innoveas
The power of energy audits

D.5.5 - Training Toolkit

WP5

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Technical References

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Project Title	**INNOV**ating the uptake of **E**nergy **A**uditing **S**chemes for SMEs
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[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

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Project Summary

The INNOVEAS project is an initiative promoted by 10 partners from 6 EU countries, to build and deliver a capacity building programme, aiming at addressing the major non-technical barriers that most often hamper the adoption the energy auditing practice, in particular among those actors, such as SMEs where such audits are not required by law.

The ultimate goal is to consolidate a structured, permanent and expandable offer to help develop continuous self-sustainable services to raise awareness and build capacity in the field of energy auditing and related energy saving measures in SMEs.

The project therefore aims at designing and deploying staff trainings and capacity building programmes to enhance corporate policy towards energy efficiency, energy culture (motivations, behaviour change, mitigation of perceived risks and barriers) and sustainable supply-chain initiatives. It therefore intends to:

- Advanced analysis of behavioural barriers to energy audits, to identify and analyse the enabling conditions and non-technical barriers hindering the adoption of energy auditing practice;
- Delivery of self-sustainable capacity building programmes, in order to systematise awareness raising procedures to overcome the psychological and organisational barriers to energy audits in SMEs, deliver a training offer to SMEs and formulate a capacity building programme targeting stakeholders such as intermediaries, policy makers and financing institutes;
- Create an institutional structure to sustain the project's objectives and results and lay the basis for the creation and consolidation of a pan-European network of enablers likely to support in the coming years the growth and expansion of the training offer to on energy efficiency for European business.

Disclaimer

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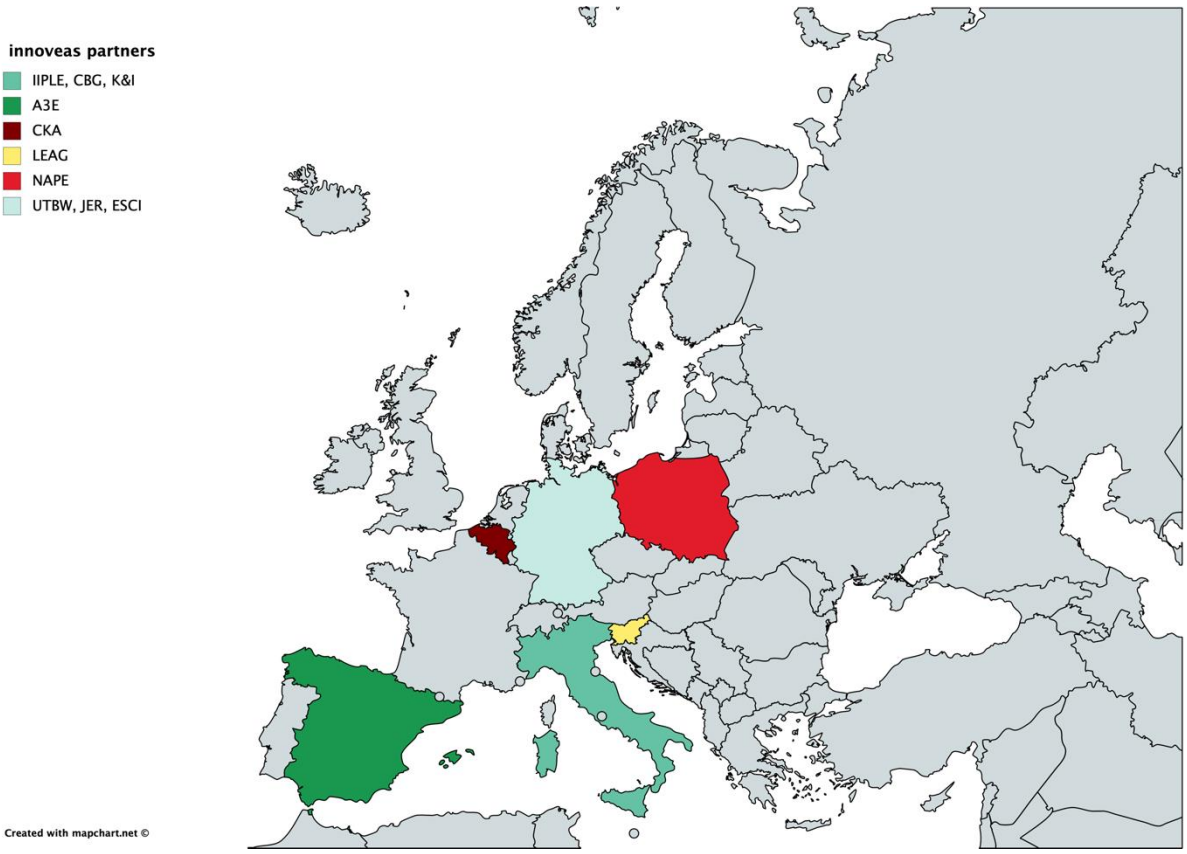
Partners



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1. Executive summary

This deliverable is a relevant element of WP5 - Reaching and engaging Stakeholders. Its main purpose is to make available the key materials of the capacity building programme also for future training activities in a simple and user-friendly way.
A Training Toolkit has been created and made available in the Innoveas training platform.
This deliverable describes how the training toolkit is structured in each country where the training is provided and how it can be used by learners through access to the training platform.
In line with the objectives of INNOVEAS, it is important for the success of the project that the key profiles of SMEs participating in the training activities develop a greater awareness of energy consumption in their company, identify the actions they can take to reduce energy consumption and gain an understanding of the benefits of the energy transition.

The development of a specific training toolkit containing the didactic material of the training activities, in the language of the countries involved, contributes directly to the purpose and to one of the main objectives of Innoveas, i.e. to deliver a capacity-building program that removes the main non-technical barriers (psychological and behavioural) that often hinder the adoption of energy audits by SMEs.
The objective of the project is to consolidate a structured permanent and scalable training offer that will contribute to the development of self-sustainable services and awareness raising in the field of energy auditing and related energy efficiency measures in SMEs.
The project aims to define and implement training programs for SMEs' staff, to strengthen company commitment in the field of energy efficiency and build initiatives for the involvement of the entire supply chain. The activity of creating a network and an international alliance is an important step towards this aim.

The training activities are structured as follows:
- Web-based modules developed by each partner involved in the trainings,
- In situ training for groups of companies,
- In-company trainings at the premises of few selected SMEs,
- Training videos.

The training toolkit presented in this deliverable includes the materials of in-situ and in-company training and describes the training videos. This report is divided into 3 chapters:

1. The description of the tools of the capacity building programme,
2. The approach of each partner and the training materials published in national language (the chapter is divided into paragraph, one for each training provider),
3. The description of the Innoveas platform, where the materials are stored and available for users.

With regards to the web-based modules, they are described extensively in deliverable D4.1 "Training webinars", therefore, although they are included in the Training Toolkit, only a general description is given. More information is available in D.4.1.
Other users and actors, in addition to SMEs, could benefit from the training toolkit, such as: trade associations, other intermediaries and trainers who will contribute to the dissemination and sustainability of the project results after the conclusion of the activities.

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2. Capacity Building Implementation

2.1. T4.1 Implementation of the training products

The structure of the Capacity Building Programme has been already described in Deliverable 3.2 “Capacity Building Plan”. The activities and tools have been developed on the basis of the target groups addressed:

1- SMEs → the final beneficiaries of the Innoveas Project are SMEs and, within it, several roles could be involved in the training activities: CEO, administrative managers, heads of production, energy managers, operative workers.
2- Stakeholders → as, for instance, energy auditors, policy makers and financial institutes, as directly-involved actors who will receive hints and tools to approach the different profiles in SMEs, implementing the audit.
3- Intermediaries → industrial associations and other intermediaries who will be the successors of the project’s training activities and materials, after the completion of the EU-funded actions. They will be the responsible for the implementation of an awareness raising and training programme directly targeting SMEs, after the end of the Innoveas Project.

For the SMEs, 3 different training modalities have been developed:

- web-based modules, short video-lessons to provide pills of contents and basic information to interested enterprises and workers (this tool will not be discussed in the present document, as it has been described in detail in D4.1 “Training webinars”, already published on Innoveas website);
- in-situ training, frontal lessons (which have been implemented in virtual modality because of COVID-19 pandemic) dealing with the concept of energy efficiency and fostering the adoption of energy audits towards the energy transition;
- in-company training, an activity performed in presence at the enterprise’s premise, where an energy manager/expert performs a sort of pre-audit, to calculate the energy costs and expenses of the company and identify possible strategies to save energy and reduce costs.

In this deliverable, the second and third activities will be explained in detail by each partner; in fact, according to different contexts, sectors each partner has implemented the training activities in slightly different ways.

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2.1.1. Task 4.1.2 In-situ for groups of companies

As described in D3.2, “in-situ” training for groups of companies is intended to provide a more accurate knowledge to the participants, gathered on a joint virtual (because of the health crisis) classroom, to better explore the topic related issues. The track for the development of the in-situ programme has been defined by the project, as linked with information on the added value of energy audits, on existing incentives, on energy audit procedures.

The specific participants of the training have been identified by each partner, within the actors of SMEs of construction, chemical and food processing sectors. The selection has been planned and implemented with different modalities by the partners involved in the activity.

2.1.2. Task 4.1.3 In-company training

The following step of the capacity building programme is the so called “In-company training” addressed to a restricted number of participants, selected among those participating in the in-situ training or within the 3 already mentioned sectors and chains. The purpose of the activity is to perform a sort of pre-energy audit, involving experts or profiles like energy auditors and energy managers.

Each partner has structured the activity in different ways and according to the specific characteristics of the company and sector. The approach to select the participants will be better explained in the following chapters.

In-company training is to be considered as a mentoring process for the SME, able to involve the owner and the key figures of the company, in order to implement a sort of energy pre-audit. The SME will be assisted by an expert who, starting from an analysis of the company's costs and bills, will be able to discuss with the key profiles of the company in order to:
- analyse measures aimed at containing consumption and improving the performance of the building stock;
- collect typological data of plants, vehicles and buildings with acquisition of consumption trends, use of plants, etc;
- define the calculation model
- analyse the criticalities and study the simulated criticalities and evaluation of the interventions
- draw up a programmatic intervention plan;
- develop an action that is not limited to enhancing energy performance, but goes further, aiming decisively at improving sustainability.

2.1.3. Task 4.1.4 Training videos

As designed by the project, the six training sessions (recorded by the partners with the support of ESCI), should have been structured to be a reference for participants who could not attend the course or who wanted to review the topics discussed.
Considering that most of the in-situ and in-company activities have been implemented in a virtual modality, the partners have agreed that a video of six minutes with slides and screens during video lessons wasn’t probably the most interesting tool for learners.

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Therefore, the structure has been modified, as described in D3.2: the training videos have the aim to recap the main features emerged during the implementation of the different classrooms. According to an initial storyboard, the more relevant topics within the flow of the programme defined for the in-situ training will be filmed and then edited providing a structured sequence in line with the overall contents.
The videos will be then published on the INNOVEAS website and embedded on the project YouTube channel to serve as a general recap for all the participants to the live training sessions and as a very first short 'insight' on the main relevant topics.

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3. Description of the contents

3.1. Spain

3.1.1. A3E

In-situ for group of companies

Title: Towards zero-emission industrial SMEs

Target group addressed:
Managers, energy managers, quality and environmental managers and maintenance personnel of SMEs

Main objectives:
The course aims to provide the necessary elements to understand the current ecological transformations and to show them the range of solutions towards an energy transition and decarbonization of their activity.

Training modules and contents:

Module 1. INTRODUCTION

- Introduction to the course and presentation of the participants
- I.1. Need to act now: Climate emergency, externalities of energy use, European regulatory framework
- I.2. Overcoming obstacles: analyse and share the barriers of the attending SMEs to the introduction of energy efficiency measures. Share the results of the INNOVEAS project. Set their own climate targets. Define energy transition and continuous improvement.
- I.3. Energy audit as a starting point: Definition, steps, benefits and limits of the energy audits. Energy audit´s scopes and climate audit. Useful tools. SPEEDIER project.

Module 2. ENERGY EFFICIENCY BENEFICTS

- II. 1. Economic savings (bill optimization, power purchase),
- II.2. Energy savings with monitoring and remote control of energy consumption
- II. 3. Energy savings with thermal insulation
- II. 4. Energy efficiency measures in food, chemistry and construction companies
- II. 5. Conclusions: Assess the benefits, costs vs. Benefits
- II.6. Climate audit: carbon footprint calculation

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Module 3. GREEN ECONOMY AND ENABLING ENVIRONMENT

- III. 1 Green economy and green marketing: Non-economic benefits and business opportunities, green Marketing, Corporate Social Responsibility, Sustainable Development Goals.
- III. 2. Certificates: environmental certificates, ISO 50001, other useful certificates for food, chemistry and construction companies.
- III. 3. Enabling context: Regulatory framework, Energy Agencies and public support; Private financing mechanisms; Energy efficiency insurance and the Go Safe with ESI project.

