



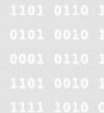
Italian National Agency for New Technologies,
Energy and Sustainable Economic Development



Analysing the behavioural impacts of mandatory Energy Audits

BEHAVE Conference – Session “Improving energy programmes in enterprises: behavioural insights and barriers”- 21st April 2021

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ITALIAN NATIONAL AGENCY
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Outline

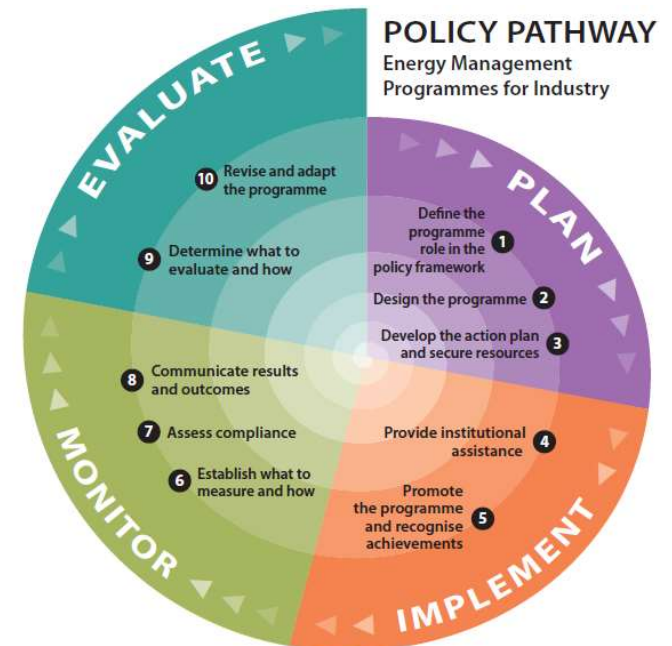
- Literature
- Our approach
- The Italian context and sample
- Results in the manufacturing and tertiary sectors
- Conclusions

State of the literature

- Existence of an extended energy efficiency gap (Backlund et al., 2012)
- Taxonomy of barriers (Sorrel et al., 2000; Cagno et al., 2013; Palm and Thollander, 2010): economic, organizational, behavioural, internal or external to the firm, ..

How would the EU and national targets be achieved?

- Energy Management Programs help energy efficiency (IEA, 2012)
- EE interventions' characteristics do matter (Fleiter, 2012)
- Firm size has an impact on barriers relevance and perception (European Commission, 2019; EIB, 2020)
- Role of industrial networks and socio-technical regimes (Thollander et al., 2018)



Source: IEA, 2012

Our approach

Why this study?

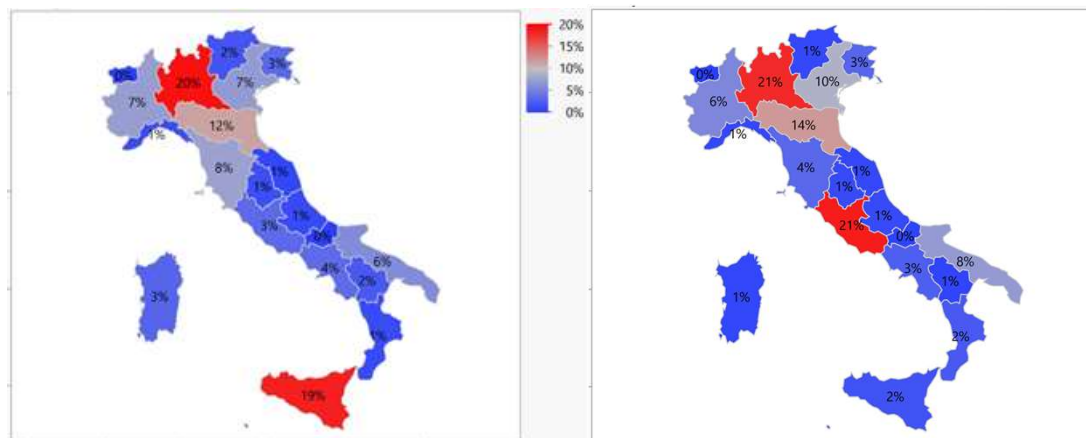
Energy audits may help to better understand the choices on EE interventions

Is Energy Audit perceived as a mere obligation or as an opportunity?

