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## PLANET – Plan for Agriculture reNewable Energy Training

### D4.4 - Complete and optimised version of the e-learning platform

<b>Document description:</b>	The document briefly describes the Moodle platform that contains the courses developed in the PLANET project: course on ICT, and specific modules on renewable energy in agriculture: solar photovoltaic, solar thermal, solid biomass and biogas. The course is accessible online at <a href="https://www.erasmus-planet.eu/course/">https://www.erasmus-planet.eu/course/</a>
<b>Partner responsible:</b>	CONFAGRI, CCS, UNITO
<b>Date of approval by the QC:</b>	17 December 2020
<b>Work package title:</b>	Development of the learning platform
<b>Task title:</b>	Task 4.4: Test of the e-learning platform by the Consortium Task 4.5: Optimisation of the e-learning platform Task 4.6: Integration of other languages modules
<b>Status (F: final; D: draft; RD: revised draft):</b>	F





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## Table of Contents

1	Hosting platform description	3
1.1	Licensing, data security and user privacy	3
1.2	User Access	3
1.3	Sections available and navigation	4
1.4	How to use the material	6
1.5	Languages available	6
2	Results: Online platform overview	7
3	PLANET Solar photovoltaic training course	9
4	Structure of solar photovoltaic course days	15
4.1	Day one:	15
4.2	Day two:	21
4.3	Day Three:	29
4.4	Day Four:	37
4.5	Day Six:	44
5	PLANET Solar thermal training course	48
6	PLANET Biomass training course	50
7	PLANET Biogas training course	54
8	PLANET Training course Information and Communication Technology	60
9.	Conclusion	64

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---	--	---

## 1 Hosting platform description

As described in Deliverable 4.1, the hosting platform chosen is Moodle, a learning platform designed to provide educators, administrators, and students with a single, robust, secure, and integrated system for creating personalized learning environments.

Powering tens of thousands of learning environments around the world, Moodle is trusted by institutions and organizations large and small, including Shell, London School of Economics, State University of New York, Microsoft and Open University. More than 90 million users use Moodle worldwide, both academically and enterprise-wide, making it the most widely used open source learning platform in the world.

Because it is open-source, Moodle can be customized in any way and tailored to individual needs. Its modular configuration and interoperable design allow developers to create plug-ins and integrate external applications to achieve specific functionality.

### 1.1 Licensing, data security and user privacy



Moodle is provided free of charge as Open Source software, under the GNU General Public License. Anyone can adapt, extend or modify Moodle for both commercial and non-commercial projects without license fees and benefit from the cost efficiency, flexibility and other advantages of using Moodle. The PLANET Consortium has therefore decided to use Moodle and adapt it to its training needs.

Regarding data security and user privacy, security controls are constantly being updated and implemented in Moodle's development processes and software to protect against unauthorized access, data loss, and misuse. UNITO, which is in charge of creating the platform, will update the core of Moodle and its plugins monthly to always have the latest security updates. Finally, the communication between the server and client applications is encrypted using the HTTP-Secure protocol, which ensures data confidentiality during connections.

### 1.2 User Access

There is one section in the PLANET platform, and the PLANET consortium will control the access to the material with two roles:

Registration for trainers: the PLANET consortium will grant access to the trainers that want to teach a class on renewable energy in agriculture, using the moodle platform, consequently the PLANET platform administrator (in the person of Remigio Berruto, UNITO) can grant access to a list of potential trainers and their email addresses.

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Registration for trainees: It will be used the same procedure described in the registration for trainers, but the registration process will be managed from the PLANET consortium training centres under the supervision of the PLANET platform administrator (in the person of Remigio Berruto, UNITO).

Upon request, we can duplicate the material in the same portal for another training centre that wants to use the training courses. in this way we can maintain the privacy of trainers and trainees of a specific course hold by another training centre that does not belong to the partners of the project.

### 1.3 Sections available and navigation

With over 10 years of development guided by social constructionist pedagogy, Moodle offers a powerful set of learner-centered tools and collaborative learning environments that enhance both teaching and learning.



As for navigation, a simple interface, drag-and-drop functionality, and well-documented resources make this Moodle platform easy to learn and use. Moreover, Moodle provides the most flexible toolset to support both blended learning and 100% online courses. For this reason, the PLANET consortium through the full range of integrated features of Moodle, including external collaboration tools such as forums has built the e-learning portal using Moodle.

Another important aspect to consider is that Moodle can be scaled to support the needs of both small classrooms and large organizations. Because of its flexibility and scalability, Moodle has been adapted for use in educational, corporate, nonprofit, government, and community settings. In addition, it is perfect for the multilingual and multinational training that will be developed for PLANET. Finally, the platform is web-based and is therefore accessible from anywhere in the world. With a default mobile-friendly interface and cross-browser compatibility, the content on the Moodle platform is easily accessible and consistent across different web browsers and devices.

In terms of the D4.1 specification, there are easily perceived icons that help users visualize the information what it represents and what the user should expect. In general, as you can see throughout the images in Chapter 3 of this document, to simplify the user experience, we have made large icons that once clicked lead to the material they want to see. This applies to videos, documents, presentations with notes, and external links. Below are the icons:



video preview

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icon documents



documents with notes



external link icon





In the same platform there are, for each day the contents with all the material. The single days of the course are characterized by a placement test and a set of activities. Depending on the days, the online course is scheduled on some days, while on others the course is scheduled with in-person activities. Initially, two different platforms were planned, one for trainees and one for trainers:

Trainees section, containing all materials for the trainee learning modules: online content.

Planet trainers toolkit section, containing all the material for the trainers, including the material for the days to be conducted in the classroom, with some guides for working based periods and usage of the platform.

All modules have been designed for single day access as well, with verification of learning before and after completion of the materials for the indicated day. In this way both the professional user and the student, who takes the course for a certification, can use the platform developed.

Subsequent to the arrival of the COVID pandemic, all activities initially scheduled in the classroom are upoladed in the online portal. Trainers made the online material visible to students, while for days when an in-class activity was scheduled, they blacked out the affected days to provide the material in class and discuss it with students. This mode allowed maximum flexibility in the use of the material by trainers and students, and is the one that can be used by the trainer to have a different split of in-class and online days.

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## 1.4 How to use the material

The material is usable in two modes:

- 1) Access to a dedicated Moodle platform. At the request of a training center, it is possible to duplicate an instance of the platform to allow the registration of individual students and trainers, which will be managed separately from the others on the site. In this way, other training centers, in addition to those collaborating in the PLANET project, can use the material and offer it in their training programs.
- 2) Access to the material for uploading on their own platform. Those who are interested in taking advantage of some lessons for their training courses, can request and download some days of training to be used later in online mode or in class, going to take only the days of their interest from the modules provided.

## 1.5 Languages available

Moodle's multilingual capabilities ensure that there are no language limitations to online learning. The Moodle community has begun translating Moodle into more than 120 languages so that users can easily localize their Moodle site, along with many resources, support, and community discussions available in various languages.

