



ANNEX I TO CONTRACT N. ...

**Supply, installation and maintenance of a battery storage system - lot 2
(Ispra, Italy)**

**REFERENCE: JRC/IPR/2015/F.3/0042/OC
Technical Specifications**

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1. INTRODUCTION

The Institute for Energy and Transport (IET) is one of the seven institutes of the Joint Research Centre of the European Commission. IET is based both in Petten (the Netherlands) and Ispra (Italy) and has a multidisciplinary team of more than 300 academic, technical and support staff members.

The mission of the JRC Institute for Energy and Transport (JRC-IET) is to provide support to European Union policies and technology innovation to ensure sustainable, safe, secure and efficient energy production, distribution and use and to foster sustainable and efficient transport in Europe.

JRC-IET is doing so by carrying out research in both nuclear and non-nuclear energy domains, with partners from the Member States and beyond. In state-of-the-art experimental facilities, IET carries out key scientific activities in the following fields: renewable energies including solar, photovoltaics and biomass; sustainable & safe nuclear energy for current & future reactor systems; energy infrastructures and security of supply; sustainable transport, fuels and technologies including hydrogen and fuel cells as well as clean fossil fuel; energy techno/economic assessment; bioenergy including biofuels; energy efficiency in buildings, industry, transport and end-use.

One of the IET units that are based in Petten is dedicated to Energy Security, Systems and Market Unit. A research lab set up within this unit is devoted to studies on Smart Grid and Interoperability. Besides being more intelligent, efficient, quality-focused and resilient than current networks, smart grids are expected to better integrate renewable energy sources (RES), which is required for meeting the "Energy Union" targets.

Increased penetration of RES in electricity networks results in growing power production variability. Hence reliable balancing technologies are required 1) to provide extra power when RES power production is too low and 2) to store energy when there is a surplus of produced RES power. This balancing task can be provided by energy storage technologies, not only in transmission and distribution grids but also in smaller-scale networks. The requested battery storage systems must allow carrying out a variety of experiments in this field.



2. STAGE 1 SUPPLY REQUIREMENTS

a. Object and scope:

The scope of the contract is the supply, installation, related services and maintenance of a **battery storage system for smart grid operations** in Ispra (Italy).

The supply must have the following general characteristics:

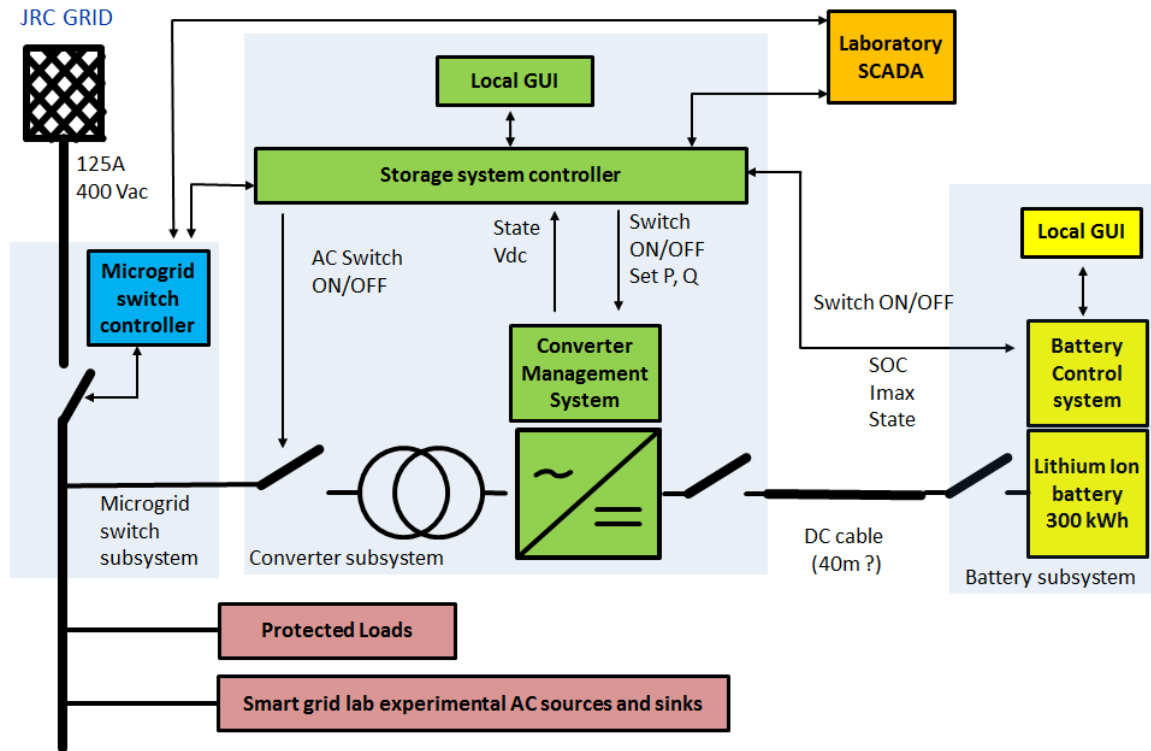
Battery storage systems for smart grid operations

