

Title of the measure:	POR 4 – Intensive Energy Consumption Management System (SGCIE)
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General description

The Intensive Energy Consumption Management System (SGCIE) was published on 15 April 2008, through Decree-Law 71/2008, being one of the measures of the NEEAP - National Energy Efficiency Action Plan that results of an extension up to 2016 of the measure of the PNAC 2006 (National Climate Change Plan), relative to the revision of the RGCE- Regulation of Energy Consumptions Management. It was changed by the Law n°7/2013.

The objective of this measure is to promote the increase of energy efficiency through the modification of production processes, the introduction of new technologies and the behaviours changes.

The SGCIE applies for all companies and facilities (also named “Operators”) that have an annual consumption over 500 toe/year, imposing binding energy audits, with an 8-year periodicity.

Facilities under European Emissions Trading System (ETS) are not covered by SGCIE, but they may participate on a voluntarily basis, as can facilities with annual energy consumptions lower than 500 toe.

Intensive energy users are obliged to elaborate and execute Energy Consumption Rationalization Plans (PREn), establishing targets for Energy and Carbon intensity and Specific energy consumption, which also outlines energy rationalization measures. The Plan must be submitted through an online system (<http://sgcie.publico.adene.pt>) to the Directorate General for Energy and Geology (DGEG), as well to submit biennial execution and progress reports. Upon DGEG’s approval, as the competent authority that supervises and inspects the SGCIE's operation, PREn becomes a Rationalization Agreement for Energy Consumption (ARCE).

By the end of each PREn period, operators must reduce their target indicators – Energy intensity and Specific energy consumption – in 4% or 6% depending if they have reference energy consumptions over 500 toe/year or under 1000 toe/year respectively. They also must, at least, maintain Carbon intensity.

The ARCE provides facility operators with excise duty exemptions on oil (*Imposto sobre Produtos Petrolíferos* – ISP), electrical power and energy products (coal, oil coke, fuel oil, oil gases, and natural gas), as well as possibility to apply for incentives on energy audit costs and on investments in energy management and monitoring equipment.

Exemptions in excise duties are foreseen in the national budget for fuels used either by consumers committed to the reduction of CO₂ emissions in the framework of the ETS or by consumers that have an ARCE.

Impact evaluation

Methods

Implementation of the ARCE is monitored through execution and progress reports (REP), with penalties foreseen for facilities that do not meet their targets.

Energy audits, Energy Consumption Rationalization Plans and biennial execution and progress reports have to be elaborated by auditors recognized by DGEG according to their academic education and professional experience, as regulated by specific legislation (Law n°7/2013 of January 22nd).



DGEG, under the Ministry for Economy, is responsible for the supervision of the regulation. All energy audit reports and the energy consumption rationalization plans must be submitted to this entity for its approval through an electronic platform (<http://sgcie.publico.adene.pt>).

The Portuguese Energy Agency (ADENE) undertakes monitoring and evaluation of the PReN in order to check the development of energy consumption and the specific energy consumption of the audited companies. This monitoring and evaluation is congregated in a database of energy efficiency indicators. The indicators are productions, energy consumption, specific energy consumption and other data that are in the Energy Consumption Rationalization Plan.

