MANAGEMENT OF EQUIPMENT WITH FLUORINATED GREENHOUSE GASES AND OZONE DEPLETING SUBSTANCES

Prepared	Revised	Approved
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0 CHANGE CONTROL

Edition	Date	Description of the modification
00		Initial edition
01	04/02/2015	Adaptation to the new regulation (CE) nº 517/2014

1 OBJECTIVE AND SCOPE

The purpose of this procedure is to define the methodology to follow in order to manage the equipment containing Ozone Depleting Substances (ODS) and/or Greenhouse Gases (GHG), ensuring its effective control.

This procedure shall apply to the facilities and activities included in the EMS scope set out in the file *Facilities in the EMS scope*.

2 REFERENCES

- ISO 14001:2004 standard.
- EMS Manual.
- GD-EU/EMS-GEN-00001 *Guide "Management of equipment with GHG&ODS"*
- EXPR-EU/EMS-GEN-00007 *Operational control, monitoring and measurement*
- EXPR-EU/EMS-GEN-00008 *Near-miss and emergency preparedness and response*

3 DEFINITIONS

- **Controlled Substances:** substances listed in Annex I of Regulation (CE) n.º 1005/2009, September 16th, *on substances that deplete the ozone layer*, including their isomers, whether alone or in a mixture, and whether they are virgin, recovered, recycled or reclaimed (for example, HCFC-22, commonly known as R22).
- **Global Warming Potential (GWP):** climatic warming potential of a greenhouse gas relative to that of carbon dioxide ('CO2'), calculated in terms of the 100-year warming potential of one kilogram of a greenhouse gas relative to one kilogram of CO2.
- **Greenhouse Effect:** process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases, and is re-radiated in all directions. Since part of this re-radiation is back towards the surface and the lower atmosphere, it results in an elevation of the average surface temperature above what it would be in the absence of the gases.
- **Greenhouse Gases (GHG):** gases that can absorb and emit infrared radiation and are thought to cause the greenhouse effect.

- **Fluorinated Greenhouse Gases:** hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and other greenhouse gases that contain fluorine, listed in Annex I of Regulation (CE) nº. 517/2014, April 16th, *on fluorinated greenhouse gases*, or mixtures containing any of those substances.
- **Hermetically sealed equipment:** equipment in which all fluorinated greenhouse gas containing parts are made tight by welding, brazing or a similar permanent connection, which may include capped valves or capped service ports that allow proper repair or disposal, and which have a tested leakage rate of less than 3 grams per year under a pressure of at least a quarter of the maximum allowable pressure.
- **Leakage detection system:** a calibrated mechanical, electrical or electronic device for detecting leakage of fluorinated greenhouse gases which, on detection, alerts the operator.
- **Ozone-Depleting Substances (ODS):** halogen-containing substances that damage the ozone layer in the upper atmosphere. Some ozone depleting substances are also powerful greenhouse gases.
- **Tonne(s) of CO_2 Equivalent:** quantity of greenhouse gases expressed as the product of the weight of the greenhouse gases in metric tonnes and of their global warming potential (GWP).

4 ABBREVIATIONS

- **CFC:** Chlorofluorocarbon.
- **EDPR EU:** EDP Renewables Europe.
- **EMS:** Environmental Management System.
- **EMS Manager:** EMS Manager in each country.
- **FGHG:** Fluorinated Greenhouse Gases.
- **GHG:** Greenhouse Gases.
- **GWP:** Global Warming Potential.
- **HCFC:** Hydrochlorofluorocarbon.
- **HFC:** Hydrofluorocarbon.
- **ODS:** Ozone Depleting Substances.
- **PFC:** Perfluorocarbon.
- **SF_6:** Sulphur hexafluoride.
- **SIS:** Sustainability Information System.

5 PROCEDURE

5.1 LEGAL FRAMEWORK

To protect human health and the environment, the European Union has established regulations for the containment, use, recovery and destruction of certain FGHG and substances which deplete the ozone layer.

These rules accompany the provisions relating to the labeling of products and equipment containing these gases, to the notification of information, to prohibitions on commercialization, as well as to the training and certification of personnel and enterprises.

