Remote Monitoring and Control of Network Power Plants

Questions - Answers

1. What is remote monitoring and remote control?
   ‘’Remote monitoring’’ is the remote real-time monitoring of key characteristics of a power plant that are of interest to the competent Network Operator and other market participants, such as the Aggregators (FoSE) of the producers. ‘’Remote control’’ is the remote intervention in the operation of a power plant in order to adjust its operation according to a target command. In the case of RES power plants, the standard adjustment involves limiting the maximum active power output of the power plant to a certain value (“active power set-point”).

2. Who are the beneficiaries of remote monitoring and control?
   The obligation to install systems for remote monitoring and remote control shall in principle apply to power plants of independent producers with electricity compensation and an installed capacity exceeding 400 kW, connected to the Interconnected Network, irrespective of the energy production technology and the date of energization. For prosumers’ power plants, remote monitoring and remote control will be carried out at a later stage.

3. Is the installation of the equipment obligatory?
   The installation of equipment for remote monitoring and remote control in power plants with installed capacity exceeding 400 kW is enforced by Law 5106/2024. Specifically, Articles 111 and 118 of the Law describe the obligation, specify deadlines for the installation of the equipment and provide penalties in case of non-compliance by the producer.

4. What are the deadlines for installing the equipment?
   Power plants with installed capacity of more than 400 kW and up to 1000 kW are required to install the equipment within six (6) months from the notification of HEDNO’s requirements, i.e. by 13/12/2024.
   Power plants with an installed capacity exceeding 1000 kW are required to install the equipment within six (6) months from the publication of Law 5106/2024, i.e. by 31/10/2024.

5. What are the penalties for not installing the equipment?
   In the event of failure to install the equipment within the specified deadline, Article 111 provides for the de-energization of the connection of the power plant to the Network. In addition, for power plants with a capacity of more than 1 MW, Article 118 also provides financial penalties.

After 31/10/2024 and after 13/12/2024, HEDNO will refuse the connection to the Network of a power plant with a capacity of more than 1000 kW and a power plant in the 400-1000 kW power range respectively, in which the required equipment has not been installed.

6. How is compliance with the obligation to install the equipment demonstrated?
   The producer must, within the deadline provided for in Law 5106/2024 submit a signed Solemn Declaration to the RES/CHP online platform stating that they comply with the requirements for remote monitoring and remote control as specified in the latest version of the document "Equipment for receiving and executing remote monitoring/control commands for RES & CHP Plants" of HEDNO in compliance with articles 111 and 118 of Law 5106/2024. The Declaration of Compliance may also be submitted by the Technical Manager of the power plant designated by the producer. For its confirmation, the "Equipment Control - Plant Protocol" and the "Equipment Control - SCADA/DMS Protocol" shall both be attached in a signed and fully completed form.

   HEDNO will carry out the necessary tests and checks in order to verify compliance and in case of false or inaccurate Solemn Declaration, in addition to the de-energization of the connection of the power plant, the declarant will have the consequences provided by the Law.

7. What checks are foreseen by HEDNO on completion of the installation of the equipment?
   The remote monitoring and remote control equipment will be tested for proper operation and for its communication with the rest of the power plant's equipment and with the SCADA/DMS system of HEDNO. To verify proper operation and communication with the power plant equipment, the "Equipment Control - Plant Protocol" must be completed. To ensure correct operation and integration with the SCADA/DMS of HEDNO, the "Equipment Control - SCADA/DMS Protocol" should be completed.

8. Who covers the cost of the equipment?
   The costs of installation, maintenance and operation of the equipment shall be covered by the producer.

9. The system to be installed requires a telecommunications connection. Who covers the operating costs?
   The operation of the remote monitoring and remote control equipment requires telecommunication connection with the system issuing commands of HEDNO’s Network Control Center. The telecommunication connection with HEDNO cannot be used for any other purpose or by any other operator and the cost of its operation shall be covered by the producer.

10. Is there any indicative equipment or list of eligible equipment?
    HEDNO has published the equipment specifications and its intended purpose on the HEDNO website. The equipment will be installed downstream of the HEDNO/producer's ownership boundary, meaning it will be located within the power plant. The producer is responsible for selecting the type of equipment. An exception to this is the selection of the router, which will be provided by HEDNO.

11. Why can't I install a router of my own choice?
    The selection and responsibility for the equipment used for remote monitoring and remote control is under the producer's responsibility.. Specifically, the router is supplied by HEDNO in order to meet the increased cyber-security requirements that have been set. Details regarding the procedure for receiving the router will be provided separately.

