



Chargers of Electric Vehicles in Learning

O1 - T1 Learning objectives

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Author: Adina Demetrian, C-Evil partnership

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Colegiul "Stefan Odobleja"	
Taliano Slovenska Obchodna Komora	
Kecskeméti Szakképzési Centrum Kandó Kálmán Szakközépiskolája és Szakiskolája	
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1 – Introduction

The objective of C-Evil project is to develop new learning and training materials on EV chargers in order to fill the gap in electricity education due to the sufficient and efficient multiplying activities. The growing number of electric vehicles needs more and more EV chargers which require adequate electricity professionals who can install, operate and maintain the equipment properly. Expert partners will provide a special knowledge that can be taught to electricians or future professionals (VET students). Together with the VET partners, they will elaborate materials that can be used anywhere in the EU.

The materials will cover the main areas connected to EV chargers such as charger types, electrical connections, licencing and permitting, installation, electricity standards, management, maintenance and error maintenance. We will put special focus on not only the hardware part of the EV chargers, but also on its software features, i.e. smart management applications. We would like to also highlight in the materials that, even though, there are general information that is valid everywhere, there are also rules and specifications that are different in every country. Country-specified information will be available which will make the materials more thorough.

In order to help understanding the terminology in the different languages, and to facilitate the employment in the EU, a glossary will be set up with the most important terminology in the project partners' languages.

Four intellectual outputs of the C-Evil project will be built upon each other. O1 will provide a solid base for the further activities of the project by defining the learning objectives (O1-T1), methodology and approach (O1-T2), and also developing the EV charger curriculum (O1-T3).

Based on the O1, the partnership will elaborate the content of the training materials (O2-T1). In further tasks of the O2, methodology of trainers' assessment (O2-T2) will be described, and trainers' feedback on the training materials will be collected (O2-T3).

O3 will include the elaboration of the learning materials (O3-T1) which will be the adaptation of the training materials in a student- and user-friendly way. Students will evaluate the learning materials (O3-T4) which requires a description of evaluation methodology (O3-T2). This IO will involve the development of the online learning space (O3-T3) where learning materials will be available for e-learning purposes.

For enhancing the spread and the adaptation of the project results, in O4, project partners will prepare guidelines and handbooks for the most important stakeholders: VET institutions (O4-T1), VET trainers (O4-T2), e-learners (O4-T3) and policy makers (O4-T4).

The partners are committed to disseminate the project results during and even after the project closure, through their daily activity. The outputs will be available on the project's platform, thus, it can be used for future projects and for further educational purposes.

Duration: 24 months

CAM is a micro-sized enterprise in Hungary, acting as lead partner of C-Evil. CAM as an expert organisation has great experiences in the field of electric mobility and in international co-operation covering professional and financial management.

The Turkish EGE University offers courses, inter alia, in the field of electrical-electronics engineering, their experts have expertise and experience related to electric mobility, especially chargers.

The Hungarian VET school, Kecskeméti Szakképzési Centrum Kandó Kálmán Szakgimnáziuma és Szakközépiskolája offers, among others, trainings for electricians. They have professional project experience in an electric car battery project.

The Romanian Colegiul Stefan Odobleja offers a wide range of qualifications in the field of, among others, mechanics and electronics, focusing on providing practical trainings to students. Automotive industry has a priority in their trainings.

Servicios Extremeños Enseña is a Spanish training center providing high-quality educational service. The institution also has experience in training material development and widespread partners to reach out to, including Spanish VET schools.

Learning Hub Friesland is a Dutch NGO enabling, driving and maximizing innovation in education in Friesland. They have experiences in training programme and training material development, organizing workshop and seminars and they have a broad network in the field of education, social sector, industry and governmental.

The Italian-Slovak Chamber of Commerce is an NGO with wide range of partner network. In C-Evil, they will ensure the representation of the labour market, and they can contribute significantly to the dissemination purposes.

Avaca Technologies is a Greek IT expert who has the required expertise for developing the project platform and also has many experiences in international projects on education.

2 – Working method

The training materials on EV chargers can help electrical professionals and students in the field to gain competitive knowledge. VET partners have examined how EV chargers appear in their own courses and trainings, and they will together summarize what they expect to accomplish with the training materials, how this knowledge can improve the competitiveness of electrical professionals.

VET project partners examined how they can build in this knowledge into their own educational programme or courses. CCIS examined the issue from the labour market point of view: what an employer can expect from the training materials. LHF, EGE and CAM used their experience in education to provide inputs for this task considering up-to-date, technological and innovative solutions.

