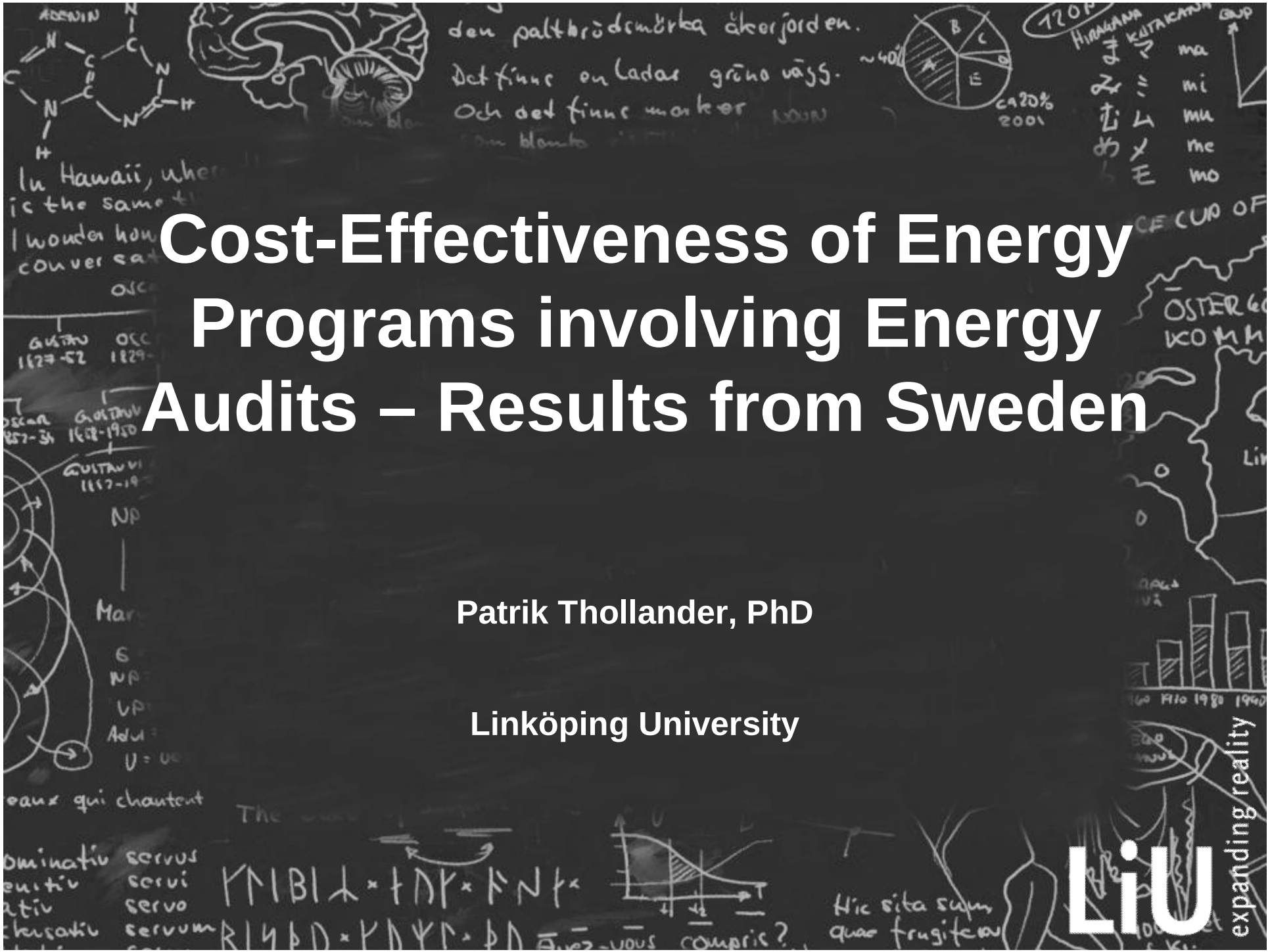

Cost-Effectiveness of Energy Programs involving Energy Audits – Results from Sweden

