



Italian National Agency for New Technologies,
Energy and Sustainable Economic Development

ITALIAN NATIONAL AGENCY
FOR ENERGY EFFICIENCY



Energy Efficiency Benchmarking based on Energy Audits in Italy

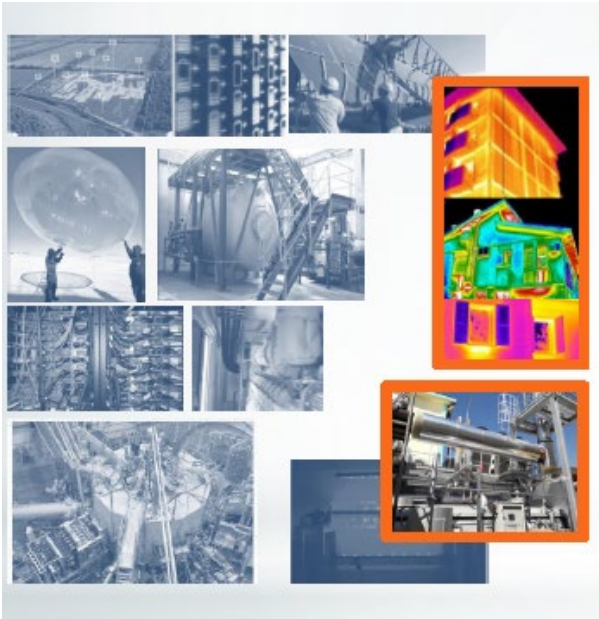
IEA - Expert Workshop on Industry Energy Efficiency Benchmarking

17th March 2021

Carlos HERCE – DUEE-SPS-ESE – carlos.herce@enea.it



ENEA – AGENCY FOR ENERGY EFFICIENCY (DUEE)



