

# Energy Efficiency in the Italian productive sectors: audits, benchmarking, research

*Focus on the EED Article 8 implementation*

*ODYSSEE-MURE meeting,  
Rome, 25/9/24*

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# Summary

- The EED Art. 8 implementation in Italy
- Highlights on ENEA's methodologies and tools
- Data analysis - National Program for Electric System Research
- The LEAPto11 initiative

# ENERGY AUDIT OBLIGATION

In Italy, according to Art. 8 of Lgs. D. 102/14, two categories of enterprises have been targeted as obliged to carry out energy audits on their production sites, firstly by the 5th of December 2015, and then at least every four years:

- Large Enterprises
- Energy Intensive Enterprises.

An organization qualifies as **Large enterprise** if it shows:

1. A number of employees  $\geq 250$  and an annual turnover  $> \text{€ } 50$  million and an annual budget  $> \text{€ } 43$  million or
2. A number of employees  $\geq 250$  and an annual turnover  $> \text{€ } 50$  million or
3. A number of employees  $\geq 250$  and an annual budget  $> \text{€ } 43$  million

**Energy Intensive Enterprises** are the ones with high energy consumptions ( $> 1\text{GWh Electricity}$ ) applying for tax relief on part of the purchased energy. All the energy-intensive enterprises are registered on the list of «Cassa per i servizi energetici ed ambientali» (Governmental Agency).

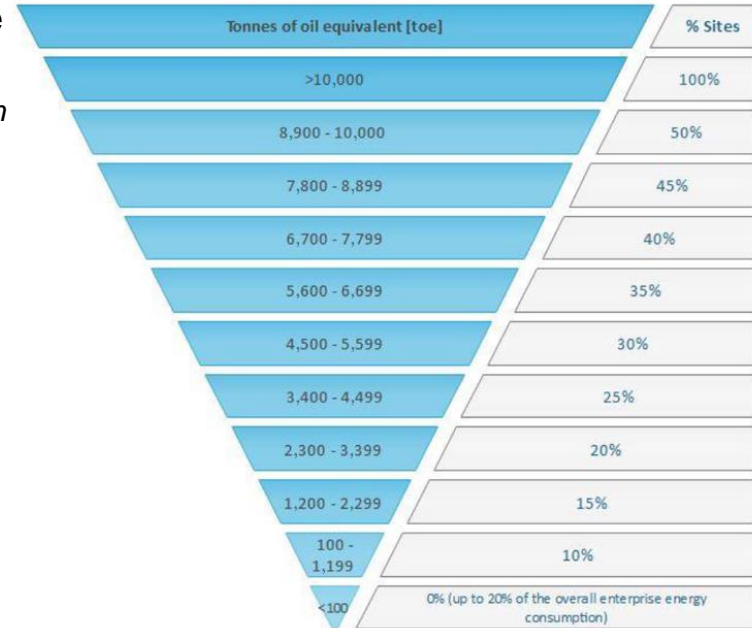
Policy implementation and management of the scheme:

- Ministry of Environment and Energy Security ([MASE](#))
- Italian National Energy Agency ([ENEA](#))



# HIGHLIGHTS ITALIAN ENERGY AUDIT SCHEME

1. **Clustering** multi-site EAs → Sampling of most representative sites by consumption classes (including associated companies). *The Italian methodology has been included in the new version of EN 16247/1-2-3-4 (Part 3, Annex D).*
2. Obligation for a **monitoring** system/strategy
3. Mandatory EA for Energy Intensive Enterprises **LE & SMEs** (Electric consumption >1 GWh)
4. Simplified procedure for **ISO 50001**
5. EAs quality ensured by **certified** Auditors and ESCOs
6. High engagement of **users / associations** – Events, information and training
7. Checks, verifications and penalties

