

Multiple benefits of energy efficiency: methodology and preliminary application to Italian plastic industry

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OBJECTIVE

- The term multiple benefits (MB) aims to capture a reality that is often overlooked: investing in energy efficiency can provide many different benefits to many different stakeholders at firm and macro-economic levels
- Analyze and quantify the multiple benefits of energy efficiency in the Energy Audits could be an effective approach to engage SMEs
- MB are explicitly included in the Art. 11(7) of EED 2023 for not obligated SMEs
- A preliminary framework to quantify the MB of different energy efficiency measures with a focus on the Italian plastic manufacturing industry has been developed
- Previous literature works have been reviewed with focus at company level [1-9]



ODYSEE-MURE [2]

SURVEY ON MULTIPLE BENEFITS IMPORTANCE IN SMEs & ENERGY AGENCIES

127 answers analyzed in LEAP4SME project on multiple benefits perception.

Two main results:

- Lack of awareness** on the potential of some MBs, which can be addressed through tailored training and extended on-site assessments
- Gap in the **perception** of these benefits among different stakeholders, which can be reduced through better dialogue between institutions and the private sector based on scientific evidence

	All SMEs (104)		Industry (41)		Services (61)		Energy Agencies (23)	
	Relevance	Rank	Relevance	Rank	Relevance	Rank	Relevance	Rank
Reducing energy costs	87%	#1	88%	#2	87%	#1	96%	#1
Reducing GHG emissions	82%	#2	90%	#1	77%	#2	74%	#4
Green Marketing	75%	#3	78%	#3	74%	#3	52%	#8
Including renewable energy	71%	#4	73%	#4	70%	#5	78%	#3
Improving air quality	67%	#5	68%	#5	67%	#6	48%	#9
Reducing O&M costs	66%	#6	56%	#8	74%	#4	57%	#5
Increasing the process efficiency	58%	#7	51%	#10	62%	#7	83%	#2
Innovative solutions	56%	#8	56%	#9	56%	#8	43%	#10
Reducing raw materials	55%	#9	61%	#6	51%	#9	57%	#6
Increasing competitiveness	54%	#10	59%	#7	51%	#10	57%	#7
Optimizing water use	49%	#11	49%	#11	49%	#11	22%	#12
Increasing product quality	28%	#12	29%	#12	28%	#12	30%	#11

PRELIMINARY ASSESMENT OF MULTIPLE BENEFITS IMPACT IN ITALIAN PLASTIC INDUSTRY

13 MULTIPLE BENEFIT CATEGORIES IDENTIFIED IN FOUR AREAS:

Application to Plastic Industry

- EPIAs** (Energy Performance Improvement Actions) identified from mandatory energy audits (Art.8 EED)
 - 750 audits from 650 enterprises (mainly SMEs)
 - 700/2500 implemented/potential EPIAs
- 6 EPIAs selected:
 - 3 **specific** to Plastic Industry
 - 3 **cross-sectoral**
- Survey with Business Association "UNIONPLAST"

Product and process related benefits

- Maintenance: reduction of maintenance time increase of production reliability and lifetime
- Process productivity: increase of production rate and shorter cycle time of process
- Product quality: improvement of productivity but also the flexibility of production
- By-products: improvement of production yields per unit of input and reduce by-products

Environmental benefits

- Decarbonization: reduction of energy use and the associated emissions (direct and indirect)
- Water: reduction of water use concern production phases implying water use
- Waste: reduction of wastes to be treated or disposed (waste fuel, heat, gas, hazardous)

Impact on staff and working environment

- Safety: reduction of the risk of workplace accidents and hazards and human errors
- Health and wellbeing: improvement of air quality, control of temperature, etc.
- Awareness: increase in employers' awareness of their active role in saving energy

Other benefits

- Green Marketing: increase of corporate sustainability, environmental and ESG standards
- Regulation compliance: readiness to future standards and current regulation
- Resilience: increase of competitiveness and independent from market fluctuations

ENEA PRELIMINARY ASSESMENT

Area	EPIA	MULTIPLE BENEFITS CATEGORIES												
		Product and process benefits				Environmental savings			Staff and working environment			Other		
		Maintenance	Process productivity	Product quality	Reduction of by-products	Decarbonization	Water	Waste	Safety	Health and wellbeing	Awareness	Green marketing	Regulation compliance	Resilience
Production Lines	Replacement of hydraulic presses with electric or hybrid presses or replacement of extruders	5	5	4	4	4	2	3	4	4	2	4	2	3
	Installation of inverters on motors (for hydraulic presses and extruders)	3	3	1	2	3	-	-	-	2	1	2	2	2
General / Management	Monitoring System	3	3	1	1	2	4	1	-	2	4	4	5	1
Renewable energy production	PV Installation	-	-	-	-	5	-	-	-	3	3	5	4	5
Thermal plant/Heat recovery	Heat recovery from press cooling	-	1	-	-	2	-	2	-	4	2	2	1	2
Compressed Air	Compressor replacement	3	3	1	-	3	-	-	1	4	1	2	2	2

Impact on the MB scale from 1 (low) to 5 (high).

Level of difficulty in MB measurability in green - easily measurable, and yellow – challenging (to be validated with BusinessAssociation)

