Pro-DEENLA

LEUPHANA UNIVERSITY OF LÜNEBURG

Steinbeis Innovation Center Logistics and Sustainability

"ENERGY SAVING AND ENERGY EFFICIENCY" LEARNING MODULE

NOTES FOR TRAINERS/TEACHERS

SPONSORED BY THE

Federal Ministry of Education and Research

bibb Federal Institute for Vocational Education and Training

CONTENTS

NOTES FOR TRAINERS/TEACHERS

LEARNING MODULE CONTEXT

The learning module relating to the topic of "Energy saving and energy efficiency" is aligned to the contents of the occupational profile position of "Environmental protection" in the general training plan for vocational education and training in the occupation of freight forwarding and logistics services clerk.

The avoidance of environmental pollution caused by the company within the occupational sphere of influence is considered and explored within the scope of the occupational profile position "Environmental protection". The contents of this thematic area are possible instances of environmental pollution caused by the company providing training and environmental protection regulations that are applicable to the company. Opportunities for efficient and environmentally friendly use of energy and materials, and strategies for waste avoidance and disposal can also be explored within the scope of this occupational profile position.

The focus of the learning module is for trainees to reflect on the use of energy both in their private and work environment.

CONTENTS OF THE LEARNING MODULE

Although energy saving is a field of activity with which everyone comes into contact both in their personal and work lives, it is not a topic which people generally consider in much depth. After all, saving energy is not a notion which generates a great deal of excitement. However, if we look beyond the limits of our own energy billing, correlations which are certainly capable of producing a world-changing effect will become apparent.

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) describes energy efficiency as a measurement of energy expenditure to achieve a stipulated benefit. The lower the loss of energy for the achievement of the respective benefit, the higher this value will be. The minimum principle thus applies: the aim is to reach the stated goal via as little expenditure as possible. If all staff at a company, from the trainees to executive management, actively involve themselves in dealing with the resource of energy in a responsible and forward-looking way, then the economically relevant energy consumption of the company will not be the only area in which a positive influence is felt. Acting in a way which lessens the impact on resources can also help create more sustainability in the economy and in society.

Given Germany's current energy mix, which also involves the use of coal to some extent, there is a direct correlation between the generation and consumption of energy and negative impacts on the environment. For instance, the burning of fossil fuels in order to create electricity and heat or to facilitate mobility leads to both greenhouse gases (e.g. CO_2) and other emissions which are harmful to people and the environment (e.g. fine dust particles).
For this reason, the most environmentally friendly energy is energy which is not produced or consumed in the first place. Energy saving and energy efficiency thus represent crucial levers in terms of structuring the economy and society in a future-oriented way.

But what sort of influence on energy saving and energy efficiency can be exerted in the workplace?

The workplace offers an opportunity to make energy savings of up to 15% simply by changing personal behaviour. In 2015, for example, the areas in which most electricity was used in the industry, trade and commerce sectors were lighting (36%), mechanical energy (25%), and information and communication technology (16%). Each of these figures is expressed as a proportion of overall consumption. We can, therefore, make a useful contribution towards energy saving and energy efficiency merely by checking whether there is enough daylight to work in or by making sure that a computer is fully switched off. This form of reflection on our own behaviour does not just unconsciously assist in structuring the economy and society in a future-oriented way, it can also help the company to save financial resources.

Energy saving and energy efficiency depends on employees who are prepared to be critical!

For example, the following simple measures are sufficient to create responsible energy behaviour in the workplace:

LIGHTING

- ✓ Daylight – before turning on the light in the office (which could use modern energy-saving bulbs), check to see if there is enough daylight to work in. White walls and ceilings can help make the very best use of available natural light. So-called daylight sensors can also be used. These switch on, switch off or dim lighting depending on how much daylight is available.
- ✓ Number of light sources – do not use too many, since does not often not result in any improvement in brightness.
- ✓ Energy-saving bulbs – light sources should be energy saving. These are usually brighter and also offer a longer product lifetime.
- ✓ Lighting in places that are seldom used – turn off the lights in these areas.
- ✓ …

AIR CONDITIONING

- ✓ Room temperature – a temperature of between 20 und 22 °C provides the best working conditions in office spaces. Doors and windows should be closed when using heating or air conditioning. Only open windows for short periods of time (do not ventilate continuously). A thermometer may assist in objectively determining the room temperature.
- ✓ Free-standing radiators – do not block radiators and keep them free of dust. Otherwise warmth will not be evenly distributed within the room and heat output may be reduced.
- ✓ …

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Green IT is a collective term which describes endeavours to use and design information and communication technology in an environmentally friendly and resource-efficient way throughout the entire product life cycle.

