



ICCEE

Improving Cold Chain Energy Efficiency in food and beverage sector

Towards more energy efficient companies – focus on various industry sectors
Brussels, 28 June 2022

The other countable benefits

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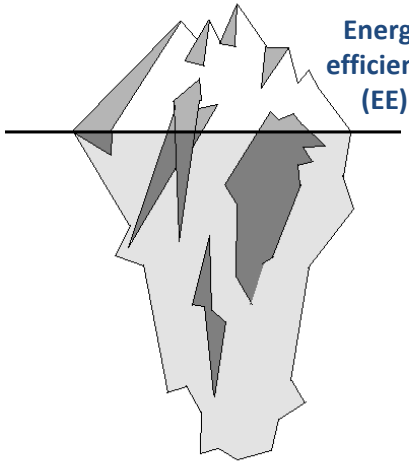
What are non-energy benefits (NEBs)?

Role of energy efficiency and NEBs in cold supply chain

Make it strategic: How to determine and evaluate NEBs?

NEBs – adding value to energy efficiency



Energy efficiency (EE)

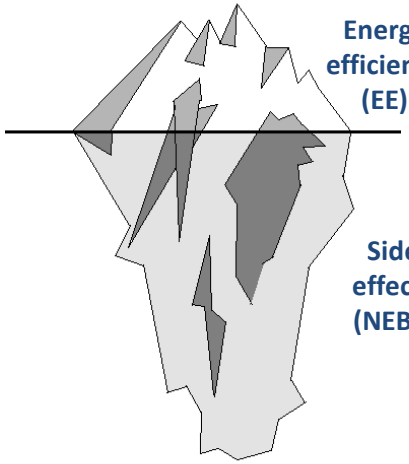
"The obvious"

The amount of energy your business saves per year.

energy saved (kWh) x energy price (€)

Reference: http://neb.uk.teknologisk.dk/Default.aspx

NEBs – adding value to energy efficiency



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For example, your company replaces incadescant bulbs with LED-bulbs and experiences fewer maintenance hours.

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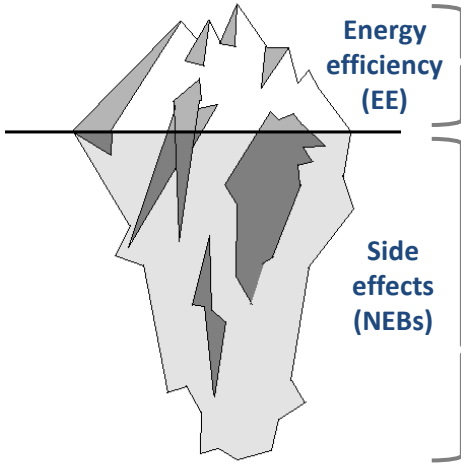

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- NEBs traditionally not included in EE project implementation economics

→ NEBs might lead to higher acceptance and implementation of EE projects

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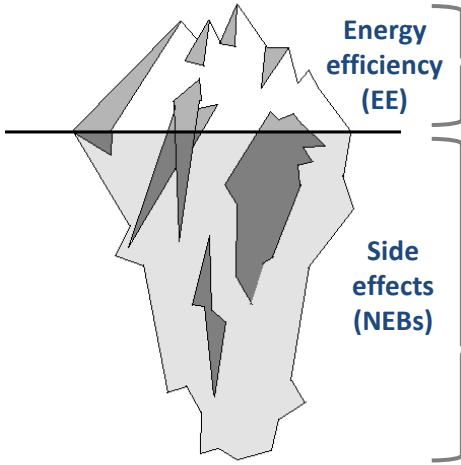

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→ NEBs might lead to higher acceptance and implementation of EE projects

"*The true value of the energy efficiency projects might be up to 2.5 times higher than if looking at the energy efficiency improvements alone* " (Worrell et al.)

Reference: http://neb.uk.teknologisk.dk/Default.aspx

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What are non-energy benefits?