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LiU expanding reality

Disposition

- Introduction
- Aim and research design
- Results and conclusion

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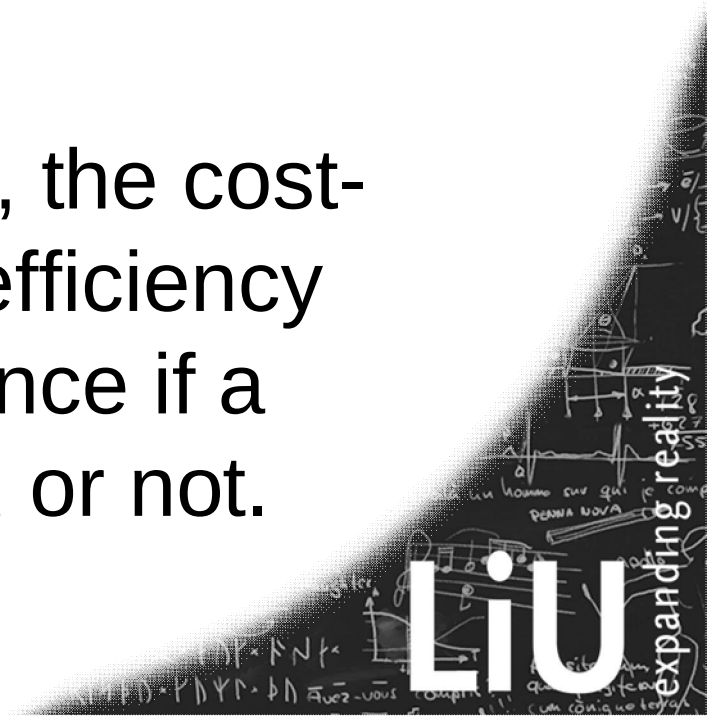
Introduction

•Energy programs including energy audits are cited as one of the most promising means to increase energy efficiency and reduce GHG emissions.

•From a public point of view, the cost-effectiveness of an energy efficiency program is of major importance if a program is to be considered or not.

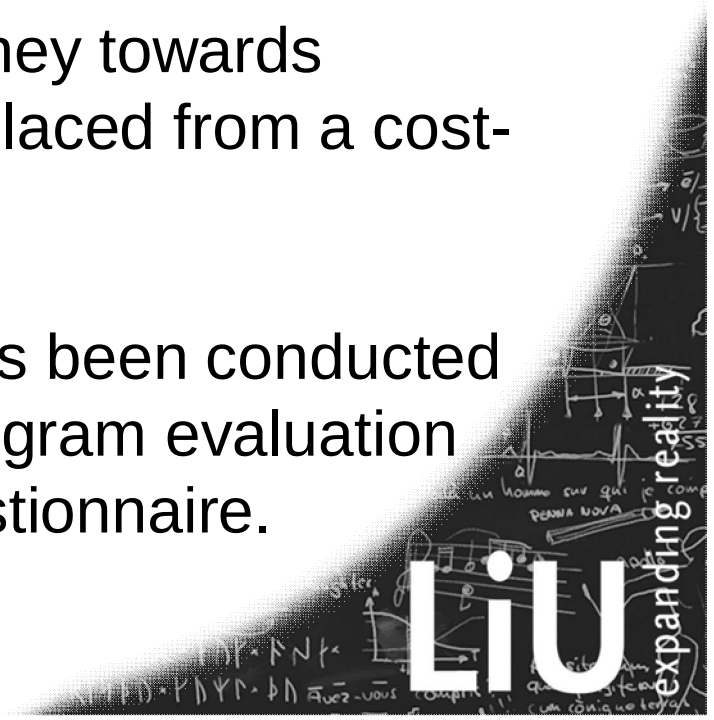


Aim and research design

•The aim of this paper is to outline results from the two largest Swedish energy efficiency programs, project Highland and the PFE (Program for improving energy efficiency in energy-intensive industry), in terms of the program's cost-effectiveness.

•Research question: where public money towards energy end-use programs should be placed from a cost-effectiveness point of view?

•The evaluation made in this paper has been conducted through a literature review, energy program evaluation methodology, case study using a questionnaire.



