

## European report on the solutions found in the School-Community-Projects

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## Executive Summary

MOST (Meaningful Open Schooling Connects Schools to Communities) is a project under Horizon 2020, the European Union's programme for research and innovation 2014-2020. MOST aims to promote responsible research and innovation by opening up science education with the purpose of creating learning spaces, which are accessible for all citizens to join, and let society learn from, about and with each other. MOST introduced School-Community-Projects (SCPs) and showed how such projects can serve as a purposeful implementation instrument for Open Schooling. This report is aimed at science education policy makers, teacher educators and teachers and gives an overview of the SCPs that were run in the 10 partner countries during the MOST project lifetime: quantitative measures of conducted SCPs, as well as qualitative measures of the topics covered, solutions found, issues tackled, and lessons learnt. The purpose of the report is to explore to what extent SCPs can contribute to responsible research and innovation. It also identifies a set of recommendations for schools who want to get involved in Open Schooling projects. The document consists of two main parts. The first part is a summary of the conducted SCPs in the MOST project (report on numbers, solutions found, issues tackled, and lessons learnt). The second part (attached as appendices) is the collection of regional reports from each country, giving more in depth insights into each country's best practice SCPs and their experiences.

MOST SCPs were conducted in two rounds, first round from spring 2021 until spring 2022, and second round from spring 2022 until spring 2023. In total, 672 SCPs were conducted across 10 countries, an average of 67 SCPs per country. In total, 78 974 participants were involved, of which 23 113 were students (12 617 female), 2 443 teachers (1852 female), 53 418 community members (776 from business/industry, 259 from policy, 617 from non-formal education providers, 51 766 from wider society, in total 11 752 female). 315 SCPs took place in primary schools, 343 in secondary schools and 14 in kindergarten. The SCPs represented a large variety of projects and lasted from 1 day to more than 6 months.

In MOST, we focused on the environmental topics waste and energy management as overarching themes for the SCPs. These issues are of pressing urgency, show the relevance of science for all involved and evidently raise the interest of people around the world and in particular young people. Of the 672 conducted SCPs, 369 were within waste management, 174 within energy management and 129 within sustainability in general. Within the topic waste management, projects were distributed among the categories general waste, recycling, plastic waste, food waste, clothing waste, and others. Within the topic energy management, projects were distributed among the categories energy savings, solar energy, alternative energy sources, energy consumption, and others.

During the project lifetime, 672 SCPs were accomplished, and thus 672 resulting ecological solutions were proposed and disseminated to a wide range of stakeholders. The solutions of the SCPs vary according to the purposes of the SCPs, the processes undertaken during the SCPs and how far the solutions have been implemented in schools and/ or the community. Based on these considerations, we categorize the solutions into: (1) Recommendations, (2) Awareness, (3) Maps or Overviews, (4) Models, (5) Established Solutions, and (6) Others. The categorization is not mutually exclusive. It means that there are solutions which can be put into more than one category.

SCPs lead to *Recommendations* in the form of proposed suggestions or ideas of solutions that emerged from the SCPs but there is no report of trying out or piloting the proposed solutions. E.g., students mapped the flaws of current practices and looked for potential for improvements. For example, by calculating current plastic waste (e.g. Netherlands) or by identifying food waste in a school canteen (Czech Republic) and people's throwing habits (e.g. Lithuania) the SCP participants looked for ways to

change practices into more sustainable ones (e.g. buy less – reuse more). Recommendations were given as posters, leaflets, films, oral presentations, exhibitions, or reports.

A great range of SCPs had the purpose of raising awareness, and the solutions belonging to this category are those where importance of knowledge, skills or practices has been underlined or where raised awareness has been explicitly reported as opposed to the Recommendations. The SCPs in this category have succeeded in raising awareness among the students, the schools, the community members who participated in the SCPs, as well as the community at large. Examples of solutions in this category are increased awareness of the importance of growing own vegetables to reduce food waste (Austria), increased awareness on biodiversity as students worked in the school's garden (Germany), increased awareness about waste management through films about residual waste made by students that were disseminated to community at large (Sweden).

A certain number of SCPs focused on identifying problems and potential ways to solve them, including by doing theoretical calculations or conducting surveys. This is a process of mapping, and it results in solutions categorized as *Maps or Overviews*. The mapping can be part of a larger process, and the collected information may function as a steppingstone for the next step in the problem solving. Examples of solutions in this category are: overviews of how much waste is generated per household due to disposable items for protection against the pandemic (Malta), overviews of how to recycle plastics (Netherlands), and maps of average monthly electricity consumption in a house, and how many solar panels that can meet the average consumption (Turkey).

Several SCPs focused on trying out new, innovative ideas of solving problems, often in small scale as in piloting or in modelling, with the view of showing the potentials for upscaling the solutions to larger community. The solutions of these SCPs are categorized as *Models*. They can be new ideas, new products, or new practices with still limited implementation, like Fuel cell cars (Germany) where a hydrogen cell was used as fuel cell of miniature model cars developed by students, or Solar cell Cars (Sweden) where use of solar panel in cars was investigated by using model cars, or innovative objects made of waste materials (such as creatively designed bags, clothes, packaging etc.). Models are of the type where concrete actions have taken place, which may lead to recommendations. The common denominator of the SCPs in this category is that they have built competences of the involved participants, and the solutions could be realized if implemented on a broad scale (beyond schools and those directly involved in the SCPs), with the support from the policy makers and/ or the companies or other stakeholders.

All participating countries had SCPs that initiated an innovation process in cooperation with external actors or stakeholders by finding solutions that have in turn been taken up by stakeholders and/or implemented by the schools. The solutions of these SCPs were innovative results that have arisen directly from the cooperation. The category *Established Solutions* refers to solutions of those SCPs that have been found, tried and established during the SCPs; they are meant to last beyond the project lifetime. These types of solutions were genuine solutions to authentic problems, they have taken effect and they have most probably created systemic changes in schools and/or in community at large. Examples are construction of benches with recycled pallets (Spain), construction of scarecrows and path markers with recycled objects (Spain), construction of school walls with tiles made of recycled plastic waste (Norway), reduced classroom heating costs by using corrugated cardboard and egg cartons as thermal insulation materials (Lithuania), painted green footprints leading to the trash cans (Sweden), shopping bags for whole village using (Czech Republic).

Regarding the implementation of SCPs, the MOST consortium faced some challenges. Based on the experience of all participating countries, suggestions were made on how best to address these

challenges. Challenges were related to time, curriculum alignment, loaded curriculum, coordination of participants, engaging community members, engaging policy makers, communication with local authorities, co-creation with external partners, co-creation and student involvement, open schooling approach, school internal conflicts, and motivated teachers. Despite these challenges, we conclude that SCPs can serve as a purposeful implementation instrument for Open Schooling and contribute to responsible research and innovation. Based on the consortiums' experiences with SCPs, we propose a set of six conclusions that highlight the potential of SCPs as an implementation instrument for Open Schooling and underpins SCPs' potential to promote responsible research and innovation:

- (1) SCPs can initiate innovation processes by finding solutions
- (2) SCPs can initiate innovation by bringing together target groups which do not regularly meet
- (3) SCPs can promote responsible research by bringing science into school and local community
- (4) SCPs can make science education motivating and meaningful for all students
- (5) SCPs can engage students at all ages to solve real problems in close contexts
- (6) SCPs can raise the environmental awareness of a whole community

## 1. Introduction

Research and innovation have improved our world and our lives in many ways and will most likely continue to do so. However, parallel to the large positive impact on human welfare and wellbeing, science and technology sometimes create new risks and ethical dilemmas, fail in solving the problems they are meant to, and spur controversy<sup>1</sup>. As the world becomes more inter-connected, new opportunities often come hand in hand with complex societal challenges. To keep pace in our rapidly evolving technological era, Europe's labour market urgently needs skilled employees in all science-related sectors and at all professional levels to ensure its future prosperity and competitiveness. In addition, we face severe global environmental challenges; and science plays an essential role when searching for solutions (Hacker, 2017).

Over the last decades many efforts have tried to reduce the distance between science and society, leading to a European-wide approach in Horizon 2020 called Responsible Research and Innovation (RRI), the process of aligning research and innovation to the values, needs and expectations of society. RRI entails engaging all actors, which in turn will help us tackle societal challenges.

The *Framework for Science Education for Responsible Citizenship* (Hazelkorn et al., 2015) identifies six key objectives and associated recommendations, which in combination, can help bring about the systemic changes required to generate a sustainable effect across our societies and in our communities. Through objective four, schools are encouraged, in cooperation with other stakeholders, to become an agent of community well-being:

*"Collaboration between formal, non-formal and informal educational providers, enterprise and civil society should be enhanced to ensure relevant and meaningful engagement of all societal actors with science and increase uptake of science studies and science-based careers to improve employability and competitiveness (objective 4, p.10)"*

Our project MOST (Meaningful Open Schooling Connects Schools to Communities) seeks to support the abovementioned challenges with a focus on the following two main aspects of the Commission's Responsible Research and Innovation (RRI) approach (Hazelkorn et al., 2015):

*"...we must engage all of society in research and innovation processes. We must provide the space for open, inclusive and informed discussions on the research and technology decisions that will impact citizens' lives...we need to bring emerging technologies and markets closer to the classroom...get everyone involved (p.5)."*

*"...science education research, innovation and practices must become more responsive to the needs and ambitions of society and reflect its values. They should reflect the science that citizens and society need and support people of all ages and talents in developing positive attitudes to science (p.6)."*

One promising path for such an approach is to open up school education with the purpose of creating learning spaces, which are accessible for all citizens to join, and let society learn from, about and with each other. In this context, science education (and we mean science including (digital) technology, engineering and maths education) is a lever with great impact and we seek to draw from this.

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<sup>1</sup> <https://rri-tools.eu/about-rri>

## 1.1 Open Schooling through School-Community-Projects (SCPs)

MOST aimed to support European school students and citizens in developing science knowledge, transversal skills and competences in working scientifically. To achieve this, our Consortium of 23 partners from 10 European countries (higher education institutions, schools, non-formal education providers, ministries, municipalities and enterprises) proposed a powerful Open Schooling idea.

In MOST we define the term Open Schooling Community as follows: Schools are supposed to directly collaborate with research (higher education), non-formal learning providers and various members from their community (families, citizens, businesses, industry, etc.) in the context of science education to create a citizen science learning space. In this space, schools act as self-reliant hubs connecting all involved actors to a vibrant science community. Science education in these schools shall not take place behind closed classroom doors and detached from real life, but link to its community's societal and innovation processes.

MOST introduced School-Community-Projects (SCPs) as a purposeful implementation instrument to connect schools to their community members in the context of science education. Community members in this project are families, businesses of various sizes, entrepreneurs and freelancers, research and innovation sectors (start-ups, SMEs and large enterprises), universities, non-formal science education providers, NGOs, civic organisations and associations, policy and the wider society. In MOST, we deliberately targeted all types of schools (primary and secondary level, general and vocational education) as Open Schooling is important for all kinds of students.

## 1.2 What is an SCP?

MOST opened up formal science education and established partnerships between schools and their communities (families, science education providers, citizens, businesses, etc.) to work jointly on environmental SCPs. These participatory projects directly respond to the needs and values of those involved, benefit the communities as a whole and make schools agents of community well-being. MOST's learning impact is boosted through an educational research-based approach that raises interest in science, scientific literacy and environmental responsibility.

These new partnership projects are supposed to benefit the community's interest as a whole and be responsive to the needs and ambitions of society and reflect its values' (Hazelkorn et al., 2015). Therefore, all SCP participants need to decide jointly on a project topic that is community relevant and requires scientific or technological solutions. Schools are supposed to particularly invite parents to become partners in school life through becoming participants in SCP, connecting to the science education processes of their children and learning alongside them. Fig. 1 illustrates the idea of a School-Community-Project.

Pursuing a common goal that actually serves community needs will develop not only shared ownership of possible solutions among project participants, but raises the acceptance of outcomes, e.g. with regards to behavioural change (Wildschut, 2017). MOST aimed to support participants in developing skills needed for their unique project via the participatory process co-creation. Co-creation (Escobar, 2010, 2011) is an innovative and participatory process, which aims to create shared ownership of all people involved and to support people in building new knowledge and create values for all concerned. Such a joint approach will enable schools to support communities at the grass-roots level through providing spaces where citizens can strengthen their environmental citizenship and make schools to agents of community well-being.



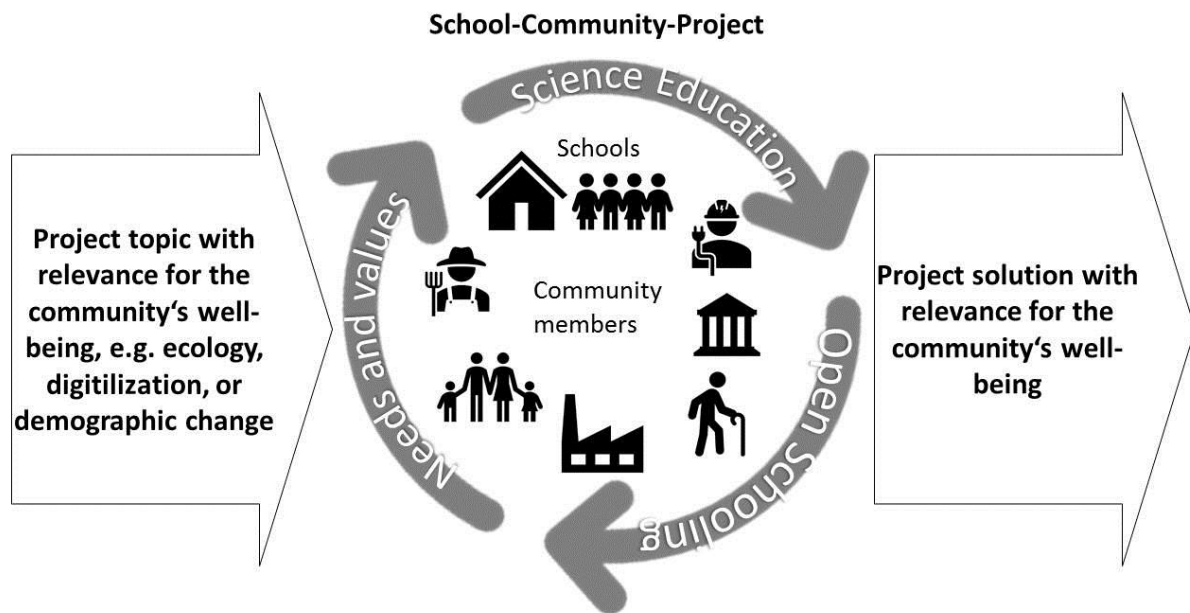


Figure 1. School-Community-Project (SCP)

### What is a School-Community-Project (SCP)?

An SCP is a cooperation between students and their community. In an SCP, students and their teachers collaborate with members of the community: Families, science education providers, citizens, businesses, etc. They join together to work on an environmentally relevant issue that directly affects their community. The size of an SCP depends on how big the school and community are and the number of people who express interest in participating.

The aim of these projects is for students and citizens to work together scientifically in order to develop regionally feasible solution approaches. The acquired knowledge will then be delivered to the community. The sharing of results can be accomplished via short video clips, pictures, posters, flyers, newspaper articles, etc.

For the MOST project we defined one SCP as a group of students working on their own research question/problem, with their own community members. The number of students and community members per SCP is flexible. Each SCP must have a clear and distinct topic, and it must be considered a school community, because there are specific community members involved (specific for this SCP).

For supporting measures on how to set up and run an SCP, please see MOST Deliverable *D3.1 Manual to plan and perform School Cooperation Projects*. D3.1 includes instructions for schools on how to organize SCPs.

### 1.3 Pedagogical basis for SCPs

The SCPs in the MOST project are based on the pedagogical approaches that stem from Project-Based Learning (PBL) (Thomas, 2000), a model that organizes students' learning around projects. PBL is associated with cooperative learning and inquiry-based approaches also known as Inquiry-based Learning (IBL), Inquiry-Based Science Teaching (IBST) or scientific practices (Crawford, 2014). These

approaches involve learners (usually students at schools) tackling processes like raising challenging questions (or problems) to investigate, planning investigations, selecting scientific approaches, collecting data, seeking explanations, evaluating and communicating the results and proposed solutions. The problems' subject of the investigations can be challenging questions taken from authentic, realistic problems faced in real life (society). In the problem-solving processes through PBL or IBL, students not only apply, analyze and evaluate their existing scientific knowledge, they also are encouraged and engaged to create new knowledge in terms of the solutions proposed. This necessitates the development of higher order thinking as indicated for instance by the higher level in the Bloom's taxonomy (Anderson & Krathwohl, 2001). In the MOST project, the scope of PBL/IBL has to be enlarged to include the community members, school director or stakeholders as participants, with the topic/theme covering authentic environment related issues (e.g., waste and energy) and promoting girls' participation.

MOST Deliverable *D4.2 Pedagogical guidelines and exemplary science materials* provides pedagogical and scientific materials that can be used as educational basis to run SCPs once the SCPs have already been initiated by using the WP3 Manual (*D3.1 Manual to plan and perform School Cooperation Projects*).

## 1.4 SCP participants

Although schools play a central role as the hubs of the SCPs, the SCPs' participants include contributors outside schools such as stakeholders from business and politics or other community members (families, science education providers, citizens, businesses, etc.). It is expected that each participant will contribute with their expertise in the problem-solving process in innovative ways. The setting in which the PBL or IBL pedagogical approaches are employed in the SCPs become different than the 'usual' teaching-learning setting involving only teachers and their students that is largely documented in the literature (e.g., Maaß & Artigue, 2013; Pedaste et al., 2015). The mechanism of learning and creation of new knowledge in MOST depend on the interactions not only between teachers-students or students-students, but also between teachers, students, and the other contributors. In this document we report on the different SCP participants in our conducted SCPs, the solutions the participants proposed and challenges that appeared.

## 1.5 Overview of this document

This document consists of two main parts, the first part is a summary of the conducted SCPs in the MOST project (report on numbers, solutions found, issues tackled, and lessons learnt), the second one is the collection of regional reports from each country from first and second round, giving more in depth insights into each country's SCPs and experiences.

## 2. Overview of conducted School-Community-Projects (SCPs)

MOST School-Community-Projects (SCPs) were conducted in two rounds, first round from spring 2021 until spring 2022, and second round from spring 2022 until spring 2023. In this chapter we present an overview of the conducted SCPs during the project period from spring 2021 until spring 2023: Number of individual SCPs per partner region, number of participants per project, per country and overall (also categorised in stakeholder groups: how many stems from industry, wider society, policy, etc.), number of participants per school level and age group, and duration of the conducted SCPs.

### 2.1 SCPs in numbers

Table 1 gives an overview of the number of SCPs<sup>2</sup> and participants in each country in the first round, while Table 2 gives a similar overview for the second round. Table 3 is a summary of numbers for the whole project lifetime. As you can see from Table 3, 672 SCPs were conducted in total in 10 countries, an average of 67 SCPs per country. In total, 78 974 participants were involved, of which 23 113 were students (12617 female), 2 443 teachers (1852 female), 53 418 community members (776 from business/industry, 259 from policy, 617 from non-formal education providers, 51 766 from wider society, in total 11 752 female). In first round, 129 schools took part, and in second round 285 schools.

Table 1. SCP documentation all partner countries FIRST ROUND

Region/Country	Number of SCPs	Total number of participants	Number of participating students	Number of participating female students	Number of participating teaching staff	Number of participating female teaching staff	Total number of participants from community	Number of female participants from community	Number of participants from business/industry	Number of participants from policy	Number of participants from non-formal learning providers	Number of participants from wider society
Austria	18	678	448	270	38	28	192	66	36	3	31	122
Czech Republic	20	333	257	159	21	20	55	36	17	12	2	24
Germany	20	381	258	148	23	14	100	51	13	3	17	67
Lithuania	20	462	342	161	35	35	85	60	8	1	6	70
Malta	21	21 934	4 039	2 548	651	532	17 244	3 260	41	24	116	17 063
Netherlands	20	1 837	1 244	605	46	31	547	253	9	3	3	532
Norway	33	1 111	389	202	58	36	664	273	75	1	4	584
Spain	24	1 456	1 102	577	144	106	210	96	19	14	5	172
Sweden	31	660	453	218	60	41	147	106	104	0	43	0
Turkey	32	584	323	160	62	23	199	99	19	18	1	161
<b>Total</b>	<b>239</b>	<b>29 436</b>	<b>8 855</b>	<b>5 048</b>	<b>1 138</b>	<b>866</b>	<b>19 443</b>	<b>4 300</b>	<b>341</b>	<b>79</b>	<b>228</b>	<b>18 795</b>

Table 2. SCP documentation all partner countries SECOND ROUND\*

Region/Country	Number of SCPs	Total number of participants	Number of participating students	Number of participating female students	Number of participating teaching staff	Number of participating female teaching staff	Total number of participants from community	Number of female participants from community	Number of participants from business/industry	Number of participants from policy	Number of participants from non-formal learning providers	Number of participants from wider society
Austria	46	1 154	724	408	128	83	302	173	116	6	62	118
Czech Republic	40	1 438	596	317	91	65	751	424	56	53	33	609
Germany	58	1 222	733	406	148	97	341	208	60	1	125	155
Lithuania	26	1 474	847	432	93	81	534	398	18	1	4	511
Malta	24	26 904	2 103	1 238	313	273	24 488	2 469	38	64	44	24 342
Netherlands	138	13 345	6 550	3 288	173	131	6 622	3 326	3	4	49	6 566
Norway	16	291	109	59	9	5	173	81	4	0	23	146
Spain	27	2 034	1 652	864	164	133	218	60	15	35	7	161
Sweden	27	855	618	351	111	82	126	106	90	0	36	0
Turkey	31	821	326	206	75	36	420	207	35	16	6	363
<b>Total</b>	<b>433</b>	<b>49 538</b>	<b>14 258</b>	<b>7 569</b>	<b>1 305</b>	<b>986</b>	<b>33 975</b>	<b>7 452</b>	<b>435</b>	<b>180</b>	<b>389</b>	<b>32 971</b>

\* due to a force majeure (fire) there are quite low numbers for Norway in second round.

<sup>2</sup> Criteria we used to define an SCP: a group of students working on their own research question/problem, with their own community members (specific for this SCP) (considered a school community).



As indicated in Table 1 (first round) and Table 2 (second round), Malta and Netherlands are two countries that reached considerably many participants with few SPCs, which can be explained as follows:

In the case of Netherlands, in the second round the Dutch team managed to connect the SCPs to a yearly national initiative for boosting inquiry and creativity in mathematics education on primary schools. This initiative provides materials for schools to have groups of students work on a topic for one full day. The Dutch team collaborated with the organizers to have waste as context for the 2023 assignment and to involve parents for collecting data on waste production at home. Students' analyzed data and worked together on specific aspects and created posters about their findings. Many of these posters were shared on a website to communicate their concerns and solutions for reducing waste, recycling or preventing litter in their community's environment. By involving parents and family members in working on the issue, the SCPs were able to reach a large number of people involved in a project on waste, become aware of the issue and of the potential of open schooling for addressing it.

In the case of Malta, the HEI partner has a close and good cooperation with the local government, and together they were able to engage whole schools in SCPs both in the first and second round. In these cases, all students in all schools engaged their parents and family members in the SCP, and thus they reached very high number of participants from wider society. In this way, the Maltese team managed to engage and achieve environmental awareness among a larger part of the local society.

When it comes to Spain, they also reached high number of students in their SCPs, due to the fact that they also engaged all students in school in one SCP. They used a whole school (institution) approach for implementing the MOST Open Schooling concept.

These cases from Netherlands, Malta and Spain somewhat represent a different type of SCP. The focus of these SCPs was to reach a broad target group with a topic that had not been taught in this way before, and therefore they adopted a whole school approach.

Table 3. SCP documentation all partner countries TOTAL

Region/Country	Number of SPCs	Total number of participants	Number of participating students	Number of participating female students	Number of participating teaching staff	Number of participating female teaching staff	Total number of participants from community	Number of female participants from community	Number of participants from business/industry	Number of participants from policy	Number of participants from non-formal learning providers	Number of participants from wider society
First round	239	29436	8855	5048	1138	866	19443	4300	341	79	228	18795
Second round	433	49538	14258	7569	1305	986	33975	7452	435	180	389	32971
<b>Total</b>	<b>672</b>	<b>78974</b>	<b>23113</b>	<b>12617</b>	<b>2443</b>	<b>1852</b>	<b>53418</b>	<b>11752</b>	<b>776</b>	<b>259</b>	<b>617</b>	<b>51766</b>

## 2.2 School levels and age groups participating in SCPs

In MOST, we aimed to reach out to all types of schools (primary and secondary level, general and vocational education) as Open Schooling is important for all kinds of students. In total 672 SCPs were conducted, and out of these 315 took place in primary schools and 343 in secondary schools. We even had 14 SCPs in kindergarten. Regarding students' average age, 21 SCPs were conducted with children less than 7 years old, 98 SCPs with students 7-9 years, 280 SCPs with students 10-12 years, 170 SCPs with students 13-15 years, and 103 SCPs with students 16-18 years old. Table 4 gives an overview of targeted school levels and age groups in the 10 partner countries.

Table 4. Number of SCPs separated into different school levels and age groups\*

	Austria	Czech Rep.	Germany	Lithuania	Malta	Netherlands	Norway	Spain	Sweden	Turkey	SUM
<b>LEVEL</b>											
Primary	25	3	12	6	16	138	7	25	23	60	315
Lower secondary	17	46	24	33	17	19	13	11	1	3	184
Upper secondary	22	11	42	4	11	1	29	5	34	0	159
Kindergarten	0	0	0	3	1	0	0	10	0	0	14
<b>Average AGE</b>											
< 7	0	0	0	3	1	0	0	17	0	0	21
7-9	26	0	12	8	16	6	4	16	10	0	98
10-12	5	3	21	12	17	132	3	14	13	60	280
13-15	13	46	43	19	11	18	13	3	1	3	170
16-18	20	11	2	4	0	2	29	1	34	0	103

\* Be aware that age levels of primary, lower secondary and upper secondary vary among countries.