- Positive side effects of energy efficiency measures (EEM) besides reduced energy costs and CO2 emissions

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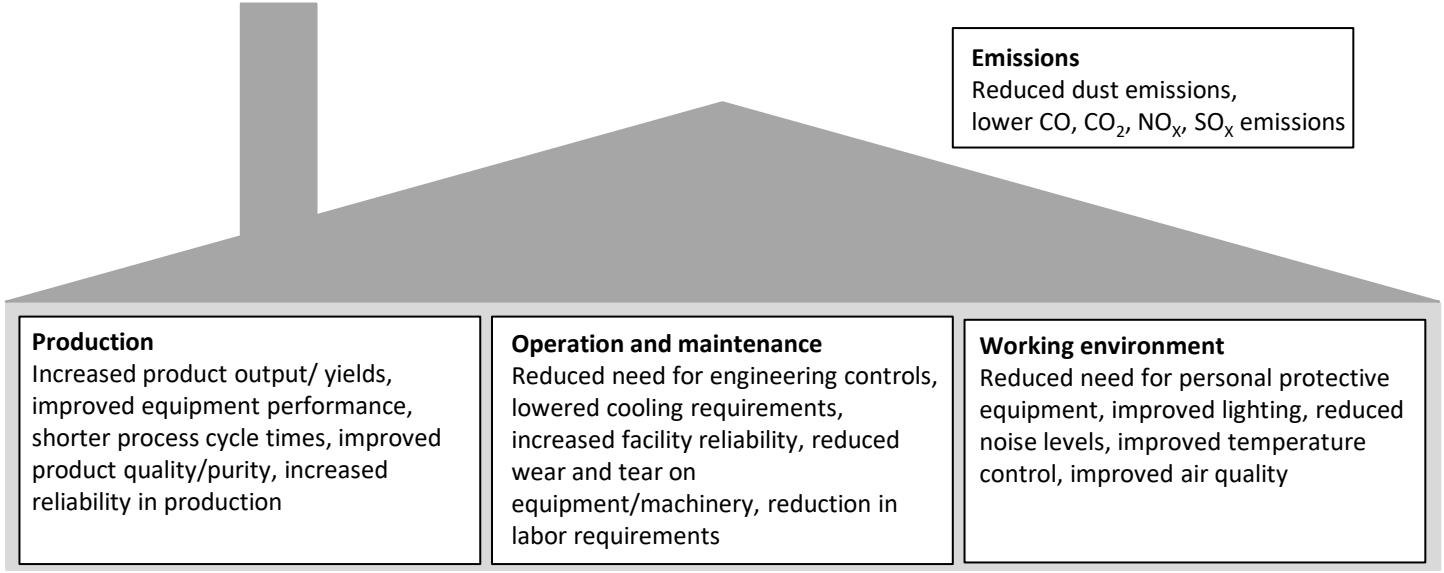

source: adaptiert nach Worrell et al. & Nehler et al.

What are non-energy benefits?

- Positive side effects of energy efficiency measures (EEM) besides reduced energy costs and CO2 emissions

Emissions
Reduced dust emissions,
lower CO, CO_2, NO_X, SO_X emissions

Production
Increased product output/ yields, improved equipment performance, shorter process cycle times, improved product quality/purity, increased reliability in production

Operation and maintenance
Reduced need for engineering controls, lowered cooling requirements, increased facility reliability, reduced wear and tear on equipment/machinery, reduction in labor requirements

Working environment
Reduced need for personal protective equipment, improved lighting, reduced noise levels, improved temperature control, improved air quality

Waste
Use of waste fuels, heat, gas, reduced product waste, reduced waste water, reduced hazardous waste, materials reduction

Other
Decreased liability, improved public image, delaxing or reducing capital expenditures, additional space, improved worker morale

source: adapted from Worrell et al. & Nehler et al.

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What are non-energy benefits (NEBs)?

Role of energy efficiency and NEBs in cold supply chain

Make it strategic: How to determine and evaluate NEBs?

Interviews on energy efficiency and NEBs in cold supply chain

- To what degree do companies cooperate along the cold supply chain with regard to EE?
- What is the relevance of NEBs? How are they perceived along the supply chain compared to the individual company perspective?