Module 4. IMPLEMENTATION

- IV. 1. Other measures and possible actions: Renewable energies, Solutions for transport/distribution and storage, Circular economy for food, chemical and construction companies, Carbon sequestration and emission offsetting mechanisms.
- IV. 2. Case Studies: Measures implemented and results in SMEs
- IV. 3. Climate Audit/Carbon Footprint Exercise in food, chemical and construction companies
- IV. 4. Tailor made solutions: Positive and negative aspects of each SME, Roadmap to energy transition

Methodology:
Online

Training material:
Within the presentations themselves there are bibliographical references and direct links to them. However, some of the complementary documentation used is presented below.

Circular 3. Metodología nuevas tarifas de electricidad, BOE
Nuevos peajes de la electricidad. BOE
Emissions Gap Report 2021
EU Chemical Strategy for Sustainability, European Commission
FAQS MOVES III, Plan de Recuperación, Transformación y Resiliencia
Guía pymes y biodiversidad, CONAMA
Guía de servicios de Eficiencia energética para la descarbonización de la economía- A3E
Guía Autoconsumo, IDAE
Guía Comunidades Energéticas Locales, IDAE
Guía Huella de Carbono, Ministerio para la Transición Ecológica
Guía para licitación Biomasa 2021, Avebiom
Guía Gestión energética industria,l EREN
IPCC informe especial 2018, AEMET y OECC.
Buildings GSR 2020 Report, UN Environmental Programme
Strategy Farm to Fork, European Commission
Estudio Consumo Sostenible, Oney
Informe 2019 Construcción (2019 Global Status Report for Buildings and Construction), IEA
Informe RAING, Emisiones de Gases de Efecto Invernadero en el sistema agroalimentario y Huella de Carbono de la Alimentación en España, Real Academia de Ingeniería.

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Presentación IDAE ayudas Autoconsumo renovable 2021, IDAE

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In-company training

A very interested company is selected among the in-situ training participants. The In-company training will consist of 3 meetings:
- an online meeting for the SME and the auditing company to get to know each other. In this meeting, the SME describes its activity and facilities and details its concerns and needs in relation to energy efficiency measures.
- A first face-to-face visit in which the auditing company will collect all the information necessary to prepare the pre-audit report.
Prior to this first visit, both companies are in contact by email or telephone to share information on invoices, equipment inventories and previous studies carried out.
The auditing company will need a couple of weeks to collect all the information and to prepare the report.
- In the second visit, the auditing company comes again to the premises of the SME to explain in detail the report and all recommended measures, solve any doubts that may exist, give its expert opinion on how the measures can be implemented with a roadmap and give advice on existing incentives.

An example of report could contain:

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Training videos

This training video serves as a general recap for all the participants to the live training sessions and as a very first short 'insight' on the main relevant topics.
This video talked about the aim of the project and what was to be achieved with the SME trainings.

In the A3E video we highlight the quality of the course content and the extensive experience of the teachers.
We also mentioned how important it is to deal with real cases and success stories and to work in a participatory way to improve motivation in companies.
We remind companies that those most interested can receive a pre-audit through the In-company Training.
In the second part of the video, we call the attention of the rest of the stakeholders to follow the project and be aware of our next steps.

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3.2. Slovenia

3.2.1. LEAG

In-situ for groups of companies

Title: Web based trainings - Increasing energy efficiency in small and medium-sized enterprises

Target group addressed:

Local energy agency of Gorenjska tried to involve as many SMEs as possible; we feel that in order to achieve a significant impact all of the sectors need to be involved. That said we focused our attention to sectors INNOVEAS has set – construction, chemistry and food. In order to attract SMEs to participate we used social media, our page, made custom made flyers that were handed out in places, where SMEs get important information (incubators, chamber of commerce, info spots, etc.). Due to covid situation – handing out physical flyers is not most practical, that is why we sent them out virtually, by email. Studying energy consumption, revenues, number of employees, etc. we made a list of 1500 SMEs from sectors of construction, chemistry and food, that could benefit the most from the in-situ trainings. We contacted them directly through email and phone. In order to spread the word about our trainings we also collaborated with chamber of commerce, chamber of crafts, chamber of agriculture and incubators.

Main objectives:

Small and medium-sized companies represent more than 99% of all companies in Slovenia. Therefore, we can rightly say that they are the backbone of the economy. In total, small and medium-sized enterprises employ almost 70 percent of people. Energy consumption in companies and industry represents more than a quarter of the energy consumed, so we can estimate that small and medium-sized companies consume more than 20% of energy in Slovenia. This represents the consumption of huge amounts of electricity, fossil fuels, and partly energy from renewable sources.
Where we have high energy consumption, we also have great potential to reduce energy consumption. Therefore, we aim to empower and educate SMEs about the tools, actions and measures that they can use to:
- improve their energy efficiency,
- rise usage of renewable energy sources,
- reduce their expenditure,
- improve their products and activities,
- consolidate their market position and make an important contribution to the fight to reduce environmental impact and nature conservation.

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Training modules and contents:

In the process of design of trainings, we discussed and considered many different scopes of trainings. In the end the partner chose 4-day trainings that ran from 9:30 till approximately 13:30. Each lecture of the training was picked and tailored to the needs of SMEs in order to present them with as much as useful and understandable material as possible. In the scope of the trainings all 4 modules (1. introduction to the concept of energy audit, 2. benefits of energy efficient measures, 3. green strategies, and practical tools, 4. measures and examples) were addressed. Content of different modules was dispersed throughout 4-day trainings. Below is the list of lectures developed in the scope of INNOVEAS.

Day 1
The INNOVEAS project and energy audits in SMEs (introduction)
Methodology of performing energy audits (energy audits)
Collection and analysis of data on energy supply and its use (energy monitoring and analysis)
Energy efficiency and energy management in buildings (energy efficiency in buildings)

Day 2
Thermal inspections in SMEs (IR thermal inspections)
Economic analysis of energy efficiency projects (evaluation of measures)
Energy efficient buildings and heating and ventilation in winter (energy efficiency, technologies, etc.)
Energy efficient buildings and cooling and ventilation in summer (energy efficiency, technologies, etc.)

Day 3
Tools or opportunities to improve energy efficiency in companies (specific measures for SMEs)
Energy efficient buildings and electric lighting (lighting – measures, importance)
Green office and practical exercises (energy efficiency in office)
Financing energy efficiency projects (how to finance energy efficient measures)

Day 4
Energy management, data collection and verification of savings (non-investment measures)
Calculation of key indicators for assessing the state of energy efficiency (status of energy efficiency)
Energy communities and infrastructure integration (how to connect and collaborate)
Integration of RES systems in buildings - heat pumps (key information – heat pumps)

Methodology:

Due to covid 19 measures, that were in force in Slovenia during the period of in situ trainings, we couldn't organize in presence lessons. That is why we tried our best to bring trainings close to SMEs. We used Microsoft Teams platform. We contacted and invited SMEs through channels described previously. We used open-source platform Jotform, in order to monitor registration of SMEs. After receiving registration, we sent out invitations to MS Teams webinars, individually for each day. Feedbacks from the participants was gathered manually, by mail and email.

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Training material:

Training material was prepared in Power point. Material was handed out to the participants. We also prepared some key points of the lectures, that were also delivered to participants. The materials published on the Innoveas training platform can be completed with the following list of references and literature:

- http://pineaudit.eu/eng/home.aspx
- http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/arhiv_aure/metodologijaep-1.pdf
- http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV11911
- https://www.agen-rs.si/porocanje-o-izvedenem-energetskem-pregledu
- https://gi-zrmk.si/media/uploads/public/document/93-predavanje_o_problematiki_ki_jo_obravnava_projekt_keepcool_2_dr_sijanec_zavrl_gi_zrmk_sejem_dom_sl.pdf
- http://ekostudio.si/wp-content/uploads/2011/09/5-6.pdf
- http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV4223
- http://www.urbenergy.eu/fileadmin/urb.energy/medias/partners_section/Partner_Outputs/main_results/Energy_Efficient_Refurbishment_WP4_manual.pdf
- https://eur-lex.europa.eu/legal-content/SL/TXT/PDF/?uri=CELEX:32010L0031&rid=1
- http://www.cres.gr/greenbuilding/PDF/prend/set3/WI_14_TC-draft-ISO13790_2006-07-10.pdf
- https://www.ozs.si/datoteke/ozs/sekcije/Janko%20Rozman/Sekcija%20instalaterjev-energetikov/TSG-01-004_2010_U%C4%8Dinkovita%20raba%20energije.pdf
- http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/arhiv_aure/metodologijaep-1.pdf
- http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV11911
- Usposabljanja za izdelovalce energetskih izkaznic Gradiva
- https://energetskaizkaznica.si/
- https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiS7dSj48L1AhVL16QKHRKbDjQQFnoECAIQAQ&url=http%3A%2F%2Fwww.ee.fs.uni-lj.si%2FEIO_uni%2F4_medved_RR.pdf&usg=AOvVaw3EsgCORkMoJZvmtpva2VL6
- https://gi-zrmk.si/media/uploads/public/document/191-gradbenik_26_predpisi_06_sijanec_sl.pdf
- http://pineaudit.eu/eng/home.aspx
- https://booksc.eu/dl/52816215/ce2db6
- http://lab.fs.uni-lj.si/kes/energetski_stroji_in_naprave/Literatura___TumaSekavcni_EnergetskiStrojiInNaprave.pdf
- http://lab.fs.uni-lj.si/kes/knjige/Tabele_termodinamskih_lastnosti_vode_in_vodne_pare.pdf

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- http://www.ds-rs.si/sites/default/files/dokumenti/zbornik_goz_in_les_razvojna_priloznost_slovenije.pdf
- http://lab.fs.uni-lj.si/kes/energetski_stroji_in_naprave/PredstavitevPredmeta1.pdf
- http://lab.fs.uni-lj.si/kes/energetski_stroji_in_naprave/ESN_predavanje_3_GorivaZgorevanje.pdf
- http://lab.fs.uni-lj.si/kes/energetski_stroji_in_naprave/ESN_predavanje_2_EnegijeKrozniIzkoristekDeloMocSobe.pdf
- http://lab.fs.uni-lj.si/kes/energetski_stroji_in_naprave/ESN_predavanje_9_EnergetskeNaprave.pdf
- Energetski pregledi stavb (primeri dobre/slabe prakse) – Nejc Avguštin, univ. dipl. inž. grad., EUTRIP, d.o.o.
- Energetski pregledi procesov – mag. Bogomil Kandus, Enekom, d.o.o.
- Analiza obstoječe aktualne zakonodaje na področju energetskih pregledov – mag. Primož Praper, EUTRIP, d.o.o.
- Physical printed material EUREM – energy manager material
- https://www.ekosklad.si/gospodarstvo
- https://www.ekosklad.si/gospodarstvo/pridobite-spodbudo/seznam-spodbud?ukrep%5B%5D=ucinkovita-raba-energije
- https://gbc-slovenia.si/wp-content/uploads/2020/07/Eko-sklad-GBC-trajnostni-vidik-razpisov-30.6.20.pdf
- https://www.care4climate.si/_files/159/ZRMK_C4.4_D1_Porocilo_sprejete%20spremembe_HG15042020%20MSZ%20oblikovano.pdf
- https://ekosklad.si/gospodarstvo/novica/pregled-spodbud-za-podjetja
- https://www.youtube.com/watch?v=yiw6_JakZFc
- https://ourworldindata.org/grapher/global-energy-substitution?country=~OWID_WRL
- https://lh5.googleusercontent.com/3eFKOYVmU3ShwHpX76qfKdqE9E2ehCMsEcCEu7J8Rec9tac17RGO1q5oomfkvBDJLOdZ6duaiiYBOq2EKn692ic3joftkg9VFlzUaQmprFJp-JqkdnY-MuoC0Ao-4GPHe10d1yNB
- http://terming.eu/termografske-delavnice.html
- https://repozitorij.etfos.hr/islandora/object/etfos%3A2318/datastream/PDF/view
- https://www.slideshare.net/NikoGodec/seminarska-naloga-toplotni-mostovi
- http://www2.arnes.si/~mlicen3/html/cene_energentov.html
- Joanneum Research Graz „Emissionsfaktoren und energietechnische Parameter für die Erstellung von Energie- und Emissionsbilanzen im Bereich Raumwärmeversorgung
- Material from payed page - https://www.digitaljuice.com
- http://en.wikipedia.org/wiki/File:Co2-temperature-plot.svg
- https://www.enekom.si/sl/pages.php?id=9
- https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2020-01-2762?sop=2020-01-2762

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- http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV10043
- http://www.cek.ef.uni-lj.si/u_diplome/mlakar3935.pdf
- http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/arhiv_aure/prirocep-1.pdf
- https://core.ac.uk/download/pdf/161592053.pdf
- http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/arhiv_aure/v10-mintbrosura.pdf

In-company training

In company trainings were offered and promoted throughout our the INNOVEAS promotion campaign. Promotion for individual trainings and pre-audit was done in public events, through various online meetings with different stakeholders, flyers, emails, direct phone calls and especially in in situ trainings. In order to produce an even bigger impact and help SMEs in the first steps of their efforts for improving energy efficiency, the partner visited and helped them with instructions, measurements, inspection and solutions for lowering their energy usage and expenses. We got in touch with the companies with the help of chambers, as stated above. This collaboration proved out to be crucial, because it could difficult for not familiar actors (in this case LEAG) to gain the trust of SMEs in order to visit them. SMEs in Slovenia are careful with information and allocation of their time and resources. We designed our trainings in three phases. We held an online meeting/phone call – where we presented SMEs with the plan, instructions about gathering the necessary data (energy expenses, specifications, basic information, etc.), pre-audit content, and time frame of the visit, and pre-audit process. We than visited the companies, inspected their facilities, production lines, disused possibilities for improvement, looked through their energy expenses etc. We presented them our training materials, and we discussed which topics would be most suitable for them. Then we presented them the topics with the emphasis on the actions that were most suitable for their company. In the third phase results of the pre-audit with recommended measures were presented.

