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# CITY MINDED – City Monitoring and Integrated Design for Decarbonisation

INTENSIVE COURSE ON CITY DECARBONISATION - REPORT

11 – 22 JULY 2022, VALLETTA, MALTA

Responsible Partner:

Malta Intelligent Energy Management Agency





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## 1. Introduction

The City Minded Intensive Course was organised by MIEMA between the 11<sup>th</sup> and 22<sup>nd</sup> July 2022. The course was organised over 2 weeks, with the first week of the course being held online via Zoom and second week of the course was organised in Valletta, Malta.

### 1.1 Course Overview and Objectives

The Intensive Course activity consisted in a 2-weeks' event embedding:

- a preparatory lab (held online during the first week), during which the project partners presented the different thematic areas, allowing the participating students to understand how to apply the topics related to sustainable development to the real urban context and analyse available data. The first week served to define the baseline and build the knowledge base for the practical workshop.
- a practical workshop, based on training and co-working sessions involving students and teachers from partners, as well as a selected group of local stakeholders. During the training sessions, teachers from the project partners shared their knowledge on urban decarbonisation. The co-working sessions aimed at defining a participatory decarbonisation roadmap for the city of Valletta.

The overall objective of the Intensive Course on City Decarbonisation was to test the final methodology and tools developed by the project in a real-life setting, applying them to a concrete case study in Malta and finally producing a site-specific urban decarbonisation roadmap for a district/neighbourhood in the city of Valletta.

### 1.2 The Valletta Case Study

Valletta is the capital city of Malta, located on a peninsula between two natural harbours, Marsamxett and the Grand Harbour, as shown in Figure 1. It is the southernmost capital of Europe and the European Union's smallest capital city with an area of 0.61 km<sup>2</sup>. Valletta was designed by engineer Francesco Laparelli da Cortona, appointed by Pope Pius V and the foundation stone of the city was laid by Grand Master Fra Jean de Valette of the Hospitaller Order of St John the Baptist (Order) on 28 March 1566. The city is characterised by its fortifications and presently has a population of around 5,800. It was officially recognised as a World Heritage Site by UNESCO in 1980 and was the European Capital of Culture for 2018. Valletta was designated as an Urban Conservation Area in 1995 and all properties in Valletta are considered to be of historical value and conserved.



*Figure 1: Valletta Peninsula. Source: Planning Authority Map Server*



## 2. Agenda

The following is the Agenda that was created for the conduct of the Intensive Course, both the first part held online and the second part carried out at the Valletta Design Cluster

### Week 1 Agenda: Online – Zoom Platform

<b>Week 1, Day 1 - July 11<sup>th</sup> 2022</b>	
14:00	Registration of the participants
14:05	Welcome speech, IRENA
14:10	Introduction and opening of the Intensive Course on City Decarbonisation, MIEMA
14:20	The CITY MINDED project: urban sustainability, decarbonisation, and climate change, Presented by CITY MINDED project partners
14:45	Thematic Area 1: Carbon Accounting and Carbon footprint mitigation, UNISI
16:15	Conclusion
17:00	End of day 1
<b>Week 1, Day 2 - July 12<sup>th</sup> 2022</b>	
14:00	Registration of the participants
14:05	Thematic Area 2: Place-making framework, UNIROMA3 - Town planning - Ecological networks & Green infrastructure - Urban and Landscape design
15:45	Conclusion
16:00	End of day 2
<b>Week 1, Day 3 - July 13<sup>th</sup> 2022</b>	
14:00	Registration of the participants
14:05	Thematic Area 3: Assessment and analysis of vulnerability associated with climate change, UPO - Vulnerability to Natural Hazards in a Climate Change Context
15:45	Conclusion
16:00	End of day 3
<b>Week 1, Day 4 - July 14<sup>th</sup> 2022</b>	
14:00	Registration of the participants
14:05	Thematic Area 4: Energy Efficiency and Renewable energy technologies in the active service of the City decarbonisation processes, IRENA&MIEMA
15:45	Conclusion
16:00	End of day 4



<b>Week 1, Day 5 - July 15<sup>th</sup> 2022</b>	
14:00	Registration of the participants
14:05	Wrap up of the performed activities, IRENA
14:20	Presentation of the workshop results (moderated by MIEMA with the participation of partners and students)
15:15	Presentation of the work program for the 2 <sup>nd</sup> week of the Intensive Course, MIEMA
15:30	Open discussion
16:00	End of day 5 and week 1 of the Intensive Course on City decarbonisation

## **Week 2 Agenda: Valletta Design Cluster**

<b>Week 2, Day 1 - July 18<sup>th</sup> 2022</b>	
14:00	Registration of the participants
14:15	Welcome speech, IRENA
14:25	Introduction and opening of the 2nd week of the Intensive Course on City Decarbonisation, MIEMA
14:30	Presentation of the target neighbourhood (or the City of Valleta), MIEMA
14:40	'Bridging the tangible with the intangible – 'green' communities at the Valletta Design Cluster, Ruby-Jean Cutajar, Valletta Design Cluster
15:00	ReCovering a Noble European City, Jesmond Xuereb, MIEMA Director and Valletta Local Council's first executive secretary
15:20	SUSTAINABLE CONSERVATION: An integrated approach within the Rehabilitation of the Old Civil Abattoir into the Valletta Design Cluster, Perit Amanda De Giovanni, Restoration Directorate
15:40	Q&A / Discussion
16:00	The CITY MINDED project: urban sustainability, decarbonisation, and climate change, Presented by CITY MINDED project partners
17:00	Conclusion
17:15	End of day 1
<b>Week 2, Day 2 - July 19<sup>th</sup> 2022</b>	
<b>Morning Session</b>	
09:30	Registration of the participants
09:35	On-site visit of the target area
11:30	Project management meeting ( <i>Project Partners only</i> )
13:00	Steering Committee ( <i>Project Partners only</i> )
13:30	End of morning session
<b>Afternoon session &amp; Dinner</b>	



15:00	Registration of the participants
15:05	Thematic Area: Place-making framework, UNIROMA3 - Work in groups
16:30	Presentation and discussion of group work results
17:00	End of afternoon session
19:30	Networking dinner: San Giovanni Restaurant, St. John's Square Valletta
<b>Week 2, Day 3 - July 20<sup>th</sup> 2022</b>	
<b>Morning Session</b>	
09:00	Registration of the participants
09:05	Thematic Area: Assessment and analysis of vulnerability associated with climate change, UPO - Work in groups - Vulnerability Index calculation and representation
11:30	Presentation and discussion of group work results
12:00	End of morning session
<b>Afternoon Session</b>	
14:00	Registration of the participants
14:05	Thematic Area: Carbon Accounting and Carbon footprint mitigation, UNISI - Work in groups
15:45	Presentation and discussion of group work results
16:00	End of day 3
<b>Week 2, Day 4 - July 21<sup>st</sup> 2022</b>	
09:00	Registration of the participants
09:05	Thematic Area 4: Energy Efficiency and Renewable energy technologies in the active service of the City decarbonisation processes, IRENA & MIEMA - On-site visit of the target area - Group work
12:00	Presentation and discussion of group work results
12:30	End of morning session
<b>Afternoon Session</b>	
14:00	Registration of the participants
14:05	Work in groups on the preparation of a site-specific urban decarbonisation roadmap - a compilation of the results from co-working sessions
17:00	End of day 4
<b>Week 2, Day 5 - July 22<sup>nd</sup> 2022</b>	
09:00	Registration of the participants
09:05	Wrap up of the performed activities, MIEMA





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09:30	Presentation of the workshop results (moderated by MIEMA with the participation of partners and students)
11:00	Final discussion and lessons learnt
12:00	Conclusion and end of the Intensive course





### 3. Participants

Course participants included selected students from each partner University, teachers from each partner organisation and a group of Maltese stakeholders selected by MIEMA. The full list of participants is included in Table 1:

*Table 1: Intensive Course Participants*

<b>Name and Surname</b>	<b>Organization</b>	<b>Country</b>	<b>Role</b>
Lorenzo Barbieri	UNIROMA3	Italy	Teacher
Romina D'Ascanio	UNIROMA3	Italy	Teacher
Ana Luiza Milanese	UNIROMA3	Italy	Student
Maria Chiara Altomare	UNIROMA3	Italy	Student
Matteo Maccanti	UNISI	Italy	Teacher
Michela Marchi	UNISI	Italy	Teacher
Morena Bruno	UNISI	Italy	Student
Francesca Gaspari	UNISI	Italy	Student
Diane Cassar	MIEMA	Malta	Teacher
Jesmond Xuereb	MIEMA	Malta	Stakeholder / speaker
Lawrence Attard	MIEMA	Malta	Staff
Maciej Tabor	MIEMA	Malta	Staff
Jakub Bobak	MIEMA	Malta	Staff
Amanda De Giovanni	Restoration Directorate	Malta	Stakeholder / speaker
Ruby-Jean Cutajar	Valletta Design Cluster	Malta	Stakeholder / speaker
Antonio Franković	IRENA	Croatia	Teacher
Andrea Poldrugovac	IRENA	Croatia	Teacher
Josefina López Galdeano	UPO	Spain	Teacher
Andrés Morillo Najarro	UPO	Spain	Student
Nuria Pilar Plaza Martín	UPO	Spain	Student
Anupoma Niloya Troyee	UPO	Spain	Student



## 4. Report from the Intensive Course

### 4.1 Course structure

The Malta Intensive Course was organised over 2 weeks during the month of July 2022. The course was attended by 7 students from the partner universities (2 from UNIROMA3, 2 from UNISI and 3 from UPO).

