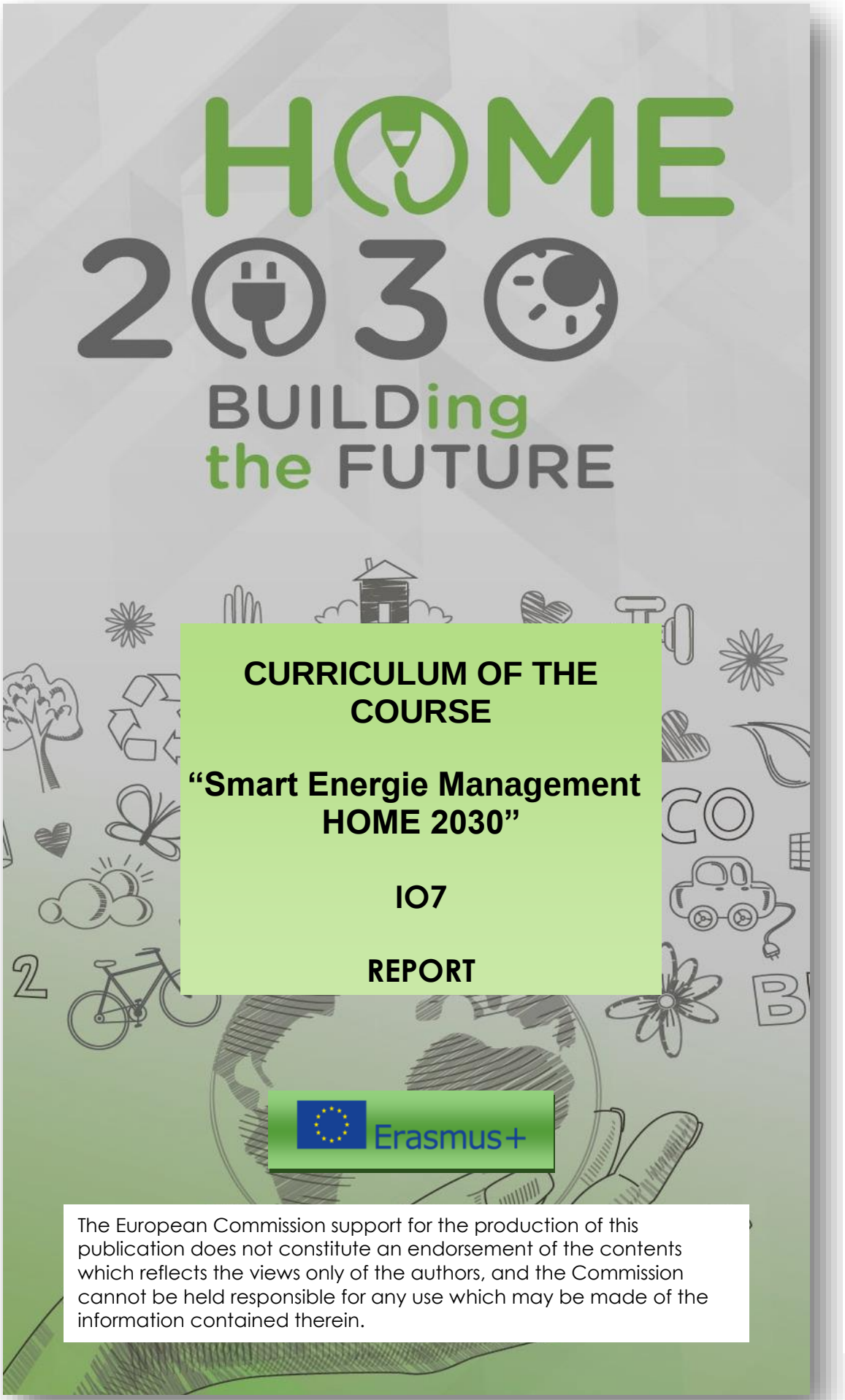


CURRICULUM OF THE COURSE

"Smart Energie Management HOME 2030"

IO7

REPORT

Erasmus+

Summary

Curriculum of the course "Smart Energiemanagement HOME 2030"

Development of the curriculum: Preliminary to this curriculum we interviewed 120 SME´s in 4 European countries. We used a standardized questionnaire to ask the participants about their special needs of their employees to solve the new topic of renewable energies in their companies.

Educational objective: The educational objective is the extension of the skills, knowledge and competences of experts in the professions / fields car vehicles, electricity and heating and plumbing in connection with renewable energies.

