Spreading the word – An online non-energy benefit tool



2-5 June 2014 ECEEE eg@lokalenergi.dk



Who are Lokalenergi?



We are Lokalenergi. A group of energy and environment enthusiasts who work strategically and tactical to improve the energy economics of your Company

- Lokalenergi
 - Electricity sales
 - Consultancy services
 - All customers segments
 - All types of energy
 - Energy labelling of buildings
 - National auditor of building energy labels
 - ESCO projects
 - Management systems
 - Research within energy optimization



Who is Erik

- Director of Lokalenergi
- Working with energy in all segments during the last 25 years
 - On all levels from high level planning to the household sector
- Certified energy consultant in industry by DEA
- Member of energy efficiency working groups
- Specialist in the "marketing" of energy efficiency
- Energy management expert nationaal



Introduction

- IF energy efficiency is so important, though in Denmark you still can find 10-15% savings potential with a payback time of less than 4 years.
- The following has been expressed:
- Existing technologies with an attractive internal rate of return can cut the growth in global energy demand by half or more within 15 years. Curbing Global Energy Demand Growth, McKinsey & Co., May 2007.
- Industries around the globe can cut CO₂ emissions 19-31% using proven technologies and practices. – International Energy Agency, 2007.
- "Energy Efficiency is the most promising means to reduce greenhouse gases in the short term." Yvo de Boer, Exec. Secretary UNFCC.

Why slow implementation

We the energy consultants, think we have a great product, but the product does not create the same excitement among the customers \bigcirc So what do we do?



From Government to consumer The language and communication



The result of the energy audit

- Industry juice production:
 - Energy comsumption:
 - Electricity 10.000 MWh
 - Heavy fuel oil 43.000 MWh
- Proposals
 - Compressed air 750 MWh (elec.)
 - Cooling 635 MWh (elec.)
 - Lighting 235 MWh (elec.)
 - Process 3.500 MWh (h.f.o.)



Top 6 in energy intensive industry

- Raw article 29%
- Purchase primary product 21 %
- Finishing cost 32 %
- Provision cost 6 %
- Energy cost 5 %
- Other production costs 7 %



Midterm Conclusion

A new way to achieve energy efficiency is needed:

The energy freak transformation



The Energy Freak transformation



What are NEBs(co-benefits, total value of energy projects)

Waste	Emissions	Operation and maintenance	
Use of waste fuels, heat, gas Reduced product waste	Reduced dust emissions Reduced CO, CO2, NOx, SOx emis- sions	Reduced need for engineering controls Lowered cooling requirements	
Reduced waste water		Increased facility reliability	
Reduced hazardous waste		Reduced wear and tear on equipment/machinery	
Materials reduction		Reductions in labor requirements	
Production	Working environment	Other	
Increased product output/yields	Reduced need for personal protective equipment	Decreased liability	
Improved equipment performance	Improved lighting	Improved public image	
Shorter process cycle times	Reduced noise levels	Delaying or Reducing capital expenditures	
Improved product quality/purity	Improved temperature control	Additional space	
Increased reliability in production	Improved air quality	Improved worker morale	

Non-energy benefits from efficiency improvements

Ref. E. Worrell



How can they be assessed ? 2

- Questionaire
 - Change, with positive value
 - Change, with negative value
 - Change, don't know value



How can they be assessed?

• Use the values from research 2.5

NON-ENERGY BENEFITS FROM COMMERCIAL AND INDUSTRIAL ENERGY EFFICIENCY PROGRAMS: ENERGY EFFICIENCY MAY NOT BE THE BEST STORY

Nick P. Hall, TecMarket Works Johna A. Roth, TecMarket Works

The results indicate that businesses place significant importance on the non-energy benefits associated with the installed technologies, and that the value of these benefits are equal to about 2.5 times the projected energy savings for the installed measures. In summary, businesses report that the

- Questionaire
- Exact calculation



How can they be assessed ? 3

- Calculation
 - Identify and describe the benefits associated with a given measure
 - Quantify the impacts
 - Convert the impacts into money



Does NEB make a difference



Production of liquid gasses

- If the temperature of the cooling water goes up it has a great influence on the energy consumption in the production of liquid gasses.
- Systematic metering introduced in connection with the implementation of EMS, indicated rising temp over time, due to smudge of the heatexchanger.
- In spite of chemical treatment of the cooling water.
- What to do ?
- Special investigation pointed towards an ozone unit together with a sand filter
- Result temp decreased with 1-2 degres



Production of liquid gasses

- Savings -energy:
 - 153.000 kWh/year or 12.000 US dollar
- Payback 3.6 years

However !

