



REPORT

CONFIDENTIAL

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VERSION 1.0

# INTERCONNECTION GRID CODE FOR THE PAN ARAB ELECTRICITY MARKET

## DATA EXCHANGE CODE

Arab Fund Grant Number 06/2018

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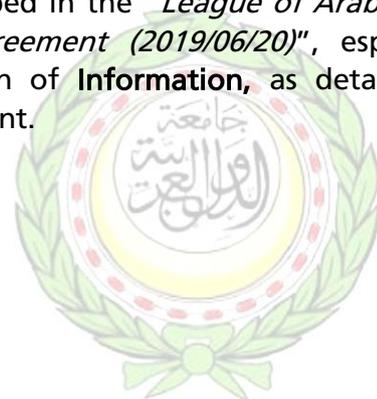
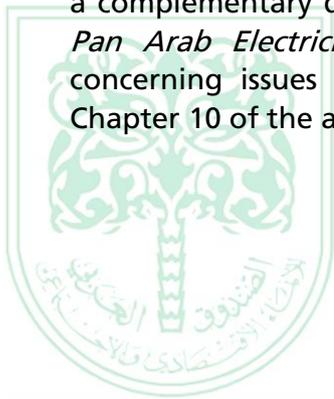


## DEC 1 SCOPE OF APPLICATION

J.<sup>1</sup> The scope of application provides elements for a proper understanding of the provisions set forth in this **Data Exchange Code**.

DEC 1.1.1 In the building of an efficient integrated **Pan-Arab Electricity Market (PAEM)**, **Information** exchange and data management shall become more connected. Increased **Information** access and exchange leads to substantial efficiency gains in **Grid** operation and planning, to lower market access barriers, enhanced transparency in consumers' usage and eventually helps create new power markets.

DEC 1.1.2 In **PAEM**, data from **TSOs** and **Non-TSOs** are required for various operational tasks and case studies. This document addresses the general rules for the technical data handling and the rules that the **Parties** shall follow for the provision and usage of these data between **TSOs** and/or **Non-TSOs**. This **Code** is a complementary document to rules described in the "*League of Arab States Pan Arab Electricity Market General Agreement (2019/06/20)*", especially concerning issues regarding the protection of **Information**, as detailed in Chapter 10 of the above-mentioned document.



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<sup>1</sup> J.: Justification

## DEC 2 ROLES, RESPONSIBILITIES AND QUALITY OF TECHNICAL DATA EXCHANGE

J. Each **Person** is responsible for the availability, reliability and validity of the technical data they provide, according to the specified requirements.

DEC 2.1.1 **Arab TSOs Committee** shall facilitate and coordinate the technical **Data Exchange** between the **Parties**, in order to increase the efficiency of the **PAEM** organization and improve the adequacy and security management of the interconnected system.

DEC 2.1.2 Each **TSO** shall be responsible for providing and using high quality data and **Information**.

DEC 2.1.3 The availability, reliability, validity and accuracy of the exchanged data shall be ensured by **TSOs** to fulfill the requirements provided for in the **Arab Grid Code**. If nothing is specified, **Best Effort** shall be applied for the specific **Data Exchange**.

DEC 2.1.4 All **TSOs** shall jointly agree on key organizational requirements, roles and responsibilities in relation to **Data Exchange**. They shall apply to all **Data Exchange** and shall include organizational requirements, roles and responsibilities for the following elements:

- a) obligations for **TSOs** to communicate, without delay, to all neighboring **TSOs**, any changes in the protection settings, thermal limits and technical capacities at the **International Interconnections** between their **Control Areas**;
- b) obligations for the adjacent **TSOs** to inform each other within agreed timescales of any changes in the data and **Information** pursuant to the **Arab Grid Code**;
- c) detailed contents of the data and **Information** established pursuant to the **Arab Grid Code**, including main principles, type of data, communication means, format and standards to be applied, timing and responsibilities;
- d) the frequency of **Information** exchanges for **Real-Time Data Exchange**, scheduled data and update of structural data shall be defined.