Training videos

LEAG produced two short videos. First video was recorded and edited with the help of ESCI. Video describes the approach and aims of the Innoveas project. LEAG employee Jure Eržen presents the in-situ trainings and their content, importance and benefits of energy audits and urges to join in situ and in company trainings and thus act and make an improvement

The video can be found both on the YouTube page of the Innoveas project and on the official website, in the section dedicated to the Slovenian training materials

Second video was produced and edited by LEAG. The video shows the inspection of the premises, energy devices and lectures that were given to the SMEs and lectures that were prepared in company trainings. The video discusses the importance of energy efficient measures and what companies can and need to do. The video can be found both on the YouTube page of the Innoveas project and on the official website, in the section dedicated to the Slovenian training materials.

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3.3. Italy –

3.3.1. - IIPLE

In-situ for groups of companies

According with the requirements of the Project and with the guidelines developed by the Consortium, IIPLE has designed and implemented the in-situ training activities for small and medium sized enterprises of the construction sector. The 16-hour programme has been divided into 4 lessons.
Because of the health emergency related to COVID-19, the training has been implemented in online synchronous modality, through the GotoMeeting platform.

Title:
Energy transition and challenges of the SMEs in the construction sector

Target group addressed:
Entrepreneurs and technicians of building and plant companies, producers of building materials, energy auditors and energy managers. Professionals and practitioners of the construction sector have also been involved in the training courses.

Main objectives:
The course aims to provide the necessary elements to understand the current ecological transformations and, in the short and medium term, the scenarios of the energy transition.

Training modules and contents:

MODULE 1 → scenarios and challenges
• Introduction to the course and presentation of the participants
• The current reference scenario and the policies in place towards a decarbonised society
• SMEs in the construction sector facing the challenges of the energy and ecological transition
• Energy audit as a pre-requisite for efficiency processes
• ways in which the Innoveas European Project can address the energy transition in SMEs
• Which barriers can hinder the energy transition
• Which activities can promote the implementation of energy audit in SMEs

MODULE 2 → The transformative forces resulting from the energy and ecological transition
• The energetic and ecological transition: meanings and implications in the short, medium- and long-term period.
• Simulation and analysis of scenarios for SMEs in the construction sector
• Economic enhancement of non-financial aspects
• The contributory approach to the energy and ecological transition: why now? Why me? Why us?
• The Energy Audit as a means to activate a “generative change”

MODULE 3 → generate shared value and improve your positioning in the market
• What generating a shared value in your business starting from a greener approach means

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• What it means for companies to have a green strategy in terms of organization and market positioning and what skills and competences this requires
• Contribution, Impact and Reputation: how social generativity helps us make choices that are better for us, for our business and for the community
• Certification criteria and measurement of environmental impacts: GRI Standard (Global Reporting Initiative Standards)
• Which "Alliances" support energy transformation

MODULE 4 → methods and tools to activate transformative processes
• New trends in consumers, procurement and public funding
• The green evolutions of the market
• Environmental marketing and green reputation
• Sustainable investments to become a socially and environmentally responsible company
• Voluntary energy-environmental certifications
• The measurement of impacts: the concept of ecological footprint
• Methods and tools for the energy and environmental transformation of the company: the MARC approach for the fight against climate change.

Methodology:
Initially planned as face-to-face lessons, the training activity has been implemented in synchronous virtual modality.

Training material:
On the training platform, IIPLE has uploaded training materials divided in folders for each edition; in each folder, with minor variations, 3 power point presentations and additional materials can be found.

1. Corso Innoveas, Modulo 1 by Eng. Sergio Bottiglioni,
    - Policies and Rules on Energy audits
        - ISO 50001:2011 "Energy management systems - Requirements with guidance for use"
        - ISO 50002:2014 "Energy audits - Requirements with guidance for use"
        - Energy Efficiency *Directive* 2012/27/*EU*
        - D.Lgs. 102/2014 "Attuazione della direttiva 2012/27/UE sull'efficienza energetica, che modifica le direttive 2009/125/CE e 2010/30/UE e abroga le direttive 2004/8/CE e 2006/32/CE"
        - UNI CEI 11339:2009 "Gestione dell'energia - Esperti in gestione dell'energia - Requisiti generali per la qualificazione"
        - UNI CEI 11352:2014 "Gestione dell'energia - Società che forniscono servizi energetici (ESCO) - Requisiti generali, liste di controllo per la verifica dei requisiti

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dell'organizzazione e dei contenuti dell'offerta di servizio"
- EN 16247-1:2012, "Energy audits - Part 1: General requirements"
- EN 16247-2:2014, "Energy audits - Part 2: Buildings"
- EN 16247-3 : 2014 "Energy audits - Part 3 : Processes"
- EN 16247-4 :2014, "Energy audits - Part 4 : Transport"
- EN16247-5:2015 "Energy audits - Part 5: Competence of energy auditors"

- Externalities of energy consumption: social costs
  - European Commission, Directorate-General for Research and Innovation, *ExternE: Externalities of Energy. Volume 1, Summary*, Publications Office, 2009
  - European Commission, Directorate-General for Research and Innovation, *ExternE: Externalities of Energy. Volume 2, Methodology*, Publications Office, 2009
  - EC Project "CASES Cost assessment for sustainable energy systems" - FP6-SUSTDEV - Sustainable Development, Global Change and Ecosystems: thematic priority 6 under the Focusing and Integrating Community Research programme 2002-2006.
  - EC Project "Externalities of energy: extension of accounting framework and policy applications (EXTERNE-POL)"
  - FP5-EESD - Programme for research, technological development and demonstration on "Energy, environment and sustainable development, 1998-2002"
  - *"Energia Apea Vincere la sfida energetica; la riqualificazione energetica negli edifici produttivi"*, Published by Angelo Mingozzi and Sergio Bottiglioni - RICERCAEPROGETTO – Galassi, Mingozzi e Associati, February 2011 - Green social festival 2011, Città metropolitana di Bologna

2. Corso Innoveas, Moduli 2 e 3 by Dott. Paolo Pezzana:
   a. Magatti M., GIaccardi C., Generativi di tutto il mondo unitevi, Manifesto per la società dei liberi, Feltrinelli, Milano, 2014
   b. Magatti M., Giaccardi C., Nella fine è l'inizio, in che mondo vivremo, Il Mulino, Bologna, 2020
   c. Giovannini E., L'Utopia Sostenibile, Laterza, Bari, 2018
   d. Stiegler B., Collettivo Internation, L'assoluta necessità, Meltemi, Milano, 2020

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e. Gowing N., Langdon C., Thinking the Unthinkable, John Catt Educational, Hampshire, 2018
f. ASVIS, Italy and the Sustainable Developement Goals, Report 2021, in www.asvis.it/rapporto-asvis
g. ISTAT, Rapporto sulle imprese 2021, in www.istat.it/archivio/264800
h. European Commission, 2020 Strategic Foresight Report, in https://ec.europa.eu/info/strategy/strategic-planning/strategic-foresight/2020-strategic-foresight-report_en
i. Club of Rome, The limits to growth, 1972, in https://www.clubofrome.org/publication/the-limits-to-growth/
j. Club of Rome, Ecological Civilization, from emergency to emergence, in https://www.clubofrome.org/publication/ecological-civilization-from-emergency-to-emergence/

3. Corso Innoveas, Modulo 4 by Dott. Federico Pinato:

a. 2020 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatService
b. New displacement in 2019 (https://www.internal-displacement.org/global-report/grid2020/)
c. Ceballos, G., Ehrlich, P. R., Barnosky, A. D., García, A., Pringle, R. M., & Palmer, T. M. (2015). Accelerated modern human–induced species losses: Entering the sixth mass extinction. Science advances, 1(5), e1400253 (https://www.science.org/doi/pdf/10.1126/sciadv.1400253)
d. Luypaert T., Hagan J.G., McCarthy M.L., Poti M. (2020) Status of Marine Biodiversity in the Anthropocene. In: Jungblut S., Liebich V., Bode-Dalby M. (eds) YOUMARES 9 - The Oceans: Our Research, Our Future. Springer, Cham (https://link.springer.com/chapter/10.1007%2F978-3-030-20389-4_4)
e. https://www.eea.europa.eu/soer/2020/soer-2020-visuals/status-of-the-nine-planetary-boundaries/view
f. https://www.chathamhouse.org/2018/12/how-poverty-contributing-deforestation-across-africa
g. https://discuss.doughnuteconomics.org/t/doughnut-images-in-italian/136
h. Malattie trasmissibili e il cambiamento climatico (https://d24qi7hsckwe9l.cloudfront.net/downloads/cambiamento_climatico_e_salute.pdf)
i. Relazione sullo stato della Green Economy 2019 (https://www.statigenerali.org/wp-

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content/uploads/2019/11/Relazione_sullo_stato_della_green_economy_2019.pdf)
j. The Sustainability Imperative, Nielsen Report 2015
k. Doing Well By Doing Good, Nielsen Report 2014
l. Global Sustainability Summit, the sustainability imperative, insights on consumer expectations, 2016
m. L'investimento sostenibile e responsabile (http://finanzasostenibile.it/wp-content/uploads/2016/08/140903_Posizione_ufficiale_SRI_FFS.pdf)
n. I Criteri Ambientali Minimi (https://www.minambiente.it/pagina/i-criteri-ambientali-minimi)
o. Guida alla responsabilità sociale (http://store.uni.com/catalogo/index.php/uni-iso-26000-2010?josso_back_to=http://store.uni.com/josso-security-check.php&josso_cmd=login_optional&josso_partnerapp_host=store.uni.com)
p. ISO 26000 (https://www.unioncamere.gov.it/csr/P42A646C640S370/ISO-26000.htm)
q. CAM edilizia e certificazioni volontarie (https://www.mite.gov.it/sites/default/files/archivio/allegati/GPP/allegato_tec_CAMedilizia.pdf)
r. Principi di sostenibilità NATO (https://www.unglobalcompact.org/)
s. Obiettivi ambientali NATO (https://sdgs.un.org/goals)
t. Framework per valutazione di performance di sostenibilità (https://ecovadis.com/it/)
u. Global Reporting Initiative (https://www.globalreporting.org/)
v. Certificazione B-corp (https://bcorporation.eu/about-b-lab/country-partner/italy)
w. Certificazione LEED (https://www.certificazioneleed.com/)
x. Strategia EU per la neutralità climatica 2050 (https://ec.europa.eu/clima/policies/strategies/2050_en)
y. Approccio MARC (https://www.etifor.com/it/approccio-marc/)
z. Impronta ecologica (https://www.footprintnetwork.org/)
aa. Impronta acquatica (https://waterfootprint.org/en/)
bb. Impronta carbonica (https://www.uni.com/ e https://ghgprotocol.org/)
cc. Life Cycle Assessment (https://www.iso.org/standard/37456.html e https://eplca.jrc.ec.europa.eu/lifecycleassessment.html https://publications.jrc.ec.europa.eu/repository/handle/JRC110082)
dd. https://continuingeducation.bnpmedia.com/article_print.php?C=754&L=221

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ee. Definizione impronta carbonica (https://www.mite.gov.it/pagina/cose-la-carbon-footprint)
ff. Definizione economia circolare (https://www.sfridoo.com/economia-circolare/)
gg. Circularity gap report (https://www.circularity-gap.world/2021)
hh. Opportunità economia circolare nel settore edile (https://www.ellenmacarthurfoundation.org/assets/downloads/Buildings_All_Mar19.pdf)
ii. IPCC (2019), Browning and Rigolon (2019)
jj. https://www.architetturaecosostenibile.it/architettura/criteri-progettuali/animali-insetti-architetture-efficienti-887
kk. https://www.youtube.com/watch?v=5FZ9Ryx5zAk&ab_channel=SustainabilityIllustrated
ll. https://www.cnbc.com/2020/10/30/how-the-intricacy-of-termite-nests-inspired-the-design-of-a-school-.html
mm. https://www.youtube.com/watch?v=5FZ9Ryx5zAk
nn. https://forterausa.com/product/
oo. Termitai per edifici sostenibili (https://www.youtube.com/watch?v=620omdSZzBs&ab_channel=NaionalGeographic e https://www.researchgate.net/publication/255650482_Beyond_biomimicry_What_termites_can_tell_us_about_realizing_the_living_building)
pp. Esempi di bioarchitettura (https://www.architettobeltrame.com/progetti/progettazione-architettonica/pigna-the-treehouse/ e https://asknature.org/ e https://biomimicry.org/)
qq. Riduzione emissioni CO2 (https://www.youtube.com/watch?v=nqN-xUU3sXU&ab_channel=WOWnature e https://bulgarelliproduction.com/sostenibilita/)
rr. https://www.sgambaro.it/blog/obiettivo-climate-positive
ss. https://fb.watch/5l0RYxXSC9/
tt. https://www.levicoacque.it/climate-positivewater/
uu. https://www.ansa.it/veneto/notizie/2021/04/15/musica-arriva-concertoclimate-positive-si-paga-in-alberi_db4cc1c6-b90e-464e-9eb8-bc03c750cae4.html
vv. https://www.youtube.com/watch?v=v1s6a8EY3iE&ab_channel=AcquaLevico
ww. https://www.alisupermercati.it/we-love-nature/ali-e-ambiente#:~:text=%EF%BB%BF%20PORTE%20DEI%20FRIGORIFERI,un%20risparmio%20energetico%20del%2030%25
xx. https://www.ikea.com/it/it/new/effetto-vaia-pub1bcc7fcd