- Interviews with 60 companies in food sector
- Follow-up online survey

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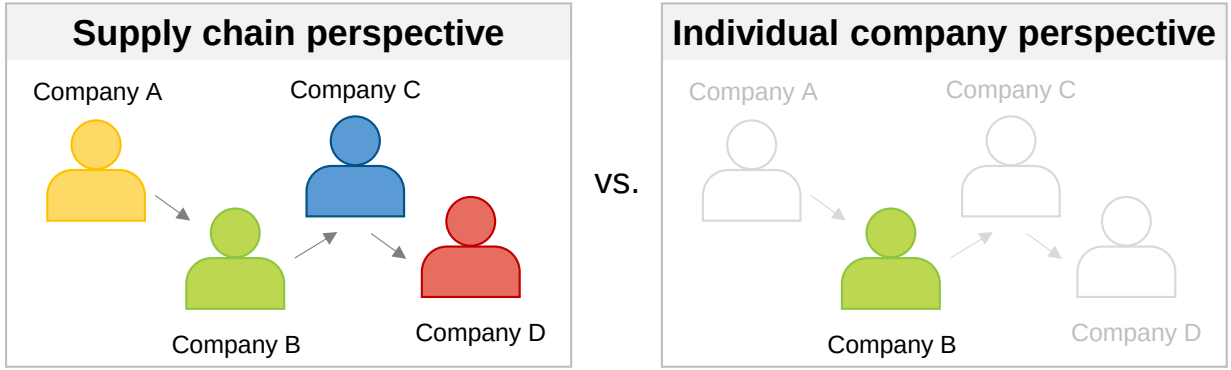
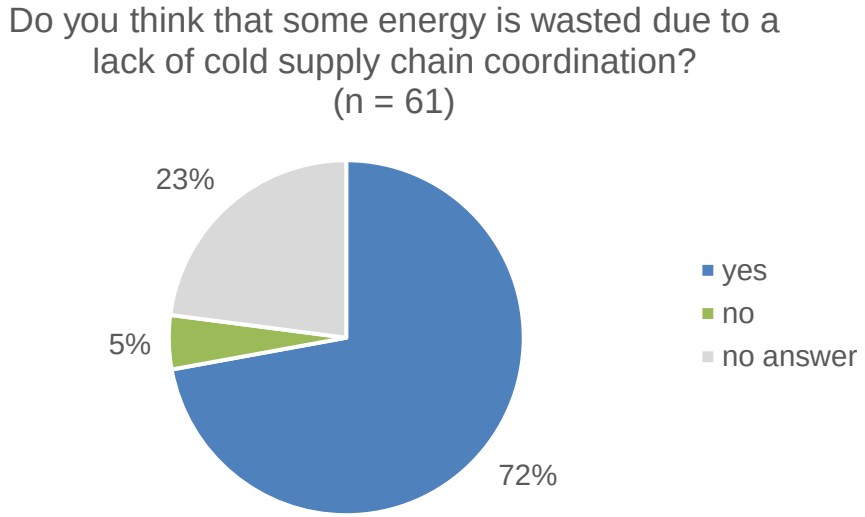


Challenges for energy efficiency along the cold chain



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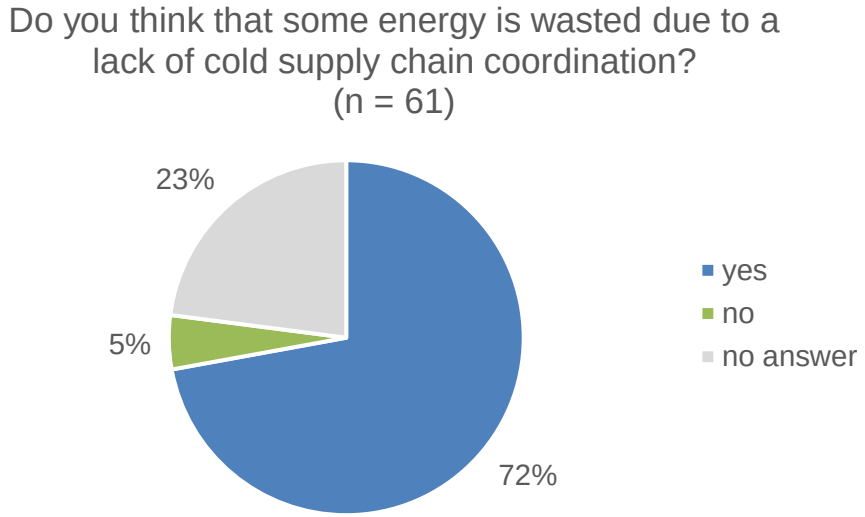
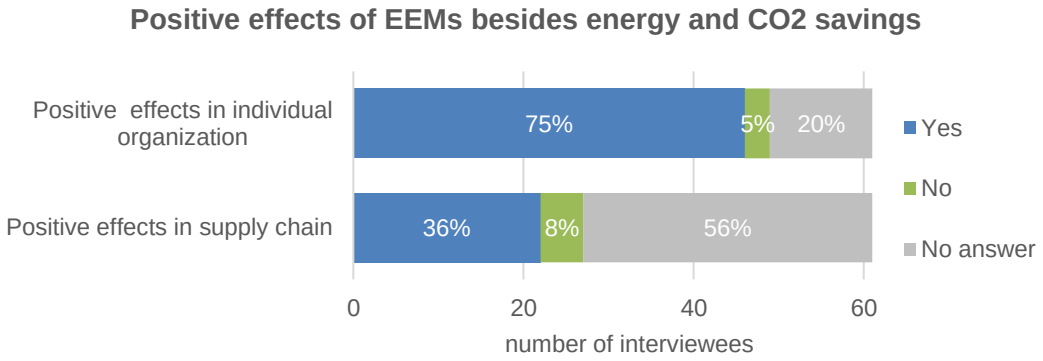


