Politecnico di Torino

1859

DEPARTMENT OF REGIONAL AND URBAN STUDIES AND PLANNING

MASTER'S DEGREE PROGRAMME IN

TERRITORIAL, URBAN, ENVIRONMENTAL AND LANDSCAPE PLANNING

CURRICULUM IN PLANNING FOR THE GLOBAL URBAN AGENDA

THE THIRD MISSION OF UNIVERSITY AND YOUTH ENGAGEMENT IN RENEWABLE ENERGY PROJECTS

Master Thesis by

Angelo Nonelli

Advisor

Prof. Dr. Patrizia Lombardi

Co-Advisor

Dr. Sara Torabi Moghadam

Academic Year 2020/2021

Degree	Master of Science in Territorial, Urban, Environmental and Land- scape Planning (Planning for the Global Urban Agenda)
Title	The Third Mission of University and Youth engagement in Renewable Energy projects
Author	Angelo Nonelli
University	
Advisor	Prof. Dr. Patrizia Lombardi Vice Rector of Politecnico di Torino Full Professor DIST - Interuniversity Department of Urban and Regional Studies and Planning Effective member of School of Planning and Design
Co-advisor	Dr. Sara Torabi Moghadam Research Assistant DIST - Interuniversity Department of Urban and Regional Studies and Planning

Ringraziamenti

Riassunto

Le Università giocano un ruolo sempre più fondamentale nel guidare lo sviluppo territoriale e regionale, in direzione della transizione energetica. Le tre missioni principali delle istituzioni di istruzione superiore sono l'educazione, la ricerca e quella che viene definita la "Terza Missione" dell'Università: il rapporto che l'Università instaura con il territorio per diffondere i risultati della ricerca e fornire il proprio contributo per uno sviluppo territoriale sostenibile. Considerando alcuni dei più importanti obiettivi dell'Agenda 2030, la riduzione delle emissioni e la prioritizzazione delle risorse rinnovabili nei sistemi di produzione energetica, tali enti hanno il compito di guidare le istituzioni locali e nazionali, e la cittadinanza intera. Tra le soluzioni e alternative per un futuro più sostenibile, le comunità energetiche (CE) rappresentano allo stesso tempo una sfida e un'opportunità per centri urbani e rurali, coinvolgendo innovazione tecnologica e sociale. La partecipazione dei cittadini rappresenta un punto chiave per il successo delle CE e nuovi metodi di coinvolgimento vanno ricercati e implementati, in particolar modo riferiti a quei gruppi della società spesso marginalizzati, vulnerabili e non inclusi nel processo di decision-making e pianificazione territoriale. Il progetto europeo SCORE, "Supporting Consumer co-Ownership in Renewable Energies", nell'ambito del quale questa tesi è svolta, si occupa dell'eliminazione delle barriere che impediscono di diventare parte attiva delle CE ai gruppi vulnerabili. Tra questi ultimi, troviamo sicuramente i giovani in età scolare. La tesi si occupa della ricerca dei progetti di Terza Missione delle Università italiane che negli ultimi anni si sono occupati di coinvolgere i giovani in iniziative orientate allo sviluppo sostenibile del territorio, quindi con una forte impronta territoriale e locale. In seguito alla ricerca, sono stati selezionati i progetti corrispondenti ai requisiti e ne sono state analizzate le caratteristiche. È stato sviluppato uno schema di riferimento che riassume ed organizza tali caratteristiche e variabili, da utilizzare come base per la realizzazione di progetti futuri destinati ai più giovani, nell'ambito dello sviluppo territoriale sostenibile. Utilizzando lo schema come guideline principale, la fase di progettazione è stata integrata con la metodologia della peer education, ritenuta adatta al gruppo target della ricerca. Con l'implementazione di tale metodologia, si è tentato di sviluppare un'attività che orientasse l'apprendimento in senso "orizzontale", tra peers, e non "verticale-gerarchico". La metodologia sviluppata è stata poi applicata a due casi studio, Oulx e Sestriere, situati in Val di Susa, Piemonte. La ricerca ha coinvolto 4 classi di terza media, per un totale di 66 ragazzi e ragazze. Infine, sono state sviluppate cinque raccomandazione finali, basate sui risultati ottenuti dal progetto.

Abstract

Universities play an increasingly fundamental role in guiding territorial and regional development in the direction of the energy transition. The three main missions of higher education institutions are education, research and what is called the "Third Mission" of the University: the relationship that the University establishes with the territory to disseminate research results and provide its own contribution for sustainable territorial development. Considering some of the most important objectives of the 2030 Agenda, the reduction of emissions and the prioritization of renewable resources in energy production systems, these bodies have the task of guiding local and national institutions, and the entire citizenship. Among the solutions and alternatives for a more sustainable future, energy communities (CE) represent both a challenge and an opportunity for urban and rural centers, involving technological and social innovation. Citizen participation is a key point for the success of ECs and new methods of involvement must be sought and implemented, especially in relation to those groups of society that are often marginalized, vulnerable and not included in the decision-making and territorial planning process. The European project SCORE, "Supporting Consumer co-Ownership in Renewable Energies", within which this thesis is carried out, deals with the elimination of the barriers that prevent vulnerable groups from becoming an active part of the ECs. Among the latter, we certainly find young people of school age. The thesis deals with the research of the Third Mission projects of the Italian Universities which in recent years have dealt with involving young people in initiatives aimed at territorial sustainable development, therefore with a strong territorial and local imprint. Following the research, the projects corresponding to the requirements were selected and their characteristics analyzed. A reference framework has been developed that summarizes and organizes these characteristics and variables, to be used as a basis for the design and implementation of future projects for younger people, in the context of territorial sustainable development. Using the scheme as the main guideline, the design phase was integrated with the peer education methodology, considered suitable for the research target group. With the implementation of this methodology, an attempt was made to develop an activity that would orient learning in a "horizontal" sense, among peers, and not "vertical-hierarchical". The developed methodology was then applied to two case studies, Oulx and Sestriere, located in the Susa valley, Piedmont. The research involved 4 last year secondary 1st level classes, for a total of 66 boys and girls. Finally, five final recommendations were developed, based on the results obtained from the project.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Background and Problem Statement

In 2014, the IPCC (Intergovernmental Panel on Climate Change) released a report clearly stating human influence on the climate system. From 1951 to 2010, the cause of the observed increase in global average surface temperature was identified in the anthropogenic increase of greenhouse gas emissions (GHG) concentrations: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). CO_2 emissions, due to fossil fuel combustion and industrial processes, are responsible for 78% of the total 1970-2010 GHG emissions increase. The main drivers of the CO_2 increase are global economic and population growths. The corresponding period, 1983-2012 was the warmest 30-year period of the last 1400 years in the Northern Hemisphere, and compared to the beginning of the 20th century, the global average temperature data registered a rise of 0.85°C. The temperature rise and changes in climate are responsible for severe impacts for people and ecosystems: shrinking of glaciers; sea level rise; alteration of hydrological systems; alteration in many terrestrial, marine and freshwater seasonal activities, migration patterns, abundances and species interactions; ocean acidification; etc. (IPCC, 2014)
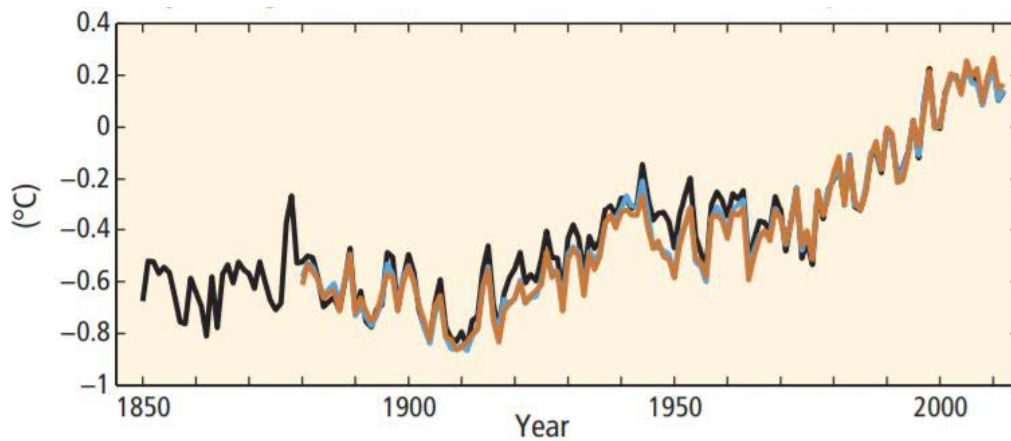
Figure 1: Globally averaged combined land and ocean surface temperature anomaly

Source: (IPCC, 2014)
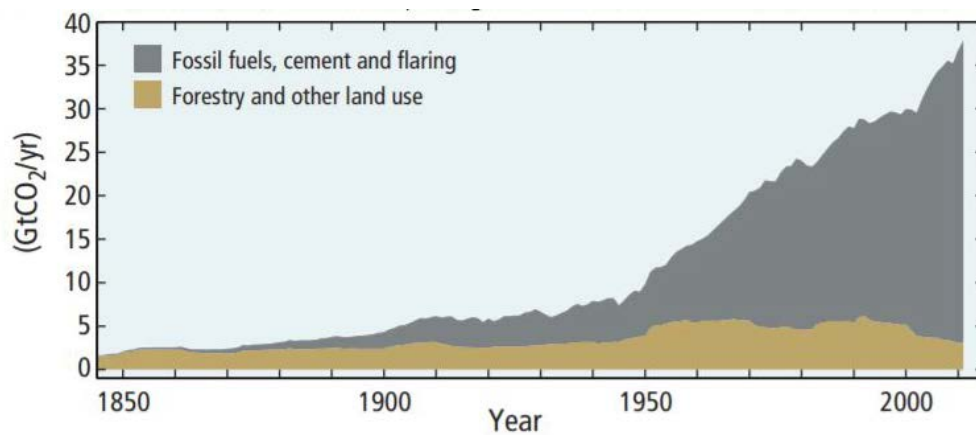
Figure 2: Global anthropogenic CO2 emissions

Source: (IPCC, 2014)

To limit climate change impacts requires the reduction of GHG emissions, and this reduction depends and relies both on socio-economic development and climate policies, mitigation and adaptation. (IPCC, 2014)

At the current pace, global warming is estimated to reach 1.5°C above pre-industrial levels between 2030 and 2052. Warming from anthropogenic forcings and influences will persist for centuries, causing long-term climate changes and associated impacts. Achieving sustainable development, especially from an environmental point of view, means having a chance of holding

the increase in global average temperature at 1.5°C, and below 2°C. Climate-related risks are higher for global warming of 1.5°C than at present, but lower than at 2°C. Compared to 2°C, limiting global warming to 1.5°C, means mitigating and reducing climate-related risks involving: by 2100, sea level rise projected to be around 0.1 meter lower; lower impacts on biodiversity and ecosystems, including species loss and extinction, retaining more of their services to humans; reduced increases in ocean temperature; lower risks to health, livelihoods, food security, water supply, human security, and economic growth; lower adaptation needed (IPCC, 2018).

Figure 3: Impacts and risks for selected natural, managed and human systems

Source: (IPCC, 2018)

In order to limit global warming to 1.5°C, emission pathways show that global net anthropogenic CO_2 emissions should decline by about 45% from 2010 levels by 2030, reaching net zero around 2050. To limit global warming to below 2°C, CO_2 emissions are projected to decline by about 25% by 2030 and reach net zero around 2070. (IPCC, 2018)

The 1.5°C scenario requires rapid and forward-looking transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems. The energy sector will have to achieve a lower energy use through enhanced energy efficiency, renewables are projected to supply 70-85% of electricity in 2050, while the use of coal would be reduced to nearly 0% of electricity. (IPCC, 2018)

3
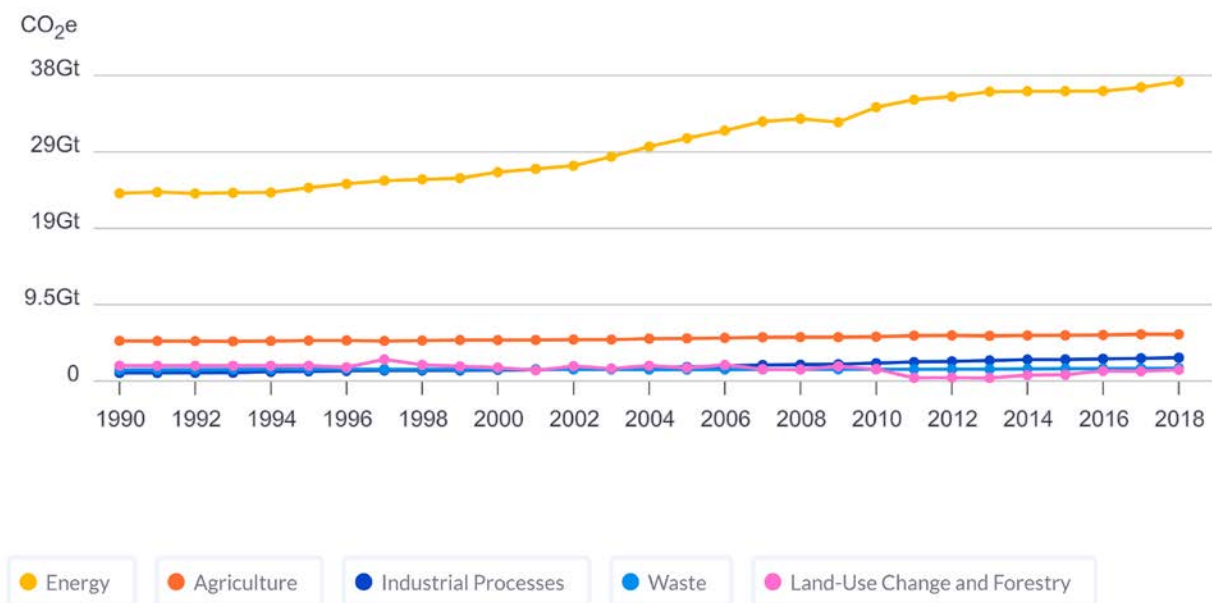
Figure 4: Global Historical Emissions

(Ge & Friedrich, 2020)

As shown in figure 4, global greenhouse gas emissions, and in particular CO_2, have grown 41% since 1990, and they continue growing. Separating the several sectors, electricity is the main responsible, contributing for 73% of the total GHG emissions and including electricity and heat production, transportation, buildings, manufacturing and construction. The generation of electricity and heat alone is responsible for 30% of the total (European Environment Agency, 2020).

Despite the negative global trend, in Europe the GHG emission intensity of total electricity generation has been decreasing by 50% since 1990, decreasing from 524 g CO2e/kWh in 1990 to 255 g CO2e/kWh in 2019 (European Environment Agency, 2020). Until 2010, increased efficiencies of transformation from fossil fuels to electricity had a role in decreasing carbon intensities, since 2010, the decrease in carbon intensities is mainly due to the transition from fossil fuels to renewable fuels in electricity generation. Also in 2019, EU's GHG emission intensity of electricity generation continued decreasing. If this trend continues, the decrease would be consistent with the EU's ambition to reduce greenhouse gases by 55% in 2030 (compared with 1990) and to reach carbon neutrality in 2050, therefore electricity generation

4

could be fully decarbonized. But to succeed in this mission, additional policies and measures are needed to significantly improve resource and energy efficiency and to spur even more the use and the deployment of renewable energy technologies (European Environment Agency, 2020).
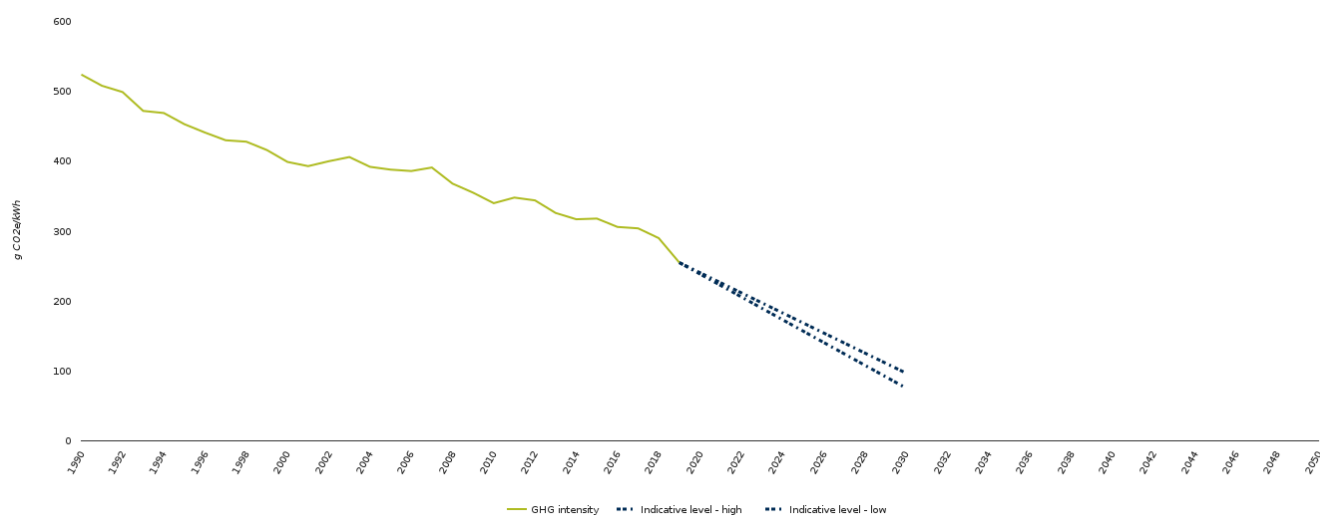
Figure 5: European level — Greenhouse gas emission intensity of electricity generation

Source: (European Environment Agency, 2020)

In 2019, the EU released a set of new policy reforms, the Clean energy for all Europeans package, consisting of 8 new laws, to help cut GHG emissions and move away from fossil fuels, contributing to the net-zero emission target to be reached within 2050, according to the Paris Agreement commitments. This new policy framework considers different sectors. The European building sector is the largest single energy consumer in the EU, being responsible for 40% of energy consumption and for 36% of CO2 emissions. By implementing measures to make buildings more efficient, the EU can achieve its climate goals faster. Each Member State will need to prepare national policy measures to achieve objectives like: paths to decarbonize buildings, smarter buildings, smart readiness indicators, E-mobility in buildings, more money and support to renovate, combat energy poverty. Concerning the renewable energy sector, the EU has set a target of at least 32% for renewable energy in the EU's energy mix by 2030. This target helps fight climate change, allows households and communities to become clean energy producers, increases energy security, creates more jobs and attracts new investments. It also puts

the consumer at the centre of the energy transition with a right to produce their own renewable energy. Another important sector is energy efficiency, as energy savings are the easiest way of reducing GHG emissions and at the same time save consumers money. The target for this sector is to increase energy efficiency by at least 32,5% by 2030. The last sector concerned is the electricity market design. The objective is to establish a modern design for Europe's electricity market, more flexible, more market-based, integrating a greater share of renewables. The new rules aim to protect, inform and empower consumers in the EU electricity sector. Switching suppliers will be easier; information about electricity and in electricity bills will be improved; identification of vulnerable and energy poor customers will be easier, and easier will be to target assistance and tackle the growing issue of energy poverty; consumers will be able to participate actively, individually or through communities, either by generating electricity and then consuming, sharing or selling it, or by providing storage services; consumers will have the right to request a smart meter and a dynamic price contract (European Union, 2019).

In the same direction as the Clean energy for all Europeans package, in 2019 was launched the European Green Deal, an action plan and set of policy reforms to tackle Climate Change and reach carbon neutrality within 2050, and in particular 1) to boost the efficient use of resources by moving to a clean, circular economy and 2) to restore biodiversity and cut pollution (European Commission, 2019b).

Within the broad European Green Deal and Clean energy for all Europeans package framework, the role of European cities become extremely important. Europe is a highly urbanized continent, cities are its economic engine. About 75% of Europe's population live in urban areas and that figure is expected to rise to 80% in 2050. To achieve the objectives set by the Paris Agreement, the Green Deal and the Clean energy for all Europeans package, ensuring a sustainable urban environment and a sustainable urban energy transition is vital, as cities play a key role in Europe's transition towards carbon neutrality. In the EU there are less than 30 cities with a population of more than one million, with only Paris and London that can be considered megacities (more than 10 million inhabitants). Despite the essential role of the European Union, cities and their governance bodies are best placed to act locally and tackle environmental issues, while providing for reforms that enhance citizens quality of life. Next to the traditional

management sectors, waste, water, public transport and land use, today they become protagonists also on the energy transition paths and climate change adaptation. Urban environmental sustainability promotes transition of urban areas and innovation, improves livability, reduces environmental impacts and maximizes economic and social benefits. Based on the stakeholder-led assessment process, the European Environment Agency (EEA), developed a conceptual model representing the inherent complexity of urban systems and to assess the role of cities in urban transitions. The model and EEA report, show how cities are unique in many ways, with contextual factors that influence the drivers and barriers to urban transitions. Therefore, being cities heterogenous, flexibility will be the key to put in place measures that work best for each situation. Among the several urban sectors, opportunities for environmental sustainability measures should focus on the following: urban mobility and land use, retrofitting buildings, enhancing the role of green spaces (European Environment Agency, 2021).

Among the measures considered and alternatives for a sustainable energy transition, energy communities initiatives offer new opportunities for citizens to get actively involved in energy, transforming the energy system. Energy community refers to collective energy actions that foster citizens' participation across the energy sector. The EU formally defines specific types of energy communities: renewable energy communities and citizen energy communities. According to the European Commission's Clean Energy for All Europeans Package, prosumers and their collective forms will play a prominent role in the future energy system that are now provided with an enabling legislative framework. Energy communities are rapidly increasing, thanks to the renewable energy support schemes providing incentives and increased awareness on collective actions. The engagement of citizens in collective energy actions can bring social and energy transition benefits, raising citizens decision-making power in the renewable energies sector. One of the main potential social innovations of energy communities is the fact that the aim is that to involve citizens independently of their income, ensuring that the benefits of decentralization are shared with low-income citizens, therefore reducing energy poverty and lowering the barriers that prevent socially vulnerable groups from participating in distributed generation and communities (Caramizaru & Uihlein, 2020).

In September 2015, the UN summit held in New York launched the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals, a 15-year ambitious plan of action for people, planet and prosperity. The 17 Sustainable Development Goals and 169 targets are integrated, interlinked and indivisible, and tackle the three dimensions of sustainable development: the economic, social and environmental.

The main goals are eradicating poverty, extreme poverty and hunger, considered the greatest global challenge and an indispensable requirement for sustainable development, along with protecting the planet and improving the lives and prospects of everyone, everywhere. Grounded in the Universal Declaration of Human Rights and international human rights treaties, achieve gender equality and the empowerment of all women and girls are also at the core of the Agenda's purpose, seeking to build on the Millennium Development Goals and complete what they did not achieve. (United Nations, 2015)

This was an historic step and act of commitment, signed by all UN Member States, that recognized the importance of tying together the objective of a life of dignity for all and the protection of the planet, through a comprehensive, forward-looking and people-centred plan.

Among the main issues addressed in the Agenda 2030, Climate change, and its consequences and threats, are one of the greatest challenges of our time.

The target 4.7 states: "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development" (United Nations, 2015).

The target 13.3 states: "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning" (United Nations, 2015).

The target 16.7 states: "Ensure responsive, inclusive, participatory and representative decision making at all levels" (United Nations, 2015).

With these three targets, the SDGs focus specifically on the role that education plays in the public engagement in sustainable development, and specifically towards young generations.

The Agenda 2030 goals and targets have been designed and written thinking about the future; for a bright and sustainable future, for all, and for the planet. Working and thinking about the future imply automatically thinking about the young generations. If the strategies and plans designed to make policies and measures effective, to achieve a sustainable development, energy transition, and all the objectives set by the international agreements signed during the last years, if all these strategies don't engage youth as one of the first stakeholders to be involved, they will miss an important point.

Young generations are the citizens, the consumers, the stakeholders of tomorrow. Addressing their engagement since their early age means shortening the time needed to realize effective change in people's behaviours and mentality, in favour of a sustainability awareness at large scale. In essence, young people are the pillars and driving force to the success of SDGs (Yahya, 2020).

This thesis, focuses on goals 4, 7, 11, 13 and 16.

1.2 The SCORE Project

The SCORE (Supporting Consumer Ownership in Renewable Energies) project, within the framework of the EU Research and Innovation programme Horizon 2020, was funded with € 1 988 625, out of the € 80 billion of funding available for the whole European programme over the 7 years of its duration (2014 to 2020).

SCORE lasted from the 1st of April 2018 to the 31st of March 2021, coordinated by European University Viadrina Frankfurt (Oder), Germany, and backed by the SCORE consortium of the following organisations, from five EU countries (Bulgaria, Czech Republic, Germany, Italy, Poland): Centre for the Study of Democracy; Město Litoměřice; Miasto Słupsk; Climate Alliance; City of Essen; co2online; Consorzio Forestale, Regione Polveriera; Cooperativa La Foresta; Cooperativa Sociale Amico; Deutscher Caritas Verband (in coop. with Energiereferat, Frankfurt/Main); Federacja Konsumentów; Politecnico di Torino; Porsenna.

Among the Sustainable Development Goals (SDGs), mainly focuses on Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable".

The aim of SCORE is to facilitate co-ownership of RE for consumers first in three European pilot communities, the Susa Valley (Italy), the city of Słupsk, (Poland) and the city of Litoměřice (Czech Republic), and later also in various other follower cities across Europe. In particular, its aims differentiate in (1) overcoming the energy use from fossil sources by adopting energy from renewable sources, (2) increasing energy efficiency of the building systems (e.g., envelope or energy system) and (3) reducing energy consumption related to building/neighbourhood users' behaviour (SCORE Consortium, 2019).

For a successful transition from fossil fuels to renewable energies (RES), financial, technical and social innovations are essential prerequisites. To achieve its objectives, SCORE's strategy is to build new energy infrastructures and motivate consumers to change their consumption habits, in order to balance demand with a volatile energy supply and to increase acceptance of new technologies like smart meters. Integrating the social, financial and technical aspects, consumer (co-)ownership in RE is an essential cornerstone for a successful outcome in energy transition.

Consumer (co-)ownership means that individuals/families shift from being just consumers and become what is called "prosumers", acquiring ownership in RE and generating part of the energy they consume. In this way, prosumers' behaviour in energy consumption is likely to change positively, they reduce the overall expenditure for energy and receive a second source of income from the sale of excess production (Torabi Moghadam et al., 2020).

One of the main challenges for prosumerism is finding ways to involve vulnerable social groups, affected by fuel and energy poverty, excluded from RE investments, in particular when it's about unemployed, women participation. Prosumerism is not widely implemented across Europe yet, and where it is present, the typical prosumer is male, middle aged and with a higher income.

It is therefore important to stress the potential of this democratic participation, especially for women and low-income households. To fight energy poverty, the participation of these under-represented groups is necessary, through financial empowerment and social protection. The aim is to formulate policy recommendations at the EU and national levels to promote prosumerism, mainly focused on women and low-income households and on the removal of barriers for consumers to become active market players (Torabi Moghadam et al., 2020).

The strategic approach envisages the application of inclusive financing techniques, in particular Consumer Stock Ownership Plans (CSOPs), tailored to the needs of the target group of the project, vulnerable groups affected by fuel poverty and cut out from RE investments.

A consumer stock ownership plan (CSOP) is a financing technique that employs an intermediary corporate vehicle and facilitates the involvement of individual investors through a trusteeship (Lowitzsch, 2020). CSOPs enable consumers – especially those without savings or access to capital credit – to acquire an ownership stake in a utility they use and thus to become "prosumers". It is a consumer-centred investment model for general services providing participation both financially and in regards to management decisions. Avoiding personal liability of the consumer-shareholders, a CSOP permits co-investments of municipalities, small and medium sized enterprises (SMEs) and other local stakeholders. An intermediary entity (CSOP-Ltd.) invests into a new or existing RE plant and operates it on behalf of different actors as co-owners (Lowitzsch, 2019). Local and regional bodies involved in the project receive legal

and technical advice for a tailor-made participation model. Learning from best practice examples, the aim is to engage local stakeholders as well as the public, and engage in a peer-to-peer exchange with other public authorities active in the project and visible as forerunners in RES in Europe. The project's expert pool supports and advices local authorities, comparing existing models of consumer co-ownership and developing best practice manuals and templates for "prosumer financing", to further spread best practice examples across the EU.
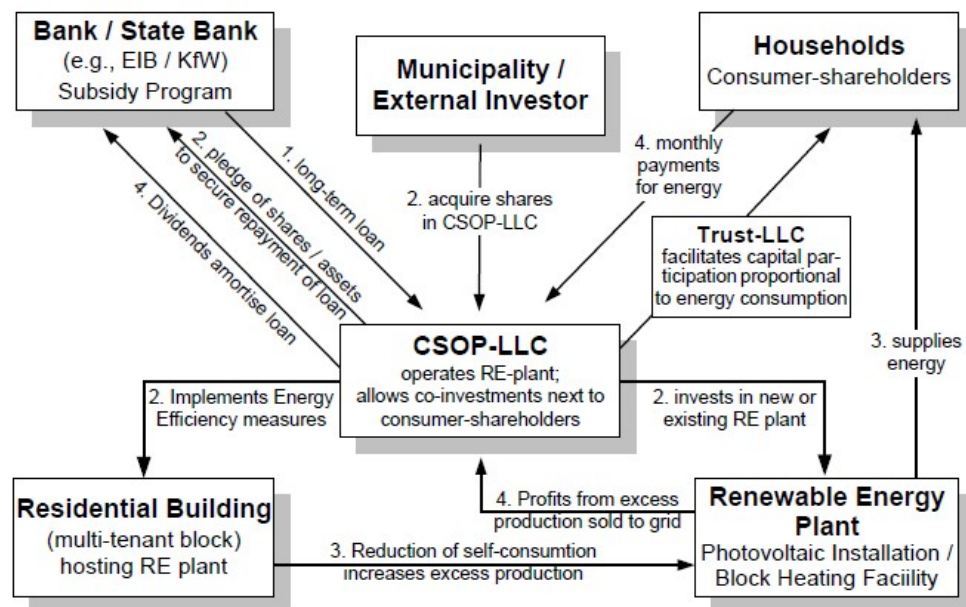
Figure 6: Financing structure of a Consumer Stock Ownership Plans (CSOPs).

Source: Lowitzsch, 2020

In the three European pilot communities, the objective of SCORE is to extend existing renewable energy projects at community scale to include local consumers and citizens with the active involvement of the local government body, through the implementation of innovative prosumer RE investments.

The five countries at the focus of the project are Germany, Italy, Bulgaria, Poland and Czech Republic and these can be seen as representatives for the EU both in old and new member states with differing prevalent political priorities. In three European pilot communities, SCORE project implement the following low carbon energy sources: Susa Valley (Italy) with Biomass; Essen (Germany) with Photovoltaics; and Litomĕřice (Czech Republic) with Photovoltaics. This thesis research relates to the Italian pilot community realized in the Susa valley, Piedmont (SCORE Consortium, 2019).

1.3 Research Objectives

In line with the objectives set by the European SCORE project, relating to vulnerable stakeholder involvement in Renewable Energy projects, this thesis research objectives focus on the underrepresented social group of youth, a category usually cut out and forgotten by the stakeholder involvement initiatives relating energy decision-making processes.

The research focuses in particular on the role that Universities Third Mission projects could have within society, promoting territorial regional and national sustainable development strategies, specifically engaging young teenagers in these topics, during their primary and secondary school years. The first main aim of the thesis is to assess the state of the art, in terms of recent Third Mission projects targeting youth, and analyzing the amount and the characteristics of the selected projects. Secondly, based on the research carried out, the second main objective envisages the elaboration of a framework summarizing the features and characteristics analyzed, in order to create a reference guide for the design of future Third Mission projects engaging youth in territorial sustainable development. Thirdly, the following step envisages the application of the elaborated framework and the design of a new project targeting young students. The last step envisages the application of the designed project and the methodology to the selected case studies. Finally, based on the results of the projects, the objective is the elaboration of recommendations applicable at local, regional and national level.

13

It follows the list of the research objectives:

1. Overview, selection and analysis of Italian Universities Third Mission projects, targeting youth, to engage them in territorial sustainable development.

2. Based on the previous selection and analysis, extraction of relevant characteristics features and elaboration of a framework that serves as a guideline for the design of future projects.

3. Based on the framework elaborated, design of a new project to engage youth in territorial sustainable development.

4. Application of the new project to the selected case studies.

5. Elaboration of recommendations.

1.4 Thesis Structure

Following the objectives described in the previous section, the thesis is organized in five main chapters.

Chapter 1, presents an introduction to the background and the problem statement that justify and give relevance to the research carried out in this thesis. It gives an overview on the problems related to climate change and energy transition and it presents the opportunity and challenges represented by alternative social and energy supply models like energy communities, and the importance of stakeholder involvement and mainly youth involvement.

Chapter 2, consists in a literature review related to the main topics dealt with: energy communities, University Third Mission and stakeholder involvement tools. The energy communities literature gives an overview on the legislative and national context; the University Third Mission literature analyses the Italian official documents and context characterizing the

Third Mission role; and the stakeholder involvement literature provides a set of alternatives researched and experienced for the engagement of the public in different fields.

Chapter 3, consists in the elaboration and development of the methodology carried out in this thesis. The chapter is organized in two main phases: Phase 1 and Phase 2. Phase 1 consists in the Italian Universities Third Mission projects overview and selection of those engaging youth in territorial sustainable development and in the consequent elaboration of a framework describing and organizing features and characteristics for the design of future projects. According to these tasks, Phase 1 is organized in two main steps, Step A and Step B. Step A consists in the Italian Universities Third Mission projects overview; Step B consists in the framework elaboration resulting from the projects analysis of the previous step. Phase 2 consists in the application of the elaborated framework for the design of new projects aimed to engage youth in territorial sustainable development, and in the selection of the case studies for the implementation of the new project. As for Phase 1, also phase two is divided in two steps, Step C and Step D. Step C consists in the framework elaboration and visualization; Step D consists in the case studies selection and description.

Chapter 4, presents the application of the new project designed in the previous chapter, to the selected case studies of Oulx and Sestriere, in the Susa valley. At the end of the projects the main differences and results have been described. Based on these, 5 general recommendations have been elaborated as contribution to the Third Mission project design objectives and to promote youth engagement in sustainability and sustainable development projects.

Chapter 5, summarize the lessons learned and the limitations addressed in this research, elaborating some conclusive thoughts for eventual future developments.

2. LITERATURE REVIEW

2.1 Energy Communities

Since 2010, the definition of energy sustainability provided by the World Energy Council, the principal impartial network of energy leaders promoting an affordable, stable and environmentally sensitive energy system for the greatest benefit of all, is based on three core dimensions: Energy Security, Energy Equity, and Environmental Sustainability of energy systems. The result of the balance between these three goals constitutes the 'Trilemma Index'. Balancing the three dimensions is the cornerstone for the prosperity and competitiveness of each country. Every year the World Energy Council compares the energy systems of 128 countries and assess the energy system performances of these countries, reflecting the three Trilemma dimensions balance and robustness (World Energy Council, 2020).
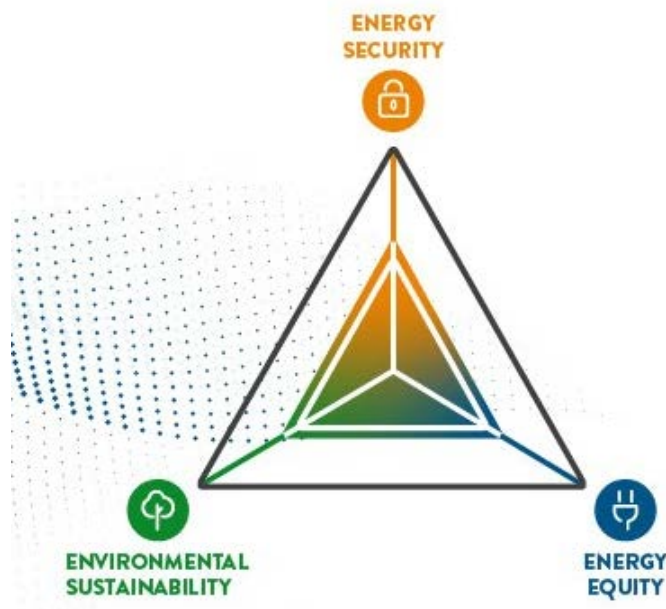
Figure 7: The Trilemma Index

Source: (World Energy Council, 2020)

Energy Security measures the ability of countries to meet current and future energy demand, withstanding and responding to system shocks, minimizing disruption to supplies. It covers domestic and external energy sources management effectiveness, along with energy infrastructure's reliability and resilience. Energy equity measures a country's ability to provide universal access to reliable, affordable, and abundant energy (electricity, gas, and oil) for domestic and commercial use. Environmental sustainability of energy systems measures the ability of countries to mitigate and avoid environmental degradation and climate change impacts, focusing on productivity and efficiency of generation, transmission and distribution, decarbonisation and air quality (World Energy Council, 2020).

During the last years, global energy transition has been driven by the interaction of broader trends in Digitalisation, Decarbonisation and Decentralisation. During the 24th World Energy Congress, held in 2019, a 4th element was added to the previous trends: Disruption-as-usual. Discussing this new emergence, and even more with the impact of COVID-19 global pandemic, in an era of disruption-as-usual and social change, leaders agreed on a needed shift from supply-centric to customers-centric energy systems. It followed a new vision of the World Energy Council focused on humanizing the energy sector. This vision consists of four main aspects: shift of value creation toward end-user and demand-side to reshape supply; foster the access to energy production within and between countries; engage people impacted by energy transition in designing and managing the process, including workers and local communities; make the price of new technologies affordable for communities, considering the full cost to society of energy transition (World Energy Council, 2020).

 In 2019, the Clean energy for all Europeans package set on an ambitious path, aimed at providing a clean and just energy transition, tackling all sectors of economy and social organization, from energy generation to the building sector, promoting energy efficiency and spurring the shift toward renewables. The measures envisaged by the package are meant to be a combination of regulatory tools and market forces: the objective of this combination is to encourage private investments in renewables when it makes economic sense, and instead to use EU funding when the market forces are not sufficient. The designed measures mainly target

private citizens, beside businesses, in fact they are designed to allow citizens to take greater control and responsibility on their own energy footprint. The ambitious plan of the package is expressed by the slogan "energy efficiency first" that sets the target of energy efficiency increase of at least 32,5% and at the same time, raise to 32% the share of renewables in the European energy production, all within 2030. These targets are set at European level, but each Member State is then responsible for the design and implementation of measures in order to reach the established goals, through the National Energy and Climate Plans (NECPs), that are also requested to draw an overall strategy for 2050. Besides GHG emissions reduction, looking at 2050, the energy transition is expected to spur economic growth, increase job opportunities, enhance the quality of life for all and empower citizens on many levels, especially their energy use. New job opportunities are mainly focusing at the local level, providing new resources and innovation to local SMEs. In this context Research and innovation has a special role to play in the energy transition, as through innovative technologies is possible to achieve increasingly energy efficiency and reduce the costs of energy production from energy sources, while at the same time improving worldwide competitiveness in the renewables energy production sector, aiming at maintaining a leader position in the renewables technology sector (European Union, 2019).

Moreover, by increasing local energy production from renewables, European States would become less dependent on imports and foreign countries, increase their resilience and their energy security, and save a massive amount of money currently invested for energy imports. To promote the achievement of energy security, the strategy is to create a more flexible and adaptable European energy market that follows and adapts to the characteristics and variables of intermittent renewable energies. Cross-border trades will be improved and strengthened by new regulations, making the flow across Europe of renewable energy easy and cheap. To achieve energy security, the interconnection of electricity and gas grids will also be necessary (European Union, 2019).

The EU objective is to realize a plan for an energy transition benefitting all citizens, no one excluded. According to estimates, more than 50 million Europeans are affected by energy poverty and Member States are required to monitor the situation through the Energy Poverty

Observatory. The new perspective aimed at strengthening the role of end-consumers in the market is oriented to empower vulnerable societal groups, like those affected by energy poverty. On average, Europeans spend 6% of their total expenditure on energy. However, lowest-income households in the last years spent 9% of their total expenditure, corresponding to a 50% increase. This is why socio-economic aspects and energy transition are deeply interrelated and the reason for putting at the center of the Clean energy package consumers empowerment and giving them ownership of the energy transition. Consumers will be provided with more transparent energy information, certified price comparison tools, smart meters to measure energy consumption and costs and with a more dynamic energy market and suppliers where switching suppliers will be easier and faster, fostering competition and more available options. Enhanced digitalization, smart grids, IoTs, storage systems will provide consumers, through the new regulatory framework enabled by the Clean energy package, more options to reduce energy consumption. It will be easier to invest in renewable energy and recover shortly from the investment. In particular, investing in the building sector is essential for the clean energy transition and to achieve a carbon-neutral and competitive economy. In Europe, the building sector is responsible for 40% of final energy consumption and for 36% of GHG emissions (European Union, 2019).

Worldwide, since 2000, there has been an increase in floor area of 65% and the electricity use in buildings grew five times faster than improvements in the carbon intensity of power generation. In the energy transition strategies, by 2050, the building sector is the sector expected to cut emissions more than any other, cutting fuels combusted directly in buildings by 75%, through eliminating almost completely coal use in building, reducing by 85% the oil consumption and cutting of 50% gas consumption. Electricity in energy use in buildings is expected to go from 33% in 2017 to 55% in 2050 and paired with a clean electricity lead buildings-related emissions to be reduced to one-eighth of current levels. Even if globally the floor area doubles, cost-effective technologies, high-performance buildings construction and energy renovations are expected to cut the sector's energy use by 30% by 2050, combining clean power generation with increased electricity consumption in the building sector. Through reallocation of capital and new policies, end-users' energy investments are expected to increase by 65%, leading to relevant cost savings for households and businesses and long-term returns achieved thanks to the building's energy transition. To address the challenge of end-users' investment, governments need to step in with

innovative policies to de-risk clean energy investment, to improve access to finance and lower the barriers for a clean energy transition (IEA, 2019).

The increased affordability of renewable energy technologies and digitalization, and the emergence of new technologies, is making the need for the distribution of renewable energies and an integrated energy system an unavoidable necessity. The current energy system, still functioning on various parallel, not interconnected, vertical energy value chains needs to be translated into an integrated energy system, conceived as a whole, in its planning and operation tasks, including multiple energy carriers, infrastructures and end-use sectors, in line with the SDGs and the Agenda 2030. An integrated energy system would empower consumers, making them active actors in the energy market, and lower their costs in energy transition. A new strategy launched by the European Commission aims at accelerating the transition to an integrated energy system through the proposal of concrete policy and legislative measures at EU level. The integration of the energy system addressed by the European Commission foresees four main concepts: a more circular energy system, focused on energy efficiency; a greater direct electrification of end-users; use of renewable and low-carbon fuels for end-use applications where direct heating or electrification are not possible; a multi-directional system, where consumers play an active role in energy supply (European Commission, 2020).

As stated above, the European Commission and global energy-related organizations recognize the role that end-consumers, local businesses and SMEs, and private citizens will increasingly play in the energy market and how this active role must be promoted and fostered in order to achieve the Agenda 2030 targets and an energy carbon neutrality by 2050. By recognizing new rights for citizens to engage directly in the energy market, also new types of communities are legally recognized by legal frameworks: the energy communities (EC). The Council of European Energy Regulators in 2019 defined at European level and from a legislative perspective the main differences between self-consumption, collective self-consumption and energy communities (Council of European Energy Regulators, 2019).
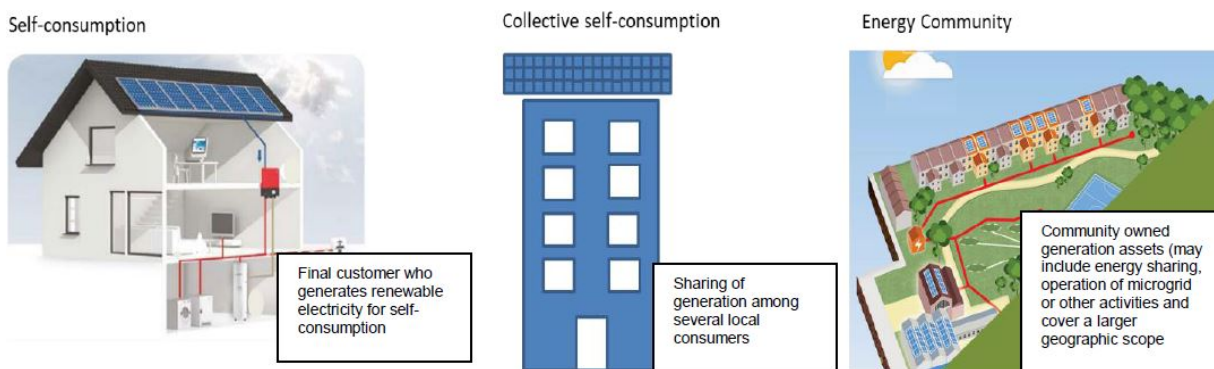
Figure 8: Diagram showing self-consumption, collective self-consumption and energy community

Source: (Council of European Energy Regulators, 2019)

Individual self-consumption concerns production and consumption of energy produced within one's own private property. Collective self-consumption concerns the direct sharing of electricity between producers or self-consumers and other final customers. Energy communities, differentiate in Citizen Energy Communities and Renewable Energy Communities (Council of European Energy Regulators, 2019).

The legal tools that define Energy communities are the revised Renewable Energy Directive (EU) 2018/2001 and the revised Internal Electricity Market Directive (EU) 2019/994. The main difference between the two is that the first relates specifically to renewable energies and defines "renewable energy communities" while the second concerns all types of electricity and defines "citizens energy communities". The similarities between the two types are manifold: both types can take different forms of legal entities: associations, cooperatives, etc.; in terms of governance, the participation must be open, voluntary and non-discriminatory; effective ownership and control by citizens, local authorities and local SMEs are to be fostered; the main benefits are intended to be social and environmental, and non-commercial oriented; the activities envisaged by both types of communities relate to energy generation, aggregation, distribution, supply,

consumption, sharing and storage, always performed in a non-discriminatory way, depending on the context (Caramizaru & Uihlein, 2020).

