



Potential efficiency gains in industrial processes are especially high.

Source: ABB Group, ZVEI

5 Consistent application required

Measures for utilizing all of the potential for energy efficiency and climate protection:

- Making energy consumption transparent, for example using smart Instrumentation & Control and energy management systems.
- Developing technical strategies for greater energy efficiency.
- Applying solutions for increasing energy efficiency in a consistent manner.
- Enabling evaluation of energy efficiency in order to use it as an economic criterion for decision-making, particularly through the consistent tracking and consideration of lifecycle costs in energy management systems.
- Increasing the existing potential for energy savings with innovative solutions and enabling technologies such as automation engineering.

The public sector should be more committed to acting as a role model and should also provide support in the following capacities:

- Lifecycle costs should be a central and contract-related criterion in awarding public contracts.
- Logical application of the general administrative regulation of the German federal government for procuring energy-efficient products and services in the federal states and municipalities as well. This is particularly true for considering the "lifecycle cost principle" when determining the most cost-effective bid.

- Increased integration of the topics of "procuring energy-efficient products and services" and "lifecycle cost principle" in vocational and other training.
- Tax relief should be granted for energy savings implemented now and in the future.
- Supporting other countries' procurement authorities and international organizations in aligning themselves with contract-related energy efficiency criteria.
- Promoting technologies that help to make full use of energy efficiency potential, both domestically and internationally.

ZVEI:

Automation

Energy Efficiency Pays Off!



ZVEI:

Automation

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1 A tool for greater transparency

Energy efficiency and reducing greenhouse gas emissions are central societal issues that we must approach from a technical and ecological perspective as well as a business management one.

It would be a mistake to believe that energy efficiency and climate protection measures necessarily lead to higher costs. In many cases, the opposite is true: As a result of investments in smart technologies, the costs for producing energy and emissions are decreased, and the total costs for production and disposal are also lowered.

This shows that energy efficiency pays off over the lifecycle of an investment, and that strictly considering purchase costs or a payback period calculation is too short-sighted. While the Public Tender Ordinance includes consideration of lifecycle costs and energy efficiency when choosing a solution, lack of appropriate calculation methods means these factors are not paid adequate attention in practice.

To strengthen consideration of lifecycle costs in the public and private sectors, the German Electrical and Electronic Manufacturers' Association (ZVEI) and Deloitte have developed a practical tool for various user groups. This presents investment alternatives in a transparent manner and makes it possible to compare them in terms of energy efficiency and their economic effects.

The calculation tool has the following main features:

- Reflecting the complete lifecycle: installation, operation and uninstal-
lation phases.
- Calculation tool design based on business management cost categories: personnel, materials, energy, purchased services, assets, financing and taxes and duties.
- Modular structure of the calculation tool, which enables consideration of selected main cost categories and subcategories for each of the three lifecycle cost phases.
- Application-specific cost items are always reflected by addition of the business management cost categories to be incorporated (example: maintenance costs = personnel costs + material costs + purchased services).
- Comparison parameters, such as the discount rate and energy costs, can be determined.
- The evaluation uses key figures as well as graphical processing forms and sensitivity analysis options stored in the calculation tool.

2 Energy efficiency pays off – the consideration of the lifecycle costs is proof

The following case study shows how the calculation tool developed by Deloitte was used in the Böblingen-Sindelfingen wastewater treatment plant (WWTP): The case study compares the original wastewater treatment plant (Project I) with the retrofitted WWTP (Project II) where the non-return valves on the pumps were replaced by pneumatic-drive gate valves (one-off investment amount: €25,000).

ZVEI: Investment project II		Year of use	0	1	2
Input data		Phase	Installation phase	Operating phase	Operating phase
		Enable cost drivers			
Material					
Energy costs	Yes		-	576,684.00	576,684.00
Raw materials	No				
Auxiliaries	No				
Operating materials	No				
Waste	No				
Total materials			-	576,684.00	576,684.00
Purchased services					
Expert opinion and advice	No				
Training expenses (external)	No				
Project company costs	No				
Insurance	No				
(External) substitute services for outages	No				
Miscellaneous	No				
Total purchased services			-	-	-
Assets					
Premises	No				
Infrastructure	No				
Technical facilities and machines	Yes		25,000.00		
Fixtures and furnishings	No				
Intangible assets and financial assets	No				
Miscellaneous	No				
Total assets			25,000.00	-	-

When the entire lifecycle of the project is considered, the retrofitted plant (Project II) demonstrates far lower energy costs. With regard to the power requirements of the entire WWTP, this results in a 2% reduction in the total demand for electrical energy. Over a project period of 24 years, Project II delivers energy savings of €11,276.30 every year. Energy-specific benefits are the result of the larger flow cross-section (no valve in the volume flow) and the fact that a loss in pressure is not required to open the non-return valve*.

Energy efficiency	Investment Project I	Investment Project II	Difference
Cash equivalent of energy costs (Euro)	9,962,812.90	9,766,456.20	196,356.70
Annual annuity of energy costs	572,143.10	560,866.80	11,276.30
Percentage energy savings		2.0%	

By entering other cost elements, it is also possible to check whether the retrofitting project (Project II) pays off, and is thus cost-effective overall, when the total lifecycle costs of all the cost items are considered.

The calculation tool is available online at: www.zvei.org/Lebenszykluskosten

Try it out yourself. You will see that "Energy efficiency pays off!"

If you have any questions, please contact: ZVEI, Measuring Technology and Process Automation Division • Phone: +49 69 6302-451 • E-mail: seibl@zvei.org

* The WWTP already operates its own combined heat and power station with electrical power generation. The energy costs indicated would be achieved where electrically energy is fully supplied by a third party.

3 Wide variety of applications

This calculation tool can be used immediately. In addition to consideration of individual components (e.g. speed-controlled pumps, energy-efficient motors, high-quality measuring instruments for process optimization), embedding in the comprehensive specific application is possible (e.g. consideration of an entire wastewater treatment plant). As a result, such aspects as the meaning of energy efficiency in the overall context are made transparent, and interactions are taken into account.

Though the concept was initially developed for the automation technology field and is illustrated in this context based on the example of a wastewater treatment plant, its generic structure allows it to be used equally well for other specific applications and industries.

Examples of potential application areas include:

- Wastewater treatment plants
- Bottling plants
- Breweries
- Waste incineration facilities
- Power plants
- Industrial production plants
- Building
- Lighting

4 Municipalities and businesses save – the climate benefits

- According to ZVEI calculations, energy savings of 10 to 25 % can be attained in German industrial and municipal facilities simply by using requirements-based automation technology. This corresponds to 88 billion kilowatt hours of energy equivalents. Up to 7 billion euros in energy costs could thus be saved each year in Germany. This is true even though some companies have already introduced extensive energy efficiency measures.
- In industry, greenhouse gases could be reduced by 43 million CO₂ equivalents. This equals the annual CO₂ emissions of roughly seven large coal power plants (2,000 MW per plant).
- 11 % of the CO₂ emissions of the industrial sector in Germany could be prevented in this way.
- Other areas of the electrical industry (such as lighting, power engineering and installation engineering) make a substantial contribution to reducing energy consumption and CO₂ emissions.

The measures and investments required are cost-effective for businesses and municipalities, as the lifecycle cost calculation shows. Municipalities and businesses save – the climate benefits.