DEC 2.1.5 The organizational requirements, roles and responsibilities shall be published by **PAEM**.

DEC 2.1.6 The **Market Secretariat** shall be appointed as the coordinator for each data collection related to a specific **Operational TSO Business**. The coordinator observes and checks the implementation of the **Data Exchange** and detects

potential trouble and bottlenecks. At time intervals agreed by the contributors, the coordinator examines data set contents and procedures concerning the **Data Exchange**, and corrects them if necessary.

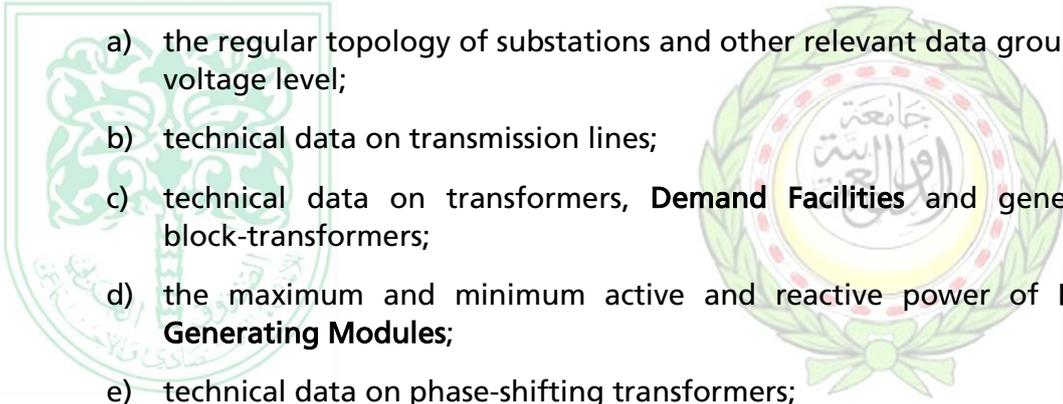


## DEC 3 DATA EXCHANGE AMONG TSOs

DEC 3.1.1 More **Information** regarding the **Data Exchange** is reported in several parts of the **Arab Grid Codes**. In **Operation Code**, **Planning Code** and **Connection Code**, several Articles are dedicated to the **Data Exchange** among **Parties** to improve efficiently the **SoO** of the **PAEM Electricity System**. This Chapter DEC 3 highlights the structural and forecast **Data Exchange** to perform static load flow computation and **DSA** of the system, concerning the **TTC/NTC** evaluation. Further, in real time, each **TSO** shall exchange data on the **Operating Conditions** of its **Grid** with the other **TSOs** of the same **Synchronous Area**, using the **ICT** tool for real-time **Data Exchange** at Pan Arab level as provided by **PAEM**.

### DEC 3.2 Structural and Forecast Data Exchange

DEC 3.2.1 Neighboring **TSOs** shall at least exchange the following structural **Information** related to the **Observability Area**:

- 
- a) the regular topology of substations and other relevant data grouped by voltage level;
  - b) technical data on transmission lines;
  - c) technical data on transformers, **Demand Facilities** and generators' block-transformers;
  - d) the maximum and minimum active and reactive power of **Power-Generating Modules**;
  - e) technical data on phase-shifting transformers;
  - f) technical data on **HVDC Systems**;
  - g) technical data on reactors, capacitors and static volt-ampere reactive (VAR) compensators;
  - h) operational security limits defined by each **TSO** for each **Network** element.

DEC 3.2.2 To coordinate the protection of their **Transmission Systems**, neighboring **TSOs** shall exchange the protection setpoints of the lines for which the contingencies are included as external contingencies in their contingency lists.