In terms of differences: renewable energy communities are restricted to the immediate vicinity to the energy source while citizen energy communities don't have this limitation; renewable energy communities are limited by the use only of renewable sources while citizen energy communities can use also fossil fuels; in terms of participation, citizen energy communities are open to all actors, renewable energy communities instead involve natural persons, local authorities and local SMEs and foster the participation of low-income or vulnerable households; renewable energy communities should remain autonomous from individual members or market actors participating as members while citizen energy communities don't mention autonomy but exclude from decision-making process those members involved in energy sector as economic activity; in terms of effective control, renewable energy communities can be controlled by SMEs while in citizen communities SMEs are excluded from control powers (Caramizaru & Uihlein, 2020).

The most common energy communities are involved in renewable energy production, however new legal forms and new activities are being taken on by energy communities. The activities in which ECs are involved involve: generation and sale to suppliers of energy produced through generation assets (solar, wind, hydro, etc.); sale of electricity and gas to customers; production and self-consumption inside the community; distribution of energy through owned or managed local electricity grids or district heating networks; energy efficiency or energy savings services; services connected to electro-mobility; legal and management advice and consultation (Caramizaru & Uihlein, 2020).

Among the possible governance models there are energy cooperatives, limited partnerships, community trusts and foundations, housing associations, non-profit-customer-owned enterprises, public-private partnerships, and public utility companies. The most common form of energy communities are cooperatives, a type of social and economic enterprise, usually relying on strong community traditions, and in which local citizens buy shares to finance a renewable energy project, in some cases also self-consuming and sharing the energy produced. The limited partnership legal form, more suitable for high investment volumes, also involves strong citizen

participation together with the participation of a limited liability company as a general partner (Caramizaru & Uihlein, 2020).

Concerning citizens participation, three main categories of drivers have been identified: socio-cultural and economic factors, energy policy factors and local-specific-contextual factors. The first category plays a strong influence on citizens participation and causes multiplication of energy communities. In the EU, higher income countries, with greater access to capital and readiness to investments, show a greater concentration of energy communities projects. Traditions and political history also play an important role, affecting the attitude toward cooperative and social dynamics. Economic benefits, higher levels of education, willingness to engage in the community, environmental concerns and interpersonal trust appear to be interconnected elements. Concerning the energy policies factors, the government role seems to play a central role in the increase or decrease of the number of energy community initiatives. Feed-in-tariffs are policy measures that offer cost-based compensations to renewable energy producers and price certainty through long-term contracts, enabling small-scale producers and communities to receive money for their investment. Feed-in-tariffs have been implemented especially in countries with strong local citizens ownership tradition. In several countries, the introduction of feed-in-tariffs corresponded to energy communities initiatives increase and increase of local businesses and citizens' investments. On the contrary, reductions in feed-in-tariffs presence as shown by several examples often corresponds to a reduction in energy communities initiatives. Governments can also influence citizens' willingness to invest in renewable projects by modifying electricity prices. In fact, the increase of national electricity prices spurs the creation of energy communities producing cheap and clean energy. Other powerful drivers motivating citizens to engage in energy communities involve financial reasons (firstly cheaper energy bills), but even more environmental and social purposes and the aim of achieving self-sufficiency from an economic and energetic point of view (Caramizaru & Uihlein, 2020).

Energy communities and in general energy transition are important changes affecting both the energy and economic systems but also and in particular civil society and social organizations. It would be reductive to consider energy transition as a technical and economic phenomenon

excluding the social aspect. Indeed, in the EU perspective the main objective is to create social innovation and energy communities have to be intended as grassroots innovations, connected to conflicting issues of local culture, political institutions, values and social norms. A typical issue of energy communities establishment is the presence of local opposition to renewables. Commitment to the place, community involvement through the whole process and outcomes are characteristics of such initiatives. Even if profit and economic aspects represent important driving elements, local community services and quality of life enhancement have a stronger influence and driving influence on citizens. Community and citizens ownership over the renewable project and infrastructure is also a central point. Energy communities can lead to a series of benefits: through the implementation of ECs, local territories may achieve energy independence, reduce local emissions and provide against local energy poverty, while making local economy investments-attractive and create new jobs; citizens empowerment and democratic dynamics are reinforced through the management and decision making process of ECs; generating profits can be reinvested into the community and generate further modernization and promoting economies of scale; an increased raise of awareness, desire to become more independent from fossil fuels and the willingness to enhance lifestyle enables citizens to take action addressing climate change and social cohesion and community bonding result strengthen (Caramizaru & Uihlein, 2020).

From the central European policies perspective and concerning the main topic of energy justice, increasing energy efficiency and alleviating energy poverty and bringing social justice changes are among the main objectives of energy communities. One of the main concerns of energy justice is assuring the benefits of energy communities are distributed equitably and fairly among different actors and members of the community. Income, education and social status and citizens welfare are often aspects influencing the level of effective empowerment, credibility and actual decision making leverage. The average EC member is represented by high-income and high education consumers. Vulnerable and low-income households often suffer from misrecognition, stigmatization, exclusion from decision-making processes and discriminatory frameworks. Energy communities could represent an innovative solution to empower and include disadvantaged consumers in the decision-making process of the energy market, through feed-in-

tariffs, lowering barriers at the entrance and reducing energy bills costs (Caramizaru & Uihlein, 2020).

After having recognized energy communities at European level with the recast of the Renewable Energy Directive and by the Electricity Market Directive, Member States are required to translate into State level this recognition and legal framework, through the National Energy Action Plans. In Italy, until 2017, it was only envisaged the energy model one-to-one configuration, consisting of a single energy system to a single end-consumer: for instance a house with a photovoltaic system for private consumption or a condominium with PV installed for common loads. The new model one-to-many configuration, envisaging a single producing system to multiple end-consumers, has been introduced by a new legislative framework. Since 2017, Energy Communities are included in the National Energy Strategy (SEN), a ten year plan to manage the foreseen transformation of the energy sector in the energy transition context. Like at European level, the SEN highlights the central role end-consumers will play in energy transition and consequently the role of energy communities. Moreover, previously, in 2015, Law 221 article 71 promoting measures of green economy established the possibility to create the so-called "oil-free zones", areas that manage to achieve independence from fossil fuels and that offer a suitable space to experiment on new forms of association based on clean energy. However, it's with the decreto legge December 30th 2019, n. 162, also called Decreto "Milleproroghe", that the Italian Government introduces, article 42-bis, the "self-consumption from renewable sources", adopting and translating into law the European Law 2018/2001/UE promoting the use of energy generated from renewable sources (RED II). This article introduced therefore in the Italian legislation the possibility of activating collective self-consumption from renewable sources, as described in the law decree. The beneficiaries of this law are electric energy consumers that will be enabled to associate to 1) become self-producers of renewable energy acting collectively, or 2) constitute energy communities (Repubblica Italiana, 2020).

At the regional level, with the Regional Law n.12 of 3 of August 2018, Piedmont region is the first Italian region fostering the institution of energy communities. The law describes energy communities as non-profit organizations with the participation of public and private subjects, oriented at the production and exchange of energy generated from renewable sources, and aimed

at contributing to energy efficiency and reduction in energy consumption. The Region intends to financially support the establishment of energy communities through ad hoc incentives and optimize the management of energy networks through strategic partnerships, like the agreements with the Italian Authority for Energy and Networks (ARERA). Moreover, to achieve self-sufficiency and establish virtuous territorial cooperative dynamics, permanent technical panels between energy communities and the Region are established in order to monitor energy consumption and shares of renewable energy self-consumed. Moreover, the Eco-bonus 2020, launched by the Decreto Rilancio 2020 (n.34) concerns the enhancement of energy efficiency of existing buildings through renovation works and interventions. The law foresees tax deductions for the envisaged interventions, enabling a 110% reimbursement (110% bonus) of the investment, advanced by the end-user, through a five-year tax rebates. The reimbursement will be carried out directly from the state program and foresees an incentive of 10% of the total intervention cost. This measure is intended to promote energy efficiency and foster energy transition, and at the same time provide a form of problems mitigation caused by the COVID-19 pandemic as it creates jobs interventions-related and enables increased energy efficiency and consequent lower energy bills for end-consumers, especially low-income consumers. The incentive is valid for works carried out between July 1st 2020 and December 31st 2021 (Borroni et al., 2020; Repubblica Italiana, 2019).

2.2 Stakeholder Involvement and Tools

Renewable energy communities (RECs) have great potential and represent a great opportunity for a just energy transition. However, important challenges for the success of RECs have not been overcome yet. Costs and benefits are unequal among different social groups, and vulnerable consumers remain underrepresented in RE projects (Hanke & Lowitzsch, 2020).

The objectives of the European Commission, with the Clean Energy Package, launched in 2018, and with the European Green Deal, launched in 2019, are to design and implement a "new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy" (European Commission, 2019a). To achieve this competitiveness in terms of efficient resources and the broader objective of a comprehensive energy transition, great importance is given to the promotion of renewable energy (RE) and the promotion of a more decentralized energy system, therefore promoting the figure of prosumers. However, the idea of prosumerism imply several assumptions that need to be effective, in order for the ideal system to work effectively: the willingness of consumers to switch from consumerism to prosumerism and therefore invest in renewable energy installations, and the awareness raise about conscious and efficient energy behavior (Hanke & Lowitzsch, 2020). Prosumers can be intended as individuals or organized in citizen energy communities (CECs) and renewable energy communities (RECs). Prosumption is expected to provide, besides a more sustainable way of producing energy, tangible benefits in form lower energy costs, additional revenues and local economic development. To include, protect and empower vulnerable energy consumers in RECs, as a means to fight energy poverty, both the European Green Deal and the recast of the renewable energy directive (RED II), oblige European Member States to introduce an "enabling framework" to facilitate the establishment and the inclusivity of energy communities. The minimum requirements of the enabling foresee: the removal of unjustified regulatory and administrative barriers to renewable communities; to grant participation in RECs to all consumers, including those in low-income or vulnerable households; available access to finance and information; the provision of regulatory and capacity-building support to public authorities to enable and set up RECs; to grant an equal and non-discriminatory treatment of all

consumers. Each Member State has then to transfer the enabling framework minimum requirements into national energy frameworks, policies and measures. However, despite the Clean Energy Package promotes participation in RECs, it doesn't specify how to achieve this aim: while the RED II acknowledges potential capacity of RECs for the empowerment of vulnerable consumers and the need to include facilitating measures for the participation of vulnerable consumers in RECs, it still remains a lack of political attention in policy-making for their inclusion. The same and in particular can be said about the National Energy and Climate Plans (NECPs). In 2019, none of the 28 draft NECPs mentioned the inclusion of vulnerable groups and Low Income Households (LIHs) in RECs, and RECs were explicitly mentioned only in 13 out of the 28 draft NECPs. In 2020, after a call from the European Commission about providing additional details and measures on the enabling frameworks for self-consumption and renewable energy communities, only one out of the 28 draft NECPs (Italy), mentions the inclusion of vulnerable households and/or LIHs in RECs (Hanke & Lowitzsch, 2020). The provision of an effective enabling framework, including subsidies to include vulnerable consumers in presumption, is connected to energy justice. Policies fostering the equal distribution of the benefits related to presumption would theoretically also foster social acceptance and political support for energy transition. However, the passage from consumerism to prosumerism requires prerequisites like access to financing, know-how and willingness to take risks. Consumers are deeply affected by context specific barriers and multidimensional vulnerability (Horstink et al., 2021). To empower consumers is mainly intended as a set of measures and policies that enable the expression of a full consumer choice, accordingly with specific consumption preferences, as a form of freedom, and therefore increased happiness. Some critics have been moved to this rational neo-economic approach that sees individual freedom and happiness only related to consumption. However, freedom of choice becomes relevant only when consumption is present, without consumption becoming irrelevant (Shankar et al., 2006). But freedom of choice and material well-being is achievable only by those who have access to capital, who can participate in the market. The unequal distribution of income therefore makes it even more difficult for poor and vulnerable consumers to achieve consumer empowerment, already disadvantaged by their condition. As described by Hanke & Lowitzsch (2020), "the vulnerability context has different dimensions, some of individual nature, others as

outcome of structural dynamics of inequality. Each dimension intersects with the others producing multiple layers of deprivations (e.g., low education restricting information access) pruning life and consumption choices. These conditions often lead to or recreate circumstances such as poverty or energy poverty". Three different vulnerability dimensions in the energy prosumption context can be summarized as: 1) Individual characteristics (low savings/access to capital; lack of time, experience and knowledge about opportunities to engage in prosumption; limited access to supportive government schemes to participate in community energy projects); 2) discriminating structures, among which housing markets and energy markets; 3) policy making. Policies for social inclusion and consumer empowerment often only relate to one aspect of vulnerability and often stand in conflict with one another. Empowerment in vulnerability context is therefore a complex and multimodal provision and structural change, more than sectorial and narrow-minded policies. As stated before, the passage from consumerism to prosumerism requires some prerequisites. Empowerment must integrate the understanding and the provision of these prerequisites, and not only the provision of consumer choices through access to information and consumption options. From the start, promoting prosumption and consumer empowerment have to be intended as a long-term process, at the interplay of the individual, interpersonal and collective, involving elements beyond consumption choices and addressing the social dynamics that reproduce social inequality, and addressing the entire social strata rather than individual consumers (Hanke & Lowitzsch, 2020). The different requirements relate to macro-areas that can be divided in: access to finance and appropriate ownership and governance models. Concerning the incentives that can be provided to vulnerable consumers to participate in RECs, the way how information is presented deeply affects their perception. An effective information approach needs to be taken into consideration and to be extended not only to consumer choice, but also and importantly to the local community, taking into account its decision-making process, and taking into account what is perceived as relevant and of interest by the community (Rogers et al., 2008). This in order to design and implement incentives that foster pro-social and pro-environmental behavior at community level. In fact, as stated by Hanke and Lowitzsch (2020), "while some approaches address economic decision makers of a household, others demand for the identification of potential advocates for change at a community and family level". And also, "Promoting pro-environmental habits at school through teaching basic

sustainable behaviour to school children affects not only the family but the entire community" (Lawson et al., 2019). In this way, once children learn about pro-environmental behavior and basic energy saving behavior, they pass this knowledge on to their parents and grandparents. Therefore, educating children about the benefits of participation in a local REC is likely to educate and affect their parents as well. By presenting the participation in a REC presented as a change benefitting the future of the family, and especially that of the children, and not only as a consumption or investment choice, the motivation and willingness to participate in a REC is likely to increase. This process is extremely relevant for several aspects. The nudging that children act on their parents could have the effect of changing the parents behavior. Children, in turn, benefit from the self-efficacy effect, an important driver for individual development. The effect of the children transferring the knowledge they learned in schools to their parents and family at large, affects and alters their family behavior, changing the choice architecture, and modifying in a predictable and pro-environmental way. Nudging is demonstrated to have great potential, and is becoming increasingly an instrument applied in social policy making and especially in the environmental policy domain (Hanke & Lowitzsch, 2020).

A research topic that specifically deals with the interaction between children and society mentioned above is the so-called Intergenerational Learning (IGL). In order to adapt and minimize the effects of climate change requires collective action, mainly hindered by socio-ideological biases and polarization over climate change (Lawson et al., 2019). For instance, globally, only 54% of adults believe in anthropogenic climate change (Wike, 2016). Climate change concern is a key predictor of individual and collective action, therefore is an important element to consider in order to make policies and national paths effective. Political ideology is one of the major drivers of perceptions relating to climate change, influencing both the type of information received (how it is framed) and how this information is interpreted by the receiver (Mccright & Dunlap, 2011). Also gender seems to influence perceptions about climate change, as it appears that conservative males show low concerns and high skepticism around climate change (McCright & Dunlap, 2011). Features like these are difficult or impossible to change in adults. Due to the increasing threats of climate change, additional communication strategies, able to engage more citizens irrespective of their personal ideology or identity are needed (Lawson et al., 2019). An understudied but promising alternative to promote climate change concern among

citizens irrespective of their socio-ideological biases is the Intergenerational Learning (IGL). Focus of this path are adolescents, still in formative and receptive phase of their lives, and still not deeply shaped and influenced by socio-ideological factors as adults. While on adults climate change communication could have a polarizing effect, on children climate change education promotes climate change concern and mitigation behaviours. In this way, children have the possibility to influence their parents and families opinions on important socio-ideological topics, bypassing the socio-ideological barriers of the family thanks to their position within the family, and can in their turn promote climate change concerns and mitigation behaviours (Lawson et al., 2018).

Some research about Intergenerational Learning has been carried out in the period 2016-2019 during a project that took place in North Carolina, US, in an area particularly vulnerable to climate change and its impacts, including sea-level rise and saltwater intrusion. The project targeted middle school children (aged 10 to 14 years old) and consisted in analyzing the differences produced in treatment groups and control groups. The treatment groups would integrate their normal school curriculum with four classroom activities and a field-based service-learning phase, plus an interview with parents conducted by the students. The treatment curriculum didn't envisage any direct interaction between the teachers and the parents; all transfer of knowledge and promotion of climate change concerns are intended to occur through children. The control groups instead would normally conduct their standard school program. The research was conducted in order to understand how IGL operates in diverse family contexts and dynamics and diverse demographics, relating to both adults and children. The research produced four major findings. Firstly, children who were involved in the treatment groups increased their climate change concerns, respectively to the students who were not involved. Secondly, children involved in the treatment curriculum fostered more climate change concern among their parents and within their family members, always respectively to the children not involved, whose families increased much less their climate change concerns. Thirdly, changes produced in parents about climate change concern increases, were most pronounced among the groups typically most resistant to climate change communication: politically conservative parents, especially men, with the lowest concern about climate change prior to their children project. Fourthly, daughters showed better results than sons, in terms of influencing their families and promoting climate

change concern (Lawson et al., 2019). These results reflect an age-related window of influence characteristic of adolescents, in this window of time adolescents retain a level of plasticity as their sense of the world and their opinions are not completely formed yet. Climate change education and communication, focusing and targeting adolescents has been demonstrated to affect knowledge gains, climate change concerns increase and adoption of mitigation behaviours, as opposed to adults that are likely not to be affected by external communication (Stevenson et al., 2018). Scientific research demonstrated that IGL and climate change education designed specifically targeting adolescents influence their parents and parents' opinions increasing their climate change concerns and behaviours. Projects using adolescents as channels of communication led to measurable changes in knowledge, attitudes and behaviours in their parents and families, in the direction of pro-environment attitudes, without targeting adults directly, even in topic specific projects relating to energy (Boudet et al., 2016). Most successful IGL projects involved approaches relating issues at local scale, field-based experiences and encouraging the participation of parents, as the local context approach leads to increased climate change acceptance, in particular among skeptical target groups. (Lawson et al., 2018). The studies conducted by Lawson et al. (2019), showed that adolescent-conducted increased family discussion about climate change is a key factor in increasing climate change concerns and behaviours, in a child-to-parent IGL framework. Especially the most resistant adults to climate change concerns and to interventions targeting adults to promote concerns, namely men and conservatives, were the most affected by the increase in such concerns. This can be associated with the trust parents have in their children, allowing conducive discussion and acceptance of new views of complex topics. The study conducted in North Carolina provides empirical evidence of IGL child-to-parent positively affecting adults' positions about climate change, overcoming resistant socio-ideological barriers and taking adults to learn and care more about climate change, through the children communication pathway. Moreover, as demonstrated by the results of the project, girls seem to be more effective in their communication outcomes, and further research is needed in this direction (Lawson et al., 2019). In the mission of expanding and increasing collective action about climate change, children and child-to-parent IGL have proved to be an effective means of change in climate change concern among adults and at the same time

a strong incentive to prepare children themselves to address and prepare for the climate change they will face (Lawson et al., 2019).

Intergenerational learning related to pro-environmental and fostering climate change concerns implies the development of effective climate change education strategies. During the last years, interest in education about climate change gained relevance, due to growing awareness and concerns about climate change effects on the environment, social and economic systems, and thanks to expanded funding allocated for educational programs addressing climate change. Following this growing interest, it is reflected in the exponential increase of scientific research articles published about climate change education around the world. In terms of numbers, 12 articles were published between 1990 and 1999, 433 articles between 2000 and 2009, and 1489 between 2010 and 2015 (Monroe et al., 2017). However, despite the amount of publications, a broad agreement about effective strategies in education about climate change is still missing. The research conducted by Monroe et al. (2017), is intended to offer a comprehensive overview on the existing literature about climate change educational strategies and highlight effective teaching methods in formal and non-formal contexts. Climate change is a controversial topic to teach. The different approaches present a broad range of alternatives: from conveying factual information about climate science, to fostering critical thinking skills to help youth understand the source of conflict about climate change, to fostering problem solving skills to conduct practical and local projects to mitigate and adapt to climate change, to engaging with social and political aspects (Monroe et al., 2017). Concerning climate change education and community involvement, the difference between 'just the facts' and 'also the actions' highlights the point at which educators believe a fundamental science topic becomes political, becoming too close to advocacy and too challenging for classroom educators (Monroe et al., 2017). The complexity of the topic originates also from the deep connection between climate change and social and political values that characterize one's group identity and cultural identity. Therefore, especially among adults, there is the tendency to follow one's group leader and share opinions and discard information that conflicts with the group's position. To design an effective program about climate change requires then to balance the objective of increasing knowledge of climate change with the consideration of the role and weight of cultural ideology in shaping perceptions and learning (Guy et al., 2014). Climate change educators, working with audiences ranging from

youth in schools to adults in communities, report several additional barriers to providing effective climate change education. The barriers mainly concern adults resistance to climate change information, and the consequent concern and hesitation from the educators side about addressing climate change in their communities, as this could decrease their credibility and effectiveness, resulting in avoiding talking about climate change (Bowers et al., 2016; Monroe et al., 2017). Moreover, some educators report lack of necessary skills and knowledge for the design and the delivering of effective and adequate climate change education (Plutzer et al., 2016).

Justified by the growing interest for climate change education, and at the same by the lack of broadly shared and recognized effective climate change methods, with several limitations and doubts still affecting this task, the systematic review conducted by Monroe et al. (2017) analyzed previously published works on this subject to draw some conclusions on how best to design climate change education programs. The systematic review focused on articles that tested, measured, and reported results of climate change educational initiatives and interventions. The preliminary search for relevant material, resulted in 1091 articles, that were then reduced to a set of 49 articles, after the exclusion of duplicates or articles that didn't provide tested results of a climate change education intervention (Monroe et al., 2017). The projects analyzed were varied and difficult to compare: short interventions (field trips, festival exhibitions), multi-weeks interventions; part of other courses or entirely separated sections. The aim of the research was then to find common denominators and themes characterizing the described efficacy of climate change educational programs. In terms of target groups and settings, the majority of the projects involved students in primary and secondary schools, with elementary not being really typical (28 projects out of 48), or universities (11 projects). Almost all projects took place in the classrooms. A few projects involved youth outside of school, and a few others targeted people outside of the student/teacher context, involving more the general community and citizens at large. Of the analyzed 49 projects, 26 were based in the United States, the rest were based in other four continents (Monroe et al., 2017).

Resulting from the systematic literature review carried out by Monroe et al. (2017), six main themes were identified as strategies that increased efficacy in environmental and climate change education programs. The six themes are:

1) The program should focus on making climate change information personally relevant and meaningful for learners.

It highlights the importance of making the distant, global and nebulous threat of climate change personally relevant (CRED, 2009). The systematic review provided evidence that learning through local examples is more effective and achieves greater impacts on learners.

2) Activities or educational interventions should be designed to engage learners;

In the review, a variety of engaging, active, and student-centered teaching methods emerged as complementary to good education and key elements for effective education results, highlighting how social interaction was present among learners from elementary schools to undergraduate courses, to workshops and online programs with adults. The engaging activities reviewed include a broad range of alternatives: debates, small groups discussions with worksheets, field trips, simulations that mimic reality, role-play initiatives, animated educational videos, cartoons, inquiry-based activities (Monroe et al., 2017).

3) Educators should use deliberative discussion to help learners better understand their own and others' viewpoints and knowledge about climate change;

This recurring theme addresses the importance of discussions and conversations among learners, to help them think more deeply about concepts, compare perceptions, understand different opinions, and reflect on what they know (Monroe et al., 2017). Among the factors that influence the experience of participants, three have been highlighted as most important: feeling that one's viewpoints are respected; learning new information about climate change; learning about others' perspectives on the issue, in particular faith-based perspectives (McNeal et al., 2014).

4) Learners should be given the opportunity to interact with scientists and experience directly the scientific process for themselves;

The review pointed out that the collaboration of educators and scientists is a source of several benefits. Teachers feel more confident in facilitating students exploring the nature of science, in case of doubts scientists are able to provide additional support, instructions and figures (Monroe et al., 2017).

5) Programs should be designed specifically to uncover and address misconceptions about climate change;

Overcoming misconceptions regarding climate change play an important role in climate change educational programs. Guided discussion among students is an effective approach for effective results (Monroe et al., 2017). Other criteria for fostering constructivist learning among students were found in the research of Aebli (1983); these criteria are: to start with students' prior knowledge; to untangle processes into successional steps; to reduce content in order to focus only on key ideas; to avoid technical terms (Monroe et al., 2017).

6) Learners should be engaged in designing and implementing school or community projects, to address some aspects of climate change at local level.

The last highlighted recurring theme analyzed in climate change educational programs, focuses on the scope and outreach of education interventions, expanding beyond the classroom limits and in particular on the possibility to establish relations between the targeted learners and the larger context of their schools or communities. The interaction between student and community is a trigger element that fosters the awareness raising and change of behaviours in a pro-environment direction, at the community scale. In the climate change education perspective, the public has a role to play in mitigating and adapting to climatic changes and in influencing policy and community planning (U.S. Global Change Research Program, 2009).

The analyzed and highlighted six themes are the recurrent features that appear to contribute to effective climate change education. The integration of these themes doesn't guarantee the efficacy of climate change education programs, but they represent a guideline to design and enhance projects. Generally, the projects analyzed employed no more than three themes in the strategies they used to engage learners (Monroe et al., 2017).

Social norms play a very important role in people's behavior and expectations, at every age, more deeply among adults. School and community-based projects, empowering learners, building skills and nurturing hope for change, might have the power to affect one's adherence to social norms and worldviews, in favor of greater climate change concerns and take action in personal life. The conducted review didn't provide exact instructions on how to design climate change education programs, it would be worth it analyzing how nations address the climate change topic and how programs are presented.

According to some recent research, it has been demonstrated that if 16% of high school students in developed countries were involved in climate change education, this would lead to a reduction of nearly 19 gigaton of carbon dioxide by 2050 (Cordero et al., 2020). If every students, including the 132 million out-of-school girls in the developing world, received climate change education could lead to a reduction of 85 gigaton of carbon dioxide by 2050, a result more effective and more powerful than investing in onshore wind turbines (47 gigaton reduction) or concentrated solar power (19 gigaton reduction) alone (Kwauk & Winthrop, 2021). Combating climate change is deeply connected to moving toward climate justice and gender justice. Achieving climate justice, could help achieving also social transformations and systems change required to address climate change equitably, tackling gender inequality, racial discrimination, poverty, and other human rights challenges highlighted by the UN Agenda 2030. Improving education and unleashing the potential of student-driven and student-led community-based climate action projects would contribute meaningfully to mitigating the causes of climate change and the other several social issues stated above. Moreover, recent research demonstrated the scale of 10,000-100,000 people represents the "sweet spot" for climate action. The collective ability to make meaningful action is rooted in local relevance and local actions achieve a successful degree of cost-benefit optimization in terms of global impact (Bhowmik et al., 2020). The selected scale is equivalent to focusing efforts at the school-district level, or the school administrative cluster. As stated by Kwauk & Winthrop (2021), "School districts are the perfect network of institutions that exist in every country in the world that have enough community connection potential to effectively scale green civic learning". As previously stated in this chapter, effective climate action requires it to be performed at local level and community-driven, and effective climate change education requires it to be locally relevant and connected to

environmental justice issues and challenges relevant at the community level (Kwauk & Winthrop, 2021). However, the majority of teachers in Europe and US don't teach climate change in schools as they don't feel confident enough about the subject, and they state they would need more training and materials. Moreover, the majority of students (Europe) feel that schools are not doing enough and want to learn more about climate change (*Survey on Climate Risk*, n.d.). Despite this growing interest in climate change education, and despite global commitments to harness the power of education since the 1992 Earth Summit, only three countries, Italy, New Zealand and Mexico, have fully integrated climate change into their curriculum (Hodal, 2019; Kwauk & Winthrop, 2021).

Education and high quality climate change education can effectively help youth to become powerful agents of change for sustainability in their communities. Projects at school and community level, implementing renewable energy technologies, and engaging students in hands-on lessons resulted in effective and positive experiences for the empowerment, leadership, school attendance of students and community resilience, especially for girls and in undeveloped countries. In particular, young students involved in non-formal peer-to-peer project-based learning experiences, often involving climate-smart solutions to combat climate change, become agents of change with great efficacy in their communities, through community workshops, discussions, mentoring and debates, reaching thousands of people in their community and strengthening the adaptive capacity and resilience of their community (Kwauk & Winthrop, 2021).

Among the strategies taken in consideration during the last years concerning climate change education projects and methods to involve youth in sustainability actions, peer education represents an understudied yet valuable alternative. As already stated in the present chapter, the role of youth for communities and societies to live sustainably and engage in deeper climate change concerns is fundamental. Peer education strategies focus on learner-centered approach that emphasize action competence and sustainability action, and don't limit to behavioural changes through the instillation of knowledge and the strengthening of attitudes. Peer education focuses therefore on building skills and values as key antecedents to motivate youth action, values and skills considered foundational as they lay at the base of our attitudes, decision-making

and action-taking processes. Values and skills on which peer education concentrate are: self-efficacy, ownership, citizenship, teamwork and critical thinking. These values and skills are intended to be combined with instilling knowledge, empowering youth, and fostering behavioural change in the process of peer education projects. Peer education is not a simple teacher-learner interaction but is a complex and holistic educational process taking place in a specific context; applied to climate change engagement it has the of promoting self-initiated actions for sustainability. At the base of peer education there is the involvement of people with similar characteristics that experience learning from each other, intended as role models, that influence and orient others' actions; it affects changes at the group and societal level, modifying norms, policies and stimulating collective action. In the past, it has been applied mainly in the health field, as a strategy for changing behavior in youth with respect to substance use and sexual health. However, the characteristic of peer education makes it suitable for other fields too, to be implemented by sustainability educators. Despite the peer education strategies that have been suggested as potentially beneficial for environmental educators, the literature review shows little evidence in this area and published, empirical research on peer environmental education is difficult to find. Among the few examples of analyses on this topic, a research on a school-based program named *MindShift* investigates whether peer education can be considered as an enabling method to facilitate youth taking sustainability actions, fostering their climate change concern, and the value of applying a peer-led approach to sustainability. The project took place in 2009-2010 in Halifax, Nova Scotia, Canada and was carried out through the entire school year, with an average frequency of weekly meetings. Its aims were to develop knowledge of sustainability and positive environmental attitudes and behaviours among high school students. A focus group of 23 students, considered as youth leaders, organized in three teams, were trained and delivered presentations through a dramatic and interactive approach to younger students, and were encouraged to organize optional school-wide, youth-led events to engage and educate the student body. Drama was the means of representation of the information to be shared. Each team is assigned with a teacher advisor. To evaluate the experience, mixed methods were used: qualitative data collection obtained through interviews, focus groups and field observations, and quantitative data obtained through questionnaires. The results obtained by the selected three target groups were analyzed and compared. The findings were organized in seven different

thematic categories, representing personal growth and learning experiences described by the peer leaders. The seven categories are: pro-environmental behavior; skill for action; sense of empowerment; pro-environmental attitudes and values; knowledge of sustainability; interpersonal relationships; sustainability actions. Changes in personal behaviours were the most prevalent changes reported by participants. Reported behavioral changes included taking shorter showers, recycling, spending less time on computer/TV, choosing local food, turning off lights; many reported these changes as permanent. Concerning the sense of empowerment, all peer leaders reported increased desire to take action, increased confidence in their abilities and skills to contribute to their team, school and community; they also reported increased sense of collective empowerment. Concerning the acquisition of skills, all peer leaders, irrespective of their role within the student-led team (co-captains or not) reported increased levels of leadership, teamwork, and presentation skills. Concerning the pro-environmental attitudes and values, shifts toward more pro-environmental orientations have been reported. Concerning the knowledge of sustainability, most peer leaders reported increased levels of knowledge and awareness, creating a meaningful connection between the school environment and their private lives. Concerning interpersonal relationships, all of the peer leaders reported increased and enhanced relations with their peers and this was one of the strongest and more positive aspects of the project. Most of the participants made new friends and shared interests and values, increasing team bonding and mutual increased sense of accountability. A small minority of peer leaders instead reported issues about teamwork and relations with their peers. Concerning the development of sustainability actions, in several cases peer leaders engaged in deliberate action, within and outside the context of the program, involving other students by holding events, and getting involved themselves in community-based initiatives, inspiring participants also about their future.

The main outcomes of the project for the peer leaders were then acquiring new knowledge, practicing action skills, shifting towards more pro-environmental attitudes and behavior, deepening their ecological values and enhancing interpersonal relationships.
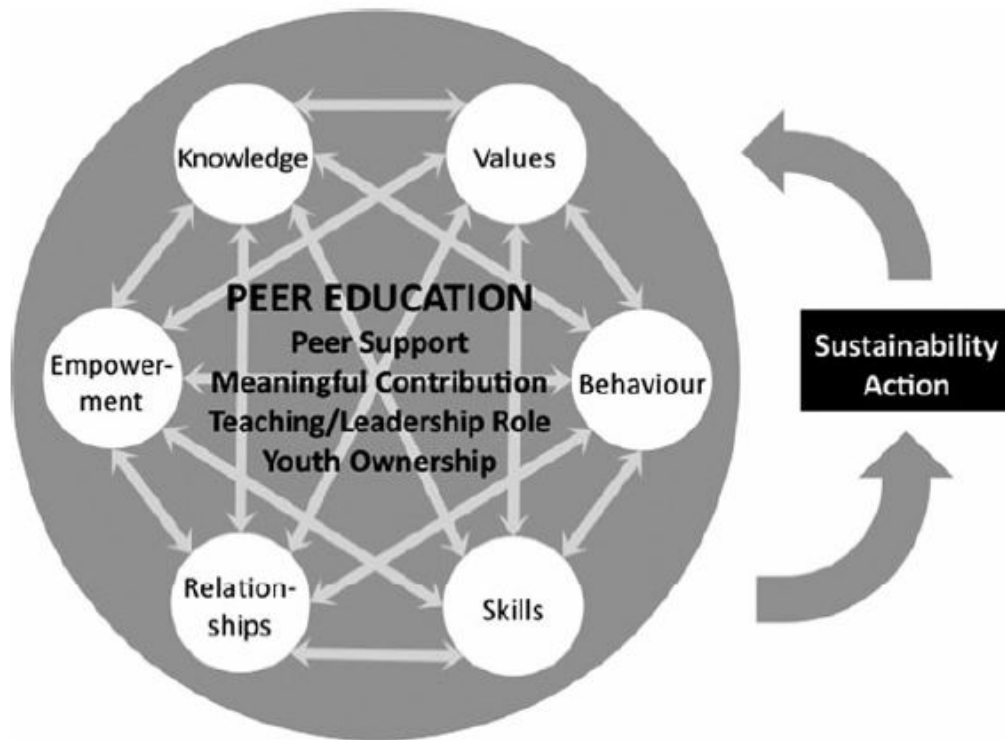
Figure 9: Objectives and facilitating elements of peer-led projects

Source: (De Vreede et al., 2014)

Having assessed the outcomes of the project, it is relevant to analyze the elements that facilitate or inhibit positive development among youth during peer-led programs, and the elements and processes that lead peer leaders to take positive and deliberate actions. Peer leaders are described as the most influential four elements: peer support, meaningful contribution, teaching/leadership role, and youth ownership. Concerning peer support, peer leaders considered supportive experiences with peers as an essential factor of the program, looking to each other as role models. Making friends and bonding as a group increased the leaders' sense of commitment and the sense of belonging. Team structure promoted and enforced social norms, and facilitated the development of interpersonal skills, self-confidence, and sense of empowerment. In a few cases, team dynamic struggles and lack of team cohesion would lead to dropouts and threaten the viability of the peer education process. Concerning meaningful contribution, peer education offers youth a way to "make a difference", to engage meaningfully with issues of the "real

world", a way to be involved in something authentic, an opportunity to influence others feeling to be "really doing something", feeling a sense of power. The participation of youth in sustainability-related initiatives benefits the environment and society, but also youth's sense of empowerment, and the development of youth and community. Concerning the teaching/leadership role, youth took on roles as teachers and leaders, fostering leadership and presentation skills, increasing their knowledge of sustainability, gaining confidence and an increased sense of empowerment, role-modeling the changes they were promoting. Concerning youth ownership, refers to the opportunities peer leaders had to take leadership and responsibility for decision making and planning, always working with the team. Ownership motivates peers and increases their commitment to the team, increasing also their sense of pride for their accomplishments. The support and supervision of an adult is important and essential to the success of youth-led initiatives, when provided in an empowering way. Moreover, the sense of co-leadership among peers in all teams is fundamental for team's bonding, sense of empowerment and leadership development (De Vreede et al., 2014).

As results from the outcomes analysis, the potential and the challenges of peer education applied to environmental education to engage youth in sustainability actions, depend on positive team relationships and dynamics, and on strong and positive adult support. Team interaction can lead to practical successes and positive growth or to members withdrawing and to failure of the project. When interpersonal dynamics get challenging, more adult support and feedback are needed to rectify the situation. (De Vreede et al., 2014).
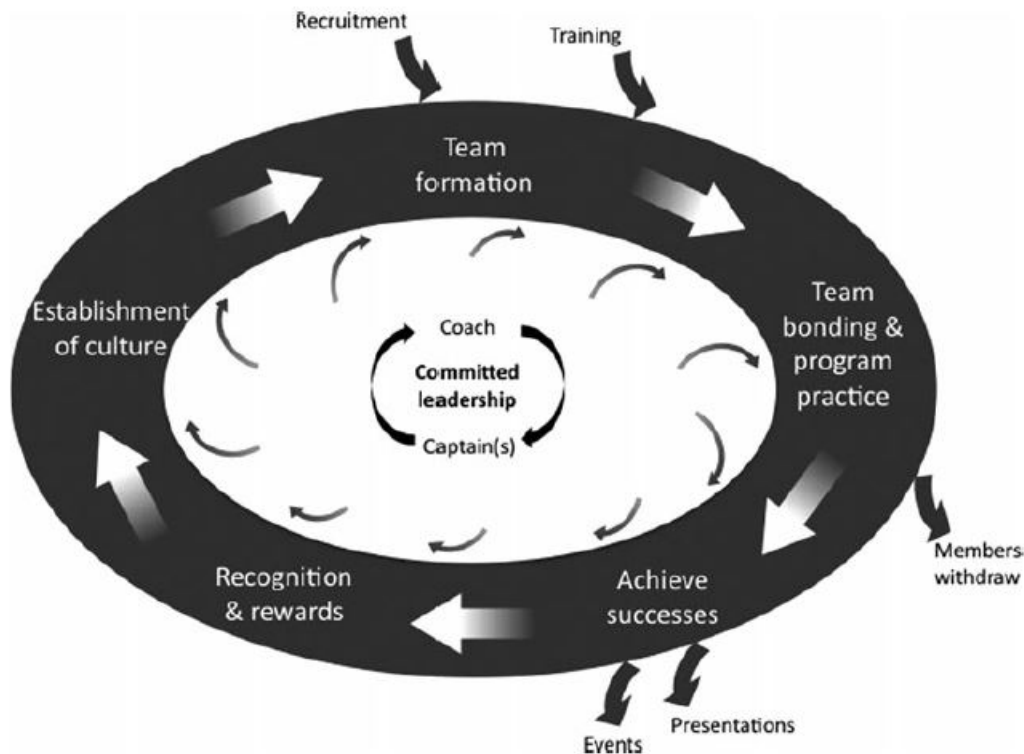
Figure 10: Life cycle of peer education teams

Source: (De Vreede et al., 2014).

It is possible to describe further some features of a peer education approach. According to Svenson et al. (1998), a key characteristic of the Peer approach is that "those of the same societal group or social standing educate each other" about a variety of issues or a specific concern (Svenson, 1998). Shared social status (age, ethnicity, gender, cultural or subcultural membership) and shared cultural backgrounds among peer educators and target group, are one of the key elements for the success of these kind of projects, pointing out to the importance of creating the basis for a strong bonding between the peer educator(s) and the target group (Parkin & McKeganey, 2000). The potential of peer education and its positive impacts rely and are grounded in youth social networks. Young people refer to their peers for advice and information on a variety of topics, and their friendships and social networks play an important role in protecting them and contributing toward their positive development (Milburn, 1995). According to Klee & Reid, any peer-led project should have an "egalitarian structure without clear authority figures and should not be concerned about asserting power, control, authority or morality (i.e. not

44

'preaching' about drug use)". Peer education can be further differentiated in "formal" and "informal" education: the first recreates hierarchy and imbalance of power typical of traditional educational environments, introducing authority figures in an egalitarian social group; the second, informal, avoids hierarchy and tries to maintain the cultural and social equality within the target group, not employing authority figures (Parkin & McKeganey, 2000). According to Shiner & Newburn (1996), some peer educators characteristics have been identified as conducive and desirable: person-based credibility; experience based-credibility; message-based credibility, preferably non-moralistic and non-judgemental.

Peer education is an appealing outreach approach for governments and services for several reasons. From a financial point of view, peer-led projects are relatively inexpensive and rely mostly on a volunteer basis. Peer education has been described as "efficient, empowering and economically viable process" (Parkin & McKeganey, 2000). The self-motivation element of the educators instructing their peers is relevant, as it leads to a double achievement: empowerment, educational training and skills improvement of the educators; and formation and empowerment of the target group. The emotional level is also involved, as peer educators voluntarily donate their time and effort to their community, with just the intention to help. Therefore the community-based element is greatly enforced in peer education (Parkin & McKeganey, 2000). Some characteristics and features can be identified as limitations to be considered in the implementation of peer education approaches: it can be time-consuming to train and supervise young people, especially in tasks that involve programme design, management and evaluation; in peer programmes, turnover is relatively high, with difficulties in having continuous work with the same group, especially when carried out in a long term; often, PE projects have more impacts on peer educators than on target groups; not always young people prefer to receive information from their peers; sometimes peer educators have a tendency to shift toward more familiar didactic teaching (UNFPA, 2006).

According to researchers, peer education approach finds space and gains relevance mainly where traditionally oriented services of information and involvement fail, in the spaces and societal fragments that established and traditional services ignore or don't prioritize, resulting in wider and more effective results than traditional outreach programs (Hunter et al., 1997; McDermott &

McBride, 1993). However, peer-led programmes rarely stand alone and they are usually part of organizations' larger activities, involving several sectors and often public agencies. Peer education programmes are often part of organizations or agencies like: schools or universities; youth organizations or clubs; communities or social organizations; health facilities; recreational clubs; workplaces (UNFPA, 2006). Moreover, the impact of peer education approaches differentiate in impacts upon peer educators and impacts upon target groups. Impact upon peer educators, often assessed through the implementation of tools like questionnaires, translate to increased levels of self-esteem, self-confidence, improved communication skills and personal development (McAleavy et al., 1996; Sawyer et al., 1997). To assess the impacts upon target groups is more challenging than assessing impacts upon peer educators (Parkin & McKeganey, 2000). Studies conducted by Revit et al. (1997), Wiist & Snider (1991) and others, presented evidence of the impact of peer education approaches. However, the assessment of the positive impact of projects upon target groups still lacks general and shared standards that would allow a better framing of results. Quantitative and qualitative methods can be implemented. Among quantitative tools there are comparative approaches of questionnaire responses from participants and non-participants to the initiatives, in pre- and post- project moments. Qualitative assessment concerns the evaluation about how deeply and in what way peer-led projects affect, enhance and change attitudes and behaviours of participants. This task is more challenging and more problematic for peer educators, as participants often feel inhibited by the normative environment of the project, providing adjusted/socially accepted answers, instead of real/correct ones; and also for time and resources limitations in the follow-up investigation, as behavioural changes in the target group may appear in time and influenced by other sources too. A further limitation is represented by the diversity of peer education projects: defining one single best method for evaluating the qualitative impacts of the approach through which to compare different projects, risks to result in an evaluation not representative of the real extent of the project potential. Peer-to-peer projects are meant to be interactive educative programmes, involving face-to-face exchanges with peer educators, participation in activities organized by the educators and role-play situations. From experience assessment, the desirable length for peer-led projects and activities should not be too long, approximately five to six hours, and optimal group size should

be quite small to promote constructive interaction between team members and constructive feedback (Parkin & McKeganey, 2000).

Despite the evidence provided by researchers about peer education approach efficacy, further research is still needed in order to define shared and agreed standards. Generally shared and implemented standards would allow to: evaluate the effectiveness in the short, medium and long term of peer education projects; differentiate between projects aiming to change community norms and those aiming to change individual norms; find the right balance between the required formality of the framework and the intrinsic informality typical of peer education; and finally identify what kinds of peer education projects are effective and successful, with which groups, in relation to which problems and in which settings (Parkin & McKeganey, 2000).

In 2005, a consultation led by the United Nations Population Fund (UNFPA) in collaboration with the Family Health International FHI/YouthNet, and with the participation of 45 experts (peer educators, trainers, and managers working in peer education) from 22 countries, had the objective of developing minimal standards for peer education programmes. During the consultation they shared best practices and lessons learned, working in small groups they tried to identify benchmarks and standards, subsequently considered and agreed upon in plenary sessions. The final document, drafted by Charles Deutsch and his team at Harvard University and reviewed by the full participant group, is the *Peer Education Toolkit – Standards for Peer Education Programmes* (UNFPA, 2006).

The document is intended to be a user-friendly guide, a guidance tool that can be used by several figures: programme designers, programme managers and supervisors, trainers and peer educators themselves. Standards are presented as a checklist, with a brief description for each of them, complemented with tips, challenges, lessons learned and best practices from around the world, and they are organized in five programme phases: planning, recruitment and retention, training and supervision, management and oversight, and monitoring and evaluation. At the end, it is presented a code of ethics, to be implemented as well. In new peer education programmes, planners and managers are requested to do their best to adopt and implement all the standards provided, adjusted to fit reality and accordingly with local law and public policy.

