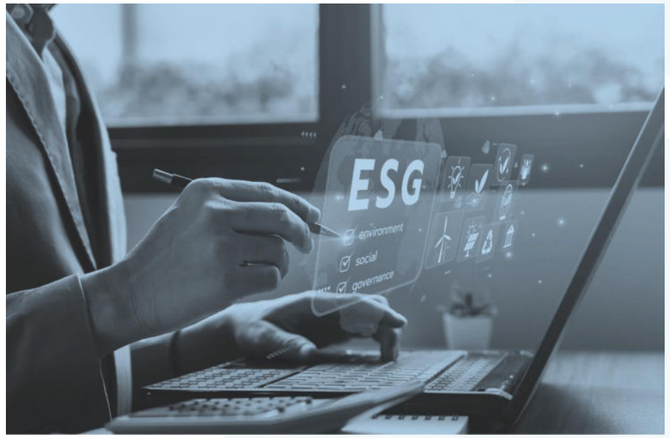
Energy efficiency in SMEs

Ivana Rogulj, IEECP



Barriers & drivers for companies

Source: Agrawal, R. et al. Challenges and opportunities for improving energy efficiency in SMEs: learnings from seven European projects. Energy Efficiency 16, 17 (2023).

Barriers: surrounding

Lack of govt. support
No energy audit obligation at SME level
Perceived legislative and institutional barriers & high bureaucracy
Lack of publicity and transparency
Lack of standardised energy efficiency finance pathways
Lack of information on incentives and tools

Barriers: financial

€

Lack of finances & limited access
High cost of energy efficiency upgrades initial investment
Doubts around actual saving potential

Barriers: internal

Lack of priority & bounded rationality
Lack of knowledge, expertise & competencies about energy efficiency regulations/incentive schemes, lack of technical knowledge, need for training
Lack of communication with executives and board and involvement of employees
Lack of information /awareness
Lack of trust on external energy experts & auditors
Lack of time & commitment

Drivers:

One-stop-shop solution
Self-financing mechanism
Non-energy benefits

Economic benefits from downsizing or elimination of equipment
Tangible economic benefits
Sufficient financial availability for energy efficiency improvements

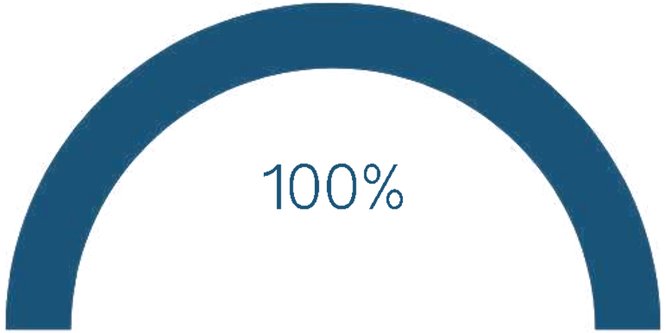
Challenges from the perspective of the National Authorities

(results from interviews & meetings)

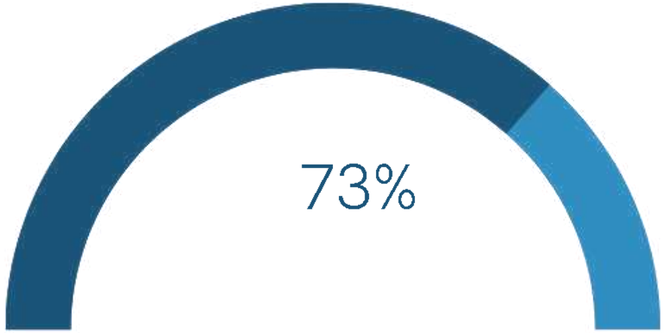
- Limited resources for transposition
- Identification of obligated companies (associated companies, ownership, lack of lists)
- Ensuring compliance (fines)
- Quality of audits (unrecognised value)
- Enhancing the uptake of measures: 

NAs monitor the uptake
- Creation of support mechanisms
- Guidance to SMEs
- Awareness on opportunities
- Compromise between reporting and monitoring effort