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In-company training

IIPLE has designed the in-company training activity as a free consultancy, aimed at small and medium-sized enterprises in the construction sector interested in triggering an energy efficiency path through a preliminary energy audit; the aim is, with the support of an energy auditor/expert, to identify critical issues, areas for improvement and the expected direct and indirect benefits of a complete energy audit.
The innovative aspect offered by the in-company activity developed by IIPLE, is the focus on the need to make a change in approach and paradigm with reference to the concept of energy efficiency and energy audit; an important role is attributed to the "energy transition" process, intended as an opportunity to be primary players in a constantly evolving market.
Consulting in the company is therefore configured as a pre-audit, during which the energy auditor:
- illustrates the benefits, not only economic, of the energy audit and the adoption of energy efficiency measures;
- lists the main technical and non-technical aspects of the energy transition process;
- collects wasteful data and indicators on the energy consumption of buildings, warehouses, construction sites, machinery;
- evaluates and suggests energy saving strategies;
- sensitizes and informs the company staff about the potential economic and non-economic achievable benefits.

During the meetings and inspections with the expert, the involvement of various profiles of the enterprises' staff is required: owner, workers, technicians, energy manager (if any), site manager, etc.
The energy auditor involved in the pre-audit activity is a technical consultant with many years of experience in sustainable energy management, energy diagnosis and certification.

Training / coaching references:

- https://www.efficienzaenergetica.enea.it/servizi-per/imprese.html
- https://www.efficienzaenergetica.enea.it/servizi-per/imprese/diagnosi-energetiche/linee-guida-settoriali.html
- https://fire-italia.org/category/studi-e-ricerche/guide/
- https://fire-italia.org/category/atti-convegni-fire/
- https://www.enea.it/it/seguici/pubblicazioni/pdf-volumi/2021/opuscolo-comunita-energetica.pdf
- https://www.gse.it/servizi-per-te/autoconsumo/gruppi-di-autoconsumatori-e-comunita-di-energia-rinnovabile
- D.lgs 102/14 - (https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2014-07-04;102

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Training video

The decision to implement the training activities through a virtual modality, because of the health emergency, has required some modifications of the training videos tool: the Consortium of Innoveas has decided, instead of sharing sequences of the lessons recorded, to create a captivating presentation video, to describe the training activity and the aim of the project and foster the participation of learners.

In the training video designed and realized by IIPLE (with the help and technical supervision of ESCI and JER) Engineer Sergio Bottiglioni describes the approach and aims of the Innoveas Project, the training contents which will be discussed during the in-situ courses.
The most innovative aspects provided by the in-situ and in-company trainings are described with the aim of raise the awareness and interest of SMEs and prospective participants to the activities implemented by IIPLE.

The video can be found both on the YouTube page of the Innoveas project (https://www.youtube.com/watch?v=J_1u1lLb1BY&t=90s) and on the official website, in the section dedicated to the Italian training materials (https://innoveas.eu/training-platform/italian/).

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3.3.2 – CBG

In-situ for groups of companies

The in-situ activities carried out present two type of formats: Transformation talks and Energy management course. The two type of activities are presented as follows.

Title: Transformation Talks: take control of your company's electrical management. With digital transformation, the future is in your hands

Target group addressed:
Entrepreneurs and technicians from SMEs in constructions, chemicals, foods and manufacturing companies.

Main objectives:
The course aims at explaining to the audience the new sustainability trends, the barriers to be overcome, the importance of an energy audit, the possible measure of energy efficiency to be implemented in SMEs, the incentives and the regulatory frameworks available.

Training modules and contents:
1 – Introduction module - Saving and optimizing: achieving sustainability through energy efficiency.
Current scenario of the Italian small and medium-sized enterprise in the field of electricity distribution and sustainability.
How to optimize consumption and achieve sustainability thanks to energy efficiency.
2 – Sustainability and SMEs: energy efficiency in the Italian market.
Technologies used, purchasing methods, investments and barriers to overcome: description of the scenario that characterizes energy efficiency on the Italian market
3 – Energy audit: the importance of having everything under control
Discovering the advantages of energy audit, the reference technical standards and obligations for businesses by reviewing interesting case studies.
4 – Electricity distribution: technological solutions for a new energy identity.
Explanation about how technology can solve dispersion problems and lead the company to achieve a new energy identity. Discovering how some technological solutions can be decisive in terms of plant control and management, reducing costs and making it possible to optimize the company's energy.
5 – Maximizing opportunities: regulatory frameworks, projects and incentives for innovation.
Explanation about the most interesting regulatory changes and the Italian and European plans linked to the energy transition of companies. Energy Efficiency Certificates, Transition 4.0, REC and AC.FER, Virtual Units, Next Generation EU and Italian PNRR: together with experts we will analyse in detail which are the tools available to companies and the incentives provided for energy efficiency.

Methodology:
Online

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Training material:
Transformation talks slides, uploaded on the Innoveas platform.

Title:
ENERGY MANAGEMENT: free training course

Target group addressed:
Entrepreneurs and technicians from SMEs in constructions, chemicals, foods and manufacturing companies.

Main objectives:
The course is aimed at corporate personnel who want to deepen the issues of energy efficiency of buildings and production facilities and auxiliary. It will deepen the issues related to energy efficiency in the company, the Energy Audit tool and energy monitoring systems. The team of experts will also provide an overview of the methods and tools and incentives to make these changes in the company.

Training modules and contents:
1 – Energy efficiency: a lever for the competitiveness of the company
During the first introductory module we will see together with the North Lombardy Energy Consortium: framework on energy issues energy issues, energy monitoring, energy audits, with the presentation of some examples and case study.
2 – Energy efficiency: a lever for the company's competitiveness
How can you make a building more efficient? The objective of the course is to provide the basis for understanding the phenomena related to energy dispersion, energy losses in buildings, in terms of building envelope and consumption of air conditioning systems. Reviewing interesting case studies.
3 – Energy: economic opportunities - cost and investment management
Let's take a closer look at the tax benefits, incentives and funding opportunities for actions in the field of Energy Management. We will analyse in detail with the North Lombardy Energy Consortium which are the tools available to companies and what incentives provide for energy efficiency.
4 – Green marketing and improvement of corporate image
Together with LE2C's expert we will discover how to implement an effective green marketing strategy and why it is important to communicate a sustainable corporate image. We'll also look at some tools such as the Personal Branding Canvas for the rapid and concrete development of a sustainable branding strategy.

Methodology:
Online

Training material:
The main material for in-situ training developed by CBG are the Energy management Slides, uploaded on the Innoveas platform. In addition to this, the partner has also selected a list of references and literature, to complete the information provided in the slides:

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- Legge 9 gennaio 1991 n 10, Norme per l'attuazione del Piano energetico nazionale in materia di uso nazionale dell'energia, di risparmio energetico e di sviluppo delle fonti rinnovabili di energia
- Decreto Legislativo 30 maggio 2008 n 115, Attuazione della direttiva 2006 32 /CE relativa all'efficienza degli usi finali dell'energia e i servizi energetici e abrogazione della direttiva 93 76 /CEE
- Norma UNI CEI 11339, Gestione dell'energia, Esperti in gestione dell'energia, Requisiti generali per la qualificazione
- Decreto interministeriale 28 dicembre 2012, Determinazione degli obiettivi quantitativi nazionali di risparmio energetico che devono essere perseguiti dalle imprese di distribuzione dell'energia elettrica e il gas per gli anni dal 2013 al 2016 e per il potenziamento del meccanismo die certificati bianchi
- Legge 14 gennaio 2013 n 4, Disposizioni in materia di professioni non organizzate
- Decreto legislativo 4 luglio 2014 n 102, Attuazione della direttiva 2012 27 /UE sull'efficienza energetica, che modifica le direttive 2009 125 /CE e 2010 30 /UE e abroga le direttive 2004 8 /CE e 2006 32 /CE
- Decreto interdirettoriale 12 maggio 2015, Approvazione degli schemi di certificazione e accreditamento per la conformità alle norme tecniche in materia di ESCO, esperti in gestione dell'energia e sistemi di gestione dell'energia, ai sensi dell'articolo 12 comma 1 del decreto legislativo 4 luglio 2014 n 102 e relativo schema di certificazione per la conformità alla norma UNI CEI 11339.

In-company training

The in-company training activity begins with the mailing of the ENERGIA 360 questionnaire to the company. The company has the duty of filling the energy questionnaire and then the questionnaire is sent to the energy auditors.
The auditors analyze the questionnaire to assess the energy knowledge of the company management and they produce a report with the performance of the company and suggestions of future actions to improve energy efficiency.
After the report production, a meeting in the company headquarter is organized. Here Confindustria explains the Innoveas project to the company management, along with the annexed questions. Beyond the Innoveas activities, the auditors explain the report to the company management and finally give suggestions to the company in developing possible measures to improve the company performances.

Training / coaching material:
ENERGIA 360 questionnaire

Training videos

The video is the last step of the training offer towards small and medium-sized enterprises. The training video developed by Confindustria Bergamo presents the Innoveas project and the activities carried out towards energy efficiency for SMEs.

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The first activity presented is the energy audit for SMEs, this helps the companies in improving energy efficiency and reducing energy costs, in order to give a competitive advantage to companies.
The second activity presented are the formative contents provided to SMEs, to explain energy efficiency opportunities with webinars developed by Confindustria.

The video is uploaded on the Innoveas website in the Italian section of the training platforms tab.

Training / coaching material:
Video on the Innoveas website

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3.4. Poland

3.4.1. NAPE

In-situ training for group of companies

Title: Improvement of energy efficiency in your SME

Target group addressed:
SME from food or chemical production sector

Main objectives:
Training on improvement of energy efficiency in SMEs from food or chemical production sector – ways to optimise and control energy usage, source of financing of energy efficiency measures.

Training modules and contents:
Module 1:
What is energy efficiency and enterprise energy audit. Workshops: calculating the energy balance and unit energy costs for a product.

Module 2:
Methods of searching for improvements - examples of modernization and methods of calculating their energy, ecological and economic effect. Workshop: Estimating which devices have the greatest potential for energy savings.

Module 3:
Energy Management Systems according to the ISO 50001 standard, and non-investment methods of reducing energy costs. Workshop: ISO 50001 implementation plan in a sample organization.

Module 4:
Financing the improvement of energy efficiency - support programs, white certificates. Energy costs, tariffs, adjustment of the ordered power. Workshops: calculating the possibility of co-financing the modernization.

Methodology:
Each module consists of three different approaches to the participants:

1. Presentation – covers basic knowledge on energy efficiency improvement in SME's, according to the topic of the module
2. Study case – presentation of good practices and study cases that shows on real examples how measurements of energy efficiency improvement are implemented in enterprises.
3. Workshop – each module consists of one workshop which is implemented during the training together with the participants. The data needed for the workshop preferably are obtained from participants, if not possible the set of example data is available for the lecturer.

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The path of each module gives participant a smooth introduction (presentations), examples that support to understand the knowledge possessed (study cases) and practice the acquired knowledge (workshop).

As the final result of the training the participant is able to identify areas in the company which could generate significant energy costs, ways to optimize the costs and energy usage and how to finance these interventions. Moreover, participant gains knowledge on requirements of institutional clients regarding CO2 reporting and implementation of ISO 50001.

