CHANCES FOR CHANGES

TAILORING ENERGY-EFFICIENCY MEASURES TO TARGET GROUPS

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Panel 1-A Policies and programmes
Tailoring energy efficiency policies to target groups

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Idea and research questions

- Each sector needs to contribute to energy efficiency targets
- Even within sectors: Companies with differing energy intensity, concerns and requirements

- Gathering information on opportunities is effortful
- Proposing measures to target groups facilitates search

Research questions:

- What are the most hindering barriers to energy efficiency measures (EEMs) and what is their relation specific types of companies?

- Fit of specific measures for specific kinds of companies?

- How can policy address companies to tap unused potentials?

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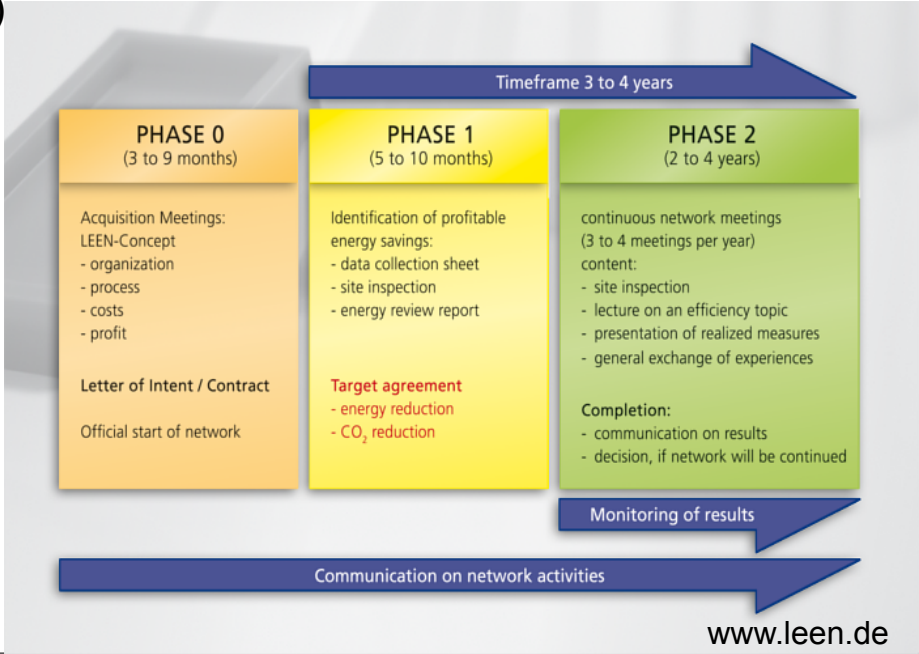
Data and Sample

- 263 participating companies in energy efficiency networks (LEEN, 2009 – 2014)
- Groups of 10 – 14 companies
- Energy audit, energy saving target and exchange of experiences
- Survey data on barriers, companies‘ characteristics and implemented energy efficiency measures (EEMs)