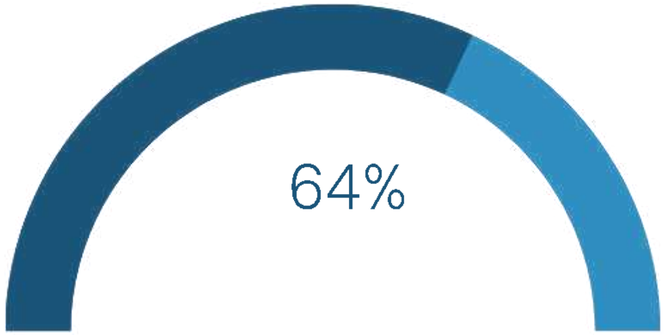
What is already there (for SMEs)



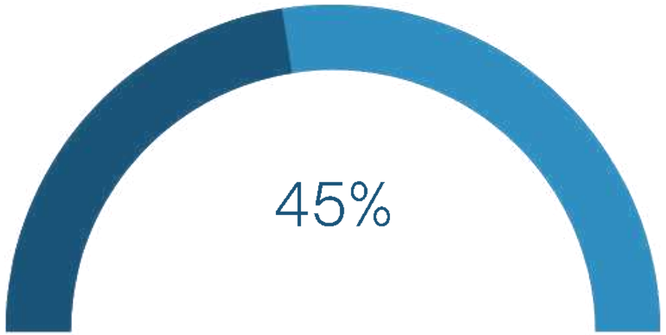
Funding mechanisms (loans, grants etc.)



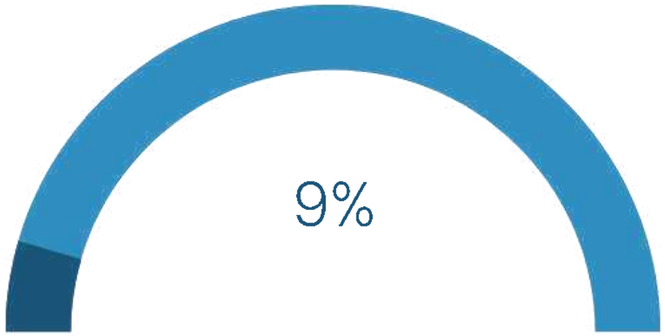
Dedicated tools (IT tools, best practices or case studies etc.)



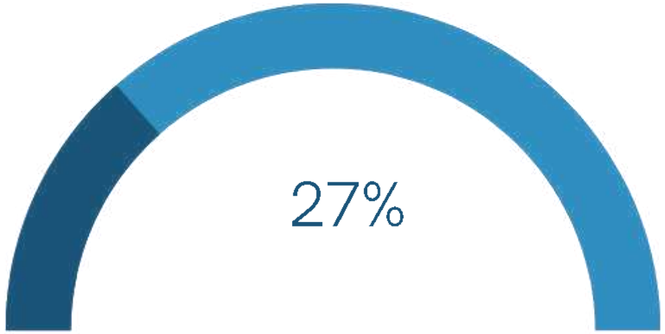
Training and education



Voluntary agreements



Regulatory measures (i.e. requirements)



Fiscal incentives

Source: H2020 DEESME (Fraunhofer ISI/KAPE)

DEESME 2050

What could help? (extract from discussion in workshops with hundreds of key stakeholders):

01_Create a set of structured guidelines for NAs and companies - from audit to investment

02_Inform on Non-Energy Benefits (multiple benefits) related to energy efficiency

03_Carbon Footprint calculation, sustainability, ESG (Compromise between reporting and monitoring effort for companies)

04_Benchmarking approach

05_Overcome the information barrier (hub/one stop shop)

01.1_Create a set of structured guidelines for NAs

A: Inventory of needs and requirements of NAs	B: Requirement-based report on best-practice for policies	C: Generic guideline on best-practice
Survey/interviews with NAs	Reviews/interviews with NAs	

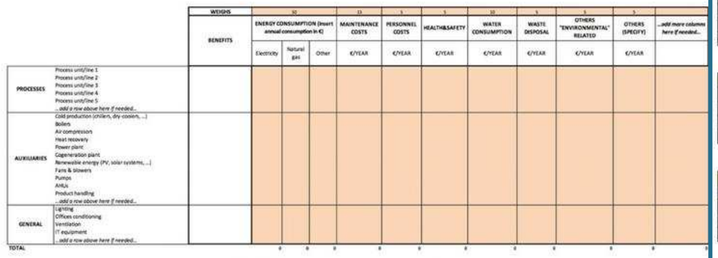
01.2_Create a set of structured guidelines for companies - from audit to investment