Training material:

1. Moduł 1: Czym jest efektywność energetyczna?
2. Moduł 1: Czym jest Bilans energetyczny?
3. Moduł 1: Case study – odzysk ciepła
4. Moduł 1: Case study – PV i kogeneracja
5. Moduł 1: Warsztaty – bilans energetyczny
6. Moduł 2: Metody poszukiwania usprawnień
7. Moduł 2: GHG protocol obliczenie śladu węglowego, study case
8. Moduł 2: 50 dobrych praktyk w MŚP oraz narzędzie self-audytu
9. Moduł 2: Warsztaty – przykładowe dane do self-audytu
10. Moduł 3: ISO 50001 – podstawy
11. Moduł 3: Case study – przykłady wdrożenia ISO 50001 w MŚP
12. Moduł 3: Warsztaty – plan wdrożenia ISO50001 w organizacji
13. Moduł 3: Mechanizmy zakupowe
14. Moduł 4: Białe certyfikaty – co to jest?
15. Moduł 4: Case Study – białe certyfikaty
16. Moduł 4: Mechanizmy finansowania inwestycji
17. Moduł 4: Case Study - od momentu audytu do momentu pozyskania finansowania
18. Moduł 4: Finansowanie bankowe – eko-firma z zyskiem

Additional information for users and learners can be found in the following list of references:

- Dyrektywa Parlamentu Europejskiego i Rady 2012/27/UE z dnia 25.10.2012 r. w sprawie efektywności energetycznej.
- Ustawa z dnia 20 maja 2016 r. o efektywności energetycznej (Dz. U. z 11.06.2016. Poz.831).
- Ustawa z dnia 21.11.2008 o wspieraniu termomodernizacji i remontów (Dz. U. Nr 223, Poz.1459).
- Ustawa z dnia 2 lipca 2004 r. o swobodzie działalności gospodarczej (tekst jedn. Dz. U. z 2015 r.poz. 584 ze zm.)
- Rozporządzenie Ministra Infrastruktury z dnia 17 marca 2009r. w sprawie szczegółowego zakresu i form audytu energetycznego oraz części audytu remontowego, wzorów kart audytów, a także algorytmu oceny opłacalności przedsięwzięcia termomodernizacyjnego (Dz. U. Nr 43, poz. 346 ze zm.).
- Rozporządzenie Ministra Gospodarki w sprawie szczegółowego zakresu i sposobu sporządzania audytu efektywności energetycznej, wzoru karty

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audytu efektywności energetycznej oraz metody obliczania oszczędności energii (Dz. U. z 27.08.2012, Poz. 962).
- Rozporządzenie Ministra Infrastruktury I Rozwoju z dnia 27 lutego 2015 r. w sprawie metodologii wyznaczania charakterystyki energetycznej budynku lub części budynku oraz świadectw charakterystyki energetycznej (Dz. U. z 18 marca 2015 r. Poz. 376).
- Obwieszczenie Ministra Energii z 12.12.2016 r. w sprawie rodzajów przedsięwzięć służących poprawie efektywności energetycznej (Monitor Polski z 2016 r. poz. 1184).
- PN-EN 16247-1 Audity energetyczne; Część 1: Wymagania ogólne, Część 2: Budynki, Część 3: Procesy, Część 4: Transport, Część 5: Kompetencje auditorów energetycznych.
- PN-EN ISO 50001: 2011 Systemy zarzadzania energią. Wymagania i zalecenia użytkowania
- ISO 50002:2014 Energy audits- requirements with guidance for use.
- ISO 50006;2014 Energy management systems – Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) – General principles and guidance.
- PN-EN ISO 13790 - Energetyczne właściwości użytkowe budynków. Obliczanie zużycia energii do ogrzewania i chłodzenia.
- PN-EN 12831- Instalacje ogrzewcze w budynkach. Metoda obliczania projektowego obciążenia cieplnego.
- Opracowanie zakresu oraz zasad wykonania audytu energetycznego do programu „Efektywne wykorzystanie energii". Narodowego Funduszu Ochrony Środowiska i Gospodarki Wodnej. NFOŚiGW, Warszawa czerwiec 2012.
- Wytyczne dla opracowania zakresu i zasad wykonania audytu energetycznego dla programu priorytetowego „Poprawa efektywności energetycznej, część 4) Inwestycje energooszczędne w małych i średnich przedsiębiorstwach. NFOŚiGW, Warszawa, kwiecień 2014 r.
- Opracowanie zakresu oraz zasad wykonania audytu efektywności energetycznej do wniosku o dofinansowanie projektu ze środków EFS. Działanie 1.2. Promowanie efektywności energetycznej i korzystanie z odnawialnych źródeł energii w przedsiębiorstwach. NFOŚiGW, W-wa, maj 2016 r.
- AUDYTY EFEKTYWNOŚCI ENERGETYCZNEJ I AUDYTY ENERGETYCZNE PRZEDSIĘBIORSTW, Maciej Robakiewicz, Biblioteka Fundacji Poszanowania Energii, Warszawa 2018

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In-company training

In company training is a structured cooperation with an SME, based on logic defined in energy auditing methodology. It can be therefore divided in 6 distinctive steps:

1. Opening meeting – training with representatives responsible for energy usage, CO2 emission.
   The trainer is an energy auditor who agrees with an SME on implementation period, possible restrictions affecting the scope or method of performing the audit, information on the existing energy management system, as well as opinions and ideas on possible energy efficiency improvement measures, CO_2 emission targets and the expected audit results. As part of this step, the auditor should set with the SME the data which should be collected, establish a work schedule, determine the assistance and equipment needed for the measurements and tests. On the SME's side one representative should be indicated as a Training Leader, acting in the next steps as internal energy auditor.
2. Data collection – energy auditor explains how-to and collect data with the SME Training Leader according to the agreement, it should cover i.e.:
   a. a list of energy-consuming systems, processes and equipment;
   b. detailed characteristics of the audited facility;
   c. Energy consumption;
   d. Sources of CO_2 emission – with divisions to scopes 1 and 2 (if applicable also 3) according to GHG protocol;
   e. maintenance and operation projects and documents;
   f. current and planned tariffs and prices;
   g. the state of the energy management system (energy management).
3. Fieldwork– joint cooperation with SME Training Leader on the premise of an SME, walk-through, interviews with employees and inventory of energy sources, assess the existing energy use in the facility, examine operating procedures and user behaviour that affect consumption and energy efficiency.
4. Data analysis – analysis of the existing state of energy consumption and possible improvements. The trainer should present simplified methods for data analysis and, together with the SME Training Leader, identify possible energy efficiency improvement measures based on his own experience, comparison of the indicators of the assessed facility and benchmarks, assessing the condition and age of the facility. The trainer should present good practices on assessing technical systems and how to operate and maintain them, as well as the best available technologies. Few individual improvement measures should be assessed together with SME Training Leader in terms of their cost, necessary investments, cost-effectiveness and impact on other improvement measures.
5. Report – Trainer presents typical draft of the report from energy audit which will allow SME Training Leader to develop own report which should consist at least of:
   a. executive summary: list of possible energy efficiency improvement measures and program for their implementation.
   b. background: general information about the site, auditors, audit methodology, and relevant regulations and requirements.

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c. description of the audit: purpose, scope, implementation time, information on the collected data, energy consumption analysis, criteria adopted for determining measures to improve energy efficiency and reduce CO_2 emission
d. opportunities to improve energy efficiency and reduce CO_2 emission: proposed actions, recommendations and implementation schedule, assumptions used to calculate savings, economic analyses, information on the available subsidies, methods of assessing the effects of the implemented measures.

6. Closing meeting – SME Training Leader, backed up by the Trainer, presents the report to the SME training group. The Trainer provides dedicated training on main outcomes and ways to improve energy efficiency and strategies to reduce CO_2 emission, and possible scenarios for achieving climate neutrality in this particular SME. The conclusions are discussed preferably with the SME management representative during workshop.

Training / coaching material:
Przewodnik – procedura audytu energetycznego w MŚP

Training video

Training video is a recap of the contents of in-situ trainings. It highlights the incentives such as lower costs of energy and necessity to use energy audit as basis for modernization.
The video emphasizes the practicality of the course and that the knowledge will give a possibility to start optimizing energy independently, but when it comes to bigger modernization -hence a better economic result, the energy audit is necessary.
It also lists economic benefits for an SME who invest in energy efficiency.
Financial aspects needed for implementation of energy efficiency measures are underlined and the solution to overcome the obstacle of limited resources are mentioned.

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3.5. Germany

3.5.1. UTBW

In-situ for groups of companies

Title:
Edition 1: Certifications and management systems for energy efficiency in SMEs
Edition 2: Energy efficiency in practice
Edition 3: Tools for energy efficiency in the company
Edition 4: Energy efficiency in practice II

Target group addressed:
CEOs of SMEs, employees of SMEs, energy consultants, energy managers, auditors and other stakeholders previously identified as relevant.

Main objectives:

- Edition 1: Certifications and management systems for energy efficiency in SMEs
  In this edition, the participants will learn what certification options and management systems are available for energy efficiency and climate protection. Which system makes sense for which company and where are the hurdles to implement it?
- Edition 2: Energy efficiency in practice
  In this edition, the participants are given methods and tips to increase and maintain energy efficiency in the company. First of all, the connection between climate change and energy efficiency will be explained. Afterwards, support networks will be introduced, it will be explained how auditors can be found and support programs will be presented.
- Edition 3: Tools for energy efficiency in the company
  The purpose of this edition is to present various tools that offer participants in the companies an introduction to climate protection, energy efficiency and management. Thereby the interest as well as the knowledge about energy consumption and emissions of the company shall be strengthened.
- Edition 4: Energy efficiency in practice II
  The goal within this series of events is to teach the participants various energy saving options and climate protection measures. Depending on the trade, different areas are addressed, technical basics are explained, problems and their possible solutions are pointed out, and hurdles are removed by means of illustrative examples from practice so that the participating SMEs and stakeholders receive the final push in the direction of energy efficiency.

Note: the numbering of the modules below corresponds to the chronological order in which we carried out the training courses during implementation - in some cases the editions

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composed of the modules overlapped in time. In addition, we have tried to offer the participants a wide range of different knowledge from which everyone can compile their “own edition" by combining the modules of their personal interest. Thus, it was not mandatory for each participant to attend all the individual modules of a particular edition in order to put together his or her own edition. Rather, each participant can design his or her own personal edition. Nevertheless, we stick to the given structure by compiling thematically oriented editions.

Training modules and contents:

Edition 1: Certifications and management systems for energy efficiency in SMEs

- **Module 2: DIN EN 16247 - Introduction for SMEs**
  After introducing various ways of establishing the topic of energy and climate protection in the company, knowledge of operational implementation is deepened. In this module, the energy audit according to DIN EN 16247 is explained in more detail and the benefits for SMEs are presented. As a basic prerequisite for a systematic approach to the topics of energy and climate protection, knowledge of the company's own energy requirements is first established here. This is the basis for every further activity in the direction of more energy efficiency and climate protection.
- **Module 3: ISO 50001 - Achieving more with energy management**
  Knowing your own energy requirements is one thing. What you then do with it as an SME is another. According to which action logic does a SME initiate target-oriented steps that contribute to climate protection? Here, an energy management system offers helpful support. By introducing and implementing the PDCA cycle (plan, do, check, act), the company is guided to take systematic steps toward greater energy efficiency and climate protection through energy savings. As a rule, this also leads to cost savings through continuous improvements.
- **Module 4: More climate protection - energy and resource efficiency with EMAS**
  Surveys on SMEs regularly conclude that climate and environmental protection are important issues here as well. Most managing directors state that these are important issues for them. But here, too, the question arises as to how these issues can be considered in day-to-day operations. If you want to approach the topic holistically and go beyond the issues of climate protection and energy efficiency, an environmental management system such as EMAS is a good guideline. This can also be implemented for an SME, as this module shows.
- **Module 5: ISO 50001 and DIN EN 16247 - how it works in practice**
  The previous modules provided insights into the different approaches to promoting energy efficiency using audits or management systems. In this module, we show successful examples of how SMEs have improved their energy efficiency using these tools. This is to show the benefits of these systematic approaches for SMEs as well. Real examples can be used to learn how it works in practice and what benefits an SME

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can also derive from these approaches. The speaker presents examples from the construction, food and chemical industries.

- **Module 11: Together on the way to climate management - also for SMEs**
  Due to the increasing and more and more concrete international and national requirements, the relevance of a holistic climate management for companies is constantly growing. More companies are taking up this challenge, but are also increasingly faced with the question of how to respond to regulatory developments to be expected in the future, customer expectations and a changed understanding of corporate responsibility for climate change mitigation.
  This module will provide insight into how the path to effective climate management in a company can look. It is taught how concrete measures and targets can be defined, how a reliable database can be built up and how a greenhouse gas balance can be drawn up.

Edition 2: Energy efficiency in practice

- **Module 1: Energy efficiency and climate protection in SMEs - The introduction**
  This module serves as an introduction to the topic, especially for SMEs. It is intended to motivate participants to take matters into their own hands. How can small and medium-sized enterprises approach the topic of energy efficiency and climate protection systematically? Is the topic really relevant? If so, in what respect? What are the sensible ways to get started? Do energy audits or energy management help to overcome existing hurdles?
- **Module 8: How your SME benefits from support programs**
  SMEs already have initial ideas for energy efficiency measures. But now the question arises how to finance it and where to get support? This module aims to answer these questions. Current support programs in the field of energy efficiency at federal and state level are presented and initial contacts with experts who can help with applications for support funds will be established.
- **Module 12: Energy efficiency networks and initiatives**
  Energy efficiency is a factor that should not be underestimated in many companies. Potential energy savings not only reduce internal costs, but also make an active contribution to climate protection. However, companies are often not even aware of the potential savings. Some companies are also faced with the question of where to find suitable experts and where to get support. This module will introduce networks that help companies to implement energy efficiency.
- **Module 13: How does energy consulting work? - Search, find, save!**
  Energy consulting can be worthwhile for a company in several ways. On the one hand the SME saves energy and thus money, on the other hand it receives a subsidy for the consultation as well as concrete promotion measures. However, the search for suitable energy consultants can often prove difficult. The question often arises as to which energy consultant is the right one for the company. Is he or she an independent expert,

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does he or she consider all subsidy programs and is he or she recognized by an institution such as BAFA or KfW? These aspects are addressed in this Module. Energy consultants describe their experiences and show how a classical energy consulting is done, which quality characteristics an energy consultant should bring along and where suitable experts are listed. And they show examples of how surprising the results can be.

