



EnTRAINER

Energy transition is now!



Life Project
Final report



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entrainer-project.eu



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Introduction

Welcome in EnTRAINER!

Energy Transition Audits towards Decarbonization, aka **EnTRAINER**, is a three-year project framed within the **LIFE Clean Energy Transition** sub-programme supporting the delivery of EU policies in the field of sustainable energy, in particular, the European Green Deal, the Energy Union (2030 energy and climate targets) and the European Union's 2050 long-term decarbonization strategy.

With this premises, EnTRAINER aims to support the EU industrial sector in the ambitious goal of being fully decarbonized by 2050, by providing stakeholders and professionals with:

- » A new, holistic and complete methodology of “Energy Transition Audits” (ETA)
- » An upskill programme for professionals and companies' staff members
- » A set of four energy tools, free of charge and designed for energy professionals, auditors, and companies
- » A Knowledge Sharing Hub for continuous interaction and knowledge sharing

EnTRAINER is coordinated by the Aristotle University of Thessaloniki, leading a consortium of seven partners spanning in four EU countries, Greece, Italy, Romania and Italy.

8 PARTNERS 4 COUNTRIES:

- » Aristotle University of Thessaloniki (AUTH) Greece
- » Universitat Politècnica de València (UPV) Spain
- » Servelect Srl (SERVELECT) Romania
- » Agenzia per l'Energia Alto Adige CasaClima (CASACLIMA) Italy
- » Panepistimio Dytikis Makedonias (UOWM) Greece
- » Universitatea Tehnică Cluj-Napoca (UTC) Romania
- » Beon Gestiona (BEON) Spain
- » Use Efficiency Association (UNIVERCITIES) Italy



EnTRAINER offers practical options for companies with high energy consumption to face the energy crisis, find energy efficient solutions, and set a plan for decarbonisation, supporting the primary goal of the EU Green Deal of a 55% reduction in emissions by 2030 and net zero emissions by 2050.

EnTRAINER – Energy transition is now!

EnTRAINER is an ambitious project that leaves as a legacy a way forward to decarbonization for companies in the industrial sector, with a focus on energy intensive companies.

What is the scenario today and where is EnTRAINER heading to?

1. THE PROJECT



1.1. The EU decarbonization in the industrial sector and EnTRAINER

To understand where the project positions itself in the large-scale reality of the industrial sector, it is crucial to start from the initial spark that triggered the decarbonization initiative, the European Green Deal launched in 2019. The aim is to reduce emissions by at least 50% by 2030 and legally binding the 2050 neutrality goal through the European Climate Law. It pushes forward a clean transition that protects people and planet, is economically sound and socially fair¹.

To respond to this EU's comprehensive long-term strategy and in the process to make Europe the first climate-neutral continent by 2050, the following have been established as main drivers:

- » **Fit for 55 Package²** : the primary policy tool linked to the Green Deal's climate goals and intermediate target. It is a collection of proposals to meet the 2030 target of at least a 55% reduction in net greenhouse gas emissions compared to 1990 levels..

- » **EU Energy Efficiency Directive (EED)** - key driver of Europe's energy transition, launched for the first time in 2012 and successively revised during the following years (last in September 2023³) significantly raising the EU's ambition on energy efficiency. The EED included the Article 8 that set the annual energy saving obligation, requiring large enterprises (non-SMEs) to comply

with the energy audit obligation, and encouraging small and medium-sized enterprises (SMEs) to adopt energy audits and energy management systems. In addition, with the recast of the 2023, the **Article 11** required SMEs with high energy consumption to perform mandatory energy audits and/or to implement Energy Management Systems (EMSs) and to include long-term CO₂ and energy reduction targets based on audit results. EnTRAINER builds on these decarbonization initiatives: Article 8 and even more Article 11 of the Energy Efficiency Directive (EED), and the ‘Fit for 55’ package are together the driving forces behind EnTRAINER’s holistic approach.

note

- 1. The European Green Deal – Striving to be the first climate-neutral continent, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en.
- 2. Fit for 55: Delivering on the proposals, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal/fit-55-delivering-proposals_en#:~:text=Under%20the%20European%20Climate%20Law,cost%2Deffective%20and%20competitive%20way.
- 3. Energy Efficiency Directive, https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

1.2 EnTRAINER objectives

Managed by a consortium of partners with expertise in the energy audit sector, EnTRAINER focuses on energy-intensive industries in four South EU countries (EL, RO, IT, ES) to develop good practices in energy transition and decarbonization in Europe.