12. What is included in the technical specifications published on the HEDNO website?
    The technical requirements published on the HEDNO website include:
    i) The commands to be received by the power plant and the signals and measurements to be transmitted by the power plant to the SCADA/DMS of HEDNO
    ii) The communication protocol between the power plant and the SCADA/DMS of HEDNO
    iii) The programming requirements of the equipment
    iv) The Specifications of telecommunications equipment, with the exception of the router.

    The procedure involving the receipt of the router is not included here, as it will be published at a later stage.

    Finally, the published requirements do not apply to prosumer power plants and power plants connected to the Non-Interconnected Islands.

13. What are the commands that will be issued by HEDNO?
    The commands that will be issued to the power plant by HEDNO are:
    i) a command for a maximum permissible injection power ("active power set-point") in absolute value or in %;
    ii) command for a complete power cut-off;
    iii) a command to ''open'' (status: off) the Interconnection Circuit Breaker (emergency situations only).

    In the future, it is anticipated that commands will be sent to control reactive power, power factor, voltage and frequency support for power plants capable of or required to comply with EU Regulation 2016/631 ("RfG").

14. What will be remote controlled and monitored by HEDNO?

The equipment that will be installed must monitor:

i) The status of the Interconnection Circuit Breaker (on or off) and its ability to be controlled remotely or locally (remote or local);
ii) The status of the earth switch (on or off);
iii) The control status of the equipment (remote or local), communication or loss of communication between the equipment and the production units and the status of the relay and the equipment;
iv) Trip protection alarms;
v) Verification that the relevant command has been received from HEDNO or other operator.
vi) Relevant signals regarding the control of reactive power/power factor/voltage and frequency support functions.

15. What are the measurements that will be sent to HEDNO?

The measurements sent to HEDNO include:

i) The active and reactive output power;
ii) The current and voltage per phase;
iii) The frequency and
iv) The power factor.

16. Does limiting active power mean loss of production and therefore loss of revenue?

The limitation of active power is in principle required for dispatching reasons. This means that the power plants or their Representatives may be requested to limit their production capacity for certain hours, as the energy they are going to produce exceeds the demand of the Greek Interconnected System and the energy that the country is allowed to export. However, active power limitation may also be requested for redispatching reasons, i.e. when reasons of congestion in the System or the Network require RES power plants to further limit their capacity.

Finally, power limitation may also be offered as a service to IPTO, which manages the balancing market. In such cases, power plants may be called upon to provide "downward Frequency Restoration Reserve," meaning they would need to reduce their power output in real time to support the System's frequency regulation.

Depending on the purpose of limitation, the power plant may or may not be compensated for the lost output, or even be compensated for providing downward Frequency Restoration Reserve.

17. Why is remote monitoring and control necessary? Is it a question of market participation or are there other reasons?

HEDNO aims to modernize its Network through digitization and active management. Remote monitoring and remote control concern all RES power plant exceeding 400kW, regardless of their obligation to participate in the market, and will serve the needs of System stability and better Network management. With power plants exceeding 400kW that are expected to be integrated into the Control Centers of HEDNO, HEDNO will be able to remote-manage over 70% of the RES capacity currently connected to the Network (2024 figures). The possibility of installing the equipment, apart from the Law, is also mentioned in the producers' Connection Contracts and the HEDN Code (Article 75).

18. My power plant is already being cut-off by switch opening in the Network. Why should I

install the remote monitoring and control system?

The disconnection of a power plant from the Network through the opening of remote-control or non-remote control Network switches is an emergency measure. In addition to the infrastructure for producing energy, the power plant has consumption infrastructure critical to its operation. The remote monitoring and control system not only ensures the continuity of critical power plant loads (such as alarms, telecommunications, and network monitoring for automatic restoration), but it also allows the power plant to generate energy, even if at a reduced level, in contrast to the complete cut-off that was carried out until now.

HEDNO reserves the right in exceptional situations, and when the power plant for any reason does not comply withthe command that has been given, to disconnect it from the Network using the means of the Network.

19. My power plant is already monitored and receives commands from the Aggregator (FoSE). Can I be exempted from the obligation?

The remote monitoring and control that a power plant may have and that has been required by an Aggregator (FoSE) in order to participate in the market, covers only some of the operational requirements specified by HEDNO. HEDNO does not only specify requirements to monitor the active power of a power plant or only commands to reduce it, but also sets additional requirements relating to the operation of the Network. Therefore, a producer, with the equipment they install, will have to meet all the requirements set out in the specifications of HEDNO. Most of the requirements will be used immediately, but others are anticipated to be used in the future. HEDNO has specified equipment that will support the current and future Network, and producers will be able to participate in the current and future energy market.