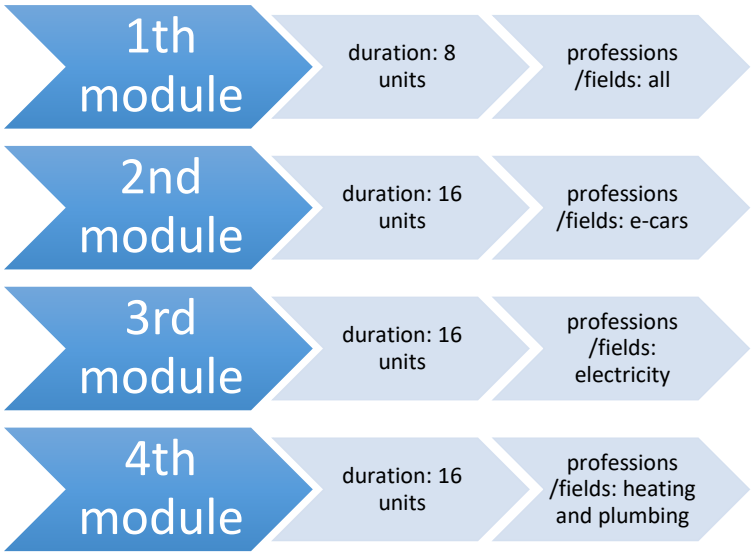
Description of the target group: The course is designed for experts in these fields. This means that their present skills, competences and knowledge are on level 4 of the European Qualification Framework (EQF).

Description of the learning outcome: Regarding the Level 5 EQF and the National Qualification Frameworks of Italy, Spain and Germany, we defined the following learning outcomes:

Overview about the EQF descriptions of Level 5:

- Skills:
  - A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems.
- Knowledge:
  - Comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge.
- Competences:
  - Exercise management and supervision in context of work or study activities where there is unpredictable change; review and develop performance of oneself and others.

Structure of the course: The course consists of 4 modules. The first module is for all professions and fields. The other modules are specifically designed for the three professions and fields. The modules 2 – 4 will be realized simultaneously. This means that the total duration of this course is 24 units (see graphic below).



Curriculum of the 1st module for all professions:

The 1st module will give all participants an overview of all three fields / professions in the context of the other 16 units. This part of the course can be taught in a normal lecture room.

Part / sequence	Duration in 45-minute units	Educational objective	Methodology	Teaching materials
1	2	Overview about the course, general information about the training centre and security-advice	Frontal lecture	Power Point Presentations
2	2	Overview e-cars: • definition high voltages in cars • electronical power units • opportunities of energy production • systems of storage and power units	Frontal lecture, group discussions	Power Point Presentations
3	2	Overview electricity: • solar technology • lighting technology • collection of energy data Smart House • technology of charging car vehicles	Frontal lecture, group discussions	Power Point Presentations
4	2	Overview heating and plumbing: • renewable energies • coupling of thermal energy and power • fuel cell • collection of energy data • heating,	Frontal lecture, group discussions	Power Point Presentations

		ventilation and air conditioning		

Learning outcomes:

Overview about the EQF descriptions of Level 5:

- Total workload: 8 units 45'

- **Skills**:
  - handling the tools of these new topics, using the new knowledge for the customers
  - transfer the theoretical knowledge into the practical part of work
  - extend their ability to solve problems in the field of renewable energies in context of all professions
  - work together with other professions on the same topic

- **Knowledge**:
  - extend their specialized knowledge of the implementation of renewable energies
  - learn more about the topics of renewable energies in all professions / fields
  - describe their possibilities in the field of renewable energies in the context of all professions / fields
  - acquire their convincing arguments to sell these technologies to their customers
  - learn more about the connection between more professions / sectors in the field of renewable energies

- **Competences**:
  - Self-managed work with the new technologies
  - Knowledge of the possibilities of renewable energies
  - Identify their gap of knowledge and skills and find possibilities to fill this gap
  - Developing strategies to extend their knowledge / skills by their own

Curriculum of the 2nd module for e-cars:

The 2nd module is especially designed for the profession / fields e-cars. This module should be taught in a workshop. This workshop requires the following facilities:

- hybrid car
- high voltage car
- tools for the measurements on cars
- LCD projector
- Laptop

Part / sequence	Duration in 45-minute units	Educational objective	Methodology	Teaching materials
1	2	Dangers in high voltage cars, on-board electrical system amperage and voltage	Frontal lecture, group discussions	Power Point presentation
2	2	Definition of high voltage in cars	Frontal lecture, group discussions	Power Point presentation
3	4	subdivision of drive configuration: • micro-hybrid-systems • mild-hybrid-systems • strong-hybrid-systems	Frontal lecture, group discussions, practical exercises	Power Point presentation, various kinds of cars, training board
4	6	subdivision of power unit options: • serial hybrid systems • parallel hybrid systems • serial parallel hybrid systems • fuel-cell power plant • electric power system	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, various kinds of cars, training board
5	2	systems of storage and power units: • high voltage batteries • explanation of different types of batteries • loading stations	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, various kinds of cars, training board