ITALIAN NATIONAL AGENCY
FOR ENERGY EFFICIENCY

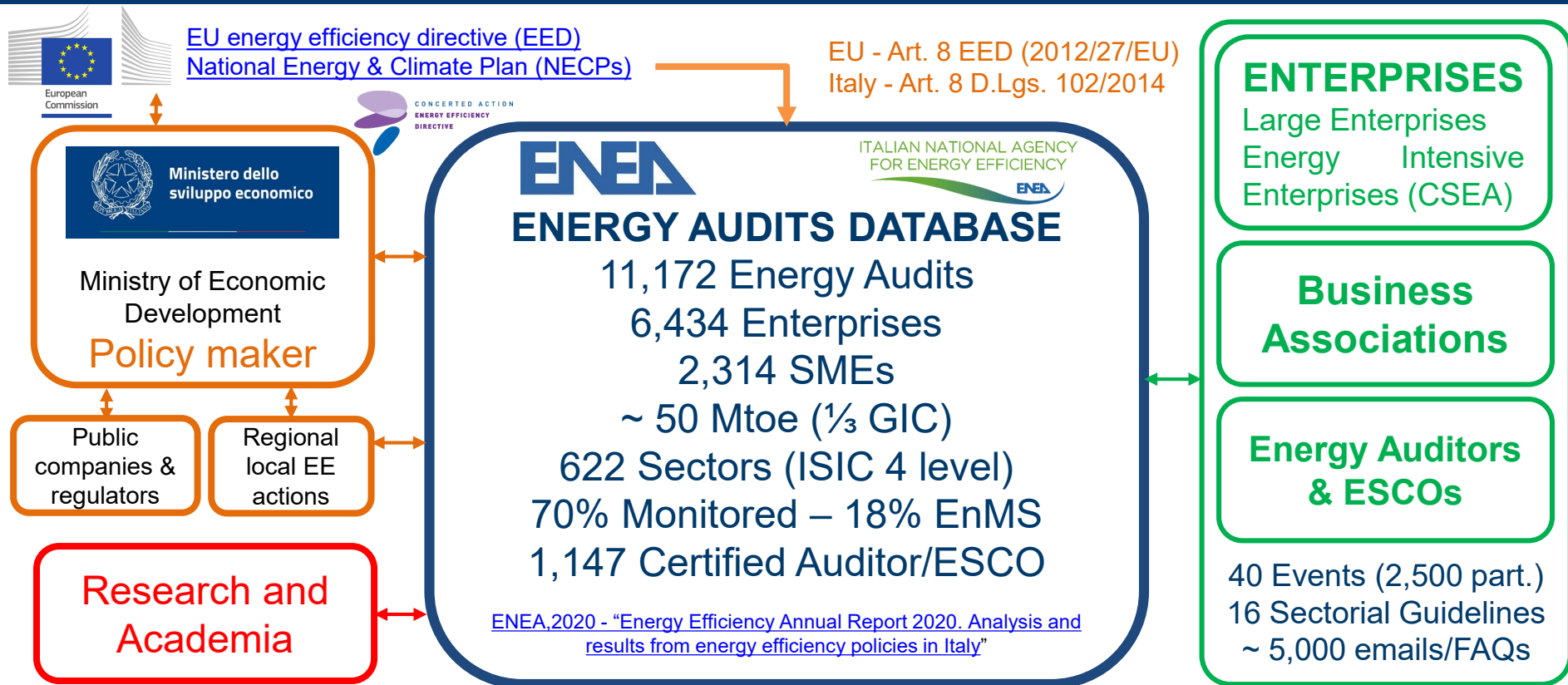


Energy Efficiency Department of ENEA is the national Agency for Energy Efficiency. Our goal is to support industries, associations and tertiary companies in EE actions, and to support the public administration

DUEE-SPS-ESE coordinate all **energy audits** (EAs) activities:

- Management of Italian **EA database** (Art. 8 – EED) – Link to savings
- **Quality** control and EAs verification (documentary and on-site)
- Co-creation and edition of **sectorial guidelines** for development of mandatory Energy Audits (EAs)
- Development of innovative **methodologies** for energy analysis performance as function of sector and sites
- Standardization of procedures for **energy monitoring** and accounting
- Development of sector/process energy **benchmark** and energy **indicators** (general and specific KPIs)
- Active **training and information** activities in energy management

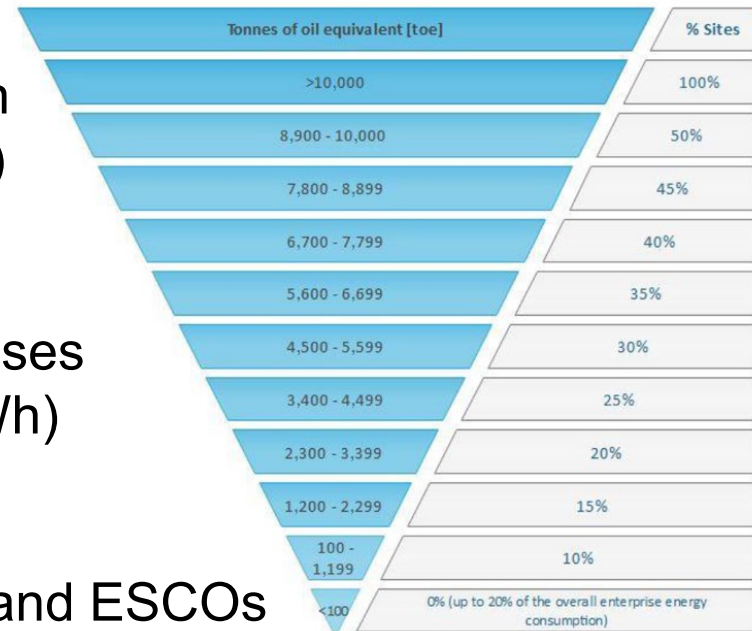
ENERGY AUDIT ECOSYSTEM - 2019



HIGHLIGHTS ITALIAN ENERGY AUDITS SCHEME

1. **Clustering** multi-site EAs → Sampling of more representative sites by consumption classes (including associated companies)
2. Compulsory **monitoring** system/strategy
3. Mandatory EAs Energy Intensive Enterprises **LE & SMEs** (Electric consumption >1 GWh)
4. Simplified procedure for **ISO 50001**
5. EAs quality ensured by **certified** Auditor and ESCOs
6. High engagement of **users / associations** - information and training

