Syrian Arab Republic

Ministry of Electricity

Public Establishment for Transmission & Distribution of Electricity

Interconnection Roles

Rules and Conditions for Connecting Renewable Energy Projects to the Transmission and Distribution Networks

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Article (1) – Definitions

For the purposes of applying these rules and the specified technical conditions, the following terms and expressions shall have the meanings assigned to them:

1. **Ministry**: The Ministry of Electricity established under Law No. 32 of 2010 and its amendments.
2. **Minister**: The Minister of Electricity.
3. **Establishment**: The General Establishment for the Transmission and Distribution of Electricity.
4. **Company**: The Electricity Company in the governorate.
5. **Electrical Energy**: Electrical power in the context of production, transmission, distribution, and consumption.
6. **Generation**: The production of electricity from renewable energy sources.
7. **Electric Grid**: The integrated system comprising generation stations, the transmission network, the distribution network, and dispatch/coordination centers.
8. **Distribution Network**: The electrical network operating on medium-voltage and low-voltage lines, along with associated equipment and components used in distributing electricity.
9. **Transmission Network**: The high-voltage network owned by the Establishment, which includes transmission lines, substations, and equipment for transmitting electricity.
10. **High Voltage**: The nominal (phase-to-phase) voltage level exceeding 24 kV.
11. **Medium Voltage**: The nominal (phase-to-phase) voltage level exceeding 1 kV and up to 24 kV.
12. **Low Voltage**: The nominal (phase-to-phase) voltage level up to 0.4 kV.
13. **Electrical Installations**: Generating stations, transformer stations, distribution networks, lines, and all related equipment and devices used in transmission and distribution systems.
14. **Transformer Station**: A station where electricity is transformed from one voltage level to another (e.g., from high to medium voltage or from medium to low voltage).
15. **Distribution Center**: A center where electricity is transformed from one medium-voltage level to another medium-voltage level or from medium voltage to low voltage.
16. **Subscriber**: Any natural or legal person receiving electricity service from the Establishment or the relevant Electricity Company in the governorate.
17. **Main Feeder (Primary Outgoing Line)**: The principal feeder from a transmission or distribution substation that directly connects to the subscriber's or investor's facility.

18. **Permit ("Taṣrīḥ")**: The authorization granted by the Ministry for local or provisional generation, in accordance with the law.
19. **License ("Rukhṣa")**: The authorization granted by the Ministry for a specific project in accordance with the law.
20. **Deficiency (Natural or Legal)**: A reference to the natural or legal status of persons/entities (per Syrian legal usage).
21. **Authorized Entity**: The party granted the "Permit" or "License" by the competent authority.
22. **Investor**: The entity (person or company) investing in generating electricity from renewable energy sources based on the relevant authorization or license.
23. **Grid Code**: The body of regulations approved by the Ministry for establishing and operating the network, covering all technical requirements for interconnecting with and utilizing the distribution network and operating electrical installations in the relevant area.
24. **Transmission Grid Rules**: The set of rules approved by the Ministry for creating, operating, and maintaining the transmission network.
25. **Distribution Grid Rules**: The set of rules approved by the Ministry for creating, operating, and maintaining the distribution network.
26. **Distribution Operating System ("Niẓām Istiṯmār al-Tawzīʿ")**: The system regulating the operation of the electricity distribution network.
27. **Transmission Operating System ("Niẓām Istiṯmār al-Naql")**: The system regulating the operation of the electricity transmission network.
28. **Renewable Energies**: Natural energy sources that are non-exhaustible, such as solar energy, wind energy, geothermal energy, and similar.
29. **Grid Stress (Electrical Grid Contingency)**: The state in which the dispatch center identifies a critical condition in the transmission or distribution network (e.g., a major fault or large deviations in frequency/voltage).
30. **Distribution**: Delivering electricity through the distribution network.
31. **Transmission**: Transferring electricity via the transmission network.
32. **Apparent Power (S)**: Measured in volt-amperes (VA) or its multiples (kVA, MVA, etc.).
33. **Active Power (P)**: Measured in watts (W) or its multiples (kW, MW, etc.).
34. **Reactive Power (Q)**: Measured in reactive volt-amperes (var) or its multiples (kvar, Mvar, etc.).
35. **Total Apparent Powers**: The sum (in time or by specific measuring means) of the individual apparent powers.
36. **Active Electrical Energy**: Measured in watt-hours (Wh) or its multiples (kWh, MWh, etc.).
37. **Reactive Electrical Energy**: Measured in var-hours (varh) or its multiples (kvarh, Mvarh, etc.).