		• process of charging • charging station		

Learning outcomes:

Overview about the EQF descriptions of Level 5:

- Total workload: 16 units 45'

- **Skills**:
  - handling the tools of these new topics
  - using the new knowledge for the customers
  - transfer the theoretical into the practical part of work
  - extend their ability to solve problems in the field of renewable energies in the context of the field e-cars

- **Knowledge**:
  - extend their specialized knowledge of the implementation of renewable energies
  - learn more about the topics of renewable energies in their professions / fields
  - describe their possibilities in the field of renewable energies in the context of e-cars
  - extend their knowledge about security
  - acquire their convincing arguments to sell these technologies to their customers

- **Competences**:
  - Self-managed work with the new technologies
  - Knowledge of the possibilities of renewable energies
  - Identify their gap of knowledge and skills and find possibilities to fill this gap
  - Developing strategies to extend their knowledge / skills by their own
  - Teach other colleagues in this field of renewable energies

Curriculum of the 3rd module for electricity:

The 3rd module is especially designed for the profession / fields electricity. This module should be taught in a workshop. This workshop requires the following facilities:

- exercise stand – collecting energy data
- exercise stand – technology of charging car vehicles
- exercise stand – solar technology
- exercise stand – lighting technology
- tools for the measurements
- LCD projector
- Laptop

Part / sequence	Duration in 45-minute units	Educational objective	Methodology	Teaching materials
1	2	Introduction of the technologies in context of smart houses	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board
2	6	Solar technology: • basic principles • different test • calculation • setup	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board

3	6	Lighting technology:
		• basic principles of lamp
		• photometric fundamental terms
		• values for the orientation of illumination
		• implementation of several projects
		  • illumination of shelves in supermarkets
		  • illumination of an advertising sign
		  • object illumination
			Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board

4	2	Technology of charging car vehicles: • different basic principles	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board

Learning outcomes:

Overview about the EQF descriptions of Level 5:

- Total workload: 16 units 45'

- **Skills**:
  - handling the tools of these new topics, using the new knowledge for the customers
  - transfer the theoretical knowledge into the practical part of work
  - extend their ability to solve problems in the field of renewable energies in the context of electricity

- **Knowledge**:
  - extend their specialized knowledge of the implementation of renewable energies
  - learn more about the topics of renewable energies in their professions / fields
  - describe their possibilities in the field of renewable energies in the context of electricity
  - extend their knowledge about security
  - acquire their convincing arguments to sell these technologies to their customers

- **Competences**:
  - Self-managed work with the new technologies
  - Knowledge of the possibilities of renewable energies
  - Identify their gap of knowledge and skills and find ways to fill this gap
  - Developing strategies to extend their knowledge / skills by their own
  - Teach other colleagues in this field of renewable energies

Curriculum of the 4th module for heating and plumbing:

The 4th module is especially designed for the profession / fields heating and plumbing. This module should be taught in a workshop. This workshop requires the following facilities:

- exercise stand – heating pumps
- exercise stand – solar power
- exercise stand – coupling of thermal energy and power
- exercise stand – control engineering
- tools for the measurements
- LCD projector
- Laptop

Part / sequence	Duration in 45-minute units	Educational objective	Methodology	Teaching materials
1	2	Introduction of the technologies in context of smart houses	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board
2	4	Heating pumps: • installation and system check • valuation of systems • diagnostic inspection	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board
3	4	Solar power: • temperature lamination • memory of charging time	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board
4	4	coupling of thermal energy and power: • electronic connection • energy recording • storage charge	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board
5	2	control engineering: • wire connection in constructions • programming • controller program and	Frontal lecture, group discussions, practical exercises, measurements	Power Point presentation, training board

		remote monitoring		

Learning outcomes:

Overview about the EQF descriptions of Level 5:

- Total workload: 16 units 45'

- **Skills**:
  - handling the tools of these new topics
  - using the new knowledge for the customers
  - transfer the theoretical knowledge into the practical part of work
  - extend their ability to solve problems in the field of renewable energies in the context of heating and plumbing

- **Knowledge**:
  - extend their specialized knowledge of the implementation of renewable energies
  - learn more about the topics of renewable energies their professions / fields
  - describe their possibilities in the field of renewable energies in the context of heating and plumbing
  - extend their knowledge about security
  - acquire their convincing arguments to sell these technologies to their customers

- **Competences**:
  - Self-managed work with the new technologies
  - Knowledge of the possibilities of renewable energies
  - Identify their gap of knowledge and skills and find ways to fill this gap
  - Developing strategies to extend their knowledge / skills by their own
  - Teach other colleagues in this field of renewable energies