Project Results: Open educational resources and other ENEPLAN outputs

Final Conference

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ENoplan Project involved **18 partners from 6 countries**: public/private Universities, research institutes or agencies dealing with education and research on RES topics.

The project was conceived to address the lack of interdisciplinary approaches in RES development and planning, specifically in HE programmes in Mediterranean countries.

**Partner Universities** involved one department/faculty or more in the project, with the aim to improve their current educational offer on the development and planning of renewable energies in different curricula (architecture, spatial planning and landscape, engineering, natural-environmental sciences, Geography and History).

**Non-HEI partners** (MIEMA, ALMEE, MEDGREEN, RSS-NERC) were called to disseminate a responsible approach to RES development and energy planning within their mission.
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Roma Tre - MIEMA
It is necessary to go beyond the widespread idea that renewable energy systems have no undesirable impacts on environment, landscape and socio-economic contexts.

This calls for an integrated approach to impact assessment, which, taking into account the multiple territorial aspects influenced by energy production processes, requires interaction between different disciplines, which are now separated.

Therefore, ENEPLAN:

• addresses the issue of integrated energy planning, which is central in EU strategies

• responds to the need of interdisciplinary educational tools in this field, in order to improve the quality of HE teaching and research in the field of energy, help the modernization of HE curricula, and reinforce the graduates’ employability.
PROJECT METHODS AND TOOLS: CONCEPT MAPPING

A concept map is a graphical tool depicting concepts and their meaningful connections:

- It can be used in any sector/discipline to organise ideas and structure knowledge
- It can support a learning process based on interaction, collaboration and creativity
- It is highly flexible: it can switch from complex models to simplified ones according to the users’ knowledge, can be continuously adapted, transformed, implemented and updated according to the user’s needs and interaction

ENEPLAN uses concept mapping as an innovative method to teach integrated energy planning, by shaping a critical, proactive and sustainable approach to the topic.
WHAT IS ENEPLAN ABOUT?

- innovative educational approaches
  - through
  - promote

- Open Educational Resources
  - produces

- ENEPLAN
  - has
  - partnership
  - comprises
  - universities
  - research centres
  - energy agencies

holistic approach

needs

higher education

integration of disciplines

environment

technology

planning

landscape

workshops for teachers and students

new professional profiles

for learning

use of concept maps

proposes

tools for integration of disciplines

on

are

integrated plans

such as

Sustainable Energy Action Plan
PROJECT RESULTS AND OUTPUTS

2 KINDS OF RESULTS:

• Results regarding the methodology (transfer and dissemination of the concept mapping method and tools)

• Results regarding contents (outcomes of knowledge exchanges and reflections on integrated energy planning issues).

Results were disseminated in compliance with the Erasmus+ Open Access Requirements.

OUTPUTS: mainly Open Education Resources (OER), e.g. open-licensed materials available online, which can be freely used, diffused, improved and exchanged by users for non-commercial purposes, following the continuous evolution of RES technologies and related legal frameworks.
ENEPLAN overall objective was to test the effectiveness of OERs based on collaborative Concept maps for HE teaching and research in the field of integrated energy planning.

To pursue this goal, the whole project was organized as a cycle of workshops, each with the same logical structure:

• a cycle of presentations by each partner or country
• group work sessions on c-mapping for the collaborative development of c-maps.

The main tool used for c-maps collaborative development was the C-map Cloud, a free centralized web platform where the c-maps produced were uploaded and shared.

The sequence of workshops allowed exchanging knowledge, getting familiar with c-mapping method and tools, and producing many OERs.
THE WORKSHOPS - #1

- **Kick-off meeting** and **1st Workshop** in Rome, Italy (March and September 2016), dedicated to draft the first basic c-map on integrated energy planning (C-map 1.0)

- **4 Thematic Workshops** in EU countries, aimed to investigate important aspects of energy planning and enrich the C-map 1.0:
  - 1st TW on Environmental assessment procedure and praxis (Seville, Spain, September 2016)
  - 2nd TW on RES and new technologies for energy production (Valletta, Malta, May 2017)
  - 3rd TW on Life Cycle Assessment and GIS Tools for Energy planning (Siena, Italy, September 2017)
  - 4th TW on Innovation, applied research in RES and relationships with SMEs (Faro, Portugal, January 2018)
THE WORKSHOPS - #2

- **Intensive course** in Amman, Jordan (February 2018), aimed to test with 90 students from 3 countries (Egypt, Jordan and Lebanon) the learning process experimented so far. The workshop resulted in the further development of the C-Map 1.0 (C-Map 2.0).