- Nominal Power: 225 kW
- Storage Capacity: 450 kWh
- The technology of the storage system shall be lithium-ion battery or equivalent, i.e. with simultaneously the same or better levels of security, low maintenance, lifetime, peak charging and discharging rates, power and energy density. It is up to the tenderer to fully demonstrate such equivalence through independent, generally recognised technical/ scientific evidences, to be mandatorily included in the technical offer
- The whole system must be fully operational after it is connected to the existing JRC AC grid (3-phase 400VAC and 1 phase 230VAC) (Plug&play);
- Local and remote control;
- Bi-directional 4 quadrant power converter;
- AC circuit breakers and protection;
- DC circuit breakers and protection;
- Main isolation transformer;
- Auxiliary power distribution circuit;
- Metering on AC and DC side;
- Integration in one or more (maximum three) standard 20-foot outdoor container;
- Able to operate in island mode (off-grid)
- Able to provide continuously high quality power to protected loads, even in case of loss of main grid supply.
- The system includes a micro-grid switch, which allows a smooth disconnection and reconnection to the mains
- User's Manual in English.

See below the specific details.

In order to meet the needs and to make clear how the system will be connected to the JRC smart grid bus-bar as well as how the system will switch from island mode to on-grid mode the tenders shall consider the following conception scheme:

Figure 1



The supply must meet **all the key technical** requirements given below.

Key technical requirements for battery storage systems	
A1	Chemistry: Lithium ion or equivalent, i.e. with simultaneously the same or better levels of security, low maintenance, lifetime, peak charging and discharging rates, power and energy density. It is up to the tenderer to fully demonstrate such equivalence through independent, generally recognised technical/ scientific evidences, to be mandatorily included in the technical offer.
A2	Maximum voltage: < 1000 V _{dc}
A3	Minimum usable capacity (on AC side): 450 kWh
A4	Support smooth automatic transition from on-grid to off-grid operation and vice versa
A5	Able to achieve automatic synchronisation through synchrophasor measurements when it returns back to the on-grid mode
A6	Dynamic Islanding must be supported by a micro-grid switch system as shown in the figure above.
A7	DC breaker and protection
B1	Grid tie , 4 quadrant operation, P and Q dynamically settable
B2	3phase , 0.4kV +/- 10%, 50 Hz +/- 4%
B3	Continuous power at 25°C: 225 kW



Key technical requirements for battery storage systems	
B4	Peak power at 25°C, for 5 minutes: 270 kW
B5	Supervision of battery charging and discharging (power limitation depending on state of charge, coordinated action with battery EMS).
B6	Efficiency: > 90% (at 25% of nominal power). Efficiency is interpreted in the context of both battery charging and in battery discharging modes
B7	Ramping capacity (P and Q): 0-100% in less than 1 second
B8	AC breaker and protection
B9	Connection to the Grid. Connection to and disconnection from the grid shall be supported through a microgrid switch able to be controlled through a GUI or SCADA.
B10	Isolation transformer
C1	Control Signals: select operation mode, specify set-points (P, Q, cosphi), switch on/off battery, switch on/off converter, Disconnect from grid, synchronize to grid
C2	Monitoring signals: Ugrid, fgrid, Pconv, Qconv, converter state, SOC, Vbat, Ibat, Ibatmax, battery state, alarms, AC measurement on all phases.
C3	Dynamic active power control (P): the active power is specified according to a set-point sent by the GUI or the SCADA. The transition time between two set-point values must be less than 1 second. Alternatively, the active power can also be specified as a schedule (day of week, daytime). The function parameters are stored in the controller memory and can be changed by the GUI or the SCADA.
C4	Dynamic reactive power control (Q): the reactive power can be specified according to a set-point sent by the GUI or the SCADA. The transition time between two set-point values must be less than 1 second. Alternatively, the reactive power can also be specified as a continuous function of the injected active power ($Q = f(P)$). The functions are stored in the controller memory and can be changed by the GUI or the SCADA. $Q(U)$ is a linear continuous function of the reactive against the active power
C5	Islanding Operation capability: the islanding operation must allow fixed or variable frequency operation (frequency droops $f(P)$). The value of the frequency and voltage can be changed through the GUI or the SCADA.
C6	Low Voltage Ride Through (LVRT). The LVRT parameters shall be adaptable in order to suit the requirements of distributed generation systems in the different European countries. The available settings for the LVRT parameters shall be provided in the offer.
C7	User's Manual in English Language
C8	Software: All software needed for the operation of the system shall be provided in English and in the latest versions available at the time of commissioning and must include any requirement licenses without time limitations.