DEC 3.2.3 To coordinate their operational security analysis and to establish the **Common Grid Model**, each **TSO** shall exchange, with all other **TSOs** from the same **Synchronous Area**, at least the **Individual Grid Models** based on the following data:

- a) the topology of **Transmission Systems** within its **Control Area**;

- b) a model or an equivalent of the sub-**Transmission System** with significant impact on its own **Transmission System**;
- c) the thermal limits of the **Transmission System** elements;
- d) a realistic and accurate forecast aggregate amount of injection and withdrawal, per primary energy source, at each node of the **Transmission System**, for different time-frames.

DEC 3.2.4 To coordinate the dynamic stability assessments, each **TSO** shall exchange, with the other **TSOs** of the same **Synchronous Area** or of its relevant part, the following data:

- a) data concerning **Power-Generating Modules** relating to, but not limited to:
  - i. electrical parameters of the alternator suitable for the dynamic stability assessment, including total inertia;
  - ii. electrical protection functions that protect the **Power-Generating Modules** against faults in the **Grid** and against **Operating Conditions** that exceed the operating limits of the **Power-Generating Modules**;
  - iii. step-up transformer description;
  - iv. minimum and maximum reactive power;
  - v. prime movers' models, excitation system models, and **Power System Stabilizer** models suitable for large disturbances;
- b) the data on type of regulation and voltage regulation range concerning tap changers and **Network** transformers;
- c) the data concerning **HVDC Systems** and **FACTS** devices on the dynamic models of the system or the device and its associated regulation suitable for large disturbances.

DEC 3.2.5 The final list of data will be determined by **Arab TSOs Committee** depending on the purpose of the data.

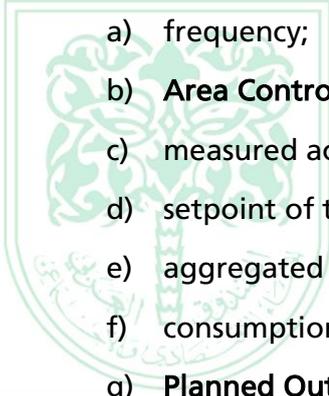
### DEC 3.3 Real-Time Data Exchange

J. Requirements to data collection describing current situation in order to support the **TSOs** in monitoring, coordinating and operating the **Transmission System**.

DEC 3.3.1 **Real-Time Data Exchange** is the focus of **Pan Arab Communication Network (PACN)**. The measurements and grid topology from neighboring **TSOs** are important for the secure operation of the **Transmission System**. The type and the amount of data to be exchanged in **Real-Time Data Exchange** shall be mutually agreed upon among participating **TSOs** . The **PACN** is meant for **Data Exchange** which helps the **TSOs** in monitoring and coordinating operation of the **PAEM Electricity System**. It is recommended not to use the exchanged data through **PACN** for real-time control applications.

DEC 3.3.2 The **Data Exchange** between communication partners is coordinated on a bilateral basis. The **Data Exchange** shall be agreed among the participating **TSOs**.

DEC 3.3.3 As a minimum, each **TSO** shall gather the following information about its **Observability Area** and shall exchange this data with all other **TSOs** to the extent that it is necessary for carrying out the operational security analysis:

- 
- 
- a) frequency;
  - b) **Area Control Error**;
  - c) measured active power interchanges between **LFC Areas**;
  - d) setpoint of the load-frequency controller;
  - e) aggregated **Generation** infeed;
  - f) consumption;
  - g) **Planned Outages** and substation topologies; and,
  - h) **Operating Condition** (normal, alert, emergency).

DEC 3.3.4 Each **TSO** shall exchange, with the other **TSOs** in its **Observability Area**, the following data about its **Transmission System** using real-time **Data Exchanges** between the **TSOs' Supervisory Control and Data Acquisition (SCADA)** systems and **EMS**:

- a) actual substation topology;
- b) active and reactive power in each line bay, including transmission and lines connecting **Power-Generating Modules**;
- c) tap positions of transformers, including phase-shifting transformers;
- d) measured or estimated busbar voltage;
- e) reactive power in reactor and capacitor bay or from a static VAR compensator;

- f) restrictions on active and reactive power supply capabilities with respect to the **Observability Area**.