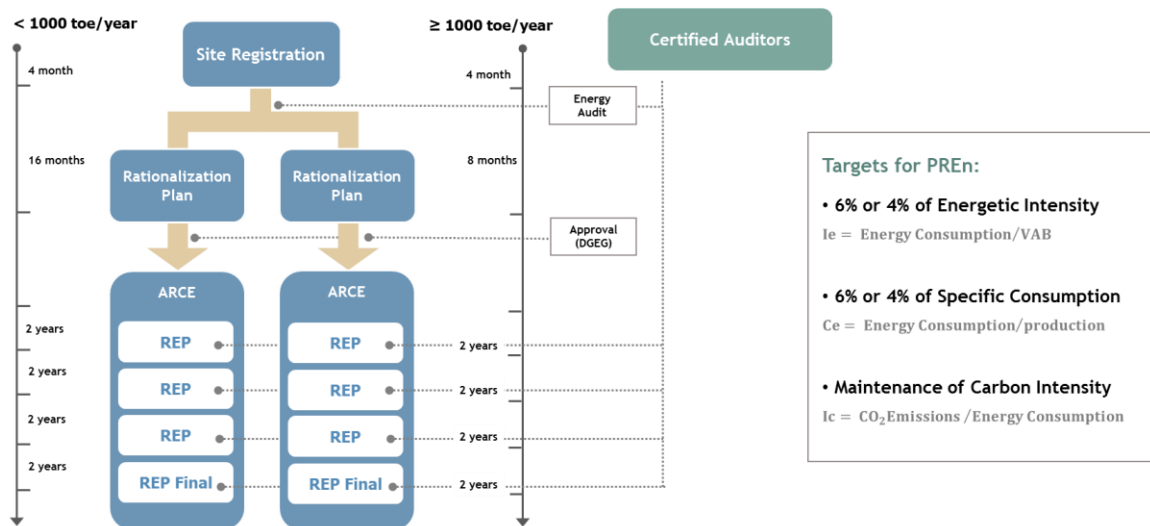


Fig. 1 - Synthesis of SGCIE application

Two sets of classified measures had been identified as Transversal and Specific Measures of each sector of the transforming industry. The transversal measures represent four groups of technological measures: Electric Engines, Production of Heat and Cold, Lighting and Other measures for the Efficiency of the Industrial Processes. These measures had been grouped given its generalized applicability in the twelve sectors of the Transforming Industry:

Tab. 1 - Transversal Measures

Transversal Measures	
Range	Measure/Technology
Electric Engines	Engine Optimization Pumping Systems Ventilation Systems Compressed Air Systems
Production of Heat and Cold	CHP Combustion Systems Heat Recovery Industrial Cold
Lighting	Efficient Lighting
Efficiency of Industrial Process/Others	Monitoring and Control Effluent Treatment Process Integration Maintenance of energy-using equipment Thermal Insulation Transports Training and Human Resources Awareness Reactive Energy Reduction

In complement to these measures, one identified inside of each one of the activity sectors, some Specific Measures most of them that can only be applied or with considerable intensity in each specific sector. Some examples:

Tab. 2 - Specific Measures

Specific Measures	
Sector	Measure/Technology
Food and Drink	Sterilization optimization Processes of separation with membranes Change of horizontal mills for vertical lines Distillation through vacuum
Ceramics	Kiln optimization Improvement of driers Drawing with steam Hard Drawing Dust production optimization Alternative fuel use
Textile	Bath functioning optimization Pre-drying mechanics / IV Solar panels water heating Textile production processes optimization

Until July 2017, 1124 intensive energy consuming companies were registered online.

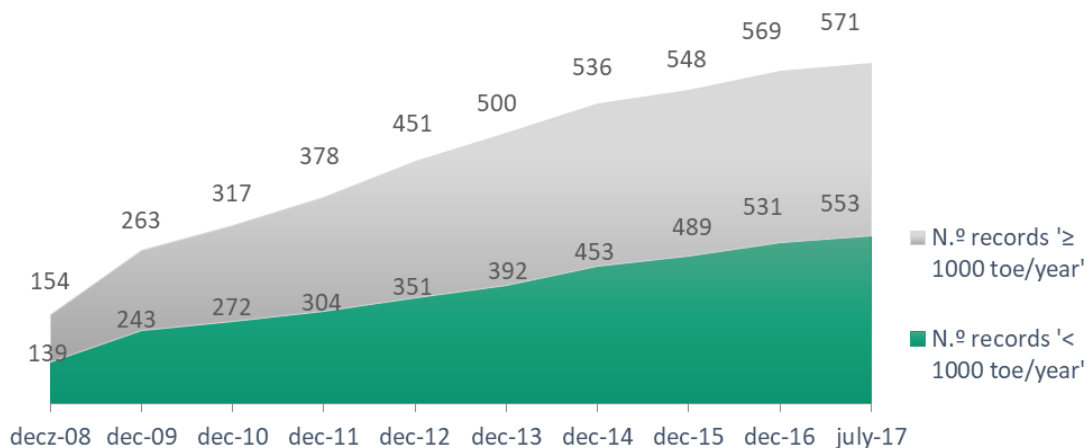


Fig. 2 - Evolution of SGCIE records

In the universe of registered operators dominates the number of companies with annual energy consumption higher than 1 000 toe/year.