Prior to the Intensive Course, MIEMA provided information and data on the City of Valletta to the respective project partners, to enable them to prepare their training material and exercises for the co-working sessions. Such information included geographic information, building typologies, details on the planning system in Malta, strategy documents and local plans and information on electricity generation and consumption.

The first week of the course was held online via Zoom and aimed to give an overview of the City Minded project, the partnership and the thematic areas of the intensive course. Each partner presented the respective thematic areas of carbon accounting, place-making framework, vulnerability associated with climate change and energy efficiency and renewable energy technologies.

The second week of the course was organised in Valletta, Malta. This was the first opportunity to have a face-to-face project activity and brought together the project partners (teachers and researchers), students and local stakeholders from the city of Valletta. Collaborative roadmaps for urban decarbonisation of Valletta were elaborated during the course by taking into consideration the different thematic areas addressed.

The first day of the second week of the course was primarily dedicated to presentations by local stakeholders which covered different aspects and perspectives in relation to the city of Valletta. Topics included green communities coordinated by the Valletta Cultural Agency, background to the city's history and evolution and the rehabilitation of the historic building where the course was hosted (the Valletta Design Cluster). The stakeholders' presentation served to give a holistic representation of Valletta and allowed the students to better understand the context of the city, its particularities and possible challenges which need to be overcome as part of an urban decarbonisation strategy. Thematic area presentations from the project partners/teachers followed the stakeholders' interventions. A city site visit was organised on the second day.

The following part of the workshop was dedicated to co-working session for the different thematic areas, moderated by the respective teachers. The students were divided into two groups for all the co-working sessions which enabled the students to interact with each other



and work on the different exercises prepared by the teachers. The groups made use of different resources such as maps of Valletta and the neighbouring port region and Google maps and have the opportunity to walk around the building and surrounding area. After each co-working session both groups presented the results of their collaborative work. After the completion of all the exercises the groups worked on the preparation of a site-specific urban decarbonisation roadmap on the afternoon of the fourth day, compiling the results from the different co-working sessions. The roadmaps were presented by the groups on the last day of the course.

#### 4.2 Contributions from Local Stakeholders

MIEMA involved the following stakeholders:

- Mr Jesmond Xuereb, MIEMA's Director and Valletta's first executive secretary, who gave an overview of the city of Valletta through his presentation with the title "ReCovering a Noble European City". The history and evolution of the city was presented, focusing on its characteristics as a fortress city, population decline and related challenges, the role of the local council and the city's regeneration since 2004.
- Ms Ruby-Jean Cutajar, representative of the Valletta Design Cluster, who spoke about the role of the VDC and different stakeholders, such as NGOs, economic operators, students and public entities, with respect to the sustainability sector through her presentation "Bridging the tangible with the intangible – 'green' communities at the Valletta Design Cluster".
- Perit Amanda De Giovanni, representative of the Restoration Directorate, spoke about her experience as the architect in charge of the rehabilitation project carried out within the Valletta Design Cluster building where the course was being hosted. Her presentation "SUSTAINABLE CONSERVATION: An integrated approach within the Rehabilitation of the Old Civil Abattoir into the Valletta Design Cluster" highlighted the importance of rehabilitating buildings within historic centres and the challenges that need to be addressed in such projects.

#### 4.3 Valletta Site Visit

An on-site visit of the target area was carried out during the morning of the second day of week 2, where the host from MIEMA explained and showed different characteristics of the city and the students had the opportunity to ask questions and take notes/photos. Several areas of interest were visited, including Valletta's main street and the new parliament building, the Upper Barrakka gardens (from which the students could get a good view of the city and surrounding areas) and St George's square where the Grandmasters' Palace is located.



*Figure 2: Valletta Site Visit: Barrakka Gardens and Republic Street / Parliament Building*



*Figure 3: Valletta Site Visit Group Photo – Upper Barrakka Gardens*

#### 4.4 Results from Week 1 - Training Sessions

##### UPO - Assessment and analysis of vulnerability

The presentation was structured in two parts of approximately 20 minutes each. The first part was a theoretical presentation used as an introduction to the subsequent exercise. This theoretical introduction focused firstly on the main effects of climate change in Malta. Climate change forecasts predict an increase in the frequency and intensity of natural hazards in Malta, among the most serious droughts, floods, and heat waves (IPCC, 2022). This was followed by an introduction to the main strategies for combating climate change: mitigation



and adaptation. Afterwards, and as a complement to the rest of the workshop exercises, more focused on mitigation, an approach to adaptation strategies based on risk mitigation was carried out. For this purpose, the risk reduction framework proposed by the IPCC (2012) was presented, with the adaptations to this framework made in the last IPCC assessment report (2022). This framework defines risk as the probability of suffering damage or loss, because of the interaction between natural hazards and vulnerable conditions, where vulnerability is defined as the propensity or predisposition to be adversely affected. The objective of this introduction is to make an approach to the hybrid nature of risks, in which the interaction between natural events and social processes are related to generate risk situations. This framework introduces the importance of the vulnerability component in reducing risk and guiding climate change prevention and adaptation strategies that should complement mitigation strategies.

The second part laid out the theoretical framework of vulnerability assessment and analysis that was to be used in the co-working session.

The workshop focused especially on:

- 1) Establishing a method that allows students to understand the different components and dimensions of vulnerability. What and why it is important to analyse;
- 2) Introducing students to the different research techniques, tools and data sources;
- 3) Training the calculation of composite indices, the representation, comparison and analysis of the results; and
- 4) Emphasizing the importance of not only measuring vulnerability but also analysing it. This is based on a theoretical introduction to vulnerability and its main components.

$$\text{Vulnerability} = \text{Exposure} + \text{Sensitivity} - \text{Adaptive capacity}$$

Where:

- Exposure = those elements (human, natural and physical) that can be affected by a natural event.
- Sensitivity = those conditions of the affected system that make it more likely to suffer damage because of a natural hazard
- Adaptive capacity = characteristics and capacities that allow a society to confront hazards while the natural phenomenon is happening (short term response), and those that are part of an ongoing process of learning,

### UNIROMA3 - Place-making framework

The training session delivered by UNIROMA3 was structured in three lectures, similarly to the previous workshops. Nonetheless, having more time available for each lecture, contents were further developed. The aim was to illustrate how spatial planning (integrating mobility planning, green infrastructure and small-scale city design) can operate to build a carbon neutral city.





The lecture on town planning and mobility was intentionally generic, since students had little or no previous knowledge on the subject and had therefore to be introduced to planning topics. The presentation: (1) introduced the place-making approach and the decarbonisation concept; (2) provided insights on new participatory approaches to town planning; (2) introduced planning tools in Malta, such as the Strategic Plan for the Environment and Development and the Grand Harbour Local Plan covering the target area of the workshop; (3) illustrated mobility issues, in particular the first and last mile of a trip, with a focus on public transport in Malta.

The presentation on ecological networks (EN) and green infrastructure (GI): (1) briefly presented the regulatory framework of EN, explained the concept in detail, and provided some relevant examples, with a focus on environmental schemes in Malta; (2) explained in detail the GI concept, with references to the scientific literature, to the EU Strategy for Biodiversity, and to sample nature-based solutions for decarbonisation at urban scale; (3) illustrated the French good practice 'trame verte et bleue' to integrate GI into spatial planning; (4) provided insights on the tools available in Malta: the National Biodiversity Strategy and Action Plan 2012-2020, the document 'Investing in the Multi-functionality of GI. An Information Document to support GI Thinking in Malta' and the 'Green Paper on Greening Buildings in Malta'.

The lecture on landscape and urban design: (1) provided a definition of key concepts such as landscape, everyday landscapes, and proximity, referring to Art. 2 of the European Landscape Convention; (2) focused on the dimension of proximity, applying the different radius of influence (from 1 Km to 200 m) to the historic centre of Valletta, and reflecting on the role of urban morphology in the perception of proximity, and on the importance of a dense urban fabric in encouraging walking; (3) presented two good practices in the design of public space of proximity: the '15-minutes city' in Paris, and the 'Superblocks' model in Barcelona; (4) analyzed the structure of the Valletta historic center, to evaluate the applicability of the 15-minutes city model therein.

### UNISI Calculation of Valletta's Carbon Footprint

The UNISI team presented the Urban Carbon Accounting Methodology for the City of Valletta to the students. The proposed methodology is the same as that used for the Siena, Rome, and Seville Workshops, with some modifications to better adapt it to the Intensive Course, which was the first project experience carried out in presence.

On the first day of the Course (Monday, July 11<sup>th</sup>), the UNISI contribution consisted of two presentations by Dr. Matteo Maccanti and Dr. Michela Marchi. The first one illustrated the methodology, data collection, and processing, calculation of Valletta's Carbon Footprint, quantification of the virtual forest equivalent necessary to absorb the emissions of the study area, selection of the theoretically most suitable mitigation measures, calculation of their emission reduction effect on Valletta's total budget.

The second presentation detailed the Excel file that the students had to elaborate, and it explained step by step what the first part of the exercise they had to do consisted of.



After the explanations, students were asked, as “homework”, to carry out the first part of the exercise (i.e., calculating Valletta's Carbon Footprint and quantifying the virtual forest equivalent) before the afternoon of Wednesday, July 20<sup>th</sup>, which was dedicated to the UNISI-coordinated exercise, so that they would have more time to devote to the second part of the exercise and focus on mitigation measures.