PEER EDUCATION UNFPA CODE OF ETHICS CHECKLIST	
1	Respect, promote, and protect human rights
2	Show cultural sensitivity
3	Respect diversity
4	Promote gender equality and equity
5	Assure and protect confidentiality
6	Promote self-examination of values; do not impose values
7	Avoid personal misrepresentation, while respecting disclosure boundaries
8	Provide updated, correct, and unbiased information
9	Be aware of individual limits and how behaviour affects peers
10	Refrain from abusing one's position with peers or the peer education programme

Table 1: Peer Education UNFPA Code of Ethics Checklist

Source: (UNFPA, 2006), Author Elaboration

The advantage of standards definition in peer education programmes benefits the results especially if the application of standards is carried out in a flexible manner and adapted to the realities of a programme's context and environment. The major advantages of using standards in peer education programmes are:

- A consensus of expert thinking and tested experience (peer education experts, including donors, managers, trainers, evaluators, and peer educators themselves). It represents an objective picture of what is practical, useful, and tested.

- A framework for quality assurance (at all stages: programme development, implementation, and assessment).

- Guidance in programme design and implementation (how the programme should be designed and implemented)

- A framework for monitoring and evaluation: standards serve indicators to measure achievements, pre- , intermediate and post- intervention assessment

- A basis for certification: standards provide the benchmarks to certify and determine peer education programmes.

Standards are only as strong as their promotion and adherence. In order to ensure the implementation and the observance, the standards should be shared, made public and supported by all the stakeholders involved in the peer education programme. The success of peer education programmes depends on how members of the target audience and the broader community perceive the soundness of the programme and the people implementing the programme. The implementation of a code of ethics is to assure that the peer education programme is of high integrity. Everyone associated with the programme should be trained to comply with the code, and there should be publicly stated policies and procedures for dealing with people who violate it (UNFPA, 2006).

Finally, the following cross-cutting elements and observations have to be respected at all stages of the implementation of peer education programmes:

- Youth participate in all aspects of the programme, including planning, implementation, and evaluation.
- Sensitivity to, and respect for, culture is ensured. Respect is shown towards the youth culture (whether it is a majority or minority culture)
- The programme is sensitive to differences in the expression of human sexuality. Programme policy and implementation encompass non-discrimination with regard to human sexualities and sexual identities.
- Sensitivity to age differences and needs is ensured. Peer education content respects age and development stages of learners

(UNFPA, 2006).

It follows the table summarizing the UNFPA Standards for Peer Education Programmes:

PEER EDUCATION UNFPA STANDARDS CHECKLIST

SECTION A: PLANNING

#	Item
1	Mobilize main stakeholders
2	Ensure active participation of youth
3	Consider cross-cutting issues
4	Refine general and specific programme objectives
5	Identify target audiences
6	Identify the needs of the target audience
7	Identify available resources and try to fill gaps
8	Develop a workplan
9	Develop an M & E (Monitoring & Evaluation) plan
10	Establish feedback mechanisms
11	Coordinate and establish linkages with other programmes
12	Develop a resource mobilization and sustainability plan

SECTION B: RECRUITMENT AND RETENTION

#	Item
1	Identify sources and channels for recruiting peer educators
2	Decide on criteria for peer educator selection
3	Set clear expectations
4	Establish a standardized and transparent interview and selection process
5	Document expectations
6	Establish means for continuous communication, including feedback
7	Establish an incentives system
8	Establish supervisory and mentoring systems
9	Offer opportunities for increasing involvement and responsibility

SECTION C: TRAINING AND SUPERVISION

#	Item
1	Arrange for qualified trainers
2	Select a quality training curriculum
3	Arrange for appropriately sized groups
4	Structure agenda and time to meet training needs
5	Provide relevant materials and handouts
6	Use interactive, participatory, and skills development approaches
7	Implement tools and methods to evaluate training and training participants
8	Discuss ethical issues
9	Involve youth at all stages
10	Arrange for trained, aware personnel
11	Ensure that peer educators are well prepared
12	Continually reinforce motivation and ethical behaviour
13	Manage the group dynamic and encourage team building
14	Share responsibility with peer educators

MANAGEMENT AND OVERSIGHT

#	Item
1	Ensure compliance with programme standards
2	Ensure technical competency of the management team
3	Establish and maintain quality expectations of programme activities
4	Establish effective administration of human and financial resources
5	Establish a transparent decision-making process
6	Establish a process for youth participation in decision-making
7	Use M & E for decision-making
8	Promote cooperation and networking
9	Establish linkages and referrals to services and commodities
10	Establish sustainability plans

MONITORING AND EVALUATION

#	Item
1	Establish relevant, clear objectives
2	Establish functional, relevant indicators
3	Include M & E in the workplan from the start
4	Implement baseline assessment
5	Develop monitoring tools and a measuring system
6	Ensure capacity to plan and implement M & E
7	Establish means for youth participation in planning and implementing M & E

Table 2: Peer Education UNFPA Standards Checklist

Source: (UNFPA, 2006), Author Elaboration

2.3 The Third Mission of University in Italy

Since the European Council held in Lisbon in 2000, the expression "Knowledge society" describes a society that bases its growth, competitiveness and social cohesion on knowledge, research and innovation; our society (European Council, 2000). In the context of a society based on knowledge, Universities and research centers, being the producers of innovation in scientific knowledge, and in culture at large, become one of the most important engines of society and economic development. The role and objective of Universities, to establish dialogue with society, is called "Third Mission" of University, being the first two missions, higher education and scientific research (Susa, 2015). During the last years, European Union projects increasingly focused on the involvement of the citizens in science. New approaches and new European policies have been developed to stimulate dialogue and debate on the results of scientific research with a wide audience and not only with the community of reference. Since 2007, the Seventh Framework Program (Framework Program 7, FP7 2007-2013) and Horizon 2020 (2014-2020) are two calls for projects in the field of "Science in society" (2007-2013) and "Science with and for society" (2014-2020). The main aim of these calls for projects is the broadening of science involvement boundaries, to make science and technology more attractive to young people and increase general interest in innovation. To achieve the objective it is required a new approach to research that allow all social actors (researchers, citizens, policy maker, third sector industries and organizations, the world of education) to work together during the entire research and innovation process, in order to close the gap between scientific world and the needs and expectations of European citizens. The new approach is called Responsible Research and Innovation (RRI), and it constitutes a keystone of Horizon 2020, the European research support that invested 80 billion euros in the period 2014-2020. The development of communication skills among the researchers and scientific community, to share the results with and involve society, is therefore one of the priorities. (Susa, 2015).

In Italy, the debate on the Third Mission of the University has been present from the mid-1990s, but it is only more recently, with some delay, that Italian Universities have reached a new awareness of the importance and the role that Third Mission activities play for the social and

entrepreneurial development of the territory and for the future of the University itself. Some concurrent factors have fostered the growth of activities and the debate on the Third Mission: 1) the new strong political role that the university evokes in relation to the territory; 2) the growing importance of sources of funding private and external to the university; 3) the new global perspective with regard to education favored by the open education movement, student mobility and the success of massive open online courses (MOOCs); 4) last but not least, the inclusion by the National Agency for the Evaluation of the University system and research (Anvur) of Third Mission activities in the evaluation exercises of Italian universities (Cassella, 2017).

The Third Mission as stated above comes after the first and second mission of university. The first mission is represented by teaching, higher education and the interaction with university students. The second is represented by the scientific research and the interaction with the scientific community. To define the Third Mission is more challenging than for the first two, as its boundaries are more blurred and, as stated by Anvur itself, "there are many ways through which the Third Mission takes place, subject of a wide literature that we don't need to discuss" (Anvur, 2013; Morcellini et al., 2017). It is therefore difficult to be defined. Its definition sets out from a series of denials, emphasizing the characteristics that make it different from the first two missions, it is not education or research. But what distinguishes and characterizes the Third Mission is the direct involvement (in various ways) of external actors, not part of the University environment but part of the Third Mission objective. There are several definitions of Third Missions, from more general ones, that define the Third Mission as the interaction between university institutions and external institutions in the private, public and volunteering sectors, as well as with society as a whole; to those that give priority to the relationship with the market sector; to those that consider the role of the university as an institution that feeds the local system, promotes projects for the innovation of the territory, promotes the development of new technologies through the transfer of services and models, at the same time activating feedback processes, which transform the university itself, making it more sensitive to the problems and needs of enterprises and/or a territory. Specifically, the activities of the Third Mission are divided over two main broad areas: the area of relations with companies and with the market and the area of valorization and enhancement of public goods and assets. To the first area belong all activities connected with economic exploitation of research and technology transfer: patents,

spin-off-related companies, incubators, etc. The importance of enhancing activities linked to the technological transfer comes from the affirmation of the so-called Triple Helix Model of Innovation, as theorized by Etzkowitz and Leydesdorff (Cassella, 2017; Etzkowitz & Leydesdorff, 2000).
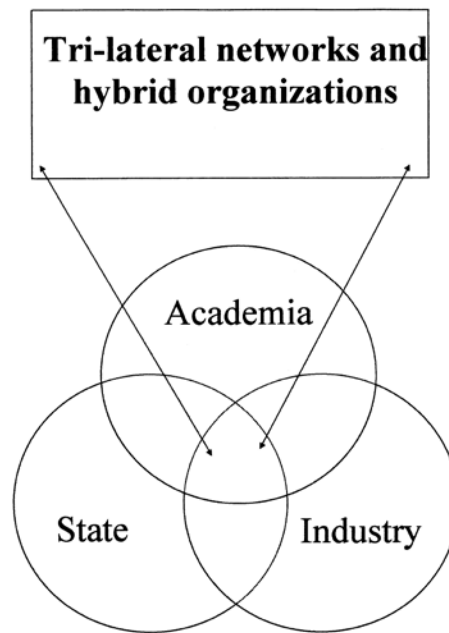
Figure 11: The Triple Helix Model of University–Industry–Government Relations.

Source: (Etzkowitz & Leydesdorff, 2000)

According to the Triple Helix theory, universities, the State and the market are three interconnected structures in an organizational form that is constantly changing and evolving. The most advanced triple helix model is embodied in a series of initiatives and trilateral alliances that sees universities, the state and the market interact to create an innovative environment. For some years now, universities appeared increasingly linked to the world of economics and industry, viewed as potential providers of both resources and source of highly trained labor demand. To the second area, belong cultural and social activities, including: enhancement of public goods, public engagement and lifelong learning. This second area has developed later than the first and includes a wide range of activities, mainly aimed at the general public, associations and professional orders, schools and the cultural sector. The first and second areas, the whole Third Mission, must be conceived as holistic and not separate, aiming to achieve a diversity of benefits

for society. While the first and second mission of university, education and research, are under the individual responsibility of teachers, the Third Mission is an institutional responsibility of each university (Cassella, 2017).

The measurement and evaluation of the Third Mission in Italy represents a complex activity that poses particular challenges and limiting factors: only few consolidated data, poorly structured and not always possible to be standardized; extremely significant territorial variables; a labile boundary between activities carried out for individual purposes (academic career, personal prestige) and activities carried out at institutional level and for institutional purposes. Nonetheless, since eight years the evaluation of the Third Mission has been the subject of increasing attention both at local and regional level and at national level. Carried out by Anvur, the VQR (Research Quality Evaluation) 2004-2010, completed in August 2013, involved universities in a first national collection of data on the Third Mission and defined a number of indicators both for technological transfer and cultural and social activities. This evaluation represented a first measurement of Third Mission activities in Italy and highlighted limits concerning limits on metrics still unsteady and the reliability of data sources (Cassella, 2017).

The legislative decrees that recognized the Third Mission as an institutional mission of the University, on par with teaching and research missions, are the Legislative Decree No. 19 dating January 27th, 2012, and the subsequent Ministerial Decree, Ministry of Education, University and Research, No. 47 dating January 30th, 2013. The first decree defines the principles of implementation of the system for the Self-Evaluation, Periodic Evaluation and Accreditation (AVA). Annex E of the second decree, defines indicators and parameters for the periodic evaluation of research and Third Mission activities: scientific dissemination activities, average number of patents for teachers, number of spin-offs, turnover ratio to third parties and research projects won/number of teachers, number of extra-moenia activities. In 2014, it began the first evaluation of the research activities of university departments, through the compilation of the Single Annual Departmental Research Sheet (SUA-RD), including a section aimed at the collection of structured data on the Third Mission: the SUA-Third Mission (SUA-TM). Among the activities included: patents, academic entrepreneurship (spin-off companies), third-party activities, incubators, research institutions and consortia, public engagement, adult training,

museum centres, archaeological excavations, historical buildings and clinical trial activities. From the analysis, it appears more established and consolidated the measurement of the activities related to technology transfer, for their economic impact on the territory. Applied research and technological transfer are strategically relevant for local and territorial SMEs, often struggling to find financial resources and skills to respond to market innovations. Therefore, one of the fundamental tasks of universities in the context of the Third Mission is to help the territories to make the "leaps" that would otherwise not have the resources to carry out, in particular, with regard to the economic exploitation of research, by accessing the world networks of production and circulation of knowledge (global value chains, GVC). The technological transfer is (or should be) therefore also a transfer of knowledge, not limited to the transfer of innovation incorporated into a physical device, developing a common path of learning, combining the technical scientific background of universities with the specific needs and technical experience of entrepreneurs and company specialists. Less developed and closer to the human sciences, appear to be the indicators of the production and management of cultural heritage. In the evaluation and measurement of Third Mission, was considered for the first time also the activities of Public Engagement, a very extensive area including a multitude of initiatives aimed to link science and society.

With ministerial decree MIUR No 458/2015 and the subsequent VQR call 2011-2014, the national measurement and evaluation of the universities Third Mission became an institutional and periodic evaluation procedure, part of each university or research institution, promoting the awareness of the university relationship with the outside world. In the 2011-2014 VQR, the evaluation of the Third Mission was entrusted to a Commission of Experts in the evaluation of the Third Mission (CETM), which was then split into two subcommittees: Exploitation of research (CETM A); Production of public goods of a social, educational and cultural nature (CETM B). Data collection has been carried out mainly at institutional level. Data on third parties, health protection, lifelong learning and public engagement have been collected both at institutional and department level. An additional survey aimed to understand the level of integration of Third Mission evaluation activities and functions within each of the evaluated universities.

The analysis of results showed a non-homogeneous picture of Third Mission activities carried out by Italian Universities. Only 70% of universities responded to the evaluation survey about the Third Mission. Although lagging behind other European countries, Italian universities in the last years introduced several institutional and organizational innovations to support Third Mission activities and the relationship with the territory. Offices dedicated to the technological transfer (UTT) have been created and a steady growth has been registered in the staff units in these offices and in skills linked to the Third Mission. The inter-university network Netval (network for the enhancement of university research) has been created to promote culture and good practices of technology transfer through the involvement of the business world (Cassella, 2017).

Evaluation results show that activities aimed at the valorization of "hard sciences" are more developed than those aimed at the valorization of human sciences. The gap may be explained by the objective to attract more university enrolments in scientific subjects, due to a decrease of registrations in such subjects. On another side, there is the perception of greater lack of scientific knowledge in society, than of humanities. Therefore the type of interaction between university and society in this sense, responds to a deficit model, aimed at bridging a knowledge gap between the public and science. However, it would be more effective to promote models of dialogue and active participation to involve citizens and companies. Always in favor of Third Mission activities related to hard sciences, have been registered successful initiatives: the European Researchers' Night (ERN), the Scientific Culture Week, the Mathematical, Physical and Chemical Olympics, etc. On the side of the human and social sciences, a successful experience of public engagement, specifically in the legal area, is represented by "legal clinics", training experiences for students who are coordinated by teachers and work to face cases of social justice and to improve access to justice for vulnerable and under-represented groups and organizations (e.g. migrants, children, people with disabilities, prisoners, etc.) (Cassella, 2017).

The evaluation and measurement of the Third Mission in Italy has now reached a decent level of development but still insufficient. It is necessary to identify additional, adequate, contextualized, and more robust indicators, in relation to activities aimed at enhancing public social, cultural and educational goods. Moreover, it is necessary to spur further evaluation and description of Third

Mission activities, increasing funding for this sector. Lastly, as suggested by CETM, in the future, evaluation of Third Mission initiatives should be increasingly oriented to and integrated by more accurate and specific qualitative analyses, and be oriented toward case-specific on-site visits. This way, it will be possible to study the social impacts of the Third Mission, its benefits and efficacy for society.

The boundaries set by the description of what is meant with "public engagement" by Anvur are rather wide and blurred, leaving space to interpretations and a wide range of foreseeable activities. The description by Anvur says simply "the set of non-profit activities bearing a cultural, educational and development of society values" (Anvur, 2015). It is useful to point out a rather possible double nature present in public engagement activities. Public engagement, therefore, seems to reveal both an praiseworthy and real public engagement aspect and a second less obvious aspect, connected with the potential economic return on university institutions, as it is true that the more universities are visible to the general public, the more they manage to raise contributions, in terms of both direct taxes on new enrolments and external funding. It is therefore important to question whether the very diction of universities public engagement reflects authentic intentions of action and feedback between universities and the non-specialized public, and to what extent the university institution is really willing to accept the stimuli, so to speak, "from the bottom up", and how much, on the other hand, is not limited to offering itself as still a closed institution, impermeable to outside interactions. Public engagement is the result of different factors: structural changes in society, logics of democracy participatory activities applied to the most varied contexts, an opportunity for economic and financial benefit; it is therefore important to investigate what, to date, the public involvement activities of Italian universities consist of. To date, the experiences attributable to an authentic synergy between the academy and the citizens are very few. The reception of the potential of scientific knowledge depends on the context and the intensity with which the academy puts at the service of the citizens varies from country to country (Morcellini et al., 2017).

The activities that can be included by the expression "public engagement" are manifold and include a bit of everything that can circulate through the media or that has visible impact on the lives of citizens: dissemination publications signed by the teachers; participation of teachers in

radio and television broadcasts; public meetings (scientific cafes, festival); organization of public events (researchers' night, open days); days dedicated to training and communication; blogs and interactive websites; provision of availability of museums, hospitals, sports facilities, libraries, theatres, historic university buildings; participation in committees for the definition of standards and technical standards; initiatives for health issues prevention; those aimed at urban and territorial development and the enhancement of the territory; organization of concerts, exhibitions, and other public utility events open to all citizens; formulation of public interest programs; orientation initiatives in high schools; forms of participatory democracy (citizen panel). Some critics have been moved to the Anvur approach concerning the Third Mission in Italy. According to these critics, the set of mentioned activities and examples of Third Mission initiatives would constitute a commendable and praiseworthy framework of proposals. However, according to the critics, the agency seems to have a strong vocation to monetize any initiative in the name of a totally corporate vision of scientific action and of the University itself. Due to this vision, considering hard sciences potential for technological transfer and consequent economic turnout, humanities and social sciences appear to be greatly disadvantaged. Moreover and moving from this, it follows that the action of universities itself is also regulated on the evaluation criteria of the Anvur agency, greatly reducing and devaluing its potential. Critics also state that the fact that the University is, in substance, ranked like other stock market products might affect and threaten the quality of scenarios in the middle and long run, affecting not only the Third Mission but also the first two, and finally affecting the role university is meant to play in society (Morcellini et al., 2017).

Concerning the sustainable development of territories, universities play a key role in supporting territories and local communities towards a path of sustainability as they have the capacity for technological innovation and for attracting capital (qualified human capital, financial capital, tangible and intangible capital), both in terms of job creation and, more in general, a driving force for change and development. Moreover, they represent a meeting space between the local, regional and the global/international dimension. Especially within the Agenda 2030 framework, universities are called to undertake a transversal process through which to pursue environmental protection, community well-being, social and intergenerational equity and economic development in an integrated and systematic way (Lombardi, 2019).

University campuses are spaces in which important urban transformations are often measured and physically produced and act as laboratories for experimenting innovative solutions and best practice models. The Italian Network of Universities for Sustainable Development (RUS) intends to gather experiences and best practices of Italian universities and assess these through working groups dedicated to the themes of education, energy, mobility, waste and resources, food and climate changes. The Italian Network of Universities for Sustainable Development was officially established by the Conference of Rectors of Italian Universities, CRUI, in July 2015. Today, the universities involved are 78, corresponding to 85% of the national total. Among the main objectives of the Network there are: the dissemination of culture and good practices of sustainability, both inside and outside the universities, according to the aims of the Sustainable Development Goals; the improvement of environmental and social aspects of all members, establishing a permanent observatory with appropriate metrics to monitor environmental, social and economic performances of universities; the promotion of a multidisciplinary educational dimension, of a multi-stakeholder approach, new pedagogical approaches and the design of innovative engaging initiatives, in order to contribute to the growth of the culture of sustainable development; the development of awareness-raising and promotion of initiatives on a local, national and international scale, with a view to stakeholder engagement; fostering collaborations with public institutions and public and private companies (Lombardi, 2019).

The challenges posed to 2030 and 2050 by the Agenda 2030 and the National Strategy for Sustainable Development (SNSvS) which have the ambition to design a vision for the future and the development centered on the paradigm of sustainability, require innovative, collaborative and multidisciplinary governance systems, in order to define new policies based on circular and systemic perspectives. In this direction, a new project proposal has been developed to strengthen the regional sustainable development governance and support the development of the Regional Strategy for Sustainable Development (SRSvS), through the definition of a new University – Region collaborative paradigm and a specific direction for the university's Third Mission. The project, developed in response to the call of the Ministry of the Environment for projects supporting the SNSvS at the regional scale (therefore involving the SRSvS), is called "PASS – Piedmont and Academy for Sustainable Development" and has been developed jointly by the 4 regional universities: Polytechnic of Turin (lead partner), University of Turin, University of

Eastern Piedmont and University of Gastronomic Sciences of Pollenzo. PASS aims at the same time to ensure adequate and lasting scientific support to the SRSvS, to guarantee multidisciplinary and transdisciplinary approaches, to direct the research and the administrative action toward ambitious results and incisive actions for the regional territory. In particular, PASS intends to overcome some of the barriers that hinder the transition to the SvS and the implementation of the SNSvS and SRSvS: limited cooperation between and within organizations; weakness of the Third Mission of university and limited production of applied research for sustainability; slowness in translating research into practical action; inertia in the extension of the direct initiative for the SvS to other subjects, public or private, of the territory (Lombardi, 2019).

The cornerstone of the project is the valorization of the synergy of the university system developed by the RUS regional coordination and its application for the development of the SRSvS. The RUS Network demonstrated at national level its potential supporting the SvS and in particular, the case of Piedmont RUS universities represent a model of action, for its unique coordination of skills and relations with the territory, integrating four universities diversified by areas of action. PASS project has three main objectives: 1) structure a model of collaboration between the Piedmont Region and the University for a sustainable development governance, through active participation in the regional decision-making bodies; 2) enhance the Third Mission of universities, through the introduction, mapping and involvement of sustainable development culture in the university environment; 3) contribute to innovating future perspectives of sustainability, from the public debate to new approaches for territorial planning. The aims of the project match several aspects of the SvS governance: consolidation of collaborative approaches and coordinated actions oriented at the innovation and cultural acceleration toward the change of social-economic paradigm envisaged by the Agenda 2030; awareness raising of the essentiality of the contribution of individuals for a sustainable development and the role of institutions in this process; a progressive and evolutionary approach that sees the collaboration between universities and the Region as unending and expanding to all fields of sustainability (institutional, social, economic and environmental) (Lombardi, 2019).

Another example in the Piedmont region, representing the effort of regional universities toward the Third Mission objectives, is the Agorà Scienza Center, created in 2006. Its missions are the

technology and knowledge transfer to society and the training of the scientific community and researchers in skills like communication and interactions between science and society. The center implements an interdisciplinary approach, involving scientific and humanistic disciplines, with the objective of raising awareness of society as a whole but in particular to sensitize young people about innovation and sustainable development. Two main projects have been carried out in the Agorà Scienza center activity: the Science Communication Society (SCS) doctoral school, and the Active Science project, both at national level. The SCS school involves PhD students and young researchers with the ambition to find new ways to communicate science and establish new dialogues between different disciplines. The project Scienza Attiva aims at putting teachers and high school students in direct contact with university researchers and establishing a two-way discussion about scientific issues, through web platforms, drawing inspiration from methods of participatory democracy (Susa, 2015).

3. METHODOLOGY

The objective of the thesis is to understand how Italian Universities actively engage youth in their specific territories and which types of projects are currently, or have been recently launched to promote youth participation and raise awareness about sustainable territorial and regional development. The final aim is to design a project for young students within the context of the SCORE project, therefore for one of the towns that take part in the pilot experiences of SCORE in the Susa Valley, in Piedmont.
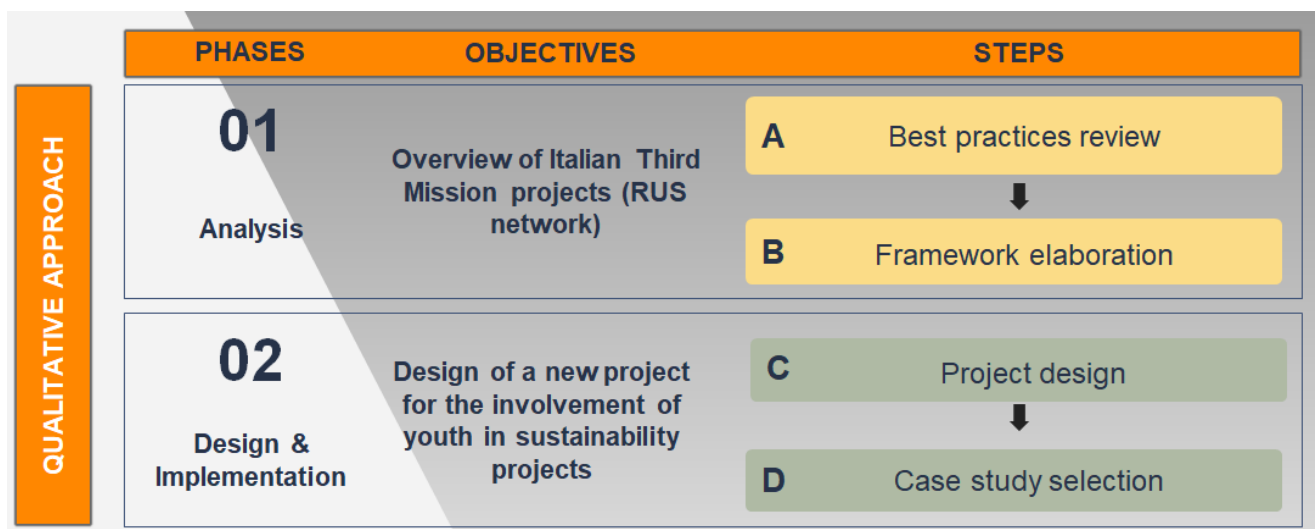
Figure 12: Methodology phases and steps

Source: Author

As shown in Figure 12, the methodological approach is divided in two main phases:

Phase 1: Analysis

- Step A: Overview and assessment. Overview and assessment of Italian Universities' Third Mission projects with the objective to engage youth in sustainable territorial development and renewable energies. In this step will be carried out a best practice overview and analysis of projects designed and implemented by Universities and parallel institutions, in a Third Mission perspective, focusing on public engagement in territorial sustainable development topics and specifically targeting youth. The ambitious is that to assess and describe the amount, the typology, the variety and characteristics of such initiatives, in order to understand the state and level of attention dedicated to this mission by Universities and other local institutions.

- Step B: Framework elaboration. Based on the selected projects in the previous step, elaboration of a framework for the design of projects for youth engagement in sustainable territorial development and renewable energies. The aim of this step is that to attempt to list and organize the main and most relevant characteristics of projects in order to assess and highlight the features more conducive for youth engagement in territorial sustainable development projects, and learn about features to be avoided from past experiences.

Phase 2: Design and Implementation

- Step C: Project design. Drawing from the lessons of Step A and B, based on the characteristics and features selected, the aim of this step is that to design a new project aimed to engage youth in territorial sustainable development initiatives.

- Step D: Case Studies selection. This step consists in the selection of the target group and the case study on which to apply the new project previously designed. The target group selection is a fundamental step as it influences the features and characteristics of the project itself, as the variables of the activity should be adapted and fine-tuned according to the target group age and characteristics.

3.1 Phase 1: Analysis

Step A: Overview of Italian Third Mission projects for sustainable development and youth engagement

In order to carry out a significant overview of Italian Third Mission projects dedicated to youth and sustainability there was the primary need of open access database resources to review and rely on. After a first online research, it was possible to state, firstly, a lack of national comprehensive documents that describe the projects implemented by all the different universities in Italy, with a description of the projects' characteristics and objectives. Secondly, it was possible to state a significant absence of documents dedicated to the collection and description of Third Mission projects of Italian Universities dedicated to the engagement of youth (locally and regionally) in sustainability and renewable energy projects.

The Italian University Network for Sustainable Development (RUS), gathering all Italian Universities committed to the topic of environmental sustainability and social responsibility, coordinates and collects best practices and experiences of the positive impact in terms of environmental, ethical, social and economic actions currently implemented by each university, so as to contribute to the achievement of the SDGs. Among the most recent and complete documents carried out by the RUS Network, there's the "Agenda 2030 e Università" by Patrizia Lombardi (Lombardi, 2020), published in September 2020. This document is a survey of Italian RUS Network Universities initiatives and best practices connected with at least one of the 17 SDGs of the Agenda 2030. The RUS Network gathers in total 78 Universities, but only 23 responded and took part in the survey. The outcome of the survey is represented by the list of all the 17 SDGs, and for each specific Goal and target it is given the number of Universities with active projects or initiatives for that goal/target. In the last part, the document reports about 121 initiatives and best practices activated by universities during the COVID-19 pandemic, as a response to the emergence situation.

Figure 13: "Agenda 2030 e Università" 23 Italian Universities survey

Source: Lombardi, 2020

Figure 14: List of 17 SDGs and relating Universities' projects

Source: Lombardi, 2020

The first part, descriptive of Universities initiatives connected to SDGs, provides the percentage of Universities active for a specific SDG, but doesn't provide the description of each project or the target group for which the project has been designed. It is therefore impossible to extract information for the elaboration of an operational framework with transferable characteristics and details for the design of projects. The last part, focused on the pandemic situation, provides an Excel document (Rete RUS, 2020) with the projects characteristics and details about the University of reference, the target group, the objective of the project, the length, the funding and organizing bodies and the level of transferability of the project. The projects presented in this document don't relate with the sustainable management of the territory from an urban and spatial planning point of view, but focus more on aspects like the psychophysical well-being, medical, social and the support to students at home. Like for the first part, it was therefore impossible to extract useful information also from this document. Despite the information, from the last Excel document it has been kept the structure and the information required for the projects' description. The same structure will be implemented for the projects' description and information extraction, once the database is found and completed.

After further research, another database set has been found that links the Third Mission of University and the outreach towards society about sustainability. The set of information found is provided by the Italian Alliance for Sustainable Development (ASviS). ASVIS gathers 292 members that represent the most important institutions and networks of civil society. The mission of the Alliance is to raise the awareness of the Italian society, economic stakeholders and institutions about the importance of the 2030 Agenda for Sustainable Development, and to mobilize them in order to pursue the Sustainable Development Goals (SDGs). Among its main objectives there is the promotion of an educational programme aimed at the education of sustainable development, with particular attention to young generations (ASVIS, 2016). Among the members of ASVIS also the RUS Network is present and together they work for the education and outreach towards society about sustainability and the message of the 17 SDGs. In the section "Education for Sustainable Development", it is stressed the importance of the education for sustainability towards youth, to make them actors of change, to transfer them knowledge, abilities, values and behaviours, in order to make society able to act consciously and responsibly towards the environment, for a sustainable future. In this "Education for Sustainable

Development" section, it is present the sub-section "Members Best Practices", the section dedicated to best practices in terms of education and outreach of SDGs values towards society, by the members of the ASVIS. The requirements for the projects to be listed in this section are 4: 1) be organized and promoted by one of the members of ASVIS; 2) aim at training participants on issues related to the 2030 Agenda with specific reference to one or more Sustainable Development Goals; 3) be free and accessible to all; 4) have been implemented starting from the date of signature of the Agenda 2030 (25 September 2015). Therefore the description of requirements is rather wide and leaves space and freedom for ideas and implementation. In this section there are 34 best practices projects published (ASVIS, 2021). The projects are published with the following information: the project title, the description of the objective and the implementation, the length or duration of the project, the target group for which the project has been designed, and it is also present the web link to each specific project website. After reviewing all the 34 projects it is possible to state that 14 out of 34 projects are suitable with the aim of the research: the 16 projects selected involve a territorial and creative approach, with the focus on the management and planning of territorial resources for a sustainable development, for the transmission of SDGs values (especially SDG 7 and 11) and they target mainly young generations, going from primary schools, secondary school 1st level and secondary schools 2nd level, to university students and lifelong learning. 13 out of these 14 projects are specifically targeted for youth, therefore have their target groups that go from primary schools up to secondary schools 2nd level.
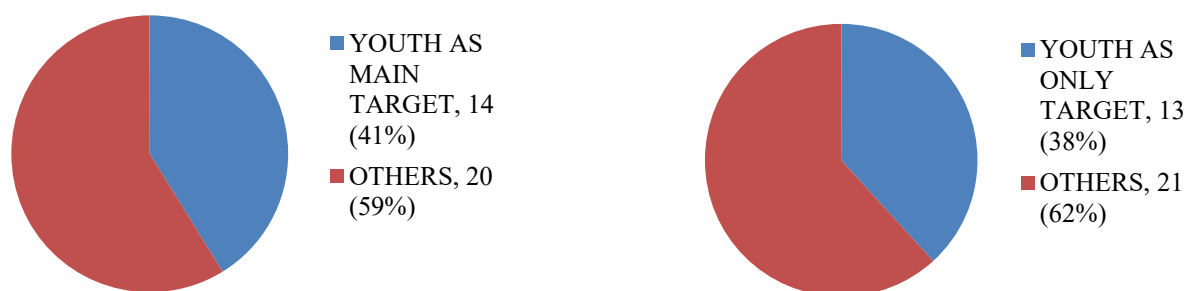
Figure 15: ASVIS projects concerning territorial sustainable development and target groups

Author, 2021

For the research of this thesis, this set of best practices represent a good example on how projects for youth are designed and implemented today. It is therefore possible to keep and learn from the characteristics described and rely on these for the creation of the framework for youth project design, objective of this research. However, none of the 14 projects selected is designed or promoted by Universities institutions, but mainly by local or regional associations, regional public bodies, research centers or private/bank foundations. In this sense, they don't represent the ideal examples on which the survey can rely, as the main mission of the research is to study and analyze how Universities interact with territories around them and design and implement projects targeting young generations about territorial sustainable development, according to the Third Mission objectives.

In the absence of comprehensive documents describing Third Mission best practices and projects carried out by Universities institutions for the formation of youth about sustainable territorial development, the research had to carry out the document and the database using the resources available and open access. In Italy, there are 97 public Universities and 19 private Universities (MIUR, 2021). The base information used for the research is represented by the RUS Network and the Universities members of the Network, as the Network serves as pre-selection of those Italian Universities that committed to the main purpose of the propagation of the culture and best practices about sustainability, both within but mainly beyond University boundaries, at urban, regional, national, international level, in order to increase the positive impacts in environmental, ethical, social and economic terms of the actions implemented by the members of the Network, in order to contribute to the achievement of the SDGs, and in order to strengthen the recognition and value of the Italian experience at international level.

The Universities that committed to the RUS Network objectives are 78, the majority of Italian Universities. In order to find the needed information the only possible and feasible way was to review each of the Universities websites and look for the section "Third Mission" or the Universities internal groups and sections that deal with the Third Mission purpose, in the sustainable territorial development direction dealt with in this thesis.

Figure 16: Rete 78 RUS Universities, mapping 2020

Source: Lombardi, 2020

All the 78 websites have been reviewed. The majority had specific sections dedicated to the Third Mission with different activities relating to a broad range of topics and focuses: sciences, social and psychophysical well-being, health and medical topics, arts and literature, etc. Some Universities (often small sized Institutions) didn't have dedicated sections but they stated however their commitment to the Third Missions objectives. Only very few Universities didn't have anything published on their websites about Third Mission engagements or projects. The first part of the research was then conducted searching in the Universities websites for the Third Mission section and extracting information about all Third Mission projects, launched and

70

implemented within the period of the last four years, connected with the topic of sustainable territorial development and sustainable management of resources. When they were present, also the sections about the teams in charge of the research and propagation of sustainable development have been analyzed. Lastly, in the Universities that had the Urban Planning/Architecture departments, also these sections have been analyzed searching for projects aimed at the propagation to society of the regional and territorial sustainable development objectives.

As result of this first analysis, the outcome was a list of 120 projects selected accordingly with the topics dealt with in this research. All the selected projects, launched and implemented within the period of the last four years, involve two main aspects: 1) a territorial approach to sustainability, with an territorial and urban planning perspective, taking in considerations mainly SDG 7, 11 and 13; and 2) the main purpose of sharing and engage society and citizens beyond the traditional University boundaries.
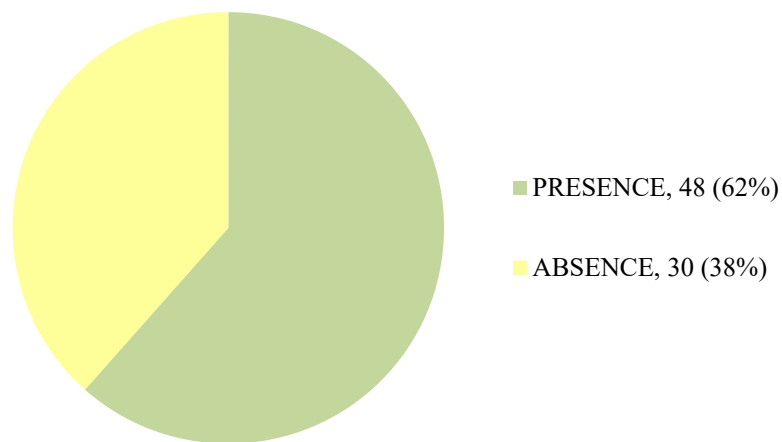
Figure 17: Percentage of Italian Universities presenting the presence/absence of Third Missions projects related to territorial sustainable development

Source: Author, 2021

The 120 selected projects belong to 48 Universities out of the 78 RUS Network Universities. Therefore a percentage of 62% of the analyzed Universities appears to be engaged with territorial sustainable development targeting society and citizens. The other 30 Universities, 38% of the total RUS Network Universities did not have any project published in their website that would involve the combination of requirements for this survey. The reasons for this lack of presence of projects in the Third Mission department and connected to the propagation of territorial sustainable development could be several. Part of the reason is connected with the specialization of Universities. Some of the Universities not showing the type of projects researched, are Universities focused on specific scientific or artistic departments, like medical schools, art institutes or economic schools. In these types of Universities it is therefore justified the absence of projects connected with territorial planning and sustainable territorial development.

In other cases, the reason could be found in the quality of the website design and how updated the websites of Universities are. The website of certain Universities showed lack of maintenance and deficient structure design, information not completely up to date and in general a presentation of the University not at the same level as the majority of the other Universities. In this case, the information researched was often not present. It is therefore difficult to state if the Universities not declaring their engagement in Third Mission through territorial sustainable development projects really have activated or not projects of this type. Relying only on University websites as the only source of information for this research is certainly a limit of the research process, that in future can be enhanced by the addition of longer and more in-depth research.

After having realized the first analysis, the selected 120 projects have been organized in an Excel file accordingly with the same structure presented by the RUS Network Report for the projects activated as response to the pandemic emergence (Rete RUS, 2020). From this structure they have kept the main information requested for project description. The file structure, descriptive of the projects characteristics, requires the following main information about each project: 1) name of the project; 2) brief description; 3) year of reference (between 2016 and 2021); 4) University of reference; 5) target group; 6) the type of approach; 7) other stakeholders involved in the funding or organization of the project; 8) website reference.

All the 120 projects have been categorized and analyzed accordingly with the Excel structure presented above. It was possible to find most information about the majority of projects, thanks to the information provided in each dedicated website. When some information was missing, the corresponding cell in the Excel file would remain empty. Most of the 120 analyzed projects refer to years between 2018, 2019, 2020 and 2021. The information requested about the typology of approach used for the project design and implementation, refers to the range of Third Mission initiatives possibilities. In this research, as the objective focuses on the relation with society and citizens, the approach typologies are limited to "technical transfer" and "public engagement". As the project selection proceeded only the projects aimed at "public engagement" have been selected, to reduce the amount of data to categorize and focus more on the objective of the research.

The presence for each project of the description about the objectives, the focus and the implementation, allowed the understanding of each project's nature and the target group that each project refers to.

With the first analysis, having already selected the projects responding to the two main requirements of focusing on sustainable development from a territorial planning perspective and having as objective the engagement of society and citizens outside of the University environment, it was obtained the first database of Italian Universities Third Mission projects aimed at the public engagement in territorial sustainable development values and concepts.

With the second analysis, based on the obtained database, the objective was to further select the Third Mission projects aimed at the public engagement in territorial sustainable development that specifically focus on youth and young students as target groups.

Therefore, from the first obtained database, the indicator about the target group played a key role for the second phase of the analysis. Starting from the Excel document with the categorized 120 projects, for the second phase of the information extraction, the projects have been further categorized and selected in reference to the target group indicator.

The 120 projects, relating to the target group category, showed great differences in the typology of the target group. The main target groups described among the selected 120 projects can be

described as follows: the University community, involving University students, University employees and University Professors; General public/civil society/citizens as broad group, without further specification; University and scientific researchers; social vulnerable groups, like women, low-income households, unemployed, inmates, marginalized groups; local associations and public bodies; private companies; younger students and youth: primary school students, 1st level secondary school students, 2nd level secondary school students, young students of age 8 to 13-14 years old. Often, depending on the nature of the project, its scope and its objective, the target groups have been assembled and combined in wider target groups, as follows: university and general public/civil society/citizens as broad group; general public/civil society/citizens as broad group and vulnerable and marginalized groups; general public/civil society/citizens as broad group and the University community (students, professors, employees); in some cases, for specific events, all the target groups were involved, all the students of all ages and all levels, and the whole civil society; University students, general public/civil society/citizens as broad group and 2nd level secondary school students; University students and 2nd level secondary school students; primary school students and 1st level secondary school students; primary school students and secondary school students.

To proceed with the selection and the classification of projects, out of the 120 projects resulted from the first analysis, the second analysis was performed extracting from the 120 projects database accordingly with information provided by the target group indicator. In particular, the selection was limited only to the projects that in the target group indicator involved students from the primary school up to the 2nd level secondary school. The selection didn't involve those projects designed as open to all and for all categories and that envisaged a wide participation of the whole civil society and groups, even if youth was included in the scope of those projects. The reason for this choice is related to the objective of the research. The objective is to rely on project best practices launched by Universities, aimed at the engagement of youth in territorial sustainable development from a territorial and urban planning perspective, projects designed specifically for youth that developed methods and experiences from which it is possible to draw lessons and guidelines for the design of a new project. Therefore, the selection performed on the 120 selected projects database was carried out selecting exclusively those projects with young students as the target group.

Out of the 120 Third Mission projects, only 12 projects had young students as a specific target group. Compared to the total Third Mission projects, the selected ones dedicated to the youth represent only a small percentage. According to the result of this research, only 10% of the projects designed and presented by Italian Universities in the Third Mission department and aimed at public engagement in territorial sustainable development are designed specifically for the youth. As stated before, other projects involve the youth as target group, but among other social groups, making these kinds of mixed target group projects less specific and tailored for young generations.
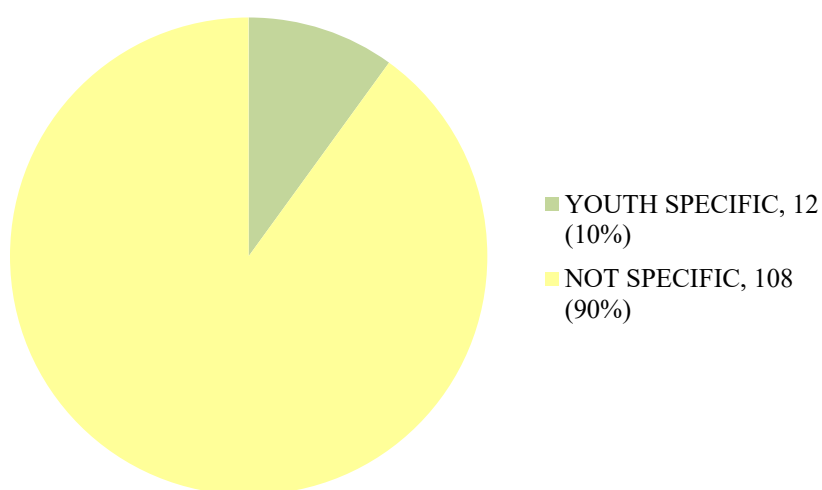
Figure 18: Third Mission projects and target groups

Source: Author, 2021

As appears from Figure 18, only 12 projects out of 120, representing only the 10% of Italian University Third Mission projects aimed at the public engagement in territorial sustainable development from a territorial planning point of view (involving sustainable resources management, territorial and urban planning according to SDG 7 and 11, renewable energy projects, and related topics), are specifically designed for young students (primary school, secondary school 1st and 2nd levels). The other 90% of projects envisages other target groups of society, or envisages mixed target groups, involving also young generations but not specifically dedicated to them.

The selected 12 projects belong to the following Italian Universities: the University of Bologna, with the project SpiaggiaLonga and the project Unijunior; the Polytechnic University of Milan, with the project ScAR – Scuola Attiva Risorse; the University Ca' Foscari of Venice, with the project Kids University Venice; the University "G. d'Annunzio" of Chieti – Pescara, with the project Rassegna Cinematografica - "Alla scoperta di vite straordinarie"; the University of Parma with the project Unijunior; the University of Sassari, with the project Scienza in Piazza 2021 and the project UNISS per bambini e ragazzi; the University of Torino together with the Polytechnic University of Torino, with the project Lessico e Nuvole, Le parole del cambiamento climatico; The University of Torino, with the project DEEP Conferenze fuori dall'ordinario; the University of Eastern Piedmont, with the project Energia in Energia - La Gara di scienze, the project La Giornata mondiale dell'acqua and the project UPO Junior.