- **Module 27: Energy efficiency and climate protection - making SMEs fit for the future**
  Through energy efficiency, an SME not only saves costs. It benefits from further positive effects. At the end of the INNOVEAS web seminar series, we work out the additional positive aspects that an SME can draw from the consistent implementation of energy efficiency and climate protection. Cost reduction and improved environmental protection are obvious. However, the company also gains additional internal and external impetus through the implementation of internal energy efficiency and climate protection projects. The company's image improves, and contact with stakeholders becomes more positive if the company continuously improves its climate footprint. Market opportunities improve in view of the increasing demand for climate balances on the part of customers in both the B2B and B2C sectors. New opportunities open up for corporate communications and marketing. Another factor that should not be underestimated is the appreciation of the company by its own employees. The company becomes more sustainable with more climate protection. These and other aspects are discussed in depth in the seminar, as always with voices from the field.

Edition 3: Tools for energy efficiency in the company

- **Module 6: Tools to support energy efficiency - The E Tool**
  Collecting energy data is an important step in achieving energy efficiency. However, it is often also a major challenge for companies. The electronic energy book "E-Tool" of the Mittelstandsinitiative Energiewende und Klimaschutz helps small and medium-sized enterprises (SMEs) to evaluate energy consumption data with little effort. The tool provides a good overview of all relevant operational data.
  In this module, it is shown how central energy sources and corresponding costs can be recorded via the concrete consideration of individual machines and vehicle fleets. An insight is given into how energy consumption can be evaluated and what savings can be made.
- **Module 7: Tools for the evaluation of measures - Economic efficiency calculator**
  When the first step has been taken and decisions for energy efficiency measures have been made, the question often arises whether an investment, e.g. in a new energy-saving system or in a new energy-efficient process, is worthwhile for a company from an economic point of view. The profitability calculator of the Energy Agency NRW, which is presented in this module, can help here. It can be used to calculate the payback period for new plants and processes. In addition, it provides other important

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parameters such as return on investment (ROI), internal rate of return and ratio of payback period to project duration.

- **Module 9: Tools for climate accounting - CO2 calculator for companies**
  There are many good reasons for a company to deal with climate neutrality and to continuously optimize its CO_2 balance. Besides climate protection, demands of politics and society as well as the improvement of the own image, also increasing energy prices force industrial companies to reduce emissions. But how can a company create a climate balance? The answer will be given in this module. The CO_2 calculator for companies supports SMEs in recording, balancing and documenting emissions in accordance with the Greenhouse Gas Protocol. Thus, companies can, with little effort and only a few steps, record their carbon footprint and receive a CO_2 report included. Furthermore, the participants receive key figures for sustainability reporting.
- **Module 10: Tools for energy data collection and energy reporting - Energy Saving Report**
  This seminar is aimed at SMEs as well as energy consultants and auditors. In this workshop the possibilities for energy auditors and SMEs are shown, which are opened by using a digital tool like the service energiesparbericht.de. This tool helps the inexperienced auditor to collect data and to create an energy audit report according to the standard DIN EN 16247-1 or ISO 50002 as well as the existing requirements of the BAFA for mandatory subsidized energy audits. An SME can also record and maintain its own energy data and use it to prepare an audit. For the experienced auditor, the tool enables the change from a confusing "Excel thicket" to a well-structured, digitalized audit process and to a team-based implementation of a large number of energy audits. The tool helps to create correctly calculated and plausible energy balances and to calculate measures. The presented tool is already used by more than 1,200 BAFA-certified auditors and about 2000 companies.
- **Module 14: Tools for energy monitoring and analysis I - Econ Solutions**
  Even SMEs can better exploit their energy-saving potential through intelligent energy data collection and analysis. Questions are answered about how which consumers and systems in companies consume how much energy at what time, how to optimize energy use in companies with meaningful energy controlling and monitoring, and how to permanently reduce the burden on the environment and budget. How is an energy management system structured? What does energy controlling do? How does energy control and monitoring work? How is data collected? These questions will be answered in this module.
- **Module 15: Tools for Energy Monitoring and Analysis II - enerchart**
  How to bring transparency into the energy flows of companies? How can savings be documented and proven? And most importantly - how does a company even begin to set up an energy monitoring system? Answers to these and other topics related to the energy monitoring system will be discussed in detail in this workshop.
  Using the enerchart software system presented here as an example, we show how companies can incorporate energy data and energy-related information into an energy

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management system, both manually and via automatic connections to energy meters, data loggers and third-party systems. This allows energy flows to be monitored and evaluated, and the effects of efficiency measures can also be visualized and demonstrated. The presentation of the results by means of dashboards, slide shows and PDF dispatch is helpful in involving groups of people not directly involved in the company's energy and environmental management. With the enerchart system, a tool is presented that has a strong focus on IoT integration, especially the integration of LoRaWAN sensors. This means that the classic energy monitoring can be enhanced with innovative added values from the areas of smart production, smart building and smart city. In this way, data analysis not only supports the company in improving energy efficiency, but also supports innovative, specific digitization of operational processes.

- **Module 21: Tools for climate accounting - The ecocockpit**
  CO_2 balancing is becoming increasingly important for more and more companies. SMEs, too, must set out on the path to less climate-damaging business practices. To ensure this, it is necessary to know one's own emissions in order to be able to initiate and control appropriate reduction measures. The seminar will present the Ecocockpit, a free tool that supports SMEs in particular on their way to systematic climate management. The tool is based on the accounting standards of the Greenhouse Gas Protocol, uses recognized databases to calculate CO_2 equivalents and focuses primarily on internal emissions. The CO_2 balancing offer "BWIHK-ecocockpit" records not only the energy-related but also the material-induced CO_2 emissions in order to provide a basis for action for resource-saving and energy efficiency measures also regarding scope3. In the seminar, the background of the balancing is explained and the tool is shown in practical operation using a balancing example.

Edition 4: Energy efficiency in practice II

- **Module 16: Savings Potentials in Compressed Air Technology - Protect the Climate, Save Cost**
  Compressed air is a versatile operating energy. However, compressed air is also one of the most expensive forms of energy currently available, so it is particularly important to use it economically and efficiently. Energy efficiency potential can be found in all parts of a compressed air system. The causes of excessive pressure losses can be, for example, leakages, lines that are too long, pressure levels that are too high, etc. In this seminar, one will learn about adjusting screws for the holistic optimization of a compressed air system. In detailed practical examples, the participant will learn how to identify and implement optimization potential in the compressed air system.
- **Module 17: Photovoltaics for SMEs - solar power pays off!**
  Photovoltaics now make an important contribution to power supply and climate protection. Small and medium-sized enterprises also benefit from installing a PV system. We want to show how this works in our web seminar.

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Mr. Thomas Uhland from Solarcluster Baden-Württemberg reports on how the framework conditions contribute to making PV worthwhile for SMEs. In addition, the Photovoltaic Network Baden-Württemberg is presented, which supports SMEs in their implementation. Mr. Christoph Hecklau from focusEnergie GmbH und Co. KG presents various technical solutions and shows how different support mechanisms take effect and ensure the profitability of the system. The fact that the way from the decision up to the installation and binding to the enterprise is not at all so complicated, is shown by many examples. Mr. Klaus Schurig from Schreinerei Schurig GmbH reports on his experiences with his own PV system. Thus, you learn first-hand how the operation of a PV system on your own roof succeeds.

- **Module 18: Efficiency potentials in electric drives**
  Electric drives can be found in almost every company. Whether in pumps, in ventilation or in the drive of machines and conveyor belts. Electric motors account for a good 30% of global electricity consumption, and in the manufacturing sector this proportion is often even higher. The efficiency potential is enormous, especially for older drives. The correct dimensioning of the drive power in the application also plays an important role in the search for efficiency potential. 40% energy savings are not uncommon in a new installation!
  In this web seminar one is clearly taught the practical basics of electric drives and learns about the efficiency potential of different drive concepts. Practical exercises will introduce participants to the decision-making process when selecting a drive for specific applications. This provides the participant with basic knowledge he needs to identify and leverage the efficiency potential of electric drives in the company.
- **Module 19: Energy efficiency in ventilation systems**
  Exhaust air treatment and fresh air supply are necessary in many plants to maintain production and protect the health of employees. However, many air conditioning and ventilation systems are either outdated, inadequately adjusted or poorly maintained. They can account for up to 50 percent of unnecessary electricity consumption. One can save quite a bit of energy by optimizing the ventilation and air conditioning systems. However, it is not always easy to identify and leverage the considerable potential, although even simple measures can often reduce energy consumption and thus costs and CO_2 emissions. In this web seminar one gets a first insight into the efficiency potentials of ventilation systems. Many examples will show which starting points to consider and that the solutions can sometimes be found in small details. Open maintenance flaps with us and look into the depths of the ventilation shafts. One will see the ventilation system with different eyes afterwards.
- **Module 20: Efficiency potentials in pump systems**
  Wherever liquids have to be transported in a company, pump systems are used. These usually run in continuous operation or at least with a high operating time. If you look at the life cycle costs of such systems, you quickly come to the conclusion that the electricity cost portion dominates the life cycle of such systems with up to 85%. Improving efficiency here is an approach that both reduces energy consumption and

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lowers CO_2 emissions from power generation and protects the climate. In this seminar, you learn about the fundamental relationships that determine the energy consumption of pump systems. These are the efficiency of the drive, the design of the pump and motor according to the actual load profile, and the design of the entire hydraulic system. Let's dive into a hydraulic system together. You will then approach your pump systems with new knowledge and take the first steps to increase efficiency.

- **Module 22: Find waste heat potentials and use "free" heat!**
  Recognizing and tapping waste heat potential – Introduction of the Waste Heat Competence Center: Entrepreneurial success is increasingly directly linked to the efficient and, if possible, climate-neutral use of energy. In addition to the generation or conversion of energy, the consistent use of waste heat plays a key role here. Supporting companies in Baden-Württemberg in all steps on the way to implementing such often-complex projects is the main field of action of the Competence Center Waste Heat, which was founded at UTBW in summer 2021. The focus of the module is therefore on an efficient and goal-oriented approach to waste heat projects, including the available assistance of the Competence Center as a contact, moderator or mediator of, for example, suitable funding programs. In addition, different technical solutions are presented. In the practical part, concrete projects from the areas of exhaust air and compressed air systems are shown.
- **Module 23: Solar process heat - CO2 free energy for SMEs is climate protection**
  This module serves as an introduction to the topic of renewable energies in industry, in particular the use of solar heat. The basics are taught and practical examples are shown in order to demonstrate the topic of solar process heat and the various possible applications to small and medium-sized companies. Thus, the CO_2 footprint in production can be reduced and climate protection can be implemented directly! Prof. Dr. Uli Jakob from dr. jakob energy research GmbH & CO KG presents the basics of the technology. Christian Zahler from Industrial Solar GmbH shows examples of practical implementation that also work well in our latitudes.
- **Module 24: Thermal refrigeration - efficiency with system**
  Cooling from waste heat instead of electricity - A contribution to climate protection and saving money at the same time. The module informs about the basics and fields of application of thermal refrigeration from waste heat and how such solutions can be implemented in an energy-efficient way.
  Refrigeration is used in industry and commerce for a variety of purposes and this demand is growing steadily. Refrigeration has always been energy-intensive and thus correspondingly expensive for companies, since electricity prices are also rising steadily. Increasing climate protection goals in companies also require that plant technology be designed to be energy-efficient and environmentally friendly. At the same time, almost every company produces waste heat that often goes unused.
  Thus, thermal cooling in industrial production can increase energy efficiency while reducing CO_2 emissions. Instead of using precious electricity, thermal chillers are powered by hot water. Waste heat, e.g. from CHP units or production processes,

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district heating or solar heat is used for this purpose. Cooling from waste heat is therefore energetically sensible and, in many cases, economically feasible, e.g. for air conditioning in buildings, for cooling data centers, machines or materials, or for the production and storage of food.
Prof. Dr. Uli Jakob from dr. jakob energy research GmbH & Co. KG presents the basics of thermal cooling. Bernd Hebenstreit from EAW Energieanlagenbau Westenfeld GmbH will show examples from industry and commerce for practical implementation.