Thanks to these features it was possible to develop the multilingual aspect of the platform, available in the following 5 languages:



English: <https://www.erasmus-planet.eu/course/>

Italian: <https://www.erasmus-planet.eu/course/it/>

Dutch: <https://www.erasmus-planet.eu/course/nl/>

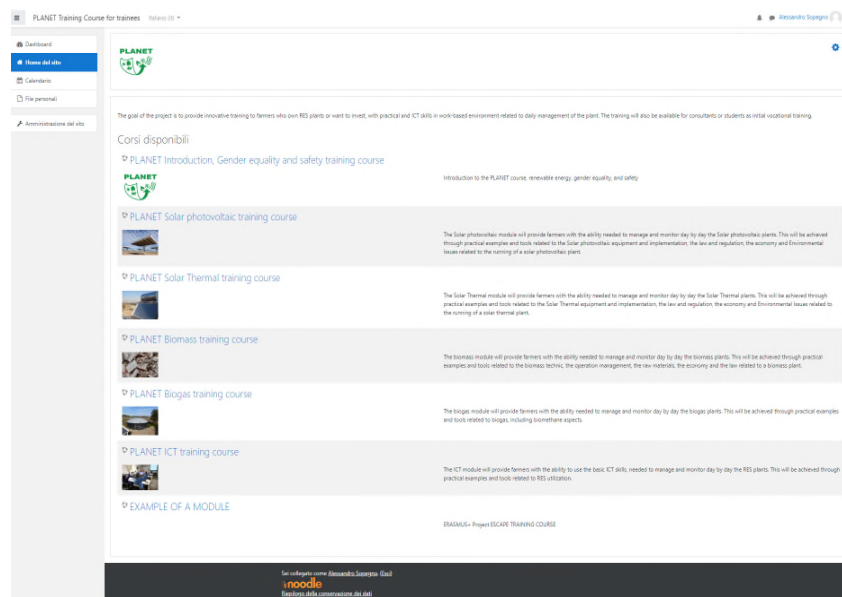
French: <https://www.erasmus-planet.eu/course/fr/>

German: <https://www.erasmus-planet.eu/course/de/>

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## 2 Results: Online platform overview

- Below is the main page of the e-learning platform created for the PLANET project, where you can see the list of all the available courses of the PLANET training course.
- The entire course is available at the following link: <https://www.erasmus-planet.eu/course>
- As you can see in Figure 1 (English content), there are 6 modules:
- Introduction, gender equity and safety training course (not included in the proposal but required for course certification)
  - . Solar PV
- . Solar Thermal
- . Biomass
- . Biogas
- . ICT



**Figure 1- first screen in EN language of the training platform, accessible at <https://www.erasmus-planet.eu/course>**

Through the first screen, users can enter individual modules to view training content. These modules are also available for the trainers sections. The difference for the two (students, trainers) is that with the trainer's permission, the page can be edited by the trainer, who could add documents, assignments, and

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assessments.

In order to show the complete and optimized version of all national platforms, in this deliverable the structure of one module in detail (solar PV training course) is presented as an example, while the other modules are available on the online platform and presented here in summary form.

~~In order to show the complete and optimised version of all the national platforms, the structure of a module, captured through screenshots, is shown below. Then, since the structure is repeated the same in each module, the links of each platform are shown here, with credentials (username and password) valid for all platforms, so that all platforms can be consulted at first hand.~~

~~English platform: <https://www.erasmus-planet.eu/course/>~~

~~Italian platform: <https://www.erasmus-planet.eu/course/it/>~~

~~French platform: <https://www.erasmus-planet.eu/course/fr/>~~

~~German platform: <https://www.erasmus-planet.eu/course/de/>~~



~~Datch platform: <https://www.erasmus-planet.eu/course/nl/>~~

~~2.1 — USERNAME deliverable~~

~~2.2 — PASSWORD D4.42020~~

**Formattato:** Tipo di carattere: (Predefinito) Calibri, 14 pt, Evidenziato



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### 3 PLANET Solar photovoltaic training course

The course is structured with a distribution of the program over 6 days (this varies depending on the course subject). The solar PV training course consists of 6 days of training, in class, online, and in the field (with a site visit to an operating solar power plant). The module begins with an introductory chapter that should give students an understanding of solar energy applications and the roles of all stakeholders involved in a solar power plant project. The module continues with an introduction to the technical equipment of a power plant and the influence of local law and regulations on applications. Students will then learn the basic rules of designing a solar power plant. The fourth day consists of a site visit where students will discover a plant in operation and how the information learned in the previous days is applied in the field. Students will also learn about health and safety regulations and operation and maintenance steps. Day 5 presents the method for evaluating the economic benefits of a solar power plant, and finally, day 6 is a presentation of how to operate a power plant through the steps of troubleshooting, maintenance, and recycling. With the knowledge of the course, the student gains the ability to revise the design of a solar power plant under the current framework to allow for sustainable economic operation of the plant.

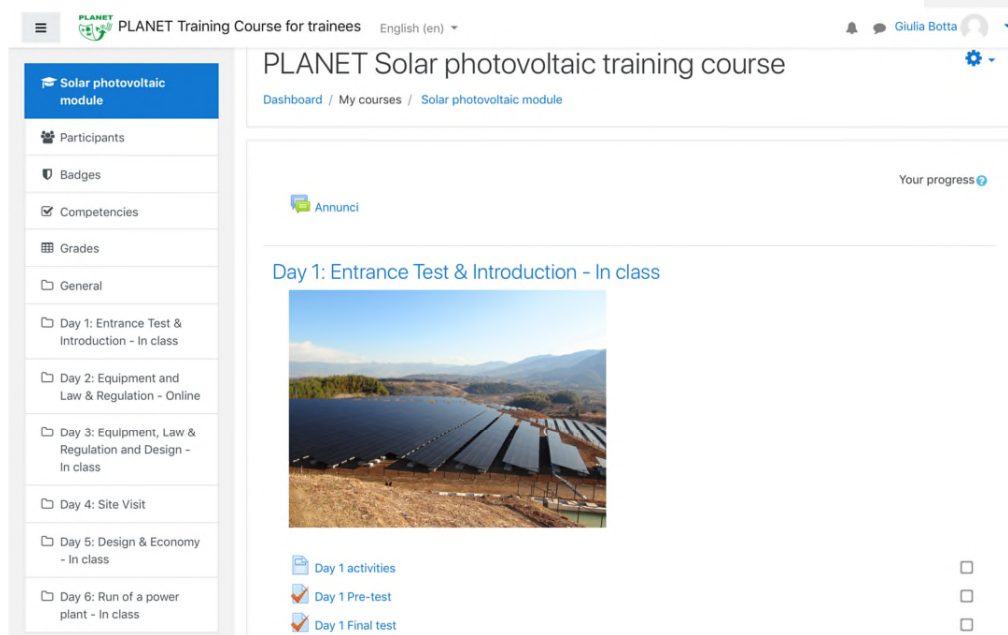









Figure 1. First day of the solar photovoltaic course

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**PLANET Training Course for trainees**
English (en)



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**Solar photovoltaic module**

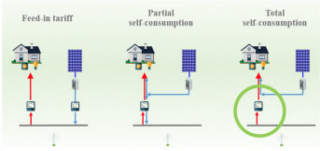
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

### Day 2: Equipment and Law & Regulation - Online





Day 2 activities
Day 2 Pre-test
Day 2 Final test


### Day 3: Equipment, Law & Regulation and Design - In class





Day 3 activities

Figure 2 Second day of the solar PV module

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 PLANET Training Course for trainees

English (en) ▾



 Giulia Botta

Solar photovoltaic module

Participants

Badges

Competencies

Grades

General

Day 1: Entrance Test & Introduction - In class

Day 2: Equipment and Law & Regulation - Online

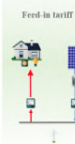
Day 3: Equipment, Law & Regulation and Design - In class


Day 4: Site Visit


Day 5: Design & Economy - In class


Day 6: Run of a power plant - In class


Day 3: Equipment, Law & Regulation and Design - In class



 Free-in tariff


 Partial self-consumption



 Total self-consumption


 Day 3 activities


 Day 3 Pre-test


 Day 3 Final test

Day 4: Site Visit












 Day 4 Activities

Figure 3 Third and fourth day of the solar PV module

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 PLANET Training Course for trainees
 English (en) ▾



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Solar photovoltaic module

Participants

Badges

Competencies

Grades

General

Day 1: Entrance Test & Introduction - In class

Day 2: Equipment and Law & Regulation - Online


Day 3: Equipment, Law & Regulation and Design - In class

Day 4: Site Visit

Day 5: Design & Economy - In class

Day 6: Run of a power plant - In class

Day 5: Design & Economy - In class



Day 5 activities

Day 5 Pre-test

Day 5 Final test

Day 6: Run of a power plant - In class









Figure 4 Fifth day of the solar PV module


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**PLANET Training Course for trainees**
English (en)




Giulia Botta



**Solar photovoltaic module**



- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class




Day 5 Final test

### Day 6: Run of a power plant - In class



 Day 6 activities
 

 Day 6 Pre-test
 

 Day 6 Final test
 

**Moodle Docs for this page**

You are logged in as [Giulia Botta](#) (Log out)



