

Assessing Multiple Benefits of Energy Efficiency

Evaluation and prioritization of industrial energy efficiency measures by including multiple benefits

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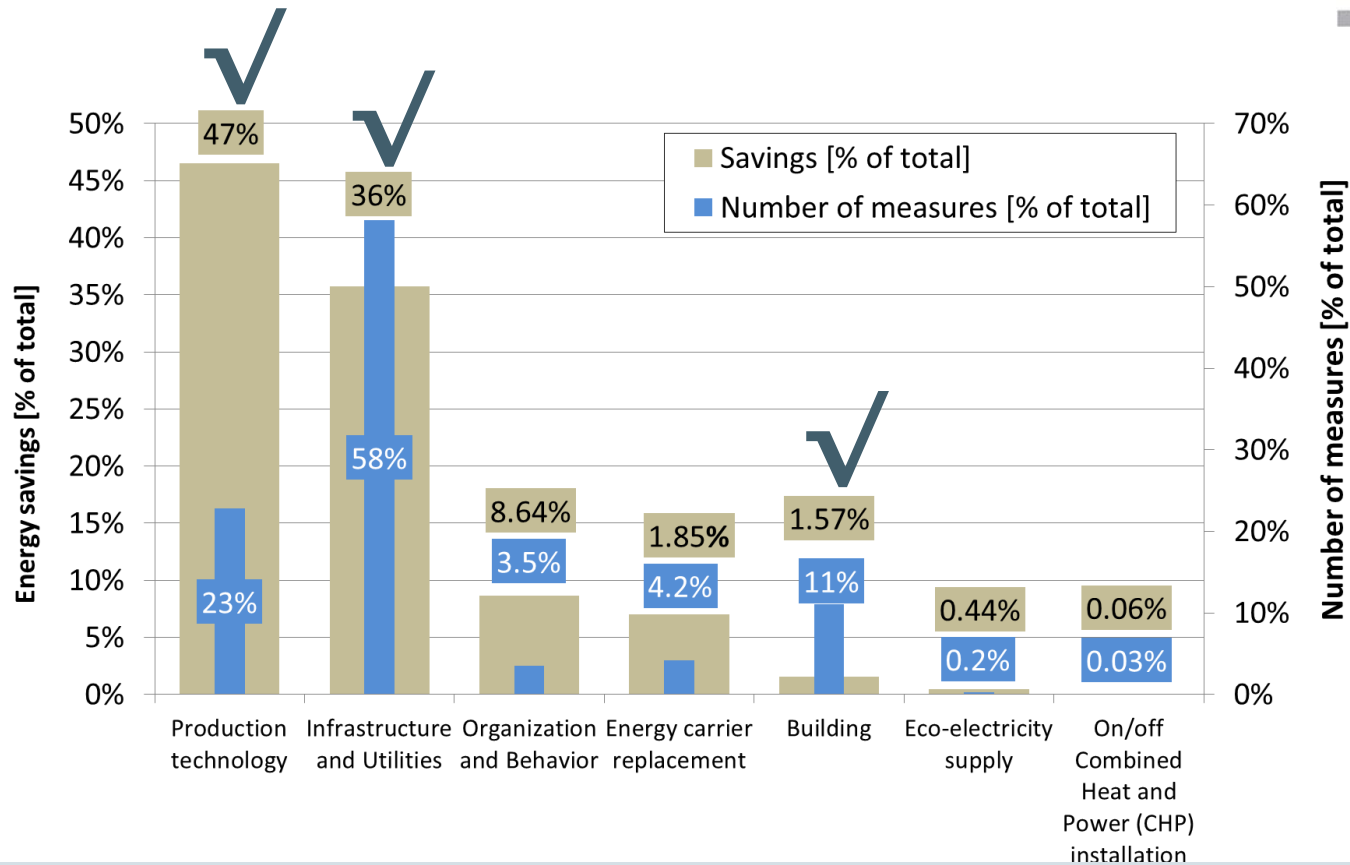