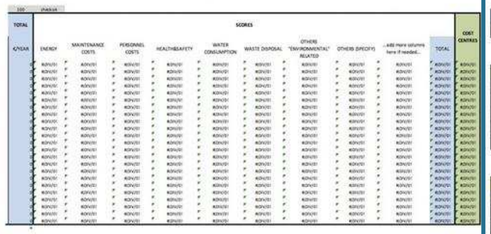
DEESME approach basic training, Level 1

DEESME advanced basic training, Level 2

2.Cost structure analysis

- **Goal of the Cost Structure:** examines all types of cost necessary to complete the production process and helps identifying opportunities for improved resource efficiency and how they can contribute to the business objectives.
- **Data:** needed from the company.
- **Note:** this step is additional to the Business Model analysis and the companies can perform it optionally.

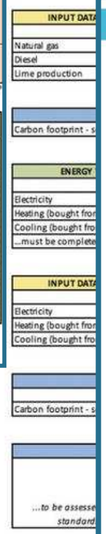




- Scope 1: Direct GHG emissions
- Scope 2: Indirect GHG emissions
- Scope 3: Other indirect GHG emissions

FUEL EMISSION FACTORS	Unit	Value	Source
Natural gas	tCO2/10000Sm3	1,972	to be added...
Diesel	tCO2/t	3,155	to be added...
Oil	tCO2/t	3,14	to be added...
...must be completed with all possible fuels...			

PROCESS EMISSION FACTORS	Unit	Value	Source
Lime production	tCO2/t lime	0,477	to be added...
Clinker production	tCO2/t clinker	0,507	to be added...
...must be completed with all possible processes...			



3.Energy auditing

- **Goal of the energy auditing:** assess the current status of energy use in a company and identify and implement energy savings and efficiency measures adapted to the organisation's needs while making energy use more cost effectively and environmentally friendly.
- **Data:** collected by the energy auditor in cooperation with the organization with regard to the energy used by sites, systems, processes and equipment.
- **Note:** steps performed in an energy audit process according to DIN EN 16247-1:

  - Introductory contact
  - Kick-off meeting
  - Data collection
  - Field work
  - Analysis
  - Report
  - Final meeting

- Most urgent actions to be executed
- Actions to be implemented 1-2 months after the report
- Actions to be implemented 2 months or more after the report

Key Area	Observations/findings	Recommendations		
		A	B	C
Operations	E.g. Failures in certain appliances	Remove any faulty appliances located in the building	Replace faulty appliances with new ones with more innovative technologies	Make use of conservation and efficiency mechanisms to reduce the energy consumption.

02_Inform on Non-Energy Benefits (multiple benefits)

- Use of waste fuels, heat, gas
- Product waste
- Waste water and hazardous waste
- Materials reduction

- Dust emissions
- Gas emissions (CO, CO2, NOx, SOx)

- Need for engineering controls
- Cooling requirements
- Facility reliability
- Wear and tear
- Labour requirements

Benefits of energy efficiency in companies

- Product output/yield
- Performance
- Reliability
- Product quality/purity
- Process cycle times

- Lighting
- Temperature control
- Air quality
- Noise levels
- Need for personal protective equipment

- Image
- Liabilities
- Delayed or reduced capital expenditures
- Space requirements
- Worker morale

02.3_Inform on Non-Energy Benefits (multiple benefits)

Example of results from DEESME BG

MB Analysis

- Increased **productivity** (13/13)
- Introduction of **new 'green' products/services** (8/13)
- Improved **maintenance, quality and safety** (13/13)
- Acquisition of **new customers** (13/13)
- Increased **customer satisfaction** (11/13)