It follows a table with a brief description for each of these 12 projects:

University	Project description
University of Bologna	SpiaggiaLonga: designed for young students of primary and secondary schools; Three days cleaning beaches and shores from plastic pollution, conferences about sustainability and the importance of plastic-free topic Unijunior: a University for young students between 8 and 14, to bring them closer to "important" subjects. One of the main themes is the Future of the Planet, touching renewable energies, climate change, and green economy
Polytechnic University of Milan	Progetto Scuola Attiva Risorse – ScAR: The project put at its centre school and culture as engines of enhancement and valorization of landscape and social cohesion. To teach young students (secondary school 1st and 2nd level) about cultural heritage and landscape, an ever-changing value system, to act on the suburbs and urban outskirts, through a conscious use of new technologies. The challenge is to involve young students, assigning them a new role: from users and beneficiaries of cultural goods to protagonists of the awareness raising about them and their promotion
University Ca' Foscari of Venice	Kids University Venice: For an entire week the University campus is open for young students from 8 to 13 years old. The project, coordinated by the University Professors and researchers, visiting Professors from external Universities, with the help of 15 University students, and together with other experts from local bodies and institutions, involves young students of primary and 1st level secondary schools in a series of 17 experimental

	and interactive classes, lessons and laboratories, all organized around the 17 SDGs of the Agenda 2030.
University "G. d'Annunzio" of Chieti – Pescara	<u>Rassegna Cinematografica - "Alla scoperta di vite straordinarie"</u>: Series of beautiful and selected movies, inspired by and coherent with the 17 SDGs of the Agenda 2030, for young students, followed by meetings with experts. The projects promote the education of a new generation of students and viewers/audience, through the raising of awareness about reality and contemporary problems, help develop critical sense, and foster the possibilities for dialogue. The selected movies, moreover the 17 SDGs, want to celebrate youth, people who have distinguished themselves for their pride in facing life's challenges, discriminations, for their altruism and their resilience, and celebrate the Earth as a place to protect and preserve.
University of Parma	<u>Unijunior (same project as for the University of Bologna)</u>: a University for young students between 8 and 14, to bring them closer to "important" subjects. One of the main themes is the Future of the Planet, touching renewable energies, climate change, and green economy
University of Sassari	<u>Scienza in Piazza 2021</u>: Project dedicated to the young students of the 2nd level secondary schools of the city and Province of Sassari. It takes place in public squares and involves the young students for exhibitions and expositions about science and public engagement in scientific topics and subjects. Among the main addressed topics are climate change and sustainability. <u>UNISS per bambini e ragazzi</u>: Due to the pandemic situation, many of the scheduled activities of public engagement towards young students had to be postponed. To face this situation and keep the youth involved in important topics, the University of Sassari provides to young students of primary and secondary schools, tools and educational materials, and the active participation of the University researchers, in order to keep active the engagement of youth in science and in important relevant scientific topics and contemporary world's issues (climate change and sustainable development)
University of Torino / Polytechnic University of Torino	<u>Lessico e Nuvole, Le parole del cambiamento climatico - Agorà Scienza</u>: A linguistic and scientific guidance for 2nd level secondary school students, to navigate the scientific debate about global climate change and its consequences.
University of Torino	<u>DEEP Conferenze fuori dall'ordinario - Agorà Scienza</u>: A series of un-conferences to engage young students and school teachers on the climate change issue. Five meetings targeted at 2nd level secondary schools students of Piedmont region, aimed at explore together with University researchers and external experts this relevant and debated topic through the format of un-conferences, in which the audience (young students) take part in the

	design and planning phase itself of the conference, deciding which specific aspects to look into and examine, which questions bring forth. The first edition is dedicated to the Climate: the topic will be addressed from several points of view and with an interdisciplinary approach.
the University of Eastern Piedmont	Energia in Energia: a project for the dissemination of knowledge about proper and rational use of energy. The Science Competition: the city I would like, from civic education to the design of an urban ecosystem. This is a part of the project dedicated to schools, with the idea to replicate in a school environment and level, experiments and initiatives addressing the renewable energies topic, through didactic-scientific laboratories targeting young students of primary schools and 1st level secondary schools.
	During the activities about energy efficiency and urban sustainability, the students of primary and 1st level secondary schools have realized original designs and models. There have been six winning classes. The results will be presented by a small number of students, under the supervision of the project coordinators.
	Giornata mondiale dell'acqua: The project aims to raise awareness about the importance of water resources. On the occasion of the World Water Day, the Municipality of Alessandria, Amag Reti Idriche S.p.A., the company of Gruppo Amag, responsible for the integrated water cycle promotes with the University of Eastern Piedmont and the Regional Educational Office, a series of initiatives to raise awareness among young students on the importance of water resources. The initiatives envisage fairs in public squares, conferences in the University buildings, laboratories with experts about water, where young students will have the opportunity to learn about the water cycle, the physical properties of water, natural ways of water purification and natural processes to make water drinkable, and about the water governance and management that takes place on a vast territory around the University and the municipality
	UPO Junior: it's a spin-off of the Notte dei Ricercatori, which was always engaged for youth involvement. This experience is an enhancement, with new features and more initiatives. The event is dedicated to primary schools and 1st level secondary schools. More than 2600 kids from 30 different schools took part in the event, with 45 organized laboratories, by the staff of 180 Professors, researchers and students of UPO.

Table 3: 12 Italian University Third Mission projects aimed at the public engagement in territorial sustainable development targeting youth as specific target group

Source: Author

As stated before, these 12 projects belong to 9 Italian Universities. Therefore, if compared to the totality of the Universities participating to RUS Network, which are 78 Universities, it is possible to state that only a small percentage of the Italian Universities engaged in public engagement about sustainable development have designed and implemented projects about sustainability and territorial sustainable development from an territorial planning perspective, targeting specifically and tailored for the youth. In particular, 9 Universities out of 78 results as the 11% of Italian Universities having designed and implemented this type of projects within the period of the last 4 years, as represented in Figure 19.
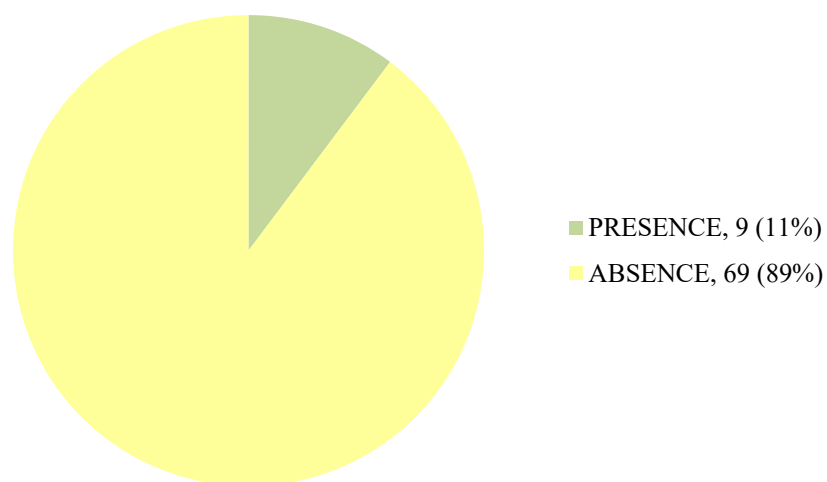
Figure 19: Percentage of Italian Universities presenting the presence/absence of Third Missions projects related to territorial sustainable development and targeting specifically youth.

Source: Author, 2021

a   b

Figure 20: Comparison between the map (a) of the totality of Italian RUS Network Universities, and the map (b) showing those Universities with public engagement projects about territorial sustainable development, targeting specifically youth.

Source: Lombardi, 2020; Author 2021

As it is possible to see in Figure 20, there is only a small number of Italian Universities engaged with Third Mission projects that combine public engagement about sustainability and territorial sustainable development from a territorial planning perspective and youth as a specific target group, having the projects tailored specifically for their age and needs. As stated before, the Universities presenting this type of projects for youth are the University of Bologna, the Polytechnic University of Milan, the University Ca' Foscari of Venice, the University "G. d'Annunzio" of Chieti – Pescara, the University of Parma, the University of Sassari, the University of Torino, the Polytechnic University of Torino, and the University of Eastern Piedmont. From Figure 20, it is possible to see that the Universities that show the presence of the type of projects researched, are located mainly in Northern Italy, in particular in the regions of Piedmont, Lombardy, Emilia-Romagna and Veneto, and specifically in the cities of Turin and Novara for Piedmont, Milan for Lombardy, and Bologna and Parma for Emilia-Romagna. There

are then only two cases that don't belong to Northern Italy. One is located in Eastern Central Italy, in the Marche region, referring to the University "G. d'Annunzio" and in particular to the cities of Chieti and Pescara. The second case is located in the Sardinia region, one of the two main Italian islands, located on the western side, and in particular the case refers to the city of Sassari and its University.

Looking at the map (Figure 20), it is possible to state that the Universities active in the department of Third Mission projects for the youth engagement in territorial sustainable development, are mainly located in Northern Italy, the most developed and advanced part of Italy, in terms of economy and education (ISTAT(b), ISTAT(a), 2021). According to the research carried out, in the Central area of Italy there is only one case of Third Mission projects to specifically engage youth in territorial sustainable development, and another one in the Sardinia region. No project of researched typology was found in Southern Italy.

From the situation represented in the map (Figure 20, b), it is possible to state that in Northern Italy there are some examples of Third Mission project best practices, distributed rather homogeneously across 4 Italian Northern regions: Piedmont, Lombardy, Veneto and Emilia-Romagna. However, the other four regions of Northern Italian, Aosta Valley, Liguria, Friuli-Venezia Giulia and Trentino-Alto Adige/Südtirol, are not covered by the presence of initiatives of the typology researched. In the Central part of Italy, there is a significant gap in the presence of projects for youth engagement in territorial sustainable development designed and promoted by the local Universities. Only one region, Marche region, showed the presence of a project best practice of the typology researched. Another example of projects activated in this direction can be found in Sardinia insular region. In the Southern part of Italy, from the research carried out there seems to be a total lack of the type of projects researched.

From the picture described, trying to assess the level of coverage of Italian Third Mission projects at a national scale, with specific reference to those projects aimed at the public engagement in territorial sustainable development topics and targeting young students as main beneficiaries of the projects, it is possible to describe three main different situations at national level and address three levels of recommendations. Concerning Northern Italy: there is already the presence of implemented projects aimed at the education of territorial sustainable

development values and practices, tailored specifically for youth. The analyzed projects belong to the main Universities of Northern Italy. Although their scope covers already a significant part of the territory, they don't cover the entire Northern region. Therefore it would be advisable to expand the range of action and design and start more projects, also in those Universities of Northern Italy that didn't show the presence of the researched project typology. Concerning Central Italy: only a minimal part of the territory is currently covered by Third Mission projects for young students. It is advisable to enhance and reinforce the effort and engagement of Universities of this area towards the Third Mission objective of public engagement in territorial sustainable development, and in particular targeting youth, in order raise awareness and as many young students of Central Italy as possible. The same can be stated for the Sardinia region. Concerning Southern Italy: from the research it appears a total lack of coverage of Third Mission initiatives to engage youth in territorial sustainable development. It is strongly advisable to promote the commitment of Universities in their role of social catalysts, in particular relating to youth, towards sustainability values and territorial sustainable development.

After having assessed the level of coverage of Third Mission projects on the Italian territory, for the engagement of youth in territorial sustainable development, and after having selected the best practices and their characteristics, it is now possible to proceed with the third phase of the analysis. The aim of the third phase was to analyze and select the main characteristics and features of the selected 12 best practices, for the creation of a framework that would serve as base for the creation of future Third Mission for young students.

The 12 projects selected from the analysis of the 120 Third Mission Italian projects database, have been extracted and categorized in a new Excel sheet. The features classification structure used in this phase was the same used for the previous analysis phases. In this case, the classification according to the characteristic descriptive structure was already performed in the previous analysis phase. The features required for the project classification are the following: name of the project; brief description of the project; project typology; project methodology; year of reference; project duration; number of participants; target age and group; coordinators; University of reference; funding partners; web reference. It follows a brief description of the main classification sections.

The project typology is intended to describe if the project is an event that happens exceptionally and on specific days/periods of the year or if it is a permanent project that lasts through the year. The project methodology intends to analyze the methods, approaches and initiatives ideas implemented to engage young students in interactive activities. The target age and group intends to analyze which are the most frequent age ranges and combined groups of young students for which projects are designed and implemented. The coordinators section intends to analyze who are the main institutions and partners that take part in the organization and the implementation of projects. The funding partners section intends to analyze which are the territorial stakeholders who take part in the financing part of the projects.

All the selected characteristics will be valuable for the elaboration of a framework that will serve as a reference for the design of projects for young students to engage them in sustainability topics and territorial sustainable development.

After having organized and classified the selected 12 projects accordingly with the required characteristics described above, it will be reported a table representing each project with the most significant characteristics. As the brief description for each of the 12 projects has been already presented before, the characteristics shown in the following table will be: name of the project; project typology; project methodology; year of reference; project duration; target age and group; coordinators; funding partners.

Below, follow the tables with the classification of the 12 selected projects and their characteristics:

Project name	Typology	Methodology	Year	Duration	Age target	Coordinators	Funding
1 Spiaggialonga	Event/workshop	conferences, interactive activities outside for the cleaning of beaches	2019	3 days	secondary schools 1st and 2nd level, Univerity students, and citizens	Volunteering University students	University of Bologna, Novamont, Hera SpA, Formula Ambiente, Formula Servizi, Infia e altre
2 Unijunior	Permanent project	Conferences, workshop, attività partecipative	2017, 2018, 2019, 2020, 2021	varied	8-14 years old	Cultural Association Leo Scienza (ex Fun Science)	University of Bologna, University of Parma, University of Modena and Reggio Emilia, University of Ferrara, MIUR, Regione Emilia-Romagna
3 Progetto ScAR - Scuola Attiva Risorse	Permanent project	Digital Storytelling, Atlante Digitale delle Memorie, e ScAR Videomaking	2017, 2018, 2019, 2020, 2021	varied	secondary schools 1st and 2nd level	Polytechnic University of Milano	fondi del 5 per mille IRPEF grazie al programma di impegno e responsablità sociale Polisocial
4 Kids University Venice	Permanent project	Interactive classes, university campus open and dedicated to youth, laboratories	2017, 2018, 2019, 2020, 2021	one week per year	8-14 years old	University Ca' Foscari Venezia	Università Ca' Foscari Venezia, Pleiadi Science Farmer, Ascotrade
5 Rassegna Cinematografica - "Alla scoperta di vite straordinarie"	Event/workshop	Series of selected movies and meetings with experts	2019	one movies per month	secondary schools 1st and 2nd level	University "G. d'Annunzio"Chieti – Pescara	Università degli Studi "G. d'Annunzio"Chieti – Pescara, Comune e l'Istituto Comprensivo di Pianella (Pe), MIUR, MIBAC

Table 4: 12 selected Italian Third Mission projects targeting youth and engaging in territorial sustainable development initiatives (1-5)

Source: Author, 2021

Project name	Typology	Methodology	Year	Duration	Age target	Coordinators	Funding
6 Scienza in Piazza 2021	Event/workshop	Online conferences (due to Covid)/ fairs organised by youth; conferences with University reserachers	2021	3 days	secondary schools 2nd level	Professors, researchers and students of the University of Sassari, municipal and provincial secondary schools, local scientific associations, Scienza in Movimento	Università degli Studi di Sassari
7 UNISS per bambini e ragazzi	Permanent project	Online conferences (due to Covid) about significant scientific topics, interactive activitivities with University researchers and Professors	2020, 2021	varied	primary schools, secondary schools 1st and 2nd level	Professors and researchers of the University of Sassari	Università degli Studi di Sassari
8 Lessico e Nuvole Le parole del cambiamento climatico - Agorà Scienza	Event/workshop	Linguistic adn terminology guide to understand better important topics like climate change and sustainable development	2019	variabile	secondary schools 2nd level, University students, University researchers	University researchers and Professors of the University of Torino and Polytechnic University of Torino, CNR, AGORÀ SCIENZA	University of Torino,
9 DEEP Conferenze fuori dall'ordinario - Agorà Scienza	Event/workshop	Un-conferences, in which the audience (young students) take part in the design and planning phase itself of the conference, deciding which specific aspects to look into and examine, which questions bring forth	2017	5 days	secondary schools 2nd level	Univesty researchers and external experts of the Univerity of Torino, Agorà Scienza	Agorà Sceinza, Accademia delle Scienze di Torino, Associazione subalpina Mathesis e Infini.To, con il sostegno della Compagnia di San Paolo, nell'ambito del sistema Scienza Piemonte

Table 5: 12 selected Italian Third Mission projects targeting youth and engaging in territorial sustainable development initiatives (6-9)

Source: Author, 2021

Project name	Typology	Methodology	Year	Duration	Age target	Coordinators	Funding
10 Energia in Energia. La Gara di scienze: la città che vorrei, dall'educazione civica alla progettazione di un ecosistema urbano	Event/workshop	from civic education to the design of an urban ecosystem; didactic-scientific laboratories; activities about energy efficiency and urban sustainability; realized original designs and models; final presentation	2019	two days, 3 hours for the final presentations	primary schools, secondary schools 1st and 2nd level	3i group, Dipartimento di Scienze e Innovazione Tecnologica (DiSIT), ITIS Volta, Gruppo AMAG, Ufficio Scolastico Territoriale, Comune di Alessandria, Associazione ISES, Associazione IDEALE	3i group, DiSIT, ITIS Volta, Gruppo AMAG, Ufficio Scolastico Territoriale, Comune di Alessandria, Associazione ISES, Associazione IDEALE
11 Giornata mondiale dell'acqua. Conferenza ad Alessandria il 22 marzo	Event/workshop	fairs in public squares, conferences in the Univerity buildings, laboratories with experts about water (water cycle, the physic properties of water, natural ways of water purification and natural processes to make water drinkable, and about the water governance and management)	2018	one day	primary schools, secondary schools 1st and 2nd level	AMAG RETI IDRICHE S.p.A., Comune di Alessandria, l'Università del Piemonte Orientale e l'Ufficio Scolastico Regionale – Ambito di Alessandria	AMAG RETI IDRICHE S.p.A, Comune di Alessandria, l'Università del Piemonte Orientale e l'Ufficio Scolastico Regionale – Ambito di Alessandria
12 UPO Junior	Event/workshop	45 interactive laboratories on several topics, many dedicated to sustainability and sustainable development	2019	4 days	primary schools, secondary schools 1st	Students and Professors of the different departments of the University of Piemonte Orientale	Università del Piemonte Orientale,

Table 6: 12 selected Italian Third Mission projects targeting youth and engaging in territorial sustainable development initiatives (10-12)

Source: Author, 2021

According to the tables presented above, representing the selected projects characteristics and their classification, it is possible to proceed with the analysis of the characteristics in order to create a framework for the creation of future Third Mission projects to engage youth in sustainability topics and territorial sustainable development.

Starting from the first feature, project typology, it is possible to state the presence of two main typologies. The first typology refers to projects designed and implemented as special events/workshops, of one day or a few days, usually concentrated and continuous. The second typology refers to projects designed as continuous and permanent, available and flexible to be organized through the year and not referring to fixed dates and events. Among the presented projects, there is a predominance of the event/workshop typology.

The second feature analyzed is the methodology implemented to carry out the projects. This will be one of the main features taken in consideration for the elaboration of the framework for the design of future projects, as it explains methods and approaches to design and deal with young students, providing examples and best practices to rely on. From the analysis of this section, a range of different methodologies have been assessed and extracted. The first methodology involves the creation of conferences, in real presence, specifically designed for young students about sustainability, SDGs and the relation with the territory and territorial sustainable development, carried out by University professors, researchers, students and external experts. This is the most traditional among the methodologies analyzed and it envisages a limited participation from the target group involved, considered in this approach mainly as passive listeners and learners. The second approach analyzed can be considered as a slight modification of the first methodology presented, the traditional conferences type. The modification envisages the transformation of the traditional conferences into un-conferences, interactive conferences and meetings where the audience (young students) take part in the design and planning phase itself of the conference, deciding which specific aspects to look into and examine, which questions to bring forth. The third typology considered, involves participative activities open-air with the involvement of young students, in the territories involved in the project, to raise awareness about local issues, like plastic pollution, water management. These activities are usually designed as one or a few days together with University professors, students and researchers, walking through

87

topic-relevant areas and initiatives valuable for the whole society. The fourth methodology assessed is represented by the organization of public events focused on sustainability and raising awareness about territorial sustainable development and climate change, like public town fairs and exhibitions, with the participating young students being the protagonists of the organization and the projects creators to be presented, with the help of University Professors and students. The fifth methodology analyzed involves a series of movie screenings for young students related to sustainability, SDGs and territorial sustainable development topics, followed by Q&A meetings with experts of the topics presented and addressed in the movies. The sixth approach consists of using the University Campus and spaces as open laboratories and discovery places for young students, with days dedicated only to their presence and activities implemented for them. The use of the campus is aimed at the interaction with youth about scientific subjects taught in Universities, especially those most relevant today, dealing with climate change and sustainable development. The seventh methodology envisages the use storytelling methods through the implementation of new technologies (video, sound, images, graphics, etc.) and the involvement of young students, in order to make them the protagonists of the narration of places, urban landscapes and territorial issues that affect and characterize their environment and contexts. The eighth methodology involves the application of didactic-scientific laboratories for young students, where in the first part the students are lectured and involved in meetings about territorial sustainable development, sustainable territorial planning, the sustainable use of resources and SDGs, like renewable energies and water management. In a second part students are asked to design a sustainable urban ecosystem model, based on the previously learnt concepts, with the help and supervision of University Professors, students, and external experts. The projects are then presented to the classes. The ninth methodology is represented by the publication of books and materials realized by University Professors and researchers, targeting young generations and aimed at explaining and simplifying the understanding of concepts, key words and findings about relevant topics like climate change and sustainable development. The tenth and last methodology assessed involves online conferences and meetings organized by university researchers and Professors, dedicated to young students. The initiative was designed during the COVID-19 pandemic situation, in order to keep contact with young students and transfer to them important

knowledge addressing sustainability and climate change, creating a space for youth, even if online, with the availability and the cooperation of University researchers.

The third feature analyzed relates to the duration of the projects. According to the cases analyzed, events/workshops typology varies from a duration of one day to four days, usually in a continuous way with no breaks in the middle. Permanent projects instead show a varied duration through the scholastic year, ranging from weekly to monthly meetings.

The fourth classification feature is the target groups that the projects address. In the cases analyzed, six main target groups have been found. The first group involves primary schools and secondary schools 1st level; the second group, primary schools, secondary schools 1st and 2nd level; the third group, secondary schools 1st and 2nd level; the fourth group, secondary schools 1st and 2nd level and University students/adults; the fifth group, secondary schools 2nd level; the sixth group, secondary schools 2nd level and University students.

The fifth classification feature concerns the coordinators that designed and implemented the projects. The first category is represented by volunteering University students that helped with the project design and dedicated themselves in the implementation phase. The second category is represented by University Professors and researchers. The third category is represented by University associations and teams, within the University people, dedicated to the Third Mission and the dissemination of sustainability values and culture. The fourth category is represented by external experts and local associations collaborating with the University. The fifth category is represented by local private companies involved with the dissemination of territorial sustainable development values and behaviours. The sixth category is represented by public regional and municipal bodies, collaborating with the University.

The sixth classification feature concerns the funding institutions that economically made possible the realization of the projects. The first category is represented by the University itself. The second category is represented by local associations involved with sustainability topics. The third category is represented by local private and public companies, directly involved in the management of local natural resources. The fourth category is represented by municipal, regional or national bodies, involved with the dissemination of sustainability values and topics connected

with the SDGs, and with national education strategies. The fifth category is represented by private foundations and banks, supporting the education of sustainability values.

After having analyzed and extracted the main features from the selected 12 Third Mission projects, designed and implemented by Italian universities, the same procedure has been carried out concerning the 14 selected best practices reported on the ASVIS web page. Although the 14 projects presented by ASVIS are not the result of universities Third Mission departments, this step is intended as a comparison between projects that have the same objectives. Therefore the comparison of the projects can serve as enhancement procedures for features extraction and a better elaboration of the framework for project design which this research is aimed at. Moreover, ASVIS and RUS Network are deeply interrelated, therefore their missions can be compared on a certain level.

Below, follow the tables with the classification of the 13 selected ASVIS projects and their characteristics:

#	Project name	Typology	Methodology	Year	Duration	Age target	Coordinators	Funding
1	¡BeJetzt! giovani attivi per lo sviluppo sostenibile 2030	Permanent project	Young students employed in local non-profit organizations for activities related to the 17 SDGs	2020-2021	school year	primary schools, secondary schools 1st and 2nd level	Volunteering Network Csv Trentino	Centro Servizi Volontariato del Trentino
2	BeSustainable	Permanent project	Web portal with material and tools that engage young students in the relation between SDGs, sustainibility and climate change, and the entrepreneurial and economic world. Different tools: interactive conferences; sustainability thematic videogames	2018, 2019, 2020, 2021	school year	secondary schools 2nd level	Legacoop	Legacoop, Coopfond
3	Change game: il tuo pianeta a prova di cambiamenti climatici	Event/workshop	Thematic videogame, focused on climate change. Real data analysis and elaboration, to observe the consequeces of choices relating energy, food, health, economy	2020	one month	secondary schools 2nd level	Fondazione Cmcc - Centro euro-mediterraneo sui cambiamenti climatici	Fondazione Cmcc - Centro euro-mediterraneo sui cambiamenti climatici
4	Come un gelato all'equatore: laboratorio per ragazzi sui cambiamenti climatici	Event/workshop	Video materials, experiments and resultes, texts, online presentations, about the effects of climate change	2020	one month	primary schools and secondary schools 1st level	Fondazione Cmcc - Centro euro-mediterraneo sui cambiamenti climatici	Fondazione Cmcc - Centro euro-mediterraneo sui cambiamenti climatici
5	Festival educazione alla sostenibilità	Event/workshop	Raise awareness of positive impact of Agenda 2030, through a range of laboratories and interactive initiatives relating territorial sustainable development	2017, 2018, 2019, 2020, 2021	varied	primary schools, secondary schools 1st and 2nd level	One People One Planet, Earth Day Italia, Movimento dei Focolari	One People One Planet, Earth Day Italia, Movimento dei Focolari

Table 7: 13 selected Italian ASVIS projects targeting youth and engaging in territorial sustainable development initiatives (1-5)

Source: Author, 2021

	Project name	Typology	Methodology	Year	Duration	Age target	Coordinators	Funding
6	Green jobs	Event/workshop	Series of presentations, conferences and meetings one-to-one about green economy and green jobs; for young students, aimed at presenting the interrelation between the entrepreneurial and the sustainability worlds	2017, 2018, 2019, 2020, 2021	varied	secondary schools 2nd level	Fondazione Cariplo, Junior Achievement Italia, InventoLab e Aldai-Federmanager, Città dei Mestieri di Milano e della Lombardia, Sportello Green Jobs e Green Jobs Hub, Sportello Stage ACTL, Altreconomia.	Fondazione Cariplo, Ufficio Scolastico Regionale della Lombardia Assolombarda Confindustria Milano, Monza e Brianza, Lodi Camera di Commercio Milano, Monza Brianza, Lodi Confcommercio Milano, Lodi, Monza e Brianza
7	Imprese rur@li. Giovani imprenditori e sviluppo rurale sostenibile	Event/workshop	"Concorso-Kit" for young students: it provides tools and learning material about the positive impact of Agenda 2030 and sustainable rural development, and about how to realize a territorial economic development more sustainable. The students have to design a model for a sustainable rural enterprise	2020-2021	one year	secondary schools 2nd level	Ires Piemonte	Ires Piemonte, Regione Piemonte, Provincia di Asti, del Comune di Cuneo e della Provincia di Vercelli
8	Pianeta dei ragazzi: clima, scienza e i futuri adulti	Event/workshop	A book, a videogame and an exhibition to bring young students closer to the climate change thematic	2020	one month	Secondary schools 1st and 2nd level	Fondazione Cmcc - Centro euro-mediterraneo sui cambiamenti climatici	Fondazione Cmcc - Centro euro-mediterraneo sui cambiamenti climatici

Table 8: 13 selected Italian ASVIS projects targeting youth and engaging in territorial sustainable development initiatives (6-8)

Source: Author, 2021

	Project name	Typology	Methodology	Year	Duration	Age target	Coordinators	Funding
9	Progetto futuri cittadini responsabili	Event/workshop	Integrative learning material for schools about civic, environmental and sustainable education	2021	six months	primary schools and secondary schools 1st level	Assocea Messina aps, in collaborazione con Ingv, Irssat, Arpa Sicilia, Anisn, Ramarro Sicilia sede territoriale di Messina e i Club services Lions	Assocea Messina aps, in collaborazione con Ingv, Irssat, Arpa Sicilia, Anisn, Ramarro Sicilia sede territoriale di Messina e i Club services Lions
10	Progetto Top metro - Corona verde: corso di formazione transizione sostenibile	Event/workshop	Online integrative and interactive learning material about sustainability, territorial sustainable development, and the social and cultural change	2021	one month	secondary schools 2nd level	Ires Piemonte, MI - USR Piemonte,	Ires Piemonte
11	Risparmiamo il pianeta	Permanent project	Intergative learning material about sustainable development, sustainable economy, protection of natural resources, energy saving and ethical finance	2021	all year	primary schools, secondary schools 1st and 2nd level	Fondazione per l'educazione finanziaria e al risparmio (Feduf)	Fondazione per l'educazione finanziaria e al risparmio (Feduf)
12	sCoolfood	Permanent project	Intergative learning material about sustainable development, and the Agneda 203	2021	once a week	primary schools and secondary schools 1st level	Fondazione monte dei paschi di Siena (Fmps)	Fondazione monte dei paschi di Siena (Fmps)
13	Walk the global walk	Event/workshop	Integrative, innovative and replicable initiatives and interactive material to bring young generations closer to the SDGs objectives	2017, 2018, 2019, 2020, 2021	varied	primary schools, secondary schools 1st and 2nd level	Oxfam italia, regione Toscana	Oxfam italia, regione Toscana, Unione Europea

Table 9: 13 selected Italian ASVIS projects targeting youth and engaging in territorial sustainable development initiatives (9-13)

Source: Author, 2021

93

After having assessed and classified also the 13 projects listed and selected by the ASVIS Alliance, aimed at engaging youth in territorial sustainable development, it is now possible to assess the main differences and similarities with the 12 selected projects designed and implemented by Italian Universities, within their Third Mission scope.

About the typology of the projects, also in the ASVIS projects, like for the 12 Universities projects, there is a majority of the event/workshop typology.

The methodologies implemented for the ASVIS projects, compared to the Universities projects, on one hand seem to rely more on online learning material and online conferences, that aimed at integrating the traditional school program with related topics to the Agenda 2030 and territorial sustainable development; on the other hand the approach implemented in the ASVIS projects sees the young students more in direct contact with local professionals and with the private sector, when compared to the 12 Universities Third Mission projects. Many of the initiatives presented involve a strong economic approach to territorial sustainable development, oriented at bringing closer youth and the range of job offers and the economic perspective of sustainable development. This approach is realized through laboratories that involve the students in the design and elaboration of economically sustainable local territorial enterprises or sustainable territorial development plans, or in meetings one-to-one and conferences with professionals of the sustainable development sector for the presentation of potential future green jobs. Moreover, also in certain ASVIS projects, tools like videogames and the support of new technologies have been implemented.

The duration of the ASVIS projects analyzed, ranges from weekly meetings, to one meeting every month, to covering the entire school year. For certain projects it was not possible to establish the exact duration. Compared to the Universities projects, the ASVIS projects duration seems to cover larger parts of the students' school year.

The age target of the ASVIS projects, appears to be more specific and less general, if compared to the Universities projects. In fact, the ASVIS projects analyzed, seem to never involve target groups older than secondary school 2nd level, and in general never to involve target groups not represented by young students (until the end of secondary schools 2nd level). When compared to

the 12 Universities projects, it is possible to state that the Universities projects are sometimes more general in defining their target groups, extending the targeted categories to University students, citizens in general and adults. In this way it is possible to state that on a certain level the projects designed by the ASVIS Alliance appear to be slightly more specific in terms of target group definition.

Concerning the classification features relating the coordination and the funding parts of the projects, from the analysis of the AVSIS projects it is possible to assess that, compared to the Universities Third Mission projects, there is a stronger coincidence of the coordinative and funding bodies, and that there is a slight stronger presence of International bodies, public research Institutes and the private sector contribution.

After having assessed the Italian Universities Third Mission projects aimed at engaging youth in territorial sustainable development, and after having compared them with the ASVIS listed projects aimed at the same objective, it is now possible to proceed with the framework elaboration, based on the characteristics highlighted and extracted from the project analysis just carried out.

The objective of this thesis is to design and implement a project that involves youth in renewable energy initiatives. Moreover, the thesis in framed within the perspective of the European SCORE project, that aims at engaging citizens in renewable energy co-ownership and raising awareness about sustainable

Step B: Framework elaboration

Based on the 12 Universities Third Mission projects classification carried out in the previous step, on the classification of the parallel 13 selected ASVIS projects, and on the resulting features and classification categories extracted from the analysis, it is now possible to elaborate a summarizing framework, gathering the main features and information and variable extracted from the analysis, in a table, with the objective to provide a structure that could serve as guideline for the design of future University projects that aim at the engagement of youth in territorial sustainable development topics.

It follows the table with the assessed features and variables:

FRAMEWORK FOR THE ELABORATION OF THRID MISSION PROJECTS TO ENGAGE YOUTH IN TERRIOTRIAL SUSTAINABLE DEVELOPMENT

Typology	Methodology	Duration	Age Target	Coordinators	Funding
Event/Workshop	Traditional conferences, with limited active partcipation by the target group (online / in presence)	One/a few days	Primary schools and secondary schools 1st level	Volunteering University students	University
Permanent project	Un-conferences: the target group take part in the design and planning phase itself	Weekly/monthly meetings	Primary schools, secondary schools 1st and 2nd level	University (Professors and researchers; when present, university team dedicated to the dissemination of sustainability issues)	Local associations and non-profit organizations, involved with sustainability topics
	Volunteering/socially useful open-air initiatives	Varied and flexible (depending on school program)	Secondary schools 1st and 2nd level	External experts and local associations (non-profit) collaborating with the University	Public/private local comapnies, directly involved in the management of local natural resources
	Organization of public town fairs and exhibitions, with the target group involved in the design and creation of the material		secondary schools 1st and 2nd level and University students/citizens	Municipal, regional or national bodies (public)	Municipal, regional or national bodies, involved with the dissemination of sustainability values and topics connected with the SDGs
	Movies screenings and following meeting Q&A		Secondary schools 2nd level	Local private companies / involved with the dissemination of territorial sustainable development values and behaviours	Private companies / Bank Foundations, supporting the education of sustainability values
	Open the University Campus to young students as an accessible laboratory and place of discovery, to bring youth closer to "important" topics		Secondary schools 2nd level and University students	Intenrational and non-profit bodies	International Bodies, European Union
	Storytelling and new technologies (video, sound, text, etc.) to narrate the city				
	Didactic-scientific laboratories that combine lectures/conferences and participative activities for the elaboration of sustainable urban ecosystem models and designs				
	Publication of books, audio-visual material, integrative of the school program and bridging the gap towards the dissemination of SDGs culture				
	Thematic videogame on climate change, with real data analysis and elaboration				
	Meetings and conferences about a market and economic approach to sustainability, with the presentations of green jobs				

Table 10: Framework elaboration for the design of Universities Third Mission projects to engage youth in territorial sustainable development and SDGs.

Source: Author, 2021

The above framework elaboration is intended to serve as guideline and base for the design of future Universities Third Mission projects aimed at the engagement of youth in topics connected to territorial sustainable development and SDGs objectives. The framework elaboration is the result of the conceptualization of the features and characteristics of the Italian Universities Third Mission projects specifically designed for youth engagement, combining a territorial perspective. The information contained in this framework are therefore intended to be significant and useful when the Third Mission department of an Italian (or international) University intends to design and launch a project targeting specifically young generations, focusing on the sustainable management of natural resources and with a strong territorial approach.

In fact, this research and framework are expected to be meaningful and useful mainly for University Architecture and Territorial/Urban Planning departments, as the approach researched and analyzed is characteristic of these types of departments, or any department that studies the interrelation between human behavior and territorial planning and territorial sustainable development. Nevertheless, the framework could be used as a base for any type of University Third Mission project design that has as core mission the engagement of young generations, by modifying and adapting methodology and tools.

In the next step it will be presented the design of the project based on this framework and framed within the SCORE project objectives and mission.

Peer Education and Intergenerational Learning selection

Accordingly with what analyzed in the literature review, stakeholder involvement tools are diverse and manifold. The Framework elaborated in the previous section provides a guideline for the characteristics the new projects designed by Universities could rely on, as the list of features and characteristics review is the result of the analysis of the selected Italian best practices of projects targeting youth and aimed at their engagement in territorial sustainable development. However, despite providing a base on which to rely for the selection of the project characteristics, the framework doesn't provide any sort of guideline in terms of the relation with students or the approach the researchers and the coordinators should implement with the target group.

Drawing from the literature review relating the different tools for stakeholders involvement and specifically targeting youth, two main approaches have been selected to provide indications and guidelines, in order to interact in the most conducive way with young students. The first concept analyzed, relevant for the design of the practical activity with students, is Intergenerational Learning. Resulting from the systematic literature review carried out by Monroe et al. (2017), six main themes were identified as strategies that increase efficacy in environmental and climate change education programs. The six themes are: 1) The program should focus on making climate change information personally relevant and meaningful for learners; 2) Activities or educational interventions should be designed to engage learners; 3) Educators should use deliberative discussion to help learners better understand their own and others' viewpoints and knowledge about climate change; 4) Learners should be given the opportunity to interact with scientists and experience directly the scientific process for themselves; 5) Programs should be designed specifically to uncover and address misconceptions about climate change; 6) Learners should be engaged in designing and implementing school or community projects, to address some aspects of climate change at local level.

These six themes have been taken in consideration during the project design and implementation phases, mainly implemented in a pre-assessment perspective, in order to foster the efficacy of the project on youth about their environmental knowledge, attitudes and behaviours, to raise their awareness and promote positive changes, increasing their environmental concerns. As it is possible to see from the selected themes, they are mainly related to bringing distant concepts like

climate change and energy transition closer to the youths, engaging them in participative activities where they have the possibility to experience firsthand the challenges and the potential of environmental threats and technological innovations.

The second concept taken into account for the relation with young students is peer education approach, considered suitable and appropriate for a project involving youth. The objective of peer education is the change of behavior, attitudes and perceptions towards a relevant topic, enabling and allowing the spreading and outreach of information in "horizontal-non-hierarchical" system, as opposed to the more traditional "vertical-hierarchical" educational systems. The aim of this spread of information and good practice, is the effective change among members of a given group, at the individual, group or societal level, by attempting to modify a person's knowledge, attitudes, beliefs, or behaviours, using the same members of the same group, therefore peers. One of the key aspects of the peer education is to form peer educators that are then in charge of the activity coordination and supervision. Peer education has been mostly implemented in youth projects concerning the raising of awareness in health education and substance abuse fields. Today, the potential of this method is being applied to sustainable development topics and the raising of awareness in the environmental field.

Given the various references analyzed related to peer education, it has been selected as the main reference to the Standards for Peer Education Programmes – Youth Peer Education Toolkit, elaborated and published by the UNFPA (UNFPA, 2006). The Toolkit presents itself as a guideline and checklist analyzing and listing minimal standards for peer education programmes. During the thesis process it has been used as a guide to supervise the design of the project in order to match and include the minimal standards described and be able to assess the quality of the activities imagined and implemented with the target groups involved. As opposed to Intergenerational Learning, the peer education guide served both in the design phase as in the ongoing process, to assess the level of interaction among students, and at the end, as a post-evaluation tool. However, further research is needed in order to apply deeper and more thoroughly the indications and instructions described in the Toolkit.

PEER EDUCATION STANDARDS CHECKLIST

SECTION A: PLANNING

#	Item
1	Mobilize main stakeholders
2	Ensure active participation of youth
3	Consider cross-cutting issues
4	Refine general and specific programme objectives
5	Identify target audiences
6	Identify the needs of the target audience
7	Identify available resources and try to fill gaps
8	Develop a workplan
9	Develop an M & E (Monitoring & Evaluation) plan
10	Establish feedback mechanisms
11	Coordinate and establish linkages with other programmes
12	Develop a resource mobilization and sustainability plan

SECTION B: RECRUITMENT AND RETENTION

#	Item
1	Identify sources and channels for recruiting peer educators
2	Decide on criteria for peer educator selection
3	Set clear expectations
4	Establish a standardized and transparent interview and selection process
5	Document expectations
6	Establish means for continuous communication, including feedback
7	Establish an incentives system
8	Establish supervisory and mentoring systems
9	Offer opportunities for increasing involvement and responsibility

SECTION C: TRAINING AND SUPERVISION

#	Item
1	Arrange for qualified trainers
2	Select a quality training curriculum
3	Arrange for appropriately sized groups
4	Structure agenda and time to meet training needs
5	Provide relevant materials and handouts
6	Use interactive, participatory, and skills development approaches
7	Implement tools and methods to evaluate training and training participants
8	Discuss ethical issues
9	Involve youth at all stages
10	Arrange for trained, aware personnel
11	Ensure that peer educators are well prepared
12	Continually reinforce motivation and ethical behaviour
13	Manage the group dynamic and encourage team building
14	Share responsibility with peer educators

MANAGEMENT AND OVERSIGHT

#	Item
1	Ensure compliance with programme standards
2	Ensure technical competency of the management team
3	Establish and maintain quality expectations of programme activities
4	Establish effective administration of human and financial resources
5	Establish a transparent decision-making process
6	Establish a process for youth participation in decision-making
7	Use M & E for decision-making
8	Promote cooperation and networking
9	Establish linkages and referrals to services and commodities
10	Establish sustainability plans

MONITORING AND EVALUATION

#	Item
1	Establish relevant, clear objectives
2	Establish functional, relevant indicators
3	Include M & E in the workplan from the start
4	Implement baseline assessment
5	Develop monitoring tools and a measuring system
6	Ensure capacity to plan and implement M & E
7	Establish means for youth participation in planning and implementing M & E

Table 11: Peer Education UNFPA Standards Checklist

Source: (UNFPA, 2006), Author Elaboration

3.2 Phase 2: Design and Implementation

Phase 2 consists of two main steps: Step C consists in the design of a new project for the engagement of youth in territorial sustainable development; Step D consists in the selection of the case studies.

Step C: Project design

The project SCORE, that defines the objectives and the context of this thesis, aims at engaging stakeholders in renewable energy communities, promoting co-ownership in renewable energy plants. In the previous phases of the project, the stakeholder focus has been set on vulnerable social groups, such as low-income households and women, to foster their engagement, lower and eliminate the barriers that usually prevent them from entering RECs.

In this final phase of the project SCORE, the focus has been set on youth and young students, as they also represent an underrepresented social group concerning the decision-making process about energy resources and they represent the stakeholders and consumers of tomorrow. It is therefore an essential mission to start early involving them in understanding sustainability and sustainable behaviours, in order to raise their awareness about important issues affecting increasing parts of the world, about possible solutions, to enhance their ability to adapt to energy sector innovations and minimize the time they will need to respond positively to these innovations. Hence, the project designed for this research intends to fulfill these objectives and contribute to the dissemination of the SDGs values and culture.

According to the framework elaborated in the previous step, it has been analyzed and selected the set of features and characteristics most appropriate in order to engage youth in territorial sustainable development, and in particular connected to the SCORE project, to engage them in energy community projects and prosumerism.

It follows the selection and description of the features and characteristics for the project design phase.

Concerning the typology, due to the fact that the project to be designed was framed within the scope and length of this thesis, it has been chosen as the event/workshop typology, as there

wouldn't have been the necessary time, capacities and human resources to design and implement a permanent project typology.

The methodology feature has been the most discussed and pivotal feature among those presented in the framework, for the choice about the right methodology typology is essential for the design and implementation of a new project that would combine the best approaches among those analyzed and selected and that would be conducive and appropriate for the transmission and dissemination to young students of concepts and values related to territorial sustainable development and energy communities.

Among the methodology categories analyzed and presented in the framework elaborated in the previous step, it has been chosen the category of the didactic-scientific laboratories, that combine traditional lectures/conferences and participative activities for the elaboration of sustainable urban ecosystem models and designs. The choice fell on this category as it would have been among the feasible options, as opposed to videogames realizations, public fairs and exhibition and book publications. In fact, the project design and implementation could count only on two University students involved. Therefore the didactic-scientific laboratory seemed the most appropriate and feasible in terms of resources. Moreover, this methodology envisages the activity to be divided into two main parts. The first is represented by a conference-lecture in which scientific and basic concepts are shared with the target group, in an interactive way that allows the target group to get familiar with the topics dealt with. This first didactic part would serve as a knowledge base for the second part, more participative. The second part is intended as a practical and participative laboratory, where the target group, from listener and receiver, becomes protagonist and maker. In this second part, the participative laboratory phase, the target group is asked to work and assimilate the concepts received during the first part, and apply these concepts for the design and idealization of a territorial model that works at a local scale in direction of territorial sustainable development.

Among the selected 12 Universities Third Mission projects targeting youth in territorial sustainable development, one project in particular has been selected as reference and example to learn from. The project is called "Energia in Energia. La Gara di scienze: la città che vorrei, dall'educazione civica alla progettazione di un ecosistema urbano" and is designed and

implemented by the Università del Piemonte Orientale. The project aims at the knowledge outreach and dissemination toward youth of correct, rational and sustainable use of energy and about the use of renewable energies. The project addresses the students of primary schools and secondary 1st level schools. The first part of the project envisages a lecture about sustainable energy use and concepts, correct and sustainable energy behaviours, about energy efficiency measures and about the use of renewable energy as an alternative to fossil fuels. In the second part, the students are asked to design a territorial model. In the second part, the students are asked to think about the concepts learnt in the first part and to design local territorial sustainable urban ecosystem plans and models, applying the features and strategies about renewable energies, sustainable urban planning and energy efficiency learnt in the previous step. This approach allows the students perspective and the application of the learnt concepts to be expressed and represented in a model designed by them and from their point of view. The results are then organized in presentations and presented to the classes participating.