20. My power plant is old and has no capability for adjusting active power. How will it support the commands given?

HEDNO, or any other entity, shall issue a command to a power plant for adjusting the injection power to a maximum value (percentage or absolute value). The power plant shall comply with the command and adjust the power to a value less than or equal to the command used. Power plants that do not have equipment with continuous adjustment and have more than one power units may disconnect their units in order to adjust the level of production to a value less than or equal to the command issued.

21. CHP power plants are installed primarily to meet thermal needs. Are CHP producers obliged to install the equipment?

Law 5106/2024 does not exempt CHP power plants with electrical capacity exceeding 400 kW from the obligation to install remote monitoring and control equipment. Respectively, EU Regulation 2019/943 as well as Article 9, par. 1B of Law 3468/2006, which defines the power plants that do not have priority dispatching (i.e. the power plants that may be requested to be cut-off), does not exclude CHP power plants.

22. If there is a problem with the telecommunication connection and the power plant is not monitored and cannot accept commands, will there be any penalties?

The producer must keep their telecommunication link operational. Once a command has

been sent, the producer verifies receipt of the command. Penalties in case of failure to execute a command, as well as any acceptable tolerance limit on the extent and frequency of deviation for the power plants in the Network, have not been specified and established yet.

23. How often will a power plant be cut-off?
Cut-offs are currently imposed primarily for market needs and system stability, and secondarily for the needs of the Network. Market cut-offs are a matter of supply (production) and demand (load) and the decision to impose them is not the responsibility and competence of HEDNO. For the needs of the Network, power plants will be cut-off or limited for maintenance reasons or reasons associated with damages to Network elements, with the same regularity as today, and in order to maintain the proper functioning of the Network frequency

24. When will the Interconnection Circuit Breaker (ICB) of the power plant be opened by the Operator?
In general, HEDNO shall open the Interconnection Circuit Breaker (ICB) of the power plant in exceptional cases related to avoiding islanding operation in the Network, ensuring the safety of people, the environment and technical equipment, as well as in cases of non-compliance with the commands received from HEDNO.
In cases where the ICB is opened by HEDNO, it will be closed by the Producer or the Technical Manager of the power plant, following consultation with HEDNO.

It is advisable for the Producer or their Technical Manager to continuously monitor the status of the ICB so that, in the rare case that the ICB is opened (status: off) at the request of HEDNO, they can be aware of it in time.
HEDNO shall not be obliged to compensate the Producer for any loss of revenue due to the opening of the ICB in the above exceptional cases.

25. Law 3468/2006 as in force, gives priority to RES power plants that were commissioned before 4.7.2019. I have an old power plant, why should I install the equipment?
The limitation of the capacity of a RES power plant may be imposed not only for dispatching reasons but also for redispatching reasons due to congestion in the System or the Network, where no distinction is made between RES power plants with and without priority dispatching. In addition, remote monitoring and remote control will enable HEDNO to monitor power flows in real time, allowing better management of its Network, which will also allow even greater RES penetration. Law 5106/2024 describes the obligation to install remote monitoring and remote control systems and it does not describe the purpose for which they will be installed.

Article 9, par. 1B of Law 3468/2006 refers only to priority of dispatching. It does not refer to the priority to be given for redispatching purposes or to necessary cut-offs due to Network management.

26. The PV power plant is already restricted on a permanent basis, with a permanent 27% restriction applied. Is a new restriction going to apply?
The restriction imposed by Article 10 of Law 4951/2022 and specified by a Ministerial Decree, is a restriction applied on a permanent basis in order to make better use of the existing RES margins in the Network. Any market restrictions that may be imposed, which

depend on the total production and load in the Country at any hour of the day, are additional to the permanent restrictions. Any exceptional restrictions due to congestion on the System or the Network shall also be additional.

27. Can the existing equipment installed on the MV side of the power plant be used to measure active and reactive power?

The protection relay featured at each power plant, from which the required measurements could be taken, is fed by the protection windings of the current and voltage transformers, which usually have a maximum error of 1% and 0.5% respectively at nominal values. Consequently, by taking into account the error of the relay itself (of 0.5% at nominal values), it is concluded that the measurement accuracy requirement of the technical description (<1.5% at nominal values) is met. Therefore, based on the specifications set, the measurement accuracy of active and reactive power for the purpose of remote monitoring can be achieved with the normal installed equipment in the MV.