- other savings :
 - Chemicals
 - Corrosion inhibitorer 12.000 US dollar/year
 - Reduced corrosion
 - Reduced labour cost
 - Reduced down time
 - Reduced enviromental influence not calculated
 - Better working environment not calculated



- 50.000 US dollar/year 12.000 US dollar/year
- 20.000 US dollar/year
 - not calculated
 - not calculated



So what now? Projects !

• Project aim:

Consultants and their clients typically consider the value of energy savings as the quantity of energy saved multiplied by the energy price. This optic prevents many worthwhile energy projects from being implemented since experience tells us that the secondary effects of energy efficiencies can impact companies in a number of positive ways such as reducing waste, reducing emissions, reducing maintenance costs, improved productivity and providing a better working environment and reduced downtime. The above-mentioned secondary effects are not included in project implementation considerations since there is no recognised method for calculating their value, nor has the area been prioritised. The object of this project is thus to increase focus on this area and to develop a method for evaluating the value of non-energy benefits (NEB). The majority of the research in this field has been conducted in the USA. This research indicates that if NEB are included, the value of energy savings can often be multiplied by a factor of 2.5, and that, therefore, the true value of energy saving projects are 2.5 times higher than otherwise thought. This implies that, if NEB are included, payback can be achieved within less than half the time otherwise assumed if calculations are based on energy savings alone.



The NEB Tool

- The NEB tool is a web-based tool that consists of the following:
 - Method for assessing NEBs of energy efficiency projects,
 - NEB database that allows users to search e.g. by branch and energy efficiency project type,
 - Case examples with more detailed description of energy efficiency projects and the associated NEBs,
 - Questionnaire for identification and assessment of NEBs, and



NEBs included in the projekt

Main category	Sub categories	
Productivity (cost per unit)	Consumption of materials	
	Necessary work force	
	Product guality	
	Unscheduled down-time	
	Other	
Sales	Sustainability	
	Customer satisfaction/loyalty	
	Publicity	
	Unique selling points (such as sustainability)	
	Other	
Work environment / health /safety	Draft	
	Air/dust/vapors	
	Sound/noise	
	Light	
	Employee flux/retention	
	Room temperature	
	Safety	
	Stress	
	Heavy lifts	
	Other	
External environment and resources	Waste and waste water (incl, industrial waste, hazardous waste, heat, materials)	
	CO ₂ emissions	
	Other GHG emissions	
	Other emissions	
	Security of supply / self sufficiency	
	Other	



Assesment of NEBs

- The NEB values are assessed relative to the achieved energy efficiency improvement. The NEBs are then rated relative to index. 100
- An energy efficiency project experienced increased productivity estimated to be twice as valuable as the achieved energy savings, the NEB "productivity" is assigned the value +200.
- Using an index avoids having to translate all NEBs into an exact monetary value
- The individual NEBs of a given project are in the tool summarised by main category of NEB and presented in a bar chart.



Issues when assessing NEBs

- **Objectivity** –calculation-based approach appears to be objective, since the values are derived from factual data. However, it is not always possible to measure the causal effects.
- **Time requirement** If the NEB database is to expand and gain a wider use it is important that the time required to assess the NEBs of an energy efficiency project is not too time consuming
- **Complexity** The assessment method must be easy to communicate to both energy consultants and their clients.
- **Validity** The user must be able to trust that the NEB values are reliable.

	Calculation	Estimation
Objectivity	High/Medium	Low
Time requirement	High	Low
Complexity	High	Low
Validity	Medium	Medium



Experienced NEBs

- NEB tool contains information on the NEBs of specific energy efficiency projects.
- It is the experiences of the energy efficiency project holders that determine the importance and thus size of the NEBs.
- The energy consultant may also assist the project holder in identifying and assessing the NEBs but it is also possible for the project holder to do this on his own.
- Both energy consultants and project holders have access to the NEB tool.
- It is the ambition to capture the most important NEBs experienced by the project holder.
- The key experienced NEBs are first identified and classified and then their relative size is assessed.



Generalisation – From 12 individual cases to rules of thumb

- The NEB tool is intended to increase the numbers of energy efficiency projects implemented through easy access to information on NEBs connected to energy efficiency projects
- At present, there is only a limited number of projects in the database. The second phase, in which we are now, the development of the tool will be focused on increasing the number of cases.
- IF a large number of cases are assessed and added to the database it might become possible to say something valid about the expected type and size of NEB associated with this type of cases.
- The intention is therefore to review the database with the aim to draw more general conclusions and suggest rules of thumb regarding type and size of NEBs.

Way forward

- Deploy information about the total value of energyefficiency
- Development of tools that can help people asses the NEB's
- Training of consultans in "selling" energy efficiency
 - New qustions not where is your compressor but "how are you doing what is your greatest challenge at the moment
- Adress of the webtool :<u>http://neb.teknologisk.dk/</u>