BM Sustainability Advancement

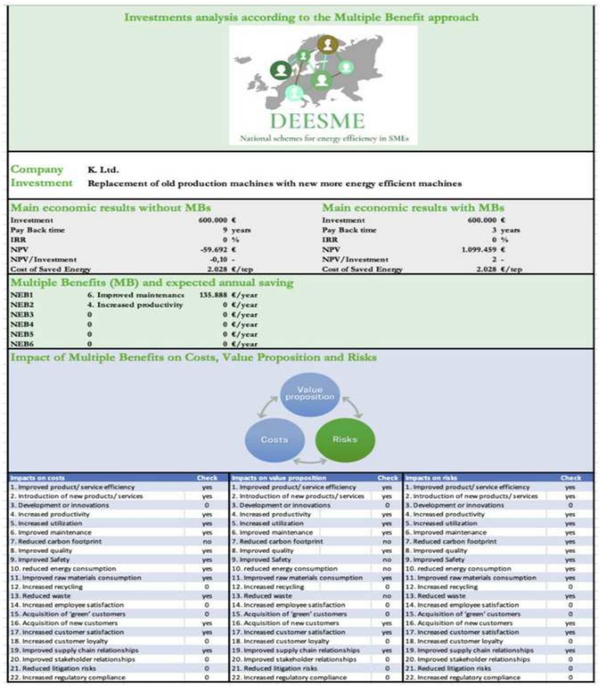
- **Value Proposition**: upcycling of leftovers, product complexity ↑
- **Key partners:** relationship with suppliers and customers ↑
- **Cost Structure:** energy and raw materials use ↓, maintenance costs

03_ CBA, sustainability, ESG

IMPORTANT ASPECT:

Standardisation & alignment with VALERI standard

(Valuation of Energy Related Investments)



Investments analysis according to the Multiple Benefit approach

DEESME
National schemes for energy efficiency in SMEs

Company K. Ltd.
Investment Replacement of old production machines with new more energy efficient machines

Main economic results without MBs		Main economic results with MBs	
Investment	600.000 €	Investment	600.000 €
Pay Back time	9 years	Pay Back time	3 years
IRR	0 %	IRR	0 %
NPV	-59.692 €	NPV	1.099.459 €
NPV/Investment	-0,10 -	NPV/Investment	2 -
Cost of Saved Energy	2.028 €/tep	Cost of Saved Energy	2.028 €/tep

Multiple Benefits (MB) and expected annual saving

NEB1	6. Improved maintenance	135.888	€/year
NEB2	4. Increased productivity	0	€/year
NEB3	0	0	€/year
NEB4	0	0	€/year
NEB5	0	0	€/year
NEB6	0	0	€/year

Impact of Multiple Benefits on Costs, Value Proposition and Risks

Impacts on costs	Check	Impacts on value proposition	Check	Impacts on risks	Check
1. Improved product/ service efficiency	yes	1. Improved product/ service efficiency	yes	1. Improved product/ service efficiency	yes
2. Introduction of new products/ services	yes	2. Introduction of new products/ services	yes	2. Introduction of new products/ services	yes
3. Development or innovations	0	3. Development or innovations	0	3. Development or innovations	0
4. Increased productivity	yes	4. Increased productivity	yes	4. Increased productivity	yes
5. Increased utilization	yes	5. Increased utilization	yes	5. Increased utilization	yes
6. Improved maintenance	yes	6. Improved maintenance	yes	6. Improved maintenance	yes
7. Reduced carbon footprint	no	7. Reduced carbon footprint	no	7. Reduced carbon footprint	yes
8. Improved quality	yes	8. Improved quality	yes	8. Improved quality	yes
9. Improved Safety	yes	9. Improved Safety	no	9. Improved Safety	yes
10. reduced energy consumption	yes	10. reduced energy consumption	no	10. reduced energy consumption	yes
11. Improved raw materials consumption	yes	11. Improved raw materials consumption	yes	11. Improved raw materials consumption	yes
12. Increased recycling	0	12. Increased recycling	0	12. Increased recycling	0
13. Reduced waste	yes	13. Reduced waste	no	13. Reduced waste	yes
14. Increased employee satisfaction	0	14. Increased employee satisfaction	0	14. Increased employee satisfaction	0
15. Acquisition of 'green' customers	0	15. Acquisition of 'green' customers	0	15. Acquisition of 'green' customers	0
16. Acquisition of new customers	yes	16. Acquisition of new customers	yes	16. Acquisition of new customers	yes
17. Increased customer satisfaction	yes	17. Increased customer satisfaction	yes	17. Increased customer satisfaction	yes
18. Increased customer loyalty	0	18. Increased customer loyalty	0	18. Increased customer loyalty	0
19. Improved supply chain relationships	yes	19. Improved supply chain relationships	yes	19. Improved supply chain relationships	yes
20. Improved stakeholder relationships	0	20. Improved stakeholder relationships	0	20. Improved stakeholder relationships	0
21. Reduced litigation risks	0	21. Reduced litigation risks	0	21. Reduced litigation risks	0
22. Increased regulatory compliance	0	22. Increased regulatory compliance	0	22. Increased regulatory compliance	0