- Regulation (CE) n.º 1494/2007, December 17th, *establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the form of labels and additional labeling requirements as regards products and equipment containing certain fluorinated greenhouse gases.*
- Regulation (CE) n.º 303/2008, April 2nd, *establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases*.
- Regulation (CE) n.º 305/2008, April 2nd, *establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of personnel recovering certain fluorinated greenhouse gases from high-voltage switchgear*.
- Regulation (CE) n.º 1005/2009, September 16th, *on substances that deplete the ozone layer.*
- Regulation (CE) n.º 517/2014, April 16th, *on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006*

Specific legal requirements for each country shall also be identified and assessed in the legal requirements assessment as established in the procedure EXPR-EU/EMS-GEN-00002 *Identification of legal requirements and other subscribed requirements. Evaluation of compliance.*

If deemed necessary, the EMS manager may develop a specific procedure/technical instruction regarding management of equipment with FGHG&ODS in the country and send it to the EDPR EU EMS Manager for its revision and approval.

5.2 OZONE-DEPLETING SUBSTANCES (ODS)

5.2.1 INTRODUCTION

The ozone (O_3) is produced naturally by sunlight. At ground level the ozone is a pollutant, but in the upper stratosphere it forms an essential layer to live on earth, because it absorbs harmful ultraviolet radiation from the sun.

The main cause of the ozone layer depletion is the increased stratospheric concentration of chlorine from industrially produced CFCs or HCFCs.

Once in the stratosphere, every chlorine atom can destroy up to 100.000 ozone molecules. The lifetime of some of these Ozone Depleting Substances (ODS) is very long, and they may continue to deplete the ozone layer long after their use has been phased out.

The main consequence of this ozone depletion is the increase of ultraviolet radiation at ground level with the resulting global warming increase and the affection to humans, animals and plants due to the continuous exposure to UV radiation.

5.2.2 EDPR OBLIGATIONS

In the EDPR facilities (wind farms, storages) there is equipment that may contain ODS, for example, air conditioning equipment. Given the serious consequences that the release of these substances into the atmosphere can cause, it is essential to proceed in accordance with the legal requirements and internal guidelines.

The use of pure HCFCs for maintenance or servicing of existing refrigeration, air-conditioning and heat pump equipment, is prohibited since 1st January 2010.

Since December 31st 2014 it is also prohibited to use regenerated or recycled HCFCs for equipment maintenance or servicing.

In the event that EDPR EU has any equipment containing HCFCs, for example R22, it will not be necessary to change the gas or replace the equipment while running.

If the equipment requires some maintenance or servicing, the gas shall be replaced by a non-HCFC substance.

Facilities with refrigeration, air conditioning or heat pump equipment, or fire protection systems, including their circuits, which contain Controlled Substances shall:

a) take all precautionary measures practicable to prevent and minimize any leakages and minimize emissions of Controlled Substances,

b) repair any detected leakage as soon as possible and in any event within 14 days,
c) contract a certified company/technician for the technical interventions in equipment containing Controlled Substances,
d) ensure that, during the maintenance or servicing of equipment or before the dismantling or disposal of equipment, these Controlled Substances are recovered for destruction, recycling or reclamation,
e) deliver to an authorized waste handler the equipment that reaches the end of its life and becomes a waste, directly or through entities responsible for this kind of waste,
f) keep updated a database with the equipment containing ODS, including:

- the quantity and type of Controlled Substances;
- the quantity of Controlled Substances recovered during maintenance, servicing and final disposal of the equipment or system;
- the identity of the company/technician which/who performed the maintenance or servicing;
- the certification or authorization for this kind of technical interventions;
- the dates and results of the leak checks carried out.

5.2.2.1 Leak check

A leak check shall be carried out if there is any equipment in the following situations:

EQUIPMENT	LEAK CHECK
Which has had a leakage of Controlled Substances	checked within 1 month after the repair to ensure that it has been effective
Containing 3 kg or more of Controlled Substances*	checked at least once every 12 months
Containing 30 kg or more of Controlled Substances	checked at least once every 6 months
Containing 300 kg or more of Controlled Substances	checked at least once every 3 months

*The equipment with hermetically sealed systems labelled as such and containing less than 6 kg of Controlled Substances shall not be checked for leakage.

EDPR does not expect to have equipment with a fluid charge of 30 kg or more of Controlled Substances at the facilities.

5.3 FLUORINATED GREENHOUSE GASES (FGHG)

5.3.1 INTRODUCTION

A greenhouse gas is a gas that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the Greenhouse Effect. Earth's natural Greenhouse Effect makes life as we know it possible.

However, human activity since the Industrial Revolution has increased the amount of FGHG in the atmosphere, (CO_2, methane, tropospheric ozone, CFCs, etc), with the resulting strengthening of the natural Greenhouse Effect, causing global warming.