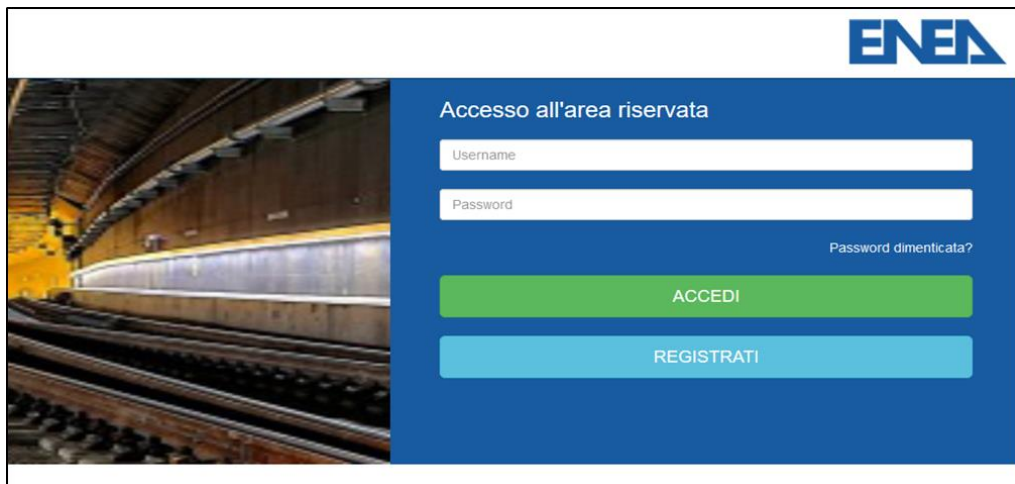


# Verification process and penalties


- Obligated Enterprises that will not carry out a compliant energy audit are subject to financial penalties.
- The penalty does not exempt enterprises from carrying out audit(s) that must be submitted to ENEA within six months.
- ENEA supports the Ministry in identifying companies that have not fulfilled the obligation. ENEA also checks the compliance of energy audits with the provisions of Annex VI EED.
- ENEA checks/verifies:
  - 3% of the energy audits carried out by external auditors;
  - 100% of the energy audits carried out by enterprises' internal auditors.

# Audit 102 – ENEA Energy Audits Database

<https://audit102.enea.it/>



Audit 102: EA Italian database

- 
- > 8000 enterprises registered
  - 1280 ESCO/EGE registered
  - More than 40,000 EAs uploaded

# ENERGY AUDIT ECOSYSTEM – Results 2019-2022

EU energy efficiency directive (EED)  
National Energy & Climate Plan (NECPs)

EU - Art. 8 EED (2012/27/EU)  
Italy - Art. 8 D.Lgs. 102/2014

## ENTERPRISES

Large Enterprises  
Energy Intensive  
Enterprises (CSEA)

## Business Associations

## Energy Auditors & ESCOs

>100 Events (5,000 part.)  
25 Sectorial Guidelines  
~ 20,000 emails/FAQs



ITALIAN NATIONAL AGENCY  
FOR ENERGY EFFICIENCY  


## ENERGY AUDITS DATABASE

12798 Energy Audits  
8010 Large Enterprises  
1299 Energy Intensive Large  
Enterprises  
2826 Energy Intensive SMEs  
1211 Certified Auditors/ESCOs



Ministry of Environment  
and Energy Security  
**Policy maker**

Public  
companies &  
regulators

Regional  
local EE  
actors

Research and Academia  
– 11 peer reviewed  
scientific papers



# Energy audits: ENEA's tools

**Starting first compliance period**

Dec 2015



**Spreadsheets F**  
**Sectorial Guidelines**  
**Old version ENEA Portal Audit102**

**Starting second compliance period**

Dec 2017



**Monitoring Guidelines**

Dec 2019



**New Spreadsheet F**  
**Others Sectorial Guidelines**  
**ENEA Guideline on Audit obligation - I edition**  
**New ENEA portal Audit102**