38. **Average Power Factor**: The ratio of active energy consumed over a certain period to the apparent energy consumed over the same period.
39. **Electricity Metering System**: The system for recording the quantities of consumed or produced electrical energy (active and reactive), as well as additional parameters as needed.
40. **Voltages (230 kV, 66 kV, 20 kV, 0.4 kV)**: Any of these nominal voltages, or other recognized standard voltage levels, used for transmission and distribution lines and substations.

Article (2) – Scope of Application

These rules and conditions shall apply to all renewable energy projects that can be connected to the transmission network or the distribution network, in accordance with the provisions of Law No. 32 of 2021 (effective 1/1/2021).

Article (3) – Allowable Capacity for a Renewable-Energy Project or System

1. **On the Distribution Network**:
   The allowable capacity range for renewable-energy projects on the distribution network is from 20 kW up to 10 MW, as follows:
   - **Supplying electricity** from a private (individual/investor) project (0.4/20 kV) of 50 kW or larger, up to 5000 kW (5 MW), or up to 80% of the capacity of the nearest transformation substation.
   - **Connecting (injecting) power** from a (0.4/20 kV) private project in the range of 20 kW up to 5000 kW (5 MW) or up to 10,000 kW (10 MW).
   - **Exceeding 80%**: When the installed capacity of the renewable-energy system exceeds 80% of the initially planned rating, the next stage of expansion may be shared to increase the project's capacity.
   - **Aggregate loading**: The sum of all renewable energy systems connected to the distribution network in a certain area must not exceed 30% of the original rated load on that network.
2. **On the Transmission Network**:
   The allowable capacity range for renewable-energy projects on the transmission network is:
   - From 66 kV up to 40 MW.
   - From 230 kV up to 100 MW.

Connecting the renewable-energy project to the transmission network entails selling the generated electricity to the Public Establishment for Transmission and Distribution of Electricity, subject to further technical studies.

Article (4) – Basic Technical Specifications for Renewable-Energy Projects

Below is an example of the **nominal voltage/frequency table** and permissible variations:

Item	Connection on Low Voltage	Connection on Medium Voltage	Connection on High Voltage
Nominal Voltage (V)	0.4 kV (phase-to-phase)	20 kV ± (±5%, ±10%, etc.)	66 kV, 230 kV ± (±5%, ±10%, etc.)
Short-Circuit Current (Ik)	According to the Company's specifications	According to the Establishment's specifications	According to the Establishment's specifications
Nominal Frequency (Hz)	50	50	50
Frequency Variation	49.95 – 50.05 (normal operation)	49.95 – 50.05 (normal operation)	49.95 – 50.05 (normal operation)
Voltage Disconnect Threshold	As specified in the network code	As specified in the network code	As specified in the network code
Protection Requirements	In compliance with IEC or equivalent standards	In compliance with IEC or equivalent standards	In compliance with IEC or equivalent standards

Note: These numeric ranges and permissible tolerances are examples/illustrations only; final values are determined by the competent technical authorities (the Establishment/Company) and in accordance with the Grid Code.

Article (5) – Protective Equipment

All generating units and interconnection points must be equipped with protective relays and devices that guarantee full protection of the network from faults. Such protection must, at a minimum, guard against:

1. **Overload (Overcurrent)**.
2. **Overvoltage**.
3. **Internal short circuit**.
4. **Faults on the network** close to the point of common coupling with the grid.
5. **Frequency rises and drops**.
6. **Voltage rises and drops**.
7. **Surges**.
8. **Back-feeding** onto the main grid if distribution is lost.

Any protective device shall operate automatically if values exceed certain allowable thresholds (±20%, ±30%, etc.), thereby disconnecting the system from the grid. It must reconnect only after the cause of the fault is removed and normal conditions are restored, subject to agreement with the primary dispatch center.

Article (6) – Earthing and Lightning-Arrester Installation

1. Earthing (grounding) the network and installing surge arresters shall be performed in accordance with international (IEC) or equivalent standards.
2. Coordination with the Company/Establishment is required regarding any special earthing requirements.

Article (7) – Control Panels, Monitoring, and Data Transfer

The project (or the investor) shall equip the plant with all necessary control, monitoring, measuring, and data-transmission panels/devices in compliance with applicable industrial design standards and relevant technical regulations. The investor must coordinate with the main dispatch center regarding monitoring and data-transfer requirements.

Article (8) – Safety Equipment and Requirements

1. The project (or the investor) must provide any required equipment to protect persons, property, the network, and project facilities from any dangers that may arise from interconnection with the grid.
2. The following illustrative measures must be implemented:

- **Isolation switch**: Must be installed at the connection point to the grid so that maintenance, testing, or other work can be carried out safely.
- **Proper labeling and warning signs**: Indicating the presence of a dual supply source (the grid and the generating system) and the location of disconnect/isolation devices.
- **Automatic disconnection** in the event of grid power loss ("Islanding"), ensuring safe re-closure only when normal conditions are restored, in coordination with the dispatch center.