The main notions instilled with the presentations were then reminded and summarized to the students on three other occasions: during the closing of the last day of the first week (Friday afternoon, July 15<sup>th</sup>), in the presentation of the first day of the workshop in presence (Monday afternoon, July 18<sup>th</sup>), and at the beginning of the co-working session curated by UNISI (Wednesday afternoon, July 20<sup>th</sup>).

In addition, a Google Drive folder was shared with the students where the Excel file for the exercise and a PDF copy of the presentations, given by Drs. Maccanti and Marchi, were uploaded. In this way, the students had all the material they needed to go over the topics and fill in any doubts (for this purpose, the two UNISI teachers also made themselves available to give further explanations either by e-mail during the online week, or directly verbally in the second week of the workshop).

Some of the information developed for the UNISI presentation are illustrated below:

1. Description of the study area analysed ([Figure 4](#));
2. Main sources of emissions analysed ([Figure 5](#));
3. Calculation of Valletta's Carbon Footprint (the results are expressed in t of CO<sub>2</sub>eq and shown in [Figure 6](#));
4. Carbon Footprint evaluation by individual household ([Figure 7](#) - allowing comparison with an average European household and that studied during the Siena, Rome and Sevilla Workshops);
5. Surface of equivalent virtual forest that would be required for the absorption of GHG emissions released to the atmosphere in the study area ([Figure 8](#), which also provides information regarding the emissions liability to be given to each emission sources, and activity sectors analysed).