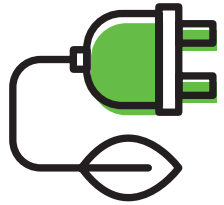
Objectives

- » To develop and apply an innovative, well-defined methodology, which will allow to go beyond conventional energy audits and put in spotlight a new approach >> the ETAs
- » To take tailor-made direct actions and support activities that cover the whole process, assessing non-energy benefits and establishing a decarbonization action plan for short, medium and long term >> the DAP
- » To upskill Energy Auditors and Energy Experts through the design and delivery of accredited specialized training courses in the participating countries >> the EnTRAINER Training Programmes
- » To facilitate the implementation of energy efficiency measures, by bringing together top decision makers, energy auditors and experts, and capitalizing on existing funding opportunities >> Leading the decarbonization

During the three years of its life, EnTRAINER addressed several stakeholders in the industrial sector, and each action and outcomes were tailored to a specific target group.

Here is how we did it.

2. ACTIONS



2.1. Decarbonization Roadmap – The ETA, DAP, Non-energy benefits

One of the goals of EnTRAINER is to **upgrade the conventional energy audits** for the industry, as foreseen by the current legislation, and the associated technical documentation, **to new enhanced energy audits**, assessing non-energy benefits and leading to the energy transition towards decarbonization for industries. These are the so-called **Energy Transition Audits (ETAs)**.

The ETA is based on the conventional energy audit, to ensure the compliance with the minimum criteria as per the European directive 2012/27/EU on energy efficiency and the EN 16247:2022 standard. Still the **ETA goes beyond this** by introducing a new holistic and more comprehensive approach aiming to facilitate the companies' transition towards a more sustainable and more climate friendly energy usage. As minimum criteria requirements the ETA includes:

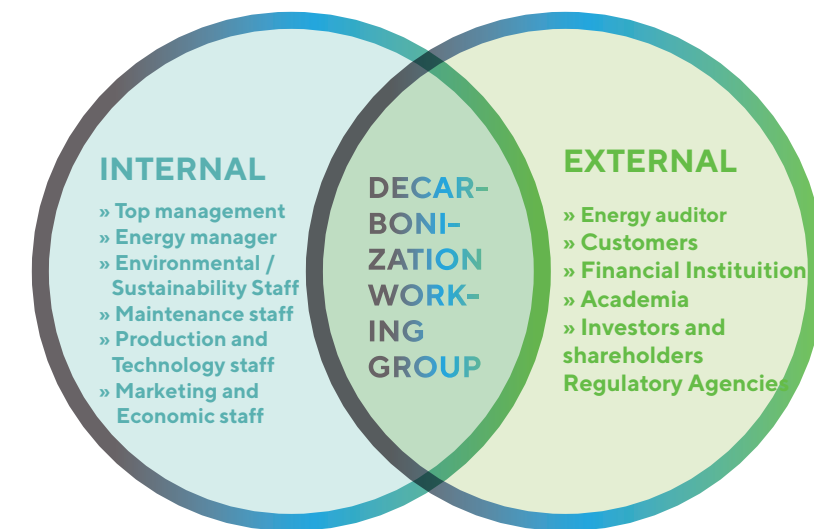
- » **Comprehensive assessments** of a company's **energy usage**, identifying energy **waste**.
- » More in-depth study of the demand-side, to identify possible **changes to schedules or production plans** that could increase efficiency, and **changes of the staff behaviour**, to raise awareness and increase sustainability.
- » Evaluation of company's environmental impact through **carbon footprint and CO₂ emissions calculations**.

- » Identification of **energy efficiency and decarbonization solutions** by adopting different environment friendly technologies.
- » Promoting **local installation of renewable** energy sources, **co-generation, energy recovery systems** or **biogas** production from waste.
- » Ranking the proposed decarbonization and energy efficiency solutions by means of a **non-energy benefits analysis** to facilitate decision-making.
- » Promoting best practices and case study simulations to **build confidence** in successful implementation of proposed action plans.
- » Providing **operational support** and suggesting **dedicated training** sessions for all the relevant categories of staff (decision makers, internal energy managers, technical staff and so on) to **improve communication** within company and a closer cooperation towards achieving energy efficiency and decarbonization goals.
- » Identifying **public, private, or alternative funding** support schemes to implement the proposed decarbonization and energy efficiency actions.
- » Enhancing the reduction of both energy costs and GHG emissions to increase the **company visibility and competitiveness at commercial level**.

