

# Training on Resource Efficiency and Optimization

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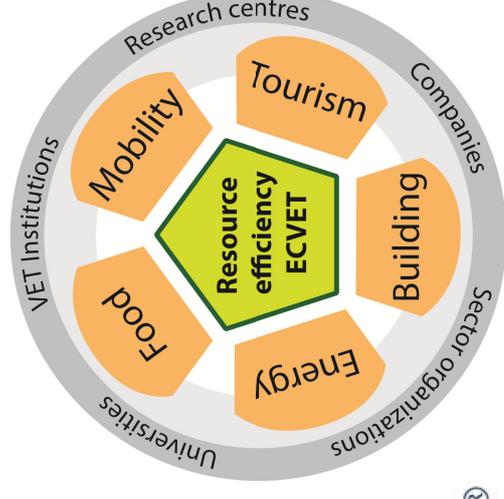
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## 1 Introduction

TREO (Training on Resource Efficiency and Optimization) is a partnership project. Its main objective was to transfer and exploit the results of a previous Leonardo da Vinci partnership, TRUST-IN, within which a European Course on Eco-efficiency was developed. TREO expanded the previous results to Vocational Education and Training (VET) schools, business representatives and enterprises in partner countries in five sectors/need areas that present major sustainability-oriented VET training challenges in Europe:

- Renewable energy sources and energy-related products
- Building and construction
- Food
- Mobility and transport
- Tourism.

The project partners organized workshops in different countries, each one being specialized in one of the sectors mentioned above. All relevant stakeholders from the guest country have always been invited to the workshop.

The main objective of the project was to test an outline of a European VET course in resource efficiency and to adapt it to the local conditions in cooperation with VET professionals and working life representatives. Competences of specific individuals to plan, develop, deliver, evaluate and reflect on VET in resource efficiency are an important result of the project at personal level. Improved quality of VET training for many individuals participating in VET programs represented a much broader outcome. The project significantly increased knowledge and qualification of members of its target groups in the field of resource efficiency and sustainable innovation all over Europe and thus contribute to reaching the EU goals in sustainable development and competitiveness area.

TREO linked the Eco-efficiency concept course with the world of practice and facilitated its adaptation, practical implementation and further spread with VET professionals.

## 9 Wrap-up

TREO was a partnership project with the main objective to transfer and exploit the European Course on Eco-efficiency in vocational education and training (VET) developed within the Leonardo da Vinci Partnerships. Fourteen partners from ten countries, both 'old' and 'new' EU Member states, with different levels of implementation of eco-efficiency into practice took part in the project.

The developed programmes aim at linking this concept of resource efficiency with the world of practice and facilitating its adaptation, practical implementation and further spread with VET professionals, enterprises, professional associations, chambers of industry and commerce, regional and local authorities, and higher education institutions. The project has achieved the planned specific objectives:

- Integrating resource efficiency and innovation in sustainability concepts and practices;
- Testing, applying and disseminating common concepts of sector specific courses on eco-efficiency;
- Supporting participants in the acquisition and use of knowledge, skills and qualifications to advance personal development, employability and active participation in the European labour market;
- Improving quality and innovation of VET system, institutions and practices;
- Enhancing attractiveness of VET employers and learners for jobs in resource efficiency.

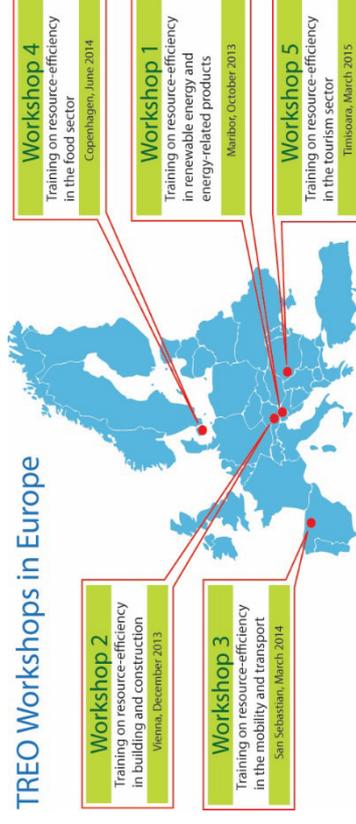
Project results have been and will be presented at national and international conferences. The Final Report will be distributed to stakeholders in partner countries, EU and globally through the PREPARE and UNIDO's RECP Networks and published at the PREPARE portal and the European Shared Treasure database of Lifelong Learning Programmes.

## 2 Project summary

The project results relied on various networking activities in all partner countries and mainly on five sector-specific workshops with multi-stakeholder participation.