Barriers like a lack of communication, know-how or attention for energy-related topics might be more pronounced when looking at the entire cold supply chain due to its complex structure

Positive effects of EEMs

- EE is important in decision making-processes of individual companies (70%) as well as along the cold supply chain as a whole (60%)

- Majority of companies sees positive effects from implemented EEMs (75%), while awareness on NEBs along the chain seems lower



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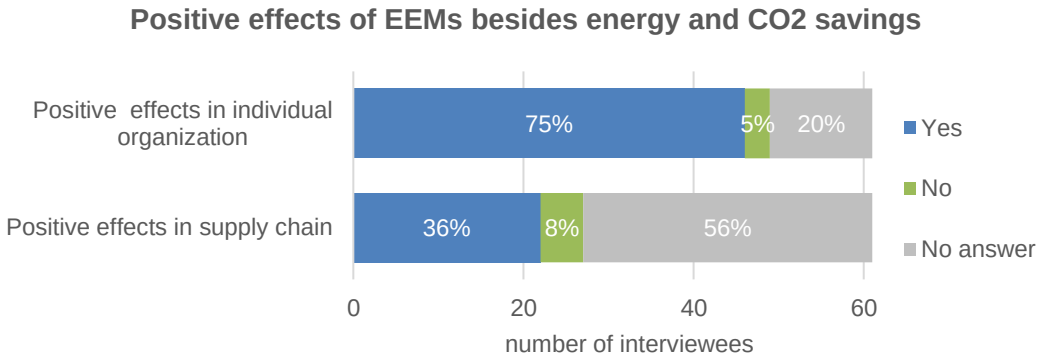
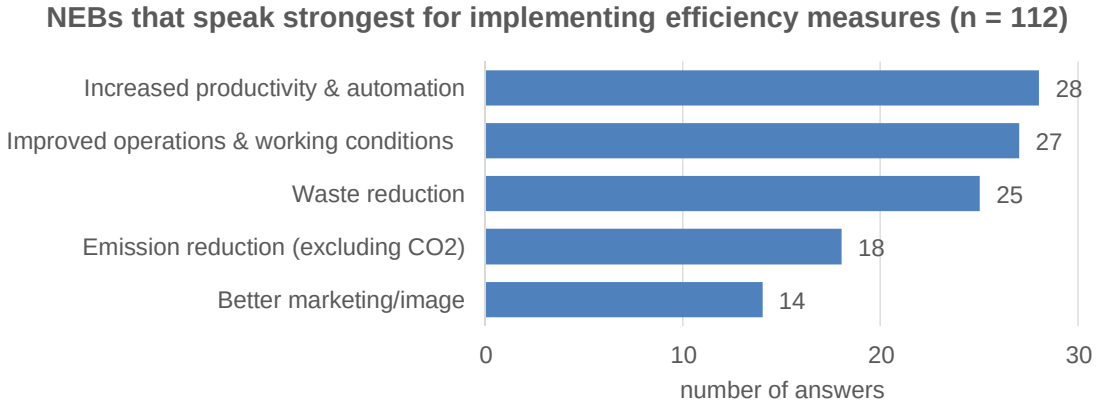
- EE is important in decision making-processes of individual companies (70%) as well as along the cold supply chain as a whole (60%)
- Majority of companies sees positive effects from implemented EEMs (75%), while awareness on NEBs along the chain seems lower
- Economic advantage from the NEBs seems a dominating aspect