Key technical requirements for battery storage systems	
C9	Size: Standard 20-foot container; reinforced floor able to support the (supplied) battery system weight (maximum 3 units)
C10	It must also support grid frequency stabilisation via virtual inertia, UPS capability and black start.
C11	Remote control capability (SCADA): MODbus/TCP
D1	Outside door: Min 875/2000 mm with cylinder lock
D2	Windows: 1x aluminium sliding window with lock
D3	Thermal insulation: minimum 5 cm foam insulation on wall, ceiling and floor
D4	Internal lighting: 2x fluorescent
D5	Internal electrical plugs: 4x 16A, 230Vac on the walls
D6	Electrical cabinet internal appliances: the electrical cabinet (3+1 phase, 16 A, 400 Vac) is supplying internal 1-phase appliances: the lights (phase 1), the AC plugs (phase 1 and phase 2) , and the auxiliary supply of the battery converter (phase 3). An external power supply cable (not part of the offer) will be connected to the cabinet. The cabinet includes standard safety devices (RSD, automatic fuses)
D7	Connection box AC cables: an AC busbar is located in a separate connection box inside the container. The AC cables (3-phase, 5 conductors, with double isolation) are connected on one end to this busbar and on the other end to the low voltage grid. The cable is not part of the offer. The box includes standard safety devices (automatic fuses).
D8	Connection box for communication cables: a separate connection box inside the container is available for connecting the external communication cables.
D9	Inside temperature control: the temperature inside the container must be controlled (ideally by forced ventilation) to allow continuous operation of the converter at nominal power with closed window and door, all year round
D10	Openings for cables: enough openings must be available for the power AC, the container power supply and the communication cables. Openings must be available both in the lateral walls and in the floor.
D11	Opening for maintenance: if required for maintenance, it must be possible to easily remove the different components of the storage system out of the container.
D12	Painting: the inside and outside surfaces of the container must be painted in white colour.
D13	Mobility: the equipment inside the container must be well fixed to allow easy transportation.
D14	The control unit must be able to be installed inside the building in a special area; its size cannot exceed the size of one standard container. The container(s) hosting the batteries will be placed in a special spot, outside the building, that can accommodate maximum two standard containers whose weight cannot



Key technical requirements for battery storage systems	
	exceed the total of 28 tons. The limit for sustaining the container's weight is around 2 tons per square meter. The containers hosting the batteries could be up to 40 meters away from the control unit. See in the Annex the blueprint of the both the building and the location dedicated to host the containers for the site of Ispra.
D15	Min operating temp -20°C Max operating temp 40°C
E1	Cooling power electronics: Fan forced ventilation must be provided and shall be sufficient up to 20°C outdoor temperature. In addition, in case of higher outdoor temperature (up to 40°C) an air-conditioning unit shall be available for cooling.
E2	Humidity: < 95% non-condensing
E3	Noise: < 85 dBA @ 2m
E4	Enclosure: Outdoor container
E5	Enclosure: IP rating IP23
E6	CE Marking or equivalent
F1	Safety: IEC 62103 – Electronic equipment for use in power installations or equivalent
F2	EMC: IEC 61000-3-4, IEC 61000-3-5 or equivalent
F3	Warranty: 2 years including annual preventative maintenance
F4	Local on-device user interface (screen size >= 5 inch)

Explanatory and requirements details:

- In islanding mode, there is no connection with grid. Islanding Capabilities can include: Emergency Islanding Support through the battery based energy storage system, Managing Critical/Non-Critical Loads of the experimental micro grid, and Penetrations of Renewables.

