIE-Project ELEP (Deliverable 2.1)

Nevertheless, either through the coordinated efforts of ENTSO-E and ACER who are jointly developing EU-wide network codes aiming to the harmonisation of practices across the EU or through the spontaneous co-operation of EU institutions at the research domain, both the technical requirements and the connection charging principles tend to a degree of convergence which in turn deviates from the illustration provided through table 3.2 above.

More specifically, a recent research initiative co-funded the EU under the 7th Framework project named: “RealiseGrid” provides a comprehensive picture of the status quo in respect of transmission system charging in the EU-27. The column entitled “charging” refers to the way the connection charges are split between theinvolved parties and the charging method is specified in accordance to the definitions provided above in section.

Table 3.3: Grid connection charges for grid expansion in EU27

Country	Legal basis		Priority to RES	Charging
	Entitled party	Obligated party		
Austria	The grid user	Grid operator	Yes	Shallow
	Contractual basis			
Belgium	N/A	Grid operator	Yes	Shallow
	N/A. Expansion according to the TSO's development plan			
Bulgaria	Plant operator	Grid operator	Yes	Shallow
	?			
Cyprus	Wind farm operator that has a supply license	Grid operator	No	Shallow
	Contractual basis			
Czech Republic	The RES producer	Grid operator, unless capacity shortage is proven.	No	Deep
	Contractual basis			
Denmark	N/A	N/A. Grid operator has the statutory obligation to expand the grid	No	Shallow
	Statutory basis			
Estonia	Plant operator	Grid operator	No	Shallow
	Statutory basis			
Finland	Plant operator	Grid operator	No	Deep
	Contractual basis			
France	Plant operator	Grid operator	No	Shallow – regular expansion case. Deep – if special (not regular) expansion is needed
	Contractual basis			
Germany	Plant operator	Grid operator	Yes	Shallow
	Statutory basis			
Great Britain	Plant operator	Grid operator	No	Shallowish
	The agreement between the grid operator and the plant operator may give cause for a claim if access to the grid can be granted through a grid expansion only			
Greece	Plant operator that is a contracting party to connection contract and holds a generation license.	Grid operator	No	Shallow
	Contractual basis			
Hungary	Plant operator	Grid operator	No	Shallowish
	Contractual basis			
Ireland	Plant operator	Grid operator	No	Shallow
	Contractual basis			
Italy	Plant operator	Grid operator	No	Shallow
	Contractual basis			

(table 3.3 continued)

Country	Legal basis		Priority to RES	Charging
	Entitled party	Obligated party		
Latvia	Plant operator	Grid operator	No	Shallow – regular expansion case. Deep – if special expansion is needed
	Statutory basis			
Lithuania	Plant operator	Grid operator	No	Shallowish
	Contractual basis			
Luxembourg	Plant operator	Grid operator	No	Deep
	Contractual basis			
Malta	Plant operator	Grid operator	Yes	Shallow or shallowish, depending on the decision of competent authorities
	Contractual basis			
Netherlands	N/A		No	Shallow
Poland	Plant operator meeting grid connection requirements	Grid operator	No	Shallowish – specified in the contract.
	Contractual basis			
Portugal	Plant operators if they apply for an early grid expansion	Grid operator	No	Deep – in case the plant operator applied for an early grid expansion Shallow – if the expansion is included in the general grid's operator expansion plan.
	Contractual basis			
Romania	Plant operator	Grid operator	No	Charges determined by competent authorities. Deep – if special expansion needed
	Contractual basis			
Slovakia	Plant operator(grid users in general)	Grid operator	No	Specified in the connection contract
	Contractual basis			
Slovenia	Plant operator	Grid operator	No	Shallow – average costs Shallowish- for above-average costs
	Statutory basis			
Spain	Plant operators – if a special expansion is necessary	Grid operator	No	Shallow – for general expansion case. Deep – if only the plant operator benefits from the expansion.
	Contractual basis – only if necessary			
Sweden	Plant operator	Grid operator	No	Shallow – if the expansion is to the benefit of the general public. Deep – if only the plant operator benefits from the expansion.
	Statutory basis			