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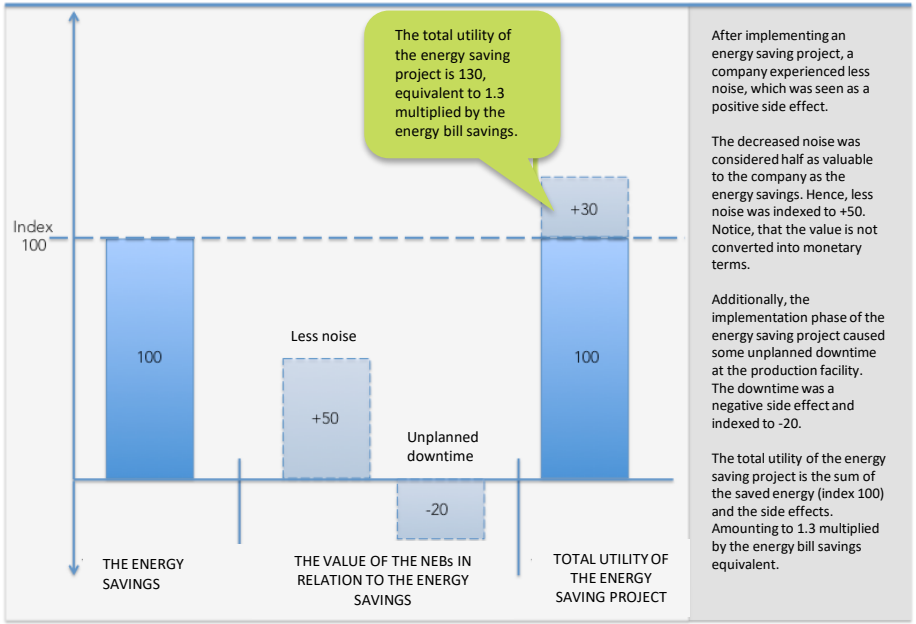
Evaluating NEBs



After implementing an energy saving project, a company experienced less noise, which was seen as a positive side effect.

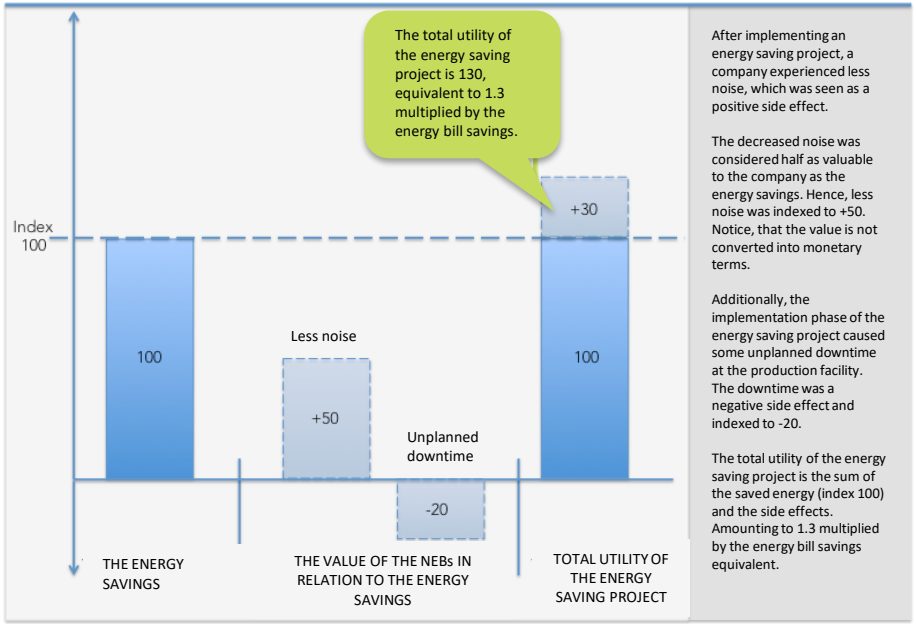
The decreased noise was considered half as valuable to the company as the energy savings. Hence, less noise was indexed to +50. Notice, that the value is not converted into monetary terms.

Additionally, the implementation phase of the energy saving project caused some unplanned downtime at the production facility. The downtime was a negative side effect and indexed to -20.

The total utility of the energy saving project is the sum of the saved energy (index 100) and the side effects. Amounting to 1.3 multiplied by the energy bill savings equivalent.

Source: http://neb.uk.teknologisk.dk/metoder.aspx

Evaluating NEBs



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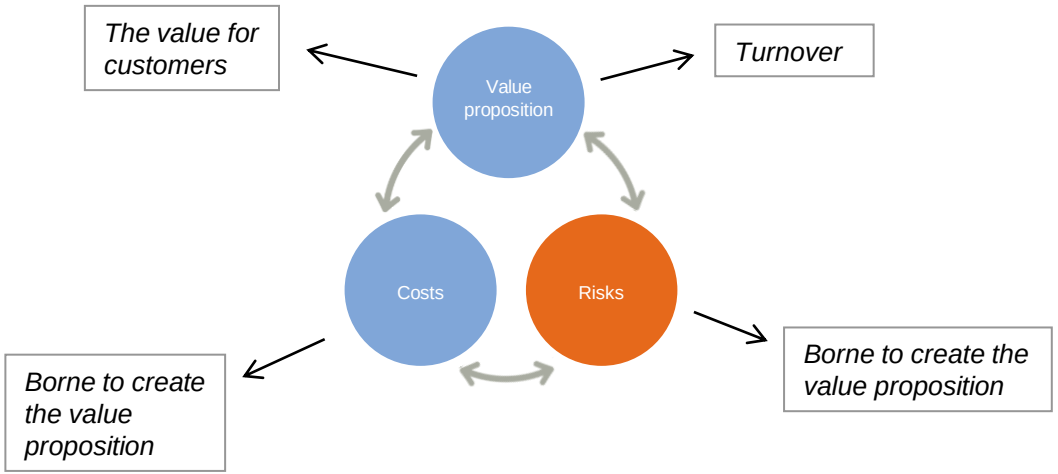
"*53% of companies rarely or never include NEBs in their investment calculations*" (Lung et. al)