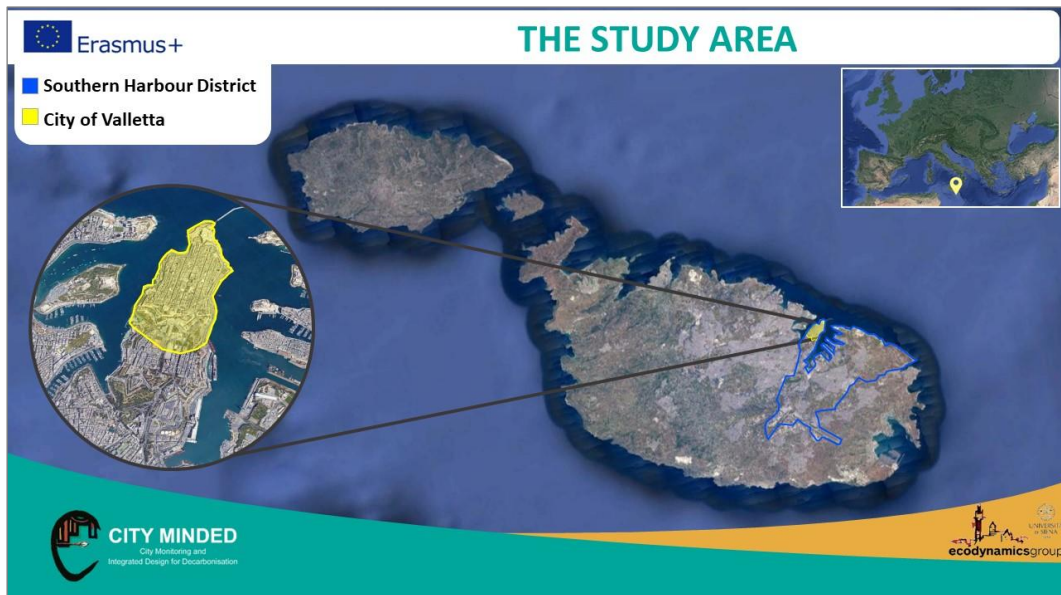


Figure 4: The study area: the City of Valletta

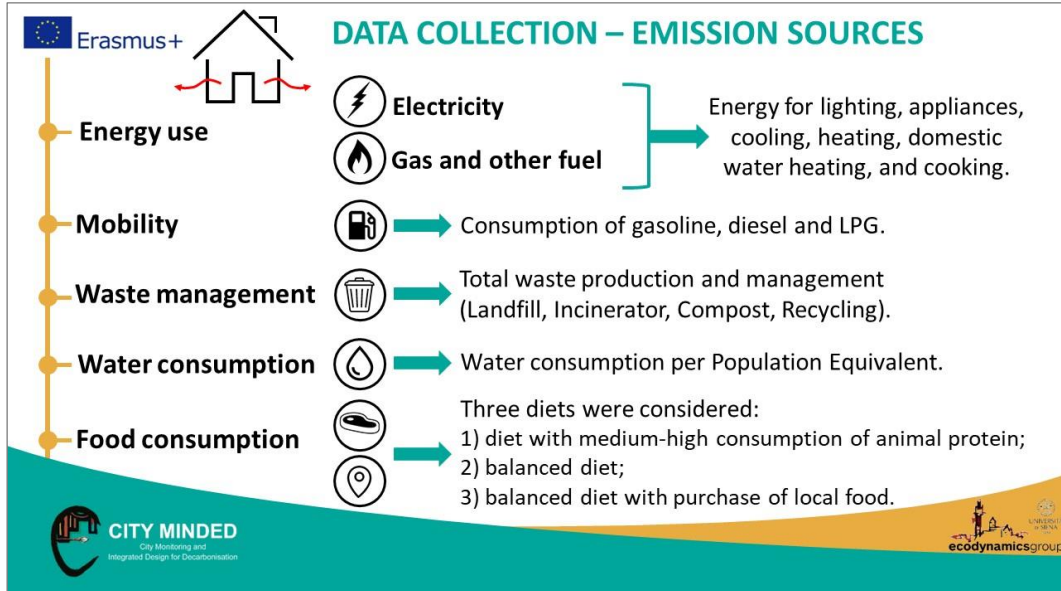


Figure 5: The emission sources analysed for the Carbon Footprint evaluation

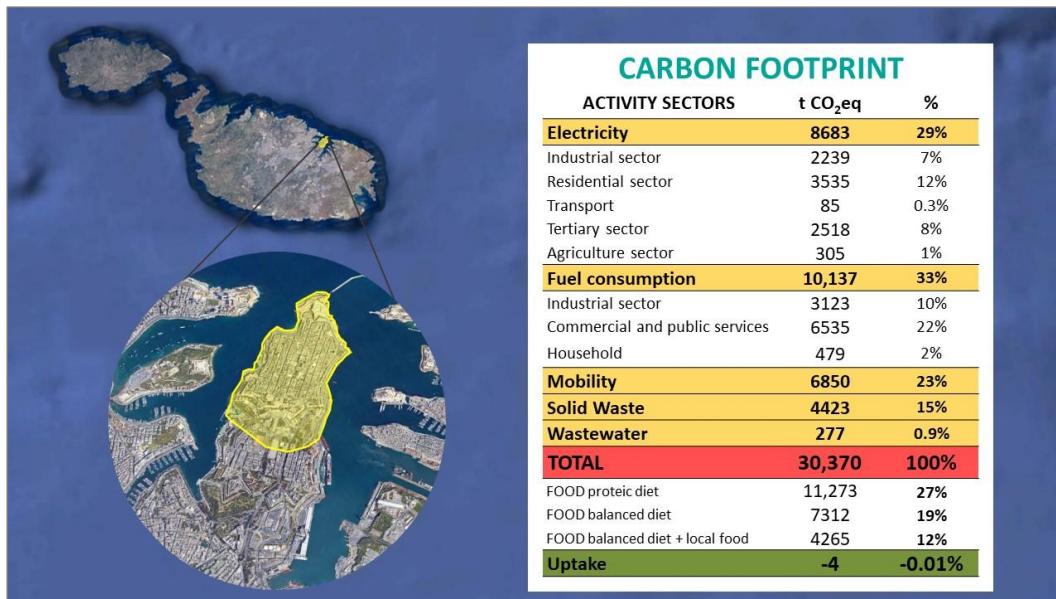


Figure 6: Total Carbon Footprint of the City of Valletta

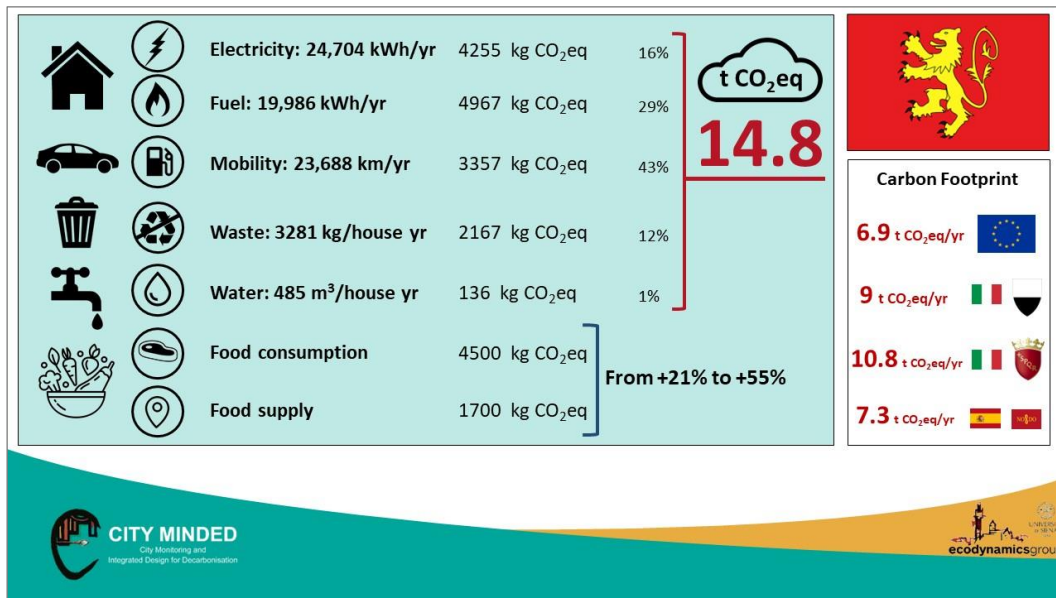


Figure 7: Total Carbon Footprint for a typical household in Valletta

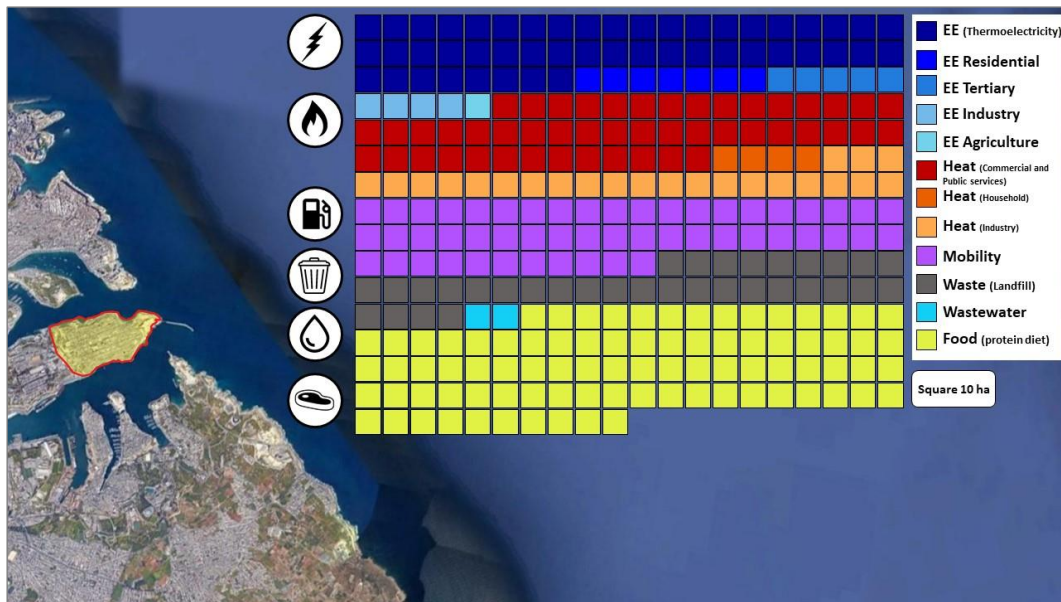


Figure 8: Scaled representation of the equivalent virtual forest that would be required to absorb gas emissions from the City of Valletta.

Then, after explaining the methodology, its applications, results, and some graphical ways to show the numbers obtained, possible mitigation actions to reduce emissions were illustrated. These are structured based on different spatial scales (household, building, building block, street, neighbourhood, city) and different time scales (short-, medium-, and long-term measures, with time scales of 10, 20, and 30 years). In addition to the solutions described in detail in [Pulselli et al. \(2019\)](#), on this occasion, since it was the study of an urban area within an island, two other solutions for generating electricity from renewable resources were presented: Floating Wind Turbines (based on productivity level and technologies proposed in [Pulselli et al., 2022a](#)) Wave Energy Converters (based on what was proposed in [Pulselli et al., 2022b](#) and [Franzitta et al., 2016](#)). In the end, a dynamic representation of the “decarbonisation” plan for city by ‘crunching’ the virtual forestland was carried out ([Figure 9](#)).



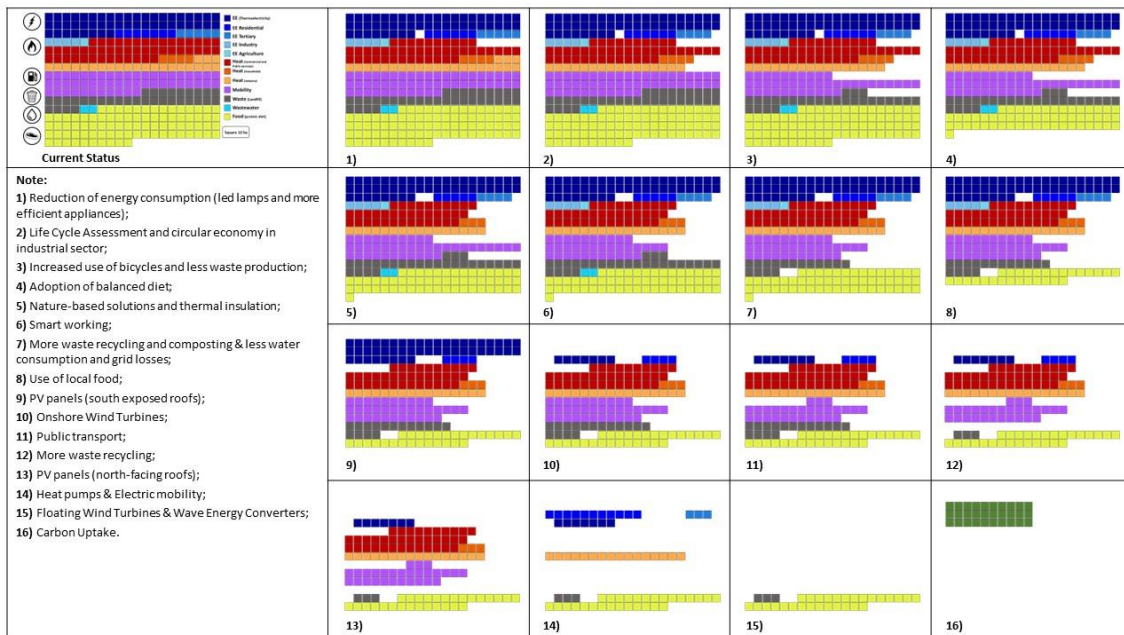


Figure 9: Carbon Footprint mitigation scenario for City of Valletta.

## IRENA & MIEMA

The first part of the session managed by IRENA & MIEMA was related to energy efficiency, detecting potential problems and identifying solutions which will be analysed during the co-working session. The analysed and proposed energy efficiency measures will then act as an integral part of the urban decarbonisation roadmap for the City of Valletta. The first session was divided into five chapters: (1) presentation of the working group, (2) current EU initiatives focused on achieving carbon neutrality by 2050, (3) energy efficiency in the active service of the city decarbonisation process by analysing all the specifics of the City of Valetta and describing possible energy efficiency measures which can be conducted to achieve better energy performance of the buildings, (4) energy refurbishment of heritage buildings and (5) how to finance the renovations and investments in new technologies.

The session included an analysis and presentation of current EU initiatives aiming to achieve carbon neutrality in Europe by 2050. The most prominent example is European Green Deal which aims to transform the EU into a modern, resource-efficient, and competitive economy, by ensuring no net emissions of greenhouse gases by 2050, ensuring economic growth decoupled from resource use and taking care that no person and no place is left behind. Another initiative is the “Fit for 55 package” which represents a set of proposals to revise and update EU legislation and put in place new initiatives with the aim of ensuring that EU policies are in line with climate goals. The last initiative presented was the “REPower EU” which is the latest strategy the EU published as a response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine.

The topic of energy efficiency, its definition, why it is important and what energy efficiency measures can be implemented in Valletta by targeting the improvement of its building stock was then presented. Among different energy consumers in urban areas, buildings were chosen



since the building stock is responsible for approximately 40% of EU energy consumption and 36% of the greenhouse gas emissions. Valletta is a World Heritage City with a high density of historic buildings has a lot of conservation constraints which have to be considered before planning adequate energy efficiency measures. The analysis of the building stock showed that refurbishment and repurposing of the buildings must be carefully regulated but positive aspects were detected such as strong interest among private individuals as well as businesses to invest in the conservation and reuse of historic buildings. Possible energy efficiency measures were aimed to reduce consumption related to heating, cooling, ventilation, lighting and hot water. The last chapter of the session was the presentation of possible financing schemes which could make easier to finance the renovations and investments in new and green technologies.

The second part of the thematic area related to energy focused on the integration of renewable energy systems within buildings located urban environment. The following six main topics were presented: urban energy systems and the urban energy strategy, renewable energy technologies, prosumers and self-consumption, urban micro-grids and energy communities, identification of different building typologies and challenges to energy renovation, and an overview of the energy auditing processes. Photovoltaic panels, micro-wind turbines and combined heat and power plants were presented as different types of renewable technologies that can be used within the urban scenario for the generation of clean energy by integrating the systems within existing buildings.

A number of best practices from Malta and other European countries in relation to the integration of RES for self-consumption were also presented. These included building-integrated photovoltaic systems, PV facades, solar parking shading devices and geothermal heat pumps. The potential of energy storage solutions and smart micro-grids were also discussed to further maximise self-consumption of energy produced through renewable energy technologies within the buildings. The presentation was focused on the context of the city of Valletta, highlighting challenges related to the integration of RES during the historic value of the buildings and laws specifying how interventions can be implemented.

#### 4.5 Results from Week 2 Co-working sessions

##### UPO

The starting point of the learning methodology was the risk equation (Risk = Hazard \* Vulnerability). To assess vulnerability, we adopted the methodological framework proposed by the IPCC (2012, 2014) which defines vulnerability based on three main components: Exposure, Sensitivity and Adaptive Capacity. Figure 10 shows the methodological proposal to assess vulnerability.