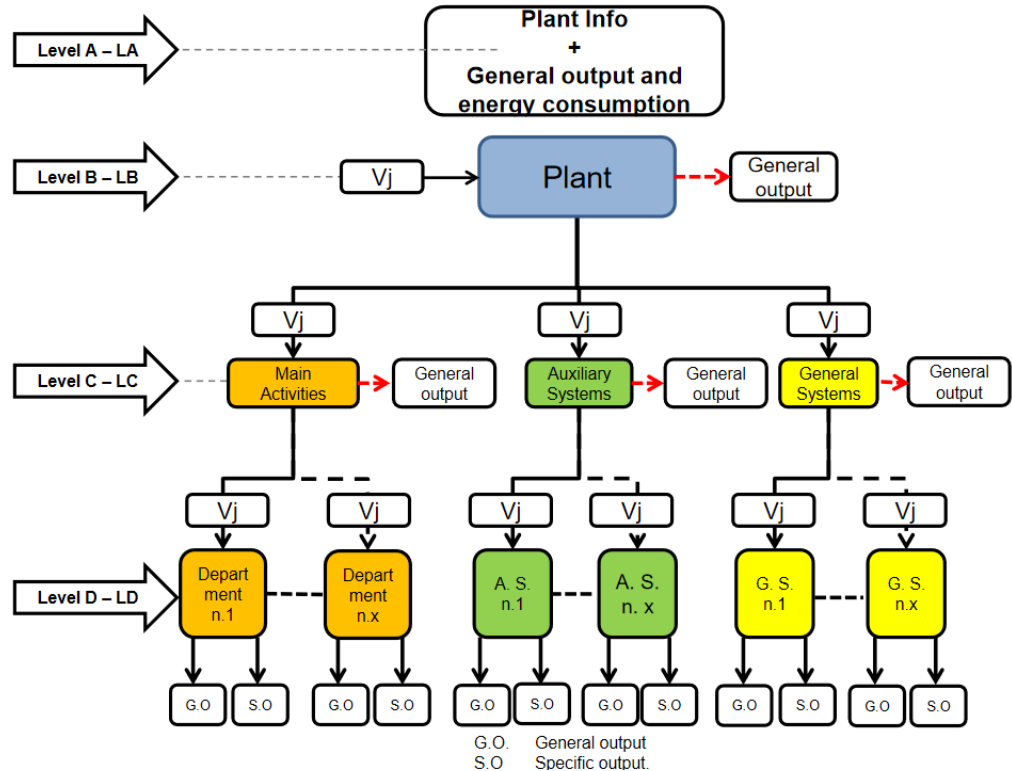
GUIDELINE FOR CLUSTER SAMPLING INDUSTRY



ENERGY AUDITS DATABASE

DATA SOURCES

1. EA reports
2. Pre-compiled spreadsheet energy consumption
3. Clustering file
4. User's portal- Internal Database



ENERGY AUDITS DATABASE

DATA SOURCES

1. EA reports
2. Pre-compiled spreadsheet energy consumption
3. Clustering file
4. User's portal- Internal Database

Available info for First level benchmark

- General Info: sectorial and geographical
- Class size, certifications and monitoring
- Production (or equivalent)
- Energy final consumption (10 energy carriers)
- Distribution uses: main, auxiliar and general
- Energy Performance Improvement Actions (EPIAs) implemented and identified