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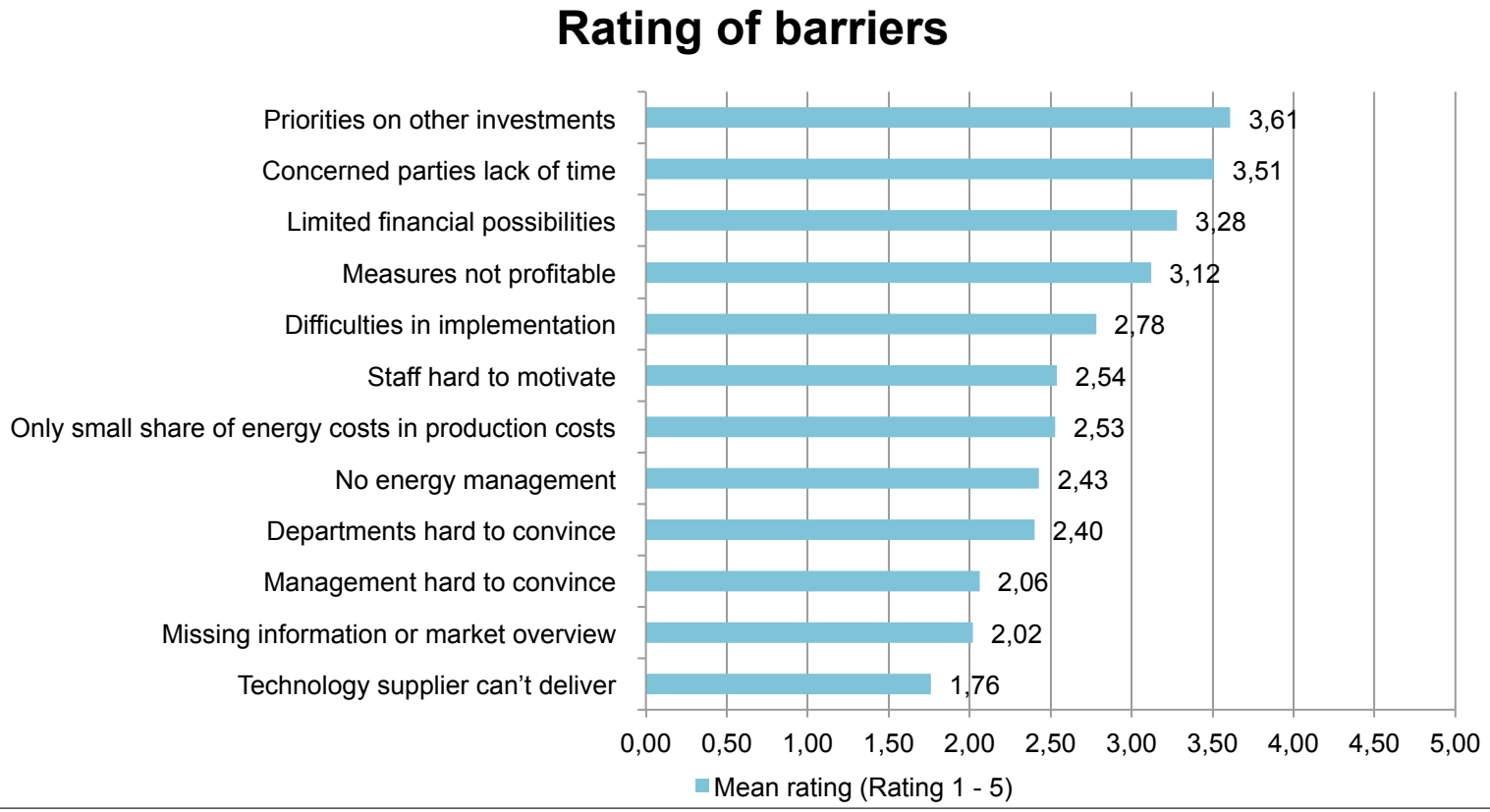
Results
Barriers

Largest experienced barriers in implementation of EEMs are related to time and money



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Results
Barriers – main factors

Factor analysis of barriers:

Items (barriers)	**Description**	**Mean of scale (SD)**	**Taxonomy cp. Cagno et al (2013)**
•*Limited financial possibilities* •*Priorities on other investments* •*Measures not profitable*	Financial/ economic restrictions	3.33 (.98)	economic barriers
•*Difficulties in implementation* •*No energy management* •*Concerned parties lack of time*	Constraints in technical/ structural circumstances	2.90 (.83)	organisational, technology-related and competence-related barriers
•*Management hard to convince* •*Departments hard to convince* •*Staff hard to motivate* •*Only small share of energy costs in production costs*	Motivation/ internal relevance	2.38 (.79)	behavioral barriers
•*Missing information or market overview* •*Technology supplier can't deliver*	Deficits in information or external market-related factors	1.90 (.79)	information-related/ awareness barriers

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Results
Companies‘ characteristics

Companies‘ characteristics taken into account:

- Number of employees
- Relatedness to customer
- Autonomy of company
- Energy costs
- Energy intensity (MWh/ employee)
- Decision making on investments
  (rate of return, amount of invested money, organisational effort, saving potential)
- Cluster of sectors (high, medium, low energy intensity processes)

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Results
Barriers and companies‘ characteristics

Connection to companies‘ characteristics

Items (barriers)	Description	Mean of scale (SD)	Influencing variables (ß)
•*Limited financial possibilities* •*Priorities on other investments* •*Measures not profitable*	Financial/ economic restrictions	3.33 (.98)	Decision based on amount of expenses** (0.18) Company part of corporation* (0.13)
•*Difficulties in implementation* •*No energy management* •*Concerned parties lack of time*	Constraints in technical/ structural circumstances	2.90 (.83)	
•*Management hard to convince* •*Departments hard to convince* •*Staff hard to motivate* •*Only small share of energy costs in production costs*	Motivation/ internal relevance	2.38 (.79)	Number of employees*** (0.26) Energy costs* (-0.18) Cluster subsector 3* (-0.15)
•*Missing information or market overview* •*Technology supplier can’t deliver*	Deficits in information or external market-related factors	1.90 (.79)	

