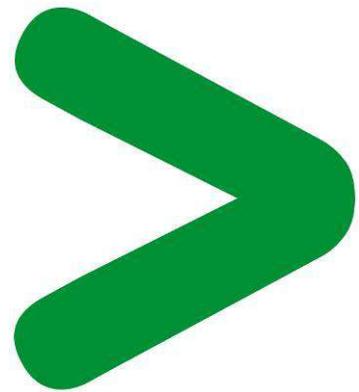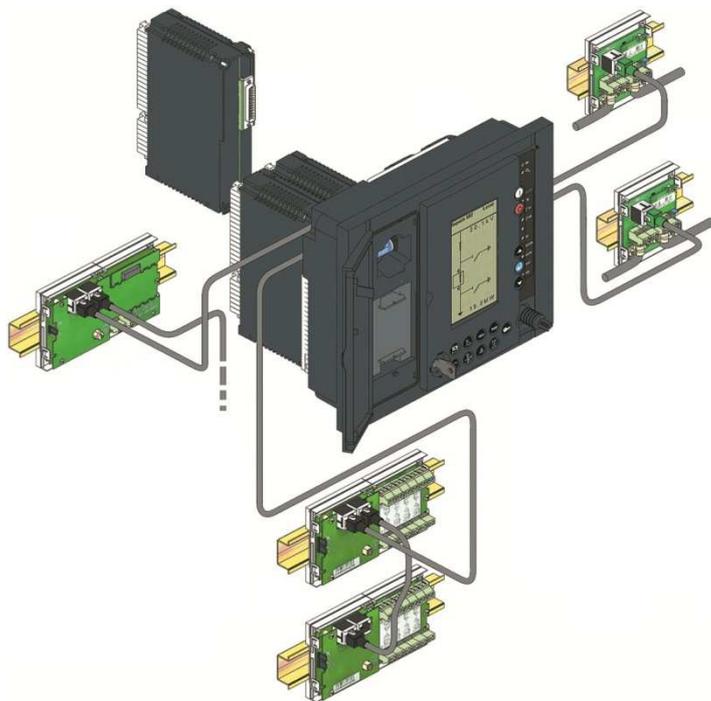# Product Environmental Profile

Sepam 80
Advanced protection relay range

SCHN-2014-124

Schneider Electric

Product overview

The current document provides the environmental profile for a typical layout of products within the Sepam series 80, which are intended to fulfil the demanding and custom requirements of industrial, oil & gas and critical applications providing functional safety, high level communication protocols, customisable logic and ease of use in a wide range of installations.

The environmental analysis was performed in conformity with ISO 14040.

Functional unit & reference flow

The selected functional unit for the study is the following:

"Being available 24h per day for detection of faults on electrical systems,
for 10 years of continuous operations in Europe".

The reference flow necessary to perform this functional unit is a typical arrangement for a Sepam system, comprising:-
-   a Sepam base unit with Advanced HMI (59704 - 2.6Kg) with its memory cartridge (59707 - 44g)
-   2 14input/6output modules (59715 - 440g each)
-   1 current transformers block (59630 - 246g)
-   1 RS485 communication module (59723 - 285g), linked to the base unit with a RJ45 cable (59663 - 90g)
and their primary packaging (1.9kg).

Constituent materials

The weight of the system modelled for this study is 6462g, including packaging.
The constituent materials are distributed as follows:
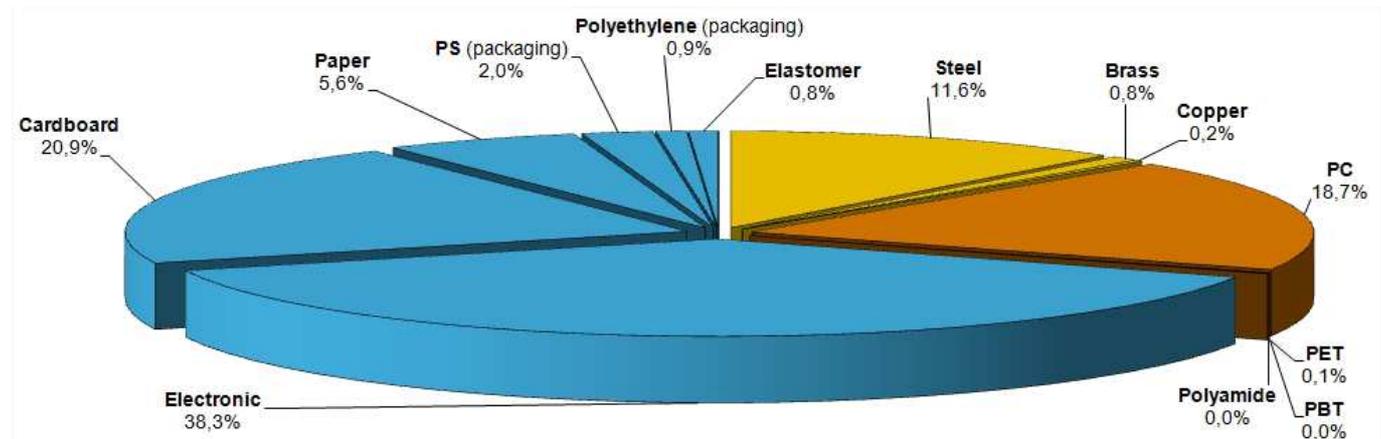
Product Environmental Profile - PEP