- **Module 25: Efficient lighting - climate protection with LED technology**
  There is lighting in every company. Be it in the office, in production or in the warehouse. Even if the share of the total consumption of a company is often not high, a lot of energy can be saved by intelligent lighting concepts, especially by using LEDs. Staff behaviour also plays a role here, which is practically presented in an example.
- **Module 26: Energetic refurbishment of non-residential buildings - protect climate, feel good**
  Older commercial buildings are often energy guzzlers and drive up a company's carbon footprint. Energy-efficient refurbishment can save up to 80% of energy and costs. In addition, the indoor climate in the building is improved. The investment in an energetic optimization is therefore worthwhile in the long run in any case.
  In the introductory lecture, Mr. Frank Hettler from KEA Klimaschutz- und Energieagentur Baden-Württemberg GmbH discusses the framework conditions and funding opportunities for the energy-efficient refurbishment of non-residential buildings.
  However, our events also live from the illustrative examples from practice: Mr. Thomas Fiehn
  from Fiehn Gebäudeautomation GmbH reports on how the company saved an old drafty school from the demolition excavator and turned it into a comfortable energy-efficient commercial building. Mr. Norbert Unterharnscheidt from e.systeme21 GmbH shows how the company will transform a boring 80s functional building into an energy self-sufficient company building ready for the future.

Methodology:

Web seminars via the Edudip platform. Experts in the respective fields and from the field present content to participants via presentations, videos and surveys and are available for discussion. Participants' questions are moderated and answered.
In addition, the web seminars were recorded and made available online to reach additional participants who could not be present at the given time and to make the information from the web seminars available afterwards.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°847095

Training material:

Module 1:

- 01_INNOVEAS_Modul_1_Präsentation_Schulungskonzept_Umwelttechnik_BW.pdf
- 02_INNOVEAS_Modul_1_sustainable thinking_2021-04-13.pdf
- 03_INNOVEAS_Modul_1_Wang_2021_04_13.pdf
- 04_INNOVEAS_Modul_1_Jakob_Energy_Research_2021_04_13.pdf
- Video: https://www.youtube.com/watch?v=8wn8yLOIoxA

Module 2:

- 01_INNOVEAS_Modul_2_UTBW_2021_04_30.pdf
- 02_INNOVEAS_Modul_2_Marko Geilhausen DIN EN 16247 _2021-04-30.pdf

Module 3:

- 01_INNOVEAS_Modul_3_UTBW_2021_05_10.pdf
- 02_INNOVEAS_Modul_3_Frau_Ak_Zeller_Gmelin_2021_05_10.pdf

Module 4:

- 01_INNOVEAS_Modul_4_UTBW_2021_05_11.pdf
- 02_INNOVEAS_Modul_4_EMAS-ISO50001_Eder.pdf
- 03_INNOVEAS_Modul_4_EMAS_SchrittfuerSchritt.pdf
- 04_INNOVEAS_Modul_4_ Störkle _Schwörer-Haus_ 2021-05-11.pdf
- 05_INNOVEAS_Modul_4_7Gruende_fuer_EMAS.pdf
- 06_INNOVEAS_Modul_4_Foerderung&Unterstuetzung_Kermann.pdf
- Video: https://www.youtube.com/watch?v=eT5noiGB-IA

Module 5:

- 01_INNOVEAS_Modul_5_UTBW_2021_05_12.pdf
- 02_INNOVEAS_Modul_5_ECA_Concept_2012_05_12.pdf
- Video: https://www.youtube.com/watch?v=emz_kKz3lo8

Module 6:

- 01_INNOVEAS_Modul_6_UTBW_2021_05_20.pdf
- 02_INNOVEAS_Modul_6_E-Tool_2021_05_20.pdf
- Video: https://www.youtube.com/watch?v=s9CAwiQHaTE

Module 7:

- 01_INNOVEAS_Modul_7_UTBW_2021_06_02.pdf
- 02_INNOVEAS_Präsentation_Wirtschaftlichkeitsrechner EA_NRW_1.pdf
- Video: https://www.youtube.com/watch?v=AFoLTxA_oyM

Module 8:

- 01_INNOVEAS_Modul_8_UTBW_2021_06_08.pdf
- 02_INNOVEAS_Modul_8_Spitzmueller AG_2021_06_08.pdf
- Video: https://www.youtube.com/watch?v=neaIXER1qus

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Module 9:

- 01_INNOVEAS_Modul_9_UTBW_2021_06_16.pdf
- 02_INNOVEAS_Modul_9_KlimAktiv_2021_06_16_CO2-Rechner-für-Unternehmen.pdf
- Video: https://www.youtube.com/watch?v=6Lgk0DekGsc

Module 10:

- 01_INNOVEAS_Modul_10_UTBW_2021_06_17.pdf
- 02_INNOVEAS_Modul_10_krumedia_energiesparbericht_2021_06_17.pdf
- Video: https://www.youtube.com/watch?v=Xch5oKhCDaQ

Module 11:

- 01_INNOVEAS_Modul_11-UTBW_2021_07_01.pdf
- 02_INNOVEAS_Modul_11_Arqum_Klimamanagement_Ellen_Leibing.pdf
- Video: https://www.youtube.com/watch?v=6eZnQkZcXPc

Module 12:

- 01_INNOVEAS_Modul_12_UTBW_2021_07_08.pdf
- 02_INNOVEAS_Modul_12_Jasmin Fiebag_KEFF Vorstellung_1.pdf
- 03_INNOVEAS_Modul_12_Akamitl Quezada_IEEKN_210708.pdf
- Video: https://www.youtube.com/watch?v=UFrnXudfnbU

Module 13:

- 01_INNOVEAS_Modul_13_UTBW_2021_07_14.pdf
- 02_INNOVEAS_Modul_13_UTBW_consultare_2021_07_14.pdf
- 03_INNOVEAS_Modul_13_Eppler_2021_07_14.pdf
- 04_INNOVEAS_Modul_13_Bühler_Sommerkeller_2021_07_14.pdf
- Video: https://www.youtube.com/watch?v=pE3CxwEj0vg

Module 14:

- 01_INNOVEAS_Modul_14_UTBW_2021_07_28.pdf
- 02_INNOVEAS_Modul_14_Econ_Solutions_2021_07_28.pdf
- Video: https://www.youtube.com/watch?v=0CQWtKzQkyQ

Module 15:

- 01_INNOVEAS_Modul_15_UTBW_2021_07_29_neu.pdf
- 02_INNOVEAS_Modul_15_krumedia_enerchart_2021_07_29.pdf
- Video: https://www.youtube.com/watch?v=gGtrAcDZAhg

Module 16:

- 01-innoveas-modul-16-utbw-2021-11-03.pdf
- 02_INNOVEAS_Modul_16_Nathalie_Bizer_2021_11_03.pdf
- Video: https://www.youtube.com/watch?v=H5gpiE2E8Dc

Module 17:

- 01_INNOVEAS_Modul_17_UTBW_2021_11_16.pdf

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- 02_INNOVEAS_Modul_17_Uhland_Solarcluster_2021_11_16.pdf
- 03_INNOVEAS_Modul_17_Focus_Energie_Hecklau_2021_11_16.pdf
- 04_INNOVEAS_Modul_17_Schurig_2021_11_16.pdf
- Video: https://www.youtube.com/watch?v=FEMHZBW8j5c

Module 18:

- 01_INNOVEAS_Modul_18_UTBW_2021_11_23.pdf
- 02_INNOVEAS_Modul_18_Hofmann_2021_11_23.pdf
- Video: https://www.youtube.com/watch?v=3-HJqX0v8IY

Module 19:

- 01_INNOVEAS_Modul_19_UTBW_2021_11_26.pdf
- 02_INNOVEAS_Modul_19_Layer_2021_11_26.pdf
- 03_INNOVEAS_Modul_19_Rosenberg_Mueller_2021_11_26.pdf
- Video: https://www.youtube.com/watch?v=47jJmsQ3FZU

Module 20:

- 01_INNOVEAS_Modul_20_UTBW_2021_12_02.pdf
- 02_INNOVEAS_Modul_20_KSB_Ersin_2021_12_02.pdf
- 03_INNOVEAS_Modul_20_KSB_Nowak_2021_12_02.pdf
- Video: https://www.youtube.com/watch?v=6wIzjGwEEAQ

Module 21:

- 01_INNOVEAS_Modul_21_UTBW_2021_12_07.pdf
- 02_INNOVEAS_Modul_21_Munga_IHK_2021_12_07.pdf
- Video: https://www.youtube.com/watch?v=rNDdlj_nIRE

Module 22:

- 01_INNOVEAS_Modul_22_UTBW_2021_12_14.pdf
- 02_INNOVEAS_Modul_22_Heyden_Pfränger_utbw_2021_12_14.pdf
- 03_INNOVEAS_Modul_22_Uitz_Simaka_2021_12_14.pdf
- 04_INNOVEAS_Modul_22_Almig_Jeschabek_2021_12_14.pdf
- Video: https://www.youtube.com/watch?v=_YoQMwcTfQU

Module 23:

- 01_INNOVEAS_Modul_23_UTBW_2021_12_16_neu.pdf
- 02_INNOVEAS_Modul_23_JER_2021_12_16.pdf
- 03_INNOVEAS_Modul_23_industrial_solar_2021_12_16_compressed.pdf
- Video: https://www.youtube.com/watch?v=_YoQMwcTfQU

Module 24:

- 01_INNOVEAS_Modul_24_UTBW_2022_01_12.pdf
- 02_INNOVEAS_Modul_24_JER_2022_01_12.pdf
- 03_INNOVEAS_Modul_24_EAW_2022_01_12.pdf

Module 25:

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- 01_INNOVEAS_Modul_25_UTBW_2022_01_27.pdf
- 02_INNOVEAS_Modul_25_ Ridi_Loerwald_2022_01_27.pdf
- 03_INNOVEAS_Modul_25_ Boehringer_2022_01_27.pdf

Module 26:

- 01_INNOVEAS_Modul_26_UTBW_2022_02_07.pdf
- 02_INNOVEAS_Modul_26_Zukunft_Altbau_Hettler_2022_02_07.pdf
- 03_INNOVEAS_Modul_26_ Fiehn_2022_02_07.pdf
- 04_INNOVEAS_Modul_26_ esysteme21_Unterharnscheidt_2022_02_07.pdf

Module 27:

- 01_INNOVEAS_Modul_27_UTBW_2022_02_28.pdf
- 02_INNOVEAS_Modul_27_Wang_2022_02_28.pdf
- 03_INNOVEAS_Modul_27_Zeller_Gmelin_Ak_2022_02_28.pdf
- 04_INNOVEAS_Modul_27_Ensinger_Schurr_2022_02_28.pdf

In addition to the materials uploaded and available on the training platform of the Innoveas project, also the following list of literature and reference can be used by learner to complete their knowledge:

- ASUE (2019) brochure „KWKK – Tri-generation“ https://asue.de/blockheizkraftwerke/broschueren/310478_kwkk_-_kraft-waerme-kaelte-kopplung
- Baden-Württembergischer Industrie und Handelskammertag (2021), Ecocockpit https://ecocockpit-bw.de/
- BAFA (2020), Leitfaden zur Erstellung von Energieauditberichten nach den Vorgaben der DIN EN 16247-1 und den Festlegungen des Bundesamtes für Wirtschaft und Ausfuhrkontrolle (BAFA) https://www.bafa.de/SharedDocs/Downloads/DE/Energie/ea_leitfaden.pdf?__blob=publicationFile&v=26
- BAFA (2020) „Förderung von Kälte- und Klimaanlagen“ for commercial applications https://www.bafa.de/DE/Energie/Energieeffizienz/Klima_Kaeltetechnik/klima_kaeltetechnik_node.html
- Bundesregierung der Bundesrepublik Deutschland (2021), Klimaschutzgesetz https://www.bundesregierung.de/breg-de/themen/klimaschutz/klimaschutzgesetz-2021-1913672
- Beuth (2018), DIN EN ISO 50001:2018-12 https://www.beuth.de/de/norm/din-en-iso-50001/289820323
- BMU, Project “Solar Payback” – Solar Heat for Industry https://www.solar-payback.com
- BMWi Industrie-Energieforschung „Energieeffiziente Wärme- und Kältetechnologien“ https://www.industrie-energieforschung.de/forschen/warme-kaelte
- CDP (Carbon Disclosure Project) (2020) Changing the chain https://www.cdp.net/en/research/global-reports/changing-the-chain
- DEN Deutsches Energieberater Netzwerk (o. J.)