To provide a tentative answer, we analyse:

1. Firms obliged to undertake an energy audit
2. Four different NACE sectors in manufacturing and tertiary
3. Different indicators on Energy Performance Improvement Actions (EPIAs), with focus on general/managerial

Total annual energy saving (%) from implemented EPIAs



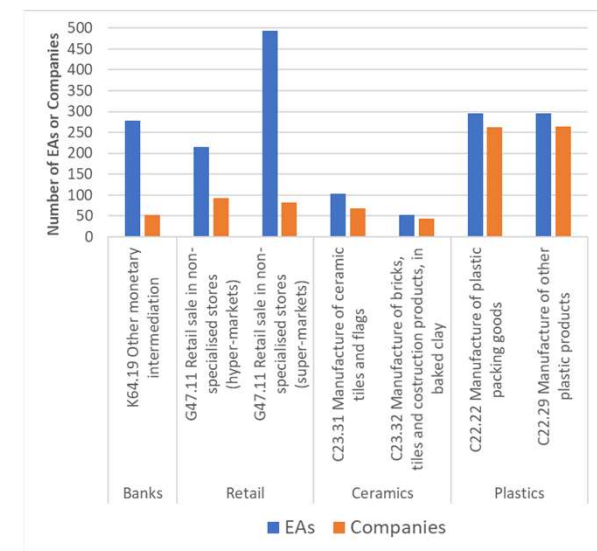
How many variables describe and influence the behaviour behind these maps from EA database?

Our working hypothesis is that knowledge is the first step to plan and act, at the level of firms but also for policy makers

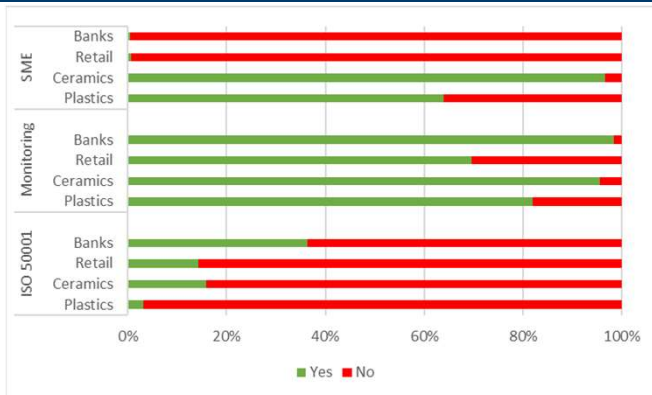
The Italian context

- Legislative Decree 102/2014 (recently updated by Legislative Decree 73/2020) sets an obligation for large enterprises and energy intensive firms to perform a energy audit every 4 years
- Data available or derived from EA
 - EPIA by intervention category per site and company
 - Savings of final energy (toe and % of consumption)
 - Investments and PBT (average and per site)
 - Cost effectiveness by intervention category
- In 2019 7,513 implemented EPIAs (475 toe/year saving of final energy) and 31,261 planned EPIAs (1,69 Mtoe/year)
- Sectors have been chosen for their representativity in terms of the categories examined (ISO 50001 certified, endowed with a monitoring system, energy-intensive SME)

Energy audits sent to ENEA in 2019	11,172
Audited companies	6,434
Large enterprises	3,695
Energy intensive companies	3,109
Energy intensive SME	2,314
ISO 50001 certified companies	405