UNECE

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Energy savings distribution by categories

EnAW Data 1997-2012, Food & Beverages industry

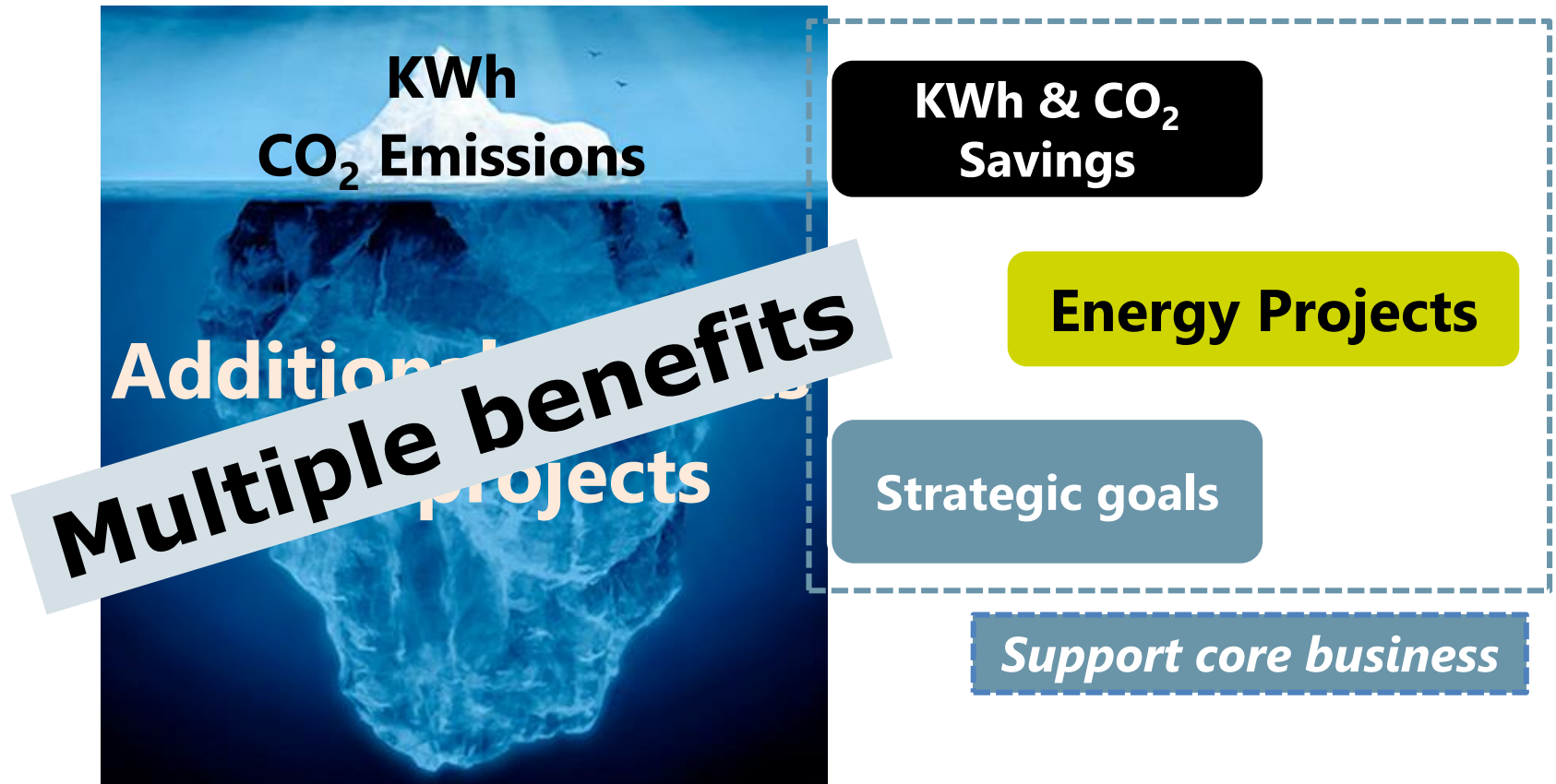


- Implementation in each category has different drivers/barriers
 - How to further “sell” energy efficiency measures?
- “different languages” for each category!