VET project partners firstly outlined their own expectations on the learning objectives which provide insight to the different ways how students, VET teachers and professionals (via distance learning) can use the training material and the e-learning platform. Then their findings have been refined together led by the task leader in line with the desired goals and impacts on the student learning processes. Learning objectives tend to be based on the SMART (specific, measurable, achievable, realistic and timebound) principles where possible.

Colegiul "Stefan Odobleja", as task leader prepared a list of aimed questions in co-operation with the Hungarian school in order to define the learning objectives in C-Evil. The questions were sent out to all project partners (except our IT partner, AVACA). The participating partners' inputs were collected and made summary from them as a final output for IO1-T1.

3 – General Objectives

1. General objective: To provide students with specific knowledge that will enable them to handle EV Chargers

- 1.1. To increase students' skills regarding reading, understanding and interpreting electric plans, and technical descriptions and EV chargers' terminology
- 1.2. To improve students' IT basic skills
- 1.3. To get students acquainted to basic economics: cost/benefit analysis for the client; analysis of costs related to acquiring and installing, costs related to maintenance
- 1.4. To provide students with knowledge on legislation, norms and standards that affect EV chargers, their installation and maintenance, electric shock protection
- 1.5. To get students acquainted with electric control measurements and tests, troubleshooting and maintenance of electric equipment
- 1.6. To teach students how to install and connect electrical equipment

2. General objective: To develop students' personal/ professional skills

- ability to apply knowledge,
- reading comprehension,
- communication skills (both speaking and written),
- organizational skill,
- decision-making skill,
- troubleshooting,
- time management
- problem solving
- flexibility
- dependability
- interpersonal skills (with employer and clients, and among co-workers)
- developing the participants' skills on finding and interpreting information and regulations relating to the installation and maintenance requirements of EV chargers (information processing capability in short)

3. General objective: To develop training materials (4-5 modules, including video tutorials) and assessment methods and tools

- 3.1. To provide accurate revision on the training timeframe in order to estimate the appropriate duration of the training (contact training and individual study)
- 3.2. To design methodologically well-structured questions at the end of each module to acquire sufficient information about the participants' knowledge

4. General objective: To take the necessary steps to have EV chargers included in the national curriculum

- 4.1. To cooperate with school inspectorates and Ministry of Education to review the contents of current curricula
- 4.2. To disseminate the results of the project to schools in each country in order to increase awareness of the up-to-date requirements in training, following the rapid development of technology and technics
- 4.3. To include the course as an extension of the existing curriculum or as optional course, depending on each country's curriculum regulations

5. General objective: To train specialists in the area among teachers

- 5.1. To provide specific and focused training on the topic
- 5.2. To gain knowledge regarding installation and expansion of electric distribution boxes in residential buildings, construction of power connections in residential buildings
- 5.3. To get familiar with the installation and expansion of electric distribution units at industrial buildings and public sites, construction of power connections at industrial buildings and public sites
- 5.4. To get acquainted to country specific regulations

6. General objective: To make use of European instruments to recognize and validate the learning results

- 6.1. To have all participants issue a Europass document for the students involved
- 6.2. To decide upon the instruments that can be used as recognition of competences for the online trainees

7. General objective: To enhance cooperation with local or national entrepreneurs in order to create a common framework

- 7.1. To identify employers who might benefit from C-Evil learning materials and set up cooperation protocols to get feedback regarding the requirements on the labour market
- 7.2. To collaborate in order to create training materials to be used for training at the workplace
- 7.3. To carry out partnerships between VET schools and local businesses in order to develop the students' practical knowledge:
 - How to install and terminate steel wire armoured cable and PVC cable;
 - Key requirements relating to electric vehicle charging equipment;
 - The advantages and disadvantages of different types of electric vehicle charging arrangements and equipment;
 - The preparation for design and installation of electric vehicle charging equipment;
 - How to plan and prepare for the design and installation of electric vehicle charging equipment in domestic and public locations;
 - How to install electric vehicle charging equipment at domestic and public locations;

- Requirements for inspection, testing, commissioning and handover of electric vehicle charging equipment;
- How to carry out inspection, testing, commissioning and handover of electric vehicle charging equipment in domestic and public locations;
- Latest national regulations for what concern buildings, public spaces and environment;
- Latest wiring regulations.
- Best worldwide practices related to municipality adoption of the technology.