Sept 2021



**ENEA Guideline on Audit obligation - II edition**



2021 - 2022



**Energy Efficiency Notebooks**



Apr 2023

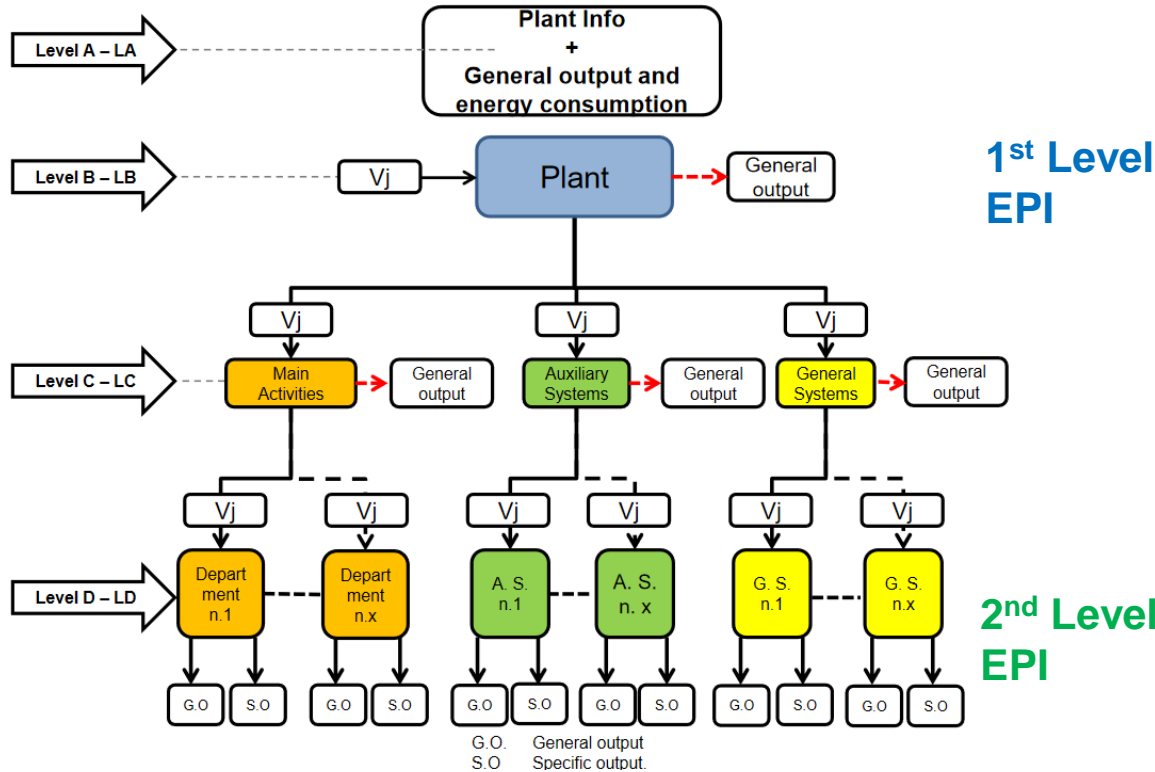


**Tool for SMEs: ATENEA4SME**





# Data from an Energy Audit



1<sup>st</sup> Level  
EPI

2<sup>nd</sup> Level  
EPI

## Available info for First level benchmark

- General Info: sectoral and geographical
- Size, certifications and monitoring
- Production (or equivalent)
- Energy final consumption
- Distribution uses: main, auxiliary and general
- EPIAs implemented and identified (planned)

## Second level benchmark

- Sectoral models, processes and BAT analysis

# Approach for analysing EPIAs

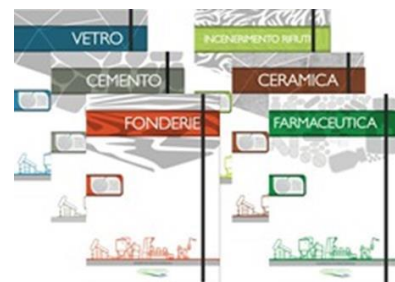
**STARTING POINT:** Implemented and planned EPIAs collected in the web portal Audit 102 (<https://audit102.enea.it/>)

## METHODOLOGICAL STEPS

1. Defining intervention areas
2. Identifying indicators
3. Computing indicators' variables
4. Cleaning and integration of the database

## OBJECTIVES

- Getting to a systematised analysis of implemented and planned EPIAs included in the EA database
- Replicability of the approach in time and for NACE codes
- Monitoring of achieved and potential savings
- Providing useful insights to practitioners and policy makers

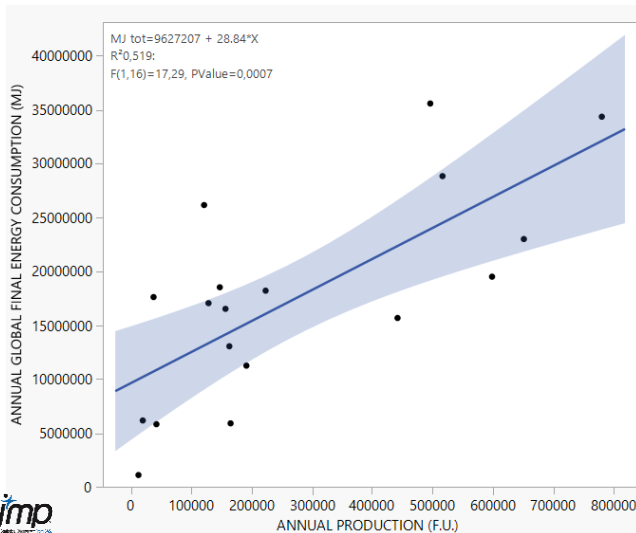


- Annual report to the Ministry of Environment and Energy Security
- Analysis of 18 4-digits NACE codes for obligation period 2019
- Data on EPIAs included in six Sectoral Guidelines
- Data on EPIAs used also in working groups with sectoral associations