- The islanding mode of operation refers to the characteristics of the Battery Energy Storage System controlled by components like Frequency control, inverter average Active/Reactive Power control and charge control. The islanding mode refers to the case when the Battery Energy System is used in coordination with the lab micro grid. Black start refers to bidirectional flow of power, from the batteries to the micro grid and back to the batteries. In UPS mode the flow of power is one way, usually from the grid to the batteries, where some loads could be connected.



- The islanding operation shall allow fixed or variable frequency operation. This means to have both functions – fixed and variable - but not at the same time.
- The type of the container to be used for this contract is of a standard size of 20-foot. The tenderers may use more than 1 container to achieve the purpose of the contract but no more than 3.
- The requirement for power is 225 kW (in Ispra). In order to meet this standard the implicit range of P is $-225\text{kW} < P < +225\text{ kW}$ (Ispra). The requirement for the voltage is 0,4 kV. In order to meet this standard the implicit range is $-400\text{kV} < Q < +400\text{ kV}$. Active and reactive power ranges shall be the same in islanding and in grid connected operations.
- In islanding and in grid connected operations, the unit shall be capable to operate in all 4 quadrants of apparent power:
 - 1) $P > 0, Q > 0$
 - 2) $P > 0, Q < 0$
 - 3) $P < 0, Q > 0$
 - 4) $P < 0, Q < 0$
- $F(p)$ is the frequency droop and $Q(U)$ is the dynamic reactive power control. Depending on the experiments, the reactive power of the inverter can be defined as a function of its active power production [$Q=Q(P)$] or as a function of local voltage measurements [$Q=Q(U)$].
- Frequency droops $f(P)$ is a linear decrease in frequency as the storage active power goes from full charging to full discharging.
Example:
 $F = 50 - (P \times \alpha) / Prated$
With:
F = frequency ($48 < F < 52$)
P = active power output
Prated = maximum active power
 α = droop coefficient ($0.5 < \alpha < 2$)
- Cycles per day: an indicative target is 1 full cycle per day (1 MWh AC energy export to grid per 24 hour).
- A guarantee of twenty four (24) months is required on the whole system, starting from the day of acceptance by the JRC, including on the 1MWh capacity
- The supply shall meet the standard of the market for the metering accuracy, usually $\pm 0.1\%$



The contract is divided into two stages:

- Stage 1:
 - **Supply, installation, training, testing and calibration and provision of documentation the supply** within 5 months from the date of the last signature of the contract.
 - **2 year guarantee** from the date of acceptance of supply and of the related services through the Certificate of Conformity. During the period there is requested an **annual preventative maintenance for the supply**.
- Stage 2:
 - After the end of the guarantee, **preventive and corrective maintenance** of the supply for twelve months, renewable for three further years (for a total maximum maintenance period of four years).

The detailed description of each stage is provided below:

3. STAGE 1 DOCUMENTATION AND TRAINING

1. The full documentation related to the the supply must be provided electronically and on paper, if requested, on the same time with the supply and must include detailed technical specifications of all components, maintenance and service guidelines and a comprehensive user manual covering all operation aspects of the equipment (installation, operation, troubleshooting and maintenance of the equipment) and evidence that the equipment was produced (manufactured) under a quality management system ISO 9001 or equivalent.
2. The documentation and installation reports must be provided in English. All documentation (written or drawn) submitted to JRC will be well structured and concise.
3. The contractor must produce the deliverables related to documents in electronic/paper format as requested by the Contracting Authority.
4. The contractor must provide **on-site 3 full days operational and service training** after installation of each supply to make clear understanding how the functionalities works and operational parameters could be attained. Training must be conducted in English. The dates and the detailed training programme must be mutually agreed upon between both parties but shall be provided at the latest within 15 working days upon request.. The estimated number of trainees for each of the training is between 3 and 8. JRC will ensure the room and technical infrastructure for the training and the contractor will provide the experts and the training materials. One training program will be organized in Ispra.