Article (9) – Power Quality Requirements for Renewable Energy Projects

1. **DC Injection**: It is not permissible to have a DC current injection into the grid that exceeds 0.25% of the rated current.
2. **Voltage Flicker**: The renewable-energy system must not cause abnormal flickers beyond the limits defined by the "maximum borderline of irritation curve" (IEEE 519–1992) or the relevant standard.
3. **Voltage Deviation**: Must not exceed ±3% from the nominal voltage at the point of interconnection.
4. **Harmonic Distortion**: The total harmonic distortion (THD) must not exceed the limits stated in the table below (based on IEEE 519–1992 or the "Grid Code" or national standards).

Example of **maximum harmonic limits**:

Point of Connection	Individual Harmonic Limit	Total THD Limit
Low Voltage	3%	5%
Medium Voltage	2.5%	4%
High Voltage (66 kV)	2%	3%
High Voltage (230 kV)	1.5%	2%

5. **Phase Imbalance**: The phase voltages at the project's connection point shall not vary by more than 2% from each other.
6. **Power Factor**: The project shall operate within normal conditions at a power factor of not less than 0.98 (leading or lagging), unless otherwise authorized in special cases.

Article (10) – Demand Factor

The project must operate, under normal conditions, with a demand factor between 0.98 (leading) and 0.98 (lagging). The Company or Establishment may allow exceptions under special circumstances.

Article (11) – Metering and Measurement

1. **Metering and Measurement**:
    - Active and reactive electricity (energy) exchanged with the grid shall be measured by appropriate meters (with accuracy class suitable for high-voltage or low-voltage service).
    - For low-voltage systems, a three-phase meter may be used. For higher-voltage systems, multi-element meters (e.g., with three separate CTs/VTs) are used in accordance with current regulations.
2. **Ownership and Installation**:
    - The meter is installed by the Company/Establishment, and the subscriber (investor) may request a parallel meter for verification.
    - Any modifications to the meter or the measuring scheme must be approved by the Company/Establishment.
    - Metering costs are borne by the subscriber (investor) unless otherwise stipulated by law.

Article (12) – Access to the Project

Authorized personnel from the Company/Establishment shall have the right to enter the project location or facilities, under legally defined duties, to inspect and verify compliance with these rules. Prior notice shall be provided, except in cases of emergency.

Article (13) – Renewable-Energy Project Data

The Company/Establishment shall periodically prepare statistics and programs necessary to improve grid performance and operations. The investor must furnish the Company/Establishment with requested data regarding the renewable-energy project's capacity, output, operational status, and any modifications thereto.

Article (14) – Permits and Licensing

The project must be duly permitted/licensed in accordance with applicable laws, regulations, and amendments, and it must meet the connection permit requirements of the Establishment for Transmission and Distribution of Electricity.

Article (15) – Points Specific to Renewable-Energy Projects

1. **Three-Phase Meter above 30 A / 50 Hz**: For low-voltage connections at the point of supply.
2. **Demand above 30 A**: Must have a power factor correction system or meet reactive power requirements as determined by the Company/Establishment.
3. **Private Transformer Station**: If the project or subscriber uses a dedicated substation at medium voltage (20 kV or higher), the measurement system must allow the correct accounting of energy exchange, with an agreed percentage offset for losses if applicable.
4. **Larger Capacities (Up to 10 MW or more)**: May require connection at higher voltage levels (66 kV or 230 kV) or the construction of a dedicated substation, subject to technical feasibility studies.

Article (16) – Interconnection with the Electrical Grid

Pursuant to the provisions of Article (15), an agreement shall be reached regarding how the project will be connected to the grid, in coordination with the Company/Establishment and the investor (subscriber). All costs for interconnection and grid modifications required by the project are borne by the subscriber or investor, unless otherwise agreed in writing. The Company/Establishment supervises the implementation and commissioning.

Article (17) – Tests

The Company/Establishment shall carry out the necessary tests on the project or the system intended for interconnection, with the investor (subscriber) present, to verify compliance with license/permit conditions and with the contractual obligations between the parties. This testing does not relieve the investor (subscriber) of responsibilities for any subsequent breach of the license or contract obligations.

Article (18) – Legal References

All matters not stated in these rules and conditions shall be referred to applicable Syrian laws and regulations in force. Any terms herein that require further elaboration shall be interpreted in light of those laws and regulations.