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https://www.deutsches-energieberaternetzwerk.de/
- dena (o. J.): Initiative Energieeffizienz und Klimaschutz Netzwerke www.effizienznetzwerke.org
- dena „Projekt Leuchtturm Abwärme“ (YouTube Video) https://www.dena.de/themen-projekte/projekte/energiesysteme/leuchtturm-abwaerme/
- Global Compact Netzwerk Deutschland– Einführung Klimamanagement https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/001-Einfuehrung-Klimamanagement-DGCN_web.pdf
- Greenhouse Gas Protocol (2004), A Corporate Accounting and Reporting Standard – revised edition file:///C:/Users/joa.bauer/Downloads/ghg-protocol-revised.pdf
- Heyden (2016), Kostenoptimale Abwärmerückgewinnung durch integriert-iteratives Systemdesign (KOARiiS): ein Verfahren zur energetisch-ökonomischen Bewertung industrieller Abwärmepotenziale, Dissertation, Stuttgart https://elib.uni-stuttgart.de/handle/11682/8968
- IEA SHC Task 49 and IEA SHC Task 64 on Solar Process Heat http://task49.iea-shc.org , http://task64.iea-shc.org
- KEFF Netzwerk – Regionale Kompetenzstellen Netzwerk Energieeffizienz www.keff-bw.de
- MCC Berlin (2021), CO2-Budget https://www.mcc-berlin.net/forschung/co2-budget.html
- Mittelstandsinitiative Energiewende und Klimaschutz (o. J.) LEITFADEN ENERGIEEFFIZIENZ IM HANDWERK https://www.energieeffizienz-handwerk.de/ , www.energie-tool.de
- OECD/IEA (2015) World EnergyOutlook 2015 https://www.iea.org/reports/world-energy-outlook-2015
- OECD/IEA (2014): Capturing the Multiple Benefits of Energy Efficiency https://www.iea.org/reports/capturing-the-multiple-benefits-of-energy-efficiency
- Pehnt et al. (2011): Endbericht . Energieeffizienz: Potenziale, volkswirtschaftliche Effekte und innovative Handlungs und Förderfelder für die Nationale Klimaschutzinitiative https://www.ifeu.de/wp-content/uploads/NKI_Endbericht_2011.pdf
- SHIP, plant database www.ship-plants.info
- SHIP Projects InSun, FRESH NRG, REEMAIN, HyCool, SHIP2FAIR, FRIENDSHIP and ASTEP http://www.fp7-insun.eu, http://fresh-nrg.eu, http://www.reemain.eu , http://hycool-project.eu , http://ship2fair-h2020.eu , https://friendship-project.eu , https://astepproject.eu

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- Mario Schmidt, Hannes Spieth, Christian Haubach, Marlene Preiß, Joa Bauer (2018): 100 Betriebe für Ressourceneffizienz, Band 2 – Praxisbeispiele und Erfahrungen. Verlag Springer Spektrum 2018
- Solarcluster e. V. (2021), Photovoltaik in Gewerbe und Industrie – Solarenergie erfolgreich einsetzen https://solarcluster-bw.de/de/news/news-einzelansicht/neuer-leitfaden-des-solar-clusters-photovoltaik-in-gewerbe-und-industrie-solarenergie-erfolgreich-einsetzen
- Solar Cluster Baden-Württemberg e.V. www.solarcluster-bw.de
- UBA (2020), ISO 14001 – Umweltmanagementsystemnorm https://www.umweltbundesamt.de/themen/wirtschaft-konsum/wirtschaft-umwelt/umwelt-energiemanagement/iso-14001-umweltmanagementsystemnorm#inhalte-der-iso-14001
- UBA (2021), Treibhausgas-Emissionen in Deutschland https://www.umweltbundesamt.de/daten/klima/treibhausgas-emissionen-in-deutschland#emissionsentwicklung
- UGA (2020), Einstieg ins Umweltmanagement mit EMAS https://www.emas.de/pub/leitfaden-emas-einstieg
- Umweltministerium BW (2021), Erneuerbare Energien in Baden-Württemberg 2020 https://um.baden-wuerttemberg.de/de/service/publikation/did/erneuerbare-energien-in-baden-wuerttemberg-2020/
- Umweltministerium BW (2021), Abwärmekonzept Baden-Württemberg https://um.baden-wuerttemberg.de/fileadmin/redaktion/m-um/intern/Dateien/Dokumente/5_Energie/Energieeffizienz/Abwaermenutzung/Abwaermekonzept-Baden-Wuerttemberg-bf.pdf
- Universität Stuttgart (2018), EEP Energieeffizienz-Index 2. Halbjahr 2018 https://www.eep.uni-stuttgart.de/institut/aktuelles/news/Energieeffizienz-Index-2018-2019-Energiewende-in-Unternehmen-laeuft-Energieeffizienz-Index-EEI-so-hoch-wie-nie-zuvor/
- UTBW (o.J.), Angebote für KMU, Exzellent BW, Expertenatlas Ressourceneffizienz, Kompetenzatlas Ressourceneffizienz http://www.exzellent-bw.de , www.consultare-bw.de , www.compare-bw.de
- VDMA Einheitsblatt 24247-9:2022-01 „Energieeffizienz von Kälteanlagen – Teil 9: Sorptionskälteanlagen“ https://www.vdma.org/viewer/-/v2article/render/15527187

In-company training

The in-company trainings are designed in two phases

Phase 1
Carrying out a KEFF check in the company. Within the framework of a pre-audit, the most important energy consumers in the company are identified and named during an on-site

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inspection of the company. In addition, possible potential for energy savings is pointed out. The company receives a written report of the inspection which is the base for phase two.

Phase 2
The results of the KEFF check (KEFF report) are discussed with a selection of employees in a joint workshop and a roadmap for implementation is developed. At the beginning, the attitudes and motives of the employees involved are determined in order to be able to derive starting points for the motivation for energy efficiency measures. The employees are activated by describing their personal starting points for energy efficiency and also telling their personal "climate story" based on the Warming Stripes. In a presentation by the facilitator, the key findings on climate protection are highlighted in a short presentation.
The core of the workshop is then a utility value analysis of all potential measures for improving energy efficiency derived from the KEFF report. From this, an initial roadmap for implementation is developed for the company.

The companies receive minutes of the event after it has taken place, reflecting both the discussion within and the results of the workshop.

Training / coaching material:

- Introduction to climate protection.pdf
- Design of the Miro Board
- utility value analysis table.pdf

Training videos

Video 1
In video 1, the importance of energy audits for SMEs is highlighted once again. The training programme for Germany is presented in short sequences. Viewers are motivated to participate in the web seminars. Duration: 3.27 min
https://www.youtube.com/watch?v=gpcy8jiJFPU

Video 2
In Video 2, Prof. Dr. Uli Jakob from dr. jakob energy research GmbH explains the approach and advantages for SMEs that the topic of energy efficiency entails. This takes the form of short, superimposed interview questions and dedicated answers that get to the heart of the respective topics. Duration: 1:59 min
https://www.youtube.com/watch?v=NrTFjkak40w

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4. Conclusion

As anticipated, all the training materials have been produced by partners in their own national language and have been published on the Innoveas training platform (https://innoveas.eu/trainings/).

The platform is open access, therefore interested users will be able to use, download and share the materials to upskill and augment their knowledges. It is intended for everyone who is interested in the topics, as well for trainers and representatives of VET centres, wanting to add these materials and references to already existing or new courses.

As the training activities are ongoing in different partner countries, the final training tool kit platform will be delivered in April 2022. It will be updated and modified by partners, according to the first tests.

The platform will be then structured by ESCI as follows:

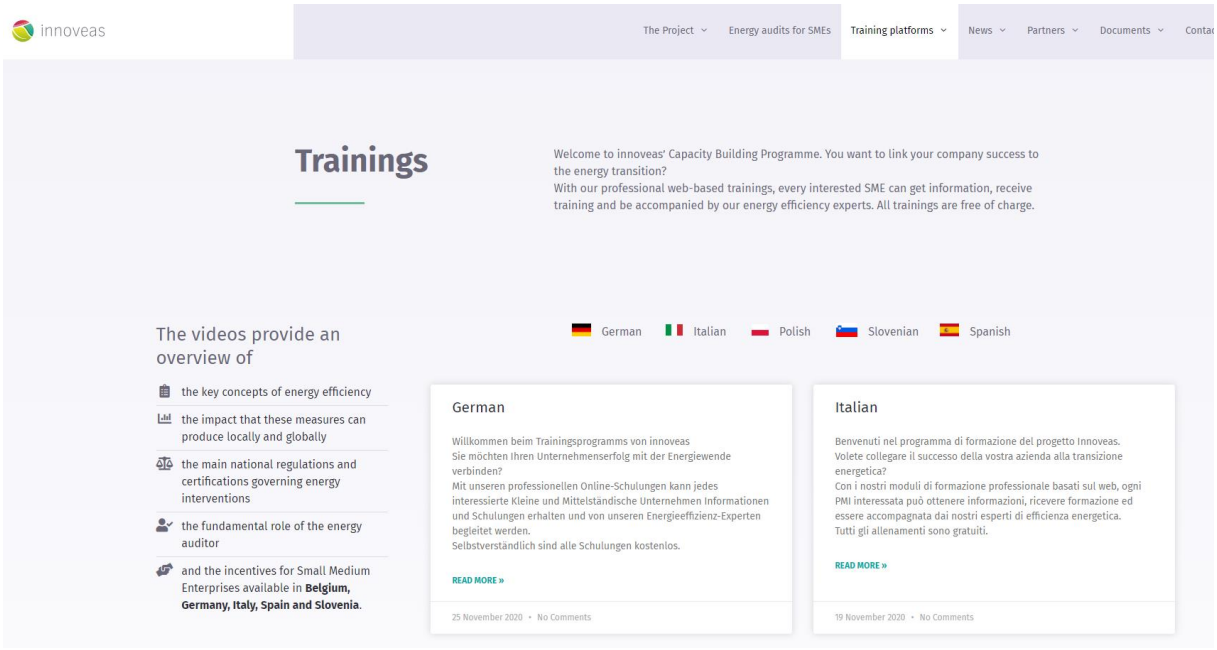

Figure 1: Screenshot of the INNOVEAS Training Platform

The user, already familiar with Innoveas or not, will arrive on the landing page of innoveas.eu. The training contents will be placed in a prominent way, directly on the landing page itself. By following this path, users will land on the introductory page of trainings (figure 2), where the general structure and levels of the training programme are described.

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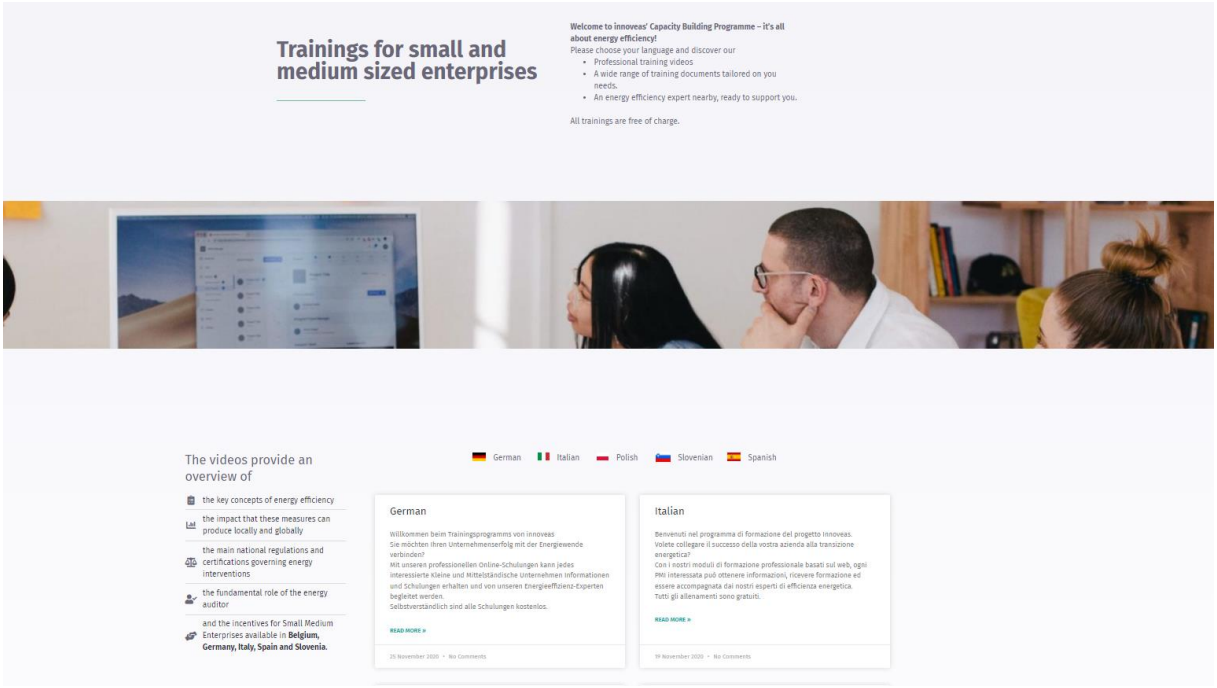

Figure 2: Intro page training

A short and informative description will lead the user to the training contents in his/her language (Italian, Spanish, Polish, Slovenian and German).
The structure of the different training materials will lean on the structure of the capacity building programme, as there are (as already recalled):

- Step 1 – **Introductory videos to training**, the web-based modules realized by each partner in national language.
- Step 2 – **Training materials from in-situ activity**
- Step 3 – **Auditing activity** (corresponding to the IN COMPANY activity according to D3.2 Capacity Building Plan)

The training platform has been developed as a clear and guided path inside the training programme, therefore users will be able to proceed from one step to the following, by clicking the corresponding button. At each step, a clear description of the contents and study methodology will be offered to users, in order to allow them to be independent while training and approaching the slides and references. In this way, learners or trainers will be able to combine the available materials and contents, and create their own training programme to cover the skills and fields of interest they are more linked to.
If the user is interested in learning more about the project itself, all initial website contents will remain available for at least 3 years. The partners have a protected access to their training material repository on the website, it is therefore possible to upload training materials for at least 3 years after the project ended.

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