5. The curriculum of the training must include at least:
 - a. Overview of the storage system components
 - b. Safety aspects
 - c. Operations of the storage system in grid connected mode (functions, parameters)
 - d. Operations of the storage system in island connected mode (functions, parameters)
 - e. Transition between island and grid connected modes (functions, parameters)
 - f. Remote control and monitoring
 - g. Maintenance issues

4. STAGE 1 SUPPLY, INSTALLATION, CALIBRATION, TESTING AND ACCEPTANCE

1. The Contractor must supply, complete the assembly and install, connect of the supply to the infrastructure/needed services, setting-to-work and commissioning of the **Battery storage systems** (including the delivery of documentation and on-site training) **within 5 months** from the date of the last signature of the contract. The duration does not include the acceptance period required by JRC to confirm the compliance with the contract and to sign the Certificate of Conformity but includes the delivery of all related outputs.

2. Delivery of the battery storage systems for smart grid operations must be done **within 2 months** from the date of the signature of the contract by the last party. The supply must be delivered DDP at European Commission – Joint Research Centre - Institute for Energy and Transport, Ispra (Varese) Italy. The contractor has to bear the risks and costs, including duties, taxes and other charges of delivering the good thereto.

3. The Contractor will ensure that the various components/parts are suitably packed to prevent accidental damage during their handling and delivery to the JRC Site (Ispra). A written notice will be provided by the Contractor at least 7 days before the delivery of the components/parts/equipment.

4. After the entrance of the supply in JRC custom, installation activities must commence on the agreed dates with JRC but not later than **one month** from the date of the Commission's written request. The contractor must install the equipment at the premises indicated by the Commission.



5. The cabling work for connecting the equipment/system to the JRC grid will be organized by JRC.
6. All equipment must comply with the European and Italian regulations currently in force and this must be certified by the contractor by providing adequate documentation including (but not limiting to) certificates of conformity, CE markings and/or whatever required by the relevant legislation. Compliance remains the sole responsibility of the Contractor.
7. The Contractor must do any **remedial work and replacements** necessary during the assembly, installation, setting-to-work, calibration testing and commissioning period.
8. The Contractor will thoroughly clean all equipment and remove all garbage, etc., from the working area and likewise make any necessary corrections or repair/replace any damaged materials or equipment. Any finished surfaces that have been scratched or discoloured shall be touched up or repainted to match the original colour. If any part has been broken, bent, or otherwise damaged, it shall be replaced before the test.
9. The Contractor's personnel (and sub-contractor's personnel, if any) performing on-site activities shall comply with all applicable Italian, site regulations, general and specific nuclear facility regulations as defined by JRC, and any other pertinent rules, regulations, guidelines and practices identified and communicated by JRC.
10. **Testing of the supply** must take place to formally ascertain the conformity with the present specifications within the 5 months, on days agreed by the contractor and the JRC and with participation of the representatives of the contractor. Personnel for the aforementioned tests must be provided by the contractor. The verification tests must serve the purpose to ascertain that the supply is fully conforming to requirements and specifications, including:
 - the check if anything is missing or appears to be damaged;
 - the set up and connection of the system and verification of its proper operation and all functionalities.
11. During the commissioning, the different functions and performance of the storage system will be demonstrated by the contractor after JRC has connected the storage system to its grid, including the calibration if required. The costs for the commissioning tests must be included in this offer. During the commissioning, the following functions will be tested:
 - Battery cycling test. During the test, the battery is connected to the low voltage grid. Starting with a nearly fully charged battery (SOC >95%), the battery is discharged at maximum current (as indicated by the battery management system)



until the battery is nearly fully discharged (SOC <5%). In a second phase, the battery is recharged at maximum current (as indicated by the battery management system) until the battery is nearly fully charged (SOC >95%). The end of charge and discharge, the change of maximum current must be automatically supervised by the storage system controller. During this test, the efficiency of the converter will also be recorded. The local and remote control and monitoring (GUI and SCADA) will be tested.

- Grid connected (parallel) operation: test of the dynamic active power control (P) function (fixed setpoint, linear function, schedule), test of the dynamic reactive power control (Q) function (fixed setpoint, function Q(U), function G(P))
- Island operation: test of the P(f) frequency droops on a variable load profile

Personnel for the aforementioned tests shall be provided by the contractor.

12. The contractor must demonstrate to the Commission that all operation modes, capabilities and functions as described in the technical specifications and a complete execution of all tasks and delivery of outputs indicated in the supplier's offer, in conformity with the stipulated requirements. In case of a positive acceptance test result, the Commission will sign the Certificate of Conformity **for each of the supply**. In case of a negative acceptance test, the contractor must take any action necessary to pass a second acceptance test.