Among the ASVIS selected and analyzed projects, it has been taken in consideration another project using the didactic-scientific laboratory methodology, that offers a best practice example to involve youth in territorial sustainable development, in topics relating the Agenda 2030 and the Programma di Sviluppo Rurale (PSR). It's the project "Imprese Rur@li. Giovani imprenditori e sviluppo rurale sostenibile - Concorso KIT", designed and launched by Ires Piemonte, and it's a competition didactic-scientific laboratory that offers a toolkit for the dissemination towards youth of territorial sustainable development concepts and the guidelines for a creative laboratory where the students are the first decision makers about the models to be designed. The project addresses the students of the secondary 2nd level schools (15-16 years old). The first part of the project envisages a learning step, where the students are given lectures about territorial sustainable development, the Agenda 2030, the Programma di Sviluppo Rurale (PSR) and sustainable development concepts from an economic and social point of view. In the second part the students become the protagonists of a creative phase where they are asked to apply what they have learnt in the first part and realize a model at the local scale for a local rural and sustainable enterprise, respecting the territorial sustainable development concepts and the sustainable use of local resources. At the end of the project, the students are asked to prepare a presentation and present it to their peers.

For the selected didactic-scientific laboratory methodology, these two presented best practice examples will serve as base on which to rely for the design and implementation of the new project.

Concerning the duration of the project, due to restricted time availability within a thesis process and in order to make the project implementation more feasible, the duration category selected is that of a few days length, to be better defined case by case.

The age target category selected for the project design ranges from 12-13 years old to 15-16 years old, therefore from secondary school 1st level (last years of the cycle) to secondary school 2nd level (first years of the cycle). The choice is justified by the selected best practices analysis, as in their application the age target ranged mostly between these two school cycles. Moreover, the topics and the activities addressed in the project are best applicable and useful among students of these selected school years, as since the end of the secondary 1st level school they start approaching technology subjects and subjects relating energy and natural resources, and they start using the support of computers and presentation material.

Concerning the coordination group and the supervision of the project design, the team for this thesis was composed mainly by three members: the author of the thesis, the co-tutor of the thesis Sara Torabi Moghadam, and PhD student Maria Valentina di Nicoli. Both Torabi Moghadam and di Nicoli, are part of the Politecnico of Turin group partner of the SCORE project, coordinating the Italian pilot projects in the Susa Valley Piedmont. They coordinated all the previous phases of the project in Piedmont, carrying out the research about stakeholder involvement in renewable energy communities and prosumerism projects. They were therefore able to supervise the design phase of this new project aimed at the engagement of youth and to supervise the implementation and the results assessment.

Moreover, the coordinating team is completed by the school teacher in charge of the classes that take part in the project. The design and the implementation of the project, concerning the engagement of young students during their school year, is expected to be carried out always in collaboration with the school teacher in charge, as he/she is able to provide relevant and internal insights and points of view, making possible the design and implementation of a project tailoerd

specifically for the classes involved, according to the specific needs and situations. He/she would also provide additional support in the supervision and the assessment phases.

Concerning the funding bodies, this is intended to be a low budget project, where the expenses are limited to the travel expenses of the coordination team between the University and the schools of reference, to reach the target group. In this case the travel expenses were covered by the Politecnico of Torino.

After having discussed the main characteristics and features selected for the project design, it is now possible to proceed with the presentation of the new project designed for the SCORE project and for this thesis.

The design of the project carried out for this thesis is related and framed within the SCORE project, therefore it responds and aims at contributing to the SCORE project objectives.

Among the main objectives of the SCORE project, there is the aim to identify the impact of drivers and barriers on consumer co-ownership and citizens involvement, and finding alternative ways and projects to engage and empower vulnerable and underrepresented social groups. This new project aims at targeting teenagers – secondary school 1st and 2nd level students .

The choice fell on the targeted group to involve a generally under-represented group of society when it comes to energy subjects and energy communities participation: young students and generations. In general, in workshops and conferences about new energy community projects, the stakeholders involved are professionals, of private or public sectors, adult citizens (often males, with an average middle/high income) representing their community. Rarely young students get involved in such initiatives. The goal of this activity is to start to form and inform citizens about prosumerism and new forms of energy communities from an early age.

In previous phases of the SCORE project, several groups of society have been targeted and involved in participatory workshops: citizens, administrative and municipal employees, and SMEs. In this new phase a new group has been chosen to reach all different tiers of societal structure.

Secondary school 1st and 2nd level students have been selected as a strategic level of society and potential future clean energy prosumers, to form and inform young students at early stages, in a critical learning step of their academic path, when they first approach scientific and technical topics and energy, renewable energies and climate change lessons. Moreover, through their work and participative tools, the aim is to involve other actors in the workshop, like students' families and citizens living in their neighborhoods. This strategy aims at creating positive and larger externalities within the local community, broadening the common knowledge and interest in energy community topics. Being in a critical phase of their education, the student-tailored activity aims at raising their awareness about energy challenges and energy community participation and making them a more active and informed group of actors within society.

The purpose of this project is:

- to raise awareness among stakeholders (in this case, younger generations) about the current energy challenges and energy community benefits and opportunities; about territorial sustainable development concepts, the Agenda 2030 SDGs objectives, the urge to fight climate change and find alternatives to fossil fuels;
- to inform and share SCORE research activities and the project results (at a basic level);
- to raise awareness and involvement among middle school students in the energy community topic through an interactive workshop that sees them as the active planners of an ideal new energy community in their municipality.

The activity has been structured in 4 distinct parts (lectures tools):

- **part 0.** a preliminary survey about the students' knowledge about energy related keywords;
- **part 1.** a frontal lesson on Renewable Energies and Energy Communities, introducing the main concepts;
- **part 2.** an interactive workshop/group activity that sees the young students as first decision makers and planners/designers for an ideal energy community for their municipality;

- **part 3.** a final meeting for presentation of the results and assessment (Qualitative analysis).

Below, the 4 parts are described in detail.

Part 0. As a first step, before meeting with the students and with the help of the school teacher of reference, it has prepared an introductory keywords list (see Figure 21), to be sent to the students in advance. This keywords list investigates the students' familiarity with keywords relating sustainability, energy and energy communities fields. Each of the students will have to mark an "X" next to the words of which they know the meaning or they have heard before. This preliminary step has two main objectives: 1) to give the students a general idea about energy and energy communities topics vocabulary in advance and familiarize with them; 2) to know in advance which elements to insist on and deepen during the frontal lesson.

Figure 21: Keywords list.

Source: Author, 2021

Part 1. As part of the stakeholder involvement process, a frontal lesson has been developed with the objective to inform the young students about basic concepts relating to the diverse sources of energy used today, non-renewable and renewable energy sources, climate change and GHG effects, and energy communities. It also briefly explains the concept of the SCORE project and its involvement in the Susa Valley. (See below Figure 22, which shows extracts from the lesson).
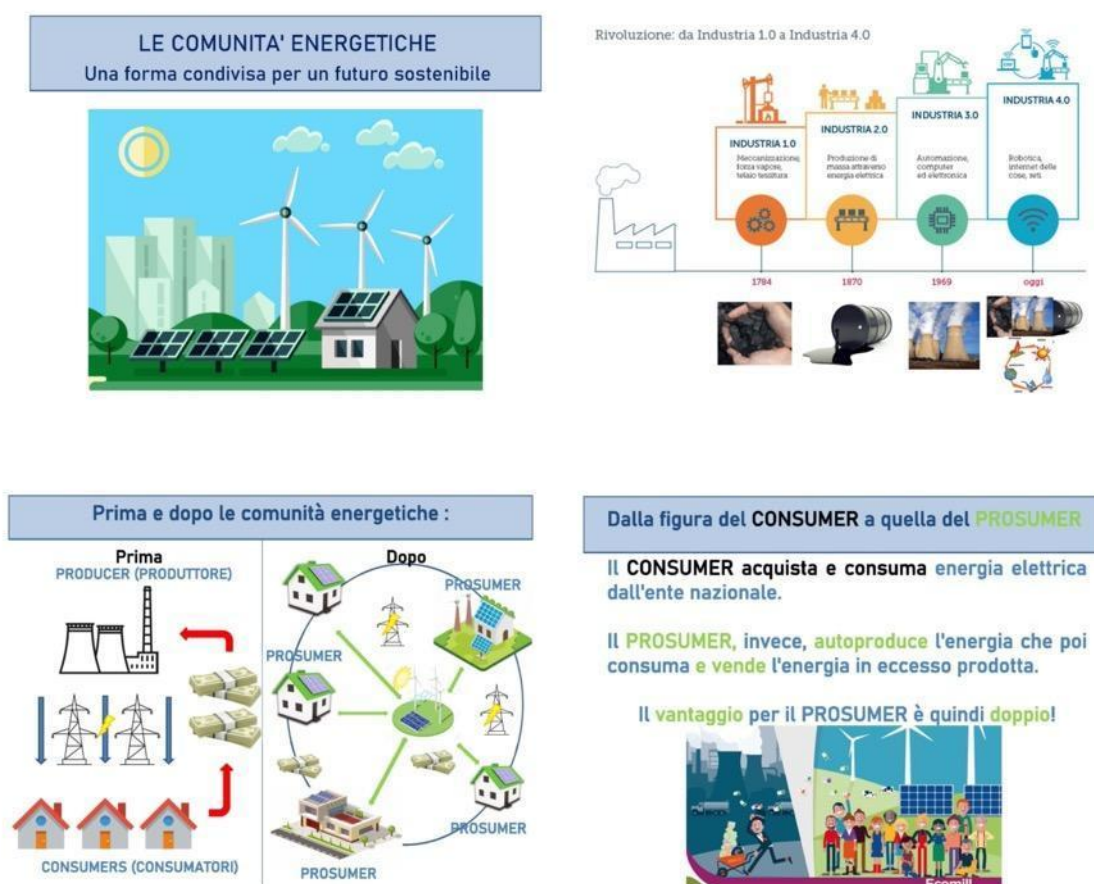

Figure 22: Lesson extracts

Source: Author, 2021

In order of appearance, the lesson has been structured in the following way:

- One brief introduction to the SCORE Politecnico of Torino group and some broad questions about the keywords list (e.g., "What do you know about the energy that we use today?"; "From which countries does it come from?"; "Who knows what it means sustainability"?).
- A brief history of energy sources and their effects on human activities and economy (coal, oil, nuclear energy, renewable energy), and how industry evolved accordingly to these changes of energy resources.
- An overview on the consequences of the human exploitation of fossil fuels and resources (environmental, economic, political, social consequences): e.g., global climate change, greenhouse effect or the rise of migrations due to the worsening of living conditions in parts of the world most affected by climate change.
- A brief chronological list of the first and most important international agreements to tackle global climate change: the Kyoto Protocol, the Paris Agreement and the Global Urban Agenda 2030.
- The main differences between renewable and non-renewable energy sources and the main reasons that are leading to the energy transition toward renewable energy sources.
- A comparison between an ordinary thermal power plant (fuelled by non-renewable energy sources) and a photovoltaic plant/solar power system (fuelled by renewable energy sources).
- Introduction to the concepts of energy community: what is it, definition, examples of different forms of energy communities, the case of the energy community project in Oulx.
- The two areas involved in the energy community system (technical and social) and why the social area has a key role to play in it.
- Explanation of the concept of prosumerism and the structural change of society dynamics and energy market relations needed to make the prosumerism objective work.
- Description of the advantages of becoming a prosumer, advantages for the environment and for the general domestic economy.
- The role of the SCORE project in fostering the success of prosumerism models across the European countries involved.

Part 2. After the frontal lesson, to involve classes of secondary school 1st and 2nd level students, a practical activity has been tailored specifically for them to make the workshop fun, educational and formative from several points of view. The activity has been tailored based on the Architecture and Planning Design Studios experience of the SCORE team, experience matured through several years of academic instruction and work. The activity requires to form groups of maximum 4-5 students, in order to create stronger teamwork skills. The result is a Planning Design Studio divided into 4 phases through which each group will have to imagine a simple idea for a new energy community in their municipality:

Phase 1: the students are requested to individually answer an online survey. The survey is divided into two parts. In the first part, the survey focuses more on each student's perceptions and opinions about renewable energies, sustainable behaviours, energy communities and on their feelings and relations with their territory and community. In the second part, each student has to interview their parents, families, neighbors, with some questions about renewable energies and the energy community and gather information about the general reactions of the interviewed people. This step was designed to receive a general impression of the citizens' opinions and feelings about energy community related topics. Drawing from the answers to the second part of the survey, each student is requested to create a map based on the area where the interviewed people are located. According to the type of answers received, the students have to position bullets on the map representing where each person they interviewed lives/works. The bullets can be of three distinct colours, according to the type of answers received: if the respondent supports the creation of energy communities and is willing to take part (prosumerism), the bullet will be green; if the person is not sure, undecided, the bullet will be yellow, if the person is against new forms of energy management and the use of renewable energy sources, the bullet will be red. This map step has been designed with the intention of having a basic geo-referenced information about citizens' opinions/sentiments/views on the energy topics dealt with in this workshop.
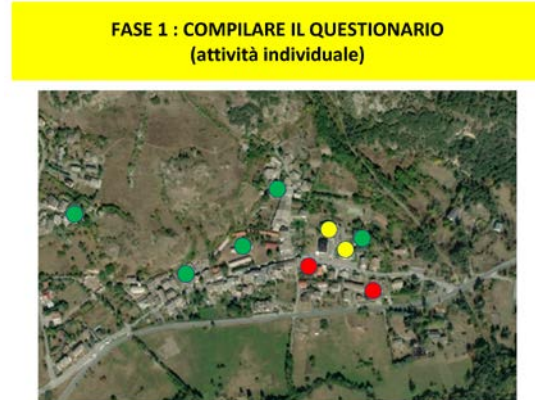
The survey is the result of the collaboration with PhD student Maria Valentina di Nicoli, who for her doctorate thesis, carried out a research on stakeholder involvement methods in renewable energy projects. Her research, mainly addressing vulnerable social groups, like

women and low-income households, has provided an invaluable insight and point of view for the creation of this survey tailored specifically for young students.

Phase 2: Each class will be divided into groups of 4/5 members, with the help of the school teacher of reference. According to the municipality morphology, each group is assigned with a selected small area in the municipality and requested to study and observe the area features and characteristics. Once they observe, understood, and described the area characteristics, the students are asked to think about the several types of technologies that use renewable energies and around which energy communities and prosumerism are formed, as explained during the earlier frontal lesson: solar/photovoltaic panels plant, wind turbines, biomass plant.

Phase 3: Once they gathered the required information in the previous phases, the group will have to produce a plan for an ideal new energy community project in the assigned area and to represent it on a map with symbols, features and elements explained to them in a precise way. This is the phase in which the group will contribute with personal/group ideas and choices. They will have to choose the size of their energy community, the type of technology they think would suit the best, how many actors/buildings will be involved in the project, benefits, and pros and cons of the new project. The students are instructed that each of their choices will have to be justified and explained. The aim of the project activity is to make the students think together, as a team, about an ideal new energy community project that, even though is only ideal and unrealistic (not supported by strong technical competences), sees them as the first actors involved in the shaping and modification of their territory. Their ideas are in this case the beginning of something new. For this, they are given a choice of icons from which they can choose (or pick other options if they wish) in order to show on their plan which buildings are concerned by the project (town hall, school, private enterprises, etc.) or which technologies have been implemented (solar/photovoltaic; wind; biomass). The different elements of the project will have to be connected through different types of lines, depending on the project idea. The technology professor will help the students through the entire process.

Phase 4: The group will have to present to the class, and to the Politecnico SCORE team, the results of their project activity and justify their choices. The suggested support tool is PowerPoint presentation program, but they are free to choose whatever tool they prefer, if it respects the presentation requirements. Each presentation will then have a few bullet maps at the beginning, results of the individual surveys, and a final group project plan. Also, in this phase, the school teacher of reference will help every group.

Figure 23: Practical activity instruction extracts

Source: Author, 2021

Part 3. Assessment and evaluation of the group project: each group's project will be assessed by the Politecnico SCORE research group together with the school teacher of reference, who also followed each previous step of the lesson/workshop. For each class, the best (one/few) project will be chosen, and the choice will be explained to the students. The assessment will be based on the presentations given by the groups, on the explanations and motivations that drove them in making the different choices for their projects. It will be assessed by how much of a community-oriented project has been implemented and how much their ideas could contribute to the improvement of community life.

Step D: Case studies

Two cases studies have been chosen in order to test and apply the new project design in the previous steps: Oulx and Sestriere municipalities, both located in the Susa valley, Piedmont.

Figure 24: The municipalities of Oulx and Sestriere, in relation with the Susa valley and the city of Turin

Source: Author, 2021

The first case study was the municipality of Oulx. Oulx is one of the forty municipalities part of the Susa valley, and specifically located in the Alta Val di Susa, 76 kilometers from Turin city. It has a population of 2598 inhabitants and covers a surface of 99 km^2. Its territory is divided into 5

hamlets (Comune di Oulx, 2021). In the municipality of Oulx, the young population category covering the age range between 11 and 19, being this the target group for the project design, represent 9% of the population, around 280 young citizens in the age between secondary 1st level school and secondary 2nd level school years (ISTAT, 2021a).

Oulx has a particular significance within the SCORE project as it is the municipality in the Susa Valley upon which fell the choice for a new energy community. Oulx's new energy community involves four buildings: the middle school, the town hall building, the tourist office and the police station, and the cultural activity building. These buildings were identified as non-efficient energy consuming buildings, fuelled by non-renewable energy sources. The project aims to replace the individual heating systems of the buildings with a centralized biomass system. For this reason, choosing young students from Oulx municipality has a double meaning because they are part of an underrepresented tier of society and stakeholders in energy decisions, and part of a community directly involved in energy community projects.

Thanks to the collaboration with the "Istituto di Istruzione Superiore Statale Luigi Des Ambrois" of Oulx and with the technology school teacher Luca Ruggiero, it has been possible to involve the last year classes of the secondary school 1st level students. In total, 3 classes, around 50 students, 13-14 years old on average, have been involved in the activity. The collaboration with the school "Des Ambrois" and with the teacher Luca Ruggiero has been made possible thanks to the contacts provided by the PhD student Maria Valentina di Nicoli, who worked previously with local institutions and stakeholders during previous steps of the project SCORE, and who collaborated and helped in the coordination of this final step.

Figure 25: The municipality of Oulx representing the school and the local energy community

Source: Author, 2021

The second case study was carried out in the municipality of Sestriere. Sestriere, like Oulx, is also one of the 40 municipalities part of the Susa valley and located in the Alta Val di Susa, 94 kilometers from Turin city. Sestriere borders the municipality of Oulx on the northern border. It has a population of 929 inhabitants and covers a surface of 25,8 km^2. Its territory is divided into 4 hamlets (Comune di Sestriere, 2021). In the municipality of Sestriere, the young population category covering the age range between 11 and 19, being this the target group for the project design, represent 9% of the population, like in the municipality of Oulx, but in this case representing around 82 young citizens in the age between secondary 1st level school and secondary 2nd level school years, being the population of Sestriere much smaller compared to the population of Oulx (ISTAT, 2021b).

The possibility to continue the project of youth engagement in a second case study presented when the secondary school of 1st level of Sestriere accepted to take part in the research. The school of Sestriere is under the same school administration of the one in Oulx, therefore the communication and the contacts were provided directly by the school teacher of Oulx and by the internal staff of the school administration.

The school of Sestriere gathers a small student community, being the municipality population only of 929 inhabitants. The young students involved in the second case study of Sestriere, were represented by only one class of the school, the third and last year of the secondary 1st level school class, equal to 12 students in total.

The municipality of Sestriere doesn't host active energy community projects, but being a small mountain town, represents an ideal case study as its institutions and citizens are sensitive about energy sustainability and energy security concepts.
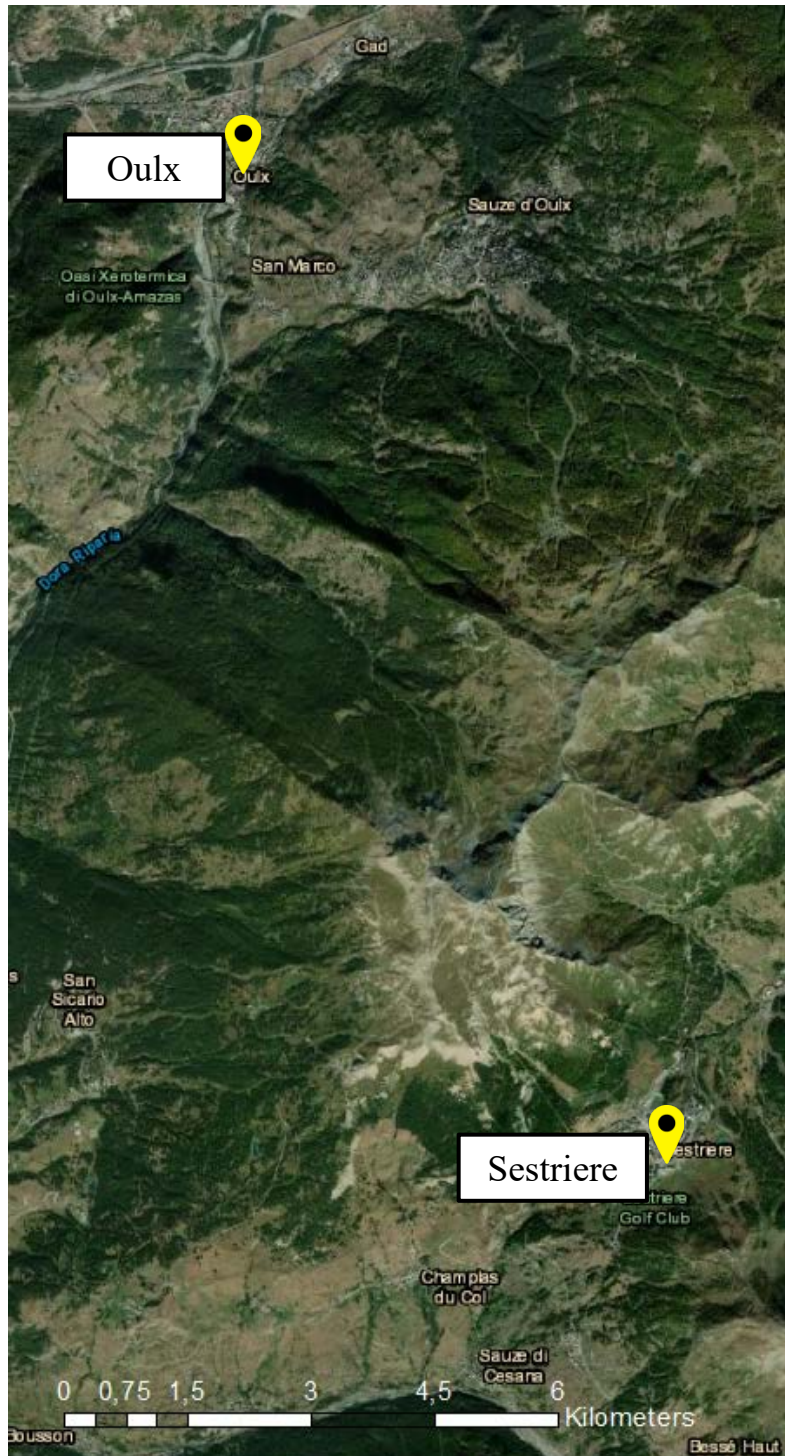
Figure 26: The municipalities of Oulx and Sestriere in relation to their territories

Source: Author, 2021

Figure 27: The school of Sestriere

Source: Author, 2021

The whole activity was initially planned to be carried out in person at the two schools of Oulx and Sestriere, but due to COVID-19 restrictions and the closing of all schools, the first two parts of the activity (part 1, lecture and part 2, workshop development) have been carried out in the virtual form, through the Zoom platform. Instead, the last part (part 3, presentation), has been carried out in presence, with the SCORE team members that reached the two schools of Oulx and Sestriere.

4. RESULTS

4.1 Results – Oulx

As participants in the activity, three third year classes from the Oulx municipal secondary 1st level school have been selected. The classes were composed of the following number of students: 3A, 21 students; 3B, 19 students; 3C, 14 students.

Part 0. The introductory keywords list showed a general average familiarity with energy field terms (e.g., renewable and non-renewable energy sources, climate change, emissions, CO_2, etc.) and almost no familiarity with terms afferent to the energy communities' specific field (e.g., prosumer, prosumerism, etc.).

3A

3B

3C

ANSWERED, 16 (76 %)
NOT ANSWERED, 5 (24 %)

ANSWERED, 7 (37 %)
NOT ANSWERED, 12 (63 %)

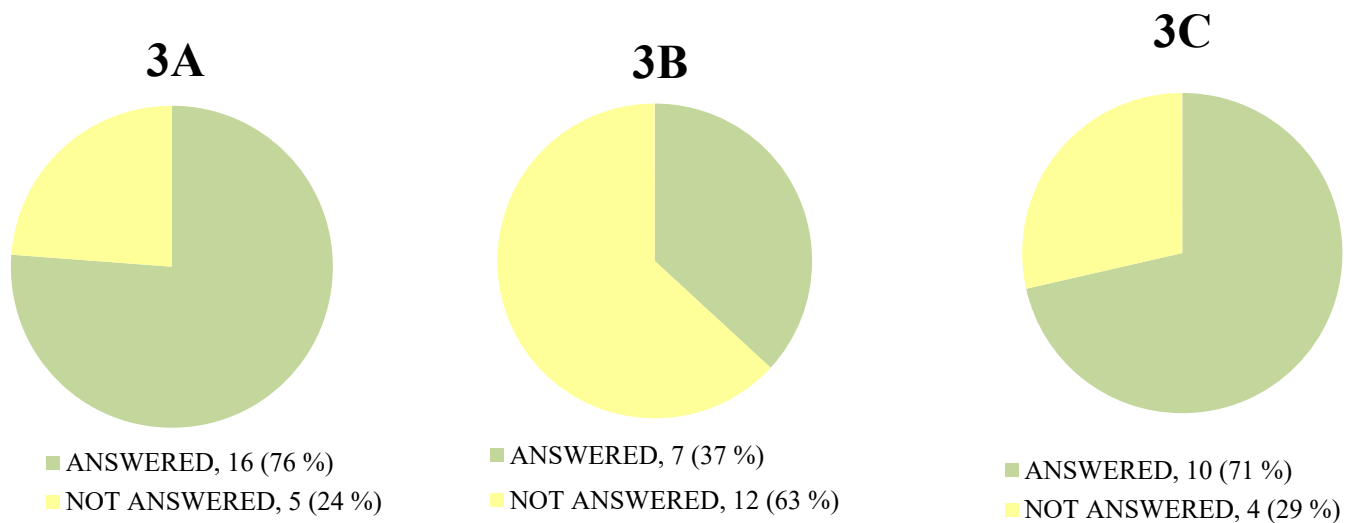ANSWERED, 10 (71 %)
NOT ANSWERED, 4 (29 %)

Figure 28: Percentages of answers received by each class to the introductory key word list survey

Source: Author, 2021

From the graphs presented above, it is possible to see the percentages of answers received in each class from the students of the Oulx school to the introductory key words list survey. The difference in the answered percentages can be explained by several factors. According to the school teacher who coordinated and supervised the classes work, a significant part of the reason can be found in the different contexts of the classes and the difference of the classes in terms of diligence, good behavior and level of maturity among the students. According to the school teacher, the classes who answered the most, are also the classes that have the best performances in terms of learning skills, behavior, and in general attitude towards the school institution. Nevertheless, the number of answers received have positively exceeded the number of answers that the survey was supposed to receive according to the school teacher's initial expectations.

In class 3A (see Figure 29), the class among the three with the largest number of students, the words the students were the least familiar with are: consumer, prosumer, energy communities, deterioration, international agreements and geopolitics. In 3B (see Figure 30): consumer, prosumer, co-ownership, deterioration. In 3C (see Figure 31): consumer, prosumer, co-ownership, geopolitics.

For the other words, the students showed average knowledge. For instance, words like energy source were familiar to most of the students. In 3A, the words the students were the most familiar with are: renewable energy source, CO_2, territory. In 3B: sustainability, energy source, natural resource, pollution, economic investment, territory. In 3C: sustainability, energy source, renewable energy source, climate change, deforestation, inequalities, pollution, territory.

As it appears from the results of this introductory survey, the familiarity with terms related to the energy community field is the lowest, but there is a good first familiarity with terms afferent to the sustainability and climate change spheres.

The aim of this workshop and activity is to raise awareness about energy community and co-ownership terms and concepts among young students like those of the middle school of Oulx.
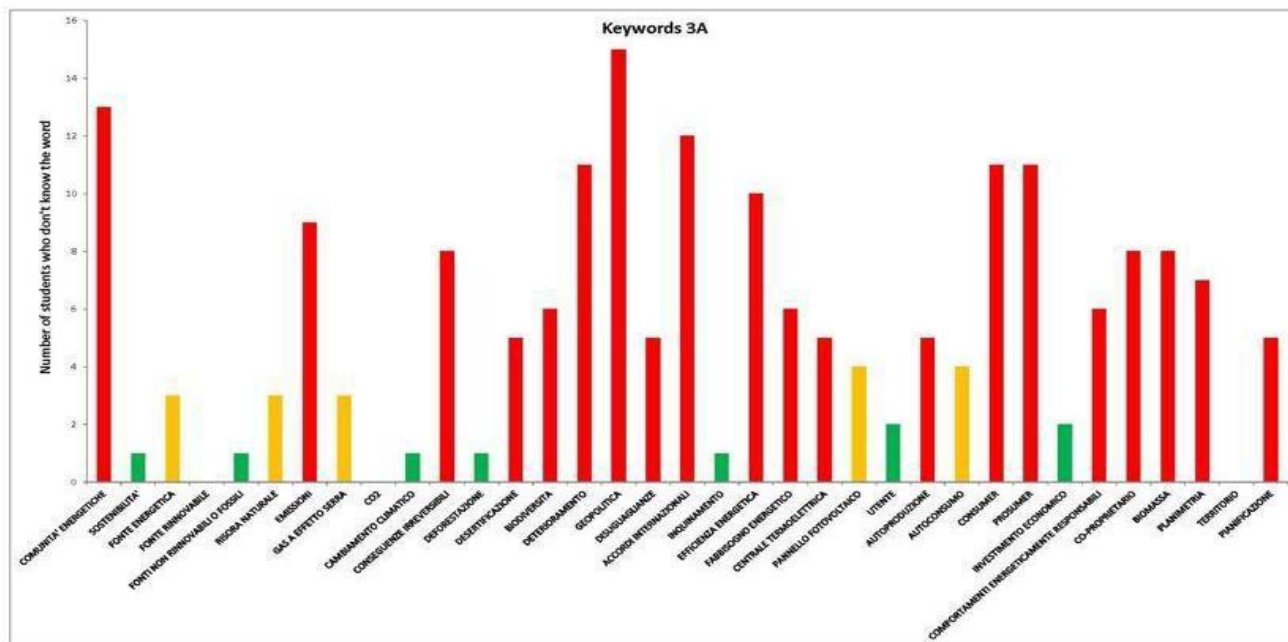
Figure 29: Keywords list survey results, class 3A.

Source: Author, 2021
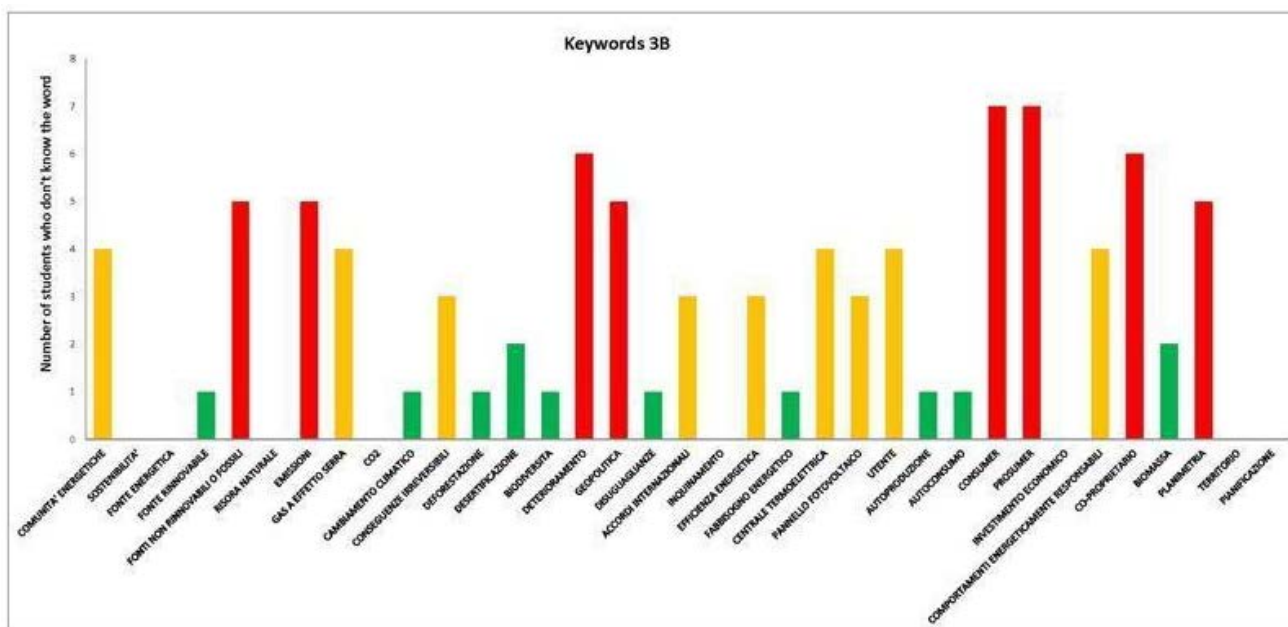
Figure 30: Keywords list survey results, class 3B.

Source: Author, 2021
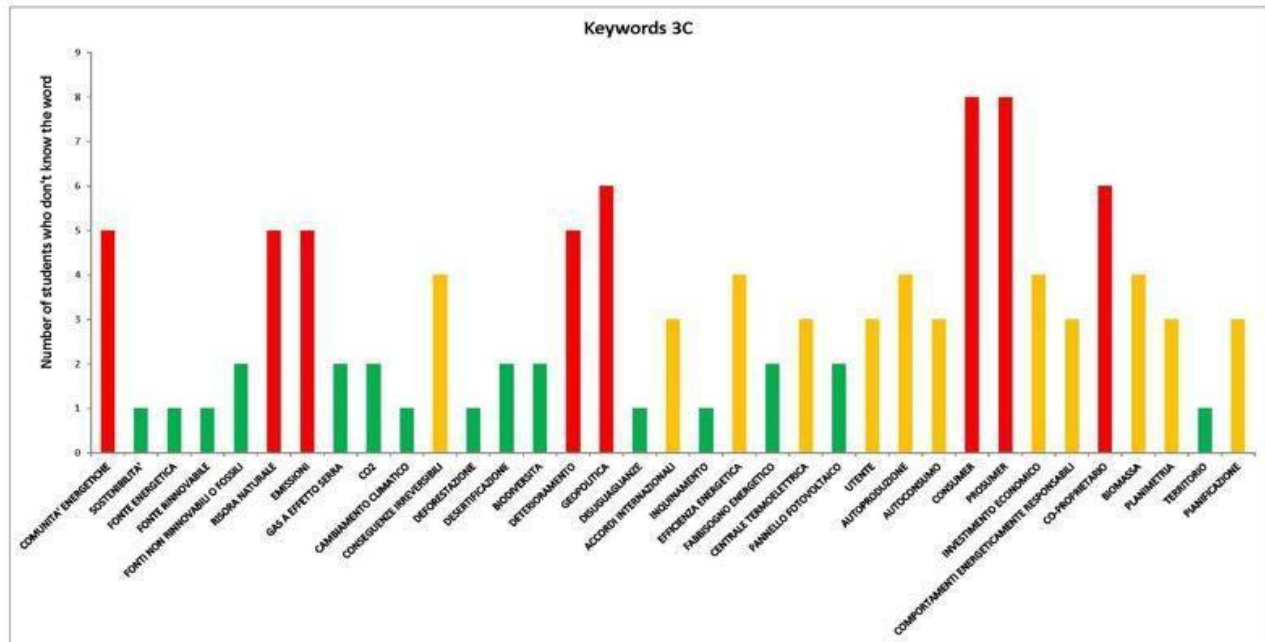
Figure 31: Keywords list survey results, class 3C.

Source: Author, 2021

Part 1. During the lecture, the classes showed an appropriate level of interest in the topics dealt with. They followed with participative interventions and their teacher (technology subjects teacher) was satisfied and surprised by the students' interest and participation. In the lecture, concepts about renewable energies, energy communities, prosumerism and the basic information about the SCORE project have been presented. The lecture step is aimed at providing the students with basic knowledge on which to rely during the following steps of the project.

Figure 32: Screenshot of the online lesson

Source: Author, 2021

At the end of the lecture, it has been presented the structure and the different phases of the 2nd part of the project, the participative laboratory. Each phase of the 2nd part of the project has been explained in detail: Phase 1, with the online survey to be filled individually and the resulting bullet map; Phase 2, with the beginning of the group work for the context analysis of the selected area for the project; Phase 3, with the actual planning and design task and tools; Phase 4, with the explanation on how to present the results of the workshop.

Below, it follows the presentation of the outcomes of the different phases by the three classes of Oulx.

Part 2.

Phase 1: In Phase 1, the students are requested to individually answer an online survey. As stated before, the survey is divided in two parts. The first part focuses on the students' personal behaviours and attitudes towards sustainability and their perceptions and opinions about their territory, about renewable energy projects and energy communities. The second part instead focused more on the citizens' opinions and perceptions, always in relation to their territory,

sustainability, renewable energy projects and energy communities. The students had to interview as many people as they could find. Considering the pandemic situation, the task has been carried out in the respect of the restrictions in place during January 2021 in the Piedmont region, and the students tried their best to satisfy the assignment.

In the first part of the survey, the students showed appreciation for the territory where they live, being a mountain territory, with clean air, presence of unspoiled nature and local wildlife. These characteristics are appreciated especially when the territory of Oulx is compared with the more urbanized territory of Turin city. Compared to the Turin urban area, the students highlighted their appreciation for the absence of air pollution, the presence of unspoiled nature, the absence of noise pollution and light pollution, the lifestyle less hectic and more relaxed, the contact with nature and local wildlife, the safety and lack of dangers, especially for younger generations.

In respect to the protection of the environment, all the students' answers show attention and consideration for the topic addressed and consider the protection of the environment a relevant topic, assigning a value ranging between: important (2% of total answers); very important (35%); and extremely important (63%). The majority of the students, considers then the protection of the environment as a primary concern that needs to be addressed (Figure 33).
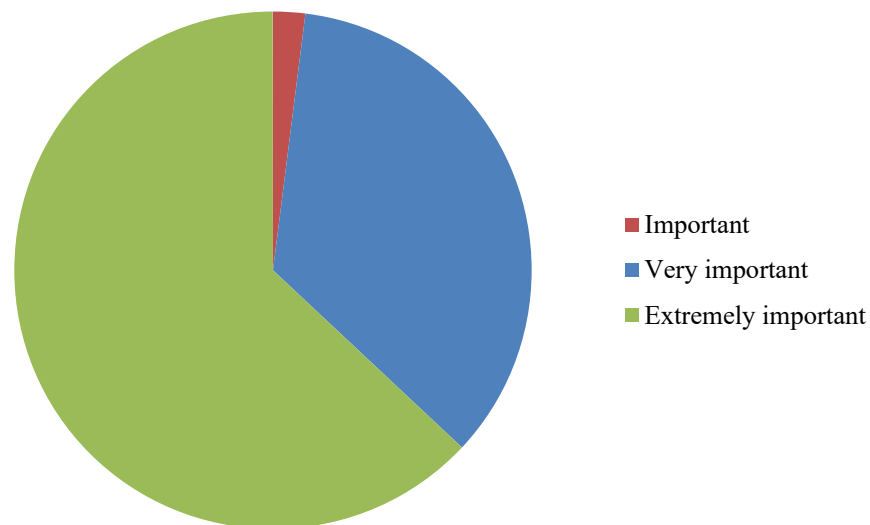

Figure 33:Degree of importance assigned by the students to the topic "protection of the environment"

Source: Author, 2021

According to what they learnt in Part 1 of the project, the lecture about renewable energies and energy communities, the students have been asked about their level of interest in further exploring and deepening the topics dealt with in the lecture. 14 students, 30% of the total answers, answered to be "neutral" about the possibility of learning more about energy communities, therefore demonstrating no particular interest in the topic. 28 students, 61% of the total, answered to be "interested". And 4 students, 9% of the total answered to be "very interested".

The percentages of the answers received, show that the majority of the students involved in the project find the topic interesting and worth exploring further. The following question asked them about the possibility to start and install a new energy community project in the municipality of Oulx, their municipality, and what were their thoughts about this idea.

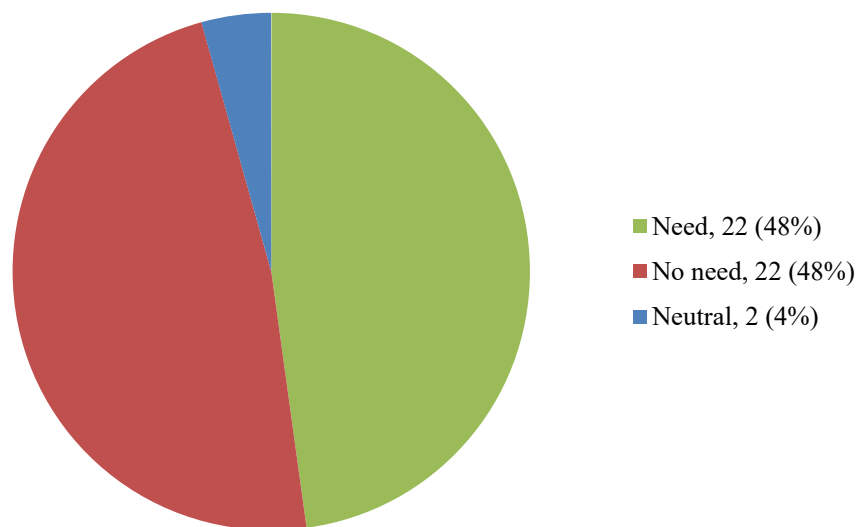Figure 34: Students opinions about the need of a new energy community project for the municipality of Oulx.

Source: Author, 2021

As it is possible to see from Figure 34, there are many students, almost half of them, who think that the project of a new energy community is not a primary necessity of the municipality, that it wouldn't be useful and it could be avoided. It follows a brief list of examples of the students answers:

> Student 1: *"The municipality does not need a new energy community project as pollution in Oulx is not a serious issue."*

> Student 2: *"We don't need a new energy community project as many households are already equipped with solar panels and photovoltaic panels."*

> Student 3: *"A new energy community project wouldn't bring many economic benefits in a small town like Oulx and the municipality is already equipped with one municipal wind turbine."*

On the other hand, the other half of the students thought that the installation of a new energy community project would be a useful initiative for the municipality of Oulx. It follows a brief list of examples of their answers:

> Student 1: *"A new energy community project would be useful because also in Oulx there is pollution."*

> Student 2: *"It would be useful especially in the old part of town, the "Borgo Vecchio", because would bring innovation and modern economic input to a part of town too much projected into the past.*"

> Student 2: *"It would be useful in particular to supply energy to public buildings and spaces, like schools, parks, sports centers, etc."*

As it is possible to see from the examples above, the answers of the students were similar and opposite and at the same time. The problem of pollution is perceived as not present by the first group, and present by the second group, motivating their opinion about the need or not of a new

energy community project for Oulx. Also, these answers show their perception towards energy community projects, as something mainly related to pollution, showing the need to insist on the fact that energy communities are expected to bring benefits in many areas of social life and social organization. Some of the students, among those thinking about a new energy community as a useful project, highlighted the potential economic benefit and social innovation that energy community projects could bring in small mountain towns like Oulx.

Finally, at the end of the first part of the survey, students were asked about their attitude towards some daily sustainable behavior and environmentally friendly behavior. According to the answers received, the students show awareness and a good/average level of sustainable behavior engagement concerning the daily domestic life (switching the lights off when not in the room; turning off devices when not in use; closing the tap when brushing teeth) and slightly less awareness and engagement concerning the actions and personal initiatives to raise awareness in others about sustainability and sustainable behaviours.

At the end of Part 1 of the survey, dedicated to their own perceptions and opinions, the students continued with the compiling of Part 2, dedicated to the interviews to Oulx citizens.

According to the analyzed results of the received online surveys compiled by the students of the three classes, there have been 246 people interviewed in the municipality of Oulx for this project. The first questions of the survey investigate the perception of the citizens about renewable energies and energy communities projects. According to the citizens' answers, some graphs about their perceptions have been produced.
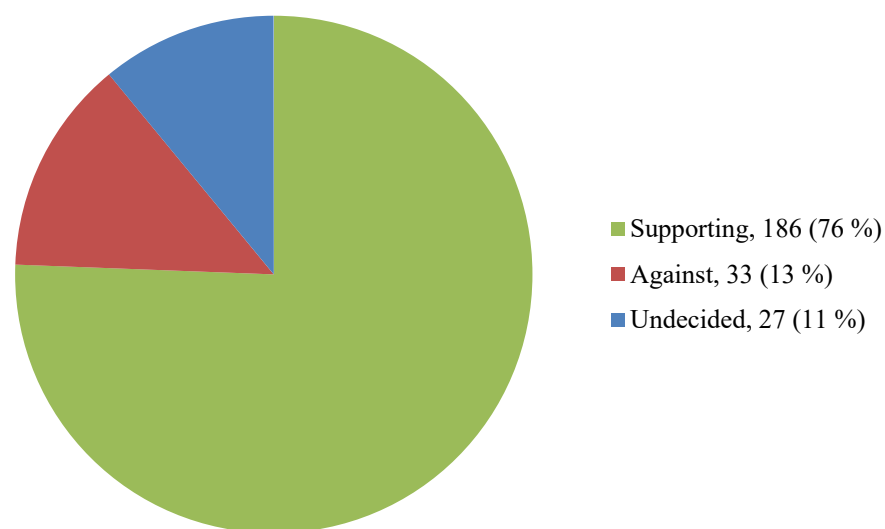
Figure 35: Citizens perception towards energy community projects

Source: Author, 2021

As it is possible to see from Figure 35, the majority of the people interviewed showed interest and supporting attitude towards energy community initiatives. The main reasons for their support can be summarized in three main categories: environmental concern, economic advantage perspective, or a combination of the previous two. In the following graph, it is possible to see the different percentages relating these motivations.