Taking the TRUST-IN Eco-efficiency course as a starting point, as well as dedicated presentations and debates, the workshops resulted on **proposals for sectoral resource efficiency courses for VET, that were subsequently validated by experts from the different sectors and countries** that partners actively engaged.

Thus, besides other management, networking and dissemination activities, the following five workshops were organized:



With the aim of complying with the requirements of the European Credit system for Vocational Education and Training, the courses are organized according to the following headlines:

- Unit identifier /name
- Unit description
- Element identifier/ name
- Element description
- Performance criteria (learning outcomes)

In this publication, the units and key elements of the course are presented. The organizers of such trainings should link to existing European and national standards and legislation.

### 3 Resource Efficiency Course Content

The VET course on Resource Efficiency has been developed during the European Training Partnership on Sustainable Innovation (TRUST IN) project, a forerunner of TREC, and further developed within the TREC project. The general structure of the course is as follows:

1. Introduction to Energy Efficiency
2. Motivation in the case of energy efficiency and climate change
3. EU directives, roadmaps and action plans
4. ISO, CEN and other standards
5. History of the eco-efficiency concept
6. Renewable energy and energy efficiency
7. Material and water efficiencies and reuse
8. Methods for improving resource efficiencies
9. Environmental management and Social Responsibility
10. Sustainable consumption
11. Organisations dealing with Resource Efficiency
12. Teaching tools and methods: textbooks, guides and manuals, Power-Points and videos, quizzes
13. Laboratory and field work, problem solving
14. Teach the students, and teach the teachers

Add some final sentence(s)

### 8 Tourism

Tourism is the fastest growing industry having a great impact at the global scale. In this context moving towards sustainable tourism it's essential and education for sustainable tourism has an important role to play. Five key elements of sustainable tourism:

#### Five key elements of sustainable tourism:

- Hospitality: human welfare
- Responsibility
- Nature protection
- Social and cultural awareness
- Resource and energy efficiency

#### Headlines of the course on Resource Efficiency in Tourism:

Unit identifier / name	Unit description	Element identifier / name
U1 – Introduction to the concept of Sustainable Tourism	The unit describes the key environmental impacts of tourism sector and the concept of sustainable tourism	U1 E1: Background and motivation U1 E2: Sustainable Tourism Concept U1 E3: Standards and certification for sustainable tourism
U2 – Ecotourism	The unit describes the alternative ways of tourism and the general principle of sustainable traveler	U2 E1: The Ecotourism explained
U3 – Resource Efficiency and Cleaner Production in accommodation sector	The unit presents the method to increase efficiency in accommodation sector and the typical efficiency measures	U3 E1: RECP methodology in accommodation sector U3 E2: Methods to increase resource efficiency in accommodation sector
U4 – Social Responsibility in accommodation sector	The unit describes the social aspects of the accommodation sector and how these aspects can be addressed	U4 E1: Social responsibility dimensions of the tourism sector U4 E2: Social impact assessment of accommodation sector U4 E3: SR strategy within the tourism sector

## 7 Mobility and transport

### 6 main challenges identified by stakeholders:

- Holistic approach including into other aspects.
- Joint understanding of the concept: sustainable mobility.
- Interdisciplinary approach: management and economy, technical and social aspects, together with environmental issues.
- Social transition: changing wishes/visions.
- Innovation: electro-mobility, new engines, biofuels, logistic,...
- Big data / users' data analysis.

### Headlines of the course on Resource Efficiency in mobility and transport:

Unit identifier / name	Unit description	Element identifier/ name
U1 – Introduction to the European Mobility sector	The unit gives an overview on the sector, the legal framework and standardization, major concepts and motivation for eco- efficiency	U1 E1: Overview and motivation for eco-efficiency U1 E2: Legislations and Standards U1 E3: Major concepts of eco-efficiency in relation to mobility
U2 – Mobility and Efficiency	The unit describes the potential efficiency improvement aspects in the sector in relation to energy, water and materials	U2 E1: Renewable energies and energy efficiency U2 E2: Water efficiency U2 E3: Material efficiency
U3 – Efficient mobility systems	The unit describes efficient mobility systems	U3 E1: Efficient mobility systems
U4 – Sustainable consumption	The unit presents the main concepts related to sustainable consumption in relation to transport and mobility	U4 E1: Sustainable consumption
U5- Practical application of the units of the Course	The unit includes practical exercises and work to apply previous knowledge and theoretical contents	U5 E1: Practical exercise and work

## 4 Renewable Energy Sources and Energy Efficiency of Products

TREO meetings and workshops aimed to develop specific courses on renewable energy and energy efficiency. The energy course included findings, recommendations and conclusions obtained from discussions between TREO partners and invited speakers.