# Building up industry KPIs

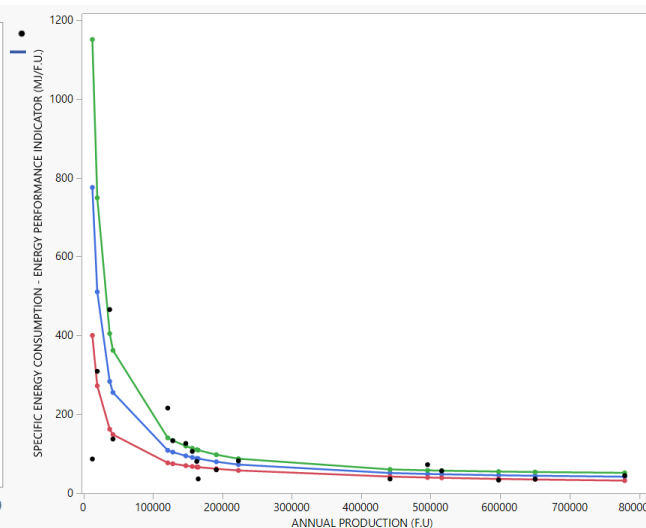
## 1. Energy final use vs Production

- Data cleaning and homogenization
- Linear regression  $En[MJ] = a \cdot Prod[FU] + b$
- Statistical analysis ( $\alpha$ , p-value,  $R^2$ ...)
- 381 ISIC-4 sectors (4 energy carriers)



## 2. Energy Performance Index

- Analytical physical model
- $$SEC_{model} (MJ/FU) = a + \frac{b}{Prod[FU]}$$
- Normal distribution (CI = 95%)



## 3. Simplified EPIs

- EPI [MJ/FU] = mean value  $\pm$  standard deviation
- EPI =  $f$  (technologies, production range,...)

High	$\sigma \leq 20\%$
Medium	$20 < \sigma \leq 60\%$
Low	$60 < \sigma \leq 100\%$
N/A	$\sigma > 100\%$

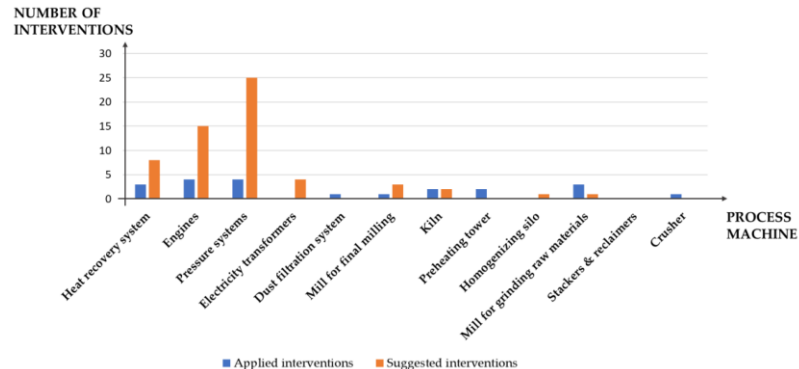
Bruni, G.; De Santis, A.; Herce, C.; Leto, L.; Martini, C.; Martini, F.; Salvio, M.; Tocchetti, F.A.; Toro, C. (2021) From Energy Audit to Energy Performance Indicators (EnPI): A Methodology to Characterize Productive Sectors. The Italian Cement Industry Case Study. *Energies* 2021, 14, 8436. <https://doi.org/10.3390/en14248436>

# Energy performance improvement actions (EPIAs)

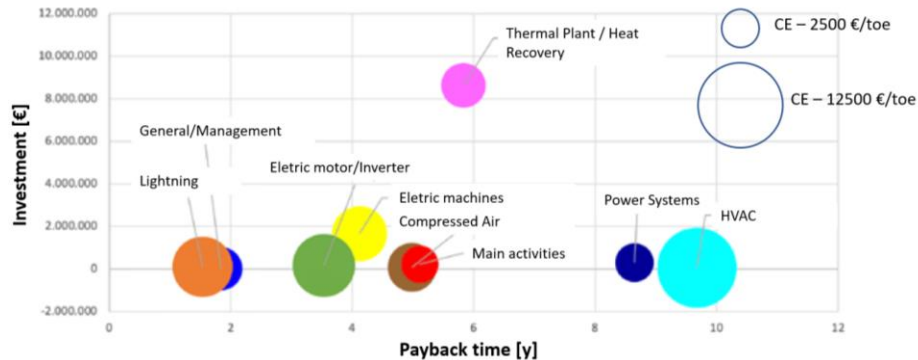
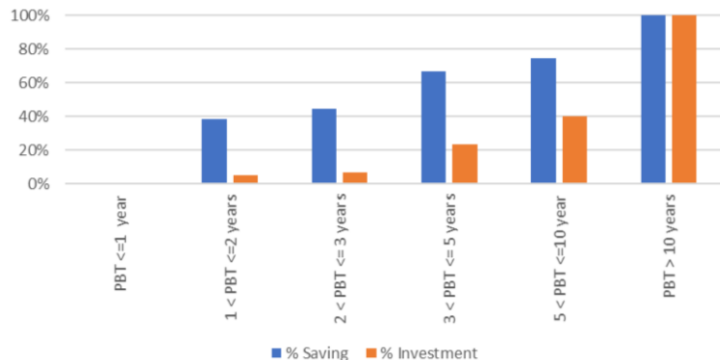
## Analysis of Implemented and Identified EPIAs