## 2.3 Duration of SCPs

The conducted SCPs had a duration from less than 1 week (N=174) and up to more than 6 months (N=31). Most of the projects lasted for 2-4 weeks (N=123), or 2-4 months (N=109) (Table 5). At the time for the reporting (deadline 19.04.23), 18 projects were still ongoing, and 9 had an unknown duration. As shown in Table 5, all countries had a combination of short and more long-lasting SCPs.

Table 5. Number of SCPs sorted according to project duration (status pr. 19.04.2023)

	Austria	Czech Rep.	Germany	Lithuania	Malta	Netherlands	Norway	Spain	Sweden	Turkey	SUM
<b>DURATION</b>											
< 1 week	16	4	0	0	0	148	6	0	0	0	174
1-<2 weeks	1	7	16	0	13	1	0	0	24	1	63
2-4 weeks	11	8	5	17	3	2	22	3	0	52	123
1-<2 mths	0	7	10	1	4	0	15	5	0	10	52
2-<4 mths	14	2	17	12	6	0	4	41	13	0	109
4-6 mths	2	32	15	13	6	1	1	2	21	0	93
> 6 mths	4	0	14	0	12	0	1	0	0	0	31
Ongoing	16	0	1	0	1	0	0	0	0	0	18
Unknown	0	0	0	3	0	6	0	0	0	0	9

## 3. Topics and research questions of School-Community-Projects (SCPs)

In MOST, we focused on the environmental topics waste and energy management as overarching themes for the SCPs. These issues are of pressing urgency, show the relevance of science for all involved and evidently raise the interest of people around the world and in particular young people (as evidenced e.g., by the Fridays for Future movement and the rising support for green political parties in some European countries). There were, however, some flexibility regarding the two topics, so in some countries they ran SCPs within the topic energy management also in first round, and opposite, SCPs within the topic waste management were run also in second round. In addition, there were several projects focusing on sustainability in general. Of the 672 conducted SCPs, 369 were within waste management, 174 within energy management and 129 within sustainability in general.

### 3.1 Topic: Waste management

Among the 369 SCPs within waste management, there were projects and research questions covering a large range of subtopics. The subtopics can be sorted in the following categories (% SCPs in parenthesis): general waste (56%), recycling (13%), plastic waste (9%), food waste (5%), clothing waste (4%), other (13%) (Figure 2).



Figure 2. Distribution of the themes for the projects within waste management

In the following we present examples of research questions within the categories mentioned above.

Plastic waste:

- How can we reduce plastic waste?
- How can we reduce microplastic?
- How can we reduce the use of plastic?
- How can we get more people to recycle plastic?
- Which alternative means of carrying plastic bags can be developed?
- The sweets we buy generate a lot of plastic waste; how can we reduce it?
- The danger of plastic – how can we avoid it?

Food waste:

- How can we reduce food waste?
- How can we produce less waste around our school?
- What is the amount of oil used in artisan restaurants and fast-food chains around the schools and the amount of waste oil generated?
- What is the optimal content of consumption basket?
- How to prevent food waste in the school canteen?
- Can we reduce food waste through promoting the app *Too good to go*?
- Can we increase the number of products made from avocado seeds?
- How not to waste milk products in the school?

Clothing waste:

- How can we reduce clothing waste?
- Can we reduce clothing waste by making products out of them (toys)?
- Can we reduce clothing waste by reusing materials?
- What can we do with used clothing?
- How can we solve the fast fashion problem?
- Fast fashion/What is the effect on the environment?
- Fair vs. Fast fashion: baguette bags/ What is the relation between fashion and the environment and how can we contribute by upcycling products?

Waste in general:

How can we reduce trash?  
 How can we reduce general waste?  
 What can we do with waste at school?  
 What can we do with the waste materials we daily generate?  
 How can we help from our school so that there s not so much waste in the sea and in the countryside?  
 How to reduce waste in the school neighborhood?  
 What kind of trash can we find in our neighborhood and what can we do against this problem?

Recycling:

How can we improve recycling?  
 How to recycle the used cooking oils in the school canteen?  
 How to improve waste sorting in the front of the school?  
 Sorting and recycling waste; what do we do with unused things?  
 Are we sorting our waste correctly and willingly? How do we sort correctly?  
 How can we get more people to recycle their waste instead of throwing it in the residual waste?  
 What can be produced from materials seen as waste at home?

Among other topics, students explored used markers, reusable bags, mask waste, cigarette ends, chewing gum waste, waste at coffee shops, glass/metal waste, old cases, artistic installations made of recycled objects, among others.

Here are some illustrative examples of research questions (RQ) and solutions within waste management:

**Example: Clothing waste (Germany)**

RQ: Fair vs. Fast fashion: baguette bags/ What is the relation between fashion and the environment and how can we contribute by upcycling products?

Solution: Making the sustainable bags turned out to be very easy and fun for the students. Many old textiles could be upcycled into useful things (here: baguette bags) and thus got a new use. While researching fast-fashion and its impact on the environment, students also became aware of major issues facing various large textile companies and brainstormed ideas and how to address these issues. Furthermore, they talked about, how they could act alternatively in their everyday lives to stop supporting these companies. In addition, the students gained a lot of knowledge regarding this issue and learned how to act in a more sustainable way in their daily life.

**Example: Plastic waste (Norway)**

RQ: How can a bigger part of plastics be recycled locally, which types of plastics can be recycled, and how can our school's community be involved in this work?

Solution: Our students designed a wall – both form and coloring – for our school's new kitchen which is covered by recycled plastic tiles. The students also conducted a social media campaign (Instagram and Facebook) to inform about challenges with plastic recycling, our project and which types of plastics our business partner Utoplast can use to produce tiles. All households connected to our school contributed with plastic waste which was used for the tiles. In addition, the students collected plastic waste from our school's surroundings. Precious Plastic can work well as a solution for local

recycling of plastics. Nevertheless, it requires that locals sort and above all clean their plastic waste accurately; to motivate them for this task, constitutes a major challenge. In addition, it seems important to find applications for the products which aren't purely decorative. Regulations – for example concerning requirements for purity of products used for food – are another major challenge. Locally based recycling of plastics can contribute to reduce pollution and emissions. Our recommendations go along with our findings: inform about the challenges, change regulations in order to create more useful applications for recycled plastic products, facilitate local collecting and cleaning, support local production.

#### **Example: Plastic waste (Netherlands)**

RQ: NO plastic bottles in school. How to reduce this plastic problem within our school?

Solution: A durable water bottle made from green plastic and used by all students and teachers at the school. The students made a distribution plan for the water bottles: a flyer will be handed out to all students and teachers. The flyer will contain information on the project, the plastic problem, and this solution. The plan is to also hand out a few of these water bottles and flyers to other schools in the Netherlands to inspire them to take similar actions.

#### **Example: Food waste (Lithuania)**

RQ: How can we reduce food waste in the school canteen?

Solution: The study showed that pupils do not eat the food and salads that are put in. They asked for the canteen to allow them to put in their own salad. The amount of salad thrown away has decreased significantly.

#### **Example: Recycling (Turkey)**

RQ: How can paper be recycled? How is the environment affected as a result of paper recycling? What is the amount of wastepaper produced at the school?

Solution: The amount of wastepaper produced in the school was calculated. The benefits that can be obtained from the recycling of this paper were discussed.

#### **Example: General waste (Spain)**

RQ: One day the school appears full of rubbish. What can we do in this situation? Is this problem also in the village? What can we do to prevent this from happening again?

Solution: Made meetings of representatives of all classes. Agreed to organize a demonstration to visualize the lack of care of the people, ask the city council for more green areas and safe school roads.

### 3.2 Topic: Energy management

Among the 174 SCPs within energy management, there were projects and research questions covering a large range of subtopics. The subtopics can be sorted in the following categories (% SCPs in parenthesis): energy savings (34%), solar energy (25%), alternative energy sources (10%), energy consumption (7%), and other (24%) (Figure 3).

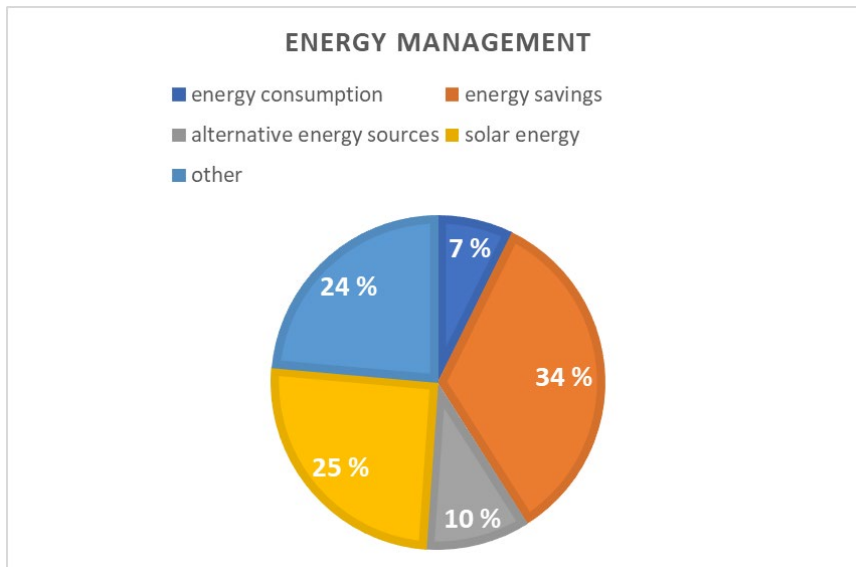


Figure 3. Distribution of the themes for the projects within energy management

In the following we present examples of research questions within the categories mentioned above.

#### Energy consumption:

- What is the average monthly electricity consumption in a house?
- What is the energy consumption in your kitchen?
- How is energy wasted in our life and how can we reduce this? Are we able to reduce the electricity consumption in our homes?
- What is the energy consumption amounts of electrical devices at home depending on their daily and weekly usage times?
- What should be the ideal platform height of gas cookers used in homes for efficient use of energy?

#### Energy savings:

- How can we reduce our carbon footprint?
- How can optimum light systems be developed in the school and the school garden?
- What kind of savings can be made in order to prevent high amounts in electricity bills due to increasing energy costs?
- How can energy savings be achieved in offices in terms of temperature?
- Which sensor systems can be used in modern smart homes?
- What kind of products can be created both to save energy and to utilize unused goods at home?
- Can savings be achieved from lighting devices in homes?
- How can we encourage the local community to save energy and how much energy will they save?
- How can the school's current energy use be minimized?

#### Alternative energy sources:

- What is our economic savings when we use alternative lighting systems?



How can you justify changing the sources of energy you use locally? (Marine energy, solar energy, geothermal energy, biomass energy, wind power and hydro power were examined)  
What do people around us know about alternative energy sources?  
Can alternative energy be produced in a healthy living concept?

#### Solar energy:

How are the solar panels at the school utilized? What is the amount of energy produced?  
Can solar panels be used efficiently in greenhouse systems?  
How much solar power can our school produce per year?  
Is it wise for our school to install solar panels on the roof of the school building?  
Is it effective to install a solar panel that can be rotated about an axis?  
How to produce energy in the future? (Solar energy)  
How can solar energy be used to power cars? (Design, develop and build solar cell cars)  
Solar cells - What is the positive effect on the environment?

#### Others:

How does blue light affect people?  
How can we reduce the impact of blue light on peoples' health and well-being?  
What are the energy costs of natural cooled underground warehouses compared to thermally cooled warehouses?  
How is biodiesel produced?

Here are some illustrative examples of research questions (RQ) and solutions within energy management:

#### **Example: Energy saving (Turkey)**

RQ: How can the school's current energy use be minimised?

Solution: There are hundreds of lamps in a school for lighting purposes. The lamps to be selected to be economical or LED lamps will provide serious electrical energy savings. Most of the time, lamps are turned on unnecessarily in schools. For this reason, photocell products should be preferred in school corridors, stairs, toilets and school environment lighting. The use of smart electricity meters is also effective in saving electricity in schools. Especially the consumption between 09:00-10:00 hours, when energy consumption is the highest in schools, can be reduced by 8% in this way. Since the energy consumption of the devices in standby mode continues at a certain rate, the plugs of all devices should be removed from the sockets or the electricity fuse should be switched off after the end of the lessons, especially for those that will not be used during the night.

#### **Example: Energy saving (Norway)**

RQ: How can we encourage the local community to save energy and how much energy will they save?

Solution: 43 teams participated in an energy reduction challenge and in total they saved 2700 kg CO<sub>2</sub>. If everyone in Norway did this, that would amount to a 12% reduction in Norway's total greenhouse gas emissions.

#### **Example: Energy saving (Lithuania)**

RQ: How can you save electricity at school and at home, and how does saving electricity contribute to saving nature?

Solution: Our research has shown whether and how pupils save electricity and what motivates them to do so. From the interviews we found out that thanks to the solar panels at the school we are not only saving electricity but also money. Information and reminders (stickers) have been distributed throughout the school that everyone can save electricity. The result is great, because you often see when pupils leave the classroom, the toilet or the corridor, they turn off the lights as they don't need them. Also, more pupils are switching off the mains electricity, not just the appliance with the switch.

#### **Example: Energy consumption (Turkey)**

RQ: How is the energy consumption of electrical devices at home depending on their daily and weekly usage times? What is the possible energy saving opportunities in the use of these devices?

Solution: Depending on the hourly use of electrical household equipment used in homes, the amount of energy consumed was calculated. Saving methods were discussed.

#### **Example: Solar energy (Sweden)**

RQ: How can solar energy be used to power cars?

Solution: Students designed, developed and build solar cars. Cars were nominated to participate in the Solar Car race day. These specific cars and the students, teachers and external partners resulted in 8 cars participating in the Race. During the race day each car competed in three categories 1) Speed, 2) Design and 3) Innovation. The race day comprised of races in heats, presentations in front of a jury and voting for the best design.

#### **Example: Alternative energy sources (Czech Republic)**

RQ: Energy sources and fossil fuels. How did it start and how to go on?

Solution: Models of energy sources were constructed, and participants discussed about perspectives.

#### **Example: Alternative energy sources (Turkey)**

RQ: Can alternative energy be produced in a healthy living concept?

Solution: By using the bicycle system, both alternative energy is produced and opportunities for a healthy life are created.

### **3.3 Topic: Sustainability**

Among the 129 SCPs within sustainability, students worked with sustainable nutrition, sustainable products, solidarity-sustainable markets, sustainable health, environmental consciousness, school



gardens, the health of our planet, respect for the environment, sustainable school buildings, cafeterias, school-communities and sustainable travelling.

Examples of research questions:

- How can we make a sustainable advent calendar?
- What is sustainable packaging and why is it important?
- What can sustainable nutrition look like in the future?
- How can we raise awareness in the community to care for the environment?
- Sustainable cafeteria – how can we achieve it?
- Sustainable Christmas-cookies – how can we produce them?
- Sustainable agriculture – how can we raise awareness?
- Sustainable traveling – is that possible? What is the connection between travelling and the environment and how can we achieve a more positive impact?

Here are some illustrative examples of research questions (RQ) and solutions within sustainability:

**Example: Sustainable school-community (Germany)**

RQ: Sustainable School-Community – what can we do to be more eco-friendly?

Solution: On the educational day, several small groups of participants dealt with the different facets of sustainability. It was decided to hold a sustainability festival with a clothing-exchange-circle, a clothing swap and a clothing processing event. In addition, the lost and found box is to be prepared for the sustainability festival, sorted by size, color etc. and sold at the sustainability festival. In addition to the topic of fast fashion, the topics of waste separation, waste avoidance, sustainable food in the cafeteria and the bicycle repair station are to be presented at the festival. The goal of the festival is for the entire school community to create an awareness of the various facets of sustainability, because with the sustainability festival, the topic reaches the entire school community, and everyone is made aware of the issue. The question of the extent to which this awareness will have an impact on everyday school life will become clear in the next school year. The created video was viewed very often and the reactions and feedback regarding the video were very positive. The elaborate preparations alone, which involved all of the school's committees, noticeably helped to raise everyone's awareness regarding this issue.

**Example: Sustainable agriculture (Germany)**

RQ: Sustainable agriculture - how can we raise awareness?

Solution: The students created a digital escape room with GeoGebra on the theme of sustainable agriculture and disseminated it online via the school and ICSE homepages. One finding of the students was that sustainable agriculture has less negative impact on climate, soil, water, air, and biodiversity than conventional agriculture. They also found out that sustainable agriculture uses as few fossil, non-renewable inputs (e.g. petroleum-based) as possible. Furthermore, in answering their research question, the students found that sustainable agriculture provides a satisfactory income for all agricultural workers. On a small scale, sustainable agriculture can be supported by buying regional products yourself that have been produced sustainably.

### **Example: Sustainable packaging (Germany)**

RQ: What is sustainable packaging and why is it important?

**Solution:** Environmental impact of packaging and paper: The production of virgin fibre paper consumes a lot of energy and water, and toxic chemicals are used that can pollute water bodies. CO<sub>2</sub> emissions per ton of paper have fallen by around 36.2% since 1995. Nevertheless, the German paper industry still emitted around 13.8 million tons of CO<sub>2</sub> emissions in 2018. Recycled paper, on the other hand, is less harmful to the environment. This means that wastepaper is processed in recycling plants in such a way that new paper is created from it. For this, the recycling industry needs up to 60% less energy and 70% less water compared to virgin paper production. In the same way, something new can be discovered from "old boxes" which the trainees demonstrated on their project day. Awareness can be raised through paper data collection at school. The data collected can be used to show how much water, wood, energy and CO<sub>2</sub> emissions would be saved with certain measures.

### **Example: Sustainable Development Goals (Malta)**

RQ: What initiatives can be taken by the Dingli Primary school community to create awareness about the Sustainable Development Goal (SDG) and create momentum for change, inside the school and beyond?

**Solution:** It was necessary to promote active citizenship skills and 21st century skills amongst the young learners through a cross-curricular approach that integrated various other projects and programmes thus promoting a systemic viewpoint. Students were encouraged to reflect on their actions and how they can achieve some targets of the Sustainable Development Goals. The school focused on providing a variety of actions aimed at enhancing the children's curiosity and responsibility towards the surroundings through activities that involve their families and consequently the community.

### **Example: Sustainable food production (Malta)**

RQ: How can the school make the best use of its olive trees?

**Solution:** A sustainable solution was adopted to make full use of the olives that would have otherwise been wasted. Moreover, the project also had an economic target as the harvest provided products that would have otherwise been purchased. Students also became conscious that food that arrives on our plates is the result of a lot of work of other persons. Food needs to be respected and food waste avoided.

### **Example: School Garden (Austria)**

RQ: What can sustainable nutrition look like in the future?

**Solution:** Garden learning, how to grow your own vegetables to reduce waste and be aware of the importance of our nutrition.

## 4. Solutions found in the School Community Projects (SCPs)

Besides the Regional Reports given in the Appendices 1-20, where three exemplary SCPs per round from each country are showcased, we collected a compilation of research questions and solutions of each SCP from each partner country. It is on this compilation that we primarily base our report in this section. We consulted the Regional Reports for more detail whenever it was necessary.

During the project lifetime, 672 SCPs were accomplished, and thus 672 resulting ecological solutions were proposed and disseminated to a wide range of stakeholders. The solutions of the SCPs vary according to the purposes of the SCPs, the processes undertaken during the SCPs and how far the solutions have been implemented in schools and/ or the community. Based on these considerations, we categorize the solutions into: **(1) Recommendations, (2) Awareness, (3) Maps or Overviews, (4) Models, (5) Established Solutions, and (6) Others.** The categorization is not mutually exclusive. It means that there are solutions which can be put into more than one category.

### (1) Recommendations

A great range of SCPs explored different ways to solve the problems, different types of products, alternative and more sustainable practices both in the topic waste and energy. In some of them, calculations have been done, for instance how much carbon footprint can be reduced if we replace meat with fungi (Austria) and how much energy would have been saved if we use solar panel instead of electric heating (Turkey) or if we reduce the heating in the buildings during winter (e.g., Turkey, Norway). In some other SCPs study of everyday products such as olive oil (Malta), textiles (e.g. Lithuania, Germany), battery (e.g. Norway), etc. have been done to understand the life cycle of those products and find out how to reduce waste during their production and how to re-use/upcycle them when these products become waste. In another SCPs the students mapped the flaws of current practices and looked for potential for improvements. For example, by calculating current plastic waste (e.g. Netherlands) or by identifying food waste in a school canteen (Czech Republic) and people's throwing habits (e.g. Lithuania) the SCP participants looked for ways to change practices into more sustainable ones (e.g. buy less – reuse more, etc.). These are a few examples of the SCPs leading to recommendations as their solutions.

What we mean by Recommendations are *suggestions or ideas of solutions that emerge from the SCPs but there is no report of trying out or piloting the proposed solutions.* Some recommendations may derive however from implemented activities, like the suggestion to make vertical farming (e.g. Austria, Germany) if you don't have a piece of land was derived from the construction of community garden (see further in the section Established solution). Included as Recommendations are also campaigns aiming at raising awareness where the increased awareness has not been reported. The SCPs leading to these types of solutions also include, but are not limited to, those which have reached many people and drawn their attention to certain ecological issues and made people inspired to act (e.g. Netherlands, Malta). More examples of questions and solutions given as Recommendations are found in Table 6. As we see from the table, there are various ways of giving recommendations, such as posters, leaflets, films, oral presentations, exhibitions, or reports.

Table 6. Examples of research questions and solutions given as Recommendations

Country	Research question(s)	Solution(s)	Format of recommendations
Austria	What can sustainable nutrition look like in the future?	Fungi as a substitution for meat, can help to reduce the carbon footprint as well as it healthier and needs less water	Report

Austria	How can we reduce the use of plastic?	Start growing your own vegetables, ways to grow vegetables even if you have no garden, findings on vertical farming and urban gardening	Report
Lithuania	How to reduce plastic waste?	Recommendations: Use metal straws instead of plastic one's straws, and instead of plastic bags use either paper or reusable bags. Replace plastic razors with metal one's shavers, pack items in cardboard boxes, and instead of plastic, use a metal drink bottle and pack your lunch in a metal box. Before you buy plastic toys, think about the harm they cause. Try to buy as much as possible fewer plastic cups, plates and cutlery. Buy as little as possible products that are packaged in plastic.	Report
Lithuania	We noticed that people still don't always take care of the environment around them: candy wrappers, bags, shards of glass are thrown everywhere, even though the park has bins. What can we do?	The pupils told their parents and pupils in other classes. We agreed to organize a "It's fun to grow up in a clean environment" campaign next spring and invite other classes to join in. They created competition drawings on the theme of ecology.	Environmental campaign by drawing competition
Czech Republic	How not to waste milk products in the school?	Campaign posters and presentations.	Recommendations given as posters and presentations
Czech Republic	How to prevent food waste in the school?	School exhibition.	Recommendations given in the exhibition
Germany	Take 10 @ 10 for the planet/How can we communicate sustainability projects and research results on the issue a wider scale?	The topics were very different and therefore the solutions found as well. Here some examples: 1) Try to attract attention to waste reduction in many ways – for example developing a game 2) Go into deep discussions with everyone involved in the waste consumption – care takers, cleaning staff 3) buy your food local and regional	Report
Malta	(a) What is the environmental impact of waste in our community? (b) How can we reduce waste in our community? (c) How can we embellish our community?	As a follow up to the clean-up, students submitted a proposal to the Local Council to embellish that area and make it more accessible and attractive for visitors.	Report
Netherlands	How to reduce waste in school?	introduce waste collection robots	Report
Norway	How is the product produced? Where does the raw materials come from? How is the product distributed? What are the emissions related to the production and transport? Product: battery	Recycle batteries from electrical cars. Recycle more ordinary batteries.	Report
Norway	How can we reduce waste from chewing gum in streets?	We designed chewing gum waste bins and presented our idea to the municipality, and we made a campaign for the wider public (distributed at a national broadcasting TV show)	Letter to municipality, Broadcasted TV-show, see also Regional Report Norway, 1 <sup>st</sup> round
Sweden	Learn about waste management	Produced film about waste management	Film contains suggestions on how to manage trash, see also Regional Report, Sweden, 2 <sup>nd</sup> round
Turkey	Can energy savings be achieved by developing new design models for street lamps?	The use of powerful LED bulbs instead of incandescent bulbs in street lights will save energy. In addition, by making changes in the design of the chandeliers used in street lights, a system that can save energy without causing light pollution has been created	Report
Turkey	How to calculate the cost of generating electricity	287 solar panels can be installed for the school. The installation of the system costs approximately 78.000 dollars. The installed system works for an average of 25	Report

	with solar energy in schools and homes?	years. The first 5 years cover the cost and the remaining 20 years provide an advantage. Generating electrical energy by installing solar panels is a costly process during the installation phase. However, when considered in the long term, it is advantageous despite performance losses.	
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## (2) Awareness

We borrow the definition from the Merriam-Webster Online Dictionary, where ‘awareness’ is defined as ‘knowledge and understanding that something is happening or exists’. For us it means *knowledge and understanding in the context of the MOST project, the topic of sustainability, waste and energy in general, and the specific topics or problems addressed in the SCPs in particular*. We expand the definition by adding the *consciousness of the importance* of knowledge, practices and skills addressed in the SCPs.

A great range of SCPs had the purpose of raising awareness, and the solutions belonging to this category are *those where importance of knowledge, skills or practices has been underlined or where raised awareness has been explicitly reported* as opposed to the Recommendations. The SCPs in this category have succeeded in raising awareness among the students, the schools, the community members who participate in the SCPs, as well as the community at large. Examples of solutions in this category are increased awareness of the importance of growing own vegetables to reduce food waste (Austria), increased awareness on biodiversity as students worked in the school’s garden (Germany), increased awareness about waste management through films about residual waste made by students that were disseminated to community at large (Sweden). See more examples of questions and solutions in Table 7.