5.3.2 EDPR OBLIGATIONS

In the EDPR facilities (wind farms, storages) there is equipment that may contain FGHG, for example, air conditioning equipment with HCFs (R410, R134a, R407), or electrical appliances using SF_6 as a dielectric fluid.

In order to prevent, and thereby, reduce FGHG emissions, it is important to follow some guidelines.

Companies operating refrigeration, air conditioning or heat pump equipment, fire protection systems, including their circuits, or electrical switchgear, which contain FGHG listed in Annex I of Regulation (CE) nº 517/2014 shall:

a) take precautions to prevent the unintentional release ('leakage') of those gases. They shall take all measures which are technically and economically feasible to minimize leakage of FGHG,
b) repair any detected leakage as soon as possible and without undue delay,
c) contract a certified company/technician for the technical interventions in equipment containing FGHG,
d) ensure that, during the maintenance or servicing of equipment or before the dismantling or disposal of equipment, these gases are recovered for destruction, recycling or reclamation,
e) deliver to an authorized waste handler the equipment that reaches the end of its life and becomes a waste, directly or through entities responsible for this kind of waste,
f) Keep updated a database (keeping the records for at least five years) with the equipment containing FGHG, including the following information:
   - the quantity and type of FGHG;
   - the quantity of FGHG expressed in CO_2 equivalent;
   - the quantities of FGHG added during installation, maintenance or servicing or due to leakage;
   - whether the quantities of installed FGHG have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number;
   - the quantity of FGHG recovered;
   - the identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate;
   - the dates and results of the leak checks carried out;
   - if the equipment was decommissioned, the measures taken to recover and dispose of the FGHG.

5.3.2.1 Leak check

A leak check shall be carried out in any of the following situations:

EQUIPMENT	LEAK CHECK
Which has had a leakage of FGHG	checked within 1 month after the repair to ensure that it has been effective
Containing FGHG in quantities of 5 tonnes of CO_2 equivalent or more, but of less than 50 tonnes of CO_2 equivalent	checked at least once every 12 months. If a leakage detection system is installed, at least every 24 months
Containing FGHG in quantities of 50 tonnes of CO_2 equivalent or more, but of less than 500 tonnes of CO_2 equivalent	checked at least once every 6 months. If a leakage detection system is installed, at least every 12 months
Containing FGHG in quantities of 500 tonnes of CO2 equivalent or more	checked at least once every 3 months. If a leakage detection system is installed, at least every 6 months

By way of derogation, until December 31st 2016 the equipment that contains less than 3 kg of FGHG, or hermetically sealed equipment, which is labelled accordingly and contains less than 6 kg of FGHG, shall not be subject to leak checks.

From December 31st 2016 onwards, hermetically sealed equipment that contains FGHG in quantities of less than 10 tonnes of CO_2 equivalent, shall not be subject to leak checks, provided the equipment is labelled as hermetically sealed.

Electrical switchgear shall not be subject to leak checks provided it complies with one of the following conditions:

- it has a tested leakage rate of less than 0,1 % per year as set out in the technical specification of the manufacturer and is labelled accordingly;
- it is equipped with a pressure or density monitoring device; or
- it contains less than 6 kg of FGHG.

5.3.2.2 Leakage detection system

The equipment (except electrical switchgear) containing FGHG in quantities of 500 tonnes of CO_2 equivalent or more should have a leakage detection system which alerts the operator or a service company of any leakage. The operator shall ensure that these leakage detection systems are checked at least once every 12 months to ensure their proper functioning.

The electrical switchgear containing FGHG in quantities of 500 tonnes of CO_2 equivalent or more, and installed from January 1st 2017, should have a leakage detection system which alerts the operator or a service company of any leakage. The operator shall ensure that these leakage detection systems are checked at least once every 6 months to ensure their proper functioning.

5.3.2.3 Labeling

The refrigeration and air-conditioning equipment, heat pumps, fire protection systems and electrical switchgear containing, or whose functioning relies upon, FGHG, shall not be placed on the market unless they are labelled indicating:

- a reference that the product or equipment contains FGHG or that its functioning relies upon such gases;
- the accepted industry designation for the FGHG concerned or, if such designation is not available, the chemical name;
- from January 1st 2017, the quantity of FGHG expressed in weight and in CO_2 equivalent, or the quantity of FGHG for which the equipment is designed, and the global warming potential of those gases.

The label shall indicate the following information, where applicable:

- a reference that the FGHG are contained in hermetically sealed equipment;
- a reference that the electrical switchgear has a tested leakage rate of less than 0,1 % per year as set out in the technical specification of the manufacturer.