The following graphs show the distribution of records concerning its top 7 geographical distribution and the classification of economic activity.

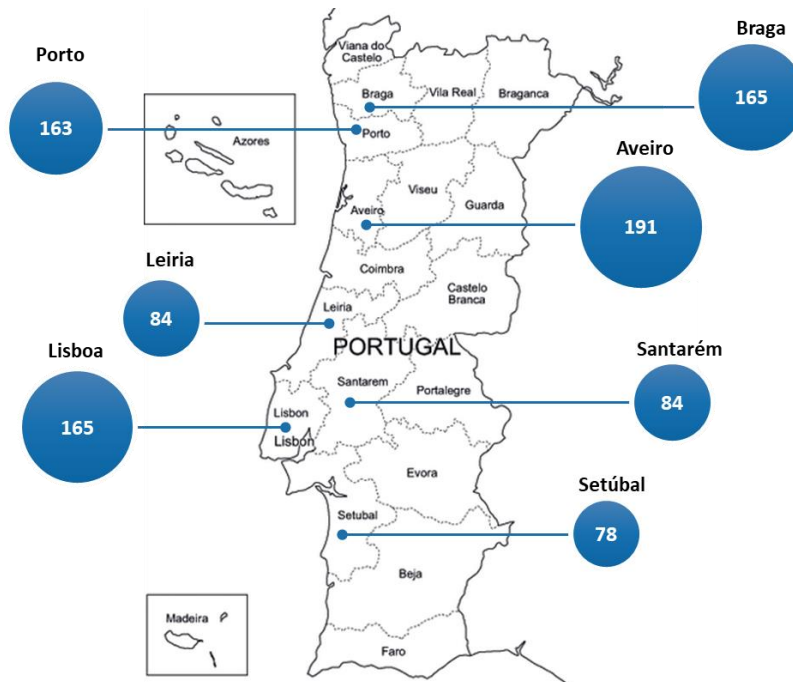


Fig. 3 – Top 7 SGCIE records per geographic location until July 2017

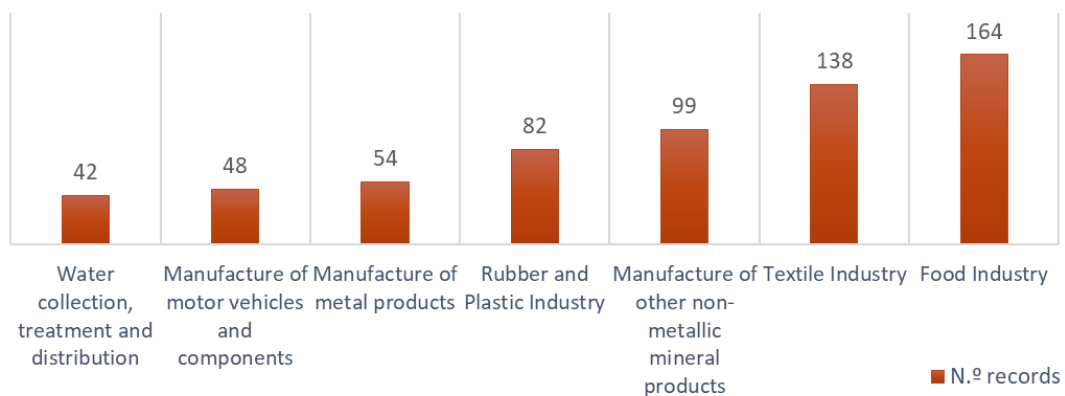


Fig. 4 - Top 7 SGCIE records per economic activity until July 2017

Results

The existing records in SGCIE equals 1 705 ktce and represent 34% of final energy consumption in the sectors of Agriculture and Fisheries, Extractive Industry, Manufacturing Industry and Public Works and Construction (Oil free non-energy).