Results from an Italian company audited

Net Present Value

Results without Multiple Benefits	440.224 €
Results with Multiple Benefits	1.480.908 €

Internal Rate of Return

Results without Multiple Benefits	17%
Results with Multiple Benefits	43%

Payback time

Results without Multiple Benefits	5 years
Results with Multiple Benefits	2 years

0301_ CBA, sustainability, ESG

LOADING ...

ESRS-E1 climate change

Governance

- **Disclosure requirement related to ESRS 2 GOV-3:** Integration of sustainability-related performance in incentive schemes

Strategy

- **E1-1:** Transition plan for climate change mitigation
- **Disclosure requirement related to ESRS 2 SBM-3:** Material impacts, risks and opportunities and their interaction with strategy and business model(s)

Metrics & targets

- **E1-4:** Targets related to climate change mitigation and adaptation
- **E1-5:** Energy consumption and mix (incl. intensity)
- **E1-6:** Gross scopes 1, 2, 3 and total GHG emissions (incl. intensity)
- **E1-7:** GHG removals and GHG mitigation projects financed through carbon credits
- **E1-8:** Internal carbon pricing
- **E1-9:** Potential financial effects from material physical risks, material transition risks and climate-related opportunities

IRO management

- **Disclosure requirement related to ESRS 2 IRO-1:** Description of the processes to identify and assess material climate-related impacts, risks and opportunities
- E1-2: Policies related to climate change mitigation and adaptation
- E1-3: Action plans and resources in relation to climate change policies and targets

Source: DEESME 2050 (SOGESCA LTD.)

04_Benchmarking approach & supply chain sustainability

LOADING ...

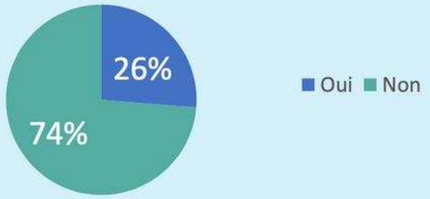
DEESME Benchmarking Report:

DEESME 2050

mt partenaires Ingénierie

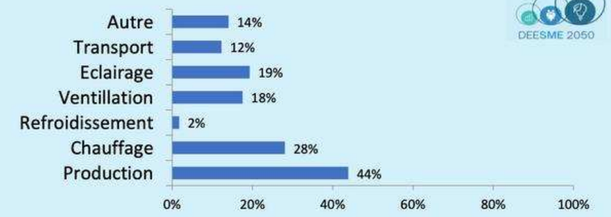
Le rapport résume graphiquement les résultats de l'enquête par questionnaire menée par MT-Partenaire auprès des entreprises du secteur de l'ameublement. Le rapport compare les informations recueillies dans le cadre de l'enquête.OPTIMUM SAS and 57 Autres entreprises

12. Avez-vous réalisé un audit énergétique au cours des trois dernières années ?



Votre réponseNon

13. quels sont vos 3 postes énergétiques les plus importants ?