Figure 36: Main reasons of citizens supporting energy community projects

Source: Author, 2021

This aspect, about which type reasons motivate people to support energy communities and innovations for a sustainable energy transition, has been perceived correctly by the students, the target of this laboratory. In fact, to the question "Do you think that people supporting energy communities are motiva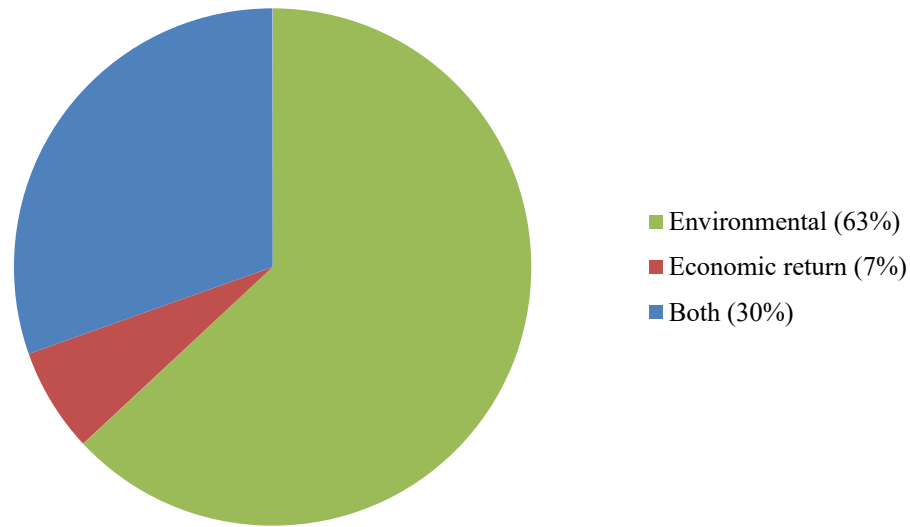ted by environmental or economic reasons?", 74% of the students answered "environmental reasons", with only 26% answering "economic reasons". This well represents the outcome of the interview they carried out in their municipality, according to the reasons provided by the citizens who support energy community initiatives.

Nonetheless, there have been some opinions against the idea of starting new energy community projects, even if only 13% of the total answers were in this category. The main reasons provided by the citizens for being against energy communities can be summarized in two main categories: the first relates to the skepticism towards these forms of projects, involving a behavioural change and an infrastructural change. Many people who declared themselves as against energy communities demonstrated a disbelief in the real utility of such projects, stating that they are comfortable with the current energy provision and social organization, and that they don't think that the proposed infrastructure and change would bring any enhancement or positive

transformation. The second category of citizens opposed to energy communities' idea, relate more to the potential costs that such initiatives would add to the households expenses. The idea of having to invest in an infrastructure that perhaps would turn more economically sustainable in the future was too far for them, some of them because would use the house in the municipality of Oulx only as second house, therefore not beneficiating enough of it; others, they just wouldn't take the risk with their capital. In the graph below it is possible to see the percentages of these two categories.

Figure 37: Main reasons of citizens against energy community projects

Source: Author, 2021

As it is possible to see from Figure 37, the main reason that the citizens interviewed provided for being against energy community initiatives is connected to the skepticism towards these forms of social and infrastructural change, even more than the economic reasons. This aspect reveals a cultural and social barrier that still remains present and solid, preventing and slowing down the innovation and sustainable transition processes.

Among the answers received by the interviewed citizens, as shown in Figure 35, the last category is represented by the undecided citizens, those that did not have any strong opinion about energy

community projects. Among the reasons supporting their indecision and hesitation toward these new types of energy and social networks, there are, like for the people against, skepticism and economic reasons, with the addition of one motivation more which is the admission of a lack of information about the topic and the need to study it more thoroughly. In the following graph it is possible to see the different percentages about the reasons presented by the undecided citizens.
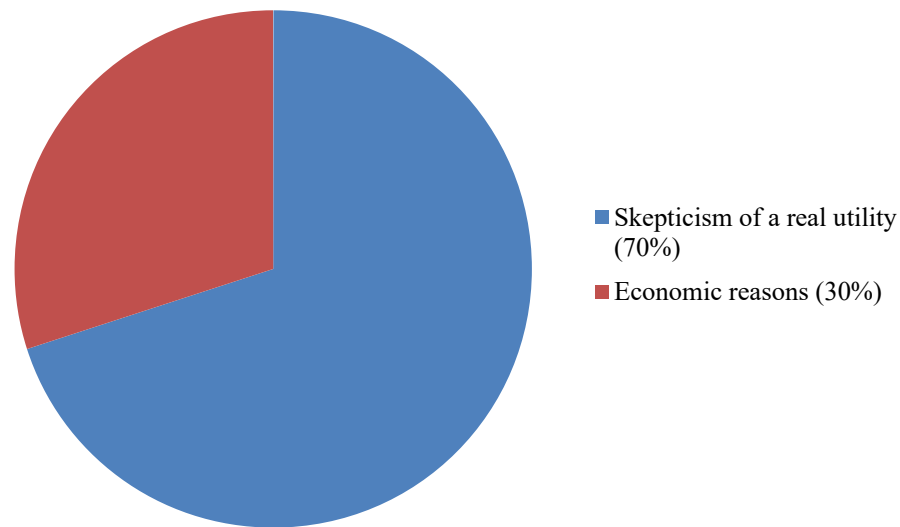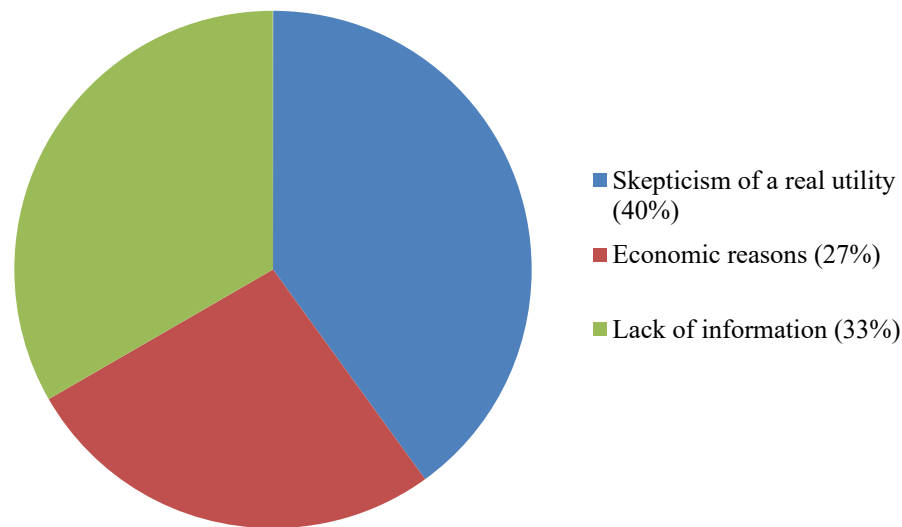

Figure 38: Main reasons of citizens undecided towards energy community projects

Source: Author, 2021

As it is possible to see from Figure 38, also for the undecided interviewed people, the main reasons influencing citizens preventing them to get involved and embrace new projects like energy community initiatives, are skepticism and cultural barriers towards important social, behavioral and structural changes, like those envisaged by the energy transition innovations. Also economic motivations play a significant part for the undecided citizens. Adding to the reasons for their indecision, it is possible to see the presence of the category "lack of information". This category shows an open minded attitude towards possible innovations and the

recognition that the subject must be studied more thoroughly in order to take position more consciously.

To the survey question "Do you think it would be possible to turn undecided citizens about energy communities into supporting citizens?", 90% of the students answered "yes", while only 10% answered "no". About the possible solutions to turn undecided citizens into supporting citizens the students provided several ideas. Here are some examples of their answers:

> Student 1: by organizing events and fairs, dedicated to renewable energies and sustainability;

> Student 2: It is possible to change adults mind only by providing proof of the economic advantage they would get

> Student 2: by engaging more public and institutional support, in order to lower the initial investment costs

> Student 4: by providing more best practices examples, in order to show the achievements and the results of successful energy community projects

> Student 5: by creating more advertisement material and spread it in public places and on social media, in order to reach more citizens

Finally, to the question "As a young student, how could you help spreading the idea and the knowledge about renewable energies, in order to engage people or institutions (public/private)?", many students answered in similar way: by organizing campaigns on social media in order to raise awareness; by organizing live events focused on sustainability and renewable energies and by increasing the advertisement material in the cities; by engaging them personally with interviews like the one carried out for this project.

In the following step, according to the interviews carried out, each student had to produce one bullet map, with as many bullets as the interviewees, and of three distinct colours: green, if supporting; yellow, if neutral; red, if against. This step was designed in order to receive basic geo-referenced information about citizens' opinions/sentiments/perceptions on renewable energies and energy community projects, topics dealt with in this workshop. The maps will also serve the students as a first context analysis of the territory on which they will have to design and plan their project for a new energy community.

It will follow a brief list of map examples produced by the students (Figure 39, Figure 40, Figure 41). The example maps show how the citizens responded differently to the interviews and there are a mix of supporting, neutral and against positions. In the following step, all these maps will be put together in order to have an overall picture of the interview's responses.
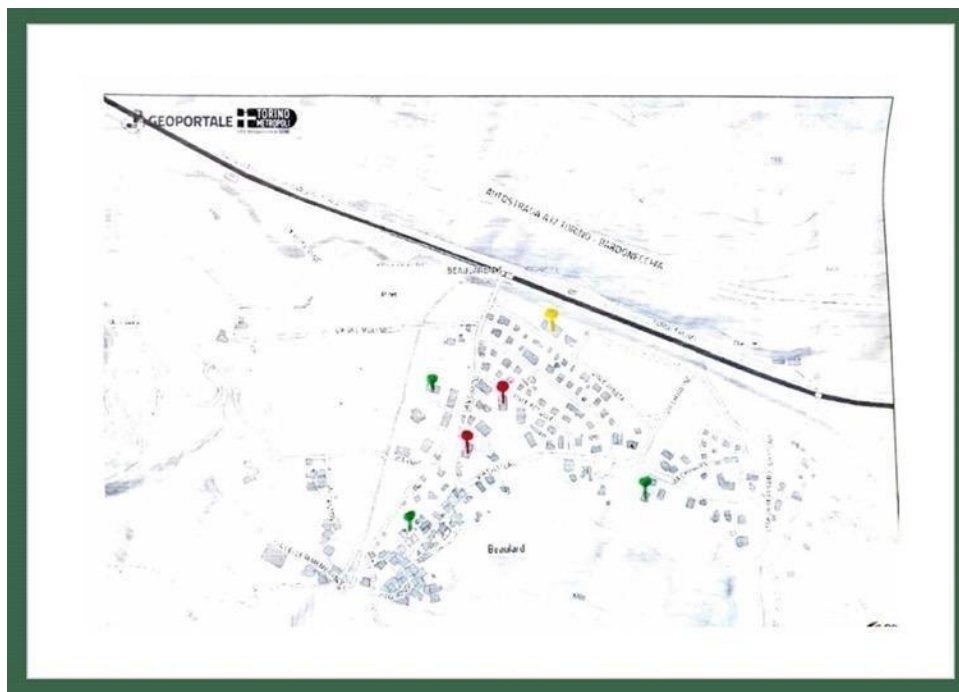
Figure 39: Class 3C, group 1. Bullets map
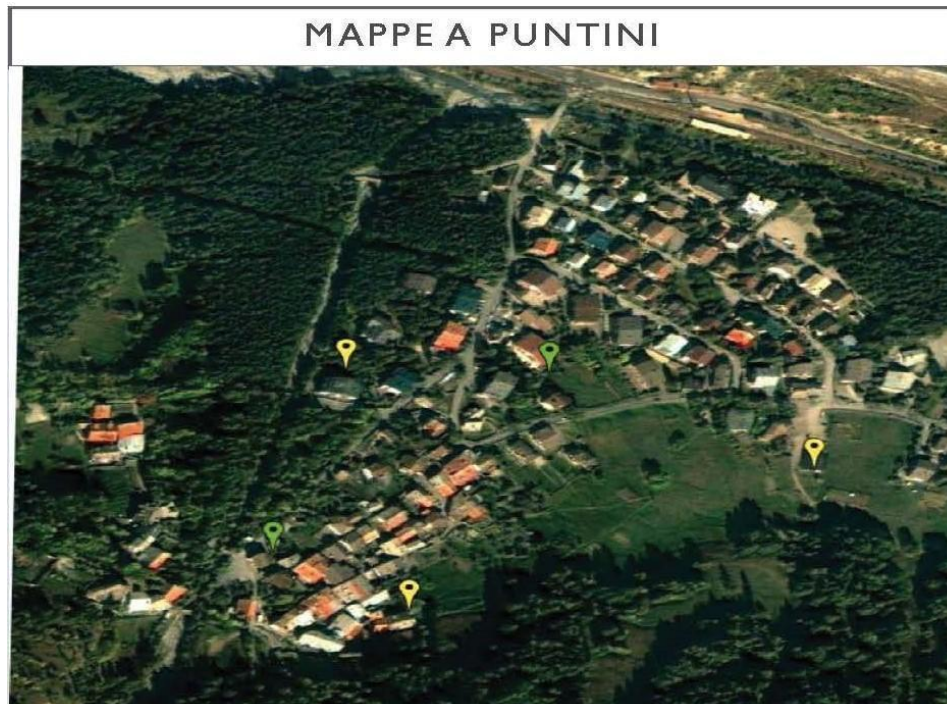
Source: Author, 2021

Figure 40: Class 3A, group 2. Bullets map.
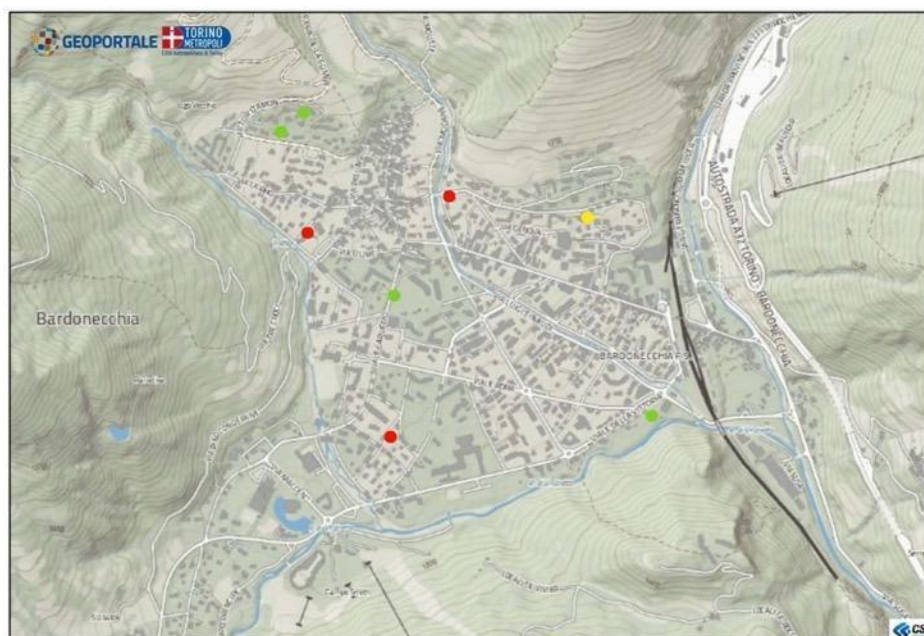
Source: Author, 2021

Figure 41: Class 3C, group 2. Bullets map.

Source: Author, 2021

Resulting from the maps produced by the students, it has been produced a summarizing map in order to gather all the citizens' perceptions about energy community projects in one comprehensive map.

Figure 42: Map of the overall Oulx citizens perceptions about energy community projects, resulting from the students surveys

Source: Author, 2021

Phase 2: This is the beginning of the group work. The classes have been divided into groups by their school teacher and each group has been assigned with a small area. The selected area for each group is the area on which the students will have to carry out the context analysis and the project design. The classes were formed as follow:

CLASSE 3°A		
GROUP N°	MEMBERS	AREA ASSEGNATA (N° 1-5)
GRUPPO 1	4	AREA 3: SIGNOLS
GRUPPO 2	4	AREA 1: BEAULARD
GRUPPO 3	4	AREA 5: GAD
GRUPPO 4	4	AREA 4: OULX
GRUPPO 5	5	AREA 2: SAVOULX

CLASSE 3°B		
GROUP N°	MEMBERS	AREA ASSEGNATA (N° 1-5)
GRUPPO 1	5	AREA 2: SAVOULX
GRUPPO 2	5	AREA 5: GAD
GRUPPO 3	5	AREA 4: OULX
GRUPPO 4	4	AREA 1: BEAULARD

CLASSE 3°C		
GRUPPO (N°)	MEMBERS	AREA ASSEGNATA (N° 1-5)
GRUPPO 1	5	AREA 1: BEAULARD
GRUPPO 2	5	AREA 2: SAVOULX
GRUPPO 3	4	AREA 4: OULX

For the context analysis phase, the groups appropriately studied their assigned areas and selected some specific sites for the energy community project, according to the morphology and characteristics of the area, the actors they wanted to involve and the results they aimed at for their projects (see Figure 43, Figure 44, Figure 45, Figure 46, Figure 47, below).

Considering the selected area, the scope of their project and the physical characteristics of the area, based on what they learned during the frontal lesson, they then selected the most appropriate technology they would consider for the new energy community and explained why they made such choices.

Figure 43: : Class 3C, group 3. Context analysis and selected areas.

Source: Author, 2021

Figure 44: Class 3A, group 5. Context analysis and selected areas.
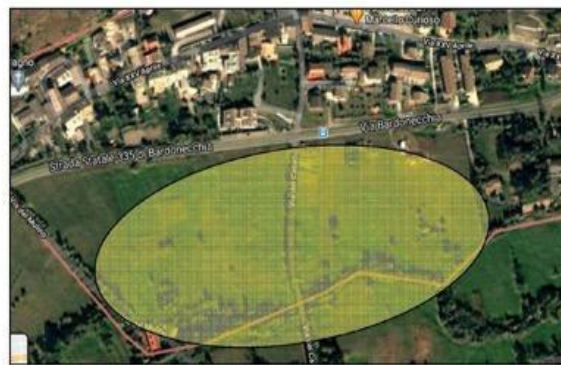
Source: Author, 2021

Figure 45: Class 3C, group 2. Context analysis and selected areas.

Source: Author, 2021

Figure 46: Class 3A, group 5. Explanation of a biomass system, technology chosen for the project.

Source: Author, 2021

Figure 47: Class 3C, group 2. Technology chosen for the project and reasons.

Source: Author, 2021

Phase 3: In this phase, the groups had to produce the actual plan for their project, results of all the observations made in the previous steps. The projects designed by the groups respected the instructions and fulfilled the goals designed for this workshop. The students of the three classes produced interesting ideas and projects, showing understanding and interest for the topics involved in the activity: sense of community, a more sustainable way of living and producing energy, a shared project managed by citizens.

The projects resulting from the students' design and team work, showed interesting perspectives on their territory. The students carried out complete and attentive context analyses, demonstrating to know the context in which they were asked to plan the new project. Their ideas connect several fundamental aspects inherent territorial sustainable development at large and specific dynamics of the energy community organizations.

One of the main and most relevant aspects to highlight about the students' projects, is the network they designed and planned for their ideas of energy communities, among several and different types of local stakeholders within the Oulx community. Private commercial activities buildings, private citizens and households, public buildings, like school buildings, sport centers, town hall, touristic services centers and buildings, local associations and organizations non-profit, have been interrelated and put in relation with each other, in order to imagine potential small communities, based on their localization, their proximity and the sharing of common interests, values and objectives.

In terms of common interests among citizens and institutions, it has been recognized by the students, the achievement of energy networks and infrastructure for a more sustainable, less polluting, more efficient and more affordable energy supply source. Moreover, the protection of the natural heritage and local landscape is also one of the main aspects taken in consideration by the students' projects.

The engagement of youth in the designed projects was an element often found and described by the students. In specific cases, young people have been considered centre and pivotal actors for an efficient and effective project implementation, not only beneficiaries but protagonists and decision makers in the management of resources and community dynamics.

It follows a brief list of examples of projects (see Figure 48, 49, 50, 51, 52).

Figure 48: Class 3C, group 3. Project map.

Source: Author, 2021

Figure 49: Class 3C, group 1. Project rendering view.

Source: Author, 2021

Il progetto di comunità energetica di Savoulx

Figure 50: Class 3C, group 2. Project map.

Source: Author, 2021

La nostra comunità energetica è stata costruita sulle basi di poche persone e associazioni per garantire il costante accordo su tutti .
la nostra sede è un posto all'aperto per poter utilizzare questo terreno per la costruzione di tecnologie rinnovabile come le pale eoliche per produrre energia pulita da far arrivare a tutta la società di beaulard

Figure 51: Class 3A, group 2. Energy community idea explained.

Source: Author, 2021

Figure 52: Class 3A, group 2. Technology chosen for the project and reasons.

Source: Author, 2021

Phase 4: Phase 4 of the workshop, the presentation phase, has been carried out in presence at the middle school of Oulx, in compliance with COVID-19 Preventive and Control Measures, with the presence of two members of the SCORE team. The presence of external people in the school was previously requested and granted by both institutions, the middle school of Oulx and the Politecnico of Turin. Each group presented their project in front of their class, the technology professor and the two members of the SCORE team. The projects were presented on Thursday the 14th of January 2021 and on Tuesday the 19th of January 2021 (see Figure 53 and Figure 54).

The students' projects' outcomes and presentations have been carried out in presence, at the secondary 1st level school of Oulx, in two different dates: the first day, on Thursday the 14th of January 2021, presenting the groups of classes 3A and 3C, and the second day, on Tuesday the 19th of January 2021, presenting the groups of class 3B.

Figure 53: Presentation class 3C.

Source: Author, 2021

Figure 54: Presentation class 3A.

Source: Author, 2021

Part 3.

The workshop organized for the last year classes of the middle school of Oulx has concluded with satisfying and quite promising results. Almost all the groups managed to fulfill the requirements of the activity and carried out the work with better-than-expected outputs. Many groups produced good quality material, with richness of details in every part and, most importantly, they respected one of the central requirements of the activity: to justify and give reasons for every choice they made in their projects. The material was of good quality both from the idea and from the layout/presentation points of view. They integrated proficiently what they learned from the online lesson on renewable energies and energy communities, their knowledge of the territory, the new information coming from the questionnaire and interviews they carried out at the beginning of the activity, and the planning task and group interaction they were required to perform. From what they presented, it is possible to state that they designed interesting ideas for new energy communities in their area, connecting and involving local businesses, private citizens and municipal institutions. Many of them involved the main school building and the participation of the students themselves, some local businesses, connected with sustainable local tourism and the preservation of the environment. Moreover, through the interviews with the citizens, the workshop managed to extend the topics of renewable energies and energy communities also outside the classes. During the presentations, they showed great interest in the topic and commitment to their projects and ideas. The workshop was also an opportunity to improve team-work skills. The groups were formed allowing the students to organize themselves but with the supervision of the professor, who had to rearrange a few groups. Some of the groups showed greater maturity than others in presenting their work. The groups that took more seriously the activity belonged to smaller classes, in an environment more conducive for experimental learning experiences. The fact of presenting in front of the class, in some cases represented a source of embarrassment for certain students, this mainly in bigger classes, where it happened more easily that some of the students listening would make fun of the presenting peers.

Feedback Surveys

At the end of the workshop, a Feedback survey was sent to the classes that participated in the project and to their school teacher. It follows the analysis and the outcomes of the answers received.

<u>Students:</u>

Out of 54 students participating in the project, only 6 answers to the feedback survey have been returned to the school teacher. This highlights the fact that once the task is concluded and the assignment has been assessed by the school teacher, most students lose interest and motivation in delivering and carrying out assignments out of the main task, even if it requires a minimal engagement.

The first question of the feedback survey asked about which parts of the project the students liked the most. According to the answers received, all the students liked all the phases of the workshop, in particular the group phase, to design and present the project together with their peers.

Only one answer highlighted the fact that following the lecture of Part 1 about renewable energies and energy communities was not easy because it was carried out remotely through the Zoom platform, and it would have been better if in presence.

> Student X: "*The part I liked the most was presenting the project to the class. The part I liked the least was the lecture at the beginning, because it was in distance learning on Zoom and I couldn't understand everything.*"

The second question asked the students about their experience with the group and the team work. All the students seemed to enjoy and appreciate the experience of sharing ideas, working together on a project and presenting it in front of their classmates. In particular, due to the

pandemic situation, the group work represented an important moment of interaction and discussion, in a period where social interaction and exchange were extremely limited.

> Student X: "*I enjoyed very much working with group, especially in this period where it is not possible to meet with friends. This work was also my first Power Point presentation and I enjoyed it a lot.*"

The third question asked the students if after the workshop they considered their knowledge about renewable energies and energy communities to be increased and on which extent. They could choose between the adjectives: for nothing (per niente); poorly (poco); fairly (abbastanza); greatly (molto); extremely (moltissimo). Among the 6 received answers, four students picked "fairly", two picked "extremely". This result shows a fair achievement in terms of youth engagement in renewable energies topics. However, there remains large margin for enhancement and improvement.

The fourth question asked the students if after the workshop it happened to talk again about the topics involved during the activity, renewable energies and energy communities. Four students answered that they talked again about sustainability and renewable energies, and about the results of the workshop, either in class with the school teacher, or with their friends.

Two students affirmed that they didn't have the chance to discuss these subjects again.

> Student X: "*Unfortunately, in my family we don't discuss about these topics.*"

The fifth and last question asked the students their opinion about spreading projects like the one they have been involved to all secondary 1st level schools in Italy. All of the answers were positive and stated that it would be useful to raise awareness in young generations about sustainability, renewable energies and innovations like energy communities, recognizing the role of future consumers, stakeholders and citizens that they represent.

Only one of them stated that it would not be a priority to implement and spread projects like this, and that there are concerns more serious (e.g. protecting endangered animals).

School teacher:

The last feedback survey was sent to the school teacher who supervised and helped coordinating the workshop.

The first question asked about his level of satisfaction with the project and with the attitude and methodology adopted by the SCORE team.

He stated to be "very pleased" with the activity carried out by the Politecnico team in his class. He appreciated the content of the lecture about renewable energies and energy communities concepts. The only limit was the fact of being forced to do it online and not in presence. He appreciated the attitude shown by the research SCORE team, as it respected his advice and conditions and, at the same time, valued and encouraged critical thinking of the students.

The second question asked if the teacher considered appropriate the level of the activity for the classes involved.

He considered the level perfectly appropriate, giving him the possibility to use the explained material to integrate the classes about energy topics, during the normal institutional school program. He also appreciated the fine tuning of the workshop and lecture material, carried out in a previous step, through online meetings between the teacher and the SCORE team following this workshop.

The third question asked if the teacher considered appropriate and satisfactory the level of collaboration established within the groups and among the groups' members.

During the pandemic situation it was difficult to supervise each step of the work, as students would mainly work from home and mainly separated. Therefore the teacher stated that he cannot assess the effective level of collaboration within the groups, and he suggests the addition of an intermediate meeting where all the groups exchange and discuss about the results achieved until that point and future developments.

The fourth question asked whether, after the workshop, the interest of the students towards the sustainability and renewable energy topics increased, decreased or remained the same.

The teacher answered that the workshop raised awareness of the students towards energy savings and energy transition. The practical designing studio activity gave reality and concreteness to topics that usually feel unreal and distant, especially to young students. After the activity, some students critically reflected and raised important issues about the heating systems implemented in their houses and thought about some potential solutions to increase energy efficiency.

The fifth and last question, asked about the teacher's opinion about the possibility to spread activities like the one carried out, to all Italian secondary schools.

He answered that he saw some difficulties in spreading activities like this because they rely on the teacher's attitude toward these topics and every class and case is different. He stated that if the teacher doesn't give importance to these topics or activities, this will influence the students in a negative way. He also stated that fortunately nowadays schools are addressing more and more topics connected to sustainability and sustainable development.

4.2 Results – Sestriere

In Sestriere, only one class of the local secondary 1st level school has been selected as a participant in the activity. The class was the 3C and was composed of 12 students.

Part 0. The introductory keywords list showed a general excellent (compared to Oulx case study) familiarity with energy field terms (e.g., renewable and non-renewable energy sources, climate change, emissions, CO_2, etc.) and almost no familiarity with terms afferent to the energy communities' specific field (e.g., prosumer, prosumerism, etc.).
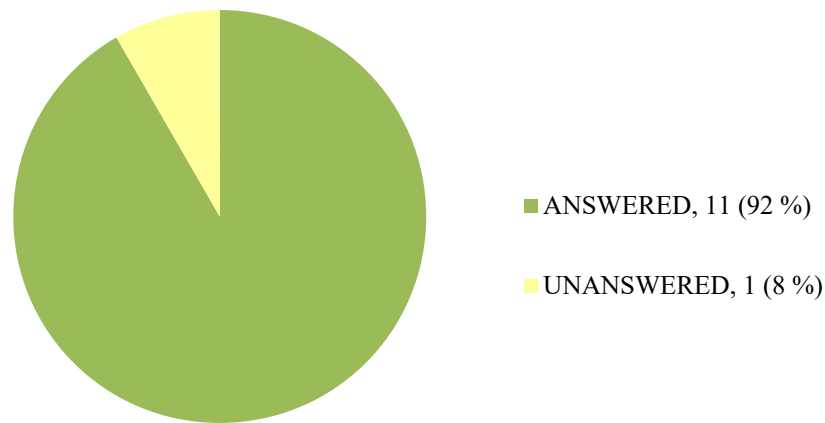

Figure 55: Percentages of answers received by the class to the introductory key word list survey.

Source: Author, 2021

As it appears from Figure 55, almost every student in the class answered the introductory key word list survey. Compared to the Oulx case studies, the percentage of students answering the survey has improved and shows a stronger engagement to the project since the beginning.

In class 3C in Sestriere, the words the students were the least familiar with are: consumer, prosumer, energy communities, geopolitics, co-ownership and sustainable energy behaviors.

Words like self-consumption, self-production, economic investment, deterioration, GHG, planning and irreversible effects, were familiar to most of the students. Instead, all students were familiar with words like sustainability, energy source, renewable energy source, natural resource,

emissions, CO2, climate change, biodiversity, inequalities, pollution, biomass, energy demand, thermal power plant and photovoltaic panel.

As it appears from the results of this introductory survey, like in Oulx, the terms that the students of Sestriere were the least familiar with are those related to the energy community field. But if compared to the Oulx case study, the students of Sestriere has greater familiarity with terms afferent to the sustainability and climate change spheres.
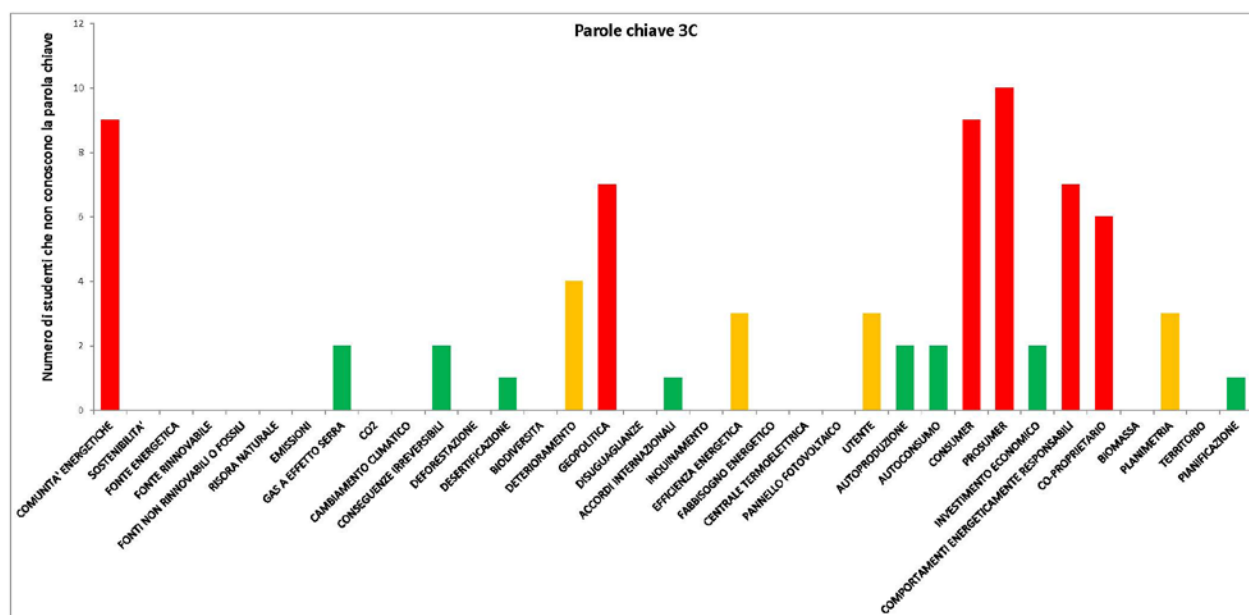
Figure 56: Keywords list survey results, class 3C.

Source: Author, 2021

Part 1. The class of Sestriere was an exceptionally small class, only of 12 students. During the lecture, even if through the Zoom platform online, it was possible to establish a good connection with the students. The experience carried out in Oulx served also as background to fine tune the timing of the lecture, the rhythm and the stressing of the concepts relating renewable energy and energy communities more important for the following phases. The class seemed interested and showed participation asking questions and details about the topics dealt with. The school teacher coordinating and supervising, technology teacher Antonella Covato, was always present also in the Zoom session to encourage the students to ask questions and be participative in the activity.

At the end of the lecture the students answered to have understood the concepts explained and the teacher was satisfied with the level and the way the lecture and the SCORE team approached the subject and the young students.
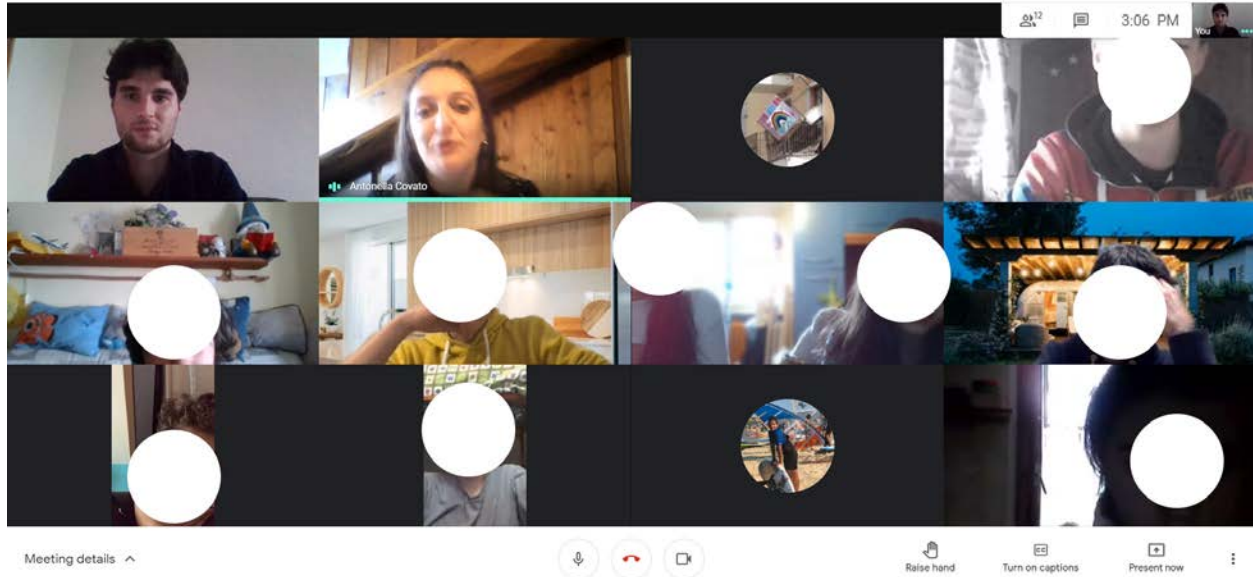
Figure 57: Screenshot of the online lesson.

Source: Author, 2021

At the end of the lecture, as for the case study in Oulx, it has been presented the structure and the different phases of the 2nd part of the project, the participative laboratory. Each phase of the 2nd part of the project has been explained in detail: Phase 1, with the online survey to be filled individually and the resulting bullet map; Phase 2, with the beginning of the group work for the context analysis of the selected area for the project; Phase 3, with the actual planning and design task and tools; Phase 4, with the explanation on how to present the results of the workshop.

Below, it follows the presentation of the outcomes of the different phases by the three classes of Oulx.

Part 2.

Phase 1: Like for the case study of Oulx, in Phase 1, the students were requested to individually answer the online survey divided in two parts: part 1, focused on the students personal behaviours and attitudes; and part 2, instead focused more on the citizens opinions and perceptions. Considering the pandemic situation, the task has been carried out in the respect of the restrictions in place during May 2021 in the Piedmont region, and the students tried their best to satisfy the assignment.

Like in Oulx, also the students of Sestriere showed to appreciate the natural aspects, the clean air, the unspoiled nature and local wildlife of Sestriere territory, compared to more urbanized areas like the city of Torino. Moreover, they showed appreciation for the local absence of dangers, absence of noise and light pollution, the cleanliness of the streets and the town in general and the lifestyle more relaxed. Nevertheless, some of them commented that despite the invaluable and natural aspects, places like Sestriere remain affected by backwardness concerning many services and infrastructure.

In respect to the protection of the environment, the students consider the protection of the environment a relevant topic, assigning a value ranging between: important (25% of total answers); very important (19%); and extremely important (56%). The majority of the students of Sestriere too considers then the protection of the environment as a primary concern that needs to be addressed (Figure 58).
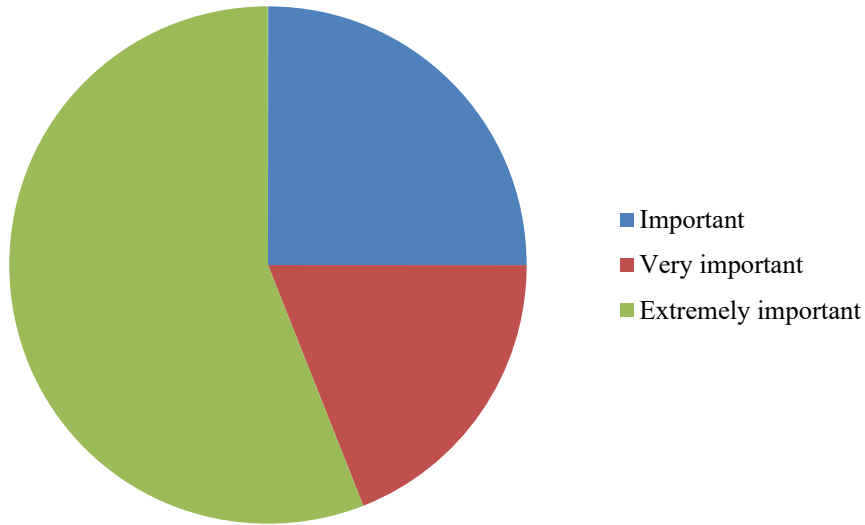
Figure 58: Degree of importance assigned by the students to the topic "protection of the environment"

Source: Author, 2021

About their level of interest in further exploring and deepening the topics dealt with in the lecture, 12 students, 75% of the total answers, answered to be "interested", while 4 students, 25% of the total, answered to be "neutral".

Also for Sestriere, the percentages of the answers received, show that the majority of the students would be interested in knowing more about renewable energies and energy community projects. The following question asked them about the possibility to start and install a new energy community project in the municipality of Sestriere, their municipality, and what were their thoughts about this idea.

As it is possible to see from Figure 58, the majority of the students of Sestriere think that the installation of a new energy community project in their municipality would be useful and an opportunity to be taken. Only one student thought that it wasn't a necessity and it wouldn't be useful. The students supporting the idea of a new energy community, focused on aspects like protection of the environment, pollution reduction and self-sufficiency of the communities. Those against, focused mainly on the deterioration of the natural heritage that a new project like this would bring.

Compared to the students in Oulx, the majority of the students in Sestriere were supportive of the idea of a new energy community project in their municipality.

It follows the graph representing the percentages of their answers and some examples of their words.
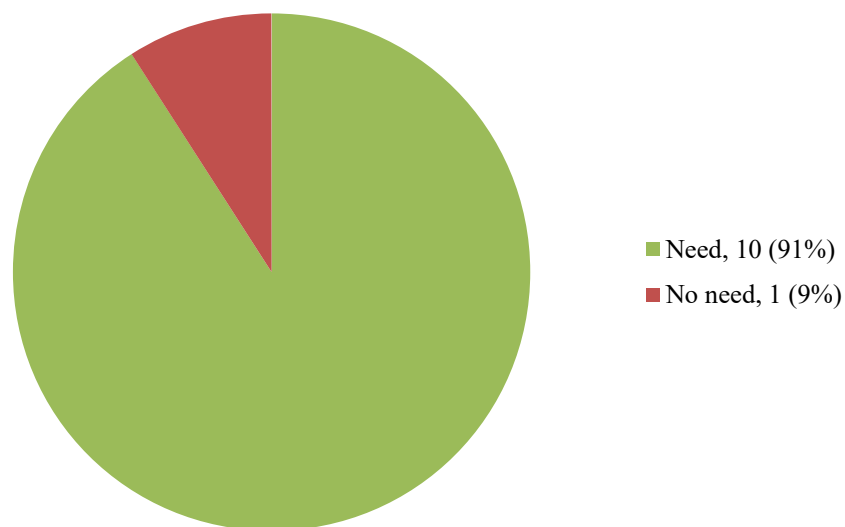
Figure 59: Students opinions about the need of a new energy community project for the municipality of Sestriere.

Source: Author, 2021

Student 1: "*A new energy community project for Sestriere would be a good opportunity, to create small community almost self-sufficient.*"

Student 2: "*Yes, a new energy community project would be useful, for the protection of the environment, and it could be located in front of the power plant MetanAlpi, using the space in front to install photovoltaic panels.*"

Student 3: "*I wouldn't like a new energy community project in Sestriere, as its creation would damage and spoil some of the natural spaces and landscape.*"

Finally, at the end of the first part of the survey, students were asked about their attitude towards some daily sustainable behavior and environmentally friendly behavior. According to the answers received, and compared to the students of Oulx, the students of Sestriere showed a lower degree of awareness and engagement in sustainable behavior concerning the daily domestic life (switching the lights off when not in the room; turning off devices when not in use; closing the tap when brushing teeth), and, like in Oulx, a rather low level of awareness and engagement concerning the actions and personal initiatives to raise awareness in others about sustainability and sustainable behaviours.

At the end of Part 1 of the survey, dedicated to their own perceptions and opinions, the students continued with the compiling of Part 2, dedicated to the interviews to Sestriere citizens.

According to the analyzed results of the received online surveys compiled by the students of the three classes, there have been 95 people interviewed in the municipality of Oulx for this project. The first questions of the survey investigate the perception of the citizens about renewable energies and energy communities projects. According to the citizens' answers, some graphs about their perceptions have been produced.

- Supporting, 75 (78%)
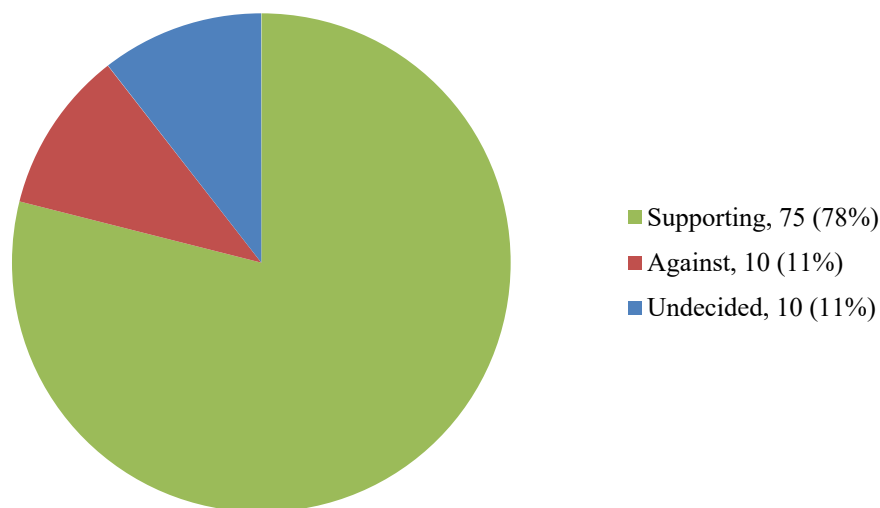- Against, 10 (11%)
- Undecided, 10 (11%)

Figure 60: Citizens perception towards energy community projects

Source: Author, 2021

As it is possible to see from Figure 60, 78% of the people interviewed in Sestriere showed interest and supporting attitude towards energy community initiatives; 11% were undecided on which position to take; and the other 11% were against the idea of energy communities. These percentages reflect and are very similar to the percentages of opinions obtained in Oulx. The fact that the percentages are similar, could represent an interesting point, as it could reflect the general attitude towards energetic innovations of this specific geographic area of Piedmont.

In the following graphs, the main reasons related to the different attitudes of citizens are analyzed.