- ✓ Screen saver – the best approach is to activate the "Switch off" monitor function in your PC's menu. Depending on the settings applied, the monitor will automatically switch to stand-by mode after a few minutes and can then be quickly turned back on by pressing a key or clicking the mouse.
- ✓ Stand-by – turn off the devices in your workplace (e.g. PC, screen, printer) before leaving. It is estimated that 50% of work computers remain switched on overnight or during the weekend. This also makes very little economic sense. The Federal Environmental Office puts the unnecessary costs incurred from general stand-by consumption of electricity across Germany at four billion euros per year.
- ✓ …

It is necessary for all employees to be integrated into a holistic energy management system. Forward-looking and systematic coordination of a company's procurement, conversion, distribution, and use of energy requires a fundamental understanding of the implications and relevance of individual operational actions. The way in which an individual deals with energy may be influenced by reminders or transparent representations of consumption.

Viewed in this way, reflecting upon how we handle energy can play a small part in saving the world. And who would not want to do that?

SUMMARY OF THE LEARNING MODULE

Classification under training regulation:	Environmental protection
Topic:	Energy saving and energy efficiency
Type of learning task:	Basic learning task, link-up learning task
Learning venues:	Workplace, company or classroom
Learning arrangements:	Individual and group work
Target competencies:	- The trainees present energy-saving measures. - The trainees derive systemic consequences from the way in which they deal with energy. - The trainees reflect upon the systemic consequences of the way in which they deal with energy. - The trainees implement their own energy-saving measures.
Brief description and module context:	The trainees begin by collecting energy-saving measures that are known to them. They then select a measure that they would like to examine more closely within contexts inside and outside the company. They develop a story about the complex system correlations of this measure and prepare this story in an appealing way. The trainees present their story in a form they have chosen themselves and reflect upon it together with their colleagues. The trainees go on to draw up an energy-saving guide. They implement the energy-saving measures outlined in this guide in their everyday working life by setting up energy teams (e.g. a light energy team), which subsequently go on to assume responsibility for further management of the individual measures.
Contents and tasks:	- Presentation of energy-saving measures from the trainees' private and work environment - Categorisation of energy-saving measures into the contexts within and outside the company - Development and presentation of the trainees' own story on the topic of energy-saving measures within contexts inside and outside the company - Reflection of the trainees on their own energy consumption and on their own influence on energy efficiency and on the avoidance of consumption - Implementation of energy-saving measures in the company environment and in the trainees' private environment where relevant
Materials required:	- PC with Internet connection - Materials for visualisation (e.g. flip chart paper and pens, PC, and projector)

LEARNING PHASES	SEQUENCE OF ACTIVITIES FOR LEARNERS	EXPLANATION OF LEARNING METHODS AND TECHNIQUES	NOTES ON RESOURCES
	THE INTRODUCTORY PHASE IS WELL-SUITED TO BE WORKED ON INDIVIDUALLY		
INTRODUCTORY PHASE	Before the trainees categorise energy-saving measures into contexts within and outside the company, they begin by collecting all the energy-saving measures which are known to them and recording these in writing.	Trainees are provided with tips on how to structure and develop a mind map *(see Note 1)**.	A PC could also be used to create the mind map.
DEVELOPMENT PHASE	Once the trainees have collected energy-saving measures, they choose one measure which they wish to look at in greater detail. They draw up a causal chain for the measure they have selected by carrying out research into its reasons and effects. The trainees use the causal chain as a basis for developing their own story.	Trainees are given tips on how to develop a story *(see Note 2)**. Depiction of a possible causal chain forms part of the story. By the way, storytelling is a highly modern method within the company context. This is a technique which is deployed both for internal management purposes and for external marketing.	During this phase, trainees should be supplied with a PC with an Internet connection so that they can conduct research into the energy-saving measure chosen.
	THE PRESENTATION AND DISCUSSION PHASE AS WELL AS THE TRANSFER PHASE ARE WELL-SUITED TO BE WORKED ON IN GROUPS		
PRESENTATION AND DISCUSSION PHASE	Once the trainees have created their own story on the topic of "Energy-saving measures and their contexts within and outside the company", they present their story to their colleagues in a self-determined form. During the presentation of the stories, the audience identifies findings and personal consequences for everyday life, and these matters are then discussed in a plenary session.		In this phase, trainees should be provided with materials for visualisation (e.g. flip chart paper and pens, PC, and projector).
TRANSFER PHASE	After the presentation and discussion of the self-developed stories, the trainees go on to draw up an energy-saving guide. They implement the energy-saving measures outlined in this guide in their everyday working life by setting up "energy teams" (e.g. light, paper, computer) which subsequently assume responsibility for further management of the individual measures.	Trainees receive tips on how to draw up an energy-saving guide *(see Note 3)**. Trainees are also provided with tips on the development and introduction of energy-saving measures with the assistance of "energy teams" (*see Note 4)**.	A PC may be helpful in the drawing up of an energy-saving guide and in the planning of energy-saving measures.