The label shall be in the official language(s) of the country, clearly readable and indelible and shall be placed either, adjacent to the service ports for charging or recovering the FGHG, or on that part of the product or equipment that contains the FGHG.

If at the time of a maintenance operation or repair, the equipment do not have the corresponding label (because it was commercialized before being mandatory), certified companies shall place it.

In the event of acquisition of new equipment containing FGHG or replacing existing ones, the O&M department shall inform the Procurement department about the importance of proper labeling of equipment containing FGHGs, in accordance with the legal requirements. Once the equipment is received, the O&M department shall verify that it is properly labelled.

5.4 EMERGENCY PREPAREDNESS AND RESPONSE

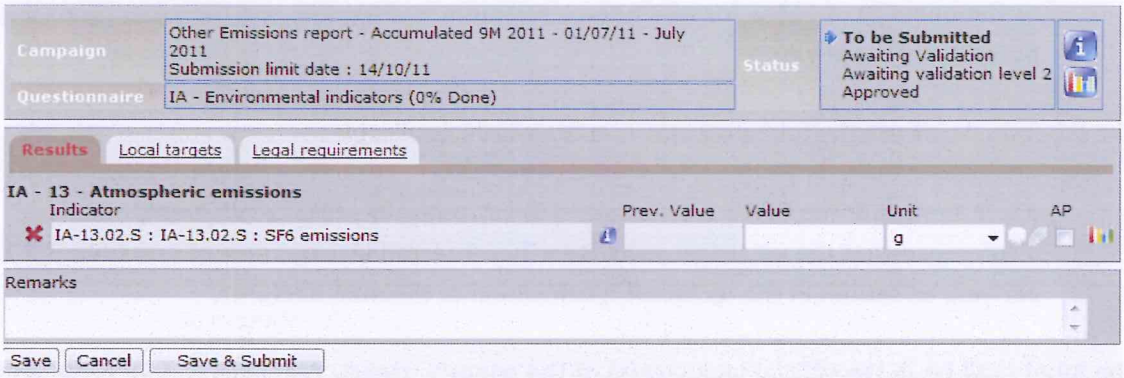
The general procedure EXPR-EU/EMS-GEN-00008 "*Near-miss and emergency preparedness and response*" sets the steps to follow, from an environmental point of view, in the event of a near-miss or leakage of Controlled Substances or FGHG.

Once the near-miss or the emergency situation has been controlled, the facility manager or his/her supervisor shall leave a written record of what happened through template TMP-EU/EMS-GEN-00011 "*Environmental Near-miss/Emergency report*".

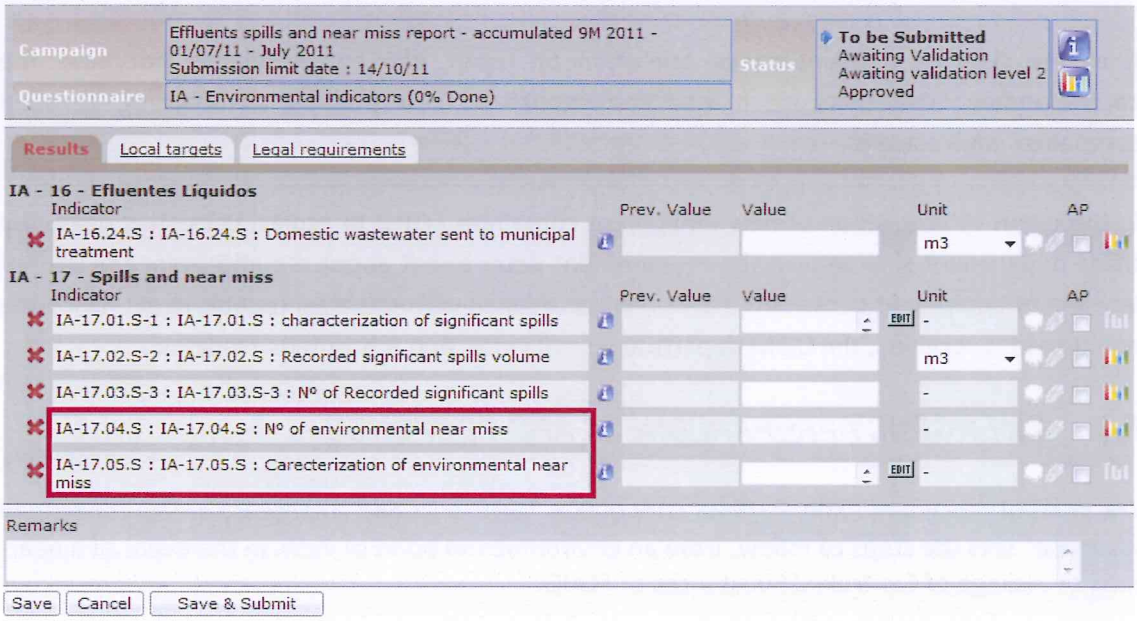
This *Environmental Near-miss/Emergency report* shall be submitted immediately to the EMS Manager in order to analyze it jointly with other departments that may be involved.