A crucial output of the ETA is the **Decarbonization Action Plan (DAP)**. The overall objective of the DAP is to support the industries to **efficiently decarbonize** their business activities. The DAP is the main core of an ETA and encompasses various strategies, such as reducing energy requirements, implementing measures to enhance energy efficiency, utilizing local renewable energy sources, employing carbon offset initiatives, and incorporating other interventions. The goal of this plan is to achieve fully or partial decarbonization for the company or industrial site up to 2050.

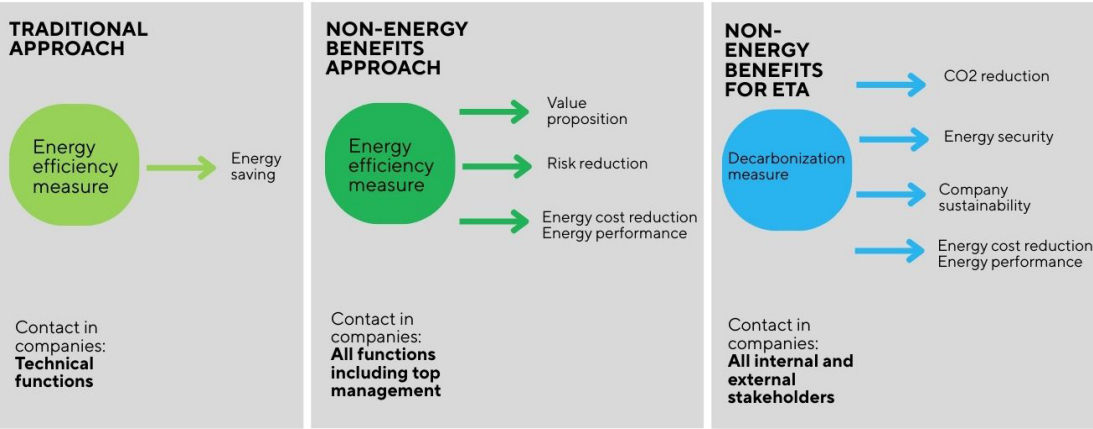
As per the above, the ETA requires the involvement of several key actors starting with the decision makers of a company, energy professionals and energy auditors. Next to them there is a wider range of stakeholders that needs to be involved and who can be grouped into **two clusters**:

- » A closer group, represented by **energy auditors, energy managers and company staff** involved in the ETA implementation and the identification of the proper decarbonization and energy efficiency solution for each analysed enterprise and/or industry sector.
- » A wider group including also **financial stakeholders** (banks, ESCOs, etc.) **and policy makers** that could facilitate the implementation process of the developed decarbonization roadmap.