** see Notes for Trainees/Students*

SOURCES

Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit [Federal Ministry for Environment, Nature Conservation and Nuclear Safety] (BMUB) (Ed.:) (2017) *Press release No. 229/17 | Energy efficiency. Available online at: http://www.bmub.bund.de/pressemitteilung/klimaschutz-mit-auszubildenden/. As at: 01.08.2017.*

Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit [Federal Ministry for Environment, Nature Conservation and Nuclear Safety] (BMUB) (Ed.:) (2016) *Kurzinfo Energieeffizienz [Brief information on energy efficiency]. Available online at: http://www.bmub.bund.de/themen/klima-energie/energieeffizienz/kurzinfo/. As at: 01.08.2017.*

Bundesministerium für Wirtschaft und Energie [Federal Ministry for Economic Affairs and Energy] (BMWi) (Ed.): *Energieeffizienz in Zahlen [Energy efficiency in figures]. Berlin.*

Bundesweites Energieeffizienz-Berater-Netzwerk [National Energy Efficiency Advisor Network] (2017): *"Energieeffizienz-im-betrieb" ["Energy efficiency in the company"]. Available online at: http://www.energieeffizienz-im-betrieb.net/energiesparen-unternehmen.html. As at: 01.08.2017.*

co2online gemeinnützige GmbH (Ed.) (year of publication not stated): *Die Stromsparinitiative [The energy-saving initiative]. Available online at: http://www.die-stromsparinitiative.de/stromspar-tipps/tipps-fuer-unternehmen/index.html. As at: 01.08.2017.*

Deutsche Energie-Agentur GmbH [German Energy Agency](dena) (2012): *Handbuch für betriebliches Energiemanagement. Systematisch Energiekosten senken. Initiative EnergieEffizienz Industrie & Gewerbe [Handbook of Energy Management. Reducing energy costs systematically. Trade & Industry Energy Efficiency Initiative]. Berlin.*

Deutsche Energie-Agentur GmbH [German Energy Agency](dena) (2014): *Einfach Strom sparen: Mein Rechner rechnet sich [The simple way to save electricity. My computer pays off]. Energiespartipps für PC, Drucker & Co [Energy-saving tips for PCs, printers, etc.]. Available online at: https://shop.dena.de/fileadmin/denashop/media/Downloads_Dateien/esd/1383_Energiespartipps_fuer_PC_Drucker_Co.pdf. As at: 01.08.2017.*

EnBW Energie Baden-Württemberg AG (2017): *Energie Trends. Jeder Tag ist voller Energie [Energy trends. Every day is full of energy]. Available online at: https://www.enbw.com/geschaeftskunden/gewerbe-landwirtschaftskunden/energie-trends/energiesparen/energie-knigge.html. As at: 01.08.2017.*

Reisinger, Niklas (2014): *Green-IT-Strategien für den Mittelstand. Nachhaltige Lösungen in der IT und durch IT-Unterstützung [Green IT strategies for SMEs. Sustainable solutions in IT and via IT support]. Reihe Nachhaltigkeit [Sustainability Series]. Volume 59. Hamburg: Diplomica Verlag.*

Umweltbundesamt [Federal Environmental Office] (2008): *Press release No. 54/08 "Bye Stand-By: EU-Kommission sagt Leerlaufverlusten den Kampf an" [Bye-bye stand-by – EU Commission declares war on wasting energy in stand-by mode]. Available online at: https://www.umweltbundesamt.de/presse/pressemitteilungen/bye-bye-stand-eu-kommission-sagt-leerlaufverlusten. As at: 01.08.2017.*

IMPRINT

Leuphana University of Lüneburg, Business Education Unit, Universitätsallee 1, 21335 Lüneburg, Germany
Steinbeis Innovation Center Logistics and Sustainability (SLN), Dresdener Straße 17, 74889 Sinsheim, Germany

Editorial staff: *Prof. Andreas Fischer, Harald Hantke, Jens-Jochen Roth, Kristin Senneke, Lisa Stoschek*

Design and print setting: *Anke Sudfeld*

Photos/Illustrations: *Fotolia: p. 1+2*

LICENSE NOTE