We note, however, that the universe of facilities in the SGCIE and those in the ETS represent about 82% of total final energy consumption of the referred universe.

The following chart presents the number of Energy Consumption Rationalization Plans.

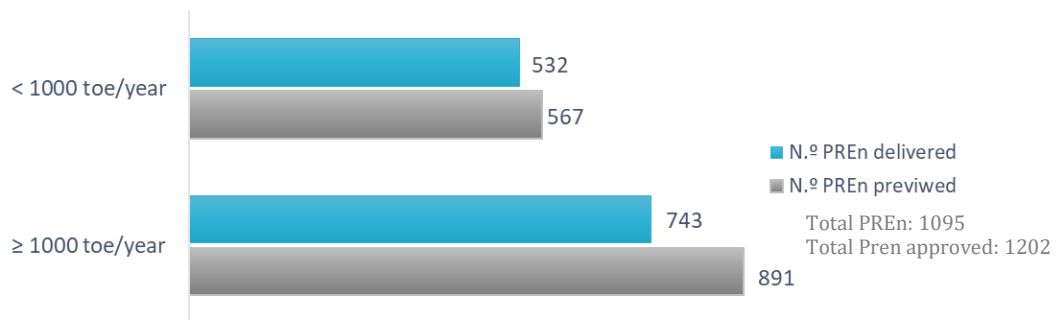


Fig. 5 - Number of PREn until July 2017

In the next pictures, one can identify the expected reduction in energy consumption and CO₂ Emissions based on approved PREn.

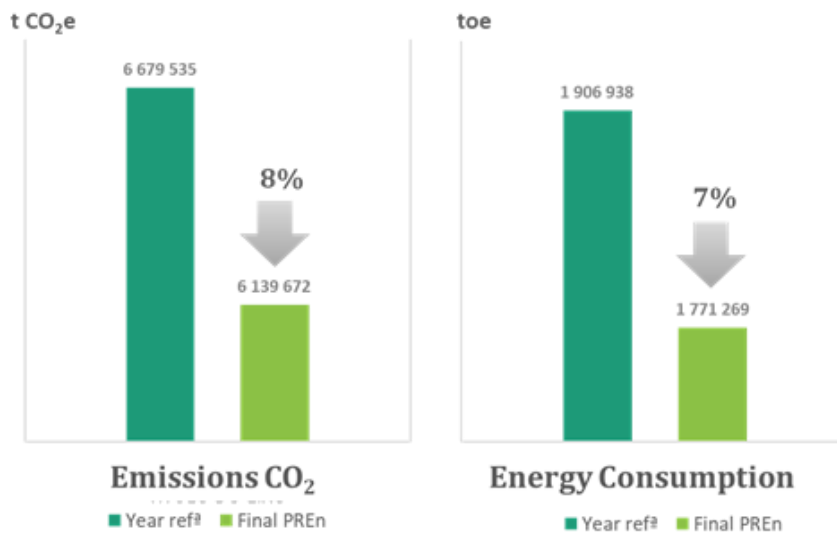


Fig. 6 - Expected reduction of energy consumption and CO₂ emissions, based on approved PREn until July 2017

As mentioned before, by the end of each PREn period, operators must reduce their target indicators in 4% or 6% depending if they have reference energy consumptions over 500 toe/year or under 1 000 toe/year respectively. Taking this into account and considering constant production and GVA, one can observe that the expected reduction of energy consumption (7%) will enable operators to meet the goals.

The next graphs represent the energy savings from approved PREn by typology of measures – Transversal and Specific.