- **Last workshop** in Cairo, Egypt (April 2018), which produced the final ENEPLAN c-map, based on lessons learnt during the students’ workshop (C-Map 2.1), now available under CC license on the project website and on the public C-Map Cloud.
PROJECT PROCESS & OUTPUTS

- Kick-off Workshop
  - Transfer of C-MAP Methodology
  - 1st Workshop
    - Integrated Energy Planning C-MAP 1.0
      - Case Studies
        - Country Frameworks
        - Papers
    - Introductory Materials on C-Mapping
  - Introductory Materials on C-Mapping

- Case Studies
  - T-Map1: Environmental assessment procedures & praxis
  - EIA map
  - SEA map
  - T-Map2: RES and new technologies for energy production
  - T-Map3: Life cycle analysis
  - T-Map4: GIS for energy planning
  - T-Map5: The role of the private sector in energy planning and development

- Cairo Workshop
  - Integrated Energy Planning C-MAP 2.1 Preliminary
  - Energy Transition Map

- Amman Workshop
  - Test with Students
  - Integrated Energy Planning C-MAP 2.0
  - Introductory Materials on C-Mapping
  - External Resources
  - Translations
  - Integrations

Roma Tre - MIEMA
THE OPEN EDUCATIONAL RESOURCES

- **State of the art Report**, describing, for each country, the legal framework on energy planning, the current level of integration among energy planning, spatial planning and environmental protection, the educational offer on energy planning, etc.

- **Collection of 36 case studies** regarding energy planning practices: wide-scale plans/strategies at national or regional level; local/thematic action plans/strategies; studies, research projects, international cooperation initiatives; incentive schemes and other mechanisms to promote energy efficiency and RES; pilot projects

- **Collection of 60 Scientific papers** on energy planning issues

- **Introductory materials on Concept Mapping**: video tutorials, guidelines, etc.

- **5 thematic c-maps** on main aspects to take into account in energy planning

- **3 General c-maps**, collecting, systematizing and interconnecting the knowledge on integrated energy planning gained during the project.

[www.eneplan-erasmus.eu](http://www.eneplan-erasmus.eu)
FOCUS QUESTION:
What are the main concepts to take into account when teaching integrated energy planning?
LCA

- ISO:45014
- methodology
- material acquisition & pre-processing
- production
- distribution & storage
- use
- end-of-life
- recycled/reused into another product life cycle
- nature
- nature
- material acquisition & pre-processing
- production
- distribution & storage
- use
- end-of-life

Four different steps: define, assess, improve, communicate.
ENEPLAN aims at developing collaborative open education resources (OER), able to improve the capacities of teachers, students and researchers in energy planning in a sustainability perspective ...read more
E-Learning

This section collects and re-organizes the teaching & learning materials and OERs produced during the ENEPLAN project, in order to provide a guidance and a reference structure for HE courses on concept mapping applied to energy planning.

The model includes a general introduction to concept mapping and six different sections, exploring the various domains in which c-maps can be fruitfully used to form the multidisciplinary knowledge and skills required for effective and sustainable integrated energy planning.

All materials downloadable from this section of the website by "ENEPLAN Project - Funded by Erasmus+" are distributed under License Creative Commons Attribution - Non commercial - ShareAlike 4.0 International.

- SECTION 1: INTRODUCTION TO CONCEPT MAPPING
- SECTION 2: HOW TO USE C-MAPS TO ANALYSE AN ENERGY PLANNING CASE STUDY
- SECTION 3: HOW TO USE C-MAPS TO ANALYSE A SCIENTIFIC PAPER ON ENERGY TOPICS
- SECTION 4: HOW TO USE C-MAPS TO ANALYSE SPECIFIC THEMES REGARDING ENERGY PLANNING
- SECTION 5: HOW TO USE C-MAPS TO DEFINE AND DESCRIBE AN ENERGY STRATEGY
- SECTION 6: HOW TO USE C-MAPS TO DESCRIBE INTEGRATED ENERGY PLANNING
SECTION 1: INTRODUCTION TO CONCEPT MAPPING

- WHAT IS A CONCEPT MAP?
- HOW TO BUILD A CONCEPT MAP?
- THE CMAP SOFTWARE AND CLOUD

PRACTICAL EXERCISE: MAPPING PREVIOUS KNOWLEDGE

The exercise has the objective to encourage learners to make the most of what they already know on the topic of energy planning, by identifying relevant concepts and connecting them with meaningful linking phrases.
- Guide for coordinators and tutors (PDF)

SECTION 2: HOW TO USE C-MAPS TO ANALYSE AN ENERGY PLANNING CASE STUDY

SECTION 3: HOW TO USE C-MAPS TO ANALYSE A SCIENTIFIC PAPER ON ENERGY TOPICS

SECTION 4: HOW TO USE C-MAPS TO ANALYSE SPECIFIC THEMES REGARDING ENERGY PLANNING

SECTION 5: HOW TO USE C-MAPS TO DEFINE AND DESCRIBE AN ENERGY STRATEGY

SECTION 6: HOW TO USE C-MAPS TO DESCRIBE INTEGRATED ENERGY PLANNING
ENPLAN: Developing net zero energy buildings (NZEB) based on collaborative open education resources (OER) able to improve the capacities of teachers, students and researchers in energy planning in a sustainability perspective.