The PFE

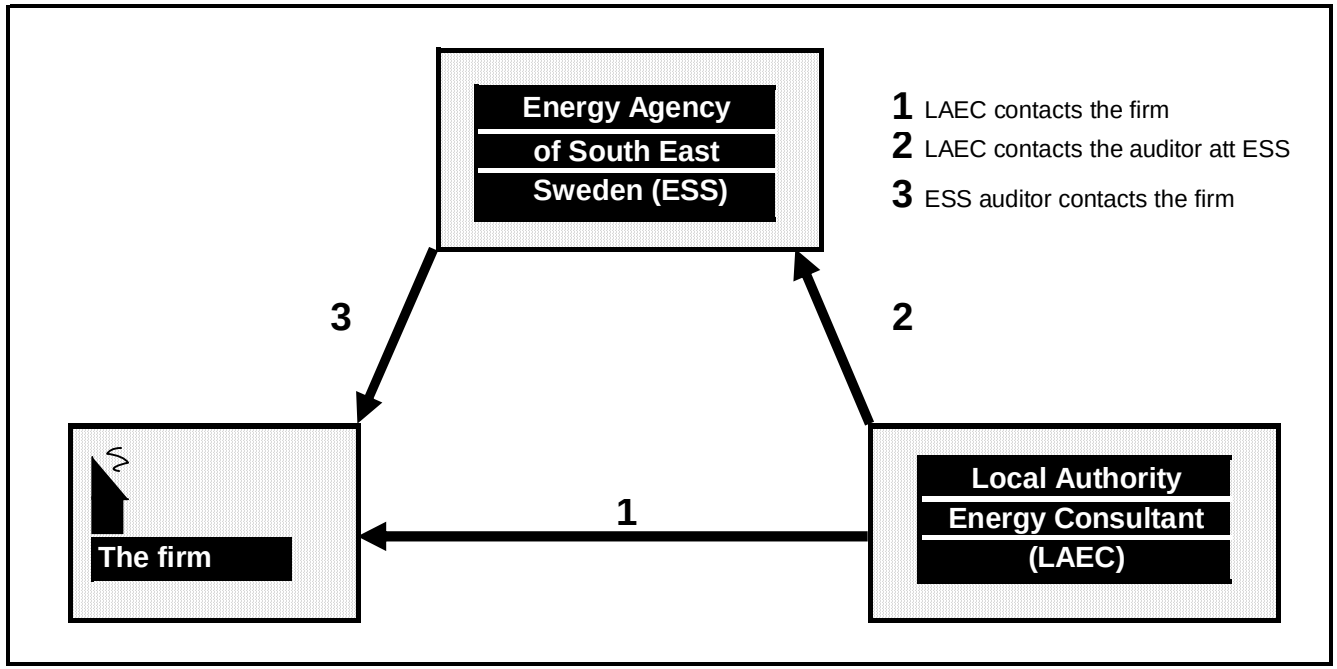
- The PFE (program for improving energy efficiency in energy-intensive industries) was initiated in 2005 and is an LTA (Long-Term Agreement) between the Swedish authorities and the electricity-intensive Swedish industry.
- Electricity-intensive firms are offered a discount of 0.55 €/MWh on the electricity tax for Swedish industry if the company fulfils the requirements.
- Of the approximately 1,200 firms that are eligible for participation, only about 120 have joined the program.

Reference: Ottosson and Petersson, 2007.

Project Highland

•Project Highland was the largest Swedish energy program since the 1990 targeting the adoption of energy efficiency measures in Sweden, funded partly by the EU's Program Objective 2 South of Sweden.

•The program offered energy audits in six municipalities. A total of about 340 energy audits where conducted, of which approximately 140 audits, were directed towards the industrial sector and the rest towards the services and sales sector.

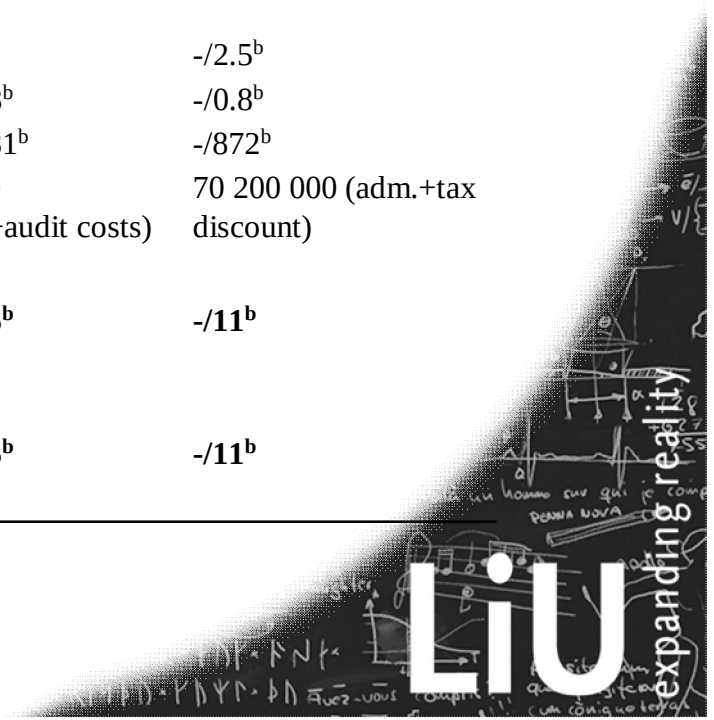


Reference: Thollander et al., 2007

[a] Thollander et al. (2007).
[b] Implemented/planned & implemented.