Votre réponse

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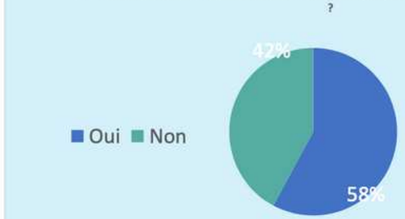
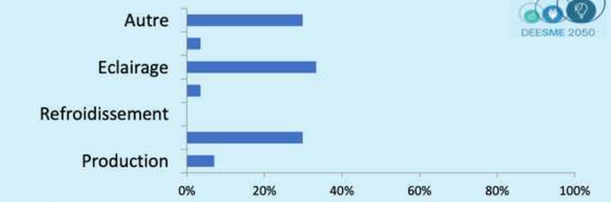
DEESME Benchmarking Report:

14. Avez-vous investi dans des actions d'efficacité énergétique au cours des cinq dernières années ?



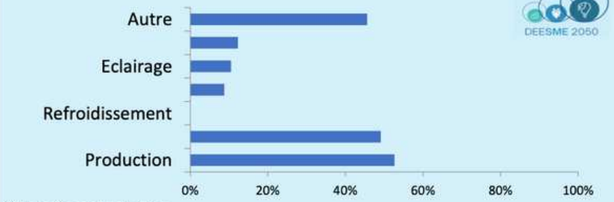
Votre réponseNon

15. les 3 principaux investissements réalisés pour l'efficacité énergétique ?



Votre réponse

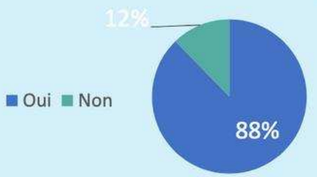
16. Qu'aimeriez-vous améliorer dans votre entreprise en matière d'efficacité énergétique au cours des trois prochaines années ?



Votre réponseProduction

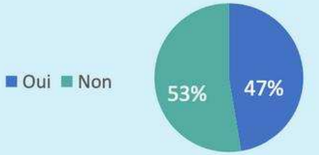
DEESME Benchmarking Report:

17. Votre entreprise est-elle consciente des avantages indirectes de la mise en œuvre d'actions d'efficacité énergétique ?



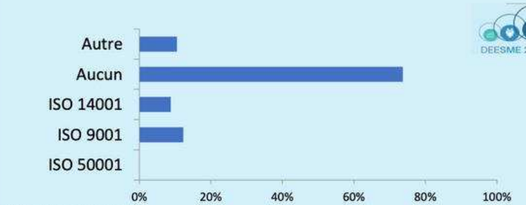
Votre réponseOui

18. Avez-vous nommé, officiellement ou non, une personne responsable des questions énergétiques ?



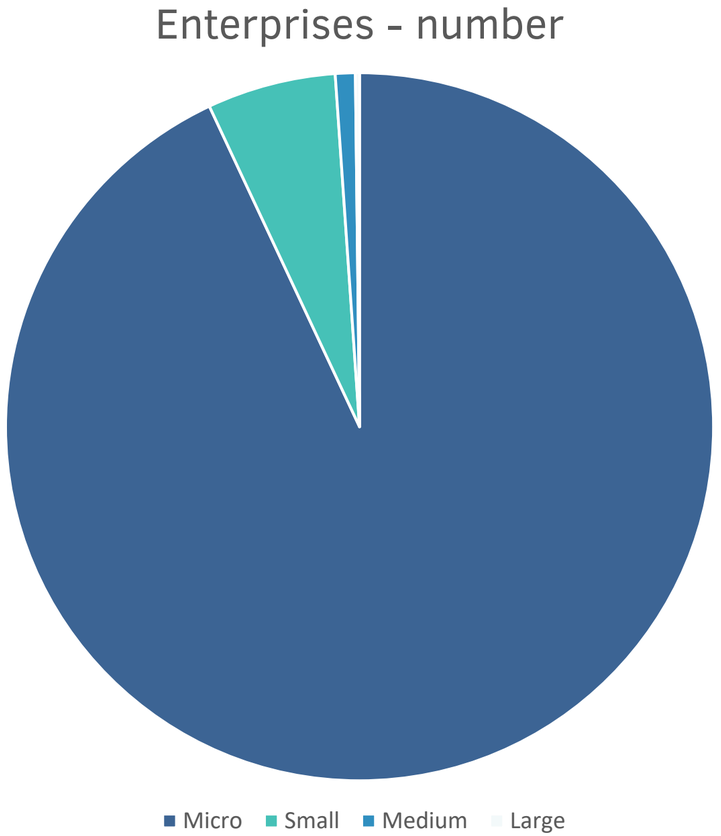
Votre réponseNon

19. Quels sont les systèmes de management adoptés par l'entreprise ?



Votre réponseAucun

05_Overcome the information barrier



Thank you!

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