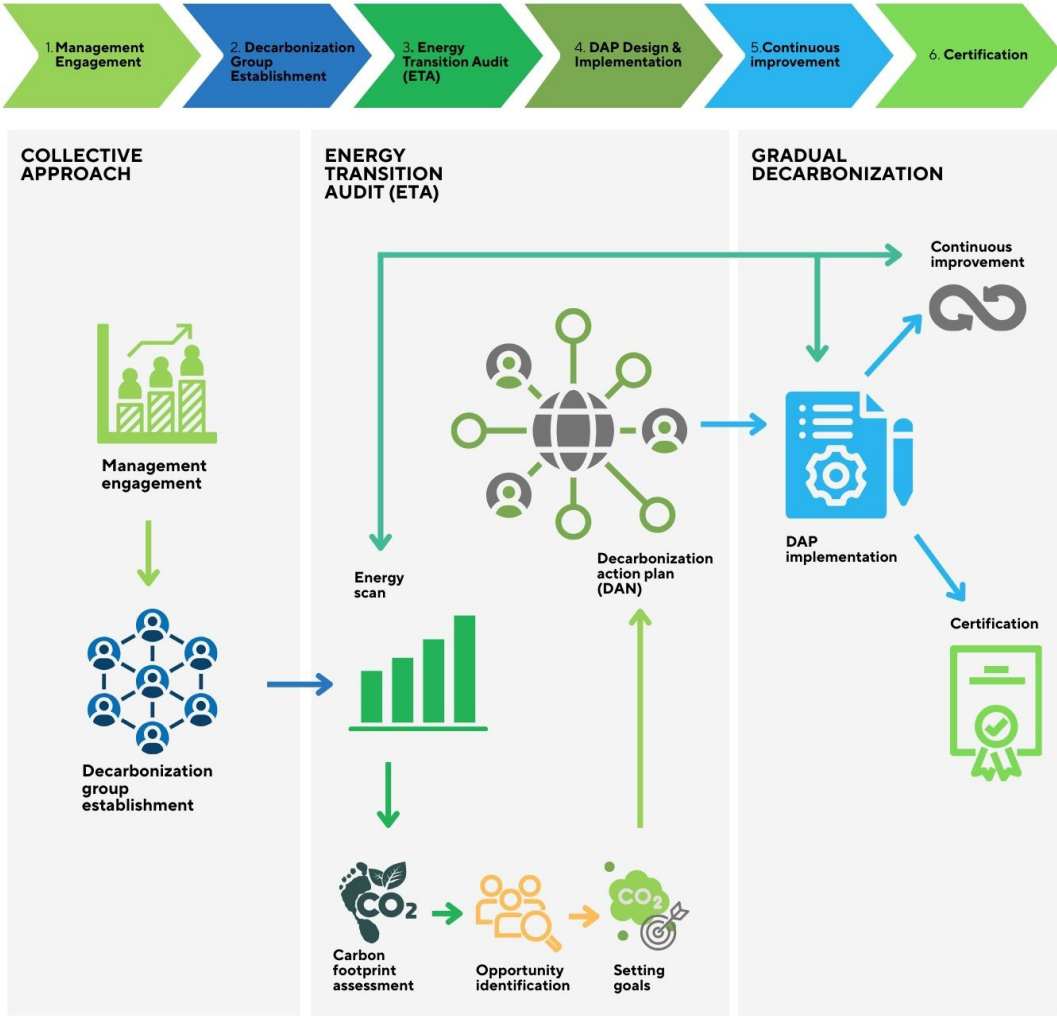


Starting with the top management of a company, the company’s experts and the energy auditors, a decarbonization working group needs to be set up and work together, collaborating in a fully committed decarbonization roadmap.

To bring on board and ensure commitment from the above key actors, the ETA includes another important factor: the **non-energy benefits** framework. **Non-energy benefits** are defined as benefits stemming from an energy efficiency investment, aside from energy savings, that are quantifiable at a certain level and arise in a short- and/or long-term perspective. Non-energy benefits approach can motivate companies to see **energy management from a new perspective** that connects energy efficiency to their business development and improvement and to their strategic objectives. With the non-energy benefits, the ETA introduces a strategic perspective and not only the conventional technical or financial one and the proposed energy efficiency measures should be aligned with the attainment of the overall business objectives.



The innovative ETA approach, including the DAP and the Non-energy benefits framework, results in the **Decarbonization Roadmap**



2.2 Upskill –
The EnTRAINER E&T Programme
and Knowledge Sharing Hub

Within the EnTRAINER project, two sets of Education and Training (E&T) courses have been designed and delivered **Energy Transition Audits Course for Energy Professionals** and **Energy Transition Audits Course for Energy Auditors**.

The **EnTRAINER E&T programmes** are designed to offer a comprehensive and holistic approach to trainees, equipping them with the necessary skills to meet the new demands for energy efficiency improvement and decarbonization of the industry.

The EnTRAINER E&T programs are structured in **Learning Units**, addressing the essential aspects of the proposed holistic **Energy Transition Audits (ETAs) approach**. Their target groups spanned from students to staff member, to expert energy auditors:

- » Future energy auditors.
- » Holder of a level 5 EQF degree in the fields of energy, industry or environment.
- » Engineering students or graduates with an energy, industrial or technical background.
- » Energy experts and professionals or other qualified individuals such as energy consultants or energy managers.
- » Personnel of industrial companies.

Below we illustrate the contents, training methods, assessment and credit evaluation of the EnTRAINER E&T programs.