Table 7. Examples of research questions and solutions in the category Awareness

Country	Research Question(s)	Solution(s) (ev. Method)	Comments
Austria	How can we reduce food waste?	Awareness of growing your own vegetables	Awareness of the importance of growing own vegetables to reduce food waste
Austria	What can sustainable nutrition look like in the future?	Importance of learning skills on how to grow your own vegetables.	Consciousness of importance of skills
Lithuania	What can we do with waste at school?	Partial waste sorting has helped the school save money and raises students' awareness.	Students' awareness is reported to raise.
Lithuania	What led to the establishment of Druskininkai resort? What healing springs are found in Druskininkai and its surroundings? Why is it important to know, consume and preserve?	An experiment. To take water samples from healing springs. They boiled, steamed and observed how much salt or other minerals were dissolved in 1 litre of the healing spring water, with varying levels of salinity and mineralization. They gathered information to find out what kind of water is suitable for which diseases and illnesses. After learning about the natural treasures of Druskininkai and its surroundings, the pupils realized the importance, significance and meaning of preserving them. By studying the historical and medical aspects of the healing water in Druskininkai, the pupils realized how effective nature's medicine cabinet is and the importance of preserving it, nurturing it and educating people.	Realization of importance of preserving natural treasures
Germany	Biodiversity in the school's garden/ How can it be increased?	The students learned a lot about biodiversity, especially flowers and birds and put this knowledge into practice by creating their school garden with many new flowers, birdhouses and insect hotels. It was also great to see the birds	Increased awareness on biodiversity



		accepting the feeders they made. What was great was that the children took this knowledge home and expanded the diversity in the garden as well – for plants and animals. In addition, the children were more aware of the birds in their environment and talked about long birdwatching sessions at the feeder outside the school.	
Germany	Climate spokesperson/How can we communicate environmental problems at school?	As a result of the introduction of the climate spokespersons, the waste in the classrooms is currently being separated much more well. Due to the warmer temperatures, it is currently impossible to say whether ventilation is more environmentally friendly. The same applies to lighting due to the summer. Additionally, the general awareness of sustainable action and energy saving was increased.	Increased awareness of sustainable actions and energy saving
Germany	Sustainable School-Community – what can we do to be more eco-friendly?	Sustainability festival: On the educational day, several small groups of participants dealt with the different facets of sustainability. It was decided to hold a sustainability festival with a clothing-exchange-circle, a clothing swap and a clothing processing event. In addition, the lost and found box is to be prepared for the sustainability festival, sorted by size, colour etc. and sold at the sustainability festival. In addition to the topic of fast fashion, the topics of waste separation, waste avoidance, sustainable food in the cafeteria and the bicycle repair station are to be presented at the festival. The goal of the festival is for the entire school community to create an awareness of the various facets of sustainability, because with the sustainability festival, the topic reaches the entire school community, and everyone is made aware of the issue. The question of the extent to which this awareness will have an impact on everyday school life will become clear in the next school year. The created video was viewed very often and the reactions and feedback regarding the video were very positive. The elaborate preparations alone, which involved all of the school's committees, noticeably helped to raise everyone's awareness regarding this issue.	Increased awareness of whole school community
Norway	How can we minimize waste and reduce unnecessary consumption?	We reduced our carbon footprint. The savings was very high during the two-week period. With an average of 80kg of CO <sub>2</sub> e between the teams. Use of the Ducky app was a solution for reducing waste/CO <sub>2</sub> emissions. It definitely raised awareness for the two-week period in which the "Waste Reduction Race" took place.	Explicit mention of raised awareness, consciousness about carbon footprint, see also Regional Report Norway 1 <sup>st</sup> round
Sweden	Learn about waste management	Students made films about residual waste. Increased awareness about waste management among pupils and teachers.	Awareness about waste management, see also Regional Report Sweden, 1 <sup>st</sup> and 2 <sup>nd</sup> round.

As mentioned earlier, some SCPs whose solutions are categorized as Recommendations may have aimed at raising awareness or may have led to raised awareness without being mentioned explicitly. Should we consider the potentials of Recommendations for raising awareness together with the SCPs in Awareness category, the awareness addressed on the topic of waste encompasses among other awareness of the hazardous effect of certain types of waste to the environment (e.g. chewing gums, plastics, etc), awareness that too much waste was produced hence measures were needed to prevent more waste, awareness of the possibilities to re-use/re-cycle/up-cycle waste, awareness of the need to manage waste sustainably. While in the topic of energy, the awareness touched issues about excessive energy consumption, use of alternative, greener energy sources, financial saving of using alternative energy sources or changing practices, and optimization of energy use.

### (3) Maps or Overviews

A certain number of SCPs focused on *identifying problems and potential ways to solve them, including by doing theoretical calculations or conducting surveys*. This is a process of *mapping*, and it results in solutions categorized as Maps or Overviews. The mapping can be part of a larger process, and the collected information may function as a steppingstone for the next step in the problem solving. Examples of solutions in this category is given in the Table 8.

Table 8. Examples of research questions and solutions in the category Maps or Overviews

Country	Research question(s)	Solution(s)	Comments
Malta	(a) What are the positive and negative aspects of the Covid-19 lockdown? (b) How much waste is generated per household due to disposable items for protection against the pandemic? (c) How can this waste be reduced without neglecting health warnings?	Students found a very high level of usage of disposable products and that individuals were not always aware of viable alternatives. The pandemic lockdown reduced human impact on the surroundings and allowed access of wildlife to urban areas.	
Malta	(a) How can we reduce waste in our school and the community? (b) What practices can reduce the use of disposable plastics? (c) How can we influence our families to adopt sustainable lifestyles?	The majority of households have heard about sustainability and are adopting different practices that can be defined sustainable. Albeit, there are still households that are not willing to change their unsustainable practices. Although aware of eco-friendly products, families tend not to buy them mostly because they are too expensive compared to other products. There was also a marked lack of awareness about microplastics.	
Malta	(a) How do trees affect our school environment? (b) Is there any difference between indigenous and non-indigenous trees? (c) Does the tree location affect their growth rate? (d) Do trees have an impact on lowering urban surface temperatures?	All data collected was logged on the GLOBE website. Mapping of trees and average temperature and precipitation was calculated. Trees offer shade during school days especially during the hot summer months. This significantly impacts the urban heat surface temperature. Trees also absorb CO <sub>2</sub> and act as a sound barrier from the adjacent busy streets.	See also Regional Report Malta, 2 <sup>nd</sup> round
Germany	What is sustainable packaging and why is it important?	Environmental impact of packaging and paper: The production of virgin fibre paper consumes a lot of energy and water, and toxic chemicals are used that can pollute water bodies. CO <sub>2</sub> emissions per ton of paper have fallen by around 36.2% since 1995. Nevertheless, the German paper industry still emitted around 13.8 million tons of CO <sub>2</sub> emissions in 2018. Recycled paper, on the other hand, is less harmful to the environment. This means that waste-paper is processed in recycling plants in such a way that new paper is created from it. For this, the recycling industry needs up to 60% less energy and 70% less water compared to virgin paper production. In the same way, something new can be discovered from "old boxes" which the trainees demonstrated on their project day. Awareness can be raised through paper data collection at school. The data collected can be used to show how much water, wood, energy and CO <sub>2</sub> emissions would be saved with certain measures.	
Germany	Solar cells 4/What is the positive effect on the environment?	Some findings of our project: - extremely costly to build solar cells yourself - Sun ideal for energy production, as inexhaustible energy - Solar energy is clean and emission-free - Solar cells from the 3D printer	

Netherlands	How to recycle plastics?	Lab controlled plastics and post-consumer plastics behave differently	
Turkey	How accurate and beneficial do family use devices in terms of energy saving at home?	The energy efficiency of electric vehicles used in homes has been determined and devices that can save energy have been identified.	
Turkey	What is the average monthly electricity consumption in a house? How many solar panels can meet the average consumption?	215.7 kWh monthly average consumption $215.7/30=7.19$ kWh used per day $7.19/1.24=5.7 \rightarrow$ Approx. 6 solar panels Approximately 6 of the so-called 30 solar panels are required.	Similar SCPs in Turkey and in other countries

#### (4) Models

Several SCPs focused on *trying out new, innovative ideas of solving problems, often in small scale as in piloting or in modelling, with the view of showing the potentials for upscaling the solutions to larger community. The solutions of these SCPs are categorized as Models.* They can be new ideas, new products, or new practices with still limited implementation. The SCPs in this category may literally speaking have used models, like in Fuel cell car (Germany) where hydrogen cell was used as fuel cell of miniature model cars developed by students, or in Solar Car Race (Sweden) where use of solar panel in cars was investigated by using model cars. Included in this category are solutions such as various waste artefacts, i.e. new, innovative objects made of waste materials, the artefacts may fulfil everyday functions (such as creatively designed bags, clothes, packaging etc.) or artistic decorative functions like various work of art. Also included in this category are solutions of alternative ways of reducing waste and energy saving that have been conducted in small scale (e.g. one building, one school) but no further spread into larger community has been reported. See examples in Table 9.

In general, the solutions in Models are of the type where concrete actions have taken place, which may lead to recommendations. The common denominator of the SCPs in this category is that they have built competences of the involved participants, and the solutions could be realized if implemented on a broad scale (beyond schools and those directly involved in the SCPs), with the support from the policy makers and/ or the companies or other stakeholders.

Table 9. Examples of research questions and solutions in the category Models

Country	Research question(s) / problem posed	Solution(s)	Comments
Czech Republic	How to reduce plastic waste?	Waste artefacts, "personalized" linen bags,	Provide examples on how artefacts can be made out of plastic waste. Many similar SCPs
Germany	Hydrogen-cell cars/How can cars run with alternative fuels?	Building model cars is well possible with a 3D printer – a sustainably and relatively waste-free way of production. Cars can be used as toys and are so functional that car races are possible with them. They also show that this possible alternative to fossil fuels could work just like in our small models.	An example of working with models literary speaking.
Germany	Avoid litter in nature/How can we avoid and counteract littering of our environment?	The group did a garbage collection campaign and in short time collected 25kg of garbage, then they disposed the items found correctly. The group found that the class alone produces a lot of plastic waste and decided to model a garbage free snack. According to our calculations, our class alone produces 10 kg less rubbish within a week if each one. A solution to reduce plastic waste is to bring a garbage-free snack at school.	Modelling exemplary practice of bringing garbage-free snack at school



Germany	Environmental protection while purchasing// How can we make shopping more eco-friendly?	After another hour of modelling, we were able to answer our researcher question. Class 4 and their families save 437g of plastic in one week. Finally, our project was recorded on a poster and hung up in the school building.	Modelling exemplary practice of plastic waste reduction by eco-friendly shopping
Lithuania	Sorting and recycling of waste, what we can do with technological waste?	Students learn about the inner workings of a computer and use them to create a variety of human communication tools.	Innovative communication tools
Malta	(a) Are young students concerned about healthy eating practices? (b) Are young students ready to try out fruit / vegetables / other ingredients that they have not eaten before? (c) How can we use local and healthy ingredients to create simple and good tasting recipes? (d) Are families ready to experiment with healthy eating alternatives?	Benefits regarding 13 different fruit/vegetables together with sixty recipes were included in the book. Siblings were encouraged to work together as a joint family effort. Parents were encouraged to let their children express their wishes, their favourite food, and their own creativity. Parents spent quality time with their children during the preparation of dishes.  The project enhanced the students' communication skills and self-confidence as well as thinking, problem-solving skills and creativity.	Modelling new, creative healthy eating practices
Netherlands	How to better recycle waste in school?	prototype for new waste bins at school	An example of producing prototype
Sweden	Design, develop and build solar cell cars/ How to do those?	Working with small cars: The students' self-built and maximum 15-centimeter-wide cars were powered by a battery that was charged with solar cells and sometimes also by lights so that they would achieve full effect. The cars competed at  Solar Car Race during Climate Week, an annual event organized by the Climate Council in Jönköping County. During the race day each car competed in three categories 1) Speed, 2) Design and 3) Innovation. The race day comprised of races in heats, presentations in front of a jury and voting for the best design.	An example of working with models literary speaking. See also Regional Report Sweden 1st and 2nd round.  The solution could also be put under Established Solution if the Race becomes established yearly practice to raise awareness.
Turkey	How to create a temperature sensor system? How to create a timer sensor system? How can temperature and timer sensor systems be used in smart homes?	Smart home systems where temperature and timer sensors can be used are designed.	Depending on how spread this solution has been implemented, it could have been put as Established solution (see below)  Similar SCPs in Turkey investigating light and sound sensors

## (5) Established Solutions

We would like to highlight SCPs that have initiated an innovation process in cooperation with external actors or stakeholders by finding solutions that have in turn been taken up by stakeholders and/or implemented by the schools. The solutions of these SCPs were *innovative results that have arisen directly from the cooperation*. The category Established Solutions refers to *solutions of those SCPs that have been found, tried and established during the SCPs; they are meant to last beyond the project lifetime*. These types of solutions were genuine solutions to authentic problems, they have taken effect and that they have most probably created systemic changes in schools and/or in community at large. Examples are construction of benches with recycled pallets (Spain), construction of scarecrows and path markers with recycled objects (Spain), construction of school walls with tiles made of recycled plastic waste (Norway), reduced classroom heating costs by using corrugated cardboard and egg

cartons as thermal insulation materials (Lithuania), painted green footprints leading to the trash cans (Sweden), shopping bags for whole village using (Czech Republic). See examples in Table 10 below.

Table 10. Examples of research questions and solutions in the category Established Solutions

Country	Research question(s)	Solution(s)	Comments
Austria	What can sustainable nutrition look like in the future?	A community garden: Garden learning, how to grow your own vegetables to reduce waste and be aware of the importance of our nutrition	A community garden has been established through co-creation with stakeholders, and it will keep going, see Regional Report, Austria, 1 <sup>st</sup> round
Czech Republic	How to reduce waste at school and at home?	Shopping bags for whole village using.	Solution spread to be used in community
Czech Republic	What are the needs in our city? How can we improve the local environment?	Drinking fountains for birds were created and placed in suitable places, out of frequent roads.	Solution made to last
Germany	Sustainable farming – How can this make a positive impact on the environment?	This long-term project has involved the entire school community and provided all students with hands-on access to sustainable agriculture. Students from other classes came to the field during the short breaks, wanted to help join the field team after the end of their regular classes and still help. However, we were often challenged by the weather and the right seasons to plant. On the planting days there were up to 50 children on the field, working, learning about eco-friendly gardening and biodiversity. We distributed the vegetables collecting donations. The project is far from being finished and has been set up for 4 years for the time being. It is to be integrated as a fixed component in the school.	Systemic change by integrating the solution as a fixed component in the school
Germany	Fair vs. Fast fashion: baguette bags/ What is the relation between fashion and the environment and how can we contribute by upcycling products?	Making the sustainable bags turned out to be very easy and fun for the students. Many old textiles could be upcycled into useful things (here: baguette bags) and thus got a new use. While researching fast-fashion and its impact on the environment, students also became aware of major issues facing various large textile companies and brainstormed ideas and how to address these issues. Furthermore, they talked about, how they could act alternatively in their everyday lives to stop supporting these companies. In addition, the students gained a lot of knowledge regarding this issue and learned how to act in a more sustainable way in their daily life.	In this Fair vs. Fast fashion series of SCPs the upcycling of textiles has been extensively explored. Here only one example is given, but there are other products (e.g. cherry pit pillows, banana bags, shoulder bags, etc), so that Fair vs. Fast fashion can be considered as making a broad impact in reducing textile waste and offering genuine solutions to the problems. Similar SCPs in Lithuania are also reported.  These solutions can also come under category Raise Awareness.
Lithuania	Food waste in the school canteen	The study showed that pupils do not eat the food and salads that are put in. They asked for the canteen to allow them to put in their own salad. The amount of salad thrown away has decreased significantly.	Documented reduction of reduced salad waste due to change of practice
Lithuania	How to reduce classroom heating costs?	We were very surprised to find that corrugated cardboard and egg cartons are excellent thermal insulation materials. Such materials give the walls a better thermal resistance and reduce heating energy costs.	Documented lasting effect of the SCP. See also Regional Report, Lithuania, 2nd round
Lithuania	Sorting and recycling of waste, how we can help to use waste of materials from factories? Create handbags from recycled materials,	The school collects scraps of materials from the sewing factories and uses them in non-formal education classes and technology lessons. Students use the used items to make various crafts that decorate the school premises.	Established innovative practices

	according to two performance categories: (a) handbags used as a fashion accessory or as a receptacle for various necessities and bric-a-brac; b) handbags used as an interior decoration, a decorative element.		
Malta	How can the school make the best use of its olive trees?	A sustainable solution was adopted to make full use of the olives that would have otherwise been wasted. Moreover, the project also had an economic target as the harvest provided products that would have otherwise been purchased. Students also became conscious that food that arrives on our plates is the result of a lot of work of other persons. Food needs to be respected and food waste avoided. The project has been spread to other schools	Waste reduction by maximizing the use of olives. Permanent change of practice. Regional Report, Malta, 1 <sup>st</sup> round
Netherlands	NO plastic bottles in school. How to reduce this plastic problem within our school?	A durable water bottle made from green plastic and used by all students and teachers at the school. The students made a distribution plan for the water bottles: a flyer will be handed out to all students and teachers. The flyer will contain information on the project, the plastic problem, and this solution. The plan is to also hand out a few of these water bottles and flyers to other schools in the Netherlands to inspire them to take similar actions.	A lasting change in practice in the whole school. Recommendations to others. Regional Report, Netherlands, 1 <sup>st</sup> round
Norway	How can a bigger part of plastics be recycled locally, which types of plastics can be recycled, and how can our school's community be involved in this work?	Our students designed a wall – both form and coloring – for our school's new kitchen which is covered by recycled plastic tiles. The students also conducted a social media campaign (Instagram and Facebook) to inform about challenges with plastic recycling, our project and which types of plastics our business partner Utoplast can use to produce tiles. All households connected to our school contributed with plastic waste which was used for the tiles. In addition, the students collected plastic waste from our school's surroundings. Precious Plastic can work well as a solution for local recycling of plastics. Nevertheless, it requires that locals sort and above all clean their plastic waste accurately; to motivate them for this task, constitutes a major challenge. In addition, it seems important to find applications for the products which aren't purely decorative. Regulations – for example concerning requirements for purity of products used for food – are another major challenge. Locally based recycling of plastics can contribute to reduce pollution and emissions. Our recommendations go along with our findings: inform about the challenges, change regulations in order to create more useful applications for recycled plastic products, facilitate local collecting and cleaning, support local production.	The school walls with tiles made of recycled plastic waste are there to stay, as well as ideas, the knowledge, and the skills of commercially producing tiles out of plastic waste are considered impactful.  This solution can also feed into the category Recommendations.
Spain	What can be done with this waste?	Plantation of aromatic herbs in recycled wheels Rock decoration for botanical itinerary Construction of benches with recycled pallets Construction of scarecrows and path markers with recycled objects	The plantation, decoration, benches and scarecrows are there to last, hence the solutions are considered established.
Spain	What could be our contribution to climate change from our educational center?	Creation of an environmental mini-company that organizes informative and environmental awareness workshops	
Sweden	How to reduce littering at school?	Sticky notes and green footprints: The students together with waste educator from June Avfall & Miljö, produced sticky notes that were placed on the school's bins. In June, they also painted green footprints leading to the trash cans.	The solution has proven to reduce the littering, see also Regional Report, Sweden 1 <sup>st</sup> round.
Turkey	How to develop sensors for used in smart homes to optimize energy consumption?	Smart home systems where temperature and timer sensors, light and sound sensors can be used are designed. Implemented in school buildings.	Impactful knowledge, skills, and practices.

## (6) Others

Including in this category are SCPs of *other types of solutions*, such as participating in climate actions, or *SCPs with unreported solutions*, see Table 11.

Table 11. Examples of problems and solutions in the category Other

Country	Research question(s) / Problem posed	Solution(s)	Comment
Norway	How is the product produced? Where does the raw materials come from? How is the product distributed? What are the emissions related to the production and transport? Product: Coca cola-bottle	Unreported	The solution was not reported by the school
Spain	How can we improve the situation of our planet?	Join various actions around caring for the environment: European car-free day, ecological Halloween, We meet Greta Thunberg, Group of "R", Christmas respectful with the environment	Climate actions as solution (there are other similar solutions proposed by Spain, such as arrange meetings, organize demonstrations, participate in European mobility week)

## 5. Issues tackled and lessons learnt in the School Community Projects (SCPs)

During the two rounds of projects, we faced several challenges, some more country specific than others. In the following we present the challenges that were faced among more than one partner country, and for which we can suggest some solutions based on our experiences.

Challenges we came across (issues tackled) and suggestions on how to tackle them (lessons learnt/solution) are presented in Table 12.

Table 12. Issues tackled and suggested solutions

Issue	Explanation of challenge	Suggested solution(s)
Time	Lack of time to organize and carry out the SCP. The necessary preparations took much time. Time is needed for contacting companies, finding the right persons, scheduling the event in time and in school and with everybody available, including a fair at the end to have students present their work.	Provide several options, link to curriculum in several subjects, arrange SCPs that last for one day only, connect planning to already existing meeting structures. Maybe it is more helpful to invest time continuously, for example use always 10 -15 minutes of your lesson.
Curriculum alignment	The SCPs are not perceived as relevant unless they are in line with the schools' curriculum.	Do not consider only strict content, SCPs are a way of covering general skills like citizenship education, education for sustainable development,

		<p>scientific literacy, communication skills. Be creative and extend the topic. Make alignment explicit.</p> <p>Early planning: Plan for a deeper integration of the curriculum from the beginning.</p> <p>In order to build a curricular sense of SCPs, it would be recommended to analyse their curricular alignment afterwards (once the SCP is finished). Then, some more links between the curriculum and the SCP can be detected realizing that the curriculum can be addressed from SCPs in a broad way. This links should be made explicit so that projects could be repeated (with context adaptations) and teachers in other schools can implement them in an easier way feeling that they are worthy and not a waste of time (or too high consuming).</p> <p>Show the alignment in a document as part of a service package for teachers or provide it as a download on the project website.</p> <p>Provide model projects showing the connection to the school curricula, how SCPs are a relief instead of extra work.</p>
Loaded curriculum	The heavily loaded curriculum and the teachers' normal workload do not allow them to engage in activities that go beyond their normal chores.	Get in contact with dedicated teachers you already know, who might volunteer to spend their free time. Try to link the curriculum much more directly into the SCPs. Plan for the next school year, so teachers can take it up in their schedule and working hours.
Coordination of participants	Finding dates for all participants to cooperate, including the community members.	Provide several options.
Engaging community members	Finding enough community members who have time to contribute constructively to the SCP.	Early planning, personal contacts, build on previous contacts with community members, organizations, and agencies, use social media or participate in

		neighborhoods meetings. Use family members, friends, “people on the street” as community members. Get to know the key community members. Family members are usually involved over a longer time period. In most classes, you will find resources among family members, which could be community members.
Engaging policy makers	Reaching out to policy makers is difficult – they are often extremely busy and cannot or only partially join such projects.	Invite parents or school leaders who are engaged in networks and can disseminate the ideas and projects elsewhere. Connecting to existing initiatives and policies.
Communication with local authorities	In many cases they didn’t response to e-mails.	Contact the offices instead of the authorities themselves. Let the students write a letter and ask for a meeting.
Co-creation and external partners	Real co-creation with external partners.	Engage external partners in different roles, such as guest lecturers, partner in execution of SCP, as informants to identify problems, and as consultants in general.
Co-creation and students’ involvement	In the co-creation phase, some faced a problem involving students in the research process planning. It is quite difficult to determine a common method for research with stakeholders and students. Students remain less active compared to stakeholders.	Trying to get as many opinions as possible and trying to keep the interaction at high levels. Efforts should be made to keep students active.
Open Schooling approach	The Open Schooling approach is characterised by a bottom-up approach and the co-creation phase between students, educators and stakeholder. In some cases, stakeholder and even teacher left the path of working on eye height, started communicating with the students as “kids”, and tried to realise their ideas on their own.	This challenge is a hard one to overcome because you as a teacher are in charge to set the rules of communication. If you recognize a breach of the rules, you need to talk to the stakeholder. In nearly every case a calm communication and a hint on the rules will lead to success.
School internal conflicts	New approaches always find opponents, and that was also the case with Open Schooling in some schools.	Integrate as many teachers as possible and react with successful Open Schooling projects to the criticism in school. The development of participatory skills and attitudes and values that promote sustainable lifestyles and choices was more successful in projects that were either a continuation (i.e., build-up on previous projects) or were



		integrated as part of the school's development plan or both. Sporadic projects tend to 'eat up' resources and time without guaranteeing a satisfactory follow-up in terms of behavioural and systemic change.
Motivated teachers	Motivate teachers for preparing of appropriate conditions at schools.	Support teachers in the SCP running. Present good practice examples. Begin with small projects. Link to established supportive school networks.  The MOST objectives are most effectively and efficiently achieved through a whole school (institution) approach, or at least having a very engaged teacher willing to work with and for society (in terms of sustainability).

## 6. Conclusions

Based on the consortiums' experiences with SCPs, we propose a set of six conclusions that highlight the potential of SCPs as an implementation instrument for Open Schooling and underpins SCPs' potential to promote responsible research and innovation:

### (1) SCPs can initiate innovation processes by finding solutions

During the project lifetime, 672 SCPs were accomplished, and thus 672 resulting ecological solutions were proposed and disseminated to a wide range of stakeholders. The solutions were categorized as: (1) Recommendations, (2) Awareness, (3) Maps or Overviews, (4) Models, (5) Established Solutions, and (6) Others. Solutions categorized as *Models* built competences of the involved participants, and the solutions could be realized if implemented widely (beyond schools and those directly involved in the SCPs), with the support from the policy makers and/ or the companies or other stakeholders. *Established Solutions* refer to solutions that have been found, tried and established during the SCPs; they are meant to last beyond the project lifetime. These types of solutions were genuine and innovative solutions to authentic problems, they arose directly from cooperation with external actors or stakeholders, they have taken effect and have most probably created systemic changes in schools and/or in community at large. All participating countries had examples of SCPs with Established Solutions. Thus, there are innovative results initiated in the MOST project and we state that SCPs have the potential to initiate an innovation process by finding solutions.