	Global reduction potential (toe/year)	Payback (years)	Cost of reduction per toe (€/toe)	GHG Reduction (t CO _{2e})	Potential for redução per site (toe/year)
Training and raising awareness of human resources	2 108	0,32	227	8 333	12,33
Industrial refrigeration	2 469	4,34	4 357	13 288	17,63
Efficient lighting	8 979	3,35	3 767	49 069	10,68
Process integration	5 273	0,95	386	14 851	229,28
Thermal insulation	10 546	1,19	522	29 078	24,30
Maintenance of energy consuming equipment	2 352	2,10	1 504	9 076	15,58
Monitoring and control	9 964	1,63	1 199	40 723	22,59
Motor optimization	5 625	2,24	2 255	30 567	14,57
Others	18 036	4,14	2 655	59 952	40,53
Heat recovery	27 679	2,03	789	72 947	84,65
Pumping systems	2 591	2,15	2 210	14 159	14,24
Combustion systems	13 596	2,18	1 493	55 444	40,58
Compression systems	7 884	2,13	2 222	42 767	11,68
Ventilation systems	3 073	1,63	1 634	16 178	13,13
Transports	572	3,52	4 076	1 715	18,46
Wastewater treatment	886	1,56	763	2 628	73,81
Grand total	121 633	2,46	1 661	460 775	-

Fig. 7 - Energy savings from approved PReN, until July 2017 - Transversal measures

To fulfil their obligations under the SGCIE, operators must rely on technicians or entities duly authorized for the preparation of energy audits and Energy Consumption Rationalization Plans, and to monitor its implementation and progress, including the preparation of reports on implementation and progress.

The technicians that are interested in being accredited must submit requests for approval to ADENE and DGEG, demonstrating that they meet the minimum academic and professional qualification and experience appropriate to the objectives in question.

Until July 2017 were recognized, around 290 technicians or entities.

Based on 108 REPs for the last biennium of ARCE, there is a 7.7% reduction in energy consumption, a reduction of 5.1% in GHG emissions and a 6.5% reduction in the GVA generated by the installations, compared to the base year of each plan approved. These developments focus on the macro variables and do not take into account the fulfilment of the indicators.

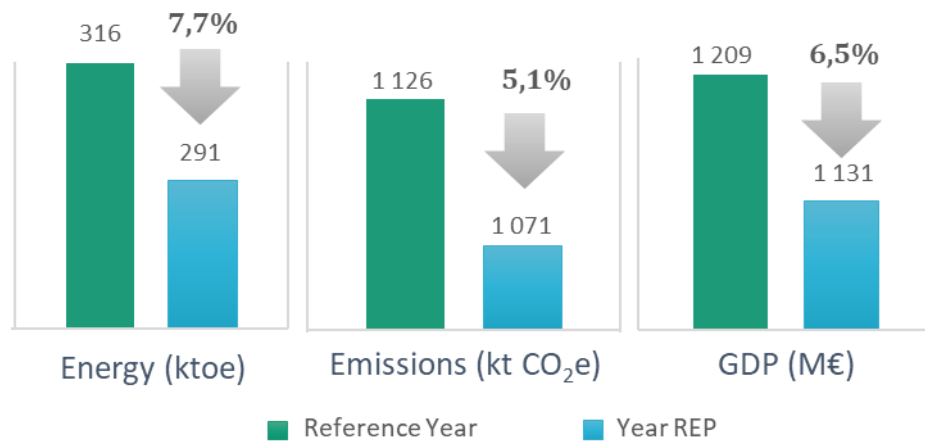


Fig. 8 - Results

Up to now, at 928 PREn with approved REPs, about 80% of the energy saving potential has been implemented.