[Reset user tour on this page](#)

[Home](#)

[Data retention summary](#)

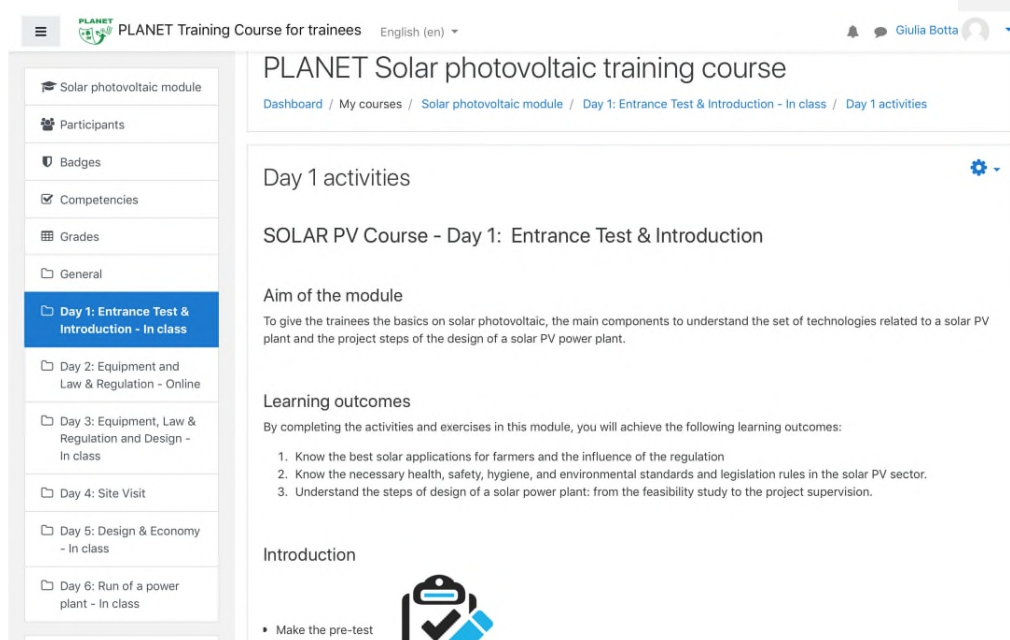
[Get the mobile app](#)

Figure 5 -Sixth day of the solar PV module

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## 4 Structure of solar photovoltaic course days


### 4.1 Day one:





The screenshot displays the PLANET Training Course for trainees interface. The left sidebar shows a navigation menu with options: Solar photovoltaic module, Participants, Badges, Competencies, Grades, General, and a list of course days. Day 1: Entrance Test & Introduction - In class is selected. The main content area shows the title 'PLANET Solar photovoltaic training course' and a breadcrumb trail: Dashboard / My courses / Solar photovoltaic module / Day 1: Entrance Test & Introduction - In class / Day 1 activities. Below this, the 'Day 1 activities' section is titled 'SOLAR PV Course - Day 1: Entrance Test & Introduction'. It includes an 'Aim of the module' section stating the goal is to provide basics on solar photovoltaic technology and design steps. The 'Learning outcomes' section lists three points: knowing solar applications for farmers, understanding health/safety/environmental standards, and understanding design steps from feasibility study to supervision. The 'Introduction' section begins with the task 'Make the pre-test' accompanied by a clipboard icon.

Figure 6 Structure of the day 1, previously shown


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**PLANET Training Course for trainees**
English (en)



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- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class**
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

- Watch the video on solar


- Watch the video on solar PV



### Activities



Below is each objective in this module followed by a set of learning activities. It is recommended that you follow each activity in the order presented. Before starting the activities, carefully read the learning objective.


**Objective 1: Know the best solar applications for farmers and the influence of the regulation**



- Read or watch the following contents to understand the best solar applications for farmers:

**Figure 7 Detail of the structure of day 1, previously shown**



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**PLANET Training Course for trainees**
English (en)



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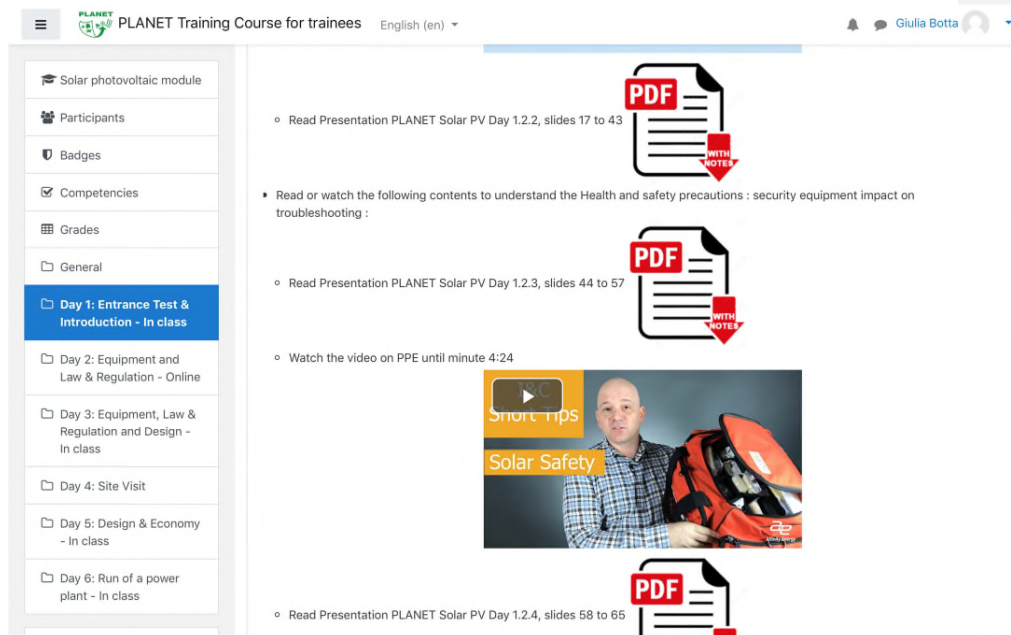
- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class**
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

Read or watch the following contents to understand the best solar applications for farmers:



- Read Presentation PLANET Solar PV Day 1.1.1, slides 1 to 8
- Watch the video on "From Sun To Electricity"
- Read Presentation PLANET Solar PV Day 1.1.2, slides 9 to 12


Objective 2: Understand the necessary health, safety, hygiene, and environmental standards and legislation rules in the solar PV sector



Figure 8 details of the structure of the day 1, previously shown



Agreement Number 2017-3177/001-001  
Page 18 of 65

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**PLANET Training Course for trainees**
English (en)




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- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class**
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- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

**Objective 3: Understand the steps of design of a solar power plant: from the feasibility study to the project supervision**

- Read or watch the following contents to understand the project step for a solar PV plant:
  - Presentation of the role of each actor involved on a solar power plant project (PLANET Solar PV Day 1.3.1 Project Steps, slides 1 to 15)
 


  - Presentation of the steps of design of a solar power plant : from the feasibility study to the project supervision (PLANET Solar PV Day 1.3.2 Project Steps, slides 16 to 37)
 






**Additional materials**


**Read or watch the following contents to understand deeper :**

- For additional information on Solar Construction Safety
- [http://www.coshnetwork.org/sites/default/files/OSEIA\\_Solar\\_Safety\\_12-06.pdf](http://www.coshnetwork.org/sites/default/files/OSEIA_Solar_Safety_12-06.pdf)

Figure 10- details of the structure of the day 1, previously shown

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 PLANET Training Course for trainees
 English (en)


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- Solar photovoltaic module
- Participants
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- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class**
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

15

PDF

WITH NOTES

Presentation of the steps of design of a solar power plant : from the feasibility study to the project supervision (PLANET Solar PV

Day 1.3.2 Project Steps, slides 16 to 37)

PDF

WITH NOTES

Additional materials

Read or watch the following contents to understand deeper :

- For additional information on Solar Construction Safety
- [http://www.coshnetwork.org/sites/default/files/OSEIA\\_Solar\\_Safety\\_12-06.pdf](http://www.coshnetwork.org/sites/default/files/OSEIA_Solar_Safety_12-06.pdf)

Make the final assignment












Figure 11- details of the structure of the day 1 structure of the day 1, previously shown

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## 4.2 Day two:


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 English (en)
 

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Solar photovoltaic module

Participants

Badges

Competencies

Grades

General

Day 1: Entrance Test & Introduction - In class

**Day 2: Equipment and Law & Regulation - Online**

Day 3: Equipment, Law & Regulation and Design - In class

Day 4: Site Visit

Day 5: Design & Economy - In class

Day 6: Run of a power plant - In class

### PLANET Solar photovoltaic training course

[Dashboard](#) / 
 [My courses](#) / 
 [Solar photovoltaic module](#) / 
 [Day 2: Equipment and Law & Regulation - Online](#) / 
 [Day 2 activities](#)

#### Day 2 activities

**Aim of the module**

To give the trainees the basics on the Equipment of a Solar photovoltaic plant, the implementation rules as well as the Laws and Regulation that compose the legal framework of these RES plants.