Results

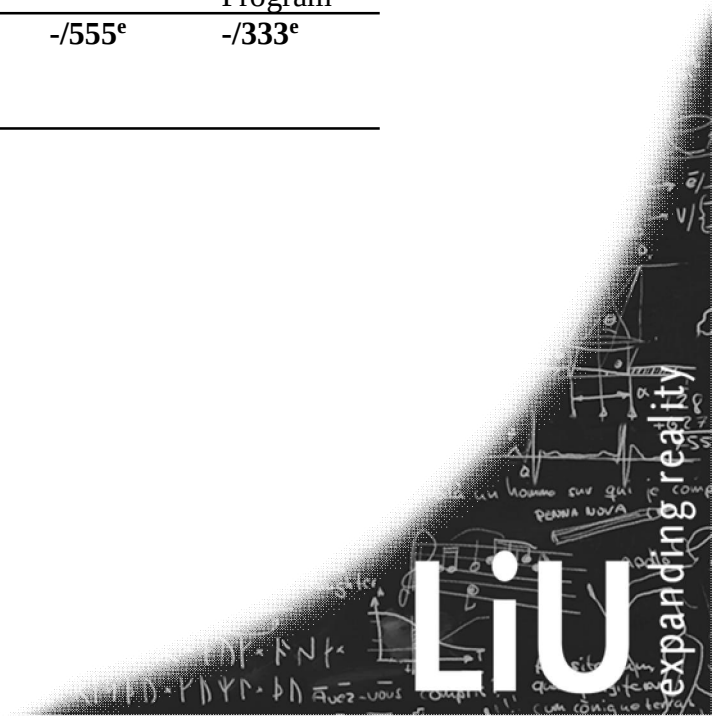
	Service and sales firms in project Highland	Industrial firms in project Highland[a]	PFE[a]
Number of firms	28	47	98
Electricity savings (GWh/year)	0.2/0.35	4/10[b]	-/765[b]
Total energy savings, including electricity (GWh/year)	0.35/0.7[b]	7/16[b]	-/808[b]
Total electricity saving (%)	3/6[b]	4/10[b]	-/2.5[b]
Total energy savings (%)	3/6[b]	3.8/8.8[b]	-/0.8[b]
Number of measures	48/90[b]	142/281[b]	-/872[b]
Subsidy, including program administration (EUR)	42 600	81 600 (adm.+audit costs)	70 200 000 (adm.+tax discount)
Cost-effectiveness for solely electricity measures (kWh/EUR)	**4/7[b]**	**47/125[b]**	**-/11[b]**
Cost-effectiveness for all measures (kWh/EUR)	**8/15[b]**	**86/195[b]**	**-/11[b]**



[a] Thollander et al. (2007).
[b] Väisenen et al., 2003.
[c] Implemented/planned & implemented.

Validation

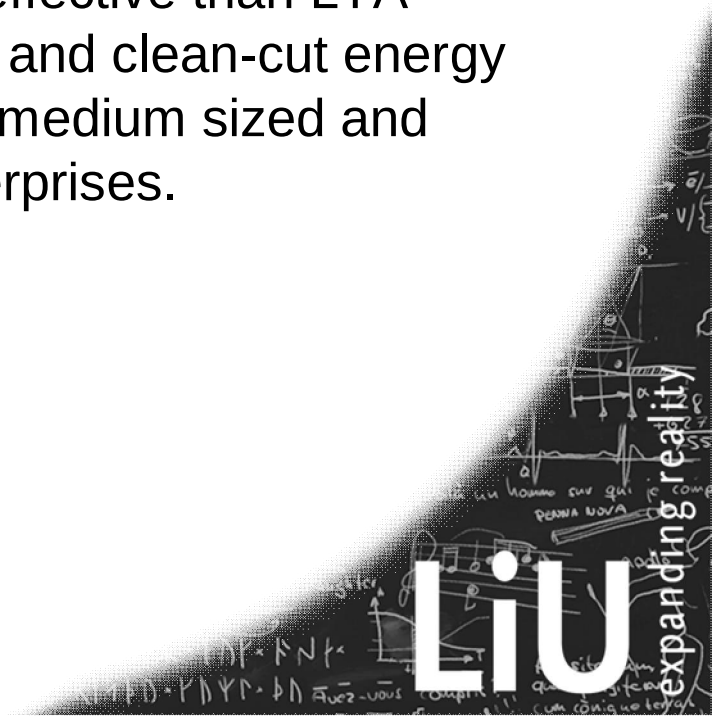
	Service and sales firms in project Highland	Industrial firms in project Highland	PFE[c]	Finnish Motiva	Norwegian Energy Audit Program[d]
Cost-effectiveness for all measures (kWh/EUR)	**8-15**	**86/195[e]**	**-/11[e]**	**-/555[e]**	**-/333[e]**