### (2) SCPs can initiate innovation by bringing together target groups which do not regularly meet

In MOST SCPs we brought together target groups which do not regularly meet yet, such as business partners, researchers, families and students. The results or solutions of the SCPs arose directly from the cooperation of schools with companies, NGOs, families etc. In total, in 672 SCPs we managed to involve 53 418 community members (776 from business/industry, 259 from policy, 617 from non-formal education providers, 51 766 from wider society, in total 11 752 female). During several SCPs

the involved participants opened up resources, techniques and practices to target groups which did not encounter these before, for example in those SCPs that reached very many people and draw attention to a problem and its solution, like the Waste Parade in Netherlands, the olives project in Malta, and the establishment of a community garden in Austria. From cases like in Austria, we see that real co-creation with external partners can be extremely valuable and empower students to tackle their own problems.

### **(3) SCPs can promote responsible research by bringing science into school and local community**

Scientific work was done in all SCPs. This is also a sign that a step has been taken in the direction of responsible research. The fact that attention was drawn to a certain ecological issue and people were inspired to act is an important result in it's own.

### **(4) SCPs can make science education motivating and meaningful for all students**

In most SCPs, participants selected an authentic problem, which was close to students' everyday life. It seems like real-life problems which the group can decide on itself are highly motivating. We experienced that it is motivational if problems are not individual but if the solutions can help a greater community. In the co-create phase, efforts should therefore be made to keep students active. As stated in the Swedish regional report, students struggling with an ordinary school setting, flourish in an SCP setting:

*"We would say that there are so many lessons learned from this project. If we would highlight one thing, then it would be the joy of seeing young people being proud of their work and their results. We have seen so many pupils who really have shined! We heard a lot of reports from teachers who said that a particular pupil did such a great job, something they usually don't show in an ordinary school setting. We also heard from many pupils that being part of this have led to them learning new things in a new way, far from the typical classroom experiences" (Regional report, Sweden).*

### **(5) SCPs can engage students at all ages to solve real problems in close contexts**

Don't be afraid of running SCPs at lower primary or in kindergarten. There are several success stories in MOST from these levels (N=14 in kindergarten, N=315 in primary school), e.g., egg cartons as thermal insulation in a Lithuanian kindergarten, blue light protection from electronic devices in a Norwegian primary school. SCPs were also implemented in secondary schools (N=343), so the SCP approach has proven valuable for all age groups. As written in the Spanish regional report, students experienced that they could make their solutions a reality; that it is possible to solve real problems in local contexts:

*"The students have learned that there are no limits, that their proposals have value and are appreciated, and that they can take action to make their resolutions a reality. In addition, apart from transversal skills, the students have learned about science and mathematics (classifications, measurements, statistics, economics, biology, energy, climate change, expression, plans...) making sense of these contents and applying them to solve real problems in close contexts" (Regional report, Spain).*

The Dutch team stated that students were able to solve real problems thanks to close collaboration with external partners from their local community:

*"The close collaboration between representatives gave students the experience that they can act and how to become an agent of change in the near future" (Regional report, The Netherlands).*



## **(6) SCPs can raise the environmental awareness of a whole community**

Dissemination of solutions found is essential to educate the greater public and the whole school community. Starting the project with the aim of disseminating results at an event with a set date (e.g., MOST fair, MOST conference, school fair, local city event) helps to stay focused and makes projects more meaningful. In 672 SCPs we managed to involve 53 418 community members. As documented in the Dutch Regional report, fairs can bring awareness to the whole community, e.g. parents:

*“In particular at the fair many parents reported that it was the first time to see their children present and seriously being involved in an environmental issue” (Regional report, The Netherlands).*

## **7. Summary**

European policy documents for citizen education encourage schools to cooperate with other stakeholders, to become an agent of community well-being – known as Open Schooling. Through Open Schooling, schools are supposed to directly collaborate with research (higher education), non-formal learning providers and various members from their community (families, citizens, businesses, industry, etc.) in the context of science education to create a citizen science learning space. Science education in these schools shall not take place behind closed classroom doors and detached from real life, but link to its community’s societal and innovation processes.

MOST introduced School-Community-Projects (SCPs) and showed how such projects can serve as a purposeful implementation instrument for Open Schooling. In MOST, we deliberately targeted all types of schools (primary and secondary level, general and vocational education) as Open Schooling is important for all kinds of students. During the project lifetime, 672 SCPs were accomplished among the 10 partner countries, involving 78 974 participants (incl. 53 418 external community members), and thus 672 resulting ecological solutions were proposed and disseminated to a wide range of stakeholders. The solutions of the SCPs were categorized as: (1) Recommendations, (2) Awareness, (3) Maps or Overviews, (4) Models, (5) Established Solutions, and (6) Others. SCPs proved to be purposeful in several ways: they facilitated innovation processes by finding solutions and bringing new target groups together, they promoted responsible research by bringing science into schools and community, they made science education meaningful for students at all ages, they made it possible to solve real problems in authentic contexts, and they raised environmental awareness of whole communities.

SCPs, as shown, have a great potential to establish Open Schooling Communities across Europe (MOST's general objective I), and further to establish a European Open Schooling Network (MOST's general objective II). SCPs were implemented in all partner regions (objective I.1) and examples/solutions given in this report show how such projects can support institutional change in schools (objective I.3). Through implementation of SCPs in a high number of schools in each country, we also established Open Schooling networks in our regions (objective II.2), which was a prerequisite to connect partner regions across Europe (objective II.3).

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## 8. Appendices

- Appendix 1: Regional report, first round, Austria**
- Appendix 2: Regional report, second round, Austria**
- Appendix 3: Regional report, first round, Czech Republic**
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- Appendix 5: Regional report, first round, Germany**
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- Appendix 7: Regional report, first round, Lithuania**
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- Appendix 20: Regional report, second round, Turkey**

## Regional Report on SCPs: Austria (first round)

### BACKGROUND INFORMATION

- Region (Country): Austria
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Universität Innsbruck  
Energie Tirol  
Verein klasse!forschung
- Numbers of SCPs done in total: 18
- Numbers of schools involved in total: 11

### OVERVIEW

*Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:*

The first round of SCPs, which we were able to begin as early as fall 2020, went through various phases of planning, rethinking, canceling, and restarting. We began with a kick-off meeting to which community members from all parts of the community as well as teachers were invited. Project ideas that emerged from this meeting unfortunately fell victim to a wave of school closures due to pandemic and vacations. In the projects carried out at that time of recurrent school closures, mainly people close to the school (gardeners, school caretakers, other teachers) were involved as community members in the implementation of the projects, as external people were not allowed to enter school buildings and schools were not allowed to go on excursions.

In a subsequent phase, accompanied by steps towards opening up due to falling incidences, a new energy could be felt. From a project perspective, however, it must be mentioned that these were almost without exception elementary schools. The feedback on Open Schooling projects in secondary schools was a chorus of refusals with the explanation that some material had to be made up. As a project team, we expressed great understanding for this and referred to the upcoming (2022) project year. Despite their efforts, the regional support team, which includes the local city councilor for education, was unable to improve the situation, or only slightly.

From the first months of the MOST project we have learned that we need to take advantage of the phases of the school year when there are no vacations and no schoolwork. In addition, we have learned from experience, and have made it our future strategy, that teachers must be approached directly. Furthermore, it is not enough to make them aware of the project, but they must be taken by the hand for the first steps in order to explain the advantages of Open Schooling to them. A flyer specially produced for this purpose, pointing out the assistance provided by materials prepared and

the support provided by the project team, proved to be a successful strategy. In addition, 40 teachers were welcomed in 5 differently oriented launch workshops. Up to 25 projects seemed possible in the meantime and were already being planned. Another strategy that met with success was the offer and implementation of individual co-creation workshops. In this way, community members and teachers came closer together and were able to work on ideas for overcoming the challenges facing the region.

On more than one occasion, the argument was that group work and open schooling projects were not a useful way of teaching in view of the pandemic situation. For strategic reasons, the project team referred to outdoor work as an option in such cases. This evolved into several projects that have a school garden connection and seek to create awareness of the value of food and the avoidance of food waste. The success of these projects is particularly evident in their sustainable implementation, as these projects are also being continued in Project Cycle II. From the berry snack garden to the mushroom garden, various ideas could be implemented and also enjoy the participation of the community.

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).*

### SCP 1: Open schooling – open community garden

The problem arose within the biology class when it was discussed how much waste is produced just by preparing a single meal. In a further step, the discussion led to different length supply chains and their carbon footprint. To create awareness of how much resources it takes to grow fruits and vegetables to produce just one meal and how much waste is saved in the process, HLWest's 3rd grade class began planning their own garden bed as part of their project class.

The goal was to save resources, avoid waste, reduce their carbon footprint, and provide their own school kitchen with fresh fruits and vegetables. Just before the class started the project, information came about the MOST project. The Open Schooling character gave the students the idea to bring the awareness and knowledge also to the community and ask community members for their know-how. A visit and joint co-creation workshop in the university garden of the University of Innsbruck made it clear that working together has many advantages. In addition to the work in the holiday season, the bed can be cared for across classes and for many years. Also, the school, in this case the community garden, develops into a place of learning from and with each other. After some interested community members were found with the help of the association "Dein Nachbar Lohbach" and the transfer office of the University of Innsbruck, the project started. In order to facilitate communication among each other, a joint group was created via Whatsapp, in which those involved could inform each other about news and activities.

Before the start, the area on which the bed should be placed had to be cleared first, because the place was very overgrown. The students then considered together with the community members how to make the soil as fertile as possible. In addition, they already considered what should be planted, what needs to be harvested when, and many other considerations. In discussions and through experimentation, the children have learned, for example, that plants have different nutrient requirements for the soil. Once these considerations had been made and the beds prepared accordingly, it was a matter of finding sponsors for the plants. To do this, the team split up. One group was responsible for acquiring sponsors, another for the work in the garden, and still others took care of theoretical aspects such as the planting plan. Fortunately, a sponsor was found who provided various seeds and plants for the bed.

Regular meetings and the possibility of exchange through the group allowed a smooth harvest in the summer. Since a certain expertise has also been developed for fall and winter vegetables over the weeks of working together, various lettuces and cabbages were spread.



By gardening together, the project has brought the community and school closer together and facilitated collaborative learning. In addition, food awareness increased and the amount of waste produced was drastically reduced as the school kitchen was now able to access the vegetables from the patch. In the meantime, the project has entered a second phase and the garden could be enlarged. Based on the plans of our colleagues, we thought about the implementation of our community garden. The most important aspect in our eyes was that the beds are also cared for and cared for in the summer months and during the holidays. For this reason, we have started to acquire interested fellow citizens for our projects. We met with them once after our SCP Leader made an appointment. Here, too, the University of Innsbruck again supported us. Together we have now drawn up a plan that is beneficial for everyone.

To disseminate our idea we used the following channels:

- Newspaper "Westwind"
- schoolhomepage
- yearbook of HLWest

### SCP 2 Not broken just bend, making new out of old – a creative bike repair shop

We all know that riding a bike is more environmentally friendly than driving a car. There's basically no air pollution, there are no non-renewable fuels burned, it reduces the "parking problem" and is also better for our own health. But what should we do if our bike breaks? How can we repair our bike in an environment friendly way? And what everyday things could we use to repair our broken bikes? Are there more creative ways to repair broken things?

Those were some of the questions posed by pupils of a class with a robotics focus from secondary school in Wattens. Together with Werkstätte Wattens we are able to introduce them to a group of artists from Vienna, who actually address the above mentioned topics in a very creative and artistic way.

The youths were able to first enjoy a workshop, that started off with an introduction, a quiz as well as some impulses that addressed and fostered the kids' problem solving competences before learning and exploring the possibilities of repairing bikes. Old and damaged bikes were not only taken apart and put back together, repaired by replacing the parts that were broken from other bikes but also in more creative ways: Parts from scooters, like handlebars, were used to repair, big wheels on small bikes and vice versa. A very special highlight was when toys were taken apart, and the pupils were allowed to braze and solder (under supervision and with support) to repair bikes and toys in even more creative ways.

After the workshop – that took part during school time – the pupils returned together with family and friends to work on their own projects and broken tools.

This SCP has been an absolute success with everyone involved. It is a great example of how to open schooling could work. The creative approach of the experts led to very enthusiastic pupil

involvement but also community involvement. It showed the ways of the youth to repair broken things with slightly out-of-the-box thinking, encouraged them to repair and reuse instead of buying new, and gave them tools to do so.

In this case, we were able to rely on a long-standing partner of Klasse! forschung “Werkstätte Wattens”, who had the expertise needed for the questions posed. The teacher was very open to impulses, and the youths were more than happy to accept challenges. They were very grateful to still be able to get out of the school, as another lockdown was looming due to the pandemic situation in Austria.

We were once more reminded, that the motivation of teachers, pupils, and experts has been there, to have successful SCPS.

### SCP 3: How to reduce waste

The research question arose as the student knew exactly what happened to the wastewater. The project was supplemented by the question of how packaging waste can be reduced when shopping. With the support of the association Klasse! forschung, the students were able to use different materials to research how a sewage treatment plant works. Experts from the University of Innsbruck have agreed to support the project as community members by providing various substances and discussing with the students how and with which materials various substances can be filtered out of the wastewater. For this purpose, water was polluted with oil, dissolved substances, and coarse substances.

The regional problem leading to this attempt is that many people have no idea where their sewage goes, how it is cleaned, and what goes down the drain.

The different levels of contamination in the wastewater pose enormous problems for sewage treatment plants, which is why the school class also became aware that greater awareness also needs to be created in the community. In addition to dissolved substances and oils, microplastics, in particular, are a major hazard in wastewater

To draw attention to consumer behavior and the problems of plastic waste as a first step, the students conducted a survey and a short interview in front of the local supermarket. Since they often got the answer that there were no alternatives to plastic packaging, they started a self-experiment. The students tried to shop for a meal together without producing plastic waste.

The next step was to pay attention to regionality and seasonality. Since the project took place in the middle of the lockdown, the families of the students and the boarding school acted as community members in this part. Together they thought about how to shop regionally and seasonally.

For us, this project is considered a best practice project, because in the middle of a global pandemic we managed to implement a holistic sustainability project with an open schooling approach together with the school, teachers, and community members, in which stakeholders from different areas come into contact and exchange information came. The results of the students of the project are summarized: 1. Do not pollute wastewater unnecessarily, for example with grease residues. 2. Expired medications and food scraps do not belong in wastewater.

3. Look for sustainable packaging and avoid plastic packaging when you buy food.

## LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

We have found that the idea of Open Schooling in Austria has not yet reached all schools and teachers. To implement open schooling projects it would be helpful if the open schooling approach is part of a curriculum.

From this, we have learned that for a successful implementation of projects the exact explanation of the idea of the open schooling approach is necessary. Once you have taken this step and brought understanding to the teachers, there is the next hurdle. In its form and requirements, the MOST project can only be carried out in the rarest of cases with the curriculum of individual subjects.

The amount of time that an open schooling project requires is only accepted by very committed teachers, provided the problem is not specifically linked to their teaching topics. For this reason, we have specifically contacted teachers who carry out projects in the form of electives. We also learned that open schooling is only possible with open schools. We will therefore use this summer intensively for projects to prevent the forecast covid19 waves from catching up with our project idea in autumn. We have also learned that teachers need support, especially in the initial phase of a project, and that intensive contact between the project team and teachers is necessary.

We also learned that communication between schools and community members is key.

## ATTACHMENT

*Please provide the following attachment:*

*List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Plastic waste: 4 SCP
- Food waste: 9 SCP
- Scrap metal: 2 SCP
- Household waste: 3 SCP

## Regional Report on SCPs: Austria (second round)

### BACKGROUND INFORMATION

- Region (Country): Austria
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Universität Innsbruck  
Verein klasse!forschung  
Energieagentur Tirol

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members?  
Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

The second round of SCPs was characterized by sustainability projects from different sectors. The main number of SCPs concentrated on the topic of energy. Therefore we organized, together with our partner Energieagentur Tirol, a lunch workshop for interested participants from vocational schools who had the possibility to work out energy related topics. Starting with co-creation workshops, the students had the possibility to think about projects, they can carry out together with the class, the apprentice company and stakeholder from different areas. The students experienced support by experts from the Energieagentur and stakeholders they contacted. But there were also many different projects under the heading of energy. Some dealt with energy saving, others thought about how energy can be obtained and used sustainably. Beside a few projects in primary schools, we conducted around 10 (one round is still running) projects with vocational schools, where the students worked together with their class on project ideas which are relevant for a specific topic facing the energy problem. Additionally we had a great partnership with the Waldorfschule in Innsbruck who participated in different projects. In total it can be said, that most of the community members where family and friends or interested participants from the neighborhood. But in some cases the project idea brought companies, NGOs and students together. A couple of projects related to our garden fair integrated local politicians and co-workers from the city into the project idea.

*In several cases we used co-creation as the method to bring stakeholder and students closer together. Therefore we often organized a small Workshop where the SCP leader presented the overarching project idea and used different co-creation methods where students could interact with each other and with the stakeholder. As a successful strategy to find SCP leaders who were willing to carry out SCPs we relied on teacher training courses which resulted into different SCPs.*

*Within the energy topic we covered the following topics:*

- Electricity consumption and energy efficiency
- Photovoltaic project
- Energy consumption
- Energy reduction
- Solarenergy
- solar lamps
- energy efficiency
- energy in the past and today
- ...

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).*

*Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.*

### SCP 1: Energy Scouts

The Energy Scouts was a idea to acquire students who were willing to participate in the MOST project. We describe the project idea as a whole because every single project had a important part of the success of this overarching project idea, we want to present here.

The idea of the SCPs around the overarching topic “energy” arised in a brainstorming session between the MOST partners Innsbruck. Ulrike Umshaus from “Energieagentur Tirol” started working out a concept and a framework which made it possible to integrate vocational schools into the MOST project. To give the students a perfect frame to carry out their project ideas, we decided to cooperate with the Chamber of Labour Tirol, to get contacts to companys and have the possibility to set up a certificate. Together we organised a Launch Workshop for students to inform about the possibilities of the MOST project and communicate the idea of MOST.



The Launch workshop introduced into the energy topic. Beside the students, we invited also experts from different fields, to bring them together with the students. The Launch workshop resulted in teambuilding and co-creation sessions which led to inspiring talks about sustainability and the need of alternative energy, possibilities of energy saving and so on. The participating students were thinking of ideas of projects, they can carry out together and together with their apprentice company. In weekly sessions over 3 months, the students met each other, talked about their findings and lessons learned.

As the overarching topic is energy, the themes and issues, the students tackled were all characterised by a strong connection to the energy topic. The close collaboration with the participating stakeholders made it possible to really open up school, to carry out School-Community-Projects. As an example we want to present a project, which was carried out in cooperation with a local car dealer. The students were thinking of how to reduce the carbon footprint. And came up with the idea to lend bikes and e-scooter instead of cars while the cars are in the repair shop for a few hours. He found out that, the customers mostly just drive into the city to go shopping, while waiting until their own car is fixed. And so the offer of bikes and e-scooter was successful in many cases and saved carbon dioxide. Other projects calculated on how they can improve the efficiency of the machines in their company.

The dissemination was made on several levels. At the end of the project we carried out a MOST-Energy Fair, where the students presented their findings to a broad audience of stakeholders from different areas with short presentations. This fair ended also in a broad discussion between the students and the companies who were present. In addition, a short video about the idea of the project was produced and can be found [here](#).



The projects also attracted attention of local newspapers, who were willing to report about the successful projects. An example can be found [here](#).

In addition, the project was submitted for the sustainability award of the Forum Umweltbildung (part of the Austrian Ministry of Climate Change) and won a prize in the category of "cooperation". A Report can be found [here](#).

Beside this, a lot of companies were informed about the successful projects which led to positive synergy effects, which became visible in the requests and interest shown in the second round of SCPs.



## SCP 2: *Weltacker and Essen findet Stadt*

The whole world on just one acre of 2000m<sup>2</sup> – How is it possible to feed the always-rising population of our world? This is a question, students of a lower secondary class raised on a first meeting with the MOST team. We then connected them with the *feld:schafft*, who are participating in the project of having a “Weltacker” in Innsbruck. There, on 2000m<sup>2</sup> everything is cultivated what grows on the acres of our world. To give the students the chance to work on their own projects, the whole project started with the Invite stage, according to the INCREASE trail map of the Manual.

So the students invited some experts to the project and started with a co creation process. Afterwards the students found themselves in small groups and discussed, how it is possible, that everyone on our planet can have the same access to nutrition and what are the existing problems right now.

Together with experts they calculated the carbon footprint of different dishes and it became clear, that the range between different meals is immense. The conclusion was, that just single adaptations can have a big impact. What was really special at this SCP, a lot of different questions related to the overarching topic of sustainability came up. So another point was the question on how to reduce waste. Plastic waste of packaging as well as food waste?

The students decided to search for a place to set up raised beds. With the help of their SCP leader and the MOST advisor they again found stakeholder who were willing to participate and a place, which is not far from school and also accessible for community member. The participants were interested community members and an elderly home which is close to the school.

Luckily we found a place, where already existing raised beds were standing (see picture). But the beds were old and in it a lot of undefined herbs were growing. So the students organized a clean up day. The community garden is on a backside of a church, so that also the church was interested in having a clean backyard. So together with the community, the students cleaned the beds and set them up for the rest of the summer. As the beds are also accessible in the afternoon, the students came in touch with different stakeholders and interested persons and both were working together. The raised beds are the answer of the question, on how we can reduce both, food waste and plastic waste.



The Weltacker project was part of our MOST-Bike fair, where we advertised a “bike-trip” through Innsbruck, connecting all MOST projects related to the topic of community garden, raised beds, greening of the schoolyard and so on. Together with a couple of community members and local politicians, we drove around Innsbruck, where the SCP leaders presented their project on different stations. The project was also disseminated via the school homepage which led to synergy effects and attracted other schools, to also take part in the MOST project.

### **SCP 3: Green Event Waldorfschule Innsbruck**

The Waldorfschule Innsbruck became aware of the project because of our successful community projects from the first round of SCPs. A first initial meeting between the MOST team Innsbruck and some teacher from the Waldorfschule led to a brainstorming about what is possible and how School Community Projects can be carried out in the given framework of the school.

Back in school, the students begun brainstorming about possible projects, therefore they observed the everyday life in school and became aware of some problems concerning waste topic issues. Together they discussed on whom to involve in the community project with the result, that especially the family members and the neighborhood close by were integrated in the project. It shows a different approach as seen in the energy scout project, which is a reason, why we want to list this project as one of our best practice examples, as well.

The decision made, on what project to carry out, the students started to think of how to carry out the project. Observing their classmates in the lunch breaks, they recognized, that a lot of the students uses plastic bottles or lunch, which is wrapped up in plastic. So they decided to organize plastic free lunch to share their knowledge with the classmates. Since then, every Friday there is a plastic free lunch in the school, with everyone participating.

In several meetings they were thinking about what they can do and how they can find a solution. In the end the solution found was to buy glass bottles, which can be refilled again and again. The remaining question was, what to serve the classmates. It should be healthy, with a low carbon footprint and of course plastic free packed. The students decided to ask the local fruit supplier for support. Willing to participate, he provided fruit and vegetables for the project. To keep the carbon footprint as small as possible they searched for reusable kitchen machines to work on their smoothies.

The dissemination strategy was quite impressive in this case. Beside drawing a poster, which is in the school now, we received social media posts on facebook, where the project MOST was introduced and the School community project was presented as well. In addition, the students organized to participate on a local Christmas market, where they presented their idea and results and sold plasticfree drinks. In this case the students played a big part as multipliers of the MOST idea and sustainable acting.

## GIRLS PERSPECTIVES

*Please reflect on to what extend the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

As you can see in our excel sheet, a few more girls than boys participated in the SCPs. As gender equality is a broadly discussed topic in Austria, the teacher and SCP leader were aware of gender related topics. We used the Launch workshops, to briefly introduce the importance of integrating girls into STEM topics as outlined in the DoA. In general, it can be said that every participant, not matter what gender, had the possibility to participate in every single step of the project. Activities, which in earlier times were known as stereotypically male as well as activities, which were known as stereotypically female, were carried out without by both genders equally, without thematising. To support girls and make women in STEM visible, we worked a lot with role models. Any of the above mentioned best practice SCPs was lead by a female SCP leader.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

### From the Manual:

No participants found	Sometimes, schools had difficulties to find participants from the community. No one reacted on Mails sent to existing networks. With changing the strategy, for example using social media or participating in neighbourhood meetings, interested community members where found.
Communication with local authorities	As suggested in the Invite stage, schools tried to contact local politicians. In many cases they didn't response to E-Mails. Therefor we decided to contact not direct the authorities themselves but the offices, which worked out in many cases. In other cases it was successful to let the students write a letter and ask for a meeting.
School internal conflicts	New approaches always finds opponents. And so it was also with Open Schooling in some schools. The key to success was to integrate as many other teacher as possible and react with successful Open

	Schooling projects to the criticism in school.
Open Schooling approach	The Open Schooling approach is characterised by a bottom-up approach and the co-creation phase between students, educators and stakeholder. In some cases, stakeholder and even teacher left the path of working on eye height, started communicating with the students as “kids”, and tried to realise their ideas on their own. This challenge is a hard one to overcome because you as a teacher are in charge to set the rules of communication. If you recognise a breach of the rules, you need to talk to the stakeholder. In nearly every case a calm communication and a hint on the rules led to success.