13. Acceptance will be signed by the Commission through the **Certificate of Conformity**¹ only after a complete execution of all tasks indicated above and correspondingly in the contractor's offer, in conformity with the stipulated requirements. Payment of stage 1 is conditioned to the delivery of such Certificate of Conformity².

14. The Contractor must ensure that Contract personnel (and any sub-Contract personnel) performing activities on JRC site:

- have the necessary ability and competence for the intended work;
- are fit and healthy for undertaking the intended work;

The Contractor's personnel (and sub-Contract personnel) performing on-site activities services must comply with all applicable national legislation and with pertinent rules, regulations, guidelines and practices in place in JRC-ISPRA.

¹ As per article II.1.20 of the contract

² As per article I.5 of the contract



5. STAGE 1 - GUARANTEE

1. A guarantee of **two years** is required on the **supply** and its performance, starting from the day of acceptance by the JRC (date of signing of the Certificate of Conformity). The contractor must repair and/or replace, free of charge, any equipment, component or part that is proven to be defective during the guarantee period. An intervention must take place not later than **3 working days** from the call from the JRC confirmed by e-mail or fax. .
2. In maximum two (2) working days as of the date of the Commission's request the contractor will give technical assistance using appropriate means of communication (e.g. by phone or e-mail).
3. The replacement of any parts will be performed after agreement with the JRC technician in charge of the equipment who will be present during the needed interventions.
4. All the parts replaced during the 24 months mentioned above must be covered by the guarantee. The parts supplied must be fully compatible with the equipment supplied and correct performance and appropriate operation must be guaranteed. Replacement parts must be the original and certified by the manufacturer or equivalent.
5. As soon as a loss of performance is identified, JRC will notify the Contractor who will analyse the defect and undertake corrective action. If the corrective action is not successfully completed within the specified time limit, the JRC may undertake the corrective action with all consequential direct and indirect costs of JRC and its agents to be borne by the Contractor.
6. The JRC may demand the guarantee to be extended for a period equal to that covering the loss of performance where such loss of performance is not attributable to JRC.

Preventive maintenance during the guarantee period:

1. The tenderer has to provide preventive maintenance at regular intervals throughout the guarantee period in accordance with proposed Preventive Maintenance Program for each of the supply.



2. Preventive maintenance is understood as periodic intervention on the equipment to ensure its proper function and calibration, in the absence of damage. The preventive maintenance must take place according to the periodicity defined by the manufacturer(s) and the manual(s) of the parts & components of the supply, but at least once within every 12 months. The preventive maintenance must take place on the JRC site on the initiative of the contractor after agreement between the JRC technician in charge of the equipment and the supplier during the working hours of the JRC.
3. This preventive maintenance must include at least:
 - a. Control and update of the equipment's performance (including at least inspection, maintenance, calibration and operational qualification of key equipment and software updates) according to the applicable standards including certificate(s);
 - b. Replacement of consumables, if required;
4. All related costs (including labour, travel and related expenses, consumables, etc.) to the preventive maintenance must be covered by the contractor.
5. Maintenance intervention(s) shall in principle take place at the Commission premises in site during normal working hours (Monday-Friday, 08.30 to 17.30, excluding holidays) upon mutual agreement between both parties on the schedule and shall be performed by the Contractor's technical staff.

A spare part is an interchangeable part that is kept in an inventory and used for the repair or replacement of failed units. Parts that are not repairable are considered consumable parts.

6. STAGE 2 –MAINTENANCE

Preventive maintenance after the end of the guarantee period:

1. After the end of the guarantee period, the contractor must provide preventive maintenance according to the periodicity defined by the manufacturer(s) and the manual(s) of the parts & components of the supply, but at least once within every 12 months. The preventive maintenance must take place on the JRC site on the initiative of the contractor after agreement between the JRC technician in charge of the equipment and the supplier during the working hours of the JRC.



2. This preventive maintenance must include at least:
 - a. Control and update of the equipment's performance (including at least inspection, maintenance, calibration and operational qualification of key equipment and software updates) according to the applicable standards including certificate(s);
 - b. Replacement of spare parts and consumables, if required. The replacement of consumables will be performed after agreement with the JRC technician in charge of the equipment who will be present during the corrective interventions.
 - c. All related costs (including labour, travel and related expenses, consumables, consumables, etc.) to the preventive maintenance must be covered by the contract.