DEC 3.3.5 Each **TSO** shall have the right to request all **TSOs** from its **Observability Area** to provide real-time **Snapshots** of state estimated data from that **TSO's Control Area** if that is relevant for the operational security of the **Transmission System** of the requesting **TSO**.

DEC 3.3.6 The reported list of data includes only the minimum set of data to be complemented by the **Arab TSOs Committee** depending on the purpose of the data and reviewed from time to time.

### **DEC 3.4 Data Exchange for Long-Term Planning**

DEC 3.4.1 Data for **Long-Term Planning** are organized in a dedicated relational **Common Database** with the following twofold goals: to simulate the market and the **Adequacy** all over the **Pan Arab Region**, and, to simulate the **Network** behavior along the time horizon.

The same **Common Database** shall be used for statistics and reporting. The data are reported (by families of data) in the **Planning Code**.

DEC 3.4.2 Data shall be tagged with the time of the forecast and the time of entering into operation.

DEC 3.4.3 The forecast data and information supplied for **Long-Term Planning** are not immediately verifiable, hence they shall have a high ethical content, as they affect the future of an important part of the energy availability and affordability the **Pan Arab Region**.

DEC 3.4.4 Punctual data delivery is important for an efficient outcome of the planning process.

DEC 3.4.5 The nature of the data for **Network** studies is the same as the ones requested for **Real-Time Data Exchange** (or near real-time).

DEC 3.4.6 The **Individual** and **Common Database** shall be designed and managed using state of the art technology and **Good Utility Practices** in matter of data protection, due to the strategic content of data.

## DEC 4 RULES TO HANDLE THE TECHNICAL DATA

J. Requirements to properly organize the handling of **Operational TSO Business** data in such a way that it minimizes the risks of abusing the generic rules regarding the rights and duties of the **Parties** involved in the **Data Exchange** required for **Operational TSO Business**, and works in a sense of good faith and cooperation for joint benefit.

DEC 4.1.1 The **TSOs'** data needed, used for, or resulting from operation of the interconnected **PAEM Electricity System** have to be handled under general rules concerning data confidentiality, acquisition, coordination and usage, back-up procedures and intellectual property. All **Parties** involved have the same rights and must comply with the same obligations at supporting **PAEM's** internal tasks and its external communication policy in the limits set forth herein.

### DEC 4.2 Basic Requirements

#### DEC 4.2.1 *Data Handling*

DEC 4.2.1.1 The **TSOs** shall exchange different kinds of data for **Operational TSO Business**, as described in the relevant parts of **Arab Grid Code** or stipulated by bilateral or multilateral agreements among **TSOs**. **TSOs** are required to organize handling of their **Operational TSOs' Business** data to fulfil this part of the **Code**.

#### DEC 4.2.2 *Data Format*

DEC 4.2.2.1 Each **TSO** shall use the standardized format for **Data Exchange** as agreed within **PAEM**. In case of no standardized format, the format shall be agreed among the **TSOs** concerned. Wherever practices that require redundant calculations or transparency obligations need the verification by one or more **TSOs**, the **TSOs** shall provide the needed interfaces for using different tools on the same data sets.

#### DEC 4.2.3 *Data Access*

DEC 4.2.3.1 A **TSO** participating in the creation of **Common Information** related to a specific **Operational TSO Business** based on the data provided by other **TSOs** must share this **Common Information** or the data derived from it with other contributing **TSOs**. The contributing **TSO** has the right to extend or restrict this use into more precise agreements. Such a restriction or extension shall be duly recorded in writing.