Source: http://neb.uk.teknologisk.dk/metoder.aspx

Make it strategic: Energy-efficiency decision making

The 3 dimensions of competitive advantage



"Strategicity"

- **Value-Cost-Risk Analysis** to categorise and value EEMs & NEBs in strategic and monetary terms

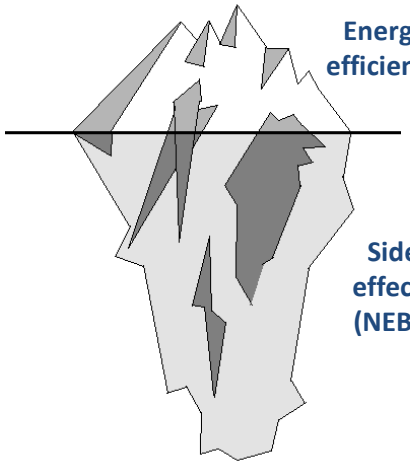
- Why?

➢ Contribution of an investment to core business and competitive advantage is a key decision-making driver and can help to make energy efficiency (more) appealing to the top-management.

Source: Cooremans, 2011 (www.mbenefits.eu)

Make it strategic: Value-Cost-Risk analysis

Determine the non-energy benefits of each EEM



Energy efficiency

Use of modern frequency converters in refrigeration technology
- VFD (Variable-frequency drive)

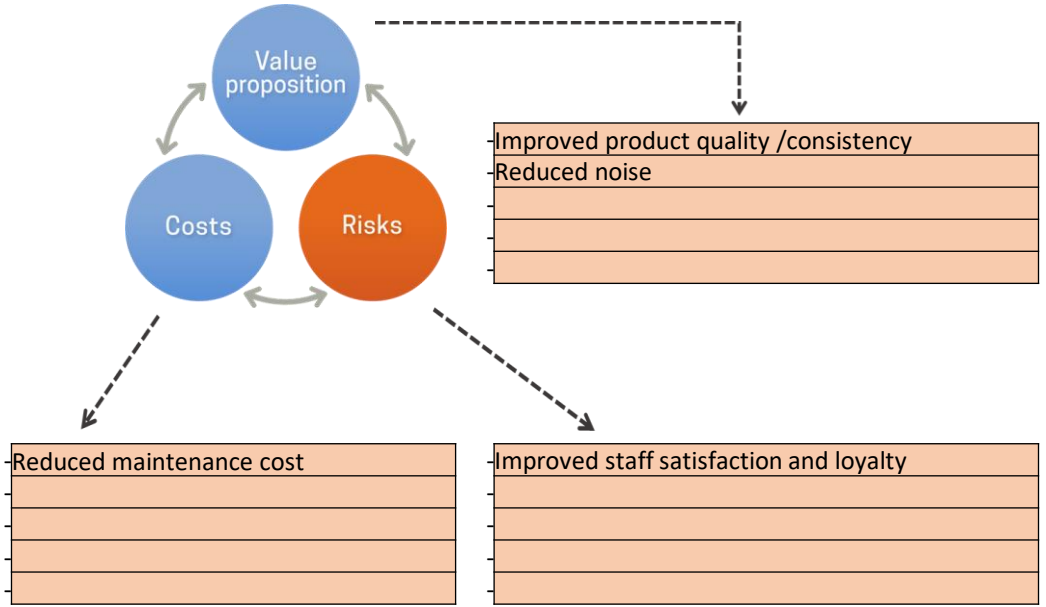
Side effects (NEBs)

e.g.
Reduced maintenance costs
Improved product quality
Reduced noise
Improved employee satisfaction

Source: D4.3 Training Tools, Cooremans (www.mbenefits.eu)