Substances assessment

Products from the Sepam 80 range are designed in conformity with the requirements of the European RoHS Directive 2011/65/EU and do not contain, or only contain in the authorised proportions, lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls - PBB, polybrominated diphenyl ethers - PBDE) as mentioned in the Directive

Details of RoHS and REACh substances information are available on the Schneider Electric's Green Premium website. (http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page)

Manufacturing

Sepam 80 are manufactured at Schneider Electric production sites on which ISO14001 certified environmental management systems have been established.

Distribution

Weight and volume of packaging have been optimized, based on the European Union's packaging directive.
The packaging weighs 1903g, consisting in cardboard, polystyrene and paper (manuals).

Use

Products from the Sepam range do not generate environmental pollution (noise, emissions) requiring special precautionary measures in standard use.

The electrical power consumption depends on the conditions under which the product is implemented and used.
For the above-described system, it ranges from 5W to 16W, depending on the number of activated outputs.
Most of the time, the system will run at its base burden, which is 10.6W, corresponding to the base power consumption, plus the communication accessory & burden dissipated, form other devices, by half of the logic inputs being powered.

End of life

This product contains PCB assemblies containing an LCD and electrolytic capacitors, and a battery that should be separated from the stream of waste so as to optimize end-of-life treatment by special treatments.
The location of these components and other recommendations are given in the End of Life Instruction document which is available for this product range on the Schneider Electric's Green Premium website
(http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page).

The recyclability potential of the products has been evaluated using the "ECO-DEEE recyclability and recoverability calculation method" (version V1, 20 Sep. 2008 presented to the French Agency for Environment and Energy Management: ADEME).
According to this method, the potential recyclability ratio is: 48%.
As described in the recyclability calculation method, this ratio includes only metals and plastics which have proven industrial recycling processes.

Schneider Electric

Product Environmental Profile - PEP

Environmental impacts

Life cycle assessment has been performed on the following life cycle phases: Materials and Manufacturing (M), Distribution (D), Installation (I), Use (U), and End of life (E).

Modelling hypothesis and method:

- The calculation was performed on the system described above.
- Product packaging is included.
- Installation components: no special components included.
- Scenario for the Use phase: This product range is included in the category 2, "Energy consuming products". According to PSR0005, typical life time is 10 years.

Protection relays like Sepam 80 are designed to sit in standby mode, and become active only when a fault occurs on the protected feeder, which hardly ever happens on a well managed line. It is thus considered to run 100% of the time at its base consumption of 10.6 W.

The electrical power model used for calculation is the European model.

- End of life impacts are based on a worst case transport distance to the recycling plant (1000km by truck)

Presentation of the product environmental impacts

Environmental indicators	Unit	Typical Sepam 80 arrangement					
		TOTAL	M	D	I	U	E
Air Acidification	g H$^+$ eq.	1,48E+02	2,97E+01	2,08E-01	0*	1,18E+02	8,36E-02
Air toxicity	m^3	1,76E+08	3,82E+07	3,10E+05	0*	1,37E+08	1,25E+05
Energy Depletion	MJ	1,31E+04	1,96E+03	1,56E+01	0*	1,11E+04	6,00E+00
Global Warming Potential	g CO_2 eq.	6,79E+05	1,29E+05	1,11E+03	0*	5,49E+05	4,26E+02
Hazardous Waste Production	kg	3,56E+00	3,47E+00	1,37E-06	0*	9,41E-02	5,27E-07
Ozone Depletion Potential	g CFC-11 eq.	1,39E-01	1,36E-02	2,10E-06	0*	1,25E-01	8,07E-07
Photochemical Ozone Creation Potential	g C_2H_4 eq.	7,53E+01	4,10E+01	2,86E-01	0*	3,39E+01	1,06E-01
Raw Material Depletion	Y^{-1}	1,29E-12	1,28E-12	2,27E-17	0*	7,40E-15	8,71E-18
Water Depletion	dm^3	2,60E+03	1,17E+03	1,15E-01	0*	1,43E+03	4,42E-02
Water Eutrophication	g PO_4^{3-} eq	1,32E+01	8,00E+00	2,06E-03	0*	5,22E+00	7,92E-04
Water Toxicity	m^3	2,72E+02	2,69E+01	4,74E-01	0*	2,44E+02	1,82E-01

0 meaning "represents less than 0.01% of the total life cycle of the reference flow".*

Life cycle assessment has been performed with the EIME software (Environmental Impact and Management Explorer), version 5.3, and with its database version 2013-02.