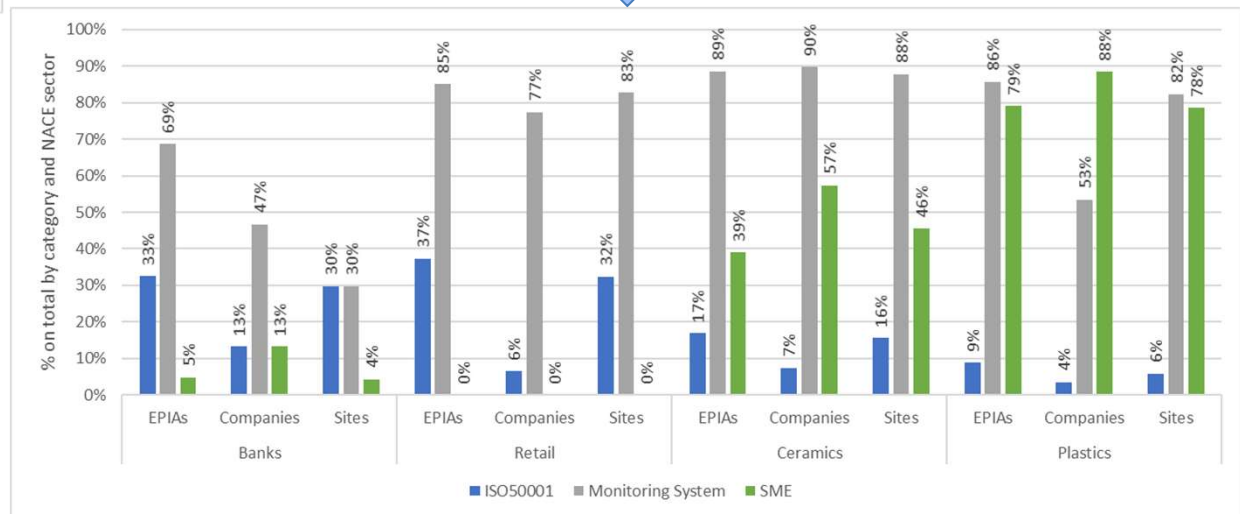


The sample



Shares on the total in the three categories of firms show that:

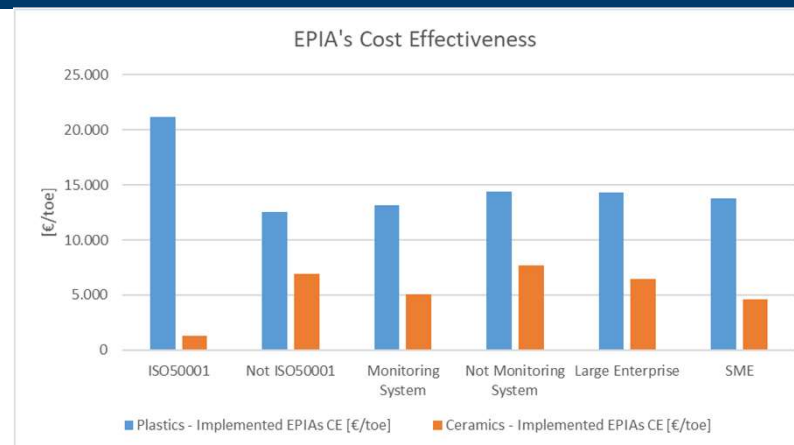
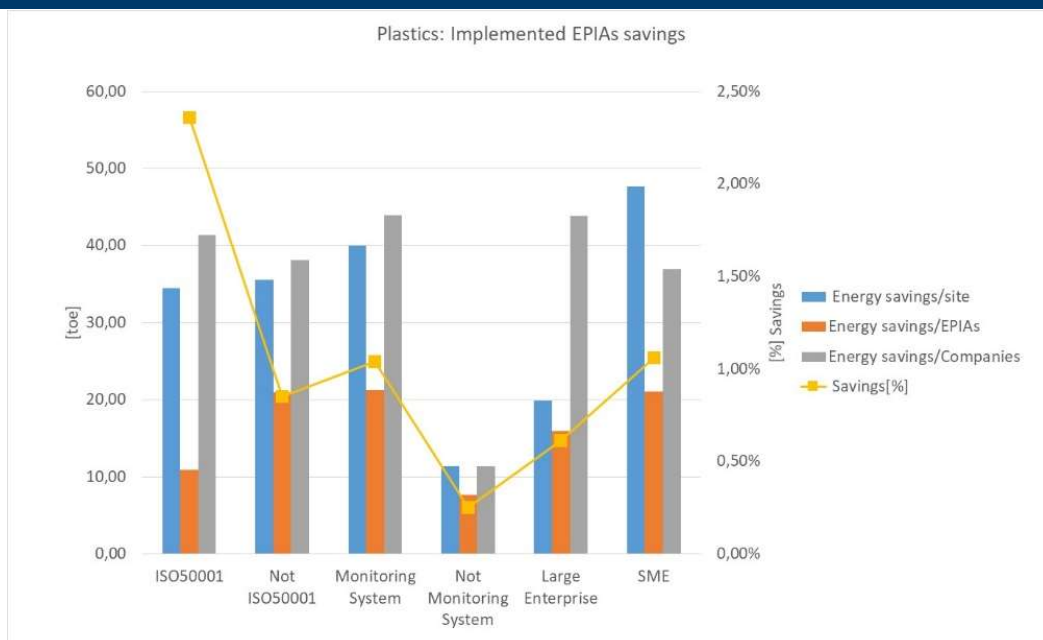
- EPIAs are influenced by the number of EA (sites) but also by specific sectoral patterns
- the sectoral intervention mix needs further analysis
- as well as the role of networks and districts for sharing practices and aggregating projects