The main reasons for people supporting the idea of energy communities, like in Oulx, can be summarized in three main categories: environmental concern, economic advantage perspective, or a combination of the previous two. In the following graph, it is possible to see the different percentages relating these motivations.
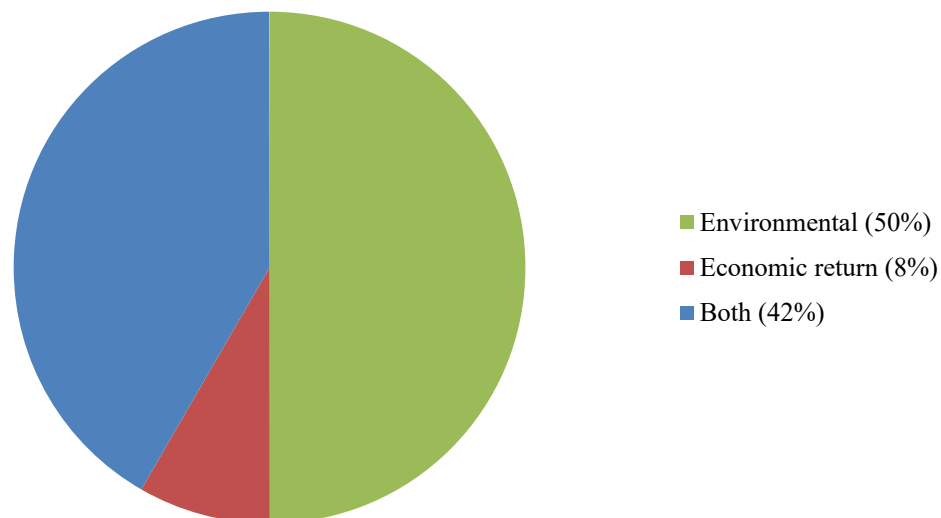

Figure 61: Main reasons of citizens supporting energy community projects

Source: Author, 2021

Compared to the results of the Oulx surveys, in the case of Sestriere the percentages of the motivations of the supporting people are similar, with some small difference. The environmental

motivation is still the main one, even if reduced minimally (50% of Sestriere compared to 63% of Oulx); the economic return motivation remained the same as Oulx; and the combination of the two previous reasons increased of a small percentage (42% in Sestriere, 30% in Oulx).

Also in the case of Sestriere, the students correctly perceived the citizens' attitude in terms of their motivations to support energy communities. According to the students' perception, 56% of the citizens in favour, were supporting renewable energies for environmental reasons and 44% for economic return reasons, which reflects the actual results of the answer analysis.

Concerning the 11% of answers against a new energy community project, it follows the graph with the main reasons.

Figure 62: Main reasons of citizens against energy community projects
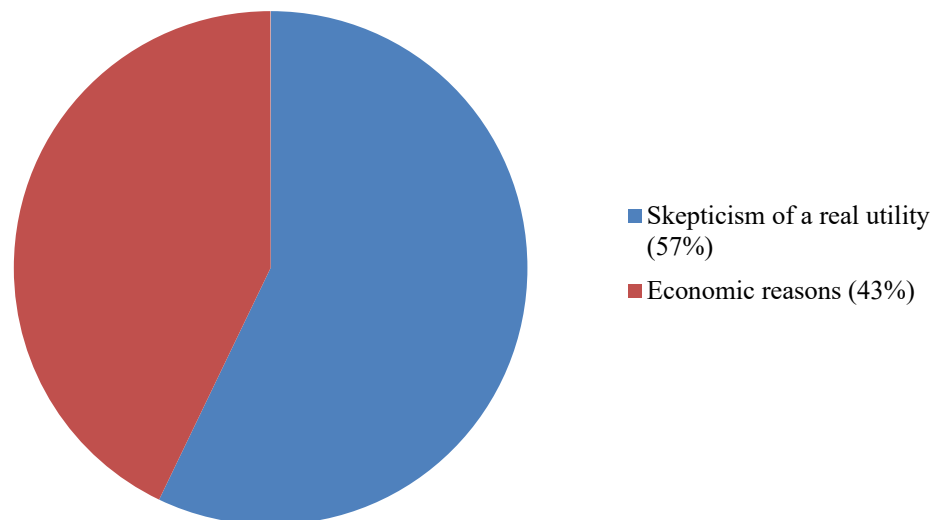
Source: Author, 2021

Compared to the experience of Oulx, in Sestriere the economic reasons to be against energy community projects gained more space (43% instead of 30%), even if the main reason provided by citizens to oppose new renewable energy projects remains skepticism towards these new forms of energy supply and the cultural barriers towards innovation.

Concerning the last category of citizens' opinions, the citizens undecided and that couldn't take a position on the energy community topic, it follows the graph representing the motivations of their hesitations.
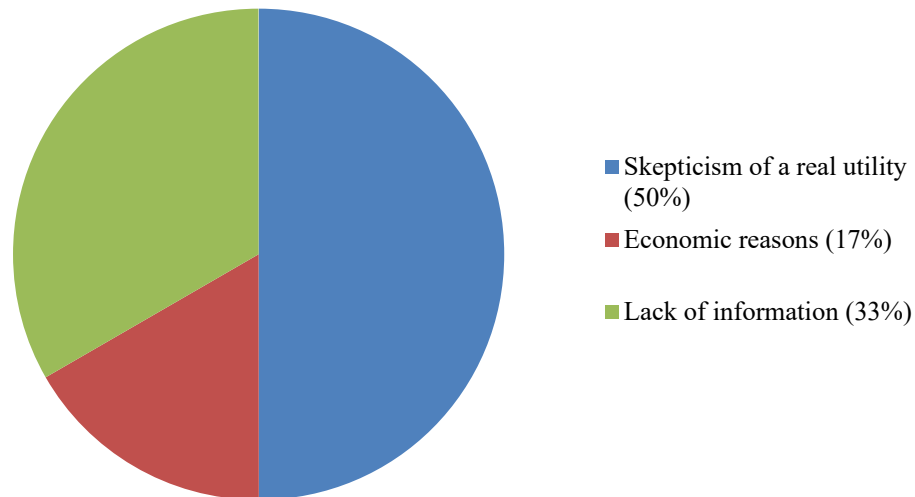
Figure 63: Main reasons of citizens undecided towards energy community projects

Source: Author, 2021

As it is possible to see from Figure 63, like for the case study in Oulx, also for Sestriere skepticism and cultural barriers towards innovative energetic and social changes, are the main reasons provided by undecided citizens. For the other reasons, "economic reasons" slightly decreased (from 27% in Oulx to 17% in Sestriere), while "lack of information" remained the same, leaving space for further engagement and understanding of the topic.

To the survey question "Do you think it would be possible to turn undecided citizens about energy communities into supporting citizens?", all the students answered "yes". About the possible ways to engage more undecided citizens the students provided several examples:

> Student 1: "*by educating and informing citizens since their young age, like we are doing now in this workshop.*"

> Student 2: "*by spreading advertisement material about the real effects of climate change and the possibilities of innovations in the energy supply field.*"

Finally, to the question "As a young student, how could you help spreading the idea and the knowledge about renewable energies, in order to engage people or institutions (public/private)?", many students answered in similar way, like for the Oulx case study: by organizing campaigns on social media in order to raise awareness and by organizing live events focused on sustainability and renewable energies.

In the following step, according to the interviews carried out, the students had to produce one bullet map each.

It will follow a brief list of map examples produced by the students (Figure 64, Figure 65). The example maps show how the citizens responded differently to the interviews and there are a mix of supporting, neutral and against positions.

Figure 64: Class 3C, group 1. Bullets map.
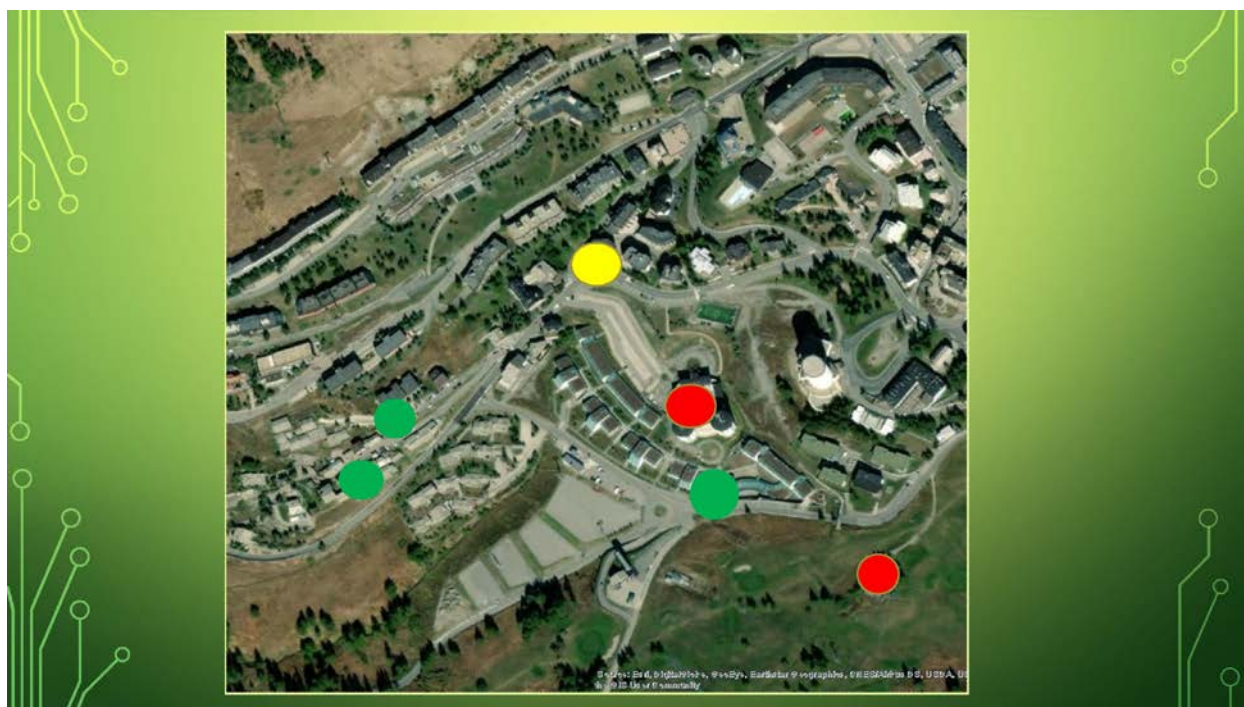
Source: Author, 2021

Figure 65: Class 3C, group 2. Bullets map.

Source: Author, 2021

Phase 2: This is the beginning of the group work. The classes have been divided into groups by their school teacher and each group has been assigned with a small area. The selected area for each group is the area on which the students will have to carry out the context analysis and the project design. The classes were formed as follow:

CLASSE 3°A		
GROUP N°	MEMBERS	AREA ASSEGNATA
GRUPPO 1	3	SESTRIERE
GRUPPO 2	4	SESTRIERE
GRUPPO 3	4	SESTRIERE

As Sestriere is an extremely small town, the areas selected were all within the municipality area, not considering the external hamlets.

Like for Oulx, for the context analysis phase, also the groups in Sestriere appropriately studied their assigned areas and selected some specific sites for the energy community project, according to the morphology and characteristics of the area, the actors they wanted to involve and the results they aimed at for their projects (see Figure 66, Figure 67, Figure 68, Figure 69, below).

Considering the selected area, the scope of their project and the physical characteristics of the area, based on what they learned during the frontal lesson, they then selected the most appropriate technology they would consider for the new energy community and explained why they made such choices.

Figure 66: Class 3C, group 2. Context analysis, selected areas and technology chosen for the project and reasons. Source: Author, 2021

Figure 67: Class 3C, group 1. Context analysis, selected areas (I) and technology chosen for the project and reasons.

Source: Author, 2021

Figure 68: Class 3C, group 1. Context analysis, selected areas (II) and technology chosen for the project and reasons.

Source: Author, 2021

Figure 69: Class 3C, group 3. Explanation of a photovoltaic panel system, technology chosen for the project.

Source: Author, 2021

Phase (additional) in Between Phase 2 & Phase 3: This phase is addition in respect to the case study of Oulx. Following the advice of the school teacher of Oulx, an additional meeting with the students was added in order to better supervise the work in progress and to create an additional moment of exchange during the process among the students. The additional meeting was carried out on Thursday the 29th of April 2021, always online through the Zoom platform, as the pandemic situation and restrictions in place were making meetings in presence difficult to implement. During that day they students were all in their classroom with the supervision of their school teacher Antonella Covato, who supervised the whole workshop. During the meeting, the students asked questions about their ideas and about details concerning the areas and the stakeholders to involve in their plans. Each group was asked to explain and share their ideas of the project and the methods of implementation with the other groups. Then, each group was requested to comment about the others' groups' works and give advice and critics about their peers' work. In this way it was intended to create a channel of exchange between the students and to allow a participative and shared common ground to rely on. The concepts and the

guidelines extracted from the peer education toolkit analyzed in the literature review (UNFPA, 2006), helped to create a checklist to be observed and in order to provide minimum standards for the design of an activity oriented to the active participation of the students, where they would become the first opinion leaders among each other, influencing each other's ideas promoting good examples of new energy communities projects. The school teacher declared that this additional step was extremely helpful in helping students understand more deeply the tasks they were requested to carry out. She also stated that the groups were creating a competitive environment, where they value more than anything producing the best possible outcome, compared to the others. Even if the competition would help to foster the students to work better and achieve better results, during the second additional meeting the groups have been instructed to integrate the competition with a collaborative environment, where the sharing of ideas and helping each other to achieve the best possible outcome, would become an essential aspect of the activity. The students seemed understating and enjoying the sharing experience. The sharing of their ideas was an interesting task, as some groups listened to the comments of the other groups about their work, and fine-tuned and adjusted their strategies. This served to show that this exchange moment was a missing step in the Oulx experience and added great relevance to the teaching role that each of the students could have toward each other, in a peer-to-peer perspective.
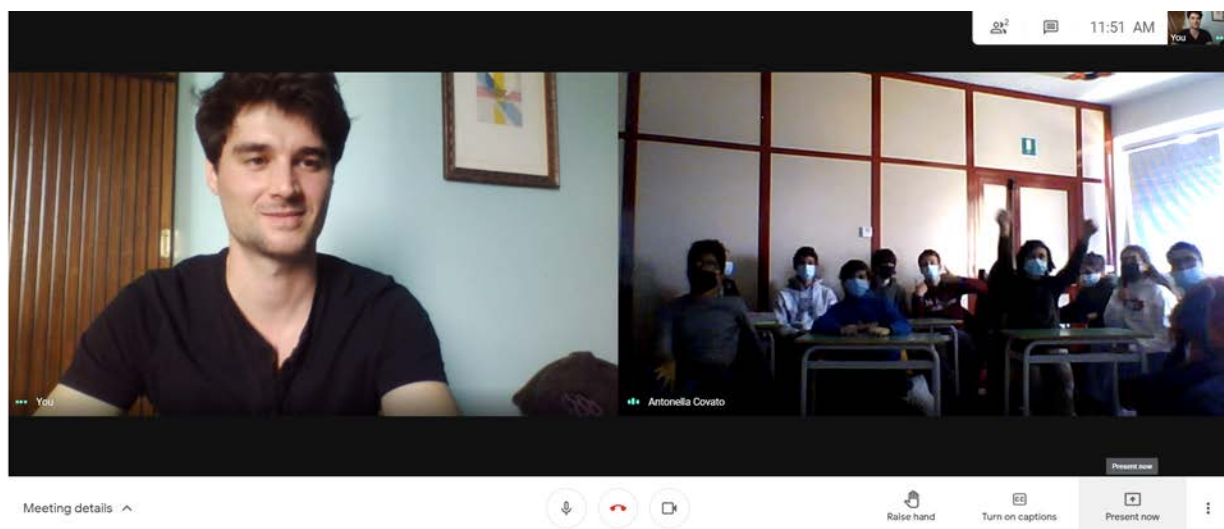
Figure 70: Screenshot of the second meeting with the students of Sestriere.

Source: Author, 2021

Moreover, always in a perspective of creating a sharing channel among the students, where they would transfer knowledge one to another and act as role models, in a peer-to-peer perspective, two among the best groups of the Oulx case study were asked to record themselves during the presentation of their projects. This short video has then been projected during the intermediate meeting with the class in Sestriere. The aim of this step was to provide the students in Sestriere an example of good practice and the successful results of the first experience in Oulx. The objective was to let students learn from each other in a "horizontal" way, where they influence each other about innovative ideas and behaviours. The experiment was successful, as the students enjoyed the videos and had the opportunity to receive information from their peers, even if through a screen. Due to the pandemic situation, this step had to be carried out on video and not in presence. In normal conditions it would be advisable and more effective to let different classes meet and exchange about the topics dealt with in the workshop.

Figure 71: Video projection in Sestriere of Oulx best practices

Source: Author, 2021

Phase 3: In this phase, the groups had to produce the actual plan for their project, results of all the observations made in the previous steps.

Compared to the Oulx experience, in Sestriere the target group was considerably small, only 12 students, and belonging to only one class. The small size of the target group enabled a closer relation with the students and a closer supervision on their work. The projects designed by the groups, only three projects in total, respected and achieved all the elements and objectives envisaged by the workshop activity. The students of Sestriere seemed particularly engaged and dedicated to the topics dealt with in the activity and showed determination in carrying out and developing more than fair and satisfactory project results. In fact, among the students it also created a competitive atmosphere that motivated the students to achieve better results, according to what their teacher Antonella Covato communicated to the SCORE team. All the three groups were particularly attentive and respectful of the assignment of studying the territory, its stakeholders and designing a project that would benefit as many local citizens as possible: private citizens, local businesses and touristic services, local private companies, the public buildings and the public spaces. The students demonstrated to know the territory in which they designed the projects, consciously choosing the areas according to the morphology, the adaptability to renewable energy infrastructure and the position of the stakeholders that would benefit the most from an potential energy community project. Moreover, the students showed a great awareness of the fact that natural resources have to be protected and preserved, finding the right balance between innovative projects like renewable energy infrastructure and the protection of the landscape. And they demonstrated to consider energy efficiency and energy saving systems, while designing their new ideas. Being Sestriere a winter touristic site, the students consciously considered the areas that are not in use all year long and that are often empty, and those instead inhabited by permanent citizens. The projects designed by the students address most of all the municipal sport hall, the main hotels buildings in town, and private houses. The students took in serious consideration the raise in the sense of community that these kind of projects would bring in small communities like Sestriere. Some of them, directly involved the public municipal administration and the town mayor to interview them and know their opinion about a potential new energy community project for the municipality of Sestriere. This was not requested among the workshop requirements and it came all from the students initiative. The fact

that Sestriere is a small town makes easier the communication with the institutions and closer the relation with the citizens, therefore for the students it wasn't complicated to reach them. At the same time, the fact that they thought about engaging the first real decision makers in a school project about renewable energies and shared energy supply and production systems, shows a particular engagement and commitment form the students side to the topic and denotes most of all that they enjoyed to be empowered in a subject that usually leaves out the young generations and cuts them out from the decision making process.

It follows a brief list of examples of projects (see Figure 72,73, 74, 75,76,77, 78).

Figure 72: Class 3C, group 1. Project map.

Source: Author, 2021

Figure 73: Class 3C, group 3. Project map.

Source: Author, 2021

Figure 74: Class 3C, group 2. Project map.

Source: Author, 2021

Figure 75: Class 3C, group 2. Technology chosen for the project and buildings involved.

Source: Author, 2021

Figure 76: Class 3C, group 2. Interview with the mayor.

Source: Author, 2021

Figure 77: Class 3C, group 1. Pros and Cons of the project.

Source: Author, 2021

Figure 78: Class 3C, group 1. Pros and Cons of the project.

Source: Author, 2021

Phase 4: Phase 4 of the workshop, the presentation phase, has been carried out in presence at the middle school of Oulx, in compliance with COVID-19 Preventive and Control Measures, with the presence of one member of the SCORE team. The presence of external people in the school was previously requested and granted by both institutions, the middle school of Sestriere and the Politecnico of Turin. Each group presented their project in front of the class, the technology professor and the member of the SCORE team. The projects were presented on Saturday the 8th of May 2021 (see Figure 79).

Part 3.

The presentations carried out with the target group of Sestriere achieved all the expected objectives of the workshop activity, and even achieved greater results than those expected. The students showed great engagement and commitment to the analysis and the design tasks assigned and declared to be satisfied with the lessons learned from this experience. The projects they presented respected all the requirements and were consistent with all the main topics: prosumerism, conscious land use and planning for a potential new energy community in Sestriere, involvement of targeted stakeholders and beneficiaries of the new project, respect of the environment and analysis of potential benefits and threats of the designed projects. The environment established in the class during the presentations was conducive and appropriate, and compared to the experience of Oulx, no one of the presenting students seemed embarrassed during the presentation and no one of their peers made fun of them. The fact of being an extremely small class could represent the aspect that enables to create a more conducive and less pressuring environment. Also in the case of Oulx, in the smallest class the results were comparatively better in respect to the other classes, and the students seemed more focused and more diligent about the work.

In Sestriere, at the end of the presentations, the students cared about taking the SCORE team around the town to see in presence the areas where their projects were based. This was an additional and unexpected part of the workshop activity that added great value and gave concreteness to the results obtained.

It will follow a brief list of some pictures of the presentation day.

Figure 79: Presentation class 3C, Sestriere.

Source: Author, 2021

Figure 80: Presentation class 3C, Sestriere.

Source: Author, 2021

Figure 81: Tour of the project areas in Sestriere.

Source: Author, 2021

Feedback Surveys

At the end of the workshop, a Feedback survey was sent to the classes that participated in the project and to their school teacher. It follows the analysis and the outcomes of the answers received.

Students:

The students of Sestriere answered to the feedback survey group by group and not individually, therefore the answers received were three in total.

To first questions, all the students answered that they enjoyed the activity and especially the group activity and the design part. Although they liked the citizens' survey phase less, they stated that they wouldn't change anything about the workshop.

> Student X: "*The part we enjoyed the most is the group work. The part we enjoyed the least is the survey part. However, we wouldn't change about the activity.*"

To the second questions the students answered that the work with the group was satisfying and that they managed to establish a collaborative relationship and environment, that allowed to carry out the expected results.

> Student X: "*It has been nice working in group, we managed to work well and divide the tasks among us. We worked all together, during the context analysis and the design parts, therefore presenting all together at end was not difficult.*"

To the third question, all the students answered that their knowledge about the topics dealt with during the workshop, energy communities and renewable energies, increased greatly ("molto") thanks to the activity just carried out.

To the fourth question, only one student answered that after the workshop it happened to talk about the subjects addressed in activity. The student stated that after the group work she talked about the topics of renewable energies and energy communities with her parents, expressing some interesting thoughts about it with them.

To the fifth question, all the students agreed that replicating the same workshop activity in all Italian secondary schools would be useful and important.

> Student X: "*Yes it would be important to replicate the project in Italian schools, as it is educative, it explains important things and it would get the young generations involved in these topics.*"

School teacher:

To the first question, the school teacher who supervised the entire workshop, answered that she considered appropriate the organization of the activity and the approach implemented by the SCORE team, and that she was really satisfied with the results.

> School teacher: "*I appreciated very much the approach used by the SCORE team as it enabled a situation of dialogue and interaction that allowed the students to express their curiosity about the subject. Personally I would not change anything about the way this activity was carried out.*"

To the second question, the school teacher answered that considered the level of the activity perfectly adequate to the class, and that she held a class about renewable energies a few weeks before the activity, within the institutional Technology subject program, therefore it was extremely useful to have this workshop at this significant moment in the students education path.

> School teacher: "*I found useful and effective to give the possibility to the students to carry out this workshop experience that allowed them to put in relation what they learned in class with a real and local dimension.*"

To the third question, the school teacher answered that the level of collaboration and integration within and between the groups has been good.

> School teacher: "*There has been a good level of interaction and collaboration among the students, on a scale of 1 to 10 I could say 9. The students responded well to the activity, despite the difficult period they approached the laboratory with positive and proactive spirit.*"

To the fourth question, the school teacher answered that the activity helped to keep alive and reinforce the interest of students for the topics of renewable energies, to which were already

interested before. After talking to them, she could state that they were enthusiastic about the activity.

To the fifth question, the school teacher answered that it would be useful to spread this type of projects to all Italian secondary schools, to make the subjects studied in class more concrete and real, and to involve more young students in renewable energy related activities.

4.3 Main differences & Lessons Learned

Main Differences

The two experiences carried out in the schools of Oulx and Sestriere, have been similar in many ways. The results obtained have been more than adequate and level of the presentations was higher than the one expected, by the SCORE team and by the school teachers sides. Both schools, followed the laboratory with participative and engaged attitudes, and the students seemed and stated having enjoyed it. The four classes involved, increased their knowledge about the topics addressed by the SCORE project: renewable energies, prosumerism, energy community projects, citizens engagement. The students engaged directly with their fellow-citizens in awareness-raising activities like the survey they carried out in the two municipalities. Even if this stage was the least favourite among the students, the results obtained provided an important overview on local people's opinion and perception about the topics relating the workshop. During the design phase instead, they could apply practically what they learnt in the previous phases. By developing the activities of the workshop, the students had the opportunity, as one of the school teacher stated, to make real and concrete concepts that previously studied on a theoretic level, and with the survey and the design tasks, they could bring those concepts on a real and local dimension.

Nonetheless, there have been some differences between the two experiences that are important to highlight.

As observed, in the school of Sestriere it was added an intermediate meeting, following the advice of the Oulx school teacher and following the checklist of the peer education toolkit, analyzed in the literature review. This intermediate meeting was a new part in respect to the Oulx experience. The objective of this intermediate meeting was to promote the collaboration among and within the groups, to promote the sharing of ideas and critical thinking, and to have a deeper and more accurate supervision on the students' work. At the end of the Sestriere experience it was clear that the additional meeting helped the entire process, helping the students understand better their tasks and bringing them closer and on a more collaborative and sharing behavior. The additional meeting enabled the creation of a continuity in the relation between the students and the SCORE team, the creation of an environment of trust where the students would be motivated and felt comfortable in sharing ideas with their peers, and also express critics about other groups' work. During this additional meeting, it was also created the link between the two experiences, the Oulx case study and the Sestriere case study. In fact, two short videos were projected in the class of Sestriere, showing the presentation of two among the best projects carried out in Oulx, presented by the students themselves. This idea aimed at the passage of information in an "horizontal" way, directly from student to student, in a dynamic that would allow the learning experience in a peer-led way. The link between the two case studies has been carried out through the screen, due to the pandemic situation. In normal conditions, it would be advisable and more effective the organization of events in real presence where the classes would actually meet and exchange on the topics addressed by the activity.

Another important difference between the two case studies, can be found in the dimension of the target groups. While in Oulx there was a mix of small/middle sized classes and large classes, in Sestriere the target group was represented by a very small class, only 12 students. According to experiences carried out, it is possible to state that small groups like the one in Sestriere seem to be more conducive and appropriate for workshop activities like the one implemented. The students seemed to be more focused and more open to the exchange with their peers, while in larger classes it was easier to observe cases of peer pressure, mocking, and embarrassment felt by the students in front of their class. Nonetheless, experiences like this served to work on these issues, even if in a superficial way and for a short time. During the presentations, even during moments of peer pressure or embarrassment, the SCORE team encouraged the more intimidated

students to pursue their task and express their ideas about their work. It seemed to be an important exercise for many of the students involved.

Lessons learned

According to the results obtained from the activity carried out in the two case studies of Oulx and Sestriere, it is possible to draw some conclusions and lessons learned from this experience.

Observing the students' work and results of their presentations, it is possible to state that they enjoyed the experience and produced significant projects and material. The experience was significant as it made real, closer to their reality and local, concepts that are usually expressed in theoretic ways in class. The project transformed them into the first decision makers and stakeholders of a field and a process that usually cut out young students and youth in general from the decision making process, the energy supply field. According to the school teachers who supervised the activity, the workshop was carried out in an excellent way and the organization and the level of work was appropriate and adequate for the classes involved. Due to the pandemic situation, some parts of the activity had to be carried out online and not in presence. This fact, diminished partly the efficacy of these phases, even if the content and the main points were however reached and achieved. In normal situations, these phases would be carried out in presence and their engagement outreach expanded and made more effective. The meeting between different target groups and schools, is a step that would be fundamental to carry out in presence. The "horizontal" transmission of concepts between students, without the intermission of adults and external experts, is one of the pivotal points of this activity and it would be important to be carried out in presence.

According to the results of the projects and the answers received to the surveys, it is possible to state that the students involved consider the protection of the natural resources as an essential task and mission that communities and society as a whole have to engage in, especially for them living in a natural context with clean air and unspoiled natural heritage. From the answers received to the surveys the students carried out in their municipalities, it is possible to state that the main obstacles for people to engage and invest in renewable energy and energy community

projects are represented by economic reasons and cultural/distrust reasons. However, while economic reasons play a big part of these barriers, the main part of the is played by the skepticism and distrust that people have towards these innovative forms of energy supply and social organization. This represents a great limit to the effectiveness and expansions of these type of alternative and cleaner energy self-production and self-consumption systems, and one of the only ways to tackle this limit is through information and public outreach about these topics. This is why it is essential to start from an early age and from young students, to inform them, engage them and involve them in a process that will see them in some years as part of the civil society, as part of the civic stakeholders that influence so deeply the direction of the energy transition.

4.4 Recommendations

The research conducted on the Italian Universities Third Mission projects highlighted a significant lack of projects aimed at engaging young students in territorial sustainable development initiatives and topics, projects specifically designed for youth, according to their needs and characteristics. After having assessed the few best practices selected and having extracted the features and characteristics that this type of projects should involve, it has been designed a project for two case studies in the Susa valley, Piedmont, for four secondary 1st level classes. The project focused on the topics of renewable energies and energy community projects, and in particular on the citizens engagement, and in this case specifically on youth engagement. The territorial and practical approach has been key to give reality and concreteness to the topics addressed and to empower young students, making them the first decision makers and stakeholders, in the decision making process of projects concerning renewable energy supply and community territorial planning. Drawing from the experience carried out, a few recommendations have been developed in order to contribute to future research in the field of youth engagement and future project designs targeting specifically young students.

All the recommendations are deeply interrelated, due to their topics and their target groups, with SDGs 4, 7, 11, 13 and 16

Recommendation 1: At national level, foster and increase the number of projects specifically targeting young students (primary and secondary 1st and 2nd level schools), designed and implemented by Italian Universities, within the scope of their Third Mission initiatives, and aiming the engagement of youth in topics related to the territorial sustainable development, energy transition and citizens involvement in sustainable behaviours.

Recommendation 2: At national level, creation and adoption of a shared project characteristics and standards framework, to be shared and approved by the Italian Universities Network, and on which to rely for the design and implementation of Third Mission projects targeting youth and aimed at engagement in territorial sustainable development topics.

Recommendation 3: At local and territorial level, foster and strengthen the relation between universities and local primary and secondary schools, in order to establish a continuous relation between different levels of education and put to good use the knowledge heritage and knowledge resources provided by the University students, researchers and Professors, to increase the outreach about sustainability towards the local territory.

Recommendation 4: At national level, creation, within all University students, researchers and Professors resources, of a department specifically dedicated to the outreach toward society about territorial sustainable development and specifically targeting youth.

Recommendation 5: At national level, within Anvur mission, spur further evaluation and description of Third Mission activities, increasing funding for this sector. Identify additional, adequate, contextualized, and more robust indicators, in relation to activities aimed at enhancing public social, cultural and educational goods, more qualitative and less economic oriented. Future evaluation of Third Mission initiatives should be increasingly oriented to and integrated by more accurate and specific qualitative analyses, and be oriented toward case-specific on-site visits.

5. CONCLUSIONS AND FUTURE DEVELOPMENTS

In the context of energy transition, the building sector is one of the most addressed sectors, both at the global and European levels, due to its significant shares and accountability for energy consumption and GHG emissions. Increasing buildings energy efficiency, reducing energy consumption and increasing shares of energy generated from renewable sources are among the main targets to achieve a clean energy transition in the direction of carbon neutrality (European Union, 2019). Among the alternatives envisaged, energy communities are receiving increasingly attention and relevance from European and Member States governments.

The potential of energy communities, at the same time challenge and great opportunity, consists in the central role that end-consumers, citizens, SMEs and local authorities acquire in the ECs framework. European and Member States central government policies are crucial, but alone are not enough. To achieve sustainable development it is necessary to count on and engage citizens in the energy transition, by making them from only passive end-consumers into active actors and participants to the energy market. This would lead a consumer to become a prosumer.

The SCORE project (Supporting Consumer Ownership in Renewable Energies), under which this research thesis is carried out, aims at facilitating co-ownership of RE for consumers. Through social, financial and technical tools, SCORE's main objective focuses on engaging citizens in energy community projects involving renewable energies, and in particular on lowering the barriers and the obstacles for the entrance and participation of vulnerable and underrepresented social groups in RE co-ownership and engagement in energy community projects. Previous steps of the SCORE project focused on the engagement of low-income households, women, and unemployed social groups (Torabi Moghadam et al., 2020).

Youth is another underrepresented social group in energy-related topics. Despite the lack of representation of young generations in the decision-making process concerning energy projects and other processes connected to sustainable development, their engagement is crucial for the success of the national and international energetic objectives relating to carbon neutrality and for the achievement of the Agenda 2030 SDGs. In fact, the overall success of the Agenda 2030

seems relying on the engagement of youth in sustainable development. Education for sustainable development motivates and empowers youth to raise their awareness and increase knowledge and concerns about current environmental problems. Consequently, trained and informed youth will be more inclined toward environmentally friendly attitudes and behaviours, adopting sustainable lifestyles and contributing to accelerate the energy transition process. Considering that youth will be turning soon into adult decision-makers social groups, it is strategically important to start early educating students about sustainable development and possible solutions. To ensure the achievement of SDGs, coordination between all agencies and international, national and local organizations is essential, and governments should promote the establishment of an environmental education channel for the general public and across the school system (Yahya, 2020).

Concerning energy communities, the involvement of youth is an especially fundamental and pivotal element. The establishment of renewable energy projects often still faces local citizens and stakeholder opposition or lack of interest, mainly due to lack of information or skepticism (Caramizaru & Uihlein, 2020). In this dynamic, social values and norms, and political views, play a strong influence. However, as demonstrated by research papers, the influence of youth, children and teenagers, on their families can trigger important changes in visions and attitudes toward environmental concerns and innovations like energy communities. (Lawson et al., 2019). The engagement of youth can lead therefore to a double advantage: firstly, the raise of awareness and environmental concern in youth itself, enabling the formation of youth's positive attitudes toward innovative and environmentally friendly alternatives, and consequently the formation of future adults and decision-makers environmentally friendly and ready to innovations; secondly, the positive influence that young students might have on their families, concerning the support to renewable energy projects. The combination of these two positive outcomes may reduce the opposing attitudes and foster rapidity in the establishment of energy community projects.

Projects for youth involvement in sustainable development and renewable energy community projects, requires specific and appropriate knowledge and competence from the educators side. Middle school and high school teachers often do not feel confident enough about these topics, in particular relating to specific subjects like energy communities and renewable energies (Monroe

187

et al., 2017). In this perspective, Universities represent an invaluable resource. The Third Mission of universities concerns the relation with the territory and actors external to the university environment, being these local SMEs for technology transfer, or citizens and public institutions for public engagement. Universities play a key role in supporting territories and local communities towards a path of sustainability, supporting National and Regional Strategies for Sustainable Development (SNSvS and SRSvS). In their Third Mission universities are called to disseminate culture and good practices of sustainability, both inside and outside the universities, to promote multidisciplinary, multi-stakeholder and new pedagogical approaches and to design innovative engaging initiatives, in order to contribute to the growth of the culture and awareness-raising of sustainable development, at a local, national and international scale.

The research carried out for this thesis is organized in five main parts. The first part focused on the review and assessment of Italian Universities Third Mission projects aimed at youth engagement in territorial sustainable development. The second elaborated a framework summarizing the characteristics of projects selected in the first phase. The third phase consisted in the design of a new project, based on the framework previously elaborated, to involve youth in renewable energy projects and the fourth phase consisted in the application of the new project to two case studies. The fifth phase elaborated some recommendations.

Concerning the first phase, one of the main findings was the significant lack of the researched project typology. From the analysis carried out, only 9 universities out of the 78 Italian universities included in the research (and representing almost the totality of Italian Universities) showed the presence of Third Mission projects aimed at engaging youth in territorial sustainable development. In particular, out of 120 analyzed Third Mission projects relating to territorial sustainable development, only 12 had youth as the main target group. Moreover, the 12 selected projects appear to be mainly concentrated in Northern Italy, with only two cases in Central Italy and none in Southern Italy. This result shows an important national lack of engagement of Italian universities for initiatives dedicated to sustainable development and youth, with only some virtuous examples that showed the presence of interesting projects. The research has been carried out focusing on projects with a strong territorial approach and oriented at sustainable development concepts, targeting specifically youth. During the research, it was possible to state

how several projects of universities' Third Mission department adapted to the emergence situation relating to the COVID-19 pandemic and increased efforts of outreach about mental health and ways to fight youth isolation and lifestyle disruption.

One of the main limitations to be considered in the first phase is the selection method of the researched projects. Given the absence of comprehensive and national dataset or archive gathering all Italian universities Third Mission projects with related descriptions and objectives, one of the only alternatives to carry out the analysis was reviewing each university's website looking the Third Mission section, or when present, sections dedicated to territorial studies or specifically about sustainability and public engagement. This methodology leaves space for inaccuracy and missed results, perhaps due to websites incomplete information and lack of coordination between the university communication office and the Third Mission initiatives department. For future developments, it would be advisable to engage in deeper and more time-consuming research establishing direct contacts with every university taken in consideration, in this way it would be possible to interact directly with the persons responsible for Third Mission initiatives and have more accurate information. This way, the information gathered in the present study could be corrected or adjusted and new best practices could be added to the selected projects.

The second phase analyzed the selected 12 projects. The elaborated framework, given the small number of selected projects, is far from being an exhaustive and effective tool. However, it describes and organizes the main features of the selected best practices and it can serve as a first base on which to rely for the design of new projects aiming at the engagement of youth in territorial sustainable development. The categories considered are typology, methodology, age target, type of coordinators and funding institutions. The characteristics analyzed that mainly affected the design of the new project are the methodology and the age target. The analysis of different methodologies offered an interesting overview on best practices approaches and enabled a conscious choice for a suitable methodology for the new design. The methodologies assessed ranged from more passive to more active participation of target groups, from more traditional frontal lectures to more interactive and participative activities, more or less involvement of devices and technology support, more or less market oriented. Despite the

differences, all methodologies had a strong territorial approach, aiming at involving youth, more or less actively, in the understanding and description of dynamics characterizing the sustainable development of territories. The age target category allowed to understand how different ages are usually combined for youth initiatives.

The greatest limitation of phase two is represented by the small number of selected cases on which the framework elaboration was carried out. Future developments and research studies on this topic will need to compare a greater number of examples and project case studies, in order test the robustness of the elaborated framework and in case update and modify its elements and categorization. New comparisons can be carried out also at international level to establish whether in other European countries the number and the typology of Third Mission projects engaging youth in territorial sustainable development appear to be different or similar to the reviewed Italian cases.

According to the second phase selection and assessment of features and characteristics, in the third phase the methodology selected for the design of the new project envisaged a combination between traditional frontal lessons and participative group activities enabling an active involvement of youth. The choice draws from examples reviewed among the selected projects in the previous phases. The main objective of the project was to put the young students in the position as main decision-makers for an ideal territorial local plan for the establishment of a new energy community. The project is divided into different parts: The first part consists in a frontal lesson to transfer to the young participants the main concepts about renewable energies and ECs; the second part aims at activating youth in their local contexts through a questionnaire to engage co-citizens and raise awareness and promote the concept of renewable energies and energy communities; in the third part the students work in groups to study the area and plan an ideal project for a new energy community in their municipality, and at the end they are asked to present the results. The design of the project, besides the features and characteristics deriving from the elaborated framework, has been integrated with the approach typical of architecture and urban planning studios, considered appropriate and conducive for the objective of the initiative. The methodology has been moreover integrated with peer education concepts and guidelines, in order to foster horizontal learning between peers.

As for phase two, the project design suffered from a small number of case studies and previous experiences on which it could rely. The part concerning the questionnaire can be considered scientifically more solid, as it has been designed relying on similar tools based on robust literature. Otherwise, the activity needs to be further tested and assessed in order to evaluate its suitability and adaptability to other case studies and enhanced if necessary.

Despite the lack of accountable literature and significant number of case studies to rely on, the application of the designed project carried out interesting results, in part proving the interest and meaning of the present research. The case studies were provided by classes of the middle school of Oulx, connected to the project SCORE as part of one of the regional energy community pilot projects. Therefore the target age was automatically selected and corresponded to 13-14 years old students, 54 students in total divided in three classes. It followed a consequent experience of the project in Sestriere with an additional class of 12 students of the same age whose teacher demonstrated interest in participating in the project. Concerning the coordination team was composed by myself, the co-advisor of this thesis Sara Torabi Moghadam and PhD Student Maria Valentina di Nicoli, whose both help and supervision have been invaluable and essential for this work. Due to the COVID-19 pandemic restrictions, the first phase of the project consisting in the frontal lesson has been carried out online through the Zoom platform in all the four classes involved in the project. This has limited the efficacy of the lesson, as in presence a more direct contact with the students would allow an interaction more direct and more engaged. However, the lesson designed to pass main concepts about today's environmental concerns, renewable energies and energy communities, succeeded in engaging the majority of students, who participated actively with questions and comments, also motivated by their school teachers who were always present.

In phase two, the students interviewed their co-citizens, their families, their friends and neighbors, local businesses and shop owners, about renewable energies and energy communities topics. This was one of the most important parts and results obtained from this project. The 54 students of Oulx managed to interview about 250 people, while the 12 students of Sestriere managed to interview around 95 inhabitants. Both numbers are close to the 10% of the respective towns total populations, consisting in a significant outreach potential, if considered that students

are considerably young and COVID-19 restrictions made possibilities of interaction limited and difficult. Even considering that numbers provided by the students might not be extremely accurate, the project and in particular this phase of youth interviewing adults demonstrated its great potential. A small number of students had the capacity of multiplying the outreach potential in terms of number of citizens and also in typology of citizens. Students interviewed and discussed environmental concerns and possible innovations (like ECs) with their families, local shops and businesses owners, and local public institutions. As demonstrated in literature, intergenerational learning has the capacity of modifying and affecting adults' attitudes and views on relevant topics through the informing actions and expressed opinions of youth, especially when the passage of information takes place in a sons/daughters – parents way. This aspect is particularly relevant if considered an important result of the questionnaires: among adults opposing or against renewable energy and new energy community projects, economic reasons were present but the main reasons motivating their opposition was skepticism and lack of information. This is an important aspect to be highlighted, as the influence of youth has the potential of affecting and modifying these conflicting positions. The students also reported from the questionnaires that according to them it would be possible to turn undecided adults into adults supporting RE and community energy projects. Moreover, adults supporting energy communities and renewable energies, as resulting from interviews and according to students perceptions, were mostly motivated by environmental concerns, more than economic interests. This is a relevant aspect as it allowed the students to refine their perceptions in this sense and gave an overview on main driving reasons motivating citizens to support renewable energy projects. Lastly, students showed a general high environmental concern and average engagement in terms of sustainable daily actions.

Although the questionnaire phase produced interesting results, for future case studies involving youth in sustainable development projects it would be advisable to compare more methods and approaches to interviews and citizens outreach, in order to assess whether better methods and with different engaging techniques are present and can be experimented.

In phase three students produced and presented their projects. The projects elaborated by students were in general of exceptional quality and several works exceeded the SCORE team and

the school teacher expectations. The students understood and highlighted the importance of establishing relevant and meaningful networks in communities, that lead to practical results as a local owned and cleaner energy infrastructure, and also the lowering of energy bills for the prosumers, but also to the raise of awareness about environmental concerns and a stronger sense of community and social cohesion. The presentations carried out by the students allowed them to practice their communication skills and in most cases were more than appropriate and adequately presented.

For future developments it would be advisable to dedicate more time to the supervision of students' projects and their presentations. An additional intermediate online meeting was added in the Sestriere experience compared to the Oulx one. This addition resulted in being extremely important for the students' work and the sharing of ideas between different groups. Moreover, projects of youth engagement and citizen outreach would need longer periods of time in order to assess effective impacts on people's attitudes and behaviours. For future developments it would therefore be advisable to dedicate a longer periods of time following the end of presentations of students projects, with additional activities in order to assess changes in students' attitudes and in particular changes in their families and friends attitudes and views about renewable energies and energy community projects.

As stated in the literature review, peer education approaches have the potential of raising awareness and produce positive changes, concerning increased knowledge, change of attitudes and behaviours, both in the target groups and the peer educators. This dynamic is particularly conducive to environmental concerns and energy transition actions. Having experienced the side of peer education among other younger students, in their turn becoming peer educators among each other, allowed me to enhance skills in communication, self-confidence and a deeper understanding of the challenges relating specifically the design and the implementation of renewable energy projects, and in particular of the challenges concerning stakeholder involvement. At the same time, this activity also showed the potential that stakeholder involvement initiatives have. Grassroots innovative processes like renewable energy communities need to start involving citizens and stakeholder since their early ages as they have the potential of promoting sustainable concepts among their families and social environments,

193

influencing them in a positive way, and moreover they raise since their youth their awareness about environmental concerns and sustainability, therefore future supporters of sustainable solutions. Universities and university students represent an invaluable resource for territories and for their sustainable development. Experiences like the one just carried out showed me how university students represent the perfect channel of communication between the scientific research community and civic society, and in particular young generations. During their studies, territorial planning or sustainable development students deal with the most innovative plans and technology innovations to lead a sustainable territorial development for our future. They are then among the most entitled actors to bring toward society innovative ideas and enlightening solutions aimed at mitigating social and environmental problems. At the same time, being still covered by the student status represents a great advantage. In fact, the supervision of university professors and researchers allow high scientific accuracy and high standards of the message carried out and shared with the external society; moreover, universities might offer financial incentives and support for the design and implementation of new projects of public engagement. Being part of the university community, students have also the possibility to tap into the wide contacts networks that university holds with local territorial public and private actors, an invaluable resource that should be valorized and exploited. University students involved in such projects, besides carrying out socially and environmentally valuable initiatives, would acquire fundamental skills that contribute to their personal development, growing as people and professionals. For all these reasons, it is extremely important that resources are put into the development of these activities, in a continuity between younger and older students, for the good of all.

The last consideration relates to the Third Mission sector of Italian universities. As stated in the literature review, the activities aimed at the valorization of hard sciences appear to be more developed and considered than those aimed at the valorization of human sciences, including social sciences and public engagement activities. The same activities of awareness raising about territorial sustainable development and environmental concerns dealt with in this thesis are included in the category of public engagement activities. Moreover, as stated by several critics, it is observable an important aspect of public engagement activities launched by universities, as they appear increasingly connected with the potential economic return on university institutions.