#### DEC 4.2.4 *Data Confidentiality*

DEC 4.2.4.1 Any **Individual** and/or **Common Information** falling into one of the following categories shall be considered **Confidential Information**:

- a) any **Information** pertaining to the interests of any **Party** developed or acquired by any **Party** and that is proprietarily or competitively sensitive;
- b) any critical energy infrastructure **Information** about proposed or existing asset, which is related to the **Generation**, transmission or distribution of electricity and which could be used for planning an attack or for any other similar type of misuse. Critical infrastructure comprises existing and proposed systems and assets (whether physical or virtual) of which the unavailability or destruction would negatively affect security, economic security, public health or safety or any combination of those factors;
- c) any investigation report and any records produced for or during an investigation of disturbance in the system;
- d) cybersecurity information that could damage cybersecurity;
- e) all other information recognized as confidential, but not falling into any of the categories above.

DEC 4.2.4.2 Confidentiality does not apply to the following data:

- a) data in the public domain other than by reason of breach of the Article DEC 4.2.4; or any other relevant bi- and/or multi-lateral agreement on confidentiality protection;
- b) data already lawfully in the possession of the **Receiving Party** prior to its receipt from the **Disclosing Party**.

DEC 4.2.4.3 The **Disclosing Party** shall mark as confidential any information submitted to the **Receiving Party** that it reasonably believes to be confidential. Any **Common Information** which involves **Confidential Information** shall be treated as confidential.

DEC 4.2.4.4 Only the **TSOs** may use the **Confidential Information**, strictly for their **Operational TSO Business** needs, or otherwise agreed or in the case of request from authorized authorities under national or international law. This **Confidential Information** may only be disclosed to the managers, employees, advisers and representatives of the **TSOs** if those persons are bound by an obligation of confidentiality.

#### *DEC 4.2.4.5 Non-disclosure of Confidential Information*

No disclosure of **Confidential Information** is allowed in any way, matter or form, in whole or in part, to any **Party** as a rule. By derogation to this, disclosure is allowed in case of:

- a) the explicit consent of the **Disclosing Party** and to the conclusion of a non-disclosure agreement which provides for, at least, equivalent obligations of confidentiality as provided for in this Article DEC 4.2.4;
- b) a **TSO** becomes legally compelled, or expects that it will be legally compelled, to disclose the **Confidential Information** to any authority. In such a case it will, unless it is not authorized to do so because of national or international law, provide prompt notification of it to the **TSO** that has provided that **Confidential Information**. The **Parties** agree on the content and extent of the **Confidential Information** to be divulged, in accordance with the relevant law, the authority orders and the general rules applied within **PAEM**. The disclosure of the **Confidential Information** is made in a proper and discreet manner. The **TSO** that discloses **Confidential Information** under this Article shall inform the **Receiving Party** of the confidential nature of the **Confidential Information** and shall ask the **Receiving Party** to treat the information, if possible, under the same terms and obligations as this Article.

#### *DEC 4.2.4.6 Handling of Confidential Information*

The **TSO** shall organize its data handling in such a way as to minimize the risks of misuse or unauthorized access or disclosure of **Confidential Information**. Any **Disclosing Party** and **Receiving Party** dealing with **Confidential Information**, has the right to rule its use, and protection in more precise bilateral agreements. In case of contradiction or inconsistency between such agreement and this Article, this Article supersedes the bilateral agreement.

#### *DEC 4.2.4.7 Use of Individual Information*

Each **Party** may make free use of its own **Individual Information** and/or **Common Information** for any purpose without constraints.

#### *DEC 4.2.5 Duty to Mitigate*

DEC 4.2.5.1 If a **TSO** is temporarily unable to provide its required information in due time, it shall inform the other **TSOs** involved immediately, and shall use all reasonable efforts to mitigate the effects of the event which has caused the failure.

## DEC 4.2.6 *Non-TSO Data*

DEC 4.2.6.1 Chapter DEC 4 also applies to technical data required from **Non-TSOs** for **Operational TSO Business**. These data may be provided by a **TSO** to the **Common Information** for the **PAEM** under the condition that there is an agreement between the **TSO** and the **Non-TSO** allowing such diffusion.

## DEC 4.2.7 *Responsibility*

DEC 4.2.7.1 Each provider is responsible for the availability, reliability and validity of the data it provides, according to the specified requirements.