Autonomy of enterprise: 0 = autonomous; 1 = part of another corporation
Level of significance: * = p≤.05, ** = p≤.01; *** = p≤.001; all models: $R^2 < 0.1$

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Results
Barriers – SME and LE

Factor	SME		LE	
	Variables of significant influence (ß)	mean	**Variables of significant influence (ß)**	mean
Financial / economic restrictions	Decision based on amount of expenses*** (0.46)	3.2		3.3
Constraints in technical / structural circumstances	Number of employees** (0.36) Energy costs* (-0.35) Decision based on amount of expenses* (0.27) Decision based on organizational effort** (0.30)	3.2		3.3
Motivation / internal relevance	Number of employees* (0.26) Energy intensity** (0.46) Energy costs* (-0.40)	2.1**	Number of employees* (0.21) Decision based on organizational effort** (0.25)	2.5**
Deficits in information or external market-related factors		2.1*	Decision based on amount of expenses** (-0.27)	1.8*

→ SME are not like large enterprises „just smaller“

Level of significance: * = p≤.05, ** = p≤.01; *** = p≤.001; all models: $0.15 < R^2 < 0.3$

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Results

Measures and target groups

Company size predicts number of implemented EEMs

Energy efficiency measure	Company characteristics influencing implementation	Average difference in company characteristics
1 production of heat	-	
2 refrigeration	-	
3 ventilation and air-conditioning technology (VAC)	Larger number of employees Lower energy intensity Less often cluster 3	488 vs. 1122 283.48 vs. 102.47 MWh/ employee 41% vs. 30%
4 lighting	Higher motivational barriers	2.22 vs. 2.66
5 compressed air	Higher motivational barriers	2.31 vs. 2.69
6 building envelope	Lower energy intensity More often in cluster 2	267.62 vs. 80.98 MWh/ employee 41% vs. 58%
7 utilization of waste heat	Lower energy intensity	291.89 vs. 118.81 MWh/ employee
8 motors and pumps	Higher organizational barriers	2.88 vs. 3.23
9 distribution of heat, cooling and compressed air	-	
10 organizational measures	Larger number of employees	449 vs. 908
11 other measures	Higher energy intensity	119.24 vs. 296.10 MWh/ employee

Large, non-energy intensive companies no energy-intensive processes

Implementation with less effort

Companies with low energy-intensity - lacking technologies with efficiency potential

more sensible and necessarily given a larger number of employees

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Conclusions

- Financial issues always play a role – **BUT:** (unfavorable) decision-making on amount of expenses might be the root of this problem
- Large enterprises conduct more efficiency measures than SME
- SME and LE face barriers with different origins and side effects
- SME should be treated separately and are inhomogeneous, too
- SME have lower energy costs, energy issues are of minor relevance, no person in charge

  → Rarely engagement in EEMs → Easy accessible potentials yet untouched

  → **BUT:** transaction costs need to be low

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Conclusions for policies

- Generating information about possibilities is effortful

→ One-stop-solutions instead of gathering information

→ SME:

  - funding audits (although not obligatory)
  - recommendations for target groups
  - development of self-assessments on easy accessible information

- Only profitable measures were suggested
- Companies neglect options i.a. due to unsuited risk indicator of short payback periods

→ Incentivize forward-looking investment behavior instead of funding the shortfall to rejected measures

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Thank you for your attention !

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Backup
Clustering of companies

N = 263	1 low energy intensive processes n=50 (SME = 24%)	2 medium energy intensive processes n=116 (SME = 33%)	3 high energy intensive processes n=97 (SME = 53%)
(NACE) Subsectors of manufacturing sector	e.g.: (14) wearing apparel (15) leather and related products (16) wood and of products of wood and cork, except furniture (18) printing and reproduction of recorded media (26) computer, electronic and optical products (27) electrical equipment (31) furniture (33) Repair and installation of machinery and equipment ...	(10) food products (25) fabricated metal products, except machinery and equipment (28) machinery and equipment n.e.c. (29) motor vehicles, trailers and semi-trailers (30) other transport equipment (32) other manufacturing	(13) textiles (17) pulp and paper products (19) coke and refined petroleum products (20) chemicals and chemical products (22) rubber and plastic products (23) other non-metallic mineral products (24) basic metals