

Understanding the Difference between Significant Energy Use (SEU) and Significant Energy Consumption (SEC)

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1. Introduction

The aim of this paper is to show the difference between Significant Energy Use (SEU) in ISO 50001 and Significant Energy Consumption (SEC) in ESOS.

2. Definitions

Words convey meaning. But words can cause confusion unless they are defined. Otherwise people can speak at cross purposes because one party's definition of a term differs from another's.

Let's unpack two terms:

- Significant Energy Use
- Significant Energy Consumption

3. Significant Energy Use (SEU)

Clause 3.5.1. of ISO 50001:2018 defines Significant Energy Use (SEU) as: “**energy use** (3.5.4) accounting for substantial **energy consumption** (3.5.2) and/or offering considerable potential for energy performance improvement (3.4.6).”

Note 1: “Significance” criteria are determined by the organisation.

Energy use or “energy end-use” is the application of energy such as ventilation, lighting, heating, cooling, transport, production processes.

So in ISO 50001:2018 there is no quantification of SEU. It is up to the organisation. An example would be SEU is any end-use energy greater than 6% of the site total. A line must be drawn between what is significant energy consumption and what is not.

This assumes that the largest energy users represent the largest energy consumption, which are likely to be the source of the largest energy savings. This may be the case but in some circumstances, might not. Therefore SEU can also be defined as offering considerable potential for energy performance improvement.

An example of SEU is shown in Table 1 for annual electricity use of a processing plant. The energy end users are shown in ten categories, along with percentages of the site total.

Energy End Use	Annual Consumption (kWh)	(Percentage) %
Process Equipment	1,008,924	39.4
Lighting	386,669	15.1
Air Compressors	325,212	12.7
Refrigeration	297,044	11.6
Ventilation	215,100	8.4
Electric Fork Lift Trucks	148,522	5.8
Electric Heating	58,897	2.3
Small Power	58,897	2.3
Electric Trace Heating	33,288	1.3
Space Heating (Radiant)	28,168	1.1
Totals	2,560,721	100.0

Table 1 Electricity Consumption Breakdown

If the organisation running the ISO 50001 decided that SEU was any end-use category which uses more than 6% of the total, then the SEU categories would be:

- Process Equipment
- Lighting
- Air Compressors
- Refrigeration
- Ventilation

This represents 87.2% of total annual energy consumption. The smaller categories represent 12.8% of total.

As far as ISO 50001 is concerned, SEU is important as it defines a substantial part of the Energy Review and Energy Performance Indicators (EnPIs). It is also used in Energy Baseline, Operational Control, Design and Procurement. It is also inferred in the Competency clause.

4. Significant Energy Consumption (SEC)

In the UK, ESOS Regulations say that all the energy consumption in a 12 month data period for buildings, process and transport is defined as the Total Energy Consumption (TEC). This period must include the ESOS Qualification Date.

Up to 5% of TEC can be discarded. This is called the “de minimis” allowance. This means that 95% or more of TEC is subject to energy audit. This is termed Significant Energy Consumption (SEC).

$$\text{TEC (100\%)} - \text{de minimis (up to 5\% of TEC)} = \text{SEC (95\% or more of TEC)}$$

In Table 2 is an example. The TEC is 7,184,002 kWh. The large users are first four rows. The small users (green shaded) are the four bottom rows.

The top four rows is the SEC representing 7,007,451 kWh (98.23% of TEC). The bottom four rows (in green) is de minimis at 1.77% of TEC which is 126,551 kWh.

So in ESOS, the first four rows (SEC) are subject to ESOS Audits. It should be noted that these categories are energy types but not energy use categories (e.g. lighting, ventilation).

In ESOS, SEC has a specific quantified meaning in relation to TEC and de minimis, but in ISO 50001 SEU is defined by the organisation.

Site	Energy Type	Annual Consumption (kWh)	Percentage of TEC (%)	Cumulative Percentage (%)
A	Grid Electricity	1,204,224	16.76	16.76
A	Natural Gas	3,383,912	47.10	63.86
B	Grid Electricity	513,805	7.15	71.01
B	Gas Oil	1,905,510	27.22	98.23
A	Kerosene	89,424	1.24	99.47
A	LPG	3,167	0.04	99.51
B	Natural Gas	8,428	0.12	99.63
Transport	Diesel	25,512	0.37	100.00
Total Energy Consumption		7,184,002	100.00	

Table 2 Total Energy Consumption – Chemical Plant

In the UK, there are now only two routes to ESOS compliance: ESOS energy audits or certification to ISO 50001. If ISO 50001 is used, then it is important to understand the difference between SEU in ISO 50001 and SEC in ESOS.

If using ISO 50001 for ESOS compliance, certification has to be held on the compliance date. The scope of the ISO 50001 Energy Management System (EnMS) must cover the Significant Energy Consumption (SEC) as defined by ESOS i.e. 95% or above all energy use in processes, buildings and transport.

5. Summary

	Significant Energy Use	Significant Energy Consumption
Application	ISO 50001 and wider energy management practice	ESOS (UK)
Definition	End-use energy categories defined by the organisation as “significant” and/or offering considerable potential improvement	95% of more of TEC covering energy consumption in processes, buildings and transport
Emphasis	End-use energy consumption by an organisation	Front end energy amounts into an organisation
Relevance	Most of the actions of an EnMS are related to SEU	Determines the scope of the number and type of energy audits or the scope required by an EnMS to ISO 50001
Review Period	At least annually, usually in the Energy Review and Management Review	Every four years