Energy Transition Audits Course for Energy Professionals	
Learning Units	LU1: European and national policies and legislation for energy efficiency, energy transition and decarbonization LU2: Cutting-edge energy efficiency and decarbonization solutions as measures for Energy Transition Audits LU3: Energy Transition Audits (ETA) and Decarbonization Action Plans LU4: Tools for monitoring and managing energy and related CO2 emissions LU5: Financing energy efficiency and decarbonization measures, tools and evaluation LU6: Team project - Applying an ETA to a case study
Training methods	• Lectures and tutorials • Working examples or exercises such as multiple-choice questions • Case study and practical activities • Interaction between participants
Assessment	Theoretical knowledge >> set of multiple-choice questions; one test per LU – 40% Practical Learning >> Team project – 60%
ECTS	Course certification awarded with 5 ECTS credits to trainees passing both evaluations obtaining at least 50% of the maximum grade in total.
Energy Transition Audits Course for Energy Auditors	
Learning Units	LU1: Energy Transition Audits LU2: Decarbonization Action Plans LU3: Tools for monitoring and managing energy and related CO2 emissions LU4: Project - Applying an ETA to a case study
Training methods	• Lectures and tutorials • Working examples or exercises such as multiple-choice questions • Case study and practical activities • Interaction between participants
Assessment	Theoretical knowledge >> set of multiple-choice questions; one test per LU – 40% Practical Learning >> Project – 60%
ECTS	Course certification awarded with 2 ECTS credits to trainees passing both evaluations obtaining at least 50% of the maximum grade in total.

The EnTRAINER E&T programmes have been facilitated by the **Knowledge Sharing Hub** (<https://hub.enttrainer-project.eu/>), an ad-hoc portal open to the trainees to view the available courses, review and download the training materials, practice and interact via an open forum.

2.3 Support – The EnTRAINER tools

A final major output of EnTRAINER is a **set of four digital tools** aiming to consolidate the knowledge among energy transition auditors, **creating a close relationship between energy professionals and the audited clients**. They provide essential support for assessing energy usage, identifying efficiency opportunities, and driving sustainable practices across various industries.

» **CUSUM Control** offers on-line supervision of energy consumption anomalies or extreme behavioural deviations from the base-line pattern.

» **Heat loss calculator** provides a rough quantified estimation of the status of the building's thermal insulation characteristics.

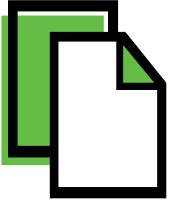
» **Energy audit estimator** offers a brief, yet valid, estimation of energy efficiency potentials of the site involved, as the first step to raise awareness of the application of actual energy efficiency measures before performing a detailed energy audit.

» **On Site Auditor** acts as a remote portal that will facilitate the on-site surveys during the actual energy audits.



Following its actions, EnTRAINER has achieved its set goals and targets and in some cases exceeded them. The figures from the ETAs and the training courses clearly show that the industrial sector is ready to start the journey towards the energy transition and it is willing to receive support from professionals and experts.

Check our results in the next chapter.