The Manufacturing & Use phases are the life cycle phases which have the greatest impact on the majority of environmental indicators.

Extrapolation rules

Sepam 60 or 80 systems are all similar in terms of materials, that is, a base unit, with optional input/outputs modules and/or communication accessories (Modbus, IEC61850, connection to temperature probes…).

To adapt the impact indicators to the actual Sepam 60 or 80 system under study, please use the following table:

Item	Manufacturing phase	Use phase
Base unit +2 MES120 +1 communication accessory	Reference	
Wide LCD	+10% HWP	-
MES120 (per unit)	±10% HWP ±20% RMD ±10% WE	±10%
Fiber-optic communication devices (if FO device is the only communication accessory, just add +35% to Use phase)	±10% HWP ±10% RMD ±10% WE	±50%
Other communication devices	±10% HWP ±10% RMD ±10% WE	±15%

Schneider Electric

Product Environmental Profile - PEP

Glossary

Air Acidification (AA)	The acid substances present in the atmosphere are carried by rain. A high level of acidity in the rain can cause damage to forests. The contribution of acidification is calculated using the acidification potentials of the substances concerned and is expressed in mode equivalent of H^+.
Air Toxicity (AT)	This indicator represents the air toxicity in a human environment. It takes into account the usually accepted concentrations for several gases in the air and the quantity of gas released over the life cycle. The indication given corresponds to the air volume needed to dilute these gases down to acceptable concentrations.
Energy Depletion (ED)	This indicator gives the quantity of energy consumed, whether it is from fossil, hydroelectric, nuclear or other sources. It takes into account the energy from the material produced during combustion. It is expressed in MJ.
Global Warming (GW)	The global warming of the planet is the result of the increase in the greenhouse effect due to the sunlight reflected by the earth's surface being absorbed by certain gases known as "greenhouse-effect" gases. The effect is quantified in gram equivalent of CO_2.
Hazardous Waste Production (HWP)	This indicator quantifies the quantity of specially treated waste created during all the life cycle phases (manufacturing, distribution and utilization). For example, special industrial waste in the manufacturing phase, waste associated with the production of electrical power, etc. It is expressed in kg.
Ozone Depletion (OD)	This indicator defines the contribution to the phenomenon of the disappearance of the stratospheric ozone layer due to the emission of certain specific gases. The effect is expressed in gram equivalent of CFC-11.
Photochemical Ozone Creation (POC)	This indicator quantifies the contribution to the "smog" phenomenon (the photochemical oxidation of certain gases which generates ozone) and is expressed in gram equivalent of ethylene (C_2H_4).
Raw Material Depletion (RMD)	This indicator quantifies the consumption of raw materials during the life cycle of the product. It is expressed as the fraction of natural resources that disappear each year, with respect to all the annual reserves of the material.
Water Depletion (WD)	This indicator calculates the volume of water consumed, including drinking water and water from industrial sources. It is expressed in dm^3.
Water Eutrophication (WE)	Eutrophication is a natural process defined as the enrichment in mineral salts of marine or lake waters or a process accelerated by human intervention, defined as the enrichment in nutritive elements (phosphorous compounds, nitrogen compounds and organic matter). This indicator represents the water eutrophication of lakes and marine waters by the release of specific substances in the effluents. It is expressed in grams equivalency of PO43-(phosphate).
Water Toxicity (WT)	This indicator represents the water toxicity. It takes into account the usually accepted concentrations for several substances in water and the quantity of substances released over the life cycle. The indication given corresponds to the water volume needed to dilute these substances down to acceptable concentrations.

PEP in compliance with Schneider Electric TT01 v10.3 and TT02 v18 procedures

Registration N° : **SCHN-2014-124**	Drafting rules: **"PEP-PCR-ed 2.1-EN-2012 12 11" supplemented by "PSR0005-ed1-EN-2012 12 11"**
Verifier accreditation N° : **VH15**	Program information: **www.pep-ecopassport.org**
Date of issue: 11-2014	Period of validity: **4 years**
Independent verification of the declaration and data, according to ISO 14025:2006	
Internal ☐　　　　　　External ☒	
Compliant with ISO 14025:2006 Type III environmental declarations	
PCR Review was conducted by a panel of experts chaired by J. Chevalier (CSTB)	
PEP data cannot be compared with data taken from another program.	