## Regional Report on SCPs: Czech Republic (first round)

### BACKGROUND INFORMATION

- Region (Country): Czechia
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):
  - CUNI (Charles University)
  - SEVER (Czech non-governmental organizations in the field of environmental and development education)
- Numbers of SCPs done in total: 20
- Numbers of schools involved in total: 14

### OVERVIEW

*For the first round of the SCPs we used pedagogical and scientific materials prepared by appropriate WPs. We have finished 20 SCPs (8 by direct support of SEVER and 12 by direct support of CUNI). SCPs organized by SEVER were focused on different environmental topics (not only waste) and their topics are: greenery in the city, biodiversity, local environment like microclimate, transport by bicycles, shopping in local shops, missing waste containers. Main benefits from these SCPs are: local – small cities (well-known environment, the topics so close to the residents), many involved organizations (chroniclers, city waste services, garden initiative, environmental group of the city, seniors) and connection to the governments of the city, results really seemed in the city. SCPs organized by CUNI are oriented mainly to two topics: „Waste reduction – Without packaging” and “Food waste in the family and/or in the school/school canteen”. The benefit is here the opening the school to local community, the involving parents, school leadership and municipality for cooperation in area of waste reduction. Also connection with future teacher’s practice was important benefit.*

*The participants of SCPs were mainly from lower secondary (12), 2 were from upper secondary level. The connection with the community members ensured parents, municipalities, in few cases also business partners and other institutions.*

*Used topic are proposed, discussed and realized in different ways. NGO SEVER has a long tradition in cooperation with municipalities and schools in them (from previous projects), thus SEVER builds the SCPs on topic requirements of cities and schools. This approach enables using open schooling (and SCPs) as an appropriate vehicle for building the sustainable communities and cities. CUNI is connected to schools through former graduates and future teachers doing their practice on schools. They build the SCPs on the current hot topics discussed in expert journals and transform them appropriately to school level projects. Schools are vehicles for enhancing awareness of the community members about these topics related to sustainability.*

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).*

### SCP 1 Let's take it unwrapped!

In the context of the so-called circular economy, there is talk of a hierarchy of waste management. Within this hierarchy, it is best to prevent the generation of waste altogether. The question is where waste can be saved at the outset. In the production process, we as ordinary citizens can hardly influence this, but as individuals we also have the opportunity to do something about it. For example, by "let's take it unwrapped!". In this context, the following questions may be offered to the pupils: Which types of materials are used to make the packaging that becomes waste in your family? Where to get more detailed information, i.e. not only is the packaging made of paper, plastic or metal? How much packaging waste does the family, school produce in a certain period (day, week)? Is it possible to estimate, based on your own findings, the amount of packaging waste produced by, for example, your municipality (community related to your school)? Does the consumption of packaging materials depend on the way things are acquired, e.g. purchased and/or delivered? On the basis of this initiation, several SCPs (School-Community Project) with different focuses on packaging and packaging technologies have been carried out in several schools cooperating with the Czech MOST project team (Faculty of Education Charles University and Centre of Ecological Education SEVER).

One example is the "Without packaging" project day carried out in an elementary school by ninth graders. The pupils, initiated by their teacher, carried out a set of activities including experimental activities on the topic of plastics, created mind maps and concept clouds from their findings, and consulted their findings with representatives of company "Bezobalu" in the framework of their lecture "Zero Waste". The final part of the project day was workshops on plastic packaging artefacts and bags, where interesting products were created from waste packaging materials as well as decorated linen bags for multi-purpose use.





From a presentation and discussion on "Zero Waste" with "Bezobalu" company representatives



Artefacts from waste packaging materials



Authentic outputs of the project day "Without packaging" - "personalized" linen bags

## SCP 2 Recycling of used cooking oils

How to focus to waste prevention in school canteen and at home? What means prevention of fat flocs? These questions were formulated at the beginning of the SCP worked with research question: how to ecologically dispose of used oil and fat in the kitchen not only in households, but also in school and other canteens or catering facilities. Participants at the school level were 9<sup>th</sup> grade elementary school students and teachers of chemical and science practice, school canteen managers and experts from oil processing companies. Valued outcomes students obtained from activities: to recognize how fats and oils spilled into the sewer clog the pipes, create so-called sewer grease covers and decommission the sewage pumps. In lab activities and discussions with expert students recognized different approaches, how to elaborate of oil waste: soak used oils in napkins and throw them in the mixed waste, pour used oils into PET bottles and place them in containers for used oils or collection bins, conclude co-operation with a company which takes oils and processes them further (produces from which biofuel). They prepared different dissemination activities: introduction of the pupil project to pupils at school, parents and the general public at the traditional event "Spring Day", finding out how used oils are further processed (what is their recycling), preparation and implementation of a school experiment on the properties of biofuels and the composition of fats and oils, organization of a survey at school and with the public on the question: "How do they get rid of cooking oil at home".

### SPOLUPRÁCE NAŠÍ ŠKOLNÍ JÍDELNY S FIRMOU BILIT S.R.O.

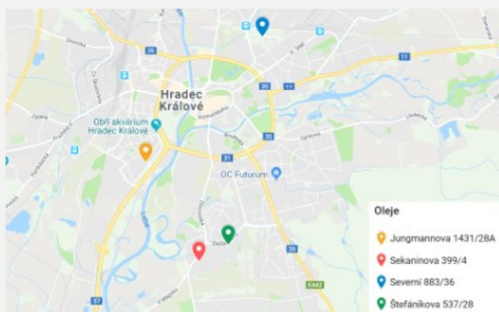
- 8 Kč / l
- svoz 1x za ¼ roku nebo dle potřeby



Cooperation between school canteen and company Bilit in used oil waste

## POPELNICE V HRADCI KRÁLOVÉ

- Jungmannova 1431 u Metuje
- Sekaninova 399 točna MHD před Duranem
- Severní 883 u prodejny Jana
- Štefánikova 537 u střediska Hvězda.



Monitoring of “used oil bins” in the city

### SCP 3 To live in green

After an agreement with the local government, the pupils focused on supporting greenery in the village. Pupils consulted with the public administration of local greenery about how to plant trees. School arboretum was established, which is open to the public. Students worked on solving of main problem: improving the environment in the village through planting trees. Participants were at school level students from lower secondary school and their teachers, local government, Mirákulum Park (production of signs) and janitor. Most of the preparation work took place in online environment. Pupils searched for the pros and cons of the city, mapped safe and dangerous places. Pupils met with the deputy mayor and the mayor, who took the pupils through the local cycle paths. The pupils handed over the results of the city's analysis to the mayor and then discussed possible project activities. After the discussion, the students have chosen the activity of planting greenery around the school and the subsequent creation of an arboretum. As part of the lesson, students identified trees around the school. Then the class approached the local green authorities and consulted with them planting trees. Pupils planted trees around the school and also planted a new fruit alley. From the 70 trees, the students chose 20 for whom we wanted to create placards. The janitor helped with their placement then. Pupils created a promotional leaflet for the grand opening of the arboretum. The arboretum was inaugurated at the end.

As next valued outcomes we can count created map of the city's dangerous places in preparation phase. Pupils met with local government representatives to present their findings from the city's



analysis. Pupils tried to present their ideas to adults and representatives of the community. Pupils learned about trees around the school, about planting trees and learned to plant a tree. Pupils developed problem-solving competencies, communicative, social, civic and work competencies during the project.



From SCP “Arboretum” realisation

## LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

We started in SCP proposal preparation in COVID-19 lockdown what influenced to communication with schools and causes postponing of SCPs beginning. Main experience is that we have to motivate teachers for preparing of appropriate conditions at schools. Also they need our support in the SCP running. Presentations of good practice are also fruitful. The beginning with small projects is suitable strategy.

## ATTACHMENT

*Please provide the following attachment:*

*List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Food waste: 7 SCP
- Waste – packaging reduction: 4 SCP
- Local environment: 3 SCP
- Local history: 2 SCP

- Waste – cooking oil: 1 SCP
- Biodiversity: 1 SCP
- Local greenery: 1 SCP
- Local arboretum: 1 SCP

## Regional Report on SCPs: Czech Republic (second round)

### BACKGROUND INFORMATION

- Region (Country): Czechia
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
CUNI (Charles University)  
SEVER (Czech non-governmental organizations in the field of environmental and development education)

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members?  
Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

For the second round of the SCPs we used pedagogical and scientific materials prepared by appropriate WPs similar way like in first round. We have finished or are going to finish 38 SCPs (24 by supported by SEVER and 14 supported by CUNI). SCPs organized by SEVER were/are focused on different environmental topics (with border view on the energy concept) e.g., energy through the lenses of the climate change –adaptation on the climate change in the city like urban greenery improvement – planting of world national trees, bird drinkers installation, or the topic of deforestation etc. The climate change is discussed in the relation with GHG emissions by different energy sources (oil, coal, wood, etc.). Main benefits from these SCPs are: local level on implementation – the own city of the student with well-known environment and good recognition of the problems affecting the citizens. In the CSPs are involved many organizations such a chroniclers, city services, garden initiative, environmental group of the city, seniors) and connection to the city government. SCPs organized by CUNI focuses mainly on energy consumption on different levels; renewable and non-renewable energy sources, energy consumption in household, , proposals recycling symbol, carbon footprint, etc. The benefit is here the opening the school to local community, the involvement of parents, school leadership and municipality members which all



cooperates on energy consumption measurements. Another benefit of the SPC was involvement of the future teacher who cooperates on the SCP and use the data for her thesis.

The participants of SCPs were mainly lower secondary students (30 SCPs), however also 10 upper secondary student groups participated in SCP implementation. The students mostly cooperate and are in touch with parents, local government members, and in few cases also business partners.

The topic of the SCP is proposed, discussed, and realized in different ways. NGO SEVER has a long tradition in cooperation with local government representatives and schools' principals and teachers (from previous projects). Thus, SCPs implemented under the supervision of SEVER reflect mostly on topics required by the municipalities. This approach enables using open schooling (and SCPs) as an appropriate vehicle for building the sustainable communities and cities. However, as demonstrated above, there exist relation between the implemented SCP and climate change and energy respectively. CUNI is connected to schools through former graduates and future teachers doing their practice on schools. They build the SCPs on the current hot topics discussed in expert journals and transform them appropriately to school level projects. Schools are vehicles for enhancing awareness of the community members about these topics related to sustainability.

## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country). Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.

### SCP 1

#### Energy Sources and Fossil Fuels. How did it start and how to go on?

First, upper secondary school students build the knowledge on what type of sources (renewable and non-renewable) are used in everyday life and what type of sources prevail in the everyday use of its families, schools and what energy is used in cities. The students, in communication with teachers, parents and municipal representatives, became aware of the importance energy resources for and understand that most energy is used to heat and light residential and commercial buildings; transport and industry follow as the second and third greatest consumers of energy. They also get the information about the energy sources used on the local level and get the information about its impacts on the environment.

The students were asked to represent in the form of a real 3D model the different phases and forms of obtaining and using energy resources. The main goal was to suggest possible solutions for their community in terms of effective use of energy and changing the non-renewable to renewable resources. In order to achieve the goal, students need to gather data about the energy sources and energy mix (share of renewable and non-renewable energy) in their city.

As might be seen on pictures below, the students developed several models portraying different types of energy sources, their production method and use. Using these models the students discussed with the local community what impacts different sources during the production and by use have on the natural environment. Moreover, using the models enabled the public to show the sources production facilities (e.g., pumps, pumping units, compressors, generators, gas flares, treaters, separators, storage tanks, and pits) and area needs to be used for the energy production (land use was discussed). Finally, students share their thoughts about the energy mix in the city and proposed several ways how to change current sources to the more sustainable one.



## SCP 2

### Bags in Woods

As part of the project, lower secondary school students decided to respond to the problem of the amount of garbage in nature. Their aim was to reduce the amount of litter in the suburban forest and encourage the local community to clean up. That's why they decided to make wooden boxes with garbage bags. Every visitor of the forest can take a bag and collect garbage on the walk, which they then put in a designated place.

The main output is several wooden boxes - trash cans, which the students created themselves from the project to the final work with wood. In addition, the students created a bulletin board with information about the project, posters, information leaflets, a photo book about their journey through the project and a promotional article. They also organized an information campaign for the public - they had a stand with leaflets on the square and explained the whole event to passers-by.

A project team worked on the project, and other elementary school students and older children from kindergarten joined in at various stages. They cooperated with the city management (mainly the deputy mayor), the city's press spokesperson, representatives of the forest administration, experts - carpenters, parents (borrowing tools, participating in a voluntary work, helping to



transport mailboxes to the forest) and the whole community (sharing opinions and suggestions regarding the project, participating on the voluntary work, use of waste containers).

The children implemented the program as part of their lessons and in their free time. They used skills and knowledge across subjects to implement the project. Pupils learned more about sustainability, became more aware of local problems, began to perceive their surroundings differently and gained the important experience that they can do something to change around them. Pupils perceive a shift in presentation and dealing with people as very important. They gained first experience in communication with the city management or other "decision-makers" and experts, they also had contact with the general public. For most of them, it was an exit from the comfort zone, they overcame stage fright and gained more self-confidence. Another area where there was a huge learning curve for them was woodworking. They got better at designing and planning, learned how to operate different tools and learned a lot about the woodworking process. The pupils themselves say that thanks to the project they have learned a lot in the field of carpentry, but much more in terms of communication, cooperation, organization of work and implementation of their own activities.



### SCP 3

#### Christmas without palm oil

Lower secondary school students focused on raising awareness about palm oil at the school and village level (awareness of the impact of their own consumer behavior). The students first found out basic information about palm oil and the destruction of forests (the reservoir of biodiversity, sink for carbon dioxide – one of the products of energy consumption and measure against soil erosion). They defined goals related to the reduction of palm oil consumption, thought about which activities would lead to the fulfillment of the goal, divided the roles among themselves and focused on the greatest possible impact of the project - that is, where in the public sector this idea (Christmas without palm oil) can be promoted and implemented through education and practical implementation.

They also thought about how to involve the public, where and what products to sell, divided the tasks and worked out the budget for the event. They informed the municipal council about the project. They made dried apples, soaps and Christmas decorations (several classes and many school teachers participated, but also some parents). The students also presented the project to managers of local action groups (Local Agenda 21). During the lighting of the Christmas tree in the village, the pupils had their own stand where they handed out leaflets, spoke to interested members of the public about the effects of using palm oil and sold self-made products (dried apples, soaps and Christmas decorations). The citizens of the village decided to support the project with an additional financial sum. The students then donated the entire proceeds to nature conservation. Pupils inform about the entire project on the school's website and also in the local newsletter. The pupils have a very good feeling not only that they helped nature with their gift, but also that they were able to spread the idea of responsible consumer behaviour and that the adults listened to them and significantly supported them. They also tried and improved various skills, e.g. budget planning, cooperation with classmates, teachers and other adults, making products, selling products, promoting their project, communicating with adults (with the public and decision makers).







## GIRLS PERSPECTIVES

*Please reflect on to what extend the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

We didn't apply the approach which one use some special conditions for girls. They were included automatically as members of project teams created from classes in the school. We didn't recorded SCP teams with gender unity, all included girls and boys with good cooperation.

We didn't need to use any strategies for engage girls. In many cases it was the girls who were the initiators and leaders of the SCPs.

In the Czech schools is working majority of teachers-women, what can be also reason for this experience.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

We started the second round with experience from the first round. It means that we use the topic "Energy" in wider sense, or we supported also SCP oriented to different area of community cooperations. We had some delay in finalisation on the first round what influenced also to beginning and finalisation of second round. Main experience similarly like in first round was that we have to motivate teachers for preparing of appropriate conditions at schools. Also they needed our support in the SCP running. Presentations of good practice were also very fruitful. At CUNI leaded SCPs the



beginning with small projects was suitable strategy. In case of SEVER led SCPs is very supportive established school network (School for Sustainable Life).

## Regional Report on SCPs: Germany (First round)

### BACKGROUND INFORMATION

- Region (Country): Germany
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):
  - University of Education Freiburg (PHFR, HEI)
  - Walter-Rathenau- Gewerbeschule
  - City of Freiburg, Department of Education
- Numbers of SCPs done in total: 20
- Numbers of schools involved in total: 12

### OVERVIEW

*The participants were from primary and secondary schools and a wide range of community members like parents or experts as well as three policy makers were involved. Co-creation has been applied in most cases in terms of developing a common project idea and finding adequate solutions to real-life problems. In a few cases, the co-creation process also included dissemination (such as a film team) and science communication.*

*To engage community members, parents and experts for environmental topics were contacted via email or phone and by contacting the MOST advisor. The problems the SCPs focused on were close to the students' personal experiences and relevant to the whole community: waste reduction, food, climate change, shopping, fashion, cosmetics. Some were more theoretical, others included hands-on experiences and a few even focused on communication strategies on how to inform more people about what they found. The problems focused mainly on reducing problematic environmental effects (of emissions, plastic waste) or finding alternatives (recycling, sharing economy or eco-friendly replacements of everyday items). Challenges we came across were the following:*

*The project coordination within the schools' curriculum (Solution: early planning)*

*Finding dates for all participants including the community members (Solution: providing several options)*

*Pandemic challenges (Solution: online meetings)*

*Finding enough community members who have time (solution: early planning, personal contacts)*

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).*

### SCP 1: “Avoiding litter at our school” - “We'll tackle it”.

This project took place at a secondary school in Freiburg and focuses on waste reduction and management. The project's trigger was the increased amount of rubbish at school that had become extremely inflationary over the last few years. In addition, packaging was not disposed of properly which lead to an enormous pollution of the schoolyard, which had also been noticed by some pupils. What was special about the participants was the following fact: The proportion of migrants and people from lower social classes at the school is over 50%, which means that teachers have a special educational mission to cover issues parents might not necessarily consider and raise the students' awareness for such problems. For this reason, the SCP participants decided to collectively research waste management at schools and come up with concrete solutions for their own school and improve the situation themselves. That is why they did not only name the project “Avoiding litter at our school” but also included the motto “We'll tackle it” to outline a clear focus on solutions. They appreciated the opportunity to find solutions to their own real-life problems they had to face every day and the students were quite passionate and emotional about that - instead of being told by teachers or parents what to do.

Amongst the solutions were the advice on how to separate waste, how to avoid waste and why it is important to use the bins provided at the school yard (and in general) or to use more sustainable alternatives instead of plastic bottles and snacks wrapped in plastic or aluminium foil. To make the solutions they found accessible to others beyond the projects' participants, they decided to invite a professional film team from a university with media focus. Together (i.e. collaboratively as equal partners) they developed a script, rehearsed and finally shot the scenes and did the cutting for the film. It was also interesting that the issues addressed and the message of the film have changed during the process: After a while, more and more negative consequences of plastic were discussed and included in the script, such as littered beaches, dying animals that had eaten plastic and huge mountains of rubbish in Asia. The co-creational process worked really well: everybody in the team was open to script ideas and suggestions and the teachers as well as the film team accepted their role as equal project participants. In terms of technical support, some students were even experienced in cutting programmes or filming techniques and could also play the expert role.

The final result was shown at the project's school in all the classes, it is featured on its website and also the MOST website to achieve a higher and more sustainable educational impact. This element of science communication was also special to the project and made it a great success.

## SCP 2: Fast fashion

This secondary school in Freiburg focused on sustainable aspects and waste reduction related to fashion. It was a mixed-age group, because it was not a regular class, but a school club focusing on environmental protection and climate change. Having decided on their topic of interest, as a kick off, they watched a film on fast and super fast fashion to raise the general awareness of all participants, which was followed by a vibrant discussion on the issues addressed. After further research, together they tried to come up with an idea to solve the problem in their own community: They organized a campaign covering all kinds of information on sustainable clothing and how to avoid or replace fast fashion and upcycle it as well as useful apps to get more insights into the topic.

In addition to that, the project offered an overview on eco-friendly and sustainable labels and brands. As a second step, to put these ideas into practice and set an example as role models for the whole (school) community, they also wanted to initiate clothes swaps and a flea market. All pieces of information and solutions found were disseminated through the club's Instagram channel, posters in a public area at school as well as the school's newsletter to reach a wider public.

The third step was supposed to be a hands-on activity: They founded a sewing club that uses old clothes and upcycles them into all kinds of things. The group sought inspiration from a regional boutique specializing in upcycling products.

Throughout the whole process, the group was accompanied by members from a second-hand store, parents and additional community members supporting the sewing club.

This SCP is a success story, because the participants tried to view the problem from many different angles and came up with multiple solutions for the (school) community. Moreover, in terms of dissemination, they have reached a huge audience and, being a school club, represent a highly sustainable project which will probably focus on and educate others on environmental issues long-term, i.e. it might also create impact beyond MOST's lifetime, with this SCP being the symbolic initial ignition.

## SCP 3: "Earth, why do you look so sick? - We want to help you!"

This project took place at a primary school in a village close to Freiburg. It was initiated by a university student and a teacher from that primary school.

They chose the topic of environmental protection and sustainability, because it concerns everyone, but especially the young people in our society. They felt that the kids were increasingly worried about the environment as a consequence of what they had heard at school, from their parents or the media and their teacher felt the need to do something to make them and their worries feel heard and taken seriously. Consequently, together with their students from Year 4 and external participants they designed a MOST project for this purpose.

The activities were given the title "Earth, why do you look so sick? - We want to help you!" to include the students' worries, but also focus on a common goal to find a solution to their (and the society's) problems.

During these intensive five weeks, the class discovered how waste separation and recycling work, what the community is already doing to protect the environment, and how much CO<sub>2</sub>, for example, is released into the air by driving. But above all, they all learned how these aspects harm the environment and drive global warming. To actively counteract this themselves, the class and their teacher met with the local forester and the village's mayor to work out a plan together, because they felt that it was important to tackle the problem with the help of an expert on climate change as well as a representative of the local community. They came up with some ideas on how to individually help the environment, but also on how to create a symbol of their project:

- That is why at the end of the project they planted a tree together at a lake close by. This tree now filters the air and reminds the children again and again how they can achieve great things even with small efforts and make the earth whole again.

## LESSON LEARNT

- Co-creation can be extremely valuable and empower students to tackle their own problems
- It is motivational if problems are not individual but if the solutions can help a greater community
- Projects need to be planned early on to fit into the tight school curriculum and to set dates with external participants
- School clubs may have impact even beyond MOST's lifetime
- The dissemination of solutions found is essential to educate the greater public
- You need to be creative to overcome challenges due to the pandemic

## ATTACHMENT

*Please provide the following attachment:*

*List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Plastic waste: 9
- Food: 1
- Science communication of environmental issues: 3
- Climate change/emissions: 1
- Sustainable shopping: 2
- Fast fashion: 2
- Cosmetics: 1
- 3D printing and recycling: 1



## Regional Report on SCPs: Germany (second round)

### BACKGROUND INFORMATION

- Region (Country): Germany
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
University of Education Freiburg (HEI), Walther Rathenau School, City of Freiburg (Office of School and Education)
- SCPs in total: 58
- Schools involved: 13

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

1. The participants were from different types of upper secondary schools (including vocational and comprehensive schools) and a wide range of community members like parent or experts as well as one policy maker were involved.

2. Co-creation has been applied in most cases in terms of developing a common project idea and finding adequate solutions to real-life problems. In a few cases, the co-creation process also included dissemination. Community members were involved through individual contacts from students, teachers, partner companies of the schools or the MOST advisor.



3. The problems the SCPs focused on were close to the students' personal experiences and relevant to the whole (school) community: waste reduction/pollution, fast/slow food (production), climate change, sustainable shopping/fashion/cosmetics/travelling, rain forests, energy and mobility, sustainable packaging, gardening/biodiversity, upcycling. Some were more theoretical, others included hand-on experiences and a few even focused on communication strategies on how to inform more people about what they found. The problems focused mainly on reducing problematic environmental effects (of emissions, plastic waste) or finding alternatives (recycling, sharing economy or eco-friendly replacements of everyday items).

4. Challenges we came across were the following:

The project coordination within the schools' curriculum (Solution: early planning)

Finding dates for all participants including the community members (Solution: providing several options)

Finding enough community members who have time (solution: early planning, personal contacts)

Reaching out to policy makers – they are often extremely busy and cannot or only partially join such projects.

## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).

Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.

(Give your own title to the stories below 😊)

### SCP 1:

#### Balcony power plants and beyond

The SCP members from Denzlingen Secondary school tried to tackle the problem of what to do with old solar modules that aren't used any more. They focused on the following questions:

"How do solar systems work and what happens with used solar systems?" as well as "How can old solar systems be reused?"

They found out that older solar modules are disposed of when they become less powerful over time and are replaced with new, more powerful modules. However, the old solar modules can still be put to good use. The students made it their goal to convert these solar modules into a balcony power system and thus feed environmentally friendly and sustainable electricity into their school system in order to make the school more eco-friendly.

For their project, they founded a sustainability club at the school. The two teachers involved all the members as well as different natural Science classes and personally addressed regional experts as well as representatives from the community to establish an open schooling atmosphere. It was a mixed age group that met with external experts on a weekly basis.

Together with parents, people from a sustainable farming project and two solar companies, they came up with the idea to recycle those solar power modules and turn them into balcony power plants. After that they planned to use the power for different purposes.

How did they work?

- When the project idea was finalized, there were many things to clarify in advance: For installations of a balcony power plant on the school building, they had to talk to the school management and the municipality as well as the energy supplier to obtain approval. After research about solar panels, a consultation with the school's janitors about possible installation locations was necessary. This was followed by a consultation with the responsible building electrician on the installation of the power socket.

- After these first steps, they could finally start the project. They did some more research about solar panels and exchanged ideas with the experts. Then they did technical drawings and created a design of the balcony power plants and at the same time did some research on how to build them and figured out ideal locations. After collecting old modules, in their natural Science and Technology classes, they added new cable routing, replaced cables and installed everything. In doing so, they made the old solar power modules ready-to-use again.

Together, they also came up with many ideas on their future use. They wanted to combine the new source of energy with an agricultural project: So they established sustainable gardening and planted all kinds of vegetables in their school garden. They received a construction trailer from the local community and installed a solar system on its roof. It is now used as a charging station for garden equipment and lights.

Future applications of the power units, they will be developing a farm bot which will independently plant and care for raised beds. It is to be powered exclusively by solar electricity from the converted solar cells. For this purpose, an electricity storage system still has to be created.

Moreover, they will design an outdoor classroom and use the power in order to fuel the overall school's power system with power from the balcony power plant as much as possible.

To sum up, the solutions they found were manifold: They found a way to recycle and reuse old solar modules and avoid their waste. Moreover, they produced environmentally friendly power for their gardening project and will even make greater use of it in the future by at least partly fueling the school's energy system with that power.