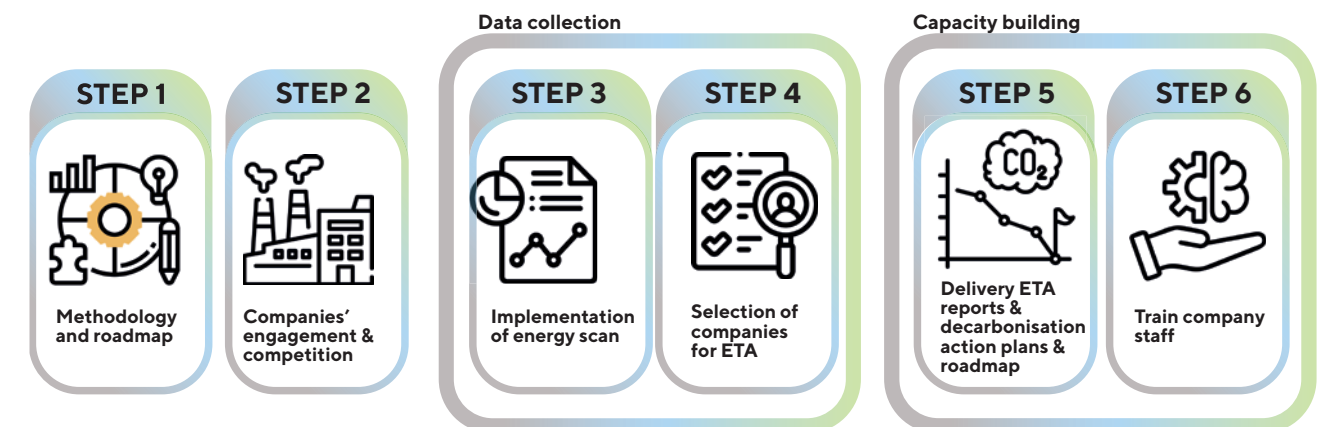
3. RESULTS

3.1 Energy scans and ETAs

During the EnTRAINER project at least 20 companies per partner countries joined the EnTRAINER path towards the decarbonization. The first step focused on engaging energy-intensive companies through a multi-step process that promotes the adoption of Decarbonization Action Plans (DAPs). Companies were selected based on prior energy audits, energy consumption, and management practices, with a competitive evaluation process prioritizing candidates when interest exceeded capacity

» 80 energy scans

» 40 ETAs implemented



3.2 Training Courses

The two sets of the EnTRAINER Education and Training (E&T) programmes, for energy professionals and for energy auditors, were delivered starting from the second year of the project in the four partner countries. The demand went far beyond the expected results: the number of registrations in all participating countries showed the willingness and the need for professionals to upskill their competencies on net-zero carbon solutions.

The numbers of registered participant per countries are showed below:

- » Greece: 152
- » Italy: 146
- » Romania: 171
- » Spain: 206

Total of **675** registered participants in **4 EU** countries with an initial estimated figure of **480**

3.3 Tools and Knowledge Sharing Hubs

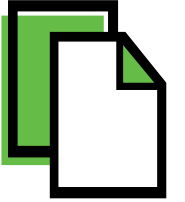
To access the tools or any protected material, the interested users must register on the website (<https://www.entrainer-project.eu>) of the project. By logging in, the user will be able to access all restricted tools that can be found under the Results >> Tools menu at the header of the website.

» **4 accessible tools for professionals and companies**



The EnTRAINER project has been engaging with external stakeholders, target groups and public since the beginning of its life. On top of its active presence of social media (LinkedIn, Facebook, X) with dedicated pages and group, the partners have interacted at multiple levels communication the projects' activities and disseminated outputs.

Below some highlights.



4. FOCUS – COMMUNICATION AND DISSEMINATION

4.1 EUSEW 2024

The EUSEW 2024 represented the first real opportunity to co-ordinating a joint communication action with the Sister Projects. Led by EnTRAINER in conjunction with AUDIT2MEASURE, DEESME2050, EE4SMEs, EE4HORECA, KNOWnNEBs the session [Paving the way to net zero energy in industry and small and medium-sized enterprises](#) was selected and delivered within the framework of the [EUSEW 2024 - Policy Session](#)