Make it strategic: Value-Cost-Risk analysis

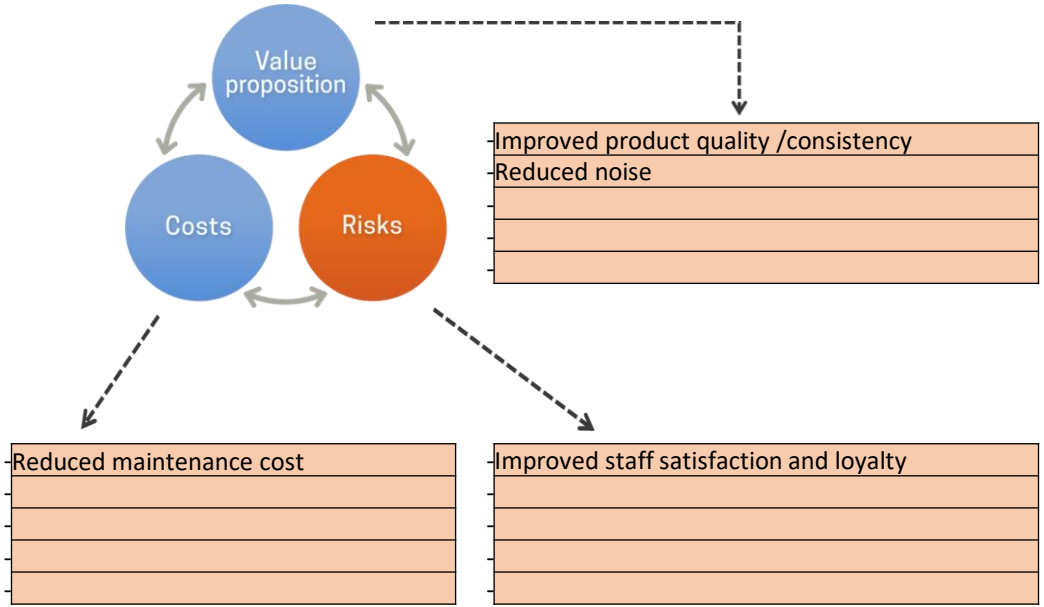
- Determine the non-energy benefits of each EEM
- Categorize them in strategic terms



Source: D4.3 Training Tools, Cooremans (www.mbenefits.eu)

Make it strategic: Value-Cost-Risk analysis

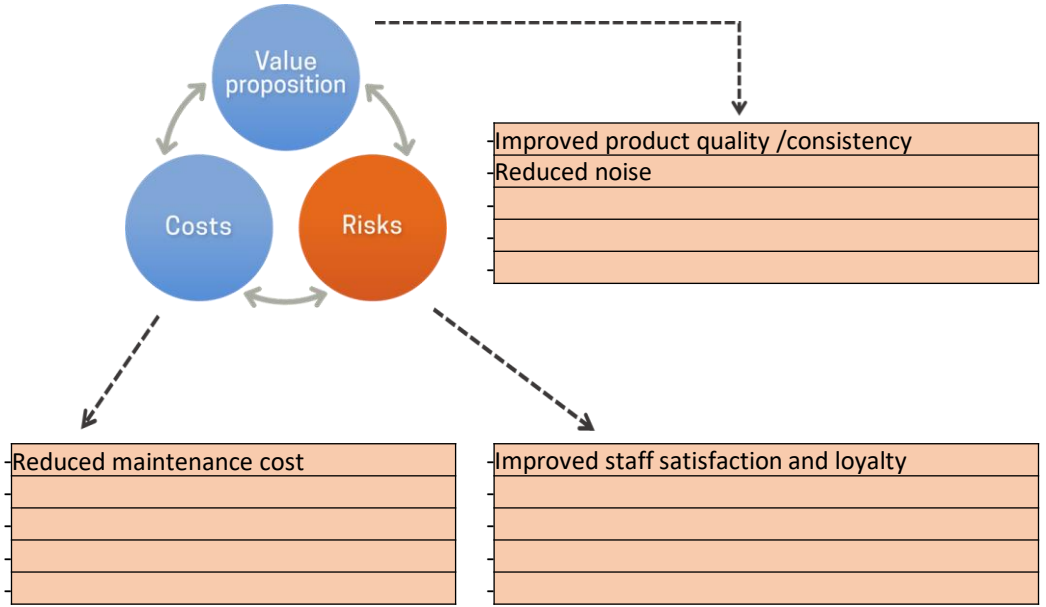
- Determine the non-energy benefits of each EEM
- Categorize them in strategic terms
- Define relevant data and indicators
- Collect data



Source: D4.3 Training Tools, Cooremans (www.mbenefits.eu)

Make it strategic: Value-Cost-Risk analysis

- Determine the non-energy benefits of each EEM
- Categorize them in strategic terms
- Define relevant data and indicators
- Collect data
- Value EEMs selected in monetary terms.