Eventually, they disseminated their results through the publishing of an article in the local newspaper, informed the whole school community about it through their website and became an inspiration for projects in other regions by spreading their ideas through the MOST section on the ICSE website.

It is a success story because they basically use waste materials and reuse them for various purposes. It is also a sustainable project that will continue working on eco-friendly energy beyond the projects lifetime, because the SCP participants met in an extra-curricular setting which can sometimes be helpful because participants are highly motivated, external participants can sometimes attend the meetings more easily than in the mornings and the project is not restricted to a school year, but work can go beyond that.

## SCP 2

### Effects of packaging on the environment

The aim of this project was to take a closer look at what impact paper and plastic packaging waste have on the environment. The underlying research questions were: What does packaging have to do with climate change? What can be done about the growing mountains of waste generated by online shopping and takeaway food? Is packaging made from renewable resources the solution? Never has there been more waste that is collected, separated and recycled in Germany - yet the mountains of waste, especially packaging waste, are growing. How can plastic and packaging waste be reduced to protect the environment? How can young people be encouraged to develop their own messages and ideas for a world free of packaging waste and implement them using media?

The project involved all kinds of people: three female teachers, a group of vocational students, occasionally parents, members from several companies and when it comes to their presence at bigger events and the study they initiated, they reached out to a large audience and included about 10.000 households in their survey.

To involve several members from companies was not difficult, because each student from a vocational school is automatically part of a company and can easily reach out to colleagues for that. To include the broader community, parents were involved and they reached out to community members through surveys or events organized with the help of and for the public and organisations like Greenpeace, HEI like the TU Stuttgart etc..

The project was divided into two phases:

Phase 1: Raising the awareness for packaging: Through research the participants learned about the global Sustainable Development Goals (SDGs) and gathered ideas and action items on how they can use the SDGs to engage. Using materials provided, they worked on future-oriented packaging materials from the packaging industry. Afterwards, they researched what has already been done in the industry.

Phase 2: Raising the awareness on consumption – packaging – plastic: In consumer trails, the participants used their smartphones to learn new things, reflect on their own consumption behavior, and develop ideas on how they can take action themselves with simple, concrete steps. On the one hand, they dealt with their own consumption behavior as well as with problems and effects of non-sustainable actions with a focus on plastic and packaging.

In addition, they planned activities to promote the solutions, e.g. a Future Day with the motto: “Old boxes rethought” with a hands-on activity at which they informed people at a booth about their apprenticeship profession, on the one hand, and showed packaging recycling from cardboard boxes, on the other hand. Furthermore, a poetry slam about it was be organized.

These solutions were found:

Environmental impact of packaging and paper: The production of virgin fiber paper consumes a lot of energy and water, and toxic chemicals are used that can pollute water bodies. CO2 emissions per ton of paper have fallen by around 36.2% since 1995. Nevertheless, the German paper industry still emitted around 13.8 million tons of CO2 emissions in 2018.

Recycled paper, on the other hand, is less harmful to the environment. This means that waste paper is processed in recycling plants in such a way that new paper is created from it. For this, the recycling industry needs up to 60% less energy and 70% less water compared to virgin paper production. In the same way, new can be discovered from "old boxes," which the trainees demonstrated on their project day.

Awareness can be raised through paper data collection at school. The data collected can be used to show how much water, wood, energy and CO2 emissions would be saved with certain measures. Also our presence at various events helped.

To summarize dissemination, they tried different measures that proved to be successful: They exchanged ideas with other projects and shared lessons learned. Participants from one group acted as mentors for other groups. They also took part in or organized several events. These were made available on the school website (e.g. Educational cooperation with a "Grenzenlos" activist; certification as a "Grenzenlos" school; presentation and hands-on activities at the MOST fair in Freiburg; Future Day in Neustadt). Moreover, information was spread by emailing the companies about their activities. A stand at the Future Day in Neustadt on July 15 was organized and a press report was published in the local newspaper. Also all activities are visible on ICSE's MOST website. Even a poetry slam about the topic was organized.

The project was a success because they reached a great number of people, so the project had a large impact on the local community and they came up with creative ways to disseminate their findings and increase awareness for the problems.

### SCP 3

#### Sustainability forum

The project focused on sustainable nutrition and gardening, because our daily routines and consumption highly affect the climate. Therefore, the following research question was formulated: How can you garden and eat sustainably? The goal was to create a sustainability forum, i.e. to create a network of people sharing the same interests that is represented in an event like a sustainability day to reach out to people, find more to join the good cause and to increase the (school) community's awareness about the issue.

Theodenktnachhaltig is the name of the school's climate club. They reached out to attractive external partners and community members by emails, phone calls or visits and invited them to the forum.

Eventually three teachers, the headmaster, and 40 external participants (parents, a city planner from the Office for Garden and Civil Engineering, members from organizations like one world forum, teachersforfuture or the Eco Institute) joined them.

They researched the topic and came up with the following solutions that have a positive effect:

- Sustainable nutrition can be achieved by growing your own food in a raised bed.
- Raised beds offer the possibility to grow food even without a garden, e.g. on city balconies.
- Own planting supports sustainable consumption.
- It is good to preserve old vegetable and fruit varieties.
- Regional consumption is as important as sustainable consumption.

Together, they came up with interactive and very lively ways to present the topic on a specific day on the school grounds. Their intention was to entertain and inform people in a relaxed atmosphere on a sunny day outside.

What happened at the forum?

- Together with their guests they built a raised bed.
- They cooked meals from sustainable/organic/homegrown vegetables and exchanged recipes and gardening tips over it.
- There were speeches and interactive performances on a stage ("infotainment").
- The schoolyard was full of booths from other climate clubs and regional organisations.
- Outdoor activities like the visualisation of one's carbon footprint through nutrition were offered.
- They offered live bread-baking.

In doing so, they wanted to inspire their audience, but also actively involve them in some hands-on activities they can also do at their homes. Also there was room to network with other actors, parents, teachers and visitors over homemade sustainable snacks and refreshments.



They disseminated their results by articles and a picture documentation on their school as well as on the ICSE website in the MOST section.

It is a success story because they brought together important regional actors for their topic and increased the (school) community's awareness of sustainable nutrition and gardening. Beyond the project, they also created a loose network of several partners who would like to keep cooperating in the future.

## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

There have been SCPs that were female ONLY: Female teachers, female community members and female students, which according to them was a safe space to work and highly co-creative. Sometimes students seemed to be less intimidated by female community members/experts than male ones. Interestingly, their choice of topics was, let's say more stereotypical: Sustainable chocolate production or sustainable cosmetics.

There were no specific strategies to engage girls as far as classes are concerned, since most school groups were already a mixed gender group when they signed up for MOST. However, in a few contexts such as school clubs the club leaders (=teachers) wanted to specifically support positive STEM experiences for girls.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

- Co-creation can be extremely valuable and empower students to tackle their own problems
- It is motivational if problems are not individual but if the solutions can help a greater community
- Real-life problems the group can decide on itself are highly motivating.
- Projects need to be planned early on to fit into the tight school curriculum and to set dates with external participants
- School clubs may have impact even beyond MOST's lifetime
- The dissemination of solutions found is essential to educate the greater public and the whole school community
- Starting the project with the aim of disseminating results at an event with a set date (e.g. MOST fair, MOST conference, school fair, local city event) helps to stay focused and makes projects more meaningful

## Regional Report on SCPs: Lithuania (first round)

### BACKGROUND INFORMATION

- Region (Country): Lithuania
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Vilnius University.....  
Vilnius municipality.....  
.....
- Numbers of SCPs done in total: 20.....
- Numbers of schools involved in total: 4.....

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:

-Participated 4 school:

- The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry,..., if any) and other partners involved in the SCPs as a whole

- The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members?

Or other strategies...

- The problems posed and covered (within waste or environmental issues)

- The challenges encountered (if any) in carrying out the SCPs and solutions

The schools which were active in other Vilnius university project were asked to participate. Only 4 school show interest to participate. In the MOST SCPs participated 4 school of lower secondary education. The primary and lower secondary classes participated in the project. The different number of SCPs were made by separate school.

The project encouraged collaboration between teachers of a variety of subjects in the school. Some of SCPs involved 2-3 multiple subject teachers who helped students with expertise questions. A total number of participating teachers was reached 25. An important aspect of the project is the involvement and development of teachers' skills in helping students to carry out research. Collaboration between different schools is weak so far. A more open collaboration and sharing is expected in the second phase of the project.

Students were actively involved in environmental projects as problem-solvers, they are building up knowledge on sustainable development and on their role as responsible citizens. Opportunity to act as scientists is improving students' abilities and understanding how science is working and how new solutions are reached. 333 students participated in the first round of the project.

The collaboration with community members is still weak. The teachers are closed to interact with other community members. The total number of non-school community members is 33. Most of them are family members. Impact of it could be the pandemic time.

The results of SCPs were the educational videos, presentations, and posters. These results were open and shared by social networks. The posters were hanged at school, at local community places, in the parcs depending on their content. The results of the SCPs could make impact on local and wider society. They really reached local community members.

The research questions of the SPCs: waste of the plastic, where to put expired medicine, what to do with used markers, the fast fashion, the water pollution of chemicals, eco products, reuse of waste. Most of the projects were related with recycling.

## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP).  
For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).

### SCP 1

#### Project title “I sort waste - I protect nature“

School: Druskininkai “Saulė” basic school

Teacher: Ilveta Eitmantienė, primary

Students age: 6-7 years



Ilveta Eitmantienė's photo (The parents agree to share their children photo)

Sorting is often seen as a trivial matter, incapable of making a difference to the global climate change problem. But all the world's troubles start with small things that are influenced by the behaviour of each of us. One person can save a hundred trees by sorting their waste, and if their children follow him, the whole forest will remain uncut. The research question of this



School Community project: Are we sorting waste correctly and willingly? How do we sort waste correctly?

The 1st grade students participated in the project. They had several meetings with community members, a lecture on waste sorting, educational videos with funny stories about protecting nature, which helped the children to learn how to sort their household waste correctly. We all together thought, what else can we do? Sorting is the first step if we want to live in a clean country, drink unpolluted water and breathe clean air. But it is not enough to be a responsible consumer. We decided to follow three steps rule: reduce packaging -> reuse -> recycle. All the parents and a few grandparents joined the project together with the children.

- The students meet representatives of “EduLandas” company and took part in the education "What secrets does water hide? What would happen if water suddenly disappeared or became unusable?" In this innovative STEAM-based education, children explored the importance of water in the modern world. In the remote version of the education, children had the opportunity to have their say in virtual votes, the results of which influenced the choices of the characters in the story.

- The children were conscientiously involved in the project activities, and we involved all family members. If children are taught the basics of waste sorting from an early age, it becomes a natural thing for them in the future. It is very difficult to forget bad habits, but much easier to develop good ones, which is why learning about the importance of waste sorting from an early age is particularly important.

#### Reducing packaging:

Consumption is growing every day in line with the world's growing population. But our habits are not environmentally friendly either. The more we consume, the more we pollute. The parents with students decided one month follow a few simple tips:

- buy only what you need;
- buy less often, but in larger quantities;
- buy packaging that can be recycled;
- buy goods in packaging that can be replenished (e.g. soap, rechargeable batteries);
- buying environmentally friendly goods (energy-saving light bulbs, items made from recycled materials);
- use less plastic bags - bring your own cloth bag to the shop.

#### Reuse:

A lot of the packaging we buy can start a second life in our homes:

- Plastic shopping bags bought in supermarkets can become rubbish bags at home and paper bags can become wrapping material;



- envelopes can be used for notes, memos;
- glass containers can become containers for all kinds of products;
- newspapers, cardboard packaging can be used as packaging material;
- old clothes at home can become new pillowcases, napkins;
- tyres can be used creatively at home - for example as swings for children;
- wood products can be used as firewood.

#### Recycling:

Every day at home, a significant amount of so-called green waste is generated. For every tonne of such waste that goes to landfill, 300-500 m<sup>3</sup> of harmful gases are produced. It is therefore important that such waste is collected and managed separately:

- Composting can be used for garden and garden waste: flower and vegetable scraps, grass clippings, tree leaves, small twigs, poo from domestic animals (rabbits, chickens etc.);
- kitchen waste: vegetable waste, husks, shells, flowers, fruit, coffee and tea grounds;
- It is not advisable to compost weeds with seeds, which may persist in mature compost. Spreading such compost on the soil leads to contamination.

The results of the project have been published on the school's Facebook page, and in the city's weekly newspaper "Mano Druskininkai".

#### SCP 2

##### **Project title „Where to put used markers?“**

School: Vilnius Jesuit high school

Teacher: Eglė Jasutė, mathematics

Students age: 13-14 years

This is a project about decreasing pollution that comes with the use of markers. Our goal is to raise awareness on the mentioned topic and make a difference.

We often use markers in our daily life, especially at school. But there is one big problem – markers aren't refillable. After markers run out of ink, they are usually thrown out without thinking twice. Most of them aren't biodegradable because the reservoir, which holds ink inside of a marker, is made out of polyester, while the body of a marker is made out of plastic. Therefore, it is not possible to recycle a marker as one piece. So, what are some environment-friendly solutions?

First, we made a public poll in which people informed us, what they do with markers that have run out of ink. Afterwards, we came up with a few ideas for reducing pollution caused by markers:

- **Bringing markers back to life.** The process is simple: take a used-up marker and dip it into water. Then wrap it in plastic cover (you can reuse the wrap multiple times) and leave it overnight. The following day, the marker is going to work as brand new. Here's a tutorial on how to do it: [https://youtu.be/cx\\_A1xZG7H4](https://youtu.be/cx_A1xZG7H4)
- **An artsy solution.** It's quite easy to make paint out of old markers: take some old markers and put them in water-filled jars. Then leave it overnight. The following day you are going to have some lovely watercolour-like paint. Here is a video on how you can do it: <https://youtu.be/Y9LWpvjluyw>
- **A correct way to recycle.** There's also a way to recycle markers without harming the environment. All you have to do is take the marker's components apart. Now you can recycle separate parts individually.

Another useful thing to mention is that some companies, like "Crayola", offer marker recycling services. You can send a handful of markers to them and they'll recycle the markers.

In conclusion, even though the problem seems quite tough to solve, there are multiple options to reduce pollution that comes with the use of markers. So, what are you waiting for?



### SCP 3

#### Project title “ Pollution of medicines - where to put them??”

School: Vilnius Jesuit high school

Teacher: Jolanta Jaksiene, science

Students age: 10-11 years

Almost all of us have expired and unused medicines in our homes. How to correctly remove outdated medicines from our home? Most people throw away expired or unused medicines in the household trash.

Prof. Viktoras Masevičius of Vilnius university Faculty of Chemistry claims that due to improper sorting of medicines, antibiotics can be found in the landfill and are dangerous for the environment. According to the professor, the breakdown of antibiotics affects the emergence of incurable diseases because of antibiotic-resistant bacteria. In addition, plastic packaging of medical products pollutes the environment. We are able to change that! Return any expired and unused medicines to pharmacy!



Agne Ralyte's comic

5<sup>th</sup> grade students made the research by investigating what is the correct way to remove expired medicines from their homes. The students listening to a pharmacist who shared information about removal of medicines, and provided numbers and facts. The students found out that in 2020 more than 80 million medicine packaging were sold, it is more than 3000 t medicines. However, only 14 tonnes were returned back to pharmacy. These facts led students to ask community, what people are doing with expired or unused medicine? Students found out that more than half respondents throw away medicines into household trash and haven't realized to do something else.

Students decided that social TV, radio or social networks should advertise the returning medicines to pharmacies. People are missing information about harm caused by discarded medicines.

Students made educational video and shared it with community (Pollution of medicine MP4 file).

### LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

### ATTACHMENT

*Please provide the following attachment:  
List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Plastic waste: 2 SCP
- Medicine waste: 1 SCP
- Recycling: 4 SCP
- Food waste: 1SCP
- Ruse of waste: 5 SCP
- Air Pollution: 3 SCP
- Water pollution: 2 SCP
- Marker waste: 1 SCP
- Closes waste: 1 SCP



## Regional Report on SCPs: Lithuania (second round)

### BACKGROUND INFORMATION

- Region (Country): Lithuania.....
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Vilnius University.....  
EDU Vilnius.....

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole

2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members?  
Or other strategies...

3. The problems posed and covered (within energy or environmental issues)

4. The challenges encountered (if any) in carrying out the SCPs and solutions

1. The schools which were active in other Vilnius university project were asked to participate. 17 school show interest to participate. In the MOST SCPs participated 17 schools: kindergarten, primary, lower secondary, and gymnasiums. The different number of SCPs were made by separate school.

The project encouraged collaboration between teachers of a variety of subjects in the school. Some of SCPs involved 2-3 multiple subject teachers who helped students with expertise questions. A total number of participating teachers was about 90. An important aspect of the project is the involvement and development of teachers' skills in helping students to carry out research. Collaboration between different schools was still weak.

Students were actively involved in saving energy projects as problem-solvers, they are building up knowledge on sustainable development and on their role as responsible citizens. Opportunity to act as scientists is improving students' abilities and understanding how science is working and how new solutions are reached. About 840 students participated in the second round of the project.



The collaboration with community members was better than in the first round. The teachers were open to interact with other community members, especially with parents – representatives of local business and community. The total number of non-school community members was 537. Most of them were family members but the external members were engaged too. Members were involved: entrepreneurs, architects, interior designers, tailoring directors, electricity suppliers, technology developers, engineers, etc.

2. No special strategies were applied to involve community members. Most of them were involved by their children. Some teachers asked their known community members to participate in SCPs.

3. The research questions of the SCPs: how to contribute to reducing fossil fuels while reducing air pollution; How to save nature by assessing consumption habits; how to save electricity at school and at home, and how saving electricity contributes to preserving nature; how we can save water in special education classes; investigate how much we save on electricity when we use solar power; how to build a lighting system for a house or apartment, a school, a house that produces more energy than it consumes, and how to connect other sensors, modules, sensors and solar panels in the future home; bringing the community together for a noble cause - insulating an internal wall with recycled materials; does the community use electrical appliances and electricity rationally; what is the dependence of electricity consumption on lighting; which contributes to electricity waste and overcapacity; finding ways for your school to save electricity. Most of the projects were related with green energy.

The results of SCPs were the educational videos, working experimental models, presentations, flyers, and posters. These results were open and shared by social networks, national MOST Fair. The posters were hanged at school, at local community places, in the parks depending on their content. The results of the SCPs could make impact on local and wider society. They really reached local community members.

## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).

Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.

### SCP 1

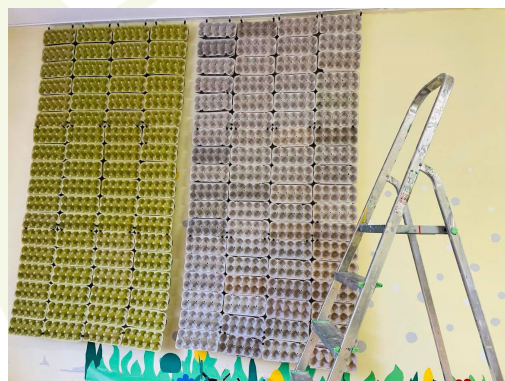
#### Bringing the community together for a noble cause - insulating an internal wall with recycled materials

Teachers of Vilnius kindergarten "Lakštingala": Dalia Sokolovienė, Svetlana Bystronovskaja, Viktorija Strazdauskienė

In this day and age, when we hear every day about energy savings and initiatives to achieve them, any opportunity to initiate actions and participate in projects is becoming commonplace, and is of great value in finding new opportunities to educate the younger generation. It is particularly important to introduce conceptual values to pre-school children by showing them all the processes.

At the beginning of September, we came together in a steering group and came up with some great ideas that we tried to implement in our institution. One of the ideas, proposed by the pupils' mother, an architect and engineering was to insulate the inside of a wall with recycled materials. The steering group really liked it and supported the idea. What was needed most was the help of the community to collect the necessary amount of material and to insulate the whole wall of the group (the one bordering the field) from the inside, raising the children's awareness of the fact that building quality is the future aspiration of all of us and that it is irresponsible and environmentally irresponsible to "heat the air". We were very surprised to find that corrugated cardboard and egg cartons are excellent thermal insulation materials. Such materials give the walls a better thermal resistance and reduce heating costs. This is all thanks to the efforts of the families of the three groups of pupils in our kindergarten, the commitment of the teachers, assistants and the whole community. It was only after the announcement of a project to collect empty egg cartons (egg trays) that a large amount of this recyclable material came into the groups. 343 egg trays were brought in over 20 days. The cartons were glued and then mounted on the wall. We recorded everything and analysed the results together with the pupils. The wall of the group was insulated from the inside and the result was not disappointing. The group wall has been given an innovative look and the room warmer.

Both the educational establishment and the home are places where attitudes are developed and shaped, and attitudes, skills and habits. In order to achieve our common goals and make them a success, we had to collaborate with parents, to involve professionals and experts in their field who shared their ideas, insights and discussions together, we implemented an idea that allowed the children not only to visually creative processes, but also make a strong contribution to their implementation and energy saving. Only a cohesive and active community, which produces a modern citizen who is open-minded about today's problems, who is able to put ideas into practice and show children the importance of sustainable living and benefits. By gaining experience, the child becomes indifferent to nature and to the issues of today's world.





## SCP 2

### **I'm changing my habits - saving water!**

Teacher of Prienai Revuonos lower secondary school Kristina Nastulevičienė

- Reducing daily water consumption can be achieved effortlessly by mobilising the whole community and changing daily habits. The research question is: how can we save water in special education? During the project period, we brought the whole community together to share the savings "virus": students and teachers, dormitory teachers and caretakers, teaching assistants, cleaners and drivers. We organised community meetings where we divided up activities: for 2 weeks, we monitored water use habits in the kitchen, toilets and washrooms. During the observation discussion, we made saving decisions and spent one month learning new water saving habits. During this time, activities took place in the classrooms: some made water saving reminder stickers, others checked the leakage rate of the toilet cisterns (using coloured water), and others searched for information on water wastage.

The "Does the toilet flush?" test showed that 2 out of 9 cisterns tested flush. After informing the school administration, the faulty taps were repaired.

Information and reminders (stickers) on how everyone can save water (in washrooms, toilets, kitchen) were distributed throughout the special education department (2 buildings) to help people to develop a new saving habit.

Classes have produced informative "BLUE PLAYS", which are displayed in the common areas of the special education unit.

We shared the project activities, results and recommendations on the school website. Each student who took part in the project took water saving reminders/stickers home to spread the water saving "virus" to their families.





### SCP 3

#### The House of the Future

The teacher of Vilnius Sietuva progymnasium: Snieguolė Bagočienė

How to create a lighting system for a house or apartment, a school, a house that produces more energy than it consumes, and how to connect other sensors, modules, sensors and solar panels in the future house.

Motion and room light sensors linked to switching lights on or off to help save energy. Selection and testing of bulbs in indoor environmental conditions. Implementation of the best solution in the house or apartment. The house is constructed in wood and generates solar electricity to heat water and provide enough electricity for the household.

Water is collected from the roof and used for heating and household needs. A well-designed ventilation system is an important part of a healthy home environment. The CO<sub>2</sub> rate indoors is very important for a person's general well-being.

Investigate how much we save on electricity by converting to solar power. How to use less of the normal electricity provided at home, in the apartment or at school. How to reduce waste by turning it into energy.

Meet both at school and remotely via Zoom. The children worked at school. Parents worked at home in some cases. They explained how to implement the tasks in the project.

We've created a house that produces more energy than it consumes. The house is visually based on drawings created by children. Everything will be controlled mainly by Micro:bit computers. The house reacts to sunlight, triggering a variety of sensors.

To make students aware of global issues at school, and to help them learn how to save electricity and land resources. We realised the complexity of the system that has to be put together to produce the house of the future, but beyond that, it will already have all the functions in place. The more of these buildings we have, the cleaner our planet will be.



## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*



All girls in the classes were involved in the SCPs. There were no special needs to attract girls as they were engaged.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

## Regional Report on SCPs: Malta (first round)

### BACKGROUND INFORMATION

- Region (Country): Malta
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
University of Malta  
WasteServ Malta
- Numbers of SCPs done in total: 21
- Numbers of schools involved in total: 17

### OVERVIEW

*Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:*

- *The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry,..., if any) and other partners involved in the SCPs as a whole*
- *The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...*
- *The problems posed and covered (within waste or environmental issues)*
- *The challenges encountered (if any) in carrying out the SCPs and solutions*

The school community projects involved 17 schools. There were 7 primary schools and 8 secondary schools while two schools involved students from both primary and secondary levels. A number of schools involved parents in the projects. These included a school that designed a survey with the help of teachers, students and parents about their lifestyle, behaviours and practices with reference to sustainable living. Some schools involved local councils. For example the Kerċem school worked with the local council and shared with them the results of the project, making suggestions that the council took up. They also involved the Ministry for Gozo in their project. The same school worked on another project in collaboration with the local council related to reduction in the use of single-use plastic.

The projects were mainly carried out through the EkoSkola network in schools because the principles of the MOST SCPs are reflected in the normal actions of schools participating in the EkoSkola programme. Most of the participating schools integrated the MOST approach into their long-term projects. However, at a particular point – due to COVID restrictions the interaction with the community had to be either stopped or converted to online participation.

Two launch meetings were held to introduce teachers to the MOST project. Material related to the project including a summary of the material and promoting co-creation. However schools were then allowed to develop their own projects and in fact the projects tackled sustainability issues in the context of their community. Some projects tackled issues related to food waste such as olives growing on trees in the school grounds. Through the project students learnt about plastics, paper, turtles, preservation of olives, olive oil and many other science topics. They worked with and shared their results with parents and other family members and other members of the local community. The MOST advisor encouraged the teachers and participants along the way.

The main challenge experienced was the COVID pandemic and the restrictions resulting from the pandemic. Although a good number of teachers expressed their interest in the project, in practice they found it difficult to implement as originally planned. Different schools adopted different strategies to cope with the COVID restrictions and therefore to ensure participation, the implementation of the SCPs (while keeping to the essential) had to adapt to these different realities. The situation was further compounded by the fact that in Malta schools are closed for holidays from the beginning of July to the end of September. Moreover June is taken for school assessments and examinations.