## DEC 4.2.8 *Miscellanea*

### *DEC 4.2.8.1 Property*

**Common Information** derived from the **Individual Information** of all **TSOs** is owned by the **PAEM**, while the **Individual Information** itself is and remains the exclusive property of the **TSO**. If a **TSO** uses data on behalf of another **Party**, the data is treated in the same way as **Individual Information** of the **TSO**, but remains the property of the disclosing **Party**. Each **TSO** may process the **Common Information** for individual use. No change in the **Information** limits the restrictions on the use of the data.

### *DEC 4.2.8.2 Intellectual Property*

The **Data Exchange Code** is not to be construed as granting the **Receiving Party** any license or intellectual property rights related to the data and its future use, unless explicitly agreed otherwise in writing.

## DEC 4.3 **Communication Infrastructure**

J. Technical infrastructure needed to exchange the requisite data shall be available.

DEC 4.3.1 The **PACN** between **TSOs** shall be implemented to provide the necessary infrastructure that facilitates and supports **Data Exchanges** among **TSOs**.

DEC 4.3.2 The availability of technical infrastructure needed to **Data Exchange** shall be ensured by the **TSOs**.

DEC 4.3.3 The implementation, operation, extension and maintenance of the **PACN** among the **TSOs** is necessary, and **TSOs** are responsible for that.

DEC 4.3.4 The **PACN** shall be a private network dedicated to **Data Exchange** between **TSOs** and operates under the responsibility of the **TSOs** and the management of the relevant **Coordination Center**.

DEC 4.3.5 The purpose of **PACN** is to exchange:

- a) Telecontrol real time **Information**;
- b) Non-real time services such as file transfer for exchange of transmission schedules, network model, planning data or statistics (File Transfer Protocol-FTP).

DEC 4.3.6 The primary scope of the **PACN** is the **Real-Rime Data Exchange**, in support of **TSO** operational processes, aimed at enhancing the security of electricity supply in the **Member States**.

DEC 4.3.7 As a result of this, real-time data traffic has the highest priority amongst all the other data communicated.

DEC 4.3.8 Every **TSO** shall be connected to the **PACN**.

DEC 4.3.9 All other **Non-TSOs** and **Non-PAEM TSOs** can be connected to the **PACN**.

DEC 4.3.10 There must not be any direct physical or logical connection between **PACN** and the internet. All **Data Exchange** between **PACN** and the outside world should be performed under full security procedures. The separation of **PACN** from insecure networks must be guaranteed by use of intermediate gateways or a **Demilitarized Zone**.

DEC 4.3.11 *Other Communication Way*

DEC 4.3.11.1 As fallback communication for **TSOs**, usually the public communication infrastructure (public mobile communication or public landline) is used. In daily operation all partners and market participants can be contacted via public communication. In case of blackout or disturbances, situations may occur when these **Parties**, only having public communication access, temporary cannot be contacted anymore.

DEC 4.3.11.2 In case of complete shortfall of regular and fallback communication, the most important partners are provided with satellite communication as

contingency communication. Therefore, this form of communication is also a fallback solution for all other forms of communication.



## DEC 5 PUBLICATION

J. Requirements to define the **Information** (incl. scope, level of aggregation of data and derived information) dedicated to internal and external publication.

DEC 5.1.1 **PAEM** defines the **Information** (including scope, level of aggregation of data and derived information) dedicated to internal and external publication.

DEC 5.1.2 **PAEM** publications are written in English/Arabic language.

DEC 5.1.3 The **Market Secretariat** of **PAEM** is responsible for the supervision of the publication and circulation of documents. The list of documents for external publication is kept by the **Market Secretariat**.

DEC 5.1.4 Regular publications with mainly recurrent statistical content are validated by the providers. All other publications are approved by the **Arab TSOs Committee**.

DEC 5.1.5 Data sent by the **Member States** for periodical publication can be found in monthly, quarterly, half-yearly or yearly publications that can be accessed from the **PAEM** website.