Conclusion

•From a cost-effectiveness point of view, public money was more effective when directed towards industrial SMEs and non-energy-intensive enterprises using energy audits (project Highland), followed by directing an LTA (the PFE) towards energy-intensive industry (if only electricity is studied).

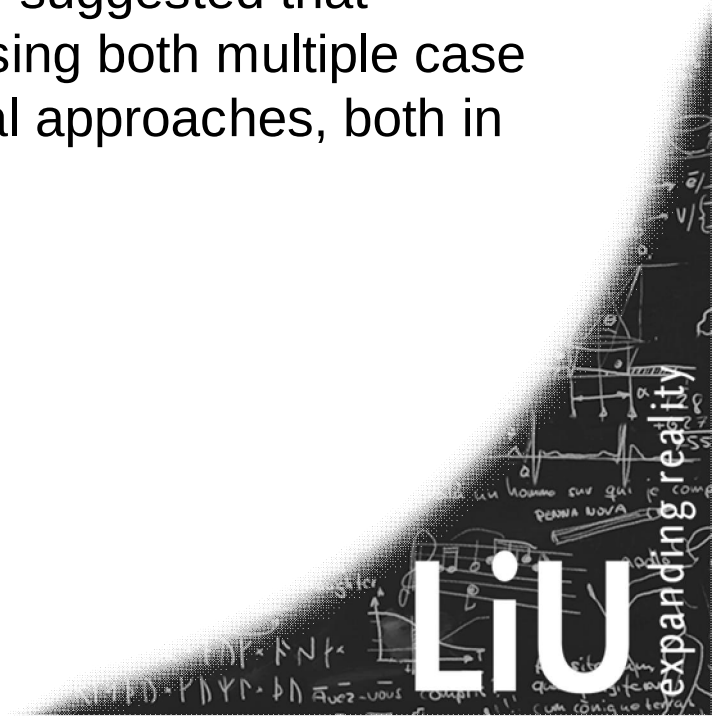
•Analytic generalization of the paper's results indicates that clean-cut energy audit programs towards small- and medium sized and non-energy-intensive industry is more cost-effective than LTA-programs towards energy-intensive industry and clean-cut energy audit programs directed towards small- and medium sized and non-energy-intensive service and sales enterprises.



Conclusion

•Finally, comparison is not unambiguous as PFE deals with both strategic issues and energy audits, and project Highland included only energy audits. Another aspect of the comparison is that PFE focuses solely on electricity, while project Highland included all energy carriers. Moreover, spillover effects are not included.

•It should be noted that this analytical generalization is based on multiple case studies in one country, and a limited number of evaluated companies. It is therefore strongly suggested that further research is conducted in this area, using both multiple case study methodology and other methodological approaches, both in Sweden and internationally.



Thanks for Your attention!

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Patrik Thollander is an assistant professor at the Division of Energy Systems at Linköping University in Sweden and within the graduate school Energy Systems Programme. His research interests include among other things energy efficiency in industry, industrial energy end-use policy design, barriers and driving forces, industrial energy system optimization, and industrial energy management and programmes.

Recent publications

•Thollander, P., Ottosson, M., 2010. Energy management practices in Swedish energy-intensive industries. Journal of Cleaner Production (18):125-133.

•Jenny, P., Thollander, P., 2010. An interdisciplinary perspective on industrial energy efficiency. In Press, Applied Energy.

Thollander, P., Dotzauer, E., 2010 An energy efficiency program for Swedish industrial small- and medium-sized enterprises. Journal of Cleaner Production (18): 1339-1346

P. Thollander*, I.L. Svensson, L. Trygg. Analyzing variables for district heating collaborations between energy utilities and industries. In Press, Energy.