The pandemic had an impact on the time they could spare to work on projects, the kind of projects they could participate in, and the involvement of guests who are not part of the class bubble. But the schools managed to overcome many obstacles. Some of the projects involved outdoor activities such as clean-ups, monitoring hatching of turtle eggs and olive picking among others

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).*

### SCP 1 Improving the environment in our community

This SCP led by the EkoSkola Committee and involving the students of Kerċem Primary school attempted to answer the following questions:

- (a) What is the environmental impact of waste in our community?
- (b) How can we reduce waste in our community?
- (c) How can we embellish our community?

It aimed to:

- sensitize students about the waste problem in the community of Kerċem
- support the Kerċem Local Council in efforts to embellish the community
- propose specific actions to improve the quality of the environment

The project started with a school-wide awareness campaign about the negative impact of waste on the community. This was supported by regular meetings of the EkoSkola Committee with the Kerċem Local Council. The EkoSkola Committee also had meetings with the Bishop and the Minister for Gozo about their concerns about the quality of the environment.

The project culminated with an onsite visit to the Għadira ta' San Raflu at Kerċem during which the students conducted a clean-up of the area.

As a follow up to the clean-up, students submitted a proposal to the Local Council to embellish that area and make it more accessible and attractive for visitors.

The Kerċem Local Council accepted the students' proposal and applied for (and received) funds from the EU to carry out the embellishment project. The application was supported by the Ministry for Gozo.

The Local Council promoted this project (and other EkoSkola initiatives) on their social media networks. The project also featured in the Ministry for Gozo's Facebook page.

## SCP 2 Changing our Ways!

This project involved students of St Benedict College Middle School, Kirkop who are 11-13 years old. They tackled the problem of waste generated and tried to answer the following questions:

- (a) How much waste does our school produce?
- (b) What are the characteristics of this waste?
- (c) Can it be avoided or reused or recycled?
- (d) How can these practices be applied to our homes?

The project focused on various waste fractions and aimed to:

- sensitize students about the issues related to the problem of waste
- lead students to identify alternatives and behaviours that effectively address the waste problem
- empower students as change agents in their families and the community

Students participated in the international Mini LitterLess Campaign which raised awareness about the harmful effects of litter in our environment. Students took part in 7 different actions: appreciating the beauty of nature; harmful effects of plastic on animals; harmful effects of invisible pollutants; reducing our consumption to reduce waste; adopting a zero-waste lifestyle; the importance of a joint effort to reduce litter; and a clean-up to pick up any litter that surrounds our school premises. The actions were seen as the primer to spark off efforts on waste reduction. Work then focused on different waste fractions.

Students focused on recycling and upcycling clothes. After learning about the origin of clothes and the positive environmental impact of recycling, upcycling, and donating clothes, and the difference between recycling and reusing clothes, they participated in a craft activity, whereby they upcycled an old t-shirt and made a tote bag out of t-shirt material. The next phase included students sensitizing their families about the issue. This led to families going through their wardrobes and donating old clothes that were placed sorted for recycling or to be sold as second-hand items.

Paper Waste was also targeted to address the large amounts of paper used at school every day. During a class workshop, students learned about the process of making paper and paper recycling. They then identified ways how to reduce paper consumption and symbolically planted a couple of trees in the school grounds to compensate for paper waste.

The school efforts in waste reduction were also presented for the European Week for Waste Reduction 2021.

Most of the solutions proposed focused on waste reduction and on ways of maximizing the use and thus extending the life of products.

The students came up with the following solutions to deal with the problem in their locality:

- More informed use of the national recyclable waste collection scheme.
- Creating awareness about upcycling as an alternative to recycling.



The project's results and suggestions were disseminated throughout the whole school community and beyond through the school's social media platforms.

While working on the project, the school established collaboration links for this and future projects with: (i) Kirkop Local Council for community outreach; (ii) ST Microelectronics – for work with electronic waste; (iii) HSBC Malta for work regarding Climate Action; (iv) Wasteserv for work related to waste management; and (v) ReFab Textile Recycling for work specifically focused on sustainable use of textiles.

### SCP 3 Investigating a turtle nest site

School-Community Project (SCP) documentation  
SCP leader: Ms Ramona Mercieca

Participating school: Gozo College, Middle School

Students' Age: 11-13 years

Project time frame: Project Year 1

The students of the Gozo College Middle School worked on this project. They investigated the following research questions:

- (a) What are the ideal environmental conditions for a successful turtle nest?
- (b) Does climate change affect turtle hatchlings?

This investigation started when a loggerhead turtle laid eggs on Ramla Bay in Gozo. This was the first recorded and confirmed nest in Gozo after 70 years and it sparked interest in conservation and marine life. Students measured surface and ground sand temperature from and around nest site, air temperature, humidity and barometric pressure 3 times daily (morning, afternoon, evening) throughout the whole incubation period between June and August.

During site visits the students noticed, on many occasions, that the beach was full of litter especially cigarette butts and microplastics. To back up the educational process and support wildlife, the students took the initiative and organised a beach clean-up event. They teamed up with volunteers from Nature Trust FEE Malta (a local NGO) and the general public.

All data collected was analysed during online meetings.

- Research shows that if a turtle's eggs incubate below 28°C, the turtle hatchlings will be male. If the eggs incubate above 31°C, the hatchlings will be female. Temperatures that fluctuate between the two extremes will produce a mix of male and female baby turtles.
- During the incubation period sand temperature never exceeded 30°C, so most hatchlings were males. Out of 105 eggs, 84 hatched but 2 of them were dead.

Besides lots of cigarette butts, bottle caps, straws and cotton bud sticks, thousands of small pieces of plastic including nurdles were collected from sieving the sand during the beach clean-up.

Most of the students were accompanied by parents and other family members during their data collection sessions. In collaboration with Nature Trust FEE Malta students promoted the Adopt the Turtle Campaign.

The students participated in 2 online meetings with students from the University of Lima. They spoke about their experience and shared the results of their investigation on marine litter and data collected from turtle nest site in Ramla Bay with 1st year General Ecology students attending Universidad Nacional Agraria La Molina in Lima, Peru. The students shared their findings and together they discussed the ideal conditions for a turtle nest to be successful. The project was also submitted and received awards in the International Virtual Science Symposium organized by the GLOBE Programme.

#### SCP 4 Environmental Audit of the building housing the office of the Prime Minister

Students of St Ignatius College Handaq Middle School led the audit of the building housing the office of the Prime Minister of Malta. They attempted to answer the following research questions:

- (a) How are principles of sustainability implemented at the work place?
- (b) How can the wellbeing of employees be safeguarded through sustainable work practices?

The project aimed to help students to:

- explore real-life sustainability issues/dilemmas that challenge the 'textbook' approach
- promote change in the community
- share experiences and suggestions about sustainability issues

A group of six students accompanied by their educators carried out an environmental audit at the Office of the Prime Minister and other areas within Auberge de Castille, including the quarters of Hon. Dr. Carmelo Abela, Minister within the Office of the Prime Minister.

After liaising with the Office staff, two students conducted a reconnaissance visit to the site to familiarize themselves with the place and identify issues that need to be looked into more detail during the actual audit exercise. Together with their teachers they developed a checklist that they will be using during the audit.

On the day of the audit, the students toured and examined the building and audited various areas including: the front offices, the reception area, the Prime Minister's office, the staterooms, the boardrooms, the kitchenettes, the bathrooms, the restrooms, the corridors, the fire exits, the waiting rooms, the terraces and various other facilities. The students also had the opportunity to interview staff members to further understand in which way the existing building design, operations and in-house policies are contributing to a more sustainable lifestyle.

Back at school the students analyzed their observations and compiled an action plan that they presented to the Hon. Dr. Robert Abela (Prime Minister of Malta) and Hon. Dr. Carmelo Abela (Minister within the Office of the Prime Minister) in the presence of their staff. In a year's time the students will once again visit the OPM to verify if any of the recommendations they put forward were taken aboard.

The solutions proposed were grouped under the following categories:

- measures to ensure energy and water conservation
- procedures related to waste management
- measures related to safety
- green procurement
- practices that promote the wellbeing of employees

Besides listing the issues found (organized per areas visited), the Action Plan presented relevant actions that need to be taken to promote sustainable choices and habits.

The event was reported on the Prime Minister's personal FB page, on newspapers, on national TV and on the EkoSkola website.

## LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

One lesson learnt is about the importance of flexibility when dealing with schools especially when dealing with issues concerning sustainability. Sustainability issues are, in most of the cases, wicked problems that, by definition, require different perspectives to resolve. Schools can be very important tools for reaching and teaching the community. They can serve as the melting pot where communal concerns are addressed and workable solutions found.

## ATTACHMENT

*Please provide the following attachment:  
List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Environmental audit of building: 1
- Plastic waste: 1
- Food waste including fruits on trees growing in the community: 3
- Waste-related practices and management: 4
- The impact of different environmental parameters on a turtle nest site: 1
- Heat Island Effect in natural and urban environments: 2
- Permaculture gardens: 2

- Waste-generated by COVID-19 pandemic: 1
  - Water conservation: 2
  - Energy consumption: 1
  - Sustainable and healthy eating: 2
  - Improving the environment of our community: 1
  - Improving the quality of life of needy people: 1
- (The numbers add up to 22 because one project dealt with energy and water which are here represented separately).

## Regional Report on SCPs: Malta (second round)

### BACKGROUND INFORMATION

- Region (Country): **Malta**
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country): **University of Malta + Wasteserv**

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members?  
Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

**Participants:** Although some of the SCPs were conducted by groups of students involved in the Girls4STEM Project Summer School, the majority of the participants were mainly schools that are involved in the Eco-School Programme (locally known as EkoSkola) run by the local NGO: Nature Trust – FEE Malta. From the start of the MOST project, it was felt that to ensure success we had to collaborate with this NGO. The reasons for this decision were:

- the objectives of MOST are shared by EkoSkola;
- 85% of the total student population in Malta are active in the EkoSkola project;
- schools participating in EkoSkola are already skilled in student-initiated action dealing with sustainability issues in their school and in the surrounding community; and
- integrating MOST in the EkoSkola program would reduce additional pressures on teachers who volunteered to be part of the project.

The main links to the community were students' siblings, parents, and other relatives. This is considered crucial in any approach as besides helping in the dissemination of the values that the project is trying to achieve; it serves to get validation and gain support from the parents. Other links with the community involved Local Councils mainly, but also the local parish, some local businesses, and a Bank.



**Strategy:** Rather than opting for one-time activities, due to their participation in EkoSkola, that fosters student-led actions that are framed within a whole-school approach, schools opted for a cross-curricular approach. This ensured that the actions were (a) backed up by the curriculum (i.e., giving them ‘currency’ to the overall educational baggage of the students), (b) integrated within the school’s development policy, and (c) continued long after the project ended. Consequently, some schools, rather than opting for a new project, decided to build on the success achieved in Project Year 1 and extended their remit. This was also advantageous regarding the contacts with community actors as most of the people involved already knew each other and worked together.

In most of the cases, specific SCP committees were not formed to coordinate actions related to sustainability. Such ‘committees’, involving various stakeholders, were already set up as a requirement by EkoSkola.

**Problems:** Teachers do not have any problem engaging in issues related to sustainability. The heavily loaded curriculum and the teachers’ normal workload do not allow them to engage in activities that go beyond their normal chores. All the SCPs reported were carried out by teachers who volunteered to dedicate their free time. However, they did not fill in evaluation forms nor keep minutes of their meetings, as they considered them unnecessary for the implementation of the SCPs. However they prepared a report about their SCP.

**Challenges:** Overall, schools did not encounter any great challenges since most of the SCPs were a continuation of previous contacts with community members, organizations, and agencies.

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found** and **where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).*

*Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.*

### Overall comment:

The success of the SCPs listed below was dependent on the following set of key principles that were maintained throughout and thus ensured that the research questions were addressed, and effective solutions found.

The approach adopted was **holistic** on three fronts: (i) it integrated sustainability issues into all aspects of education (i.e., the curricula, the pedagogy, and the school management) through a whole school approach; (ii) it ensured that the economic, social and environmental dimensions were being considered during the project design discussions; and (iii) preparation for, the implementation and the follow-up of each project was interdisciplinary in that it integrated various disciplines, including science, social science, and humanities.

The SCP had to be grounded in the local context thus ensuring **local relevance**. When addressing local sustainability issues, students had to learn about and respect the community's values, traditions, and practices. We found that the closer the projects are to “home” the greater the chances of students developing the empathy to engage with the issue on a global level.

The projects had to involve and build **partnerships and networking** among various stakeholders, including educators, family members, local communities, NGOs, and government entities. Besides being a learning opportunity, this networking opens up a wealth of educational resources (including community resources).

Working in groups facilitated **participatory learning** that is learner-centred and interactive. This encouraged the development of critical thinking, problem-solving, and collaboration skills.

- Each SCP ensured that its actions were **monitored and evaluated**. Besides ensuring the SCPs' effectiveness and impact, it provide insights on how the project could be improved in successive months.

### SCP 1: Olive Picking

The school's main concern is food waste and Olive Picking is just one of a string of projects that are all connected to this main theme and to the school organic farm – which was originally a derelict area. Once formed, the organic farm became the hub for initiatives related to healthy eating. Through contacts with various farmers (mostly relatives of the teachers and/or students) students learned agricultural skills and were soon growing their own vegetables and fruits at school. They also decided to sell the produce (for fundraising purposes to maintain the farm) to their teachers and families.

In their efforts to keep the production as organic as possible, the students decided to keep a compost bin which was maintained mainly through garden waste from the farm itself. While collecting garden waste from the garden of the Sisters of St Dorothy convent, students noticed that a large percentage of olives was being wasted. They enquired about this and learned that the community of sisters used to pick the olives themselves to produce olive oil, however they had to discontinue this practice because of their old age. This was what sparked the Olive Picking project.

### SCP 2: Fostering SDG Awareness

The school administration conducted a questionnaire with staff, parents/guardians and students and discovered a community deficit with issues related to sustainability (as expressed in the SDGs) and consequently on how to make sustainable choices and live sustainable lifestyles. The school initiated a string of student-led projects under the theme Together for Our Planet of which Fostering SDG Awareness is a component. The overall aim was to facilitate a whole-school approach to learning all the learners (from KG to Year 6). Besides a general increase in awareness of the SDGs, this SCP included as Priority Targets certain SDGs (i.e., SDGs 11, 12, 13, 14 and 15) in the School's Development Plan and have now become part and parcel of our teaching and learning:

To promote active citizenship skills and 21st century skills amongst the young learners, a cross-curricular approach that integrated various other projects and programmes thus promoting a systemic viewpoint was adopted. Students were encouraged to reflect on their actions and how they can achieve some targets of the Sustainable Development Goals. The school focused on providing a variety of actions aimed at enhancing the children's curiosity and responsibility towards the surroundings through activities that involve their families and consequently the community.

### SCP 3: Towards a Carbon Neutral Future: Our Tree Inventory Project

The school is situated in Gzira, an urban area in which there is heavy traffic and many buildings. In efforts to improve air quality, the Local Council embarked on a tree inventory exercise in the locality funded by the JUSTNature project, which is a part of the European Commission's (EC) Horizon 2000 programme. The school decided to support this inventory exercise especially because of its 200 trees located in different areas of the school. The tree inventory exercise was conducted in collaboration with the Research Innovation Unit as part of the Gzira Local Council.

All the Grade 7 students (11-and 12-year-olds) participated in the exercise and were divided into small groups, each of which assisted by teachers, Learning Support Educators. Grade 11 students (16-year-olds) together with project officers from the University of Malta and the Eastern Regional Council environmental manager. Each group mapped the trees of different areas of the school.

During this exercise, the students identified each tree using an application called Plantnet or Google Lens and a booklet which illustrated different local tree species. Students then measured the circumference of the trunk to determine the age of the tree. They also took a photo of each tree using a survey reference scale to find the height of the tree and the width and surface area of the tree canopy. All this data was inputted using an app called Map marker and each tree's location was geotagged. All the data collected was sent to the Gzira Local Council for processing.

The aim of this exercise was to determine how trees impact the carbon sequestration within the area and the amount of oxygen released through photosynthesis. Moreover, the information collated will assist in determining the temperature change because of the shade provided by the canopy of trees and the natural cooling of the site through transpiration.

### GIRLS PERSPECTIVES

*Please reflect on to what extend the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

There were no specific strategies used to engage girls per se. The emphasis was on ensuring active student participation irrespective of the gender. The importance of the whole process was to ensure that the sessions spent planning were conducted in a learning environment in which the students felt accepted and safe. The trust built in the group led to a situation in which everyone felt free to contribute, take initiatives and work towards the group's common target. In fact participation of female students was always very high (except in the case of an all boys' school).

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

The development of participatory skills and attitudes and values that promote sustainable lifestyles and choices was more successful in projects that were either a continuation (i.e., buildup on previous projects) or were integrated as part of the school's development plan or both. Sporadic projects tend to 'eat up' resources and time without guaranteeing a satisfactory follow-up in terms of behavioural and systemic change. The major lesson learned was that the MOST objectives are most effectively and efficiently achieved through a whole school (institution) approach.

## Regional Report on SCPs: Netherlands (first round)

### BACKGROUND INFORMATION

- Region (Country): Netherlands
- Partner Institutions:  
Utrecht University, Freudenthal Institute  
Naturalis Biodiversity Center, Leiden
- Numbers of SCPs done in total: 20
- Numbers of schools involved in total: 18

### OVERVIEW

*In the Netherlands most SCPs were oriented to lower secondary education. These SCPs were all oriented on reducing waste at home and around the school. The community members being involved in these SCPs initially involved the parents of the students, but in some cases also involved representatives from industry (e.g. for alternatives for plastic water bottles in school) or policy makers on the level of the school (how to implement sustainable measures for waste reduction in and around the school). One initiative where we collaborated with an initiative for primary schools – the Energy Detective – resulted in a SCP with a primary school related to the energy transition and involving parents of the children. Another specific SCP oriented on upper secondary school students who wanted to do their final research project on recycle plastics in collaboration resulted in a SCP with researchers from university.*

*In a large scale event where students in small groups worked as SCPs on waste reduction in and around the school, we know that they collaborated on a research question/aim, a method to address the aim, teachers guiding this process, and final presentations of their findings. How exactly this group work exactly followed a co-creation procedure was less visible for us. In the schools where we closely collaborated with the implementation of SCPs, the students and other SCP members really worked with a co-creation process following phases like brainstorming with post-its, grouping themes, distributing work for collecting information needed and involving relevant community members, etc. The involvement of community members was in all cases organized by having students ask their parents, call representatives from industry, or make appointments with members of the board of their school. In the case of the primary school initiative related to the Energy Detective, also members of the municipality were involved, since they are also interested in ways to involve and inform parents about the needs and possibilities through the schools.*

*The challenges that we encountered were mainly caused by the successive changes in regulations at schools or sickness of teachers due to the covid pandemic. Several times we were not allowed to visit schools, projects (and the launch workshop) were cancelled, and schools and teachers preferred to limit their focus to the core curriculum and to supporting students at risk. The best solution that helped us to have experience with implementing on a large scale was by designing a description of a one full day SCP that*



*(mathematics) teachers could use to involve their students in a project that could also be used to evaluate their transversal and process skills in mathematics.*

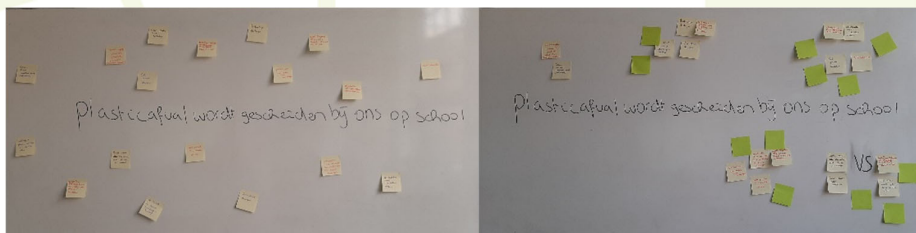
## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP).  
 For each story, please give a more detailed information on the problem posed, strategies to start up SCPs,  
 who were involved, ways of working and solutions found. Explain also why this SCP has become a success  
 story for your region (country).

### SCP1: NO plastic bottles in school

The first SCP in the Netherlands was carried out by a small group of four enthusiastic secondary school biology students (16-18 years old). Plastics disappearing in the water surrounding the school (canals) was the main underlying problem the students choose in their brainstorm session. Students were introduced to the problem of microplastics in lessons before the start of this project as part of the regular school curriculum.

We first shared success experiences on sustainable subjects or on collaboration projects, later added a broader view on successes in general according to the process of appreciative inquiry. Students wrote each experience on a sticky note, put these on the whiteboard. Then, students selected the experiences that could contribute to this next project. The students noted that many plastic waste was part of the total amount of regular waste in combination with the fact that our school is not separating their waste. Therefore, the students wanted to focus on how to reduce this plastic problem within our school.



(self-made photo's)

Ideas were grouped by the students, and everyone was allowed to vote (with green sticky notes) for several themes. This helped the class to choose the most important and interesting topics. With a few of our favorite brainstorm idea's we asked all available staff, teachers and students in de school to vote for their favorite solution, or to add an option. Students were also asked to divide topics and to do some literature research on their main topic as homework for the next meeting.

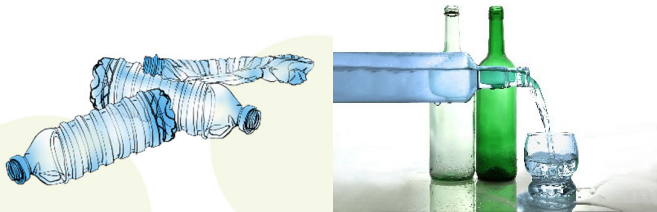
The group contacted the municipality Utrecht and learned about their future plans of post-collection waste separation. This changed the direction of the project from plastic waste separation, to ways of reducing the amount of plastic waste produced in the school. Several ways of waste reduction were proposed by the students. The type of plastic waste mostly found in waste bins, was the non-recycled plastic water bottle. By interviewing teachers, fellow students and school staff members, one favorite idea was selected: a durable water bottle, made from green plastic, that they wanted all students and teachers to use!

The team compared several water bottles on price, looks, possibilities for logo's and sustainability (source material). Students contacted the manufactures of our favorite water bottle.

The team created a distribution plan for the water bottles: a flyer will be handed out to all students and teachers. The flyer will contain information on the project, the plastic problem, and this solution. The plan is to also hand out a few of these water bottles and flyers to other schools in the Netherlands to inspire them to take similar actions.

The team presented this bottle and the implementation plan to the director of the school. He was positively surprised by the idea and promised to make concrete steps after the summer holidays.

The success of this SCP was the implementation of activities inspired by appreciative inquiry (discovery, dream, design and deliver - <https://appreciativeinquiry.champlain.edu/>) and the brains storm and co-creation processes supported by post-its and well organized group work.



(Pixabay pictures)

## SCP2: Reducing waste in and near school

This SCP was performed by 15 students in a special 'brain skills' group that perform extra curricular activities and follow the regular curricula in a reduced time frame. First the students were asked to measure the weekly waste production at home to involve their parents in creating awareness for waste and the need for change. When extrapolating their measurements by calculating yearly production (and comparing these numbers with national averages) the students' interest was raised to focus on how to reduce waste.

Afval

In Nederland wordt huishoudelijk afval vaak gescheiden ingezameld. Thuis doe je dat bijvoorbeeld door papier en glas apart te houden en misschien heb je een aparte Milko voor groente- fruit- en tuinafval (gtf). Een deel van het huishoudelijk afval wordt opgehaald door de vuilniswagen en ander deel breng je zelf weg, bijvoorbeeld naar de glasbak.

**Instapopdracht 1**  
 Vul met elkaar een tabel over jullie huishoudelijk afval.

Soort afval	wordt opgehaald	wegbrengen	Schat in: Hoeveel stuks of hoeveel gewicht (kg) per week
GFT	X		3-4 bakjes + tuinafval
plastic	X		2 zakken
pasta	X		1 doos per week
rester	X		1 doos p/w
glas		X	8 flessen/pakken p/w

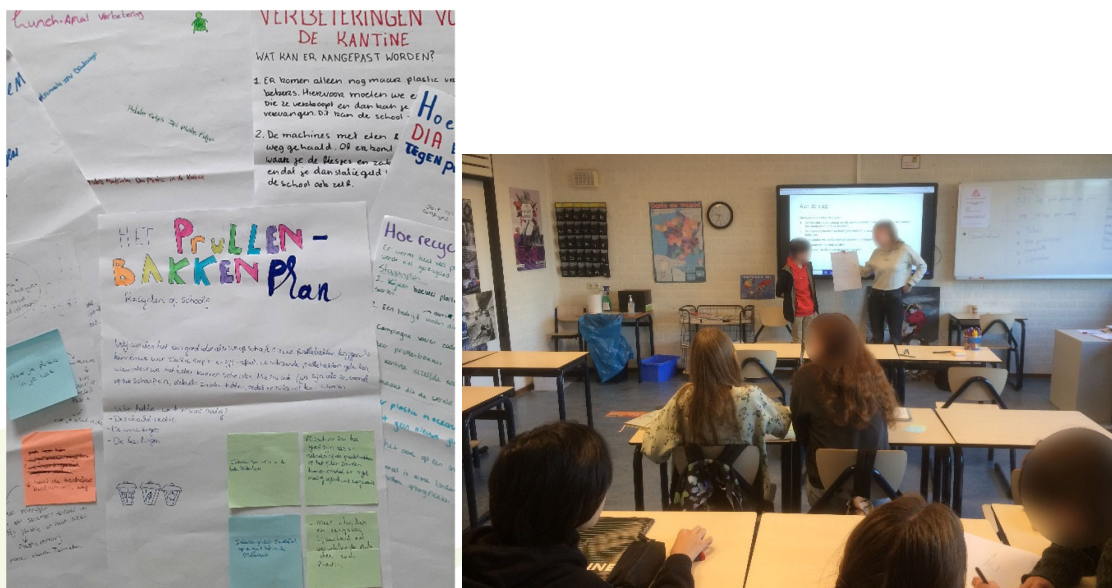
Het Centraal Bureau voor de Statistiek (CBS) verzameld in Nederland allerlei gegevens, ook over afval. Op de website van het CBS stond in de zomer van 2021 dit bericht met de staafgrafiek (op de volgende pagina).