Corrective maintenance after the end of the guarantee period:

1. The tenderer has to provide a corrective maintenance upon request (phone call confirmed by fax or e-mail). As corrective maintenance is understood any intervention made in case of improper performance or breakdown of the equipment outside of the preventive maintenance. These interventions must take place mainly at the JRC-Ispra during its working hours. If decided by JRC, the equipment will be shipped to the supplier and be returned by the supplier to the JRC. The transportation and related costs to transportation are to be covered by JRC. If the transportation is required by the contractor, the transportation and related costs are covered by the contractor.
2. The guarantee response time for the intervention must be as short as possible and no more than 3 working days from the request.
3. The corrective maintenance must include at least:
 - Replacement and/or repairing of the broken/damaged components, if required;
 - Replacement of spare parts and consumables, if required.
 - Testing and re-calibration of the equipment.
4. The replacement of any parts/consumables will be performed after agreement with the JRC technician in charge of the equipment who will be present during the corrective interventions.
5. The successful completion of the corrective maintenance must be done within 10 working days following the request by JRC, if this will be provided on JRC Ispra site and within 10 working days from receipt of the equipment if the maintenance will be provided on the contractor site. This period may be extended by the Commission upon a duly substantiated prolongation request by the Contractor
6. The contract includes **unlimited number** of visits on-site for corrective maintenance under stage 2. The contract must cover the cost related to the corrective intervention (labour, travel to Ispra and related travel expenses)



- including the cost of the spare parts/components within the limit of maximum 2,000 EUR per year (based on the unit prices presented in the financial offer).
7. Agreed spare parts/components not covered in the above 2,000 EUR limit may be the object of a separate offer to be considered for purchase by the JRC.
 8. The parts supplied must be fully compatible with the instruments and the correct performance and appropriate operation must be guaranteed.
 9. Maintenance intervention(s) must in principle take place at the Commission premises in site during normal working hours (Monday-Friday, 08.30 to 17.30, excluding holidays) upon mutual agreement between both parties on the schedule and must be performed by the Contractor's technical staff.
 10. When deemed necessary and by mutual agreement by both parties, off-site intervention(s) - at the sole expense of the Contractor (including shipment), hence at no additional costs for the JRC - may take place.

7. TECHNICAL REPORTS

At the end of each intervention, both for the preventive and corrective maintenance, a Technical Report will be produced and signed by the contractor, and countersigned by the JRC responsible. This technical report will indicate the number of the contract, the work performed, the time spent, and include a detailed account of the defects found and of any parts replaced. Either the format of technical report attached in annex IV to the contract or any other format may be used, where such other format provides for the required information.

At the end of the each year of stage 2., a **Final Report** will be produced. This final report will indicate the number of the contract and consist of a list of all technical report/s drawn up during the period and a copy of the countersigned Technical Report/s. This final technical report must be approved by the JRC responsible and must condition.

This report also must describe how the stage was implemented in comparison with the offer (annex to the contract).

All reports shall be in English and shall include the following mandatory information: contractor, contract number, nature of the report, subject, name of the author and original signature.



8. HEALTH AND SAFETY MEASURES (OHS)

Interferential risks

During the periods of installation, guarantee or maintenance, the JRC will ensure that where the equipment is located:

1. appropriate preventative safety measures are taken;
2. no experimental or other activity takes place, whether from JRC or other external personnel;

As a consequence the possible interferential risks are eliminated or reduced to a level that is not significant.

As risks may vary over the duration of the contract, any changes to interferential risks must be communicated by the JRC to the contractor.

Before any intervention on the Ispra site the Contractor and the JRC will prepare and sign the "Joint inspection report". This will:

1. either confirm the initial risk analysis and documentation,
2. or adapt it to new circumstances that were not foreseen, generating where necessary either a new or an updated DUVRI ("Documento Unico di Valutazione dei Rischi Interferenziali") or other specific document for Netherland.

The Contractor must make available the DUVRI or other specific document for Netherland to any subcontractor and must provide the JRC with documentary evidence to the effect that this obligation has been fulfilled.

Annex 1: Blue Print of the Building 18, which will be used to host the control unit of the Battery Storage System.

Annex 2: Blueprint of the location outside the building 18 where the containers hosting the batteries will be placed.