Different sectoral patterns of total final energy consumption in terms of ISO 50001 certification, monitoring system and firm size



Results in the manufacturing sector



- ✓ Having a monitoring system positively affects energy saving per site, EPIAs and company
- ✓ Both energy management and monitoring increase savings (%)
- ✓ Higher savings in energy intensive SMEs

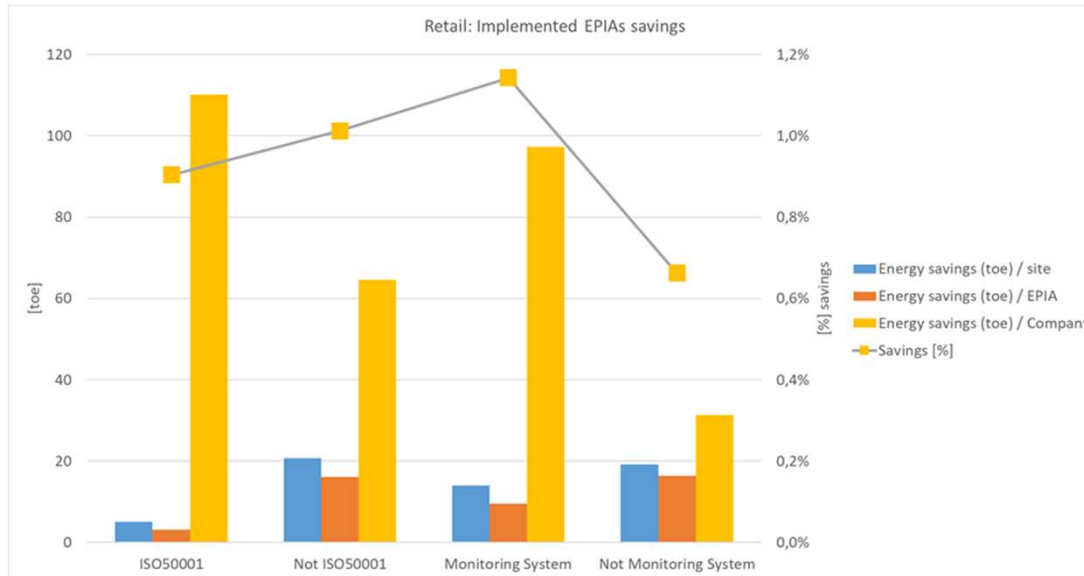


