

GENERAL SPECIFICATION

PROCESS

GS EP ECP 107

Energy Efficiency calculations

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1. Scope

The objective of an energy efficiency study is to compare the energy efficiency of different concepts and/or to quantify the energy performance of a project throughout field life. It applies to new developments and re-developments of existing facilities.

This document specifies the relevant study cases, perimeters and energy efficiency key performance indicators to be used at pre-engineering stage and during engineering studies (basic, FEED and detail engineering).

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
Directive 2012/27/EU Best Available Techniques for energy efficiency	Energy Efficiency Directives of the European Union http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP ENV 001	Environmental requirements for projects design and E&P activities

3. Acronyms and definitions

3.1 Acronyms / Abbreviations

EE	Energy Efficiency
EFF	Efficiency
EI	Energy Intensity
GHG	Greenhouse Gas
HP	High Pressure
KPI	Key Performance Indicator

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KPI 1	Energy Loss Evaluation
LHV	Lower Heating Value
LPG	Liquefied Petroleum Gas
MP	Medium Pressure
SEE	Specific Energy Efficiency
TEG	Tri Ethylene Glycol
η	Auto-Consumption

3.2 Terms and definitions

There are five types of statement in this specification, the “shall”, “should”, “may”, “can” and “must” statements. They are to be understood as follows:

Shall	Is to be understood as mandatory. Deviating from a “shall” statement requires derogation approved by Company.
Should	Is to be understood as strongly recommended to comply with the requirements of the specification. Alternatives shall provide the same level of protection or performance and this shall be documented.
May	Is to be understood as permission.
Can	Is to be understood as a physical possibility.
Must	Expresses a regulatory obligation

For the purpose of this specification, the following definitions shall apply:

Extra Heavy oil	Crude oil having a gravity of less than 20° API and a viscosity at reservoir between 100 and 10,000 cP
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4. Objectives

Key performance indicators are defined in order to provide a common basis for quantifying field energy performance. The indicators complement each other and provide a characterisation of the project performance on different aspects:

- Use of self-consumed energy (fuel gas).
- Use of purchased energy (diesel, electricity, steam).
- Valorisation of energy under several forms (not only oil & gas commercialization, but also re-injected gas, LPG, sulphur, etc.).
- Minimising flaring and venting.

These aspects are in line with the EU regulation [Directive 2012/27/EU](#).

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The principles of minimization of GHG emissions and optimization of energy efficiency are stipulated in **GS EP ENV 001**.

The main Contractor (the entity Company has signed a contract with for the engineering of part of a project) shall produce a detailed energy efficiency calculation note in accordance with the requirements of this General Specification. The main Contractor shall also examine the results thereof and propose potential optimizations to Company for their review.

In certain countries (e.g. EU countries), energy efficiency studies for new projects are required by law. At times these studies are part of a national commitment to improve on energy efficiency. In addition, specific methodologies are generally required to be followed. Though such methodologies may differ somewhat from what is outlined in this document, the results derived from these studies are useful in understanding the local impact and potential EE benchmarking with other industry branches and sectors. Then it is the scope of the designer to comply with the local regulations.

Hence in such cases, the energy efficiency report to the authorities should be attached to this study report.

5. Operational cases

As process simulations are usually run for the peak production flow which is not representative of the yearly production, the EE calculations shall be done taking into account the production availability.

The operational modes of the plant will be divided into two categories: the normal operation and the degraded cases (part of the process in batch or seasonal variations). The energy efficiency study is required to cover all types of operating modes encountered along the field life of the facility.

5.1 Normal operation cases

It is essential that study cases be carefully chosen, in order to provide meaningful results. The cases shall be representative of the operation of the installation over its entire lifetime.

The relevant studies are presented in the following table.

<u>Description</u>	<u>Number of cases</u>	<u>Hints</u>	<u>Typical Application</u>
Baseline	1 case	If re-development is planned to start in a given year, fill in the baseline data of the existing field for that year.	Re-development studies
Start-up / Early production	1 case	If the plateau production is not reached before year 2 or 3, study the 'year 1' case.	Existence of an early production system, or long start-up phase