WEBGIS

The ENPLAN database and webgis bring together both existing datasets provided by project partners, and other open geo-data on energy potentials and renewable energy installations, providing an educational support to the students and the teachers participating in the project activities. Visit the ENPLAN Webgis.

SECTION 1: INTRODUCTION TO CONCEPT MAPPING

SECTION 2: HOW TO USE C-MAPS TO ANALYSE AN ENERGY PLANNING CASE STUDY

- Presentations of relevant case studies
- ENPLAN Case Studies Report
- Practical Exercise: Mapping a Case Study

SECTION 3: HOW TO USE C-MAPS TO ANALYSE A SCIENTIFIC PAPER ON ENERGY TOPICS

- ENPLAN Scientific Papers Collection
- Practical Exercise: Mapping a Scientific Paper

SECTION 4: HOW TO USE C-MAPS TO ANALYSE SPECIFIC THEMES REGARDING ENERGY PLANNING

- Thematic C-Maps

SECTION 5: HOW TO USE C-MAPS TO DEFINE AND DESCRIBE AN ENERGY STRATEGY

- Practical Exercise: Describing an Energy Planning Process

SECTION 6: HOW TO USE C-MAPS TO DESCRIBE INTEGRATED ENERGY PLANNING
SECTION 6: HOW TO USE C-MAPS TO DESCRIBE INTEGRATED ENERGY PLANNING

ENERGY C-MAPS

The ENEPLAN project designed a basic concept map on energy planning (C-map 1.0), trying to highlight the main concepts and issues which influence and drive it (and which should be therefore integrated to develop more effective and sustainable policies, plans, programmes and projects) as well as to explore their mutual interconnections and interdependencies.

This basic concept map was then developed during the course of the project and evolved in a C-map 2.0, embedding and systematizing all the knowledge and information gained through the partners' presentations, the practical exercises and the work on thematic c-maps carried out during the project implementation.

The improved Cmap 2.0 can give an important contribution to:

- the definition of a systematic, theoretical and operational framework concerning the relations between RES development, energy planning, spatial planning and environmental and landscape sustainability.
- the development of capacities for managing complex information related to RES development in environmentally sensitive areas.
- the conception of strategic interventions which are effective both from the technological and environmental points of view.

Download the C-Map Tools application to view the C-Maps: https://cmap.ihmc.us/cmaptools/.

In order to view the complete c-map, when opening it with C-map Tools software, please select "Tools" and "Validate and Fix Links" from the toolbar located at the top of the screen. In the pop-up window, click on "Search and fix" and then on "OK" when the search is complete.

- C-Map 1.0 (ZIP)
- C-Map 2.0 (ZIP)
- C-Map 2.1 (ZIP)
THE WEBGIS

The WebGIS was initially designed to bring together existing energy-related open access geo-data or data provided by project partners.

The fulfilment of this objective was hindered by unexpected difficulties encountered with limited access rights to most geographical datasets available in partner countries, and therefore could not be freely published on the platform.

Currently, the WebGIS - fully accessible and linked to the project website - contains a limited number of open datasets, but many references to repositories where geographic information useful for energy planning can be downloaded or consulted.
EXPLOITATION OF OERS

ENEPLAN OERs were exploited by most partners during their educational activities, within regular courses, during special training sessions or within the framework of larger dissemination events:

• ASU, ZEWAIL, BAU, JUST, UJ, UOP organized c-mapping workshops for their students
• AUB, UNICAM and PSUT used c-maps as teaching tools during regular courses
• UAlg and ALMEE organized open classes to present ENEPLAN and the Cmap tools
• LU carried out a meeting to illustrate the method to its teaching staff
• Roma3 took part in a dissemination event presenting a c-map on energy impacts
• UJ and JUST organized a students workshop within the 6th Global Conference on Renewables and Energy Efficiency for Desert Regions (GCREEDER 2018).
CONCLUSIONS

ENEPLAN OERs can be considered as a toolbox for a long-term increase of the incorporation of energy planning topics within existing curricula, especially in engineering, architecture and urban planning, according to an interdisciplinary approach.

For this reason, all ENEPLAN OERs are conceived to be improved through customization: i.e. the C-map 2.1 can be considered as a “structured box” to be used as a basis for further development or adaptation to users’ needs by adding external resources according to targets, backgrounds and purposes.

Concept maps have proved to be a stimulating work tool for teaching or researching in energy planning, especially to frame, organize and consolidate knowledge focusing on connections rather than on technical details and to blur curricular boundaries.
THANK YOU

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