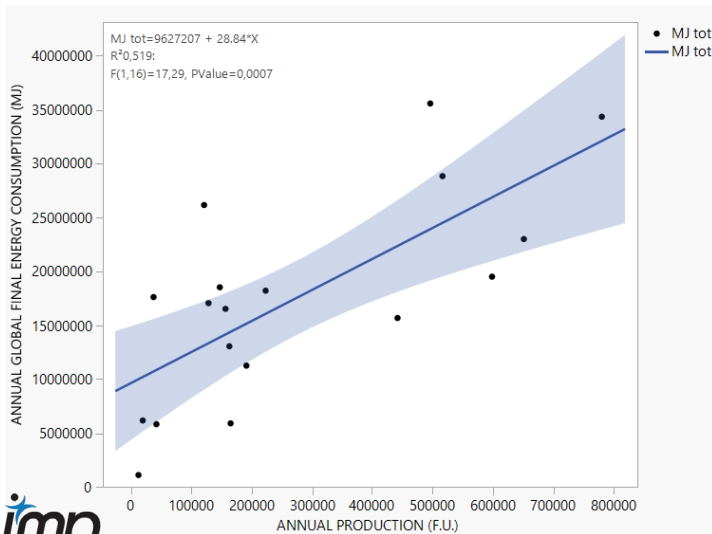
Second level benchmark

- Sectorial models, processes and BAT analysis

BENCHMARKING PROCEDURE

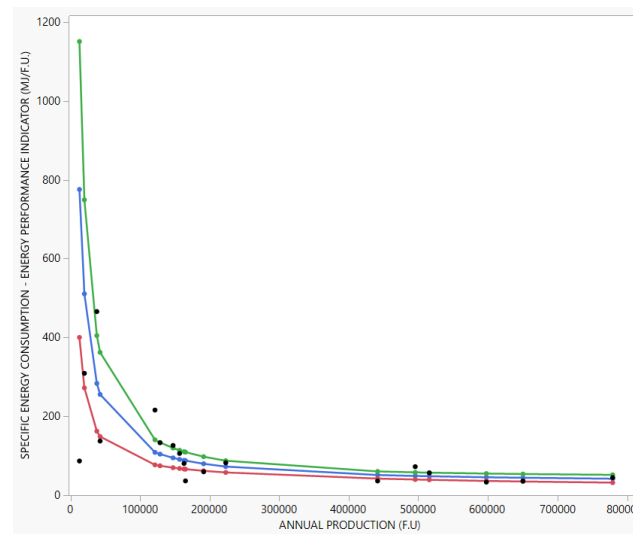
1. Energy final use vs Production

- Data cleaning and homogenization
- Linear regression $En[MJ] = a \cdot Prod[FU] + b$
- Statistical analysis (α , 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	$\sigma > 100\%$

CEMENT	High			
IRON & STEEL	High	Medium	Low	N/A

APPLICATION OF BENCHMARKING

Policy Support – Ministry of Economic Development

- Biannual analysis of electrical EIs *Tax Relief* (222 SEC Ind.) – *Planned Gas EIs*
- Mandatory implementation monitoring systems incentives – *Transition 4.0*
- Tracking implementation EPIAs and energy savings in EIs – *Art. 7 EED*
- Technical specific support and training national (e.g. regulatory issues) and regional (e.g. promotion of EAs call) focused SMEs policies

Sectorial analysis:

- Development Level A-D EPIs and tools
- Market-driven implementation EPIAs and BAT
- Trends of EPIAs and cost effectiveness analysis
- Specific analysis: SMEs, EnMS, monitoring, etc
- Continuous feedback with industrial associations

THANK YOU FOR YOUR ATTENTION

HELPING TO TRANSFORM AN OBLIGATION INTO AN OPPORTUNITY

DUEE-SPS-ESE

Energy Efficiency in the
Economic Sectors Technical
Unit

Energy Audits Working Group

- Marcello Salvio
- Enrico Biele
- Giacomo Bruni
- Alessandra De Santis

- Carlos Herce
- Luigi Leto
- Sergio Luciani
- Chiara Martini
- Fabrizio Martini

- Federico Alberto Tocchetti
- Claudia Toro
- Domenico Santino

STAY TUNED FOR NEWS – STUDIES UNDER PREPARATION FOR 2021

<https://www.efficienzaenergetica.enea.it/>
carlos.herce@enea.it

- **ITALIAN MANUFACTURING 1st LEVEL EPIs**
- **MONOGRAPHY CEMENT, GLASS, CERAMICS**
- **ENERGY ANALYSIS OF EUROPEAN SMEs**
- **IMPACT OF EnMS AND MONITORING IN EPIAs**

This work received funding from Italian Ministry for Economic Development (RdS PTR19-21 - 1.6) and from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 893924



Energy Efficiency Benchmarking based in Energy Audits in Italy
IEA - Expert Workshop on Industry Energy Efficiency Benchmarking - 17th March 2021



[LEAP4SME Project](#)