According to critics, this represents and highlights a strong vocation to monetize any initiative in the name of a totally corporate vision of scientific action and of the University itself, with the vision of ranking University institutions like other stock market products. This is connected with the consideration of hard sciences as potential for technological transfer and consequent economic turnout and a disinterest for humanities and social sciences that appear to be devalued and overlooked. To date, the experiences attributable to an authentic synergy between the academy and the citizens appear to be very few. This corporate vision of the University risks to affect and threaten the quality of scenarios in the middle and long run, affecting not only the Third Mission but also the first two, and finally affecting the role university is meant to play in society. The activity of Third Mission in Italian universities is assessed and evaluated by the National Agency for the Evaluation of the University system and research (Anvur). Anvur is therefore responsible for the approach and direction influencing the Third Mission in Italy, and in particular is the responsible for these ranking-oriented, monetizing and economic evaluation criteria, under which the action of universities itself is also regulated and evaluated. For future developments and future research in this field, the evaluation and measurement of the Third Mission in Italy has now reached a decent level of development but still insufficient. It is necessary to identify additional, adequate, contextualized, and more robust indicators, in relation to activities aimed at enhancing public social, cultural and educational goods, more qualitative and less economic oriented. Moreover, it is necessary to spur further evaluation and description of Third Mission activities, increasing also funding for this sector. Lastly, in the future, evaluation of Third Mission initiatives should be increasingly oriented to and integrated by more accurate and specific qualitative analyses, and be oriented toward case-specific on-site visits. This way, it will be possible to study the social impacts of the Third Mission, its benefits and efficacy for society.

6. REFERENCES

Anvur. (2013). La terza missione nelle università e negli enti di ricerca italiani. *Documento Di Lavoro Sugli Indicatori*, 1–33.

Anvur. (2015). *LINEE GUIDA per la compilazione della Scheda Unica Annuale della Ricerca Dipartimentale (SUA-RD) Parte III: Terza missione*. http://www.anvur.it/wp-content/uploads/2018/05/Linee_Guida_compilazione_SUA_RD_Parte_III_Terza_missione.pdf

ASVIS. (2016). *Rapporto ASviS 2020 - Alleanza Italiana per lo Sviluppo Sostenibile*. https://asvis.it/missione/

ASVIS. (2021). *Buone pratiche degli Aderenti - Alleanza Italiana per lo Sviluppo Sostenibile*. https://asvis.it/buone-pratiche-degli-aderenti/

Bhowmik, A. K., McCaffrey, M. S., Ruskey, A. M., Frischmann, C., & Gaffney, O. (2020). Powers of 10: Seeking "sweet spots" for rapid climate and sustainability actions between individual and global scales. *Environmental Research Letters*, *15*(9). https://doi.org/10.1088/1748-9326/ab9ed0

Borroni, A., Lowitzsch, J., & Tartaglia, A. (2020). Introduzione alle comunitá energetiche - quadro normativo di riferimento, misure di attuazione e incentivi. *Rivista Di Ateneo - Tutela e Sicurezza Del Lavoro*. https://doi.org/10.1441/4527

Boudet, H., Ardoin, N. M., Flora, J., Armel, K. C., Desai, M., & Robinson, T. N. (2016). Effects of a behaviour change intervention for Girl Scouts on child and parent energy-saving behaviours. *Nature Energy*, *1*(8), 1–10. https://doi.org/10.1038/nenergy.2016.91

Bowers, A. W., Monroe, M. C., & Adams, D. C. (2016). Climate change communication insights from cooperative Extension professionals in the US Southern states: finding common ground. *Environmental Communication*, *10*(5), 656–670. https://doi.org/10.1080/17524032.2016.1176947

Caramizaru, A., & Uihlein, A. (2020). *Energy communities : an overview of energy and social innovation*. Publications Office of the European Union. https://doi.org/10.2760/180576

Cassella, M. (2017). *La "terza missione" dell'università: cos'è,come si valuta*. 59–66.

https://doi.org/10.3302/2421-3810-201702-059-1

Comune di Oulx. (2021). *Informazioni sul Territorio | Comune di Oulx*. https://www.comune.oulx.to.it/il-comune/informazioni-sul-territorio/

Comune di Sestriere. (2021). *Scheda del comune - Comune di Sestriere*. https://www.comune.sestriere.to.it/it-it/vivere-il-comune/scheda

Cordero, E. C., Centeno, D., & Todd, A. M. (2020). The role of climate change education on individual lifetime carbon emissions. *PLoS ONE*, *15*(2), 1–23. https://doi.org/10.1371/journal.pone.0206266

Council of European Energy Regulators. (2019). *Regulatory Aspects of Self-Consumption and Energy Communities, CEER Report C18-CRM9_DS7-05-03*. *June*, 53. https://www.ceer.eu/documents/104400/-/-/8ee38e61-a802-bd6f-db27-4fb61aa6eb6a

CRED. (2009). The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public. *Research Handbook on Communicating Climate Change*, 93–94. https://doi.org/10.4337/9781789900408.00017

De Vreede, C., Warner, A., & Pitter, R. (2014). Facilitating youth to take sustainability actions: The potential of peer education. *Journal of Environmental Education*, *45*(1), 37–56. https://doi.org/10.1080/00958964.2013.805710

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and "mode 2" to a Triple Helix of university-industry-government relations. *Research Policy*, *29*(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4

European Commission. (2019a). The European Green Deal—Communication from The Commission to the European Parliament, The European Council, The Council, The European Economic And Social Committee and The Committee of The Regions. *Solar Power*, 47–65. https://doi.org/10.2307/j.ctvd1c6zh.7

European Commission. (2019b). *The European Green Deal*. EUR-Lex. https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1596443911913&uri=CELEX:52019DC0640#document2

European Commission. (2020). *Powering a climate-neutral economy: An EU Strategy for Energy System Integration EN. 1*, 1–9. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0299&from=EN

European Council. (2000). *Lisbon European Council 23-24.3.2000, Conclusions of the Presidency* (pp. 1–14). https://www.europarl.europa.eu/summits/lis1_en.htm#2

European Environment Agency. (2020). *Greenhouse gas emission intensity of electricity generation in Europe*. European Environment Agency. https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-3/assessment-1

European Environment Agency. (2021). *Urban sustainability: how can cities become sustainable? — European Environment Agency*. https://www.eea.europa.eu/themes/sustainability-transitions/urban-environment/urban-sustainability

European Union. (2019). *Clean energy for all Europeans package | Energy*. European Commission. https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en

Ge, M., & Friedrich, J. (2020). 4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors. *World Resources Institute*. https://www.wri.org/insights/4-charts-explain-greenhouse-gas-emissions-countries-and-sectors

Guy, S., Kashima, Y., Walker, I., & Neill, S. O. (2014). *Special issue article : The social psychology of climate change Investigating the effects of knowledge and ideology on climate change beliefs*. *429*(October 2013), 421–429.

Hanke, F., & Lowitzsch, J. (2020). Empowering vulnerable consumers to join renewable energy communities-towards an inclusive design of the clean energy package. *Energies*, *13*(7), 1–27. https://doi.org/10.3390/en13071615

Hodal, K. (2019). *Italy to put sustainability and climate at heart of learning in schools | Global development | The Guardian*. https://www.theguardian.com/global-development/2019/nov/06/italy-to-school-students-in-sustainability-and-climate-crisis

Horstink, L., Wittmayer, J. M., & Ng, K. (2021). Pluralising the European energy landscape: Collective renewable energy prosumers and the EU's clean energy vision. *Energy Policy*, *153*, 112262. https://doi.org/10.1016/j.enpol.2021.112262

Hunter, G., Ward, J., & Power, R. (1997). Research and development focusing on peer intervention for drug users. *Drugs: Education, Prevention and Policy*, *4*(3), 259–270. https://doi.org/10.3109/09687639709028548

IEA. (2019). Perspectives for a Clean Energy Transition. The Critical Role of Buildings. *Energy Transition Progress and Outlook to 2020.*, 117.

IPCC. (2014). Climate Change 2014 Synthesis Report Summary for Policymakers. *IPCC 5th Assessment Report*, 1–31. https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf

IPCC. (2018). Summary for Policymakers. In P. R. S. Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, M. I. G. A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, & and T. W. (eds. . E. Lonnoy, T. Maycock, M. Tignor (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change,*.

ISTAT(a). (2021). *Lavoro e conciliazione dei tempi di vita. 1*, 47–60.

ISTAT. (2016). Istruzione e Formazione. In *Annuario Statistico 2016* (pp. 59–78). https://www.istat.it/it/files//2021/03/2.pdf

ISTAT. (2021a). *Popolazione per età, sesso e stato civile 2019*. Tuttitalia.It. https://www.tuttitalia.it/piemonte/42-oulx/statistiche/popolazione-eta-sesso-stato-civile-2021/

ISTAT. (2021b). *Popolazione per età, sesso e stato civile 2021 - Sestriere (TO)*. https://www.tuttitalia.it/piemonte/82-sestriere/statistiche/popolazione-eta-sesso-stato-civile-2021/

Kwauk, C., & Winthrop, R. (2021). *Unleashing the creativity of teachers and students to combat climate change: An opportunity for Global Leadership*. https://www.brookings.edu/research/unleashing-the-creativity-of-teachers-and-students-to-combat-climate-change-an-opportunity-for-global-leadership/

Lawson, D. F., Stevenson, K. T., Peterson, M. N., Carrier, S. J., L. Strnad, R., & Seekamp, E. (2019). Children can foster climate change concern among their parents. *Nature Climate Change*, *9*(6), 458–462. https://doi.org/10.1038/s41558-019-0463-3

Lawson, D. F., Stevenson, K. T., Peterson, M. N., Carrier, S. J., Strnad, R., & Seekamp, E. (2018). Intergenerational learning: Are children key in spurring climate action? *Global Environmental Change*, *53*(August), 204–208. https://doi.org/10.1016/j.gloenvcha.2018.10.002

Lombardi, P. (2019). *Il ruolo delle Università nella Strategia per lo Sviluppo Sostenibile del Piemonte*. http://www.politichepiemonte.it/argomenti/colonna1/ambiente-e-territorio/670-il-ruolo-delle-

universita-nella-strategia-per-lo-sviluppo-sostenibile-del-piemonte#_ftnref4

Lombardi, P. (2020). *Agenda 2030 e Università*. https://reterus.it/public/files/Documenti/Mappature/ASVIS-RUS-territori.pdf

Lowitzsch, J. (2019). Investing in a Renewable Future – Renewable Energy Communities, Consumer (Co-)Ownership and Energy Sharing in the Clean Energy Package. *Renewable Energy Law and Policy*, *9*(3), 14–36. https://www.proquest.com/scholarly-journals/investing-renewable-future-energy-communities/docview/2216859574/se-2?accountid=153013

Lowitzsch, J. (2020). Consumer Stock Ownership Plans (CSOPs)— The Energy Communities. *Energies*, 1–24. https://doi.org/https://doi.org/10.3390/en13010118

McAleavy, G., McCrystal, P., & Kelly, G. (1996). Peer education: A strategy for improving health education in disadvantaged areas in Belfast. *Public Health*, *110*(1), 31–36. https://doi.org/10.1016/S0033-3506(96)80032-1

Mccright, A. M., & Dunlap, R. E. (2011). The Politicization Of Climate Change And Polarization In The American Public's Views Of Global Warming, 2001-2010. *Sociological Quarterly*, *52*(2), 155–194. https://doi.org/10.1111/j.1533-8525.2011.01198.x

McCright, A. M., & Dunlap, R. E. (2011). Cool dudes: The denial of climate change among conservative white males in the United States. *Global Environmental Change*, *21*(4), 1163–1172. https://doi.org/10.1016/j.gloenvcha.2011.06.003

McDermott, P., & McBride, W. (1993). Crew2000-peer-coalition-in-action.pdf. *Druglink*. http://www.drugwise.org.uk/wp-content/uploads/Crew2000-peer-coalition-in-action.pdf

McNeal, K. S., Hammerman, J. K. L., Christiansen, J. A., & Carroll, F. J. (2014). Climate Change Education in the Southeastern U.S. Through Public Dialogue: Not Just Preaching to the Choir. *Journal of Geoscience Education*, *62*(4), 631–644. https://doi.org/10.5408/13-061.1

Milburn, K. (1995). A critical review of peer education with young people with special reference to sexual health. *Health Education Research*, *10*(4), 407–420. https://doi.org/10.1093/her/10.4.407

MIUR. (2021). *Istituzioni universitarie accreditate - Miur*. https://www.miur.gov.it/istituzioni-universitarie-accreditate

Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2017). Identifying effective climate change education strategies: a systematic review of the research. *Environmental Education Research*, *25*(6), 791–812. https://doi.org/10.1080/13504622.2017.1360842

Morcellini, M., Rossi, P., & Valentini, E. (2017). *Unibook. Per un database sull'Università*. file:///D:/Dropbox/5 Raccolta saggi/ebook_Mendeley/Morcellini Rossi Valentini - 2017 - Unibook per un database sull'università.pdf

Parkin, S., & McKeganey, N. (2000). The Rise and Rise of Peer Education Approaches. *Drugs: Education, Prevention and Policy*, *7*(3), 292–310. https://doi.org/10.1080/09687630050109961

Plutzer, E., McCaffrey, M., Hannah, A. L., Rosenau, J., Berbeco, M., & Reid, A. H. (2016). Climate confusion among U.S. teachers. *Science*, *351*(6274), 664–665. https://doi.org/10.1126/science.aab3907

Repubblica Italiana. (2019). DECRETO-LEGGE 19 maggio 2020, n. 34 Misure urgenti in materia di salute, sostegno al lavoro e all'economia, nonche' di politiche sociali connesse all'emergenza epidemiologica da COVID-19. *Gazzetta Ufficiale Della Repubblica Italiana*. https://www.gazzettaufficiale.it/eli/id/2020/05/19/20G00052/sg

Repubblica Italiana. (2020). Testo del decreto-legge 30 dicembre 2019, n. 162, c.d. Decreto "Milleproroghe." *Gazzetta Ufficiale Della Repubblica Italiana*. https://www.gazzettaufficiale.it/eli/id/2020/02/29/20A01353/sg

Rete RUS. (2020). *Raccolta iniziative RUS per l'emergenza Covid19 - Google Sheets*. https://docs.google.com/spreadsheets/d/10BJDGO6DIERYev8K-qPPePqE6FsTBEKgcTyQ82Gwo70/edit#gid=0

Rogers, J. C., Simmons, E. A., Convery, I., & Weatherall, A. (2008). Public perceptions of opportunities for community-based renewable energy projects. *Energy Policy*, *36*(11), 4217–4226. https://doi.org/10.1016/j.enpol.2008.07.028

Sawyer, R. G., Pinciaro, P., & Bedwell, D. (1997). How peer education changed peer sexuality educators' self-esteem, personal development, and sexual behavior. *Journal of the American College Health Association*, *45*(5), 211–217. https://doi.org/10.1080/07448481.1997.9936887

SCORE Consortium. (2019). D3.1. Manual on Energy Refurbishing: Including the mitigation on

Rebound effects. *Energy for Sustainability International Conference 2019. Designing a Sustainable Future*, 64.

Shankar, A., Cherrier, H., & Canniford, R. (2006). Consumer empowerment: A Foucauldian interpretation. *European Journal of Marketing*, *40*(9–10), 1013–1030. https://doi.org/10.1108/03090560610680989

Stevenson, K. T., Nils Peterson, M., & Bondell, H. D. (2018). Developing a model of climate change behavior among adolescents. *Climatic Change*, *151*(3–4), 589–603. https://doi.org/10.1007/s10584-018-2313-0

Survey on Climate Risk. (n.d.). Retrieved July 5, 2021, from https://www.schooleducationgateway.eu/en/pub/viewpoints/surveys/survey-on-climate-education.htm

Susa, I. (2015). *La terza missione dell'Università | Scienza in rete*. https://www.scienzainrete.it/articolo/terza-missione-dell'università/redazione/2015-03-14

Svenson, G. R. (1998). *European guidelines for youth AIDS peer education*. 55.

Torabi Moghadam, S., Di Nicoli, M. V., Manzo, S., & Lombardi, P. (2020). Mainstreaming energy communities in the transition to a low-carbon future: A methodological approach. *Energies*, *13*(7), 1597. https://doi.org/10.3390/en13071597

U.S. Global Change Research Program. (2009). Climate Literacy: The Essential Principles of Climate Science. *Science*, *March*, 17. http://www.climatescience.gov

UNFPA. (2006). Standards for HIV peer education programmes. *Education*, 1–92. https://www.unfpa.org/sites/default/files/jahia-publications/documents/publications/2006/ypeer_standardsbook.pdf

United Nations. (2015). A/RES/70/1. Transforming our world: the 2030 Agenda for Sustainable Development Transforming our world: the 2030 Agenda for Sustainable Development Preamble. In *United Nations General Assembly Resolution* (Vol. 16301, Issue October). https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf

Wike, R. (2016). *What the world thinks about climate change in 7 charts | Pew Research Center*.

FacTank. https://www.pewresearch.org/fact-tank/2016/04/18/what-the-world-thinks-about-climate-change-in-7-charts/

World Energy Council. (2020). World Energy Trilemma Index 2020. *World Energy Council and Olyver Wyman*, 1–69. https://trilemma.worldenergy.org/reports/main/2020/World Energy Trilemma Index 2020.pdf

Yahya, W. K. (2020). *Engaging Youth Participation in Making Sustainability Work*. 1–10. https://doi.org/10.1007/978-3-319-69627-0_130-1

ANNEX 1 – FRONTAL LESSON

LE COMUNITA' ENERGETICHE
Una forma condivisa per un futuro sostenibile

ARGOMENTI CHE AFFRONTEREMO

- **Come mai oggi si parla di energia pulita?**

  - L'evoluzione delle fonti energetiche

    - Tipologie di fonti energetiche

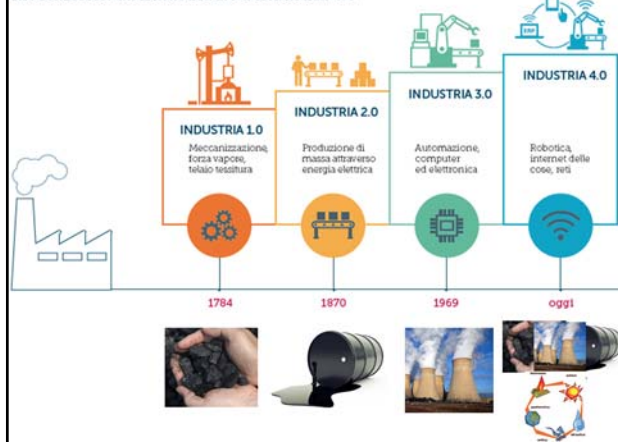- **Le comunità energetiche**: il futuro dell'energia

DOMANDE INIZIALI

Cosa sapete sull'energia
che usiamo tutti i giorni?
Che **origini** ha (fonti),
da quali **paesi** proviene,
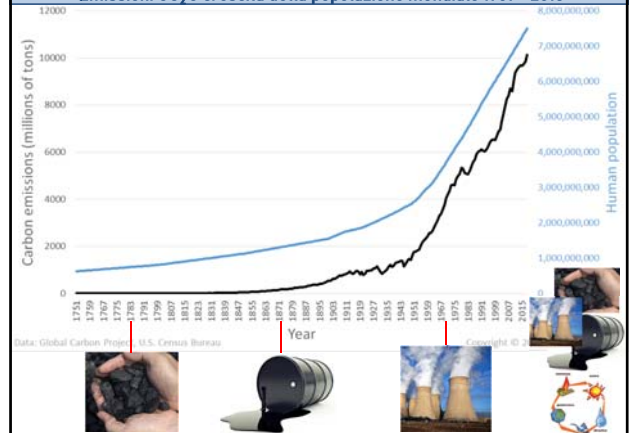come arriva nelle nostre case…

Cosa vuol dire sostenibilità?

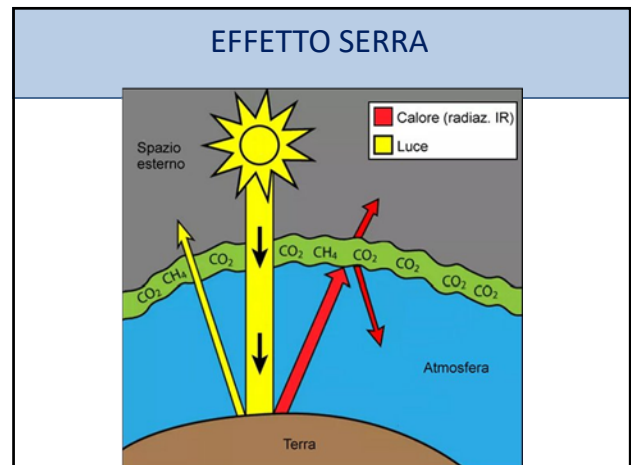## Evoluzione delle fonti energetiche

Forza muscolare, Fuoco, Acqua, Vento	1770	1870	1970	oggi
	Carbone	Petrolio & sviluppo dell'elettricità	En. Nucleare, Informatica,	Mix delle 3 precedenti + Fonti rinnovabili

Rivoluzione: da Industria 1.0 a Industria 4.0

INDUSTRIA 1.0 — Meccanizzazione, forza vapore, telaio tessitura — 1784

INDUSTRIA 2.0 — Produzione di massa attraverso energia elettrica — 1870

INDUSTRIA 3.0 — Automazione, computer ed elettronica — 1969

INDUSTRIA 4.0 — Robotica, internet delle cose, reti — oggi

Emissioni CO$_2$ e crescita della popolazione mondiale 1751 – 2018

Crescita e conseguenze

Aumento produttivo e crescita economica =

Aumento livello di comfort per milioni di persone

MA

Aumento emissioni di CO_2 e di gas a effetto serra

&

sfruttamento eccessivo delle risorse naturali terrestri

Cambiamento climatico e conseguenze irreversibili

EFFETTO SERRA

Rischi e conseguenze dei cambiamenti climatici e dell'eccessivo sfruttamento delle risorse naturali :

Rischi e conseguenze

di cambiamenti climatici ed eccessivo sfruttamento delle risorse naturali :

Ambientali :
- Deforestazione
- Desertificazione
- Scioglimento dei ghiacci e innalzamento dei mari
- Condizioni climatiche estreme (siccità, incendi, alluvioni, aumento delle precipitazioni, ecc.)
- Deterioramento della qualità dell'acqua e riduzione della sua disponibilità
- Riduzione della biodiversità

Sociali e geopolitiche:
- Salute (aumento di patologie e decessi connessi all'inquinamento)
- Flussi migratori
- Aumento delle disuguaglianze sociali
- Aumento dei costi della vita ed energetici, povertà in aumento
- Crisi economiche
- Guerre

Cambio di passo : I primi ACCORDI INTERNAZIONALI
per contrastare il cambiamento climatico

COP3, il Protocollo di Kyoto (1997) : il primo documento internazionale che ha imposto l'obbligo di riduzione delle emissioni ai Paesi più sviluppati (160 paesi)

Accordo di Parigi, COP21 (2015) : primo testo universale e di carattere vincolante per mantenere il riscaldamento globale al di sotto di 2 °C in più rispetto ai livelli pre-industriali.

Agenda 2030 (2015) e i 17 Obiettivi di Sviluppo Sostenibile (Sustainable Development Goals - SDGs) : nuovi obiettivi per il miglioramento delle condizioni di vita della la popolazione mondiale.
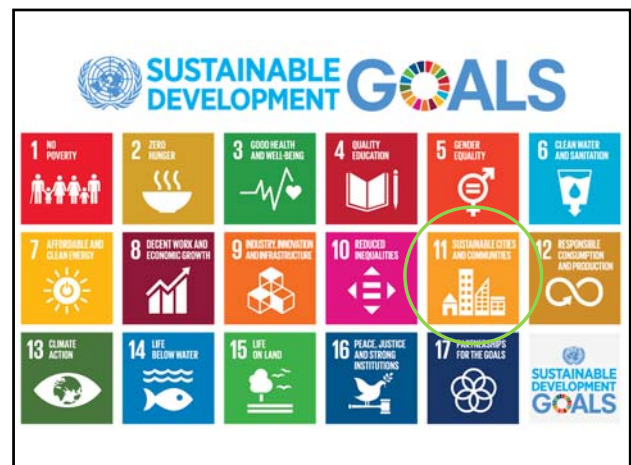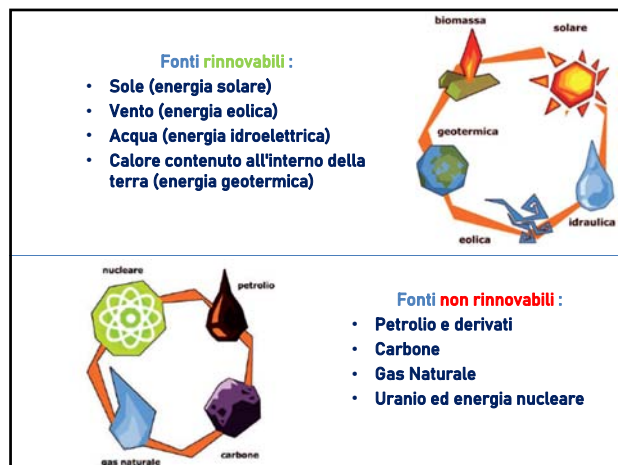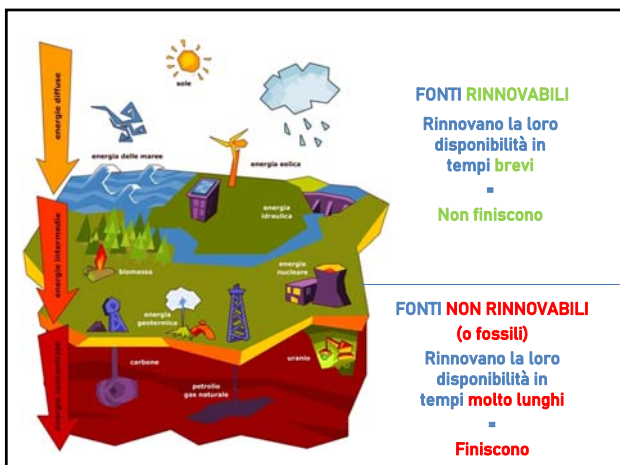

- Inquinamento e aspetti ambientali

- Finiscono (fonti limitate)

- **Prezzo**

- **Dipendenza da paesi esteri per l'approvvigionamento**
  (l'Italia, per esempio, è attualmente in grado di provvedere solo
  per una piccola percentuale del suo fabbisogno energetico)

DOBBIAMO TROVARE FONTI ALTERNATIVE E NUOVI MODI DI PRODURRE ENERGIA…
LE SCELTE DI CIASCUNO DI NOI RISULTANO ORA PIU' IMPORTANTI CHE MAI

- **Cosa si intende con**
FONTI RINNOVABILI e NON RINNOVABILI?

FONTI RINNOVABILI

Rinnovano la loro
disponibilità in
tempi brevi
=
Non finiscono

FONTI NON RINNOVABILI
(o fossili)
Rinnovano la loro
disponibilità in
tempi molto lunghi
=
Finiscono

Fonti rinnovabili :
- **Sole (energia solare)**
- **Vento (energia eolica)**
- **Acqua (energia idroelettrica)**
- **Calore contenuto all'interno della terra (energia geotermica)**

Fonti non rinnovabili :
- **Petrolio e derivati**
- **Carbone**
- **Gas Naturale**
- **Uranio ed energia nucleare**

Vantaggi & svantaggi fonti rinnovabili

Vantaggi :
- Pulite
- Economiche
- Locali e disponibili

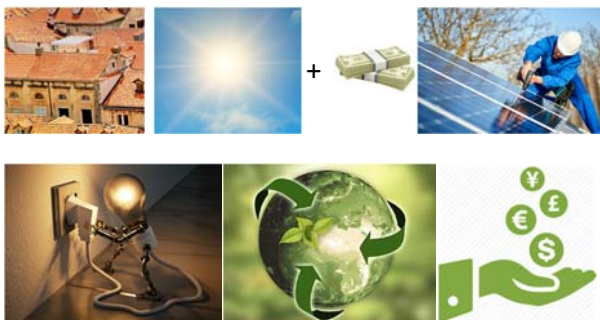L'efficienza degli impianti a fonte rinnovabile è in costante via di miglioramento

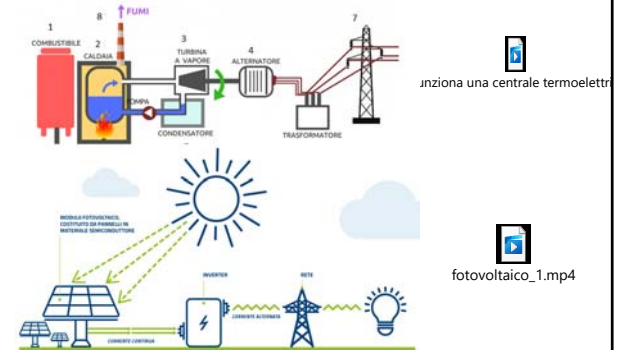Svantaggi :
- Costo dell'investimento iniziale per poterle usare

Vantaggi & svantaggi fonti rinnovabili: esempio dell'orto

Vantaggi & svantaggi fonti rinnovabili: esempio dell'orto

Come funziona una centrale termoelettrica (a partire da fonti non rinnovabili) e il pannello fotovoltaico (fonte rinnovabile)

...unziona una centrale termoelettri...

fotovoltaico_1.mp4

Come possiamo favorire il passaggio a energie pulite?
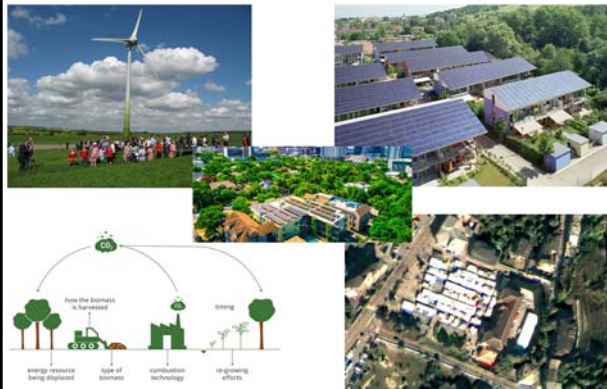
Grazie alle COMUNITA' ENERGETICHE

Cos'è una comunità energetica :

È l'unione di utenti (comuni, piccole e medie imprese e cittadini), in una determinata area, che condividono la VOLONTA' di autoprodurre e autoconsumare energia proveniente da fonti rinnovabili.

Cos'è una comunità energetica :

Comunità energetica ad Oulx :

La CE di Oulx comprende 2 edifici: la scuola e il comune.

Il progetto prevede di sostituire l'impianto di riscaldamento con uno a biomassa (energia rinnovabile) e migliorare l'isolamento termico. In questo modo si punta ad ottenere edifici con consumo energetico quasi pari a zero.

La comunità energetica coinvolge 2 ambiti principali interconnessi:

1.Tecnologico

2.Sociale

La comunità energetica coinvolge 2 ambiti principali interconnessi:

1.Tecnologico

2.Sociale
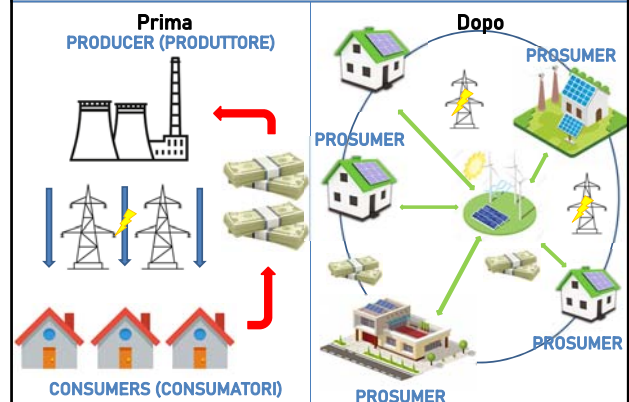

La comunità energetica coinvolge 2 ambiti principali interconnessi:

Perché parliamo di ambito sociale?

Perché le comunità energetiche sono prima di tutto comunità di persone.
Perché funzionino, è richiesto un cambiamento delle nostre abitudini, una volontà comune e un impegno economico iniziale.

Prima e dopo le comunità energetiche :

Prima
PRODUCER (PRODUTTORE)

Dopo
PROSUMER

PROSUMER

PROSUMER

CONSUMERS (CONSUMATORI)

PROSUMER

PROSUMER

Nuove leggi

Come abbiamo detto prima, questo cambiamento richiede un cambiamento profondo della società e delle sue strutture.

…Per esempio :
Fino a qualche anno fa, non era permessa per legge l'autoproduzione di energia e la sua condivisione.

Con una legge di febbraio 2020 (Decreto Milleproroghe 2020) si introduce la possibilità di creare comunità energetiche e di attivare progetti di autoconsumo collettivo di energia da fonti rinnovabili.

Dalla figura del CONSUMER a quella del PROSUMER

Il CONSUMER acquista e consuma energia elettrica dall'ente nazionale.

Il PROSUMER, invece, autoproduce l'energia che poi consuma e vende l'energia in eccesso prodotta.

Il vantaggio per il PROSUMER è quindi doppio!

Dalla figura del CONSUMER a quella del PROSUMER

- L'energia autoprodotta è pulita, quindi non inquina.
- Le bollette saranno meno care e l'energia in eccesso autoprodotta e non consumata, può essere venduta sulla rete ad altri prosumer.
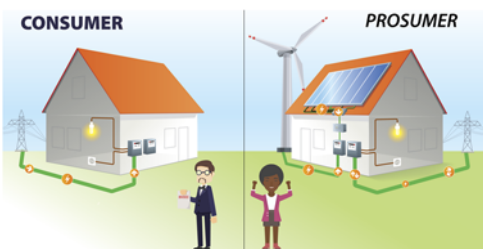
Dalla figura del CONSUMER a quella del PROSUMER

Cosa bisogna fare per diventare PROSUMER?

- Entrare a far parte della comunità energetica

- Investire in nuove tecnologie, di autoproduzione, per rendere gli edifici più efficienti

- Adottare comportamenti energeticamente responsanbili (per esempio, consumare di meno…)

Quindi…
PERCHE' ENTRARE A FAR PARTE DI UNA C. E.?
Vantaggi :

- Si inquina MOLTO di meno! E si combatte il cambiamento climatico

- Si risparmia e si guadagna: è possibile rivendere l'energia in eccesso

- Si forma un senso di comunità maggiore, in cui le persone si sentono più rappresentate e in controllo delle loro risorse, della loro vita e dei loro soldi

Quindi…
PERCHE' ENTRARE A FAR PARTE DI UNA C. E.?

…E se non posso fare l'investimento iniziale?…

SCORE
Co-own. Prosume. Renew.

Il progetto europeo SCORE si occupa proprio di questo : aiutare a trovare soluzioni perché il maggior numero di cittadini entrino a far parte di comunità energetiche locali.

Il progetto lavora su tre comunità energetiche: una italiana, in Val di Susa (di cui fa anche parte Oulx), una tedesca e una in Repubblica Ceca.

SCORE
Co-own. Prosume. Renew.

S.C.O.R.E. è l'acronimo di "Supporting Consumer Ownership in Renewable Energies".

Vuol dire "Aiutare i cittadini a diventare co-proprietari delle loro fonti energetiche".

SCORE
Co-own. Prosume. Renew.

Questo è un questionario che è stato elaborato per capire cosa pensano i cittadini delle comunità energetiche e delle energie rinnovabili.

Ve ne manderemo una copia a testa, completatelo con la vostra famiglia! ☺

http://survey.polito.it/34418/lang-it

ANNEX 2 – QUESTIONNAIRE – GOOGLE FORM

Section 1 of 2

QUESTIONARIO

Parte 1 - Cosa pensano i cittadini delle energie rinnovabili e comunità energetiche?

1. Qual è la tua classe? *

1. 3°A

2. 3°B

3. 3°C

2. Qual è il tuo gruppo? *

1. Gruppo 1

2. Gruppo 2

4. Gruppo 4

5. Gruppo 5

3. Quante persone hai intervistato? *

Short answer text

4. Quante persone sono favorevoli al tema delle energie rinnovabili e comunità energetiche? *

Short answer text

5. Descrivi brevemente le motivazioni delle persone favorevoli. *

Long answer text

6. Quanti sono contrari? *

Short answer text

7. Descrivi brevemente le motivazioni delle persone contrarie. *

Long answer text

8. Quanti indecisi? *

Short answer text

9. Descrivi brevemente le motivazioni delle persone indecise. *

Long answer text

10. Secondo te, è possibile convincere le persone indecise o contrarie a partecipare alle comunità energetiche? *

◯ Sì

◯ No

11. Se sì, come? Se no, perché? *

Long answer text

12. Secondo te, le persone interessate a progetti di comunità energetiche, lo sono soprattutto per aspetti ambientali o economici? *

◯ Ambientali

◯ Economici

13. Come giovane studentessa/studente, in che modo potresti far conoscere ad altre persone o enti (pubblici o privati) il tema delle energie rinnovabili? *

Long answer text

Parte 2

⌄   ⋮

Cosa pensi tu?

---

14. In che comune abiti? *

Short answer text

---

15. Noti delle differenze da un punto di vista ambientale e di stile di vita, tra il tuo comune e un *
grande centro, come può essere Torino? Se sì, quali e descrivile brevemente.

Long answer text

---

16. Per quello che conosci, ci sono degli aspetti del tuo comune/zona che apprezzi? (ad *
esempio, aspetti ambientali, sicurezza degli spazi pubblici, ecc.)

Long answer text

---

17. Per te, quanto è importante la protezione e la salvaguardia dell'ambiente? *

Scegli un solo valore in una scala da (-3) per "Non importante" a (+3) per "Importante".

○ (-3) Non importante

○ (-1)

○ (0)

○ (+1)

○ (+2)

○ (+3) Importante

18. Rispetto a quanto imparato sulle comunità energetiche e le energie rinnovabili, quanto ti interesserebbe approfondire l'argomento? *

Scegli un solo valore in una scala da (-1) per "Per niente interessato/a" a (5) per "Molto interessato/a".

○ (1) Per niente interessato/a

○ (2) Non interessato/a

○ (3) Neutrale

○ (4) Interessato/a

○ (5) Molto interessato/a

19. Pensi che nel tuo comune, o in una realtà che tu conosci, servirebbe realizzare un progetto di comunità energetica? Se sì, descrivi brevemente perché e dove. *

Long answer text

20. Cosa pensi delle seguenti affermazioni? *

Scegli un solo valore in una scala da (1) per "Non sono assolutamente d'accordo" a (5) per "Sono assolutamente d'accordo".

Mi sento forte…	○	○	○	○	○
Ci sono molte p…	○	○	○	○	○
Parlo spesso d…	○	○	○	○	○

21. Pensando al comune/territorio in cui vivi, quali sentimenti provi? *

Scegli uno o più sentimenti

- ☐ Fiducia
- ☐ Orgoglio
- ☐ Speranza
- ☐ Vergogna
- ☐ Paura
- ☐ Noia

22. Quanto spesso adotti questo comportamento? *

Scegli un solo valore in una scala da (1) per "Mai" a (5) per "Sempre".

	(1) mai	(2) raramente	(3) occasional…	(4) spesso	(5) sempre
Spegnere la luc…	○	○	○	○	○
Spegnere comp…	○	○	○	○	○
In inverno, indo…	○	○	○	○	○
Chiudere l'acqu…	○	○	○	○	○

Preferire il bag…	○	○	○	○	○
Leggere articoli…	○	○	○	○	○
Parlare con ami…	○	○	○	○	○
Far notare ad al…	○	○	○	○	○

ANNEX 3 – WORKSHOP

Workshop: una nuova comunità energetica per Oulx

Workshop: una nuova comunità energetica per Oulx

OBIETTIVO DEL PROGETTO:
Progettare una nuova Comunità Energetica per Oulx
&
Coinvolgere gli abitanti

FASI DEL PROGETTO:
- **Fase 1 : Compilare il questionario (individuale)**
- **Fase 2 : Analisi del contesto (gruppo)**
- **Fase 3 : Progettazione (gruppo)**
- **Fase 4 : Presentazione e discussione (gruppo)**

FASI DEL PROGETTO

Fase 1	Fase 2	Fase 3	Fase 3

FASE 1 : COMPILARE IL QUESTIONARIO
(attività individuale)

- Come prima cosa, dobbiamo compilare il questionario...

- **A cosa serve?** A capire cosa pensano i cittadini delle energie rinnovabili e delle comunità energetiche.

- Intervistate le vostre famiglie e altre persone che conoscete (parenti, amici, negozianti...) e provate a spiegare cosa sapete delle energie rinnovabili e del progetto di comunità energetiche.

FASE 1 : COMPILARE IL QUESTIONARIO
(attività individuale)

- Ciascuno dovrà compilare il questionario. Il questionario è online al seguente link:
  https://forms.gle/KDya3d2QPvoGzSt38

Vediamolo insieme...

FASE 1 : COMPILARE IL QUESTIONARIO
(attività individuale)

MAPPATURA: In base alle risposte ottenute dalle persone intervistate (Parte 1 del questionario), assegnate un colore a ogni categoria: VERDE ai favorevoli, GIALLO agli indecisi e ROSSO ai contrari.

Aiutandovi con Google Maps, segnate la posizione approssimativa delle persone che hanno risposto.

Favorevoli	Indecisi	Contrari

FASE 1 : COMPILARE IL QUESTIONARIO
(attività individuale)

FASE 2 : ANALISI DEL CONTESTO
INIZIA LA FASE DI GRUPPO!

- **Cosa vuol dire** "analisi del contesto"? Significa studiare e conoscere il territorio in cui si vuole fare un progetto.

- **A cosa serve?** A scegliere la zona più adatta per il progetto.

- Ogni **scelta** deve sempre essere **spiegata e motivata**

- Per svolgere la Fase 2, seguite la traccia nella slide successiva...

FASE 2 : ANALISI DEL CONTESTO
(attività di gruppo)

- Tramite Google Maps, esplorate l'area assegnata al vostro gruppo. Per chi ha la possibilità, scattate fotografie dell'area che ritenete significative (da consegnare insieme al progetto!)

- Osservate le diversità dell'area. Quali differenze ci sono? Area costruita - area naturale - area intermedia

- Pensate alle diverse tecnologie disponibili. Pannelli solari/pannelli fotovoltaici - turbine eoliche - impianti a biomassa

FASE 3 : PROGETTAZIONE
(attività di gruppo)

- Fase di progettazione: mettete insieme le informazioni raccolte nelle fasi precedenti e disegnate su una mappa come vedreste realizzata la vostra comunità energetica.

FASE 3 : PROGETTAZIONE
(attività di gruppo)

- **All'interno dell'area assegnata, scegliete la dimensione** che ritenete più adatta per la vostra comunità energetica e spiegate il motivo della scelta

- **Scegliete la tecnologia (ANCHE PIU' DI UNA)** che ritenete più adatta per la vostra comunità energetica e spiegate il motivo della scelta.

- **Indicate con delle linee la connessione** tra i vari partecipanti alla comunità energetica.

FASE 3 : PROGETTAZIONE
(attività di gruppo)

FASE 3 : PROGETTAZIONE
(attività di gruppo)

Domande da farsi mentre si progetta

- Che dimensione avrà la mia comunità energetica? (Uno o due edifici? Una zona?) Perché?

- Chi/cosa voglio cercare di coinvolgere nella mia comunità energetica? (esempi: cittadini privati, la stazione, un negozio in particolare, un'azienda, il comune, ecc.) Perché?

- Quali pro e contro avrà la realizzazione della mia comunità energetica? Descriverli.

- Che benefici porta la mia comunità energetica alla vita delle persone di Oulx?

FASE 4 : PRESENTAZIONE E DISCUSSIONE
(attività di gruppo)

- Infine, preparate una breve presentazione (PowerPoint o come preferite) per presentare il vostro progetto.

- Siete liberi di scegliere se presentare tutti insieme o scegliere uno o più rappresentanti per gruppo.

REGOLE

ELABORATI DA CONSEGNARE

Individuali:

1. **Questionario**

2. **Mappa delle risposte (verde, giallo, rosso)**

Di gruppo:

3. **Mappa del progetto della comunità energetica.**

REGOLE

- **4/5 gruppi formati da massimo 4/5 persone**

- **Ad ogni gruppo verrà assegnata un'area**

- **Consegna del progetto: al rientro delle vacanze**

- **Ogni gruppo, dovrà presentare il progetto. 10 minuti massimo. Potete scegliere voi quante persone presenteranno il progetto**

MATERIALE DA UTILIZZARE

- **Ora vediamo quali materiali usare per la progettazione**

MATERIALE DA UTILIZZARE

- **Potete usare qualsiasi tipo di edificio: case, negozi, industrie, chiese, scuole…ecc.**
- **Usate le ICONE per indicare i tipi di edifici sulla mappa**

- Scuola
- Stazione
- Casa
- Negozio
- Polizia
- Chiesa
- Ristorante/bar
- Comune

MATERIALE DA UTILIZZARE

- Si può scegliere tra le varie tecnologie che sfruttano le fonti rinnovabili: pannelli solari/fotovoltaici, turbine eoliche, impianti a biomassa

MATERIALE DA UTILIZZARE

- Anche per quanto riguarda le tecnologie, utilizzate le icone corrispondenti. Ad esempio...

- Biomassa

- Solare/fotovoltaico

- Eolico
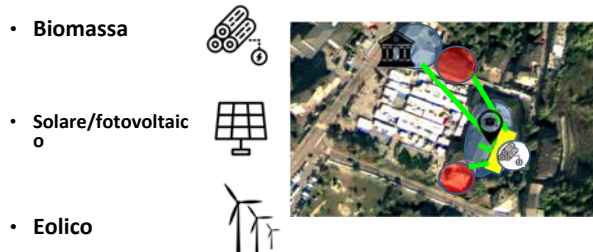
AREE ASSEGNATE PER IL PROGETTO

AREE ASSEGNATE PER IL PROGETTO

AREA 1 : BEAULARD

AREA 2 : SAVOULX

AREA 3 : SIGNOLS

AREA 3 : OULX

AREA 3 : GAD