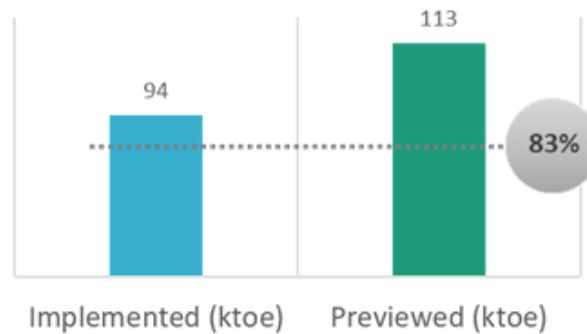


Fig. 9 – Energy saving potential of measures

Interaction of measures

The present regulation was designed to avoid interaction with others measures in force, does excluding:

- Consumers committed to the reduction of CO₂ emissions in the framework of the European Emissions Trading System (ETS)
- Co-generation plants legally autonomous from consumers
- Transport companies and companies with high specific consumption fleets (to be establish under a specific regime)
- Buildings covered by the Energy labelling of buildings - Decree-Law 118/2013, August 20th, except when the building is located inside the area of an energy intensive facility

This measure interacts with measures described in the General Cross-Cutting, namely: POR7 - National Energy Efficiency Action Plan (NEEAP), 2013-2016; POR8 - Energy Efficiency Fund; POR10 - Plan for Promoting Efficiency in Electricity Consumption 2013-2014; POR11 - Plan for Promoting Efficiency in Electricity Consumption 2017-2018; POR 12 - Portugal 2020 and POR13 - Efficiency in end-use energy and energetic services.

Means and outputs

Means

To comply with the mandatory targets of the SGCIE it is assumed that participants will have an overall investment/cost of around € 200M.

There are financial supports approved so far in industry of about 1,87 M€, by the Energy Efficiency Fund.

Call	Energy Efficiency Fund approved financing (€)
2	213,960.70
4	70,099.58
8	199,492.88
13	41,254.15
19	1,345,403.38

The public budget committed is related to the ISP exemption. The ARCE provides facility operators with excise duty exemptions (ISP) on oil, electrical power and energy products (coal, oil coke, fuel oil, oil gases, and natural gas), as well as possibility to apply for incentives on energy audit costs and on investments in energy management and monitoring equipment.

Outputs

There were 1 192 audit whose potential is 135 669 toe/year of final energy, from transversal measures.

Data about energy savings

The potential for energy savings identified so far in SGCIE has been 135 669 toe/year of final energy (121 633 toe/year from transversal measures and 36 from sectoral measures) and the energy savings actually implemented has been, approximately, 94 ktoe/year.

Sources of uncertainties about energy savings

The uncertainty of data collection of SGCIE is related to possible differences between estimated energy efficiency potential and metered energy efficiency, actually implemented.

Evaluation of the energy savings

The typology of the calculation method used is number 8 of the quantitative impact evaluation table: monitoring of energy consumption indicators (either unit energy consumption for whole sectors or sub-sectors, or, specific energy consumption indicators for specific end use equipment).

The typology of the baseline used in the evaluation method is the “actual before” energy consumption, which meters the energy consumption for the site, equipment, etc, where the energy efficiency action was implemented.

Other indicators monitored and/or evaluated

Other indicators monitored and/or evaluated in SGCIE consists in the avoided CO₂ emissions (only direct emissions – scope 1 and 2, for CO₂) and the cost effectiveness indicators (examples are the payback and the gross value added).

Historical data

Intensive Energy Consumption Management System (SGCIE) replaces the prior Regulation on Management of Energy Consumption (RGCE), created under Decree-Law no. 58/82 of 26 November 1982, and Decree-Law no. 428/83 of 9 December 1983, establishing an energy consumption management and monitoring system for energy consumption-intensive companies and facilities. Under this decree, energy intensive facilities were extended to include medium-sized enterprises with consumption over 500 toe/year, broadening the scope of the previous RGCE (which applied to facilities consuming over 1 000 toe/year). The Law n°7/2013 of January 22nd made some changes in the actual regulation regarding the period of PREn and the approval of energy auditors.



References

- Decree-Law 71/2008, April 15th: <https://dre.pt/application/file/249641>
- Law n°7/2013, January 22nd: <https://dre.pt/application/file/257091>
- Minister Council Resolution n° 80/2008, May 20th: <https://dre.pt/application/file/249160>
- Minister Council Resolution n° 20/2013, April 10th: <https://dre.pt/application/file/260476>
- <http://sgcie.publico.adene.pt>
- <http://www.dgeg.pt/>