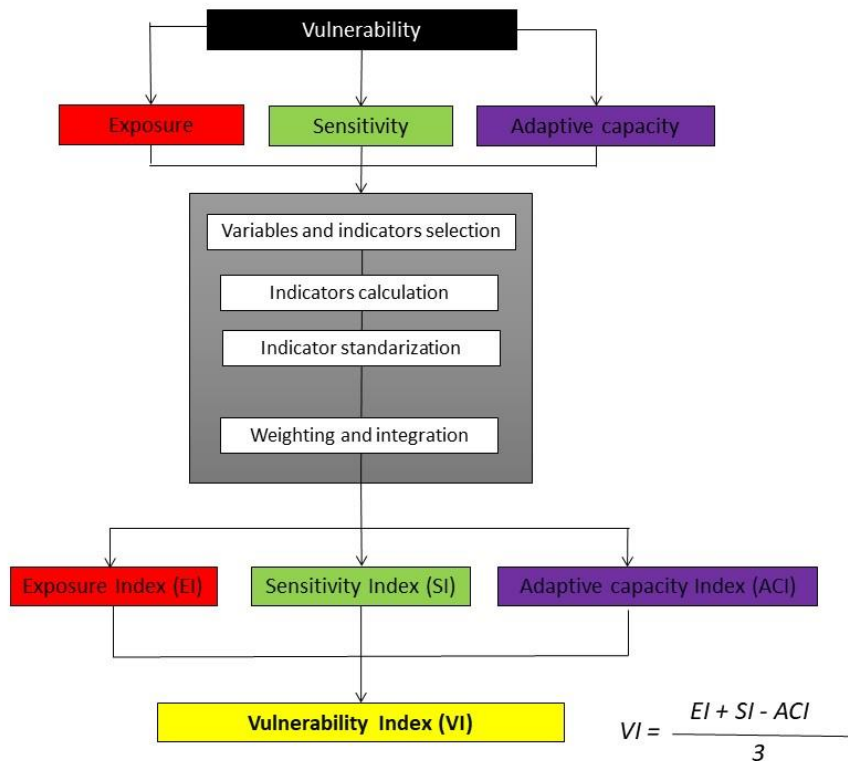
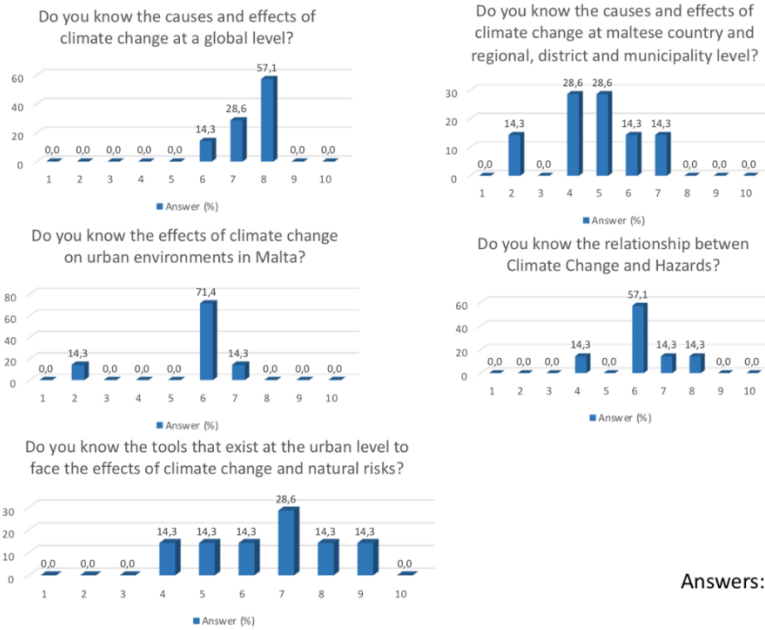


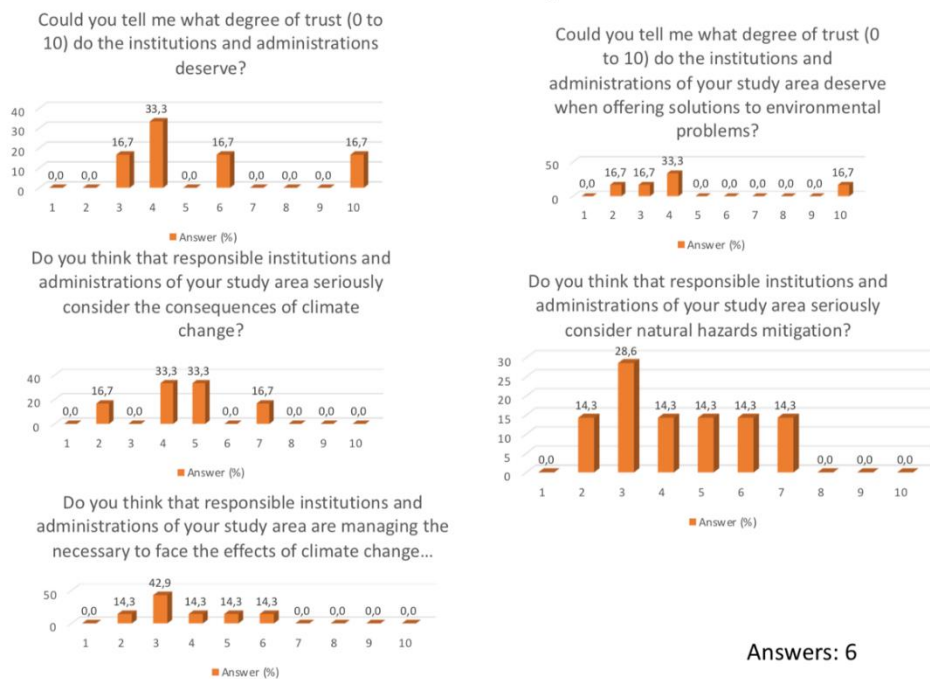
Figure 10: Methodological proposal to assess vulnerability

Each group selected a case study (Southern Harbour district, Group 1 and Northern Harbour district, Group 2) for which they calculated the Vulnerability Index (VI) by following a series of steps included above. Starting from the indices of each of the vulnerability index (Exposure, Sensitivity and Adaptive Capacity) calculated, it was analysed how the VI is structured, that is, how each of the components influences the final determination of the value of the VI. This allows a first approach to the causes that generate vulnerability. To do this, the relative weight of each of the indices in the final value of vulnerability was calculated according to the following equations and then they are represented in the vulnerability structure triangle. Once each group had calculated the index for their case study, the results were shared and the index values for each district compared.



Answers: 7

Figure 11: Example of Climate change and risk perception survey results



Answers: 6

Figure 12: Example of Institutional trust survey results



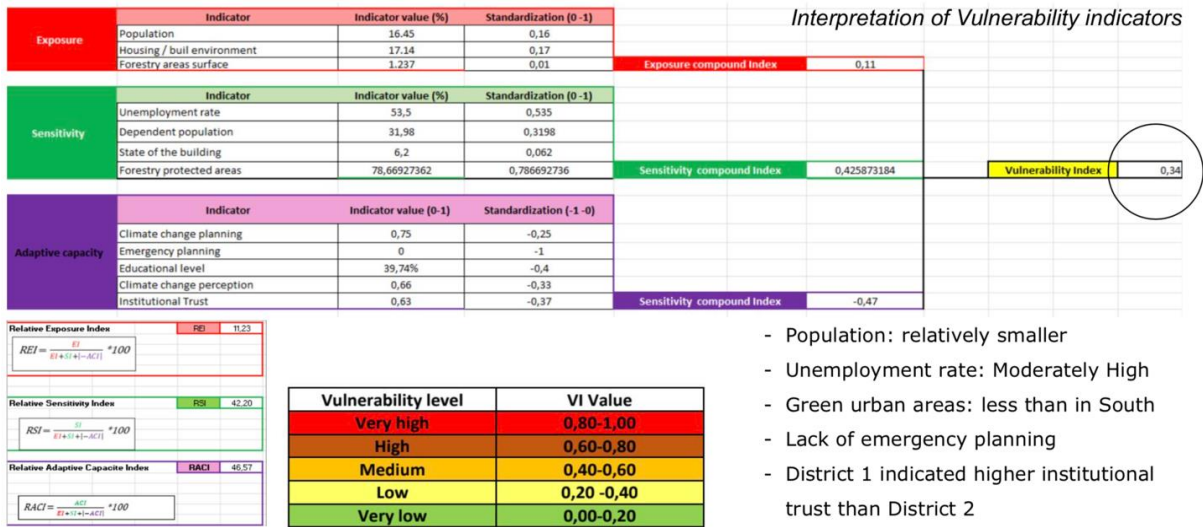


Figure 13: Group 1 results

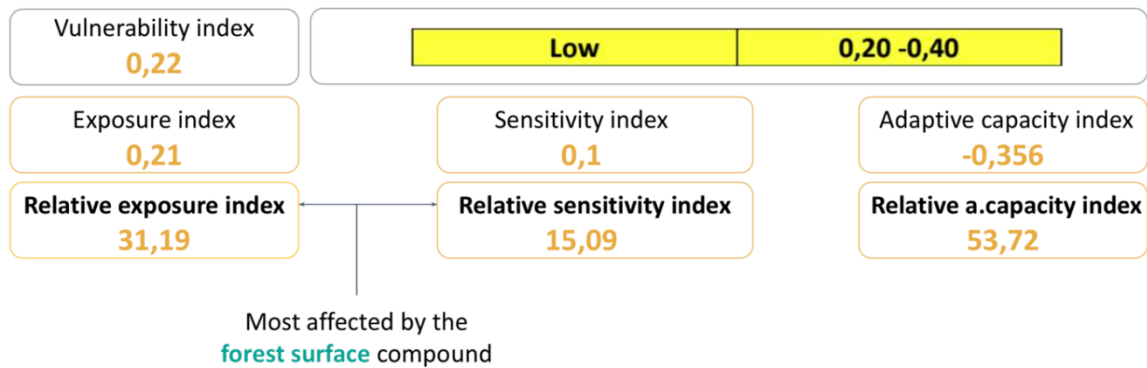


Figure 14: Group 2 results

At the conclusion of the afternoon's work, students fixed the summary of their reasoning and conclusions on a map and PowerPoint presentation that was presented in the last day of the workshop with the vulnerability index and the triangle results (Figure 15), and with the following main conclusions:

- Sensitivity and lack of adaptive capacity are the main component of vulnerability for Valletta (>33)
- Vulnerability is dynamic as it could change between two closely related district (0.34 low in dist 1 to 0.15 very low in dist 2)
- Valletta district 1 has lower exposure than Rome or Florence but has similar sensitivity as Viterbo in global context
- We will only be able to deal with the risks posed by climate change if we understand what makes us vulnerable.