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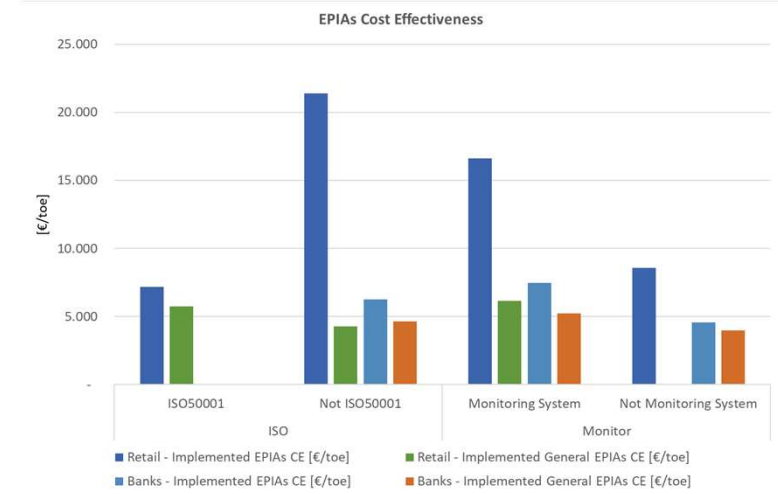
- ✓ Cost effectiveness is the average cost of saving one toe and it depends on the EE intervention mix
- ✓ In Ceramics the positive effects of energy management and monitoring are confirmed, in Plastics only for monitoring
- ✓ Cost effectiveness is better in SMEs



Results in the tertiary sector

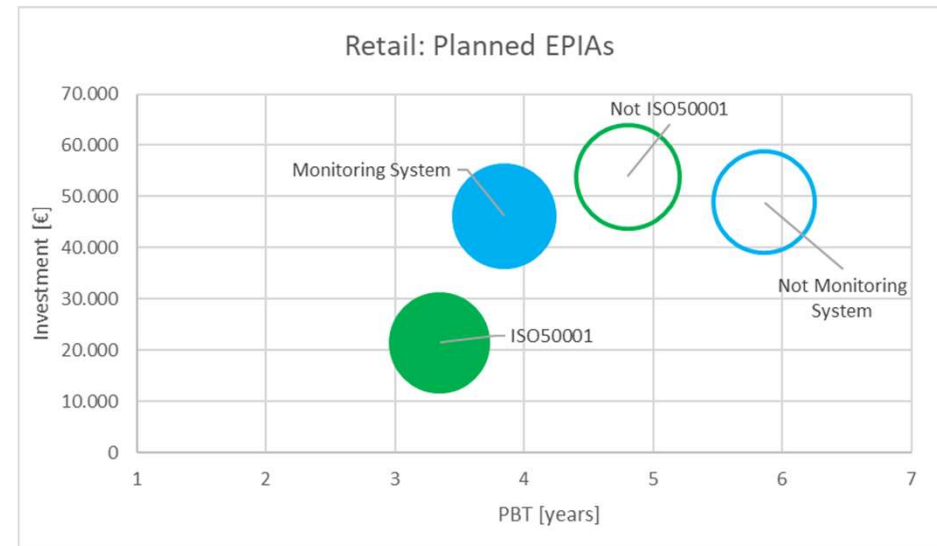
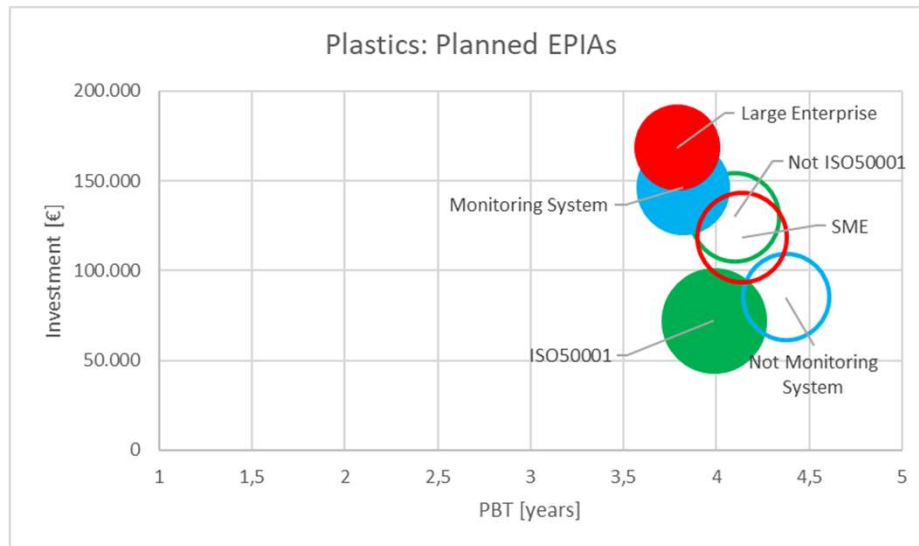