5.5 REPORTING

As explained in the section 5.3 of the general procedure EXPR-EU/EMS-GEN-00008 "*Near-miss and emergency preparedness and response*", based in the information recorded in the template TMP-EU/EMS-GEN-00011 "*Environmental Near-miss/Emergency report*", every quarter the EMS manager, as SIS contributor, shall report in SIS the information regarding SF_6 released into the atmosphere:



As well, as environmental near-miss situations related to FGHG or/and ODS emissions:



The information to report in SIS regarding SF_6 emissions and near miss situations shall be accumulated for the whole calendar year.

6 RESPONSIBILITIES

EMS Manager:

- Ensure that legal requirements regarding FGHG and ODS are identified and assessed, including those specific legal requirements for the country and internal guidelines.
- If deemed necessary, develop a specific procedure/technical instruction for the country regarding the management of equipment with FGHG & ODS.
- Promote to take precautionary measures practicable to prevent and minimize any leakages and emissions of FGHG & ODS.
- Ensure that HCFCs (pure, regenerated or recycled) are not used in EDPR equipment.
- Ensure that a database with, at least the mandatory information included in this procedure, is keep updated.
- Report in SIS the information regarding SF_6 emissions and near miss situations.

Country EMS Management Representative:

- Ensure the implementation of this procedure.

O&M department:

- Take all precautionary measures practicable to prevent and minimize any leakages and emissions of FGHG & ODS.
- Repair any detected leakage without undue delay.
- Carry out the corresponding leak checks.
- Ensure that the corresponding leakage detection systems are in place.
- Contract certified companies/technicians for the technical interventions in equipment containing FGHG & ODS.
- Keep available all records regarding maintenance or servicing operations, certification/authorization of the contracted companies/technicians, etc.
- Inform providers affected by this type of operations about the existence of this procedure and the obligation to comply with it.
- Ensure that HCFCs (pure, regenerated or recycled) are not used in EDPR equipment.
- Ensure that, during the maintenance or servicing of equipment or before the dismantling or disposal of equipment, FGHG & ODS are recovered for destruction, recycling or reclamation.
- Deliver to an authorized waste handler the equipment that reaches the end of its life and becomes a waste.
- Follow the general procedure EXPR-EU/EMS-GEN-00008 *"Near-miss and emergency preparedness and response"* in the event of a FGHG or ODS near-miss or leakage.
- When possible, purchase equipment without FGHG or ODS.

- Inform the Procurement department about the importance of proper labeling in the event of acquisition of new equipment containing FGHG or replacing existing ones.
- Verify that new equipment containing FGHG is properly labelled.
- Ensure that certified companies/technicians place the corresponding label in the equipment containing FGHG, if at the time of a maintenance operation or repair, the equipment do not have it.

7 TEMPLATES

Not applicable

All evidences regarding certification/authorization of companies/technicians, leak checks, the database with mandatory information, etc are considered to be records, despite not having a format; as well as and any other document that gives evidence of the process defined in this document.

8 ANNEXES

Annex I – How to convert FGHG to CO_2 equivalent

ANNEX I

How to convert FGHG to CO_2 equivalent

Quantity of FGHG (in tonnes) * GWP = CO_2 equivalent (in tonnes)

Example: If the equipment contains 0.35 kg (0.00035 t) of R-134a (HFC 134a), which has a GWP of 1430, then this would be the equivalent of 0.5005 tonnes of CO_2.

Global Warming Potentials (GWPs) can be found in annex I of Regulation (CE) n.º 517/2014

- To calculate the Total GWP of a mixture:

Σ (Gas X % * GWP X) + (Gas Y % * GWP Y) +... (Gas N % * GWP N)

Example: If the equipment contains 1.84 kg (0.00184 t) of R-407c (which has a 23% of R-32, 25% of R-125 and 52% R-134a), the Total GWP is:

(23% * 675) + (25% * 3500) + (52% * 1430) = 1773.85

Then this would be the equivalent of 3.263 tonnes of CO_2:

0.00184 t * 1773.85 = 3.263 t CO_2