**Learning outcomes**

By completing the activities and exercises in this module, you will achieve the following learning outcomes:

1. Know the Equipment and Implementation of a Solar photovoltaic plant
2. Know the Law & Regulation behind of a Solar photovoltaic plant



**Introduction**

- Make the pre-test

**Activities**

Below is each objective in this module followed by a set of learning activities. It is recommended that you follow each activity in the order presented. Before starting the activities, carefully read the learning objective.

Figure 12- details of the structure of the day 2, previously shown

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PLANET Training Course for trainees

English (en)

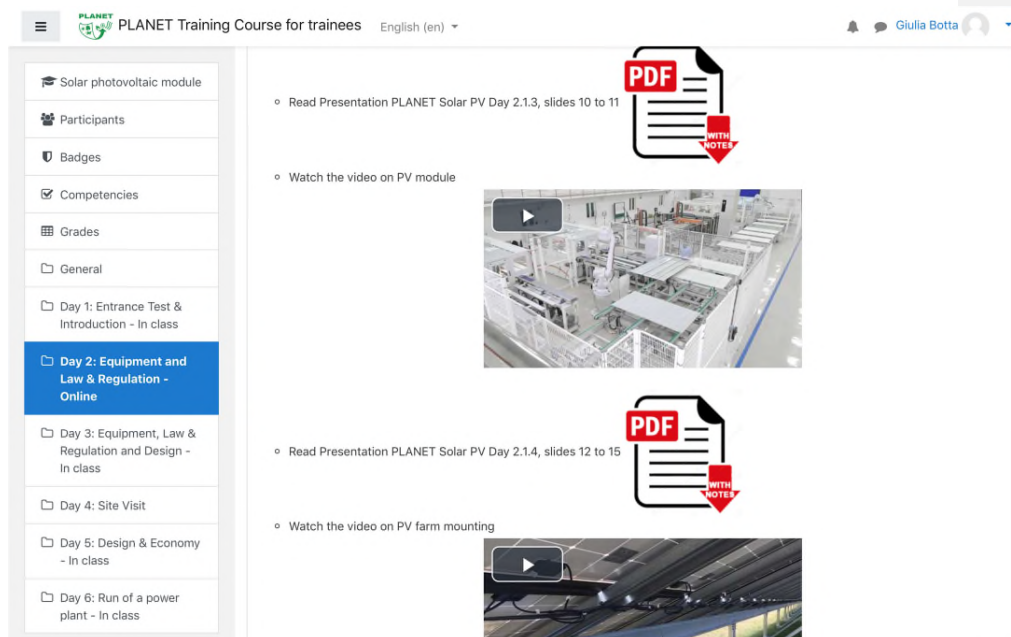
Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online**
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class



Objective 1: Know the Equipment and Implementation of a Solar photovoltaic plant


- Read the following documents to understand the Equipment:
  - Read Presentation PLANET Solar PV Day 2.1.1, slides 1 to 4
  - Watch the video on PV farm overview
  - Read Presentation PLANET Solar PV Day 2.1.2, slides 5 to 9
  - Watch the video on PV cell manufacturing



Figure 13 details of the structure of the day 2, previously shown



Agreement Number 2017-3177/001-001  
Page 23 of 65

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**PLANET Training Course for trainees**
English (en)



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- Solar photovoltaic module
- Participants
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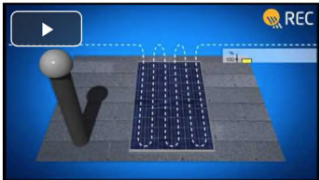







- Read Presentation PLANET Solar PV Day 2.1.5, slides 16 to 19
 
- Watch the video on Shading effects and diodes
 
- Read Presentation PLANET Solar PV Day 2.1.6, slides 20 to 22
 
- Watch the video on DC circuit
 

Figure 15 details of the structure of the day 2, previously shown



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 PLANET Training Course for trainees
 English (en)



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- Solar photovoltaic module
- Participants
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- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class


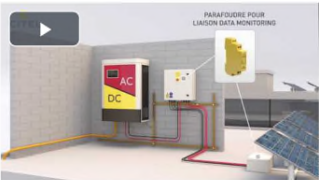




- Read Presentation PLANET Solar PV Day 2.1.7, slides 23 to 24
 
- Watch the video on Surge protection
 
- Read Presentation PLANET Solar PV Day 2.1.8, slides 25 to 32
 
- Watch the video on Inverter
 

Figure 16 details of the structure of the day 2, previously shown

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PLANET Training Course for trainees

English (en)

Giulia Botta

Solar photovoltaic module

Participants

Badges

Competencies

Grades

General

Day 1: Entrance Test & Introduction - In class

Day 2: Equipment and Law & Regulation - Online

Day 3: Equipment, Law & Regulation and Design - In class


Day 4: Site Visit

Day 5: Design & Economy - In class

Day 6: Run of a power plant - In class

Read Presentation PLANET Solar PV Day 2.1.9, slides 33 to 36

Watch the video on Inverter AC Switchboard



Read Presentation PLANET Solar PV Day 2.1.10, slides 37 to 40

Watch the video on Inside the Main Switchboard









Figure 17 details of the structure of the day 2, previously shown


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**PLANET Training Course for trainees**
English (en)



Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online**
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

- Read Presentation PLANET Solar PV Day 2.1.11, slide 41



Objective 2: Know the Law & Regulation behind of a Solar photovoltaic plant

- Read or watch the following contents to understand the Law & Regulation behind of a Solar photovoltaic plant:
  - Read Presentation PLANET Solar PV Day 2.2.1, slides 1 to 34
- Watch the video on PV module testing








Figure 18 details of the structure of the day 2, previously shown

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PLANET Training Course for trainees

English (en)

Giulia Botta

Solar photovoltaic module

Participants

Badges

Competencies

Grades


General

Day 1: Entrance Test & Introduction - In class

Day 2: Equipment and Law & Regulation - Online

Day 3: Equipment, Law & Regulation and Design - In class

Day 4: Site Visit



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Read Presentation PLANET Solar PV Day 2.2.2 slides 35 to 43

WITH NOTES

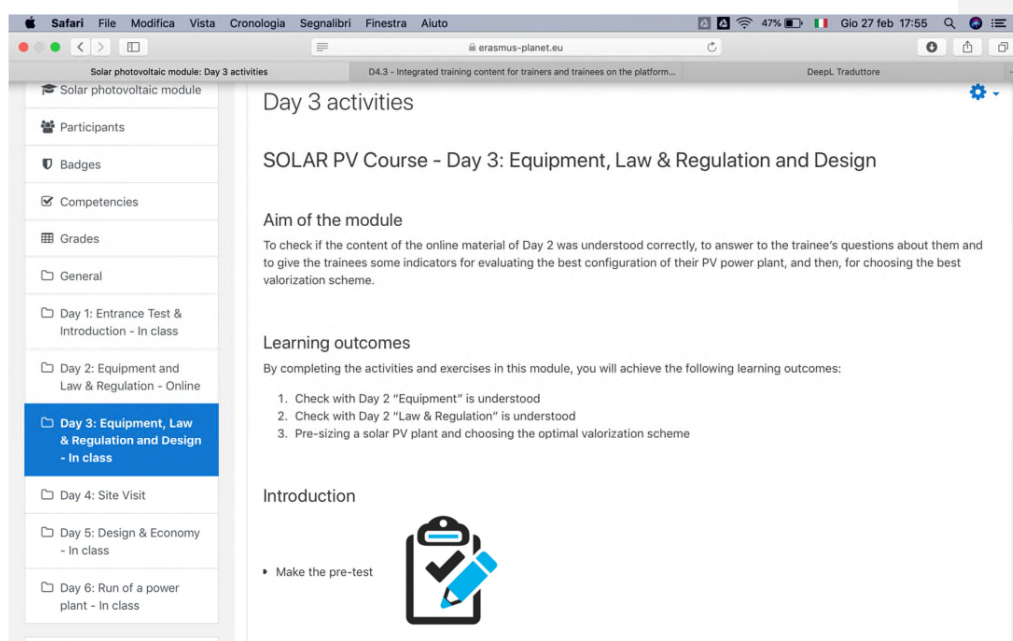
Make the final test

Figure 19 details of the structure of the day 2, previously shown

Agreement Number 2017-3177/001-001  
 Page 28 of 65

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### 4.3 Day Three:



**Day 3 activities**

**SOLAR PV Course - Day 3: Equipment, Law & Regulation and Design**

**Aim of the module**

To check if the content of the online material of Day 2 was understood correctly, to answer to the trainee's questions about them and to give the trainees some indicators for evaluating the best configuration of their PV power plant, and then, for choosing the best valorization scheme.

**Learning outcomes**



By completing the activities and exercises in this module, you will achieve the following learning outcomes:

1. Check with Day 2 "Equipment" is understood
2. Check with Day 2 "Law & Regulation" is understood
3. Pre-sizing a solar PV plant and choosing the optimal valorization scheme

**Introduction**

- Make the pre-test

Figure 20 details of the structure of the day 3, previously shown

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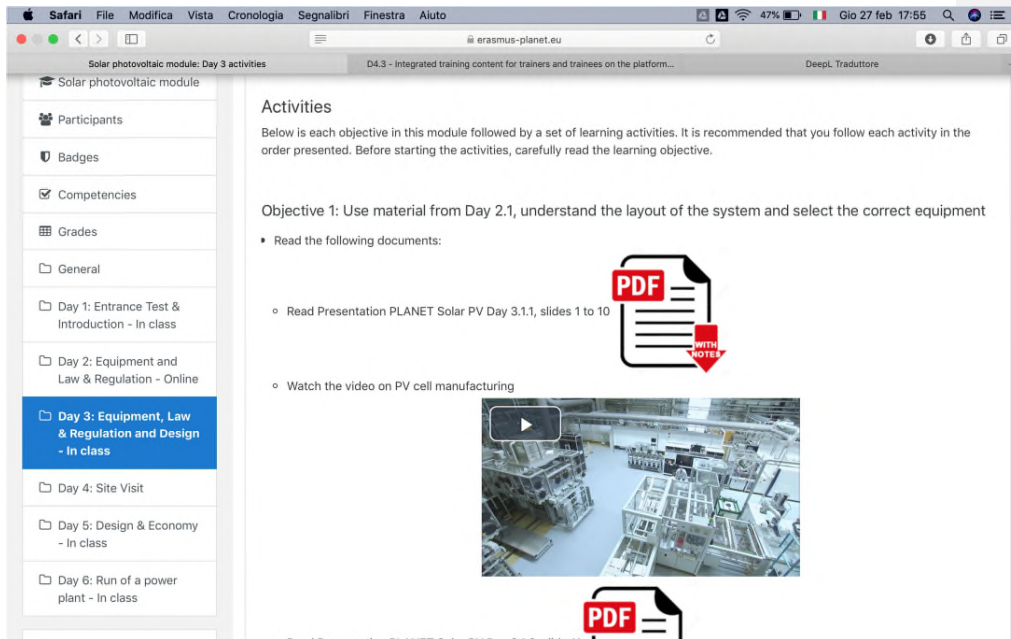




Figure 21 details of the structure of the day 3, previously shown

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Solar photovoltaic module: Day 3 activities


D4.3 - Integrated training content for trainers and trainees on the platform...

DeepL Traduttore


Solar photovoltaic module

- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class**
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

- Watch the video on PV module



- Read Presentation PLANET Solar PV Day 3.1.3, slides 12 to 15



- Watch the video on PV farm mounting






Figure 22 details of the structure of the day 3, previously shown

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Solar photovoltaic module: Day 3 activities

D4.3 - Integrated training content for trainers and trainees on the platform...

DeepL Traduttore

- Read Presentation PLANET Solar PV Day 3.1.4, slides 16 to 19
- Watch the video on Shading effects and diodes
- Read Presentation PLANET Solar PV Day 3.1.5, slides 20 to 22
- Watch the video on DC circuit

Day 3: Equipment, Law & Regulation and Design - In class

Day 4: Site Visit

Day 5: Design & Economy - In class

Day 6: Run of a power plant - In class

REC



PDF

WITH NOTES

WITH NOTES

Figure 23 details of the structure of the day 3, previously shown



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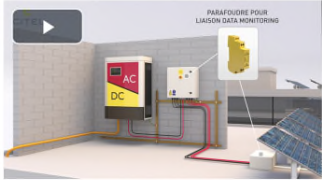
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Solar photovoltaic module: Day 3 activities D4.3 - Integrated training content for trainers and trainees on the platform... DeepL Traduttore

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class**
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

- Rad Presentation PLANET Solar PV Day 3.1.6, slides 23 to 24
 


- Watch the video on Surge protection
 


- Read Presentation PLANET Solar PV Day 3.1.7, slides 25 to 32
 


- Watch the video on Inverter
 




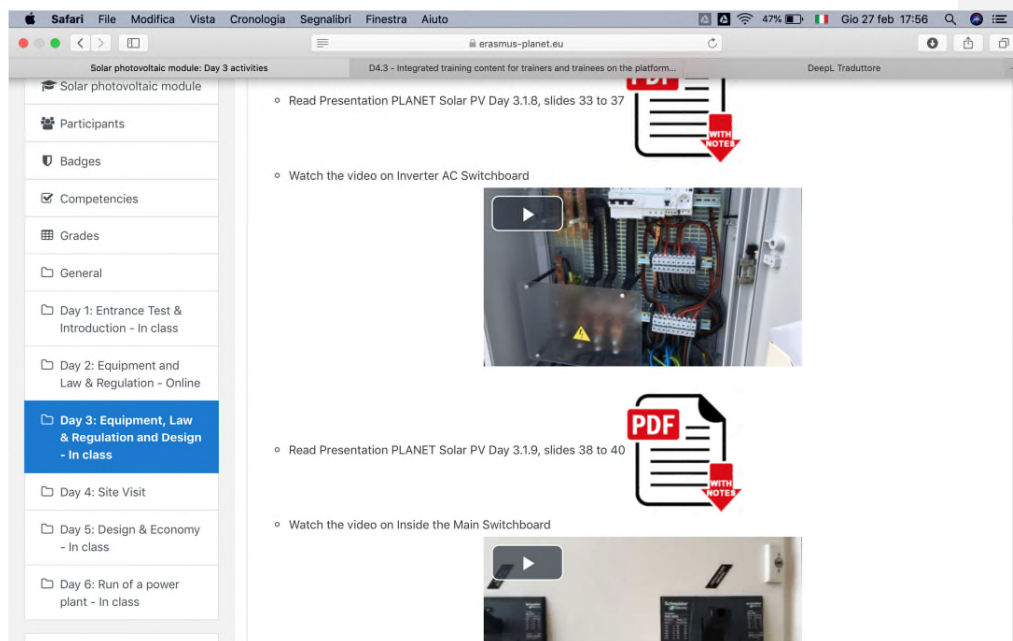


Figure 24 details of the structure of the day 3, previously shown

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Solar photovoltaic module: Day 3 activities

D4.3 - Integrated training content for trainers and trainees on the platform...



DeepL Traduttore

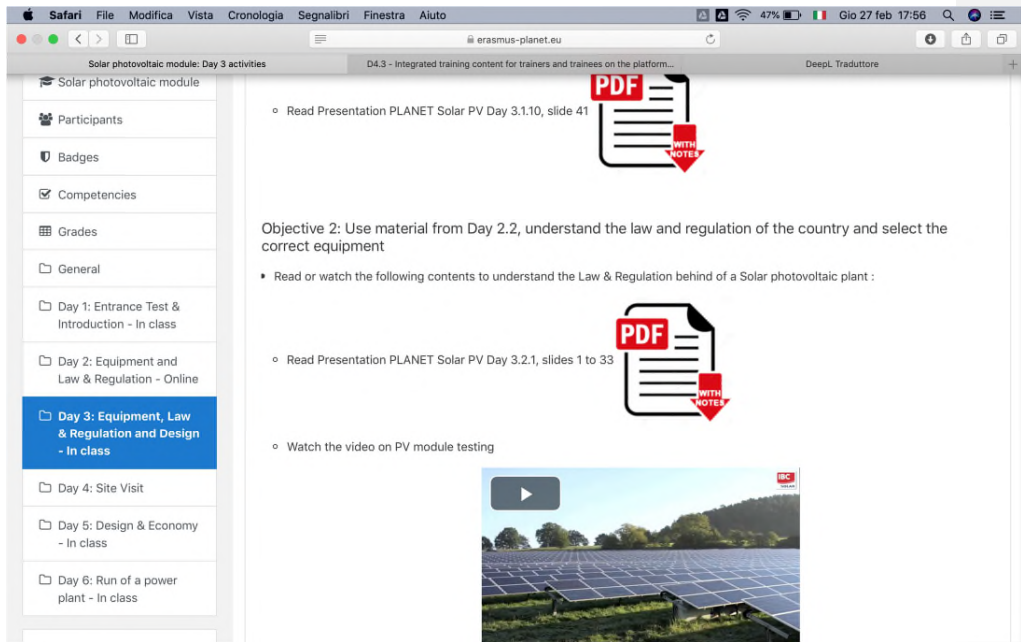
Solar photovoltaic module

- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class**
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

- Read Presentation PLANET Solar PV Day 3.1.8, slides 33 to 37
- Watch the video on Inverter AC Switchboard
- Read Presentation PLANET Solar PV Day 3.1.9, slides 38 to 40
- Watch the video on Inside the Main Switchboard

Figure 25 details of the structure of the day 3, previously shown

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Solar photovoltaic module: Day 3 activities

D4.3 - Integrated training content for trainers and trainees on the platform...

DeepL Traduttore

Solar photovoltaic module



- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class**
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

Read Presentation PLANET Solar PV Day 3.1.10, slide 41

Objective 2: Use material from Day 2.2, understand the law and regulation of the country and select the correct equipment

- Read or watch the following contents to understand the Law & Regulation behind of a Solar photovoltaic plant :
  - Read Presentation PLANET Solar PV Day 3.2.1, slides 1 to 33
  - Watch the video on PV module testing

Figure 26 details of the structure of the day 3, previously shown

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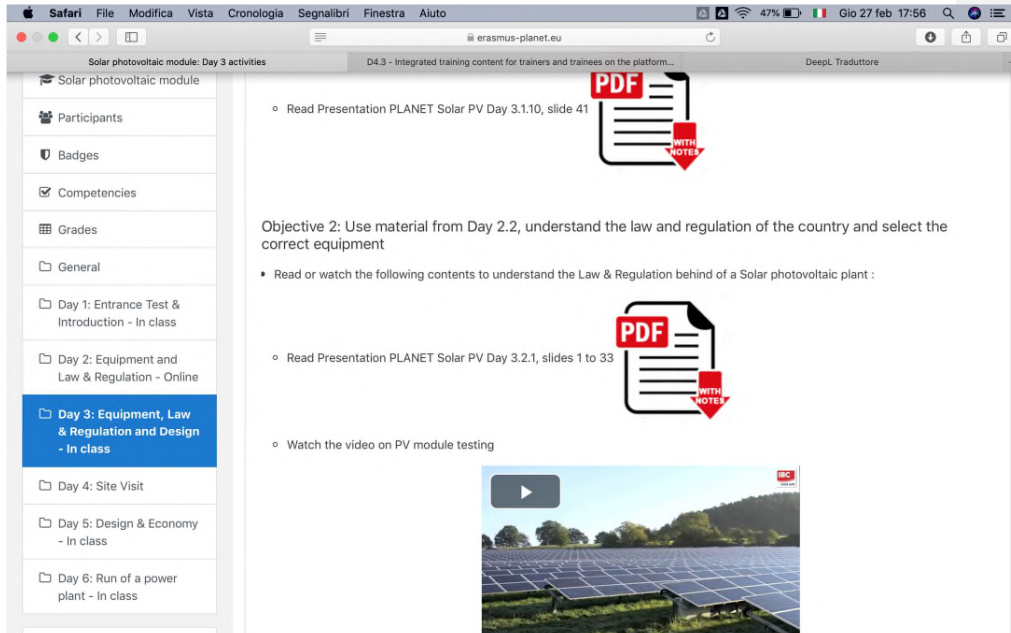






Figure 27 details of the structure of the day 3, previously shown

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#### 4.4 Day Four:



 PLANET Training Course for trainees
 English (en) ▾
🔔
💬
Giulia Botta
👤
▾

Solar photovoltaic module

Participants

Badges

Competencies

Grades

General

Day 1: Entrance Test & Introduction - In class

Day 2: Equipment and Law & Regulation - Online

Day 3: Equipment, Law & Regulation and Design - In class

Day 4: Site Visit

Day 5: Design & Economy - In class

Day 6: Run of a power plant - In class

### SOLAR PV Course - Day 4: Site Visit

#### Aim of the module

To enable the trainees to understand how to run a solar photovoltaic power plant

#### Learning outcomes

By completing the activities and exercises in this module, you will achieve the following learning outcomes:

1. Recognize the Equipment and Implementation
2. Check the sizing of the power plant
3. Identify the operating problems and solutions during the run of the power plant

#### Activities

Below is each objective in this module followed by a set of learning activities. It is recommended that you follow each activity in the order presented. Before starting the activities, carefully read the learning objective.

##### Objective 1: Recognize the Equipment and Implementation

- Read the following contents to recognize the equipment and implementation:
  - Print and read Presentation PLANET Solar PV Day 4.1









Figure 28 details of the structure of the day 4, previously shown

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**PLANET Training Course for trainees**
English (en)





Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit**
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class

- Fill in the questionnaire
- Discuss the assessment results with the other trainees and the trainer.

Objective 2: Check the sizing of the power plant



- Read the following contents to check the sizing of the power plant:
  - Print and read Presentation PLANET Solar PV Day 4.2

- Fill in the questionnaire
- Discuss the assessment results with the other trainees and the trainer.

Objective 3: Identify the operating problems and solutions during the run of the power plant



- Read or watch the following contents to identify the operating problems and solutions during the run of the power plant:
  - Print and read Presentation PLANET Solar PV Day 4.3


- Fill in the questionnaire
- Discuss the assessment results with the other trainees and the trainer.




Last modified: Thursday, 21 November 2019, 4:25 PM

Figure 29 details of the structure of the day 4, previously shown

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## FIVE:


 PLANET Training Course for trainees
 English (en)



 Giulia Botta
 

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class**
- Day 6: Run of a power plant - In class

### PLANET Solar photovoltaic training course

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 [Solar photovoltaic module](#) / 
 [Day 5: Design & Economy - In class](#) / 
 [Day 5 activities](#)

#### Day 5 activities

##### SOLAR PV Course - Day 5: Design & Economy

**Aim of the module**

To give the trainees the methodology and some indicators for designing the right configuration of their PV power plant, and then, for evaluating the economic efficiency of the project.

**Learning outcomes**

By completing the activities and exercises in this module, you will achieve the following learning outcomes:



- Evaluate the opportunity and the economy of a solar photovoltaic plant
- Design a solar PV plant as a group assignment


**Introduction**


- Make the pre-test

**Activities**



Figure 30 details of the structure of the day 5, previously shown

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**PLANET Training Course for trainees**

English (en)




 Giulia Botta

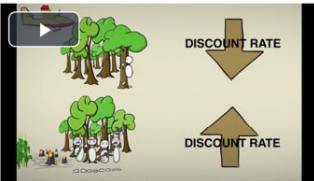
- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class**
- Day 6: Run of a power plant - In class

order presented. Before starting the activities, carefully read the learning objective.

Objective 1: Evaluate the opportunity and the economy of a solar photovoltaic plant

- Read or watch the following documents to evaluate the opportunity and the economy of a solar photovoltaic plant:
  - Read Presentation PLANET Solar PV Day 5.1.1
 


  - Watch the video on Discounting
 


  - Read Presentation PLANET Solar PV Day 5.1.2
 








  - Watch the video on Net Present Value until minute 3:32

Figure 31 details of the structure of the day 5, previously shown





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**PLANET Training Course for trainees**
English (en)



Giulia Botta


- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class**
- Day 6: Run of a power plant - In class






- Read Presentation PLANET Solar PV Day 5.1.3



- Watch the video on Internal Rate of Return









- Read Presentation PLANET Solar PV Day 5.1.4

Figure 32 details of the structure of the day 5, previously shown

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 PLANET Training Course for trainees
 English (en)



 Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class**
- Day 6: Run of a power plant - In class

Objective 2: Design a solar PV plant as a group assignment












- Read the following documents to Design a solar PV plant as a group:
  - Read Presentation PLANET Solar PV Day 5.2.1
 
  - Start working on the assignment in groups
 
  - Show first hints to the trainees for the group assignment
 
  - Read Presentation PLANET Solar PV Day 5.2.2
 
  - Continue to work on the assignment in groups
  - Show the solution to the trainees
 
  - Read Presentation PLANET Solar PV Day 5.2.3
 

Figure 33 details of the structure of the day 5, previously shown

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**PLANET Training Course for trainees**
English (en)



Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class**
- Day 6: Run of a power plant - In class

**Additional materials**








- Read the following documents to understand deeper:
  - Watch the video on Net Present Value until end
 
  - Watch the video on Cost Ratio and Payback
 
  - Watch RETScreen 4 Tutorial
 

Figure 34 details of the structure of the day 5, previously shown

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#### 4.5 Day Six:



 PLANET Training Course for trainees
 English (en) ▾



 Giulia Botta
 

Solar photovoltaic module

Participants

Badges

Competencies

Grades

General

Day 1: Entrance Test & Introduction - In class

Day 2: Equipment and Law & Regulation - Online

Day 3: Equipment, Law & Regulation and Design - In class

Day 4: Site Visit

Day 5: Design & Economy - In class

Day 6: Run of a power plant - In class

## PLANET Solar photovoltaic training course

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 [Solar photovoltaic module](#) / 
 [Day 6: Run of a power plant - In class](#) / 
 [Day 6 activities](#)

### Day 6 activities

#### SOLAR PV Course – Day 6: Run of a power plant

**Aim of the module**

To give the trainees the basics on how to identify operating problems, decide what to do about it and report accordingly.

**Learning outcomes**

By completing the activities and exercises in this module, you will achieve the following learning outcomes:

1. Identify, troubleshoot and report equipment damage and malfunctions; know the major failures of the system and how to react and understand the Compliance with Environmental Legislation.



**Introduction**


- Make the pre-test



**Activities**

Below is each objective in this module followed by a set of learning activities. It is recommended that you follow each activity in the

Figure 35 details of the structure of the day 6, previously shown

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**PLANET Training Course for trainees**
English (en)



Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class**

Objective 1: Identify, troubleshoot and report equipment damage and malfunctions; know the major failures of the system and how to react and understand the Compliance with Environmental Legislation









- Read the following contents to troubleshooting most recurrent operational problems:
  - Read Presentation PLANET Solar PV Day 6.1
 
- Read or watch the following contents to understand the major failures during the run of a PV power plant:
  - Read Presentation PLANET Solar PV Day 6.2
 
  - Watch the video on hail testing
 

Figure 36 details of the structure of the day 6, previously shown


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**PLANET Training Course for trainees**
English (en)




Giulia Botta

- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class**

- Read Presentation PLANET Solar PV Day 6.3
 


- Watch the video on PID
 


- Read Presentation PLANET Solar PV Day 6.4
 


- Read or watch the following contents to understand the Compliance with Environmental Legislation:
  - Read Presentation PLANET Solar PV Day 6.5
 












Figure 37 details of the structure of the day 6, previously shown

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**PLANET Training Course for trainees**
English (en)



Giulia Botta



- Solar photovoltaic module
- Participants
- Badges
- Competencies
- Grades
- General
- Day 1: Entrance Test & Introduction - In class
- Day 2: Equipment and Law & Regulation - Online
- Day 3: Equipment, Law & Regulation and Design - In class
- Day 4: Site Visit
- Day 5: Design & Economy - In class
- Day 6: Run of a power plant - In class**

- Read Presentation PLANET Solar PV Day 6.5
 
- Watch the video on recycling
 
- Read Presentation PLANET Solar PV Day 6.6
 

Make the final assignment (click here)

Last modified: Monday, 2 September 2019, 5:38 PM

Figure 38 details of the structure of the day 6, previously shown

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## 5 PLANET Solar thermal training course

The course is structured with a distribution of the program over 6 days (this varies depending on the course subject). The solar thermal training course consists of 6 days of training, in class, online and in the field (with a site visit to a working solar plant). The module begins with an introductory chapter that should allow students to understand the applications of solar energy and the roles of all stakeholders involved in a solar plant project. The module continues with a presentation of the technical equipment of a solar power system and the influence of local law and regulations on the system. Students will then learn the basic rules of designing a solar thermal system. The fourth day consists of a site visit where students will discover a plant in operation and how the information learned in the previous days is applied in the field. Students will also learn about health and safety regulations and operation and maintenance steps. Day 5 presents the method for evaluating economic benefits, and finally, day 6 is a presentation of how to operate a solar thermal system through the troubleshooting, maintenance, and recovery phases. Through the study of this module, the student will learn notions to enable sustainable economic operation of the system.

### Day 1: Entrance Test & Introduction - In class

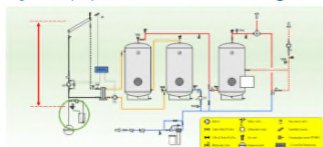


 Day 1 activities


 Day 1 Pre-test

 Day 1 Final test

### Day 2 Equipment & Law and Regulation - Online





 Day 2 activities

 Day 2 Pre-test

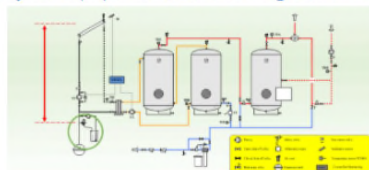
 Day 2 Final test




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**Figure 39 first and second day of solar thermal course**

Day 3: Equipment, Law & Regulation and Design - In class



 Day 3 Activities

 Day 3 Pre-test



 Day 3 Final test

Day 4: Site visit








 Day 4 Activities

**Figure 40 third and fourth day of solar thermal course**

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#### Day 5: Design & Economy - In class



-  Day 5 Activities
-  Solar TH 5.2 Assignment files
-  Solar TH 5.2 Assignment Solution files
-  Day 5 Pre-test
-  Day 5 Final test

#### Day 6: Run of a power plant - In class





-  Day 6 Activities
-  Day 6 Pre-test
-  Day 6 Final test

**Figure 41** fifth and sixth day of solar thermal course

## 6 PLANET Biomass training course




The course is structured with a distribution of the program over 6 days (this varies depending on the course subject). The biomass training course covers the technical part of operational management, raw materials, design and economic feasibility, legal and safety aspects and the tour of a biomass plant. The content of the module provides the student with a comprehensive and practice-oriented knowledge of the construction and operation of local biomass heating plants, starting with the basics of biomass heating plants, suitable raw material ranges and their extraction, technical structure and their function, operational management, required contracts, safety and hazard information and compliance with legal regulations. With the

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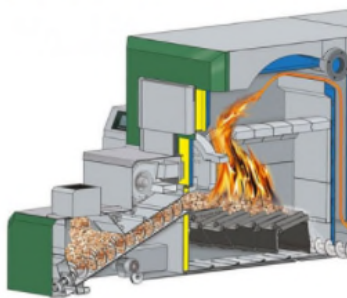
knowledge of the course the student obtains the ability to influence the design of a new biomass heating plant according to the current framework to enable sustainable economic operation of the plant.




### Day 1: Technic part 1 - In class



-  Day 1 activities
-  Day1 pre-test
-  Day1 test

### Day 2: Technic part 2 - In class



-  Day 2 activities
-  Day2 pre-test
-  Day2 test

**Figure 42** first and second day of biomass course




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## Day 3: Operation management - In class




 Day 3 activities

 Day3 pre-test

 Day3 test

## Day 4: Raw material - In class





 Day 4 activities

 Day4 pre-test




 Day4 test

Figure 43 third and fourth day of biomass course

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## Day 5: Design & Economy - Online



-  Day 5 activities
-  Day5 pre-test
-  Day5 test

## Day 6: Law - Online








-  Day 6 activities
-  Day 6 pre-test
-  Day 6 test

Figure 44 fifth and sixth day of biomass course

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#### Day 7: Legal and safety issues - Online




 Day 7 activities

 Day7 pre-test

 Day7 test

#### Day 8: Site Visit



 Day 8 activities



 Day8 pre-test

 Day8 test

**Figure 45 seventh and eight day of biomass course**

## 7 PLANET Biogas training course

The course is structured with a program distribution over 11 days (this varies depending on the course subject). The biogas training course consists of digestion microbiology, technical plant layout, biogas plant (operational) management, business models, safety, environment and logistics. Site visits are combined with (group) assignments to apply the skills and knowledge learned. The training content provides the student with a working knowledge of basic plant design, operations management, safety and hazard information, and regulatory compliance. This module focuses on small-scale digesters, which are typically

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found among agricultural premises throughout Europe. Small-scale digestion has many advantages. Basically it produces bioenergy from manure. The resulting revenue gives farmers more income. In addition to this manure digestion also reduces the emission of methane and nitrogen from manure pits. The harmfulness of methane as a greenhouse gas is a very large, yet under-appreciated side effect. With the knowledge of this course, the student obtains the ability to influence the design of a new biogas plant and is able to ensure the technical, biological, sustainable and economic operation of the plant.

### Day 1 - Introduction of biogas - In class

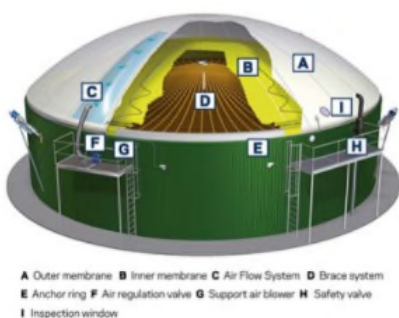


-  Day 1 Activities
-  Biogas Day 1 Pre-test
-  Biogas Day 1 Final test


**Figure 46** first day of biogas course

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## Day 2 - Layout of a biogas plant - Online



 Day 2 Activities

 Biogas Day 2 Pre-test

 Biogas Day 2 Final test

## Day 3 - Process - In class





 Day 3 Activities

 Biogas Day 3 Pre-test

 Biogas Day 3 Final test



Figure 47 second and third day of biogas course



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Day 4 - Site visit





-  Day 4 Activities
-  Assignment Biogas Module 4

Day 5 - Business models for biogas plants - In class



-  Day 5 Activities
-  Biogas Day 5 Pre-test
-  Biogas Day 5 Final test

Figure 48 fourth and fifth day of biogas course

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Day 4 - Site visit





-  Day 4 Activities
-  Assignment Biogas Module 4

Day 5 - Business models for biogas plants - In class



-  Day 5 Activities
-  Biogas Day 5 Pre-test
-  Biogas Day 5 Final test

Figure 49 sixth and seventh day of biogas course

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## Day 8 - Operation of biogas plant - In class





-  Day 8 Activities
-  Biogas Day 8 Pre-test
-  Biogas Day 8 Final test

## Day 9 - Maintenance - In class



-  Day 9 Activities
-  Biogas Day 9 Pre-test
-  Biogas Day 9 Final test

Figure 50 eighth and ninth day of biogas course




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## 8 PLANET Training course Information and Communication Technology



The course is structured with a distribution of the program over 9 days (this varies depending on the course subject). The ICT module will provide students and professionals with the ability to use basic IT skills necessary to manage and monitor day-to-day renewable energy production facilities. This will be achieved through practical examples and tools related to the use of renewable energy sources.

### Day 1: Basics on ICT - Online




-  Basics on ICT
-  ICT Day 1 pre-test
-  ICT Day 1 test

**Figure 51** first day of ICT course


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## Day 2: Safety Surfing and Communication - Online

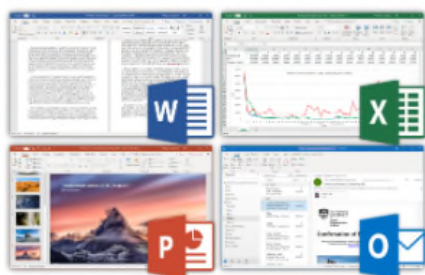


 Safety Surfing and Communication

 ICT Day 2 pre-test

 ICT Day 2 test

## Day 3: MS Office applications - Online



 MS Office applications

 ICT Day 3 pre-test







 ICT Day 3 test

Figure 52 second and third day of the ICT course

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#### Day 4: General in-class activity - In class





-  Day 4 activities
-  ICT Day 4 pre-test
-  ICT Day 4 test

#### Day 5: Word practice and tasks - In class



-  Day 5 activities

**Figure 53 fourth and fifth day of ICT course**

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## Day 6: Excel practice and tasks - In class





 Day 6 activities

## Day 7: Excel practice and tasks - In class



 Day 7 activities

**Figure 54** sixth, seventh day of ICT course

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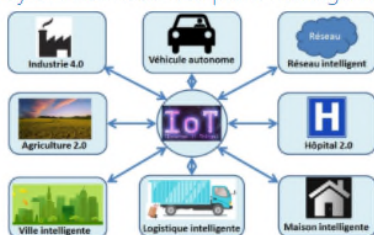
## Day 8: Creating reports for investors and stakeholders - In class



 Day 8 activities

 ICT Day8 in-class assignment

## Day 9: Informatic RES plant management tools - In class



 Day 9 activities

## Final test

 ICT Final test

**Figure 55 eight, ninth day of the ICT course**



After the last day of the course, we can notice the final test.

## 9. Conclusion

Following the previous deliverables (4.1 and 4.3), with the indications regarding the realization and structure of the platforms, the complete and optimized version of all national e-learning platforms has been finalized.

The material is set up to implement a "Flipped Classroom", a learning methodology that involves individual moments and moments in the classroom, where you go to deepen what has been studied individually. To facilitate learning, the iconography is standardized and the structure is repeated in a very similar way for



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each module. The modules are divided one per day, with an initial and a final test to verify the skills acquired during the study of the module. This model allows for an intuitive and user-friendly platform for both trainers and trainees.

Each language resides on a different platform as there are many aspects that take on regional/national significance and therefore are only present on the national platform of interest (e.g. contributions, installation constraints, specific standards).

An engaging learning model whose strength, especially since the advent of the Covid-19 pandemic, is the "flipped classroom" model that makes the entire learning experience possible online. A versatile methodology that anticipates trends and needs.

The entire course is available at the following link: <https://www.erasmus-planet.eu/course>