- ✓ Both energy management and monitoring increase energy saving at corporate level, but not at site or EPIA level
- ✓ Having a monitoring system has a significant positive impact on savings (in % of total consumption)



- ✓ Evidence is mixed
- ✓ In tertiary sector general EPIAs are more important in the intervention mix, so their cost effectiveness could be computed
- ✓ The efficiency of investment in General EPIAs is higher than in other categories

Planned EPIAs – manufacturing and tertiary sectors



- Planned EPIAs are not binding and further analysis is needed, in particular relatively to their implementation
- Average investment per site and PBT are shown by firm category and bubble dimension is cost effectiveness
- In Plastics investments by SMEs are lower
- Both energy management and monitoring have a mixed impact on investments but shorten PBT

Overview of results

		EPIAs						Planned EPIAs									
		EPIAs per site [#]	General EPIAs per site [#]	EPIAs savings [toe/site]	General EPIAs savings [toe/site]	EPIAs Savings [%]	EPIAs Cost Effectiveness [€/toe]	General EPIAs Cost Effectiveness [€/toe]	EPIAs per site [#]	General EPIAs per site [#]	EPIAs savings [toe/site]	General EPIAs savings [toe/site]	EPIAs Savings [%]	EPIAs Cost Effectiveness [€/toe]	General EPIAs Cost Effectiveness [€/toe]	EPIAs PBT [y]	General EPIAs PBT [y]
Retail	ISO 50001																
	Monitoring system																
Banks	ISO 50001	na	na	na	na	na	na	na									
	Monitoring system		na														
Plastics	ISO 50001				na			na									
	Monitoring system							na									
	SME							na									
Ceramics	ISO 50001				na			na							na		na
	Monitoring system				na			na									
	SME				na			na									

■ Better performance for enterprises certified ISO 50001, having a Monitoring system or defined as SME
■ Mixed results on performance
■ Not better performance for enterprises certified ISO 50001, having a Monitoring system or defined as SME

- ❖ Relevant role of sectoral characteristics and the distribution of EPIAs among different areas
- ❖ **Implemented EPIAs:** both energy management and monitoring have a positive impact on EPIAs number, and monitoring positively affects savings (%), General EPIAs savings and, in manufacturing, cost effectiveness
- ❖ Mixed results on **planned EPIAs:**
 - slight positive effect of monitoring system on the number of both global and general EPIAs and their PBT
 - positive impact of monitoring system on savings and cost effectiveness of General EPIAs

Conclusions

- Firms in different NACE sectors deal with EE differently and several variables play a role
- In all examined sectors firms with a monitoring system of energy vectors have a higher EPIAs/site ratio: **an energy audit must always be accompanied by a specific monitoring plan to be effective and useful for the company decision-maker**
- This analysis needs to be replicated on other sectors to confirm the achieved findings
- The methodology is also replicable over time and by other countries having similar data
- Interesting to investigate the impacts of new legislation, for example the obligation of implementing one of the planned interventions recently introduced in Italy

With the analysis of EA database we tried to add a piece of information to the puzzle.

Finding ways to transform mere legal obligations in opportunities and to stimulate private investments still is a challenge **..otherwise on what would we work?**

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Thanks for your attention!

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