- Analysis of Best Technologies
- Savings and Payback time
- Market trends of identified EPIAs
- Cost Effectiveness (€/toe) indicator

Important information for policy makers (incentives) and market stakeholders (ESCOs)



Source: ENEA (2022)



# Linking Energy Audit and EnMS Policies towards new EED article 11

Project data	
Reference	LIFE22-CET-LEAPto11/101121013
Start Date	01/02/2024
End Date	31/01/2027
Total Eligible Budget	1,775,291 €
EU Contribution	1,686,526 €
Consortium	10 National Energy Agencies + Communication Partner
National Energy Agencies	ADENE, CRES, DENA, EIHP, ENEA, EWA, LEA, SEAI, SIEA, RVO
Countries	Portugal, Greece, Germany, Croatia, Italy, Lithuania, Ireland, Slovakia, Netherlands, Malta, Belgium (Revolve)



## Goals:

- Improving the effectiveness of National programmes under EED article 8 and new article 11 for a better data management and KPI production
- Supporting Agencies, policy makers and business actors (business associations, networks), auditors and National Agencies during the art.11 transposition with data-driven and knowledge based high-level policy advice
- Spreading the culture, use and implementation of Standards and Protocols to increase the uptake of the energy efficiency measures recommended in audits and Energy Management Systems (EnMS).



<https://leapto11.eu>

# Linking Energy Audit and EnMS Policies towards new EED article 11

## Article 11 (EED Recast)

### Energy management systems and energy audits

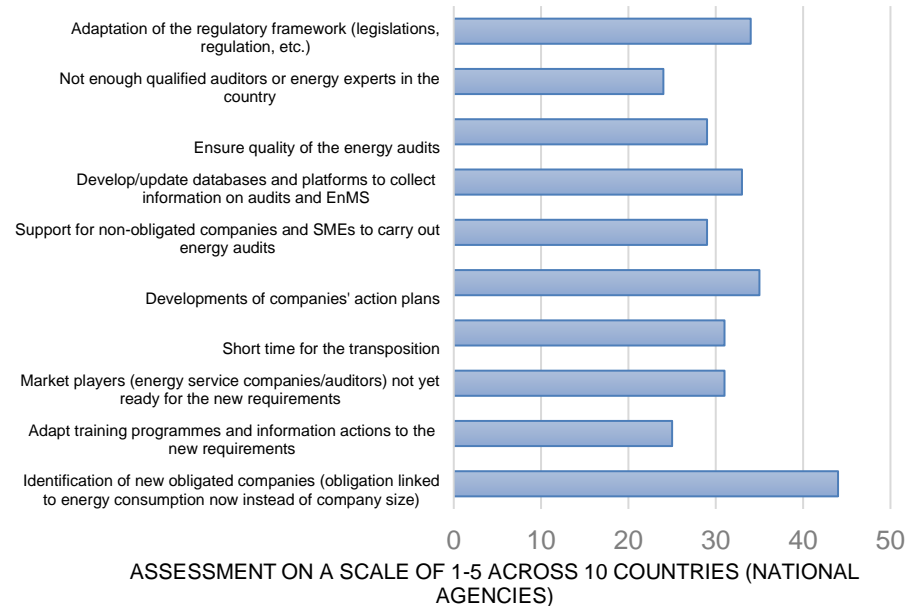
1. Member States shall ensure that enterprises with an average annual consumption higher than 85 TJ of energy over the previous three years, taking all energy carriers together, implement an **energy management system**. The energy management system shall be certified by an independent body, in accordance with the relevant European or international standards.

2. Member States shall ensure that enterprises with an average annual consumption higher than 10 TJ of energy over the previous three years, taking all energy carriers together, which do not implement an energy management system are subject to an **energy audit**.

...

Source: Recast EED

## Challenges with the transposition of the new EED



Source: LEAPto11

Thank you for your attention

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