### Headlines of the course on Energy Efficiency of Products:

Unit identifier / name	Unit description	Element identifier / name
U1 – Introduction to the European Energy sector	The unit gives an overview on motivation for energy efficiency, the legal frame work and standardization, and major component of energy efficiency	U1 E1: Background and motivation U1 E2: Legislation and standards U1 E3: Main sectors, relevant for energy efficiency and energy saving potential
U2 – Energy management systems	The unit describes the energy management systems and the energy assessment methods	U2 E1: Renewable energy sources U2 E2: Regulation of emissions U2 E3: Fuel efficiency assessment
U3 – Major energy systems	The unit presents the main energy systems, typical area of improvements, and energy conservation	U3 E1: Energy systems U3 E2: Methods to increase energy efficiency in products U3 E3: Sustainable consumption
U4 – Teacher's aids for renewable energy sources and Energy Efficiency of products	The unit describes the available literature and other teaching materials	U4 E1: Life cycle assessments U4 E2: Textbooks U4 E3: PowerPoint and videos U4 E4: Guides and manuals

Some remarks highlighted by stakeholders from different countries:

- There is a lack of courses pointing to specific sectors like effective energy consumption, prevention in energy consumption, eco-efficiency skills development, innovations and special training programs for public administration, and
- National regulation/supports in the field of energy efficacy.
- More practical teaching and less theoretical learning is advised. Therefore, trainees could be more prepared for a job, knowing what employers expect from them.

## 5 Building and construction

There is a general demand for skilled technicians with a solid background especially for the renovation of buildings, including historical buildings. Therefore a strong link to practical examples is an important element in the curriculum for building and construction.

### Key elements of “Building and construction”:

- Introduction to the European Building and Construction sector
- Introduction to energy efficiency and renewable energy in buildings
- Practical implementation, tools, measurements

### Headlines of the course on Resource Efficiency in Building and construction:

Unit identifier / name	Unit description	Element identifier / name
U1 – Introduction to the European Building and Construction sector	The unit provides an introduction to the sector, legislation, standards, eco efficiency and approaches to increase resource efficiency	U1 E1: Data and motivation U1 E2: Directives and standards U1 E3: The concept of Eco efficiency
U2 – Introduction to Energy Efficiency and Renewable energy	The unit provides an introduction to energy efficiency, water efficiency, materials efficiency and social aspects	U2E1: Energy efficiency in buildings U2 E2: Materials and water U2 E3: Social aspects
U3 – Practical implementation, tools, measurements	The unit provides an introduction to measuring techniques, evaluation schemes and their application	U3: Practical examples

The acceptance of the training depends strongly on the costing of the training the value of certificates, links to standards and legal requirements and recognition of training. To enhance the acceptance, the organizers of such trainings should provide a recognized certificate for the participation.

## 6 Food

### Five key elements of sustainable Food (Waste):

About 90 Mt (million tonnes) of food is wasted annually in Europe – agricultural food waste and fish discards not included – with a negative impact on CO<sub>2</sub> emissions. The course addresses food waste from the retail and leisure sector, e.g. hotels, restaurants and public canteens. As food waste occurs in all steps of the supply chain, it is possible to adapt the course to other parts of it. Main content:

Unit identifier / name	Unit description	Element identifier / name
U1 – Introduction to the European Food sector	The unit provides an introduction to the sector, eco efficiency and approaches to increase resource efficiency	U1 E1: Food sector <ul style="list-style-type: none"> <li>• From “farm to fork”</li> <li>• The “players”</li> <li>• Contribution to GHG</li> </ul> U1 E2: Environmental & future food product <ul style="list-style-type: none"> <li>• Reduce environmental impacts, climate impact, nutrient emissions to water</li> <li>• Reduce impacts from toxic substances and materials</li> <li>• Contribute to a diverse landscape and rich biodiversity</li> </ul>
U2 - Introduction to Food waste and resource efficiency	The unit provides an introduction to specific sources and practices for generating food waste	U2 E1: Food efficiency
U3 – Practical implementation	The unit provides an introduction to measuring techniques, evaluation schemes and their application	U3 E1: Practical application with focus on food waste <ul style="list-style-type: none"> <li>• Canteen and kitchens in restaurants and hotels</li> <li>• Consumers</li> <li>• Retail</li> </ul>

The concept is open for involvement of regional and local actors, and citizen groups, connected e.g. to local campaigns guided by waste management utilities, local and educational institutions.