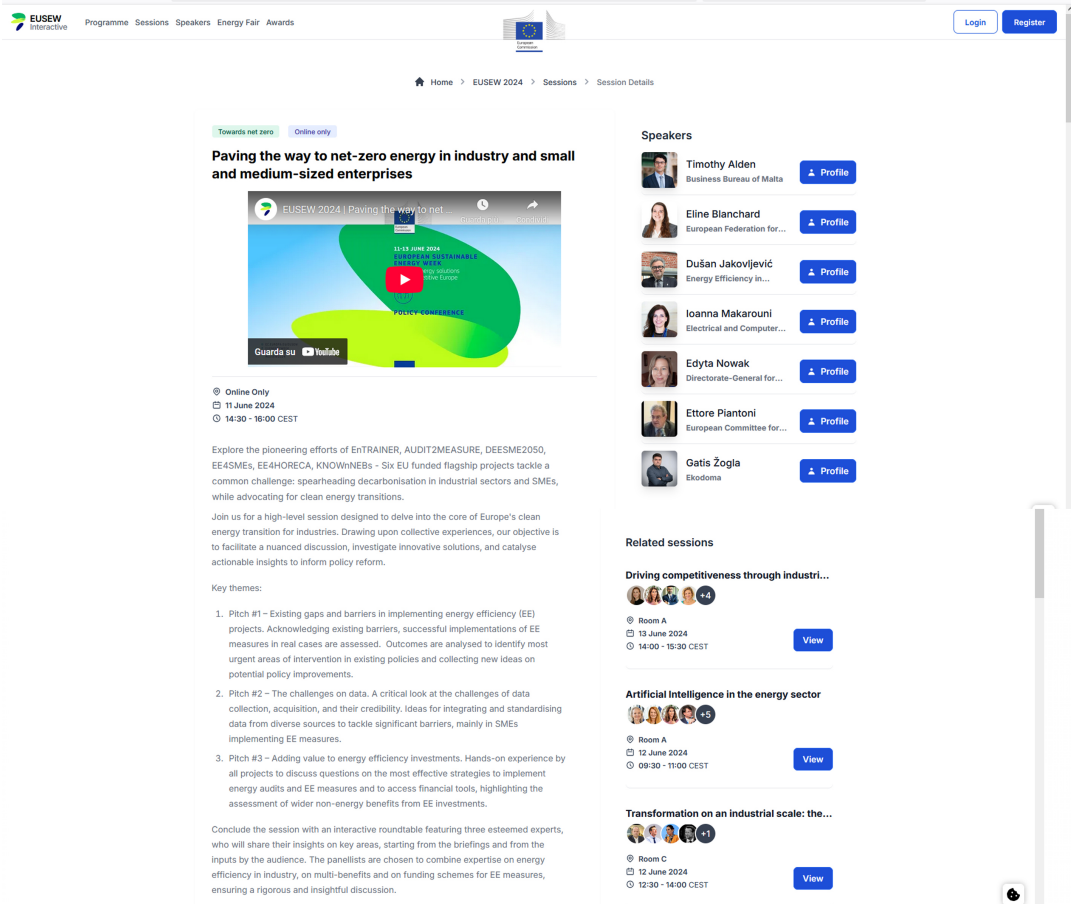
Figure 01

Introducing the
Sister Projects,
Agnese Riccetti
(UniverCities)



Figure 02

EUSEW 2024 web page illustrating the event held in conjunction with the six Sister Project during the EUSEW 2024. Source: official EUSEW Interactive website



4.2 Synergies with Sister Projects

The interaction with the Sister Projects went beyond the session in the EUSEW 2024. More activities have seen EnTRAINER be part of this join synergy and sharing knowledge and lessons learnt