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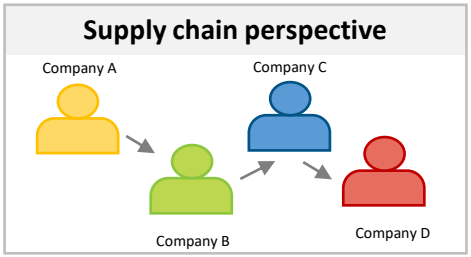

„Go beyond: Take the supply chain perspective“

What positive effects might an EEM have on your cold chain partners?
Is there a common financial benefit?

Source: D4.3 Training Tools, Cooremans (www.mbenefits.eu)

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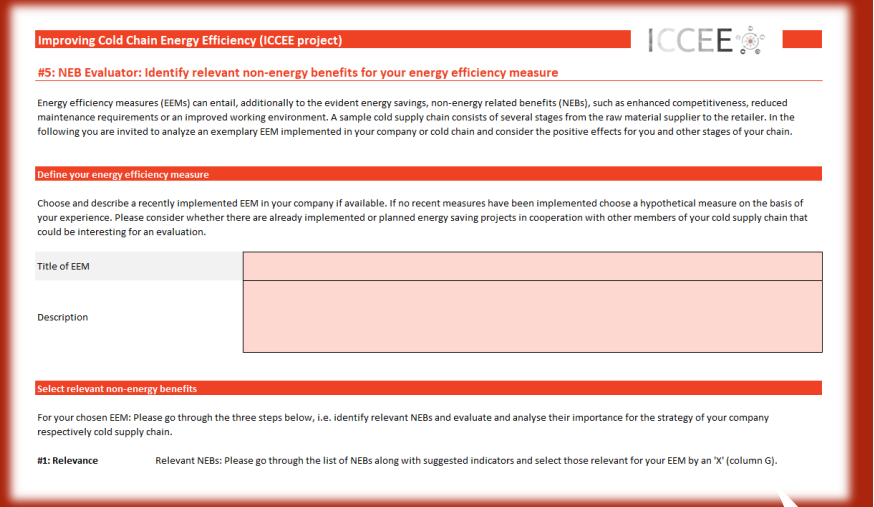
Tool #5: Non-energy benefit evaluator

Key features

- Assessment of the **strategic value of non-energy benefits** of specific energy efficiency measures
- Structured **identification of relevant benefits** using prepared lists along a set of simple steps

Target group

- Supply chain & environmental managers



Improving Cold Chain Energy Efficiency (ICCEE project)

#5: NEB Evaluator: Identify relevant non-energy benefits for your energy efficiency measure

Energy efficiency measures (EEMs) can entail, additionally to the evident energy savings, non-energy related benefits (NEBs), such as enhanced competitiveness, reduced maintenance requirements or an improved working environment. A sample cold supply chain consists of several stages from the raw material supplier to the retailer. In the following you are invited to analyze an exemplary EEM implemented in your company or cold chain and consider the positive effects for you and other stages of your chain.

Define your energy efficiency measure

Choose and describe a recently implemented EEM in your company if available. If no recent measures have been implemented choose a hypothetical measure on the basis of your experience. Please consider whether there are already implemented or planned energy saving projects in cooperation with other members of your cold supply chain that could be interesting for an evaluation.

Title of EEM	
Description	

Select relevant non-energy benefits

For your chosen EEM: Please go through the three steps below, i.e. identify relevant NEBs and evaluate and analyse their importance for the strategy of your company respectively cold supply chain.

#1: Relevance Relevant NEBs: Please go through the list of NEBs along with suggested indicators and select those relevant for your EEM by an 'X' (column G).

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Links

NEB-Tool - Project financed by Elforsk (Danish):

http://neb.uk.teknologisk.dk/Default.aspx

Multiple benefits of energy efficiency – EU Project:

https://www.mbenefits.eu/

Multiple benefits serious game (www.mbenefits.eu/news-resources/library/multiple-benefits-serious-game/):

https://wegas.albasim.ch/#/public

IEA-report "Capturing the Multiple Benefits of Energy Efficiency":

https://www.iea.org/reports/capturing-the-multiple-benefits-of-energy-efficiency

#2: The role of energy efficiency III

Is there any group that mainly drives energy efficiency along the cold supply chain? (n = 143)