Energy Efficiency Management

What's the goal?

Energy Efficiency (EE) - measures and projects can support **core business goals and strategies**



Swiss Food & Beverage Industry

An example: Hot water boiler replacement

| | |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EE-Measure | New water boiler with „economiser“ and higher efficiency and capacity |
| Investment | CHF 900'000 total, 50% energy related |
| Energy savings | ~ 80'000 CHF p.a. (1'230 MWh natural gas p.a.) |
| Additional impacts, i.e. Multiple benefits | <p>~ 140'000 CHF p.a.</p> <ul style="list-style-type: none"> - Better temperature control - Optimized resources <ul style="list-style-type: none"> • less downtime and reworks • less manpower • working shifts elimination |
| Payback period | <p>Reduced from 5.6 to 2 years with multiple benefits</p> <p>NPV_{10 years}: 1'150'000 CHF and IRR_{10 years}: 47%</p> |

| MB1 | Products and services |
|------------|------------------------------------------------------------------------------------------------------|
| MB11 | Product quality |
| MB12 | Product features |
| MB13 | Service offering |
| MB14 | Know-how, Expertise, Competence |
| MB15 | Market understanding |
| MB16 | Market barriers and consumer resistance |
| MB2 | Processes |
| MB21 | Production efficiency /capacity/cycle time |
| MB22 | Process reliability and consistency |
| MB23 | Process control, e.g. Temperature |
| MB24 | Cool- and hot- requirements |
| MB25 | Defects und rework |
| MB26 | Production flexibility and/or complexity |
| MB27 | Maintenance and downtime |
| MB28 | Cleaning cycle |
| MB29 | Weather dependency |
| MB3 | Employees satisfaction |
| MB31 | Job security |
| MB32 | Repetitive tasks |
| MB33 | Physically demanding work |
| MB34 | Overtime |
| MB35 | Usage of a variety of skills |
| MB36 | Possibility to work independently |
| MB37 | Working environment (temperature, acoustic, air, space, light) |
| MB4 | Resources |
| MB41 | Raw material usage |
| MB42 | Water consumption |
| MB43 | Production waste (raw material, finished product, special or hazardous waste, emissions & particles) |
| MB5 | Equipment |
| MB51 | Equipment- and machines lifetime |
| MB52 | Over dimensioning |
| MB53 | Downsizing or disposal of equipment |
| MB54 | Wear and tear |
| MB55 | Equipment breakdowns |
| MB6 | Compliance |
| MB61 | Tax exemption and incentives, e.g. CO ₂ |
| MB62 | Environmentally friendly production recognition, e.g. Eco-label |

Assessing multiple benefits - *Why?*



- To **objectively rank** and **prioritize** EE-projects vs. core business invest.
- To **align** EE-programs with company's goals & strategies

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Hot water boiler replacement

Challenges:

- Data availability

Highly dependent on the strategic role of EE project

- Energy-related benefits

- Energy-related costs

quantification

Methodologies standardization

→ tool under test (excel-based)

Thanks a lot for your attention!

Additional savings calculations: 140'000 CHF p.a.

CHF 125'000 p.a.: Improved temperature control

- Less waste, rework and finishing of the final product → *Reduced costs for raw materials and production costs*
- Less downtime → improved productivity → *Additional margin*
- Less manpower → *Reduced manpower cost*

CHF 15'000 p.a.: Improved working time/shifts

- Reduced manpower and optimized shifts, i.e. elimination of more costly night and week-end shifts