» KNOWnNEBs Newsletter – issue n.3, May 2024

Figure 03

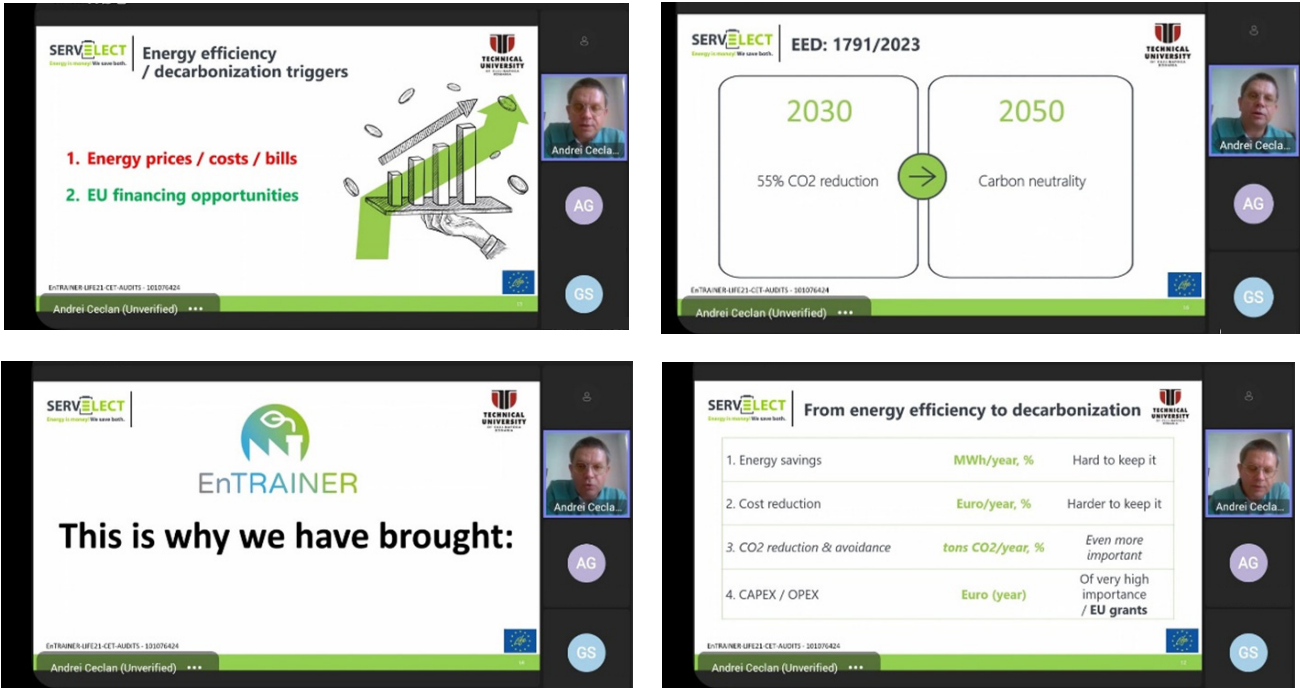
Newsletter – issue n.3, May 2024



» KNOWnNEBs Final Conference – three days of online and final hybrid meetings to exchange the expertise and experiences during the projects

Figure 04
Screenshot from
the joint event,
speaker Andrei
Ceclan
(Technical
University of
Cluj-Napoca)

» Competitiveness in transition: transposing energy efficiency policies to national regulations, coordinated by DEESME50 in conjunction with EnTRAINER and AUDIT2MEASURES



4.3 Project Papers

Thanks to the contribution of partners from the academia, four papers have been published so far, available in the EnTRAINER web site, [Results](#) >> Articles and publications

- » EnTRAINER’s Project Tools Framework for Energy Transition Audits Towards Decarbonization [DOI: 10.1109/SyNERGYMED62435.2024.10799389](#)
- » A Novel Educational and Training Program on Energy Transition Audits and Decarbonization [DOI: 10.1109/EPEi63510.2024.10758039](#)
- » Energy transition audits in industries located in Valencian region [DOI: 10.1088/1742-6596/2940/1/012016](#)
- » Identifying the non-technical barriers of energy audits in industries: the EnTRAINER project approach [DOI link: 10.1109/EAAEIE65428.2025.11136705](#)

The EnTRAINER project will end in November 2025, and more reports plus a final event are expected to happen before the end.

Here is a quick overview of what you can expect to find soon on our website.

5. GOING FORWARD



5.1 Case Studies / Lighthouse Examples

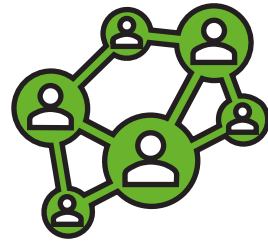
- » Updated version of the Report Holistic Energy Transition Audit Methodology
- » Updated version of the [Decarbonization roadmap](#)
- » Auditing replication report and satellite followers recommendations



5.2 Learning & Replication

- » Replication and [sustainability plan](#)
- » Capacity building and [exploitation plan](#)

5.3. Final event



Friday 17th October,

9:30 – 13:30

Hybrid

On-site: Universitat Politècnica de València (UPV)

Online: via Teams, link tbc

Figure 06

EnTRAINER
Consortium

**We are looking forward
to hosting you!**



APPENDIX

GLOSSARY OF TERMS

DECARBONIZATION

the process of stopping or reducing Greenhouse gases, especially carbon dioxide, being released into the atmosphere as the result of a process, for example the burning of fossil fuels

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ENERGETIC AUDIT

a technical inspection and detailed analysis of the energy profile and consumption of a company or building. Its scope is to identify the areas where there is potential for energy efficiency measures and savings and propose corresponding measures.

ETA

Energy Transition Audit, innovative energy audit developed the En-TRAINER project for the industrial sector. The ETA goes beyond the traditional approach of energy audit including a roadmap toward the decarbonization (DAP) and non-energy benefit analysis

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DAP

Decarbonization Action Plan, roadmap designed by the EnTRAINER project for the industrial sector. The DAP includes a list of interventions and solutions that a company can implement in the short-, medium-, long-term to become fully neutral by 2050.

REFERENCES

For additional information, visit the EnTRAINER website >>
[Results](#) page and in particular:

» References for Chapter 2

- » [Holistic Energy Transition Audit Methodology](#)
- » [Decarbonization roadmap](#)
- » [Report on engagement of the clients and initial energy scans](#)
- » [Energy Transition Audit Guidelines](#)
- » [Accredited Training programmes in Energy Transition Audits](#)
- » [Hub guide](#)
- » [Tools guide](#)

» References for Chapter 3

- » [Report on performed detailed Energy Transition Audits](#)

» References for Chapter 4

- » [Newsletter #1](#)
- » [Newsletter #2](#)





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