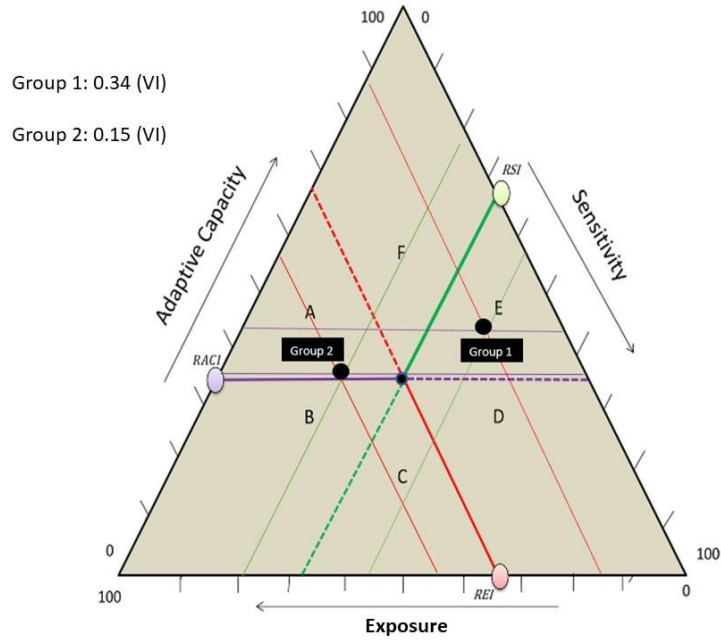


Figure 15: Vulnerability Structure Triangle Results

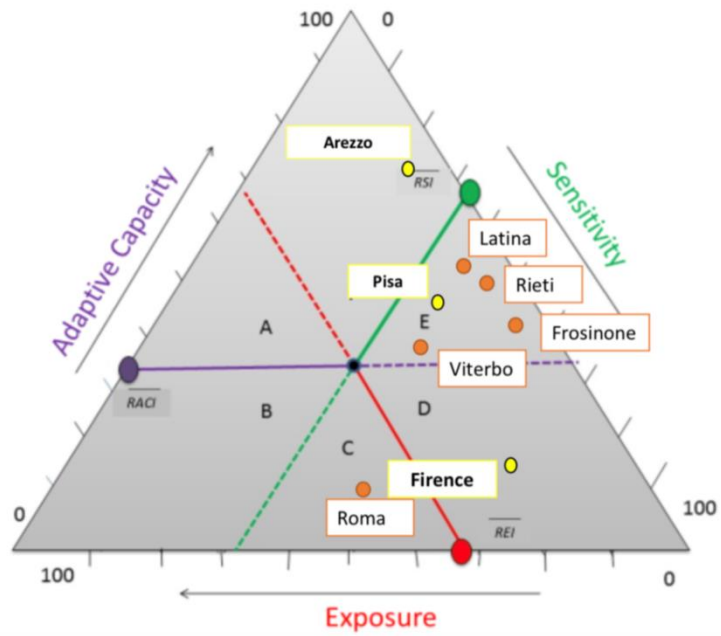


Figure 16: Vulnerability Structure Triangle Results from previous workshops



The vulnerability structure triangle does not represent the values acquired by the components but the relative weight that each of the components (regardless of whether their relationship with vulnerability is direct or inverse) has in the final determination of the VI. To calculate the Relative Exposure, Sensitivity and Adaptive Capacity Relative Indices use the following equations.

Some of the conclusions regarding vulnerability that can be extracted from the on the workshops results are:

- Vulnerability is multifaceted (social, environmental, institutional, economic, physical)
- Vulnerability is dynamic (temporal and spatial changes)
- Vulnerability assessment is Hazard and context (territorial scale, availability of data...) specific.
- There is still a long way to go and many challenges in which to continue advancing in these methodologies.
- Only by knowing what makes us vulnerable will we be able to cope with the risks posed by climate change.

### UNIROMA3

The co-working session lasted one afternoon and was delivered by two researchers, who carried out two parallel training sessions with four and three students respectively.

In the first session, students were asked to highlight strengths and weaknesses of the city of Valletta, in a sort of simplified SWOT, to identify on a satellite map three main features of the urban area: barriers (natural and artificial), connections (ecological and mobility) and key elements (main natural spaces, derelict areas, public spaces), and to prepare a power point presentation to illustrate the results of their analysis.

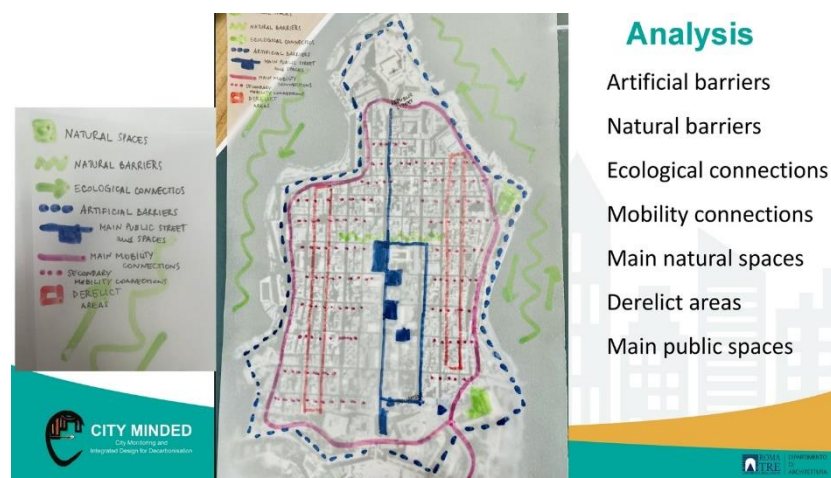


Figure 17: Group 1: elaborations of the analysis



Based on these outcomes, in the second session students were asked to devise objectives and actions for the urban improvement of Valletta, and they highlighted on the maps possible solutions to enhance mobility (e.g. soft mobility and sustainable transport connections), increase green infrastructure (e.g. green areas, parks, community gardens, green corridors) and upgrade public space (squares, co-working hubs). Both groups prepared a power point presentation to illustrate their strategies for the sustainable development of Valletta and for the improvement of its liveability, which focused mainly on sustainable mobility and pedestrianization, but also on the increase of green areas and trees for cooling the city.

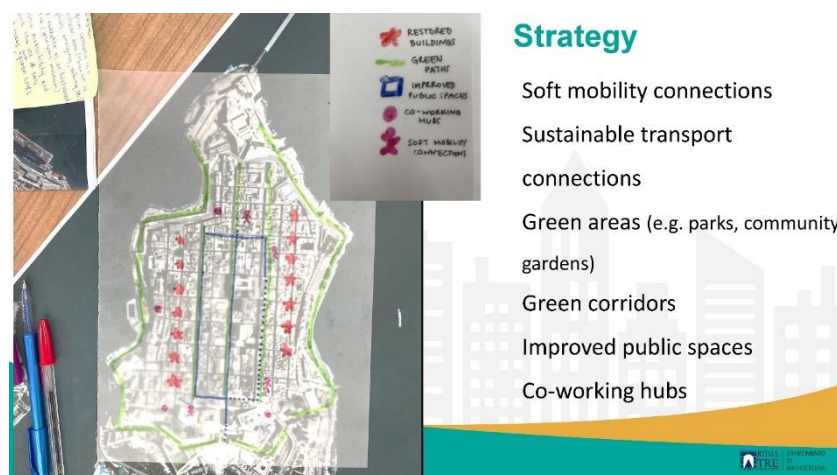


Figure 18: Group 1: elaborations of the strategy

During both exercises, the students interacted with one another and the tutors, and greatly appreciated the opportunity to be finally part of an in-person experience, in particular those who had already participated in the CITY MINDED online workshops a few months earlier.

Both groups produced original results, taking into account that most students had no background in town planning and visited the area for the first time.

## UNISI

On July 20, the Co-Working session coordinated by the two teachers from the University of Siena was held at the Valletta Design Cluster.

The exercise proposed had the following aims:

- Quantifying the Carbon Footprint (CF) of the City of Valletta;
- Quantifying the virtual equivalent forest area needed to absorb GHG emissions;
- Discussing potential policies (brainstorming);
- Simulating the CF mitigation of the City.



The co-working session began with a short presentation given by Dr. Maccanti to summarize to the students the theoretical part covered in the first week's lecture, the methodology, and the equation they will have to apply for the various calculations required. In the end, students were shown the planned timetable for the various steps into which the exercise was divided (Figure 19).

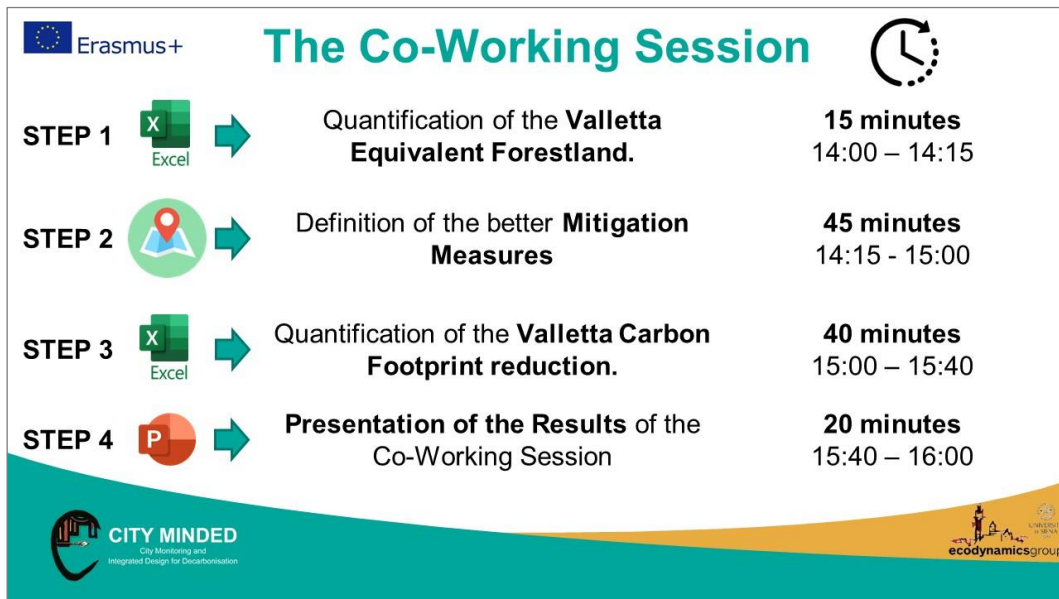


Figure 19: The time schedule for the UNISI co-working session.

The first part of the exercise (quantification of CF and virtual equivalent forest) was conducted individually, or in self-organized groups, the days before the co-working session. Therefore, students were divided into the two groups defined on the first day of the Workshop and were asked to present their results of the CF calculation and forest hectares. Some of the errors the students made were corrected, after which all the time available was devoted to mapping the mitigation strategies and identifying the best solutions for the study area.

The students started to identify the best measures for GHG emissions reduction based on the evaluations and maps carried out during the previous day in the co-working session coordinated by UNIROMA3 (see Figures 19 a-d as an example). The planned timelines were not met; the class started earlier and ended after the scheduled time (the lesson, therefore, lasted about three hours instead of two) because students spent a lot of time identifying the best solutions to apply in Valletta and calculating their mitigation effects on the total CF.

Students debated the best solutions, discussed, each presenting proposals and suggestions based on their knowledge, documented real-world virtuous examples, and debated with teachers from UNISI and other partners, resulting in choral work, a kind of small think tank, concrete, and tangible expression of a scientifically based cultural enhancement process for an instant planning of the city of the future.





At the conclusion of the afternoon's work, students fixed the summary of their analysis and conclusions on a paper map and a PowerPoint presentation, and one spokesperson from each group carried out a brief final presentation.

Both groups met and crossed the Carbon Neutrality goal for the city of Valletta as they focused heavily on the implementation of renewable energy facilities (particularly PV panels and wind turbines, both onshore and offshore floating). Some solutions, are listed below (for more details see Figures 20-21):

1. Increasing urban greenery;
2. Reducing energy consumption through the use of LED bulbs and more efficient household appliances;
3. Optimizing waste management system through increased recycling and energy production from waste (e.g., for the production of biogas and biodiesel);
4. Changing individual diets by reducing meat consumption (imagining, for example, the gradual increasing inclusion of products derived from insects), vegetables and local products.

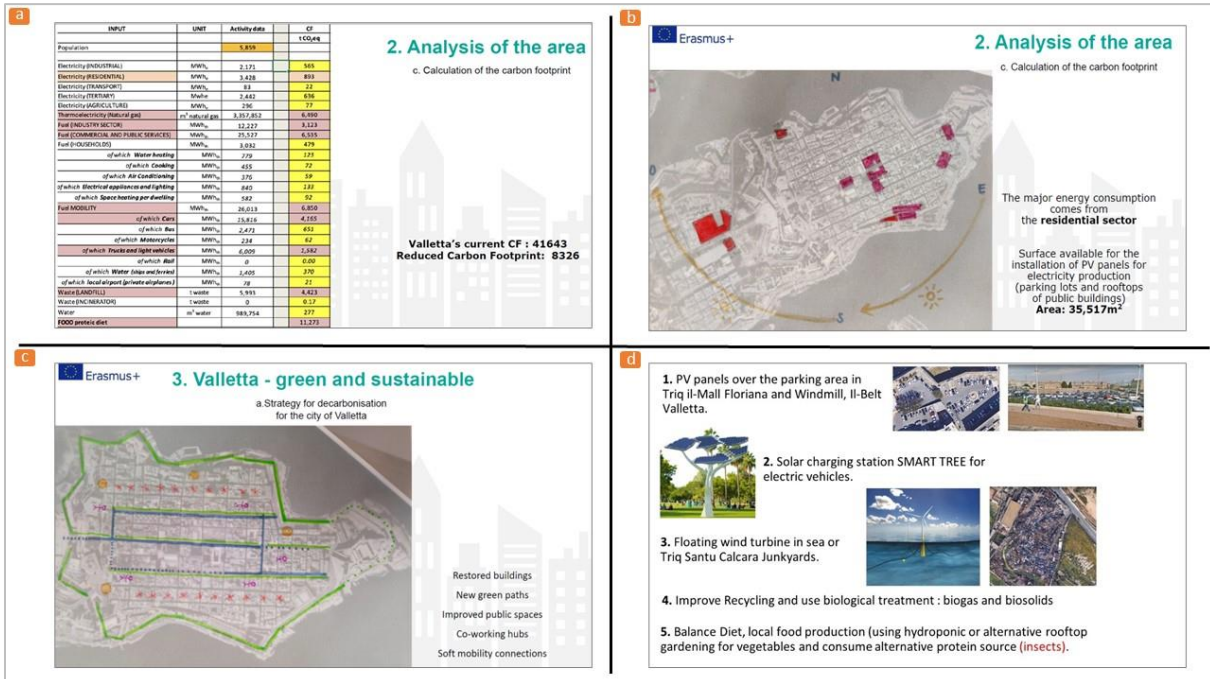


Figure 20: Group 1: Results summary: a); Total Carbon Footprint of the Area; b) Polygons identification to install new Photovoltaic (PV) panels; c) Map of the new green paths and soft mobility connections. d) Some policies chosen in the decarbonization plan.

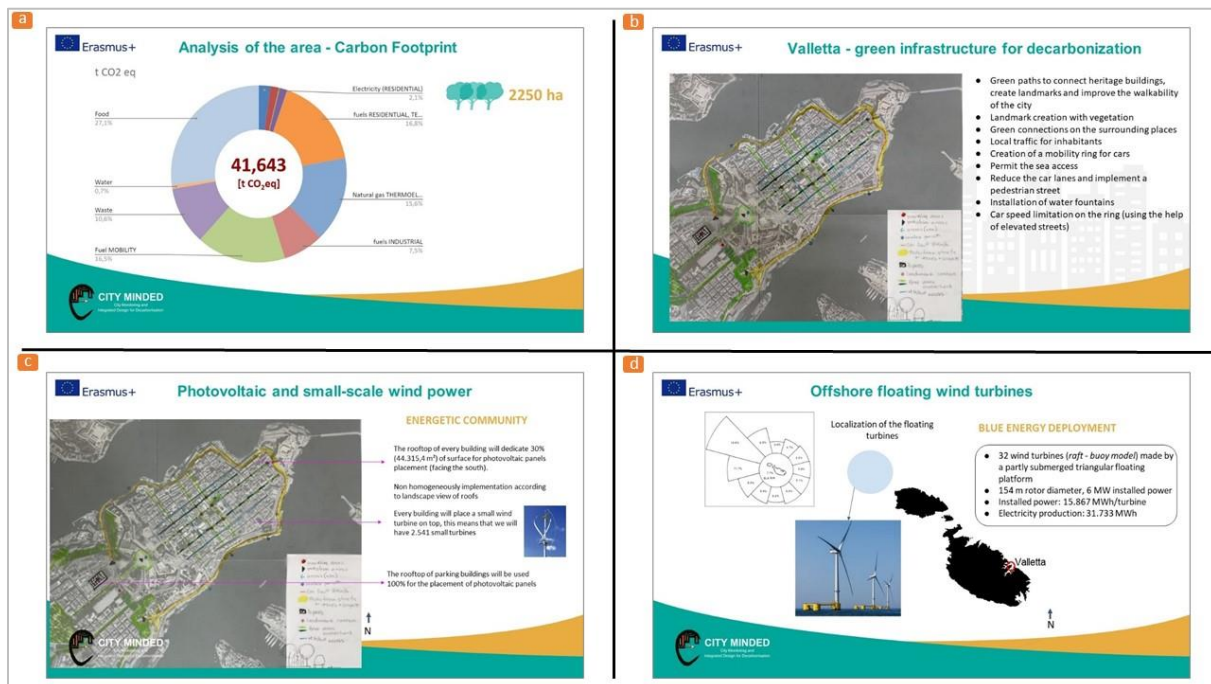


Figure 21: Group 2: Results summary. a) Total Carbon Footprint of the area; b) Current Carbon Footprint and virtual forest equivalent surface; c) Places identification for the installation of new PV panels and small wind turbines in the energetic community; d) Offshore floating wind turbines as the best decarbonization strategy.

## IRENA & MIEMA

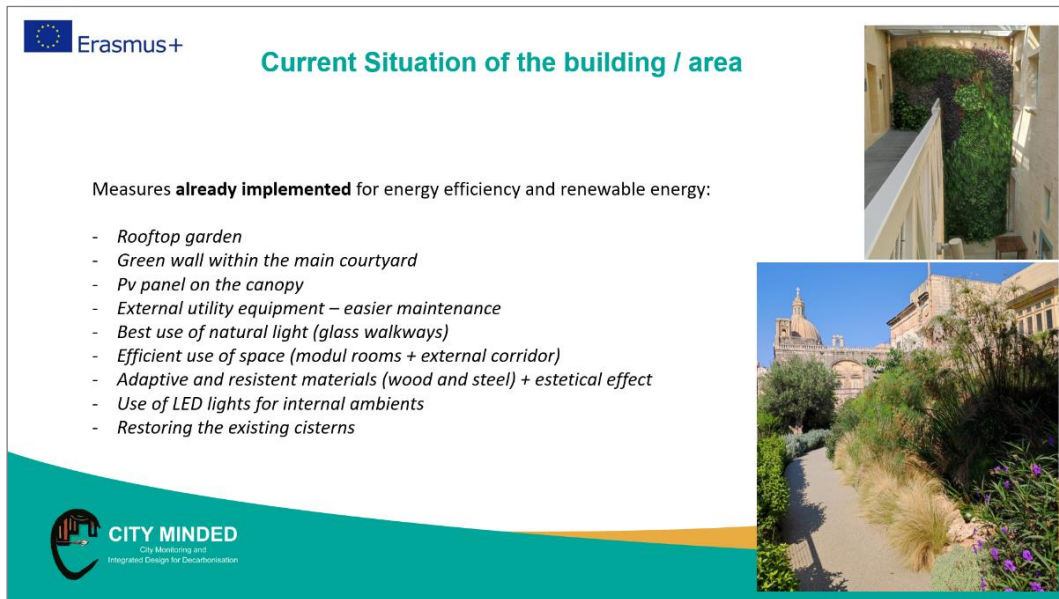
The exercise with the students was finally the occasion to test the methodology in a real environment. The students and teachers were divided in two groups and the exercise was divided into four main tasks, each following and complementing the previous one. The first group worked on the building of the Valletta Design Cluster. The first task was to identify the measures already implemented for energy efficiency and renewable energy. The second task was to propose additional measures to maximise the energy performance, the third one was to identify challenges and mitigation measures for the implementation of the proposed measures and the last task was to propose an implementation timeline (short, medium, long term). The second group had to select a building/group of buildings in Valletta and then identify aspects of the area which have a bad energy performance and what would be the main energy consumers. Then the group had to propose measures to maximise the energy performance (EE + RES) and identify challenges and mitigation measures for the implementation. The last task was to propose an implementation timeline (short, medium, long term) for the proposed measures.


The first group started their exercise with a walk around the building to identify any energy measures which were already implemented. The group identified the roof garden, green wall within the main courtyard, solar electricity panels on the canopy, good use of natural light





(glass walkways), efficient use of space (modular rooms + external corridor), use of adaptive and resistant materials (wood and steel), use of LED lights and restored existing cisterns. The existing measures are shown in Figure 22.





 Erasmus+

### Current Situation of the building / area

Measures **already implemented** for energy efficiency and renewable energy:

- Rooftop garden
- Green wall within the main courtyard
- Pv panel on the canopy
- External utility equipment – easier maintenance
- Best use of natural light (glass walkways)
- Efficient use of space (modul rooms + external corridor)
- Adaptive and resistant materials (wood and steel) + estetical effect
- Use of LED lights for internal ambients
- Restoring the existing cisterns




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Figure 22: Identified and implemented measures on the Valletta Design Cluster

Following the analysis of implemented measures, the group proposed several solutions to improve the energy efficiency of the building and maximise the use of renewables, as shown in Figure 23. The proposals included: increase the number of PV panels, movable PV canopy to increase the efficiency of solar retention, install sensors for the lights and water taps in the building, limit air conditioning temperature, ensure shading in roof garden to improve usability, improve air circulation to reduce the greenhouse effect, improve accessibility for persons with reduced mobility and provide a key map of the building. The identified challenges by the group were the establishment of the maintenance plan, how to ensure regular checks for PV and service equipment and the conservation rules.




Erasmus+

### Energy efficiency and RES Proposals

Proposals for VDC:

- Increase the number of **PV panels**
- **Movable PV canopy** to increase the efficiency of solar retention
- Sensors for the **lights** and **water taps** in the building
- Limit **Air condition** temperature
- **Shadow** (lighter tents) in roof garden to improve usability
- Improve **Air circulation** to reduce Greenhouse effect
- Improve **accessibility** for person with reduced mobility
- Provide a **key map** of the building



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Figure 23: Proposals for the improvement of the Valletta Design Cluster

The second group started their exercise by the on-site visit of the target area. The group selected a group of buildings located in Triq San Duminku in the historical centre of Valletta, shown in Figure 24.

Erasmus+

### Target Building / Area



- Historical centre of Valletta
- Location: *Triq San Duminku*
- Several holiday homes/apartments managed by Airbnb

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Figure 24: Target area chosen by group 2

As part of the analysis, the students walked around the building and took notes about the visible interventions or weaknesses. Then the group interviewed users and flat owners to collect valuable inputs regarding the energy performance of the buildings, interventions made and what are the challenges that the owners are facing, particularly in terms of energy consumption and living comfort. The current situation is summarised in Figure 25. The group identified absence of common areas, heritage regulation and accessibility as the main challenges of the area. As the mitigation measures, the group proposed the organisation of common areas on the roofs, the use of roofs for the installation of renewables and use of glass



PV cells if possible. As regards the accessibility, the group proposed installation of common wood ramp to avoid steps in the entrance of the block, and the adaptation of stairs and access from street to the roof for people with accessibility problems.

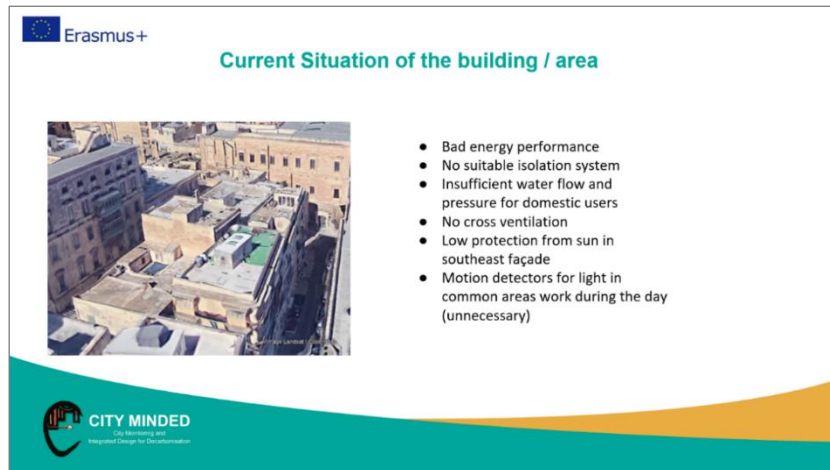


Figure 25: The analysis of the selected area

Following the analysis of the area, the group proposed the energy efficiency measures and renewable energy systems as shown in Figure 26.



Figure 26: The proposed solutions by Group 2



## 5. Intensive Course Conclusions

During the last day of the intensive course the two student groups presented a complete presentation including results from the different co-working sessions and proposed decarbonisation roadmaps for the city of Valletta. Participating students managed to integrate the different aspects of decarbonisation, making meaningful connections among the different modules as well as with the topics presented by the stakeholders to build tangible proposals to reduce the carbon footprint of the city. The decarbonisation roadmaps prepared by the two groups are included as an annex to this report.

A common conclusion drawn up after the presentation of the results by both group is that the developed methodology worked very smoothly in a real environment and that the workshops in presence give more opportunity to produce tangible results than the online ones. Nevertheless, the methodology developed as part of the City Minded Project can work both remotely and in presence, a result which brings added value to the project. The work between the students and teachers from different Universities and with different levels of knowledge has provided significant proposals for the decarbonisation of Valletta. The results of the roadmaps presented by the students during the last day can be used by stakeholders and practitioners to prepare actions aiming at achieving carbon neutrality in the coming years.

The city decarbonisation itinerant workshop served as an opportunity for the teachers from the different partners to test a different way to transmit relevant knowledge to their students on how a participatory decarbonisation agenda is outlined in the “real world” and on how the needs, expectations and personal commitment of local stakeholders and communities should be identified, mobilized and taken into account to optimize the effectiveness of such agendas. The participation in the Intensive Course also provided the students with a unique opportunity to apply the knowledge they acquired through their respective disciplines to a real-life case study.