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**“Technical Assistance for Harmonisation of Transmission
Code in line with ENTSO-E”**

Consultation Report

Final

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Table of Contents

1. Preamble	3
2. Background and Objectives of the public consultation	3
3. Comments received during the written public consultation	4
4. Analysis of comments	5
5. Modifications introduced in the draft Electricity Transmission Grid Code after the written public consultation	5
5.1 Modifications of the frequency withstand capability	5
5.2 Modification of the rate-of-change-of-frequency (ROCOF) withstand capability	6
5.3 Clarifications for voltage ranges	6
5.4 Clarifications for reactive power capability	7
5.5 Fast acting additional reactive current injection: modification of time to provide 2/3 of the additional reactive current	7
5.6 Clarifications on some requirements defined by TEIAS during the connection process	7
5.7 Clarifications for renewable generation	8
5.8 Harmonisation of definitions	8
5.9 Corrections	8
6. Modifications introduced in the Electricity Market Balancing and Settlement Regulation after the written public consultation	9
6.1 Modification of the general objectives for balancing	9
6.2 Modification of the gate closure time for intraday market	9
6.3 Modification of the entity in charge of updating max and min prices for day ahead market bids	9
7. Modifications introduced in the Electricity Market Distribution Regulation after the written public consultation	9

1. Preamble

A consortium, composed of RTE International (France), ELIA System operator (Belgium) and FICHTNER (Germany), and led by RTE International has been selected by CFCU to provide technical assistance to TEIAS according to Service Contract n° TR2010/0315.01/001 "Technical Assistance for Harmonisation of Transmission Code in line with ENTSO-E".

This project is co-financed by the European Union and the Republic of Turkey, both represented by CFCU.

2. Background and Objectives of the public consultation

The harmonisation of Turkish power system regulations with the ENTSO-E requirements aims to facilitate the integration of the Turkish Electricity Market to the EU Internal Electricity Market, to fulfil power system operational security and quality of supply requirements of Continental Europe synchronous network and to set rules for the integration of renewable and other types of generation.

To meet these objectives, the Turkish Grid Code and the other relevant Turkish regulations have been updated in order to be in line with RGCE Operation Handbook and nine draft EU network codes. These regulations and documents are the following:

- Electricity transmission grid regulation
- Electricity market distribution regulation
- Electricity market balancing and settlement regulation
- Electricity Market Ancillary Services Regulation
- Electricity Market Import and Export Regulation
- Principles and procedures on capacity allocation and secondary market for physical transmission rights in accordance with the electricity market export and import regulation
- Auction rules established by TEIAS and the neighbouring TSOs for the Allocation of Capacities on the Interconnection.

A consultation process on the amendments proposed to be introduced in these regulations and documents has been conducted in the framework of the technical assistance mentioned above. In Europe, the European regulation requires the organisation of such a consultation process while implementing measures pursuant to European Network Codes. Hence, the organisation of such a public consultation is part of the objectives of harmonisation.

This public consultation aims at identifying the views and proposals of all relevant parties during the decision-making process. The consultation process has been conducted by TEIAS at an early stage of drafting the regulations. It has been conducted in an open and transparent manner, involving all relevant market participants, and, in particular, the organisations representing all stakeholders. That consultation has also involved national regulatory authorities and other national authorities, supply and generation undertakings, distribution system operators, relevant industry associations, technical bodies and stakeholder platforms. The consultation process has been mainly based on a written public consultation during which all relevant parties could send comments on the consulted draft regulations. Jointly to this process, TEIAS organises public workshops for presenting the amendments and helping the relevant parties to make their comments.

The consultation schedule was as follows:

31 October	<ul style="list-style-type: none"> • Announcement of the public consultation on TEIAS website and invitation for stakeholders to participate
14 November	<ul style="list-style-type: none"> • First workshop (1 day) <i>Introductory workshop</i>
26 November to 5 December	<ul style="list-style-type: none"> • Publication of draft harmonised regulations for public consultation (with supporting documents) and beginning of the written public consultation
10 to 12 December	<ul style="list-style-type: none"> • Second workshop (3 days) <p><i>Extensive workshop with detailed presentations of amendments by field of activity.</i></p>
12 January 2015	<ul style="list-style-type: none"> • End of the written public consultation

Two supporting documents have been published jointly to the draft amended regulations in order to help stakeholders to participate in the public consultation. They aim at explaining and justifying why and how new amendments are proposed to be introduced in Turkish regulation. They consist in:

- Explanatory note
- Draft Legal Guidance Document

A Final Public Workshop was held on the 9th of March to present to stakeholders the updated draft regulations including the feedback of the public consultation. No new comments or remark were raised by the sector stakeholders during this workshop.

3. Comments received during the written public consultation

94 comments were received from 9 companies:

- AKENERJİ ELEKTRİK ÜRETİM A.Ş.
- ENERJİSA ENERJİ ÜRETİM A.Ş.
- EÜAŞ
- FICHTNER
- RES Group Ltd

- TEDAŞ
- UL International GmbH, DEWI Danışmanlık Mühendislik Tic. Ltd. Şti.
- VESTAS BoP - VESTAS R&D
- ZORLU Endüstriyel ve Enerji Tesisleri İnşaat Ticaret A.Ş

Most of the comments (more than 70) are related to connection issues, 9 are related to legal aspects and 9 related to market issues and real time balancing.

4. Analysis of comments

The table in annex of this report details the analysis of all the 94 received comments. For each comment, three cells have been added to the tables received from the stakeholders and detail the results of the analysis. The first cell “Comments considered” indicates in a synthetic manner (yes/no) whether the comment has been taken into account or not. The second cell “answer and justifications” explains why it has been taken into account or not and gives the relevant justifications. The last cell “Proposed Wording” concludes whether the comment lead to a modification of the wording of regulations or not.

Many comments (about 35) deal with initial requirements (not amended during the process of harmonisation with ENTSO-E requirements). A part of them (20 comments) are too far from the scope of the present revision of the Turkish regulation and need additional investigations for analysing them. These comments will be studied in a further revision of the regulation.

The following chapters 5, 6 and 7 detail the modifications introduced in the draft regulations submitted to public consultation as a result of this consultation process.

Comments lead to some major modifications related to requirements for connection of new users, and more particularly for connection of new generators. They concern mainly frequency withstand capabilities (frequency ranges and rates of change of frequency), voltage withstand capabilities and reactive power support capabilities.

The other modifications are more of editorial type, clarifications or corrections.

5. Modifications introduced in the draft Electricity Transmission Grid Code after the written public consultation

5.1 Modifications of the frequency withstand capability

The requirements in Electricity Transmission Grid Code are modified to be aligned with RGCE requirements for new generating facilities, new transmission connected demand facilities and new distribution networks as shown in following tables (see article 47, 57 and 67). The initial ranges are maintained for existing generating facilities and facilities under construction (see article 34).

Art 47, 57 Frequency Range (Generators, Demand facilities)	Art 47, 57 Minimum Time Period
$51 \text{ Hz} \leq f < 51.5 \text{ Hz}$	30 minutes
$49 \text{ Hz} \leq f < 51 \text{ Hz}$	Unlimited
$48.5 \text{ Hz} \leq f < 49 \text{ Hz}$	1 hour
$47.5 \text{ Hz} \leq f < 48.5 \text{ Hz}$	>30 minutes

Art 67 Frequency range (HVDC systems)	Art 67 Time period for operation
47.0 Hz – 47.5 Hz	60 seconds
47.5 Hz – 48.5 Hz	90 minutes
48.5 Hz – 49.0 Hz	90 minutes
49.0 Hz – 51.0 Hz	Unlimited
51.0 Hz – 51.5 Hz	90 minutes
51.5 Hz – 52.0 Hz	15 minutes

This harmonisation shall:

- ensure non discrimination for owners of generating units in Turkey compared to same owner in continental Europe (avoid additional costs for the procurement of new equipments due to non standard requirements compared to other EU countries).
- facilitate the integration of new renewable generation sources (which is one of the objectives of the European policy) by using same standards as in continental Europe.

5.2 Modification of the rate-of-change-of-frequency (ROCOF) withstand capability

With regard to the rate of change of frequency withstand capability for new Power generating Module, minimum requirement of +/-0.5Hz/s is introduced in article 47 as a temporary requirement. This value may be re-evaluated in further revision of the regulation (results of simulations shown during December public workshop highlight that high ROCOF, up to 2 Hz/s, can be experienced in case of network split, even within synchronous area with high inertia like Continental Europe).

5.3 Clarifications for voltage ranges

1) The voltage ranges for 154KV level and 66 kV are modified to be harmonised with IEC standards. Moreover, values in per units (pu) are replaced by value in kV in order to avoid any ambiguity.

Following voltage ranges are introduced in Article 50 (voltage ranges in which new Power Generating Modules shall be capable of staying connected to the network and operating) and Article 58 (voltage ranges in which new transmission connected demand facilities and new transmission connected distribution networks is capable of withstanding without damage).

Article 75 (voltage ranges in which new HVDC systems shall be capable of staying connected to the network and operating) is modified accordingly.

Voltage Range(kV) (connection to 154 KV system)	Time period for operation (Generators and Demand)	Comments
130,9 – 140	60 minutes	<i>Same as previous requirement in pu for lower voltage (0,85 pu).</i>
140-170	Unlimited	<i>Harmonisation with IEC range for permanent operation</i>
170 – 172,5	20 minutes	<i>Harmonisation with IEC range for limited time operation</i>

Voltage Range(kV)	Time period for operation	Comments
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(connection to 66 KV system)	(Generators and Demand)	
56,1 – 59,4	60 minutes	<i>Same as previous requirement in pu(0,85 pu - 0.90 pu)</i>
59,4 – 72,5	Unlimited	<i>Harmonisation with IEC range for upper voltage permanent operation</i>
72,5 - 75.9	20 minutes	<i>Harmonisation with IEC range for limited time operation</i>

2) The voltage ranges for 400kV are replaced by value in kV in order to avoid any ambiguity.

Following voltage ranges are introduced in Article 50 (voltage ranges in which new Power Generating Modules shall be capable of staying connected to the network and operating) and Article 58 (voltage ranges in which new transmission connected demand facilities and new transmission connected distribution networks is capable of withstanding without damage).

Article 75 (voltage ranges in which new HVDC systems shall be capable of staying connected to the network and operating) is modified accordingly.

Voltage Range(kV) (connection to 400 KV system)	Time period for operation (Generators and Demand)	Comments
340 – 360	60 minutes	<i>Same as previous requirement in pu(0,85 pu - 0.90 pu)</i>
360 – 420	Unlimited	<i>Same as previous requirement in pu(0.90 pu - 1.05 pu)</i>
420 – 440	60 minutes	<i>Same as previous requirement in pu (1.05 pu - 1.1 pu)</i>

5.4 Clarifications for reactive power capability

Voltage ranges in which the reactive power capability is available is reduced to +- 5% for new type B power park module (see Article 54).

For type C and D, voltage ranges in which the reactive power capability is available are modified according to values in kV detailed in previous paragraph (see Article 52, 55).

Article 77 (voltage ranges in which the reactive power capability is available for new HVDC systems) are modified according to values in kV detailed in previous paragraph.

5.5 Fast acting additional reactive current injection: modification of time to provide 2/3 of the additional reactive current

The Power Park Module (ARTICLE 54 (2) (b) point 1) option a.) or the individual units of the Power Park Module (ARTICLE 54 (2) (b) point 1) option b.) shall be capable of providing at least 2/3 of the additional reactive Current within a time period specified by TEIAS which shall not be less than **60 milliseconds** (instead of 10 milliseconds in the initial version).

5.6 Clarifications on some requirements defined by TEIAS during the connection

process

Power oscillations damping control for Power Park Modules (Article 55) can be required by TEIAS **prior to connection**.

With regard to fast acting additional reactive Current injection in case of asymmetrical (1- phase or 2- phase) faults, the Relevant Network Operator in coordination with TEIAS shall have the right to introduce a requirement for asymmetrical Current injection **in terms and conditions related to connection included into the connection agreement** (Article 54 (2) c).

Requirements related to the priority to Active or Reactive Power contribution will be defined in terms and conditions related to connection included into the connection agreement (Article 55 (2) e).

5.7 Clarifications for renewable generation

Article 36(1) sets that “at steady state, standard deviation in the unit output power within half an hour time should not exceed 2.5% of the installed capacity of the unit”. A clarification is added in order to precise that **"Article 36(1) does not apply to Power Generating Modules which primary energy source is based on wind, solar, wave and tidal power"**.

For the initial delay of activation for Frequency sensitivity Mode (Article 49 (2) c 5), it “shall be as short as possible and reasonably justified by the Power Generating Facility Owner to TEIAS, by providing technical evidence for why a longer time is needed, if greater than 2 seconds” and the last part of the sentence is deleted (“or a shorter time if specified by TEIAS, for generation technologies without Inertia”).

With regard to Synthetic Inertia, Article 55 (2) a 1 is modified in order to precise that additional Active Power to the Network is supplied **at the Connection Point**.

5.8 Harmonisation of definitions

"Rated power", "installed power" and "installed capacity" are replaced by "Maximum Capacity". "Generating facility" is replaced by "Power Generating Module". Definitions of “generating unit” and “generator” are merged.

5.9 Corrections

Article 263 (d) is modified in order to precise that “ Annex 18 ... shall only apply to Existing Power Park Modules based on the wind energy connected to the distribution **and transmission** system having installed capacity of 10MW and above as from the day...

In Annex E18.4, the wind turbines should provide the frequency ranges and operating periods specified in the Article **34(8)** of this Regulation

In Article 47 (1) g, “the maximum admissible gradient of increase of Active Power output should be 10 % of the installed capacity per minute” is added to the conditions in which a reconnection is allowed.

In Article 49 2 the second subtitle “2. Type C Power Generating Modules shall fulfil the following requirements referring to Frequency stability:” is deleted.

6. Modifications introduced in the Electricity Market Balancing and Settlement Regulation after the written public consultation

6.1 Modification of the general objectives for balancing

As participation of renewable energy sources in balancing is not introduced in the Turkish Regulation at this stage of their revision, the following objective for balancing is temporarily deleted in Article 9: "c) The participation to Balancing and Settlement of renewable energy sources shall be facilitated."

6.2 Modification of the gate closure time for intraday market

Market participants can update the previous bid amounts that they have submitted to the balancing power market and their FDGS's until **one hour** before the physical delivery (article 55 i).

6.3 Modification of the entity in charge of updating max and min prices for day ahead market bids

Market Operator shall submit for regulatory approval the proposal of amendments on maximum and minimum prices (article 41 (7)). Furthermore article 41 (6) and article 41 (7) will be merged.

7. Modifications introduced in the Electricity Market Distribution Regulation after the written public consultation

Article 5 (last paragraph) and 6 (first paragraph) are clarified in order to mention TEDAS as the ultimate owner of the distribution networks. They are replaced by "**Since the Distribution Network Operator is not the owner of the asset that it operates, the Distribution Network Operator shall ensure that TEDAS is informed and involved whenever necessary**". Article 5 (last paragraph) of the Electricity Transmission Grid Regulation is modified accordingly.

The following provision in article 8 is deleted: "Any conflict arising between the present Regulation, the Electricity Transmission Grid Regulation and existing law and regulations shall give the precedence to the Transmission Grid Regulation".