Grootste toename huishoudelijk afval in bijna 25 jaar  
 In 2020 werd 9,1 miljard kilogram huishoudelijk afval ingezameld, 521 kilogram per inwoner. Dit was een jaar eerder nog iets minder dan 8,5 miljard kilogram (492 kilogram per inwoner). Hiermee is deze afvalberg met 6,8 procent gegroeid, de grootste toename sinds 1997.

Huishoudelijk afval naar soort

After a some introductory videos on where (plastic) waste travels and the damage it causes, the students focused on how to reduce waste produced within their school and surrounding the school.

Groups of students did some extra research on their favorite topics. Each group created a poster with the main issue and their solution. These poster presentations were shared with teaching staff and the board of the school. Potential next steps were new and better waste buckets outside the school and less products with plastics in the school canteen.



(self-made photo's)

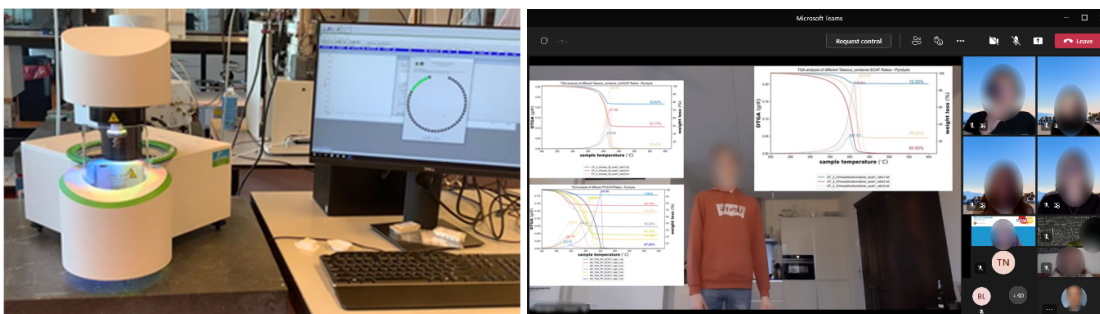
The students came up with creative ideas, in particular the one informed by their experiences on the school playground with waste buckets from which waste easily is blown away by the wind (the "Prullenbakken Plan"). Their solution was seriously considered by the board of the school. Concrete next steps (implementations) were not realized within the timeline of this SCP.

This SCP 2 was successful in the sense that we also piloted the worksheets for a national one day SCP event during which students have to measure waste production with their parents and create research questions for small waste reduction projects that can be addressed in one day. This national SCP event is guided by Utrecht University from a distance, so well-described guidelines for students and teachers were of crucial importance for its implementation. SCP 2 proved the potential of such an approach and helped us to fine tune the guiding materials.

### SCP 3: Recycling plastics

In addition to these plastic waste projects, a small group of four U-Talent students (age 16-17) carried out their thesis research project that they have to perform at the end of secondary school, with help from a Utrecht University researcher. Their topic focused on the decomposition of plastics in the recycling process. Within several meetings, these students were able to perform experiments determining the differences in decomposition between lab controlled plastics and post-consumer plastics. This research aimed to determine whether the lab controlled plastics used in recycling innovation experiments behave in similar ways as the actual plastic containers we as consumers are using. The students presented their findings at the online U-Talent thesis symposium 2022 and concluded their presentation with "To all future students researching this topic: we helped you, will you continue this work?".





(Self-made photo's by students and supervisors)

The new aspect in this SCP was the co-creation process between students and researchers at university. On the one hand it was inspiring for the students to be involved in real research. On the other hand the possibilities to really create a solution for the community was rather limited on the research level.

## LESSON LEARNT

*It is possible to connect school projects with community members. Students are very eager to do this and seem to really seriously be involved in such projects. Not all parents participate. When being asked for measuring energy or waste consumption at home, we noticed that in all cases several students didn't return with these numbers. This can either be caused by carelessness of the students and/or by their parents who won't like/want to participate. It is difficult to trace causes as soon as students leave the school. Another lesson is that the contexts of waste and energy reduction provide rich opportunities for projects that can be connected to STEM curricula (even to mathematics!). A final lesson is that within the timeframe available for these projects it turned out to be difficult to reach really implemented or sustainable results.*

## ATTACHMENT

*Please provide the following attachment:*

*List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Reducing (plastic) waste around the school: 19 SCPs
- Reducing energy consumption at home: 1 SCP



## Regional Report on SCPs: Netherlands (second round)

### BACKGROUND INFORMATION

- Region (Country): Netherlands
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Utrecht University, Freudenthal Institute, Utrecht  
Naturalis Biodiversity Center, Leiden

### OVERVIEW

*In this second round we mainly worked with primary schools. The SCPs were organized as nature clubs in the Leiden-area (lead by Naturalis) and around a yearly, national, one full day mathematics event (De grote Rekendag) which was attributed to waste (De Grote Afvalparade). An SCP involving community members and representatives from the world of work was organized at one secondary school (AcademieTien). In primary schools the SCPs were mainly established around written materials. In the secondary school we followed the Most INCREASE trail map and a strategy of appreciative inquiry guiding students and their SCPs the formulate their own questions and ambitions to work on. In that case co-creation was established during the first day by having all members physically present and during the second day by encouraging the students to communicate by e-mail with community members, industry (were asked to be responsive) and policy makers. The problems related to energy addressed the isolation of school buildings and by roof gardens, and issues related to electric cars (e.g. how to encourage teachers to use these cars and how to organize smart charging). The fair connected to these SCPs were well received, although the whole organization was very time consuming.*

### SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).*

*Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.*

### SCP 1 Waste @ Mathematics in Teams

Mathematics is more than performing procedures and also includes higher-order thinking skills like mathematical problem solving, creativity, reasoning, modelling and communicating mathematics. To support schools in assessing these skills in an authentic way, Utrecht University organizes a yearly Mathematics in Teams event in the Netherlands. The Math-Day-15 event in year 2021-2022 was devoted to waste in close collaboration with the MOST project. More than 1000 secondary school students (3havo/vwo, age 15) from at least 13 schools worked for a day in teams of three-four students on a 'large' and open problem. Is waste a problem? Often it is: the plastic 'soup' in the oceans is a major problem. Worldwide, people are looking for solutions for this. In 2021, a deposit was introduced on small plastic drinking bottles in the Netherlands, so that the cans do not end up in the sea. But waste can also be a problem closer to home and school: chewing gum and cigarette butts on the street, litter around schools and supermarkets, leftover food that attracts rats, and so on. Students had to develop a plan to improve the waste situation in and around your school. First, they were encouraged to look at data about waste they produced for one week at home, compare this with yearly numbers for households in the Netherlands, followed by a research in and around their schools.



Figure: Students at one of the schools

As a final product, they had to create evidence-based advises for the school on how to deal with waste (even) better.

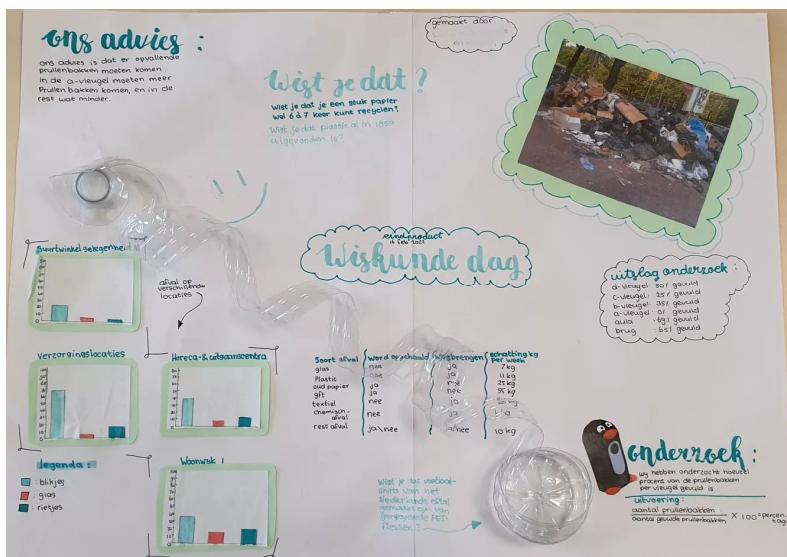


Figure: A poster supporting an advice on the location of dust bins

A teacher reflection:

“My students spent an entire day enthusiastically working on the assignment. They reported that it was amazingly fun to spend a day doing math. The homework was about the amount of waste produced in a week by a household. The different numbers prompted discussion and comparison with national figures. It was immediately clear: the huge mountain of waste produced each year is a huge problem. In particular, designing a poster or powerpoint about their research/solution for the school's environment appealed to many students. They also liked that they were allowed to walk around the school and do their own little research. Many groups indicated that they suddenly saw much more waste lying around and would now be more aware of it.”

Students reported:

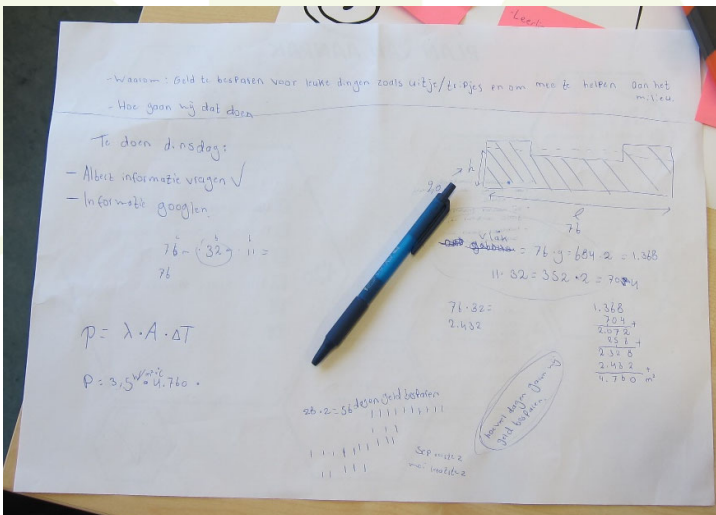
"We found this day very interesting, as litter is a very hot topic. It made us realize what a big problem it really is. We learned a lot from this day and hopefully something will be done seriously about this problem!"

## SCP 2 Grass up on the roof

Academie Tien is a secondary school in a new developing area of Utrecht in the Netherlands. The school drives on innovative educational concepts and one of them is time for project weeks. In January 2023 such a week was used to set up SCPs on energy saving measures in the community with a particular focus on a new school building being built. A school leader supported this idea for the intended interaction with neighbors and the importance of sustainability education.



The week started with introductions on energy from a local energy and an IT company, a researcher and a representative of a city lab (RAUM) aiming at creative placemaking. They presented current challenges like the energy transition, charging electric cars and net-constipation and the potential of gardens in urban areas. The 15-16 year old students brain stormed on possible ideas according to a method of appreciative inquiry. They created groups and plans for various topics that involved the stakeholders and community members.



A group of students calculated the gains of lowering the temperature in school with one or more degrees by using measurements and formulas for the area of the school and energy flow through roof, walls and windows. Other groups designed a dashboard and an app for smart charging and plans for (vegetable) roof gardens. The final day they got the opportunity to present their findings at a Fair in school. Local news published an article on this event and highlighted the importance of learning to understand and address the interests of various stakeholders in the community to stand up for sustainability.





The fair was a big success. Parents were impressed by the students' ideas and their presentations with serious plans for sustainability measures. These ideas were not only dreams but their feasibility was underpinned with budgets, timetables and resources needed. What next? The stakeholders, parents, teachers and directors now need to act... Anyway, the students experienced and learned how to bring people together. The school will repeat this activity next year. Their new building will get a green house on a roof to grow vegetables and to "dance up on the roof" for a more sustainable future.



### SCP 3 The waste parade

A similar national event as SCP1, but this time for primary schools. They will work one full day (March 29, 2023) on mathematics and waste in teams. Circa 200 primary schools will join this event and report their findings.

## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

Team-activities allow for girls to either work together or work in teams. This seemed to motivate them to engage in the project. We don't have evidence for this phenomenon in our SCPs, but it is remarkable that often teachers were proud on the work of girls. Maybe we can find some further evidence in the AcademieTien SCP, but that case study is still under construction.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

The SCP that meted most the requirements of a real school-community project involving parents in stakeholders from the world of work was the SCP at AcademieTien. This project showed that the necessary preparations took much time. Time needed for contacting companies, finding the right persons, scheduling the event in time and in school and with everybody available, including a fair at the end to have students present their work. This time was available thanks to the MOST project, but without such support it would hardly have been possible. On the other hand, all positive reactions from stakeholders, teachers, students and parents were very encouraging. In particular at the fair many parents reported that it was the first time to see their children present and seriously being involved in an environmental issue. The close collaboration between representatives gave students the experience that they can act and how to become an agent of change in the near future. Moreover, brainstorm templates and templates for supporting the teams to articulate their project and a work plan were very helpful during the process. These tools need to become available for all interested in also implementing SCPs.

## Regional Report on SCPs: Norway (first round)

### BACKGROUND INFORMATION

- Region (Country): Norway
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):

NTNU (Norwegian university of science and technology)  
BIS (Birralee International School)  
Ducky AS

- Numbers of SCPs done in total: 33
- Numbers of schools involved in total: 5

### OVERVIEW

*Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:*

- *The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry,..., if any) and other partners involved in the SCPs as a whole*
- *The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...*
- *The problems posed and covered (within waste or environmental issues)*
- *The challenges encountered (if any) in carrying out the SCPs and solutions*

In the period spring 21-spring 22 in Norway we have conducted 33 SCPs involving five schools: one primary, one lower secondary and three upper secondary schools. The total number of participants amounted to 1111 persons, out of them were 389 students (202 female), 38 teaching staff (36 female) and 664 community members (273 female). The community members included participants from business/industry (75), one policy maker, four from non-formal learning providers and the rest (584) were from wider society such as family members and people on the streets. The duration of the SCPs varied from 2 days to 12 months but most of them were carried out in two weeks.

The topics covered were waste reduction (plastic, food, general household waste), recycling & reusing waste (plastics, clothes, packaging materials), waste disposal (chewing gums littering, cups in coffee shops), and studying life cycles of various consumer goods to evaluate the

sustainability of its production and use. Solutions found included *educational campaign*, i.e. raising awareness & knowledge to reduce consumption & waste for exp. by using apps, like Ducky app, Toogoodtogo, campaign on reducing plastic use, buy quality-long lasting products, school lunch of food after expiry date, or other strategies, *make new products* out of waste (bags, toys, tiles, etc), *suggestions of new bin systems* (chewing gums bins, app with bin poin systems, etc).

Different strategies were employed to establish the SCPs, but basically it involved facilitating contact between schools and business/industry partners and following up by NTNU. Once the contact has been established, it was up to the schools to design their projects, and there was a variation on how the external partners was involved. For some schools, external partners were consultants or target of campaign (Birralee International School - family members, municipality), for others they were source of information (Strinda school - Trondheim RenholdsVerk, TRV), task/challenge giver (Thora Storm school - TRV), a partner in conducting campaign (Trondheim International school - Ducky) or making new products out of waste (Skansen school - Utoplast).

Among challenges faced were alignment with the existing curriculum and co-creation with external partners. In BIS the teachers worked hard to attach the SCPs to the IPC curriculum and translate the requirements of involving external and solving authentic problems in the local society in topic Waste into something tangible and feasible for young children (Year 4 and 5). It was also difficult for them to co-create with business partner.

One possible way to deal with co-creation was early contact. The best example of co-creation was perhaps Skansen upper secondary school. The school students worked for one year with Utoplast – a business partner who produced products from recycled plastic waste. The students supplied Utoplast with carefully selected and cleansed plastic waste collected from households and the school's surrounding, and Utoplast made colorful tiles out of the waste. The tiles were then used in the the school's new kitchen that the students designed. Their question was "How can a bigger part of plastics be recycled locally, which types of plastics can be recycled, and how can our school's community be involved in this work?" The students also conducted a social media campaign (Instagram and Facebook) to inform about challenges with plastic recycling, the project and which types of plastics Utoplast can use to produce tiles.



## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP).  
For each story, please give a more detailed information on the problem posed, strategies to start up SCPs,  
who were involved, ways of working and solutions found. Explain also why this SCP has become a success  
story for your region (country).*

### SCP 1

Title: How can we make Trondheim a “greener” city by reducing household waste?

Participants:

Students and teachers from Thora Storm upper secondary school, Trondheim

Representatives of the local waste management company (Trondheim Renholdsverk, TRV)

Citizens in the proximity of the school

*Plastic packaging has more lives than a cat! It can be recycled ten times. That is, as long as it does not end up in the general waste before it gets this far. Therefore, it is very important that as much of the plastic as possible is sorted out and given new life.*

Summary:

Trondheim Renholdsverk (TRV) provides waste collection, disposal and recycling services for all private households in Trondheim municipality. In Trondheim there are five main sections of waste; general waste, paper & cardboard, plastic packaging, hazardous waste and glass/metal. The goal of TRV is to ensure that various raw materials are reused as much as possible and in the best possible way. What can be recycled is to be recycled. In addition, they work to minimize the amount of waste, and to reduce emissions. Their waste analyses show that one third of what we throw away in the general waste could have been eaten, reused or pre-separated at the source. Glass and metal packaging can live forever, but in order for them to become new products, we must sort them out at the source. Plastic packaging can be recycled ten times, so it is important that it does not end up in the residual waste. We recycle more plastic than before, but still only 31% of the plastic is returned in Trondheim, so we still have a long way to go.

The students were given access to the analysis of household waste (picking analysis). Based on this, they were challenged to find a solution for how we can increase the recycling rate in Trondheim.

The project was arranged as an innovation camp lasting for 2 days. A representative from TRV visited school and presented their local waste problems connected to general waste, plastic packaging and glass/metal. The kick-off took place in a large auditorium with the headmaster and



teachers present. Students worked in groups of four or five with one of the presented challenges. They were free to choose type of waste and were encouraged to find a solution on how to reduce the amount of their selected type of waste. Some groups made interviews with citizens nearby. TRV was available for questions during their work. At the end of day two, each student group presented their solution in the school's amphitheater, either as a video, poster or digital presentation, and two representatives from TRV served as a panel of judges.

Student solutions consisted of a deposit scheme for plastic, glass and metal, to avoid or reduce recyclable packaging in general waste. They also suggested information campaigns, better labeling of packaging, and better information on where to find return points, e.g., integration in online maps.

- As stated by one of the teachers: "I think the students came up with good solutions, even new ideas and things that we had not thought about ourselves either. What I am most pleased with is the representative from TRV who posed very good questions, and the fact that there was a utility value in the project is very, very good. That it can actually be used for something".

When talking about student solutions and products, the TRV representative expressed her gratitude: "They have provided us with a product. A beautiful production, which in itself has a value for us! It can actually be used for something".

- Students felt they became more conscious after the project, e.g. "At least, I sort my plastic waste better now", and appreciated the way of working: "It's a bit exciting because it's a bit different from the usual school life, right".

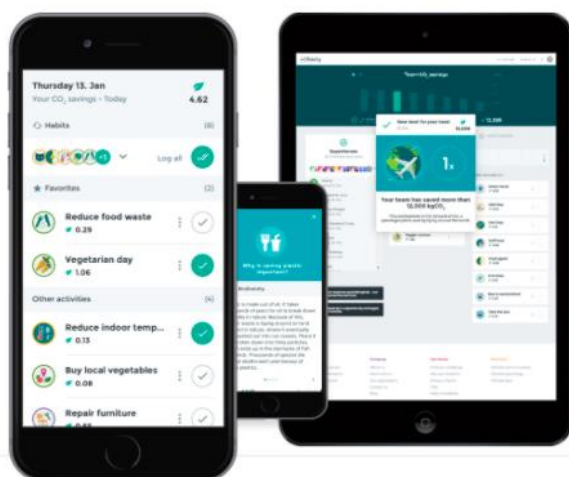


Source: Pixabay, <https://pixabay.com/no/photos/s%C3%B8ppelkasse-s%C3%B8ppel-milj%C3%B8forurensning-1260832/>

## SCP 2

### The Waste Reduction Race: A Path to empowerment!

The **Waste Reduction Race** is an initiative created by the students in **Trondheim International School (THIS)** as part of the MOST project. This game-like campaign aimed to see how to minimise waste and reduce unnecessary consumption in a playful and meaningful way. The students from the Middle Years Programme (MYP 9) set a goal to gain a better knowledge on waste and observe how individuals can make a difference when collaborating together.



As the school community projects (SCPs) in MOST aims to strengthen collaborations between students, teachers, community members and other stakeholders, the students recruited teachers, parents and [SINTEF Ocean](#) as a research organisation to take part and compete with them in this climate challenge. The recruitment of SINTEF was done through one of the parents at THIS.

Nothing can be more fun than competing in a game with your classmates and teachers, even more when adding another level to compete with parents working at SINTEF Ocean along with

researchers working on innovation and sustainable use of the ocean.

The challenge lasted for two weeks, in which 57 participants from three teams (Students, Teachers, and SINTEF Ocean) competed together using a [Ducky](#) platform through logging concrete climate activities based on Norwegian consumption data using nudging, positive climate actions, and peer-influence.

The Climate activities included daily climate activities as switching-off unnecessary lights, reducing indoor heating, eating vegetarian, and recycling waste. In the Ducky platform, the participants could track their progress with the other teams, setting goals, and give real time climate data, with comprehensible climate translations making the competition even more meaningful and joyful.

During the two weeks challenge, the participants managed to log in around 4400 climate activities and saved around 4000 Kg CO<sub>2</sub>e which is as much as 410 trees absorb in a year. Looking at the bigger picture, if everyone in Norway did this, that would amount to a 19% reduction in Norway's total greenhouse gas emissions! What a spectacular achievement!

In the competition, researchers from SINTEF felt more engaged in environmental issues, learned something new, and felt that the challenge was a good way to reduce emissions.

If you are wondering who the winner of the Reduction Waste Challenge is, it is everyone!

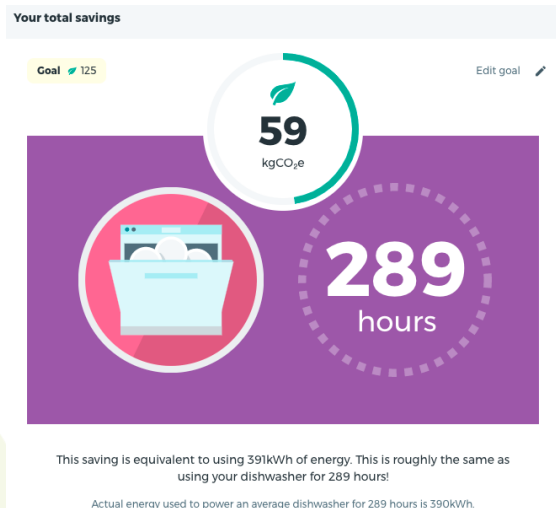
Glimpse from participants at the Reductions waste Race:

*The climate challenge "raised awareness of how specific actions can reduce waste".* **Teacher, THIS**

*"I felt like I was part of the solution and had the opportunity to make a difference".* **Students, THIS**

*"It's mostly not about the competition, but useful to see how much we can reduce emissions by taking different everyday choices."* **Researcher, SINTEF**

*"It is so inspiring and powerful to see the engagement among the different stakeholders in this project. Especially when it is connected to important SDG's as Climate Action and Responsible Consumption & Production"* **Project leader, Ducky**



## Insights from the Reduction Waste Challenge:

### Most popular activities - Trondheim International School

Activities logged the most number of times



**I switched off unnecessary lights today**

**452**

number of times logged



**I reused my clothes today**

**302**

number of times logged



**I wasted no food today**

**332**

number of times logged



**I recycled as much waste as possible today**

**299**

number of times logged



**I reduced the indoor temperature over night**

**324**

number of times logged



**I reduced the indoor heating today**

**289**

number of times logged

### Total Savings - Trondheim International School

Some comparisons to give you a better understanding of what you have achieved

Total kgCO<sub>2</sub>e saving

**4,097**

This is roughly as much CO<sub>2</sub>e as 410 trees absorb in a year.

One adult tree absorbs roughly 10 kgCO<sub>2</sub>e a year

Average participant saving

**80**

If everyone in Norway did this, that would amount to a 19% reduction in Norway's total greenhouse gas emissions\*.

\* Norway's greenhouse gas emissions are 54 million tonnes CO<sub>2</sub>e per 2015. Source: Statistics Norway





## UN Sustainable Development Goal labels - Trondheim International School

A brief summary of which activities were logged under the UN Sustainable Development Goals categories



**1,122 activities were logged with this SDG tag**

138% of participants logged activities with this SDG tag



**1,100 activities were logged with this SDG tag**

138% of participants logged activities with this SDG tag



**1,024 activities were logged with this SDG tag**

138% of participants logged activities with this SDG tag



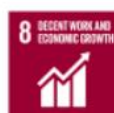
**693 activities were logged with this SDG tag**

136% of participants logged activities with this SDG tag



**345 activities were logged with this SDG tag**

105% of participants logged activities with this SDG tag



**144 activities were logged with this SDG tag**

100% of participants logged activities with this SDG tag

## SCP 3



### **MOST Project: Chewing Gum**



Year 5 students at Birrlee International School in Trondheim have developed a project with the aim of reducing the amount of discarded chewing gum on our streets, both here in Trondheim and (hopefully) throughout the rest of the world.

The project began by passing the power to the students; we challenged them to find a waste related problem in the city and then to develop a project based on this. The class decided that we would need to go out into the community to explore these problems for ourselves.

As a class, we visited a number of local areas to look for problems. We found issues surrounding litter, food waste, recycling, cigarette butts and chewing gum. It was some mathematics that led us to focus on chewing gum, as we found out that there were 16 pieces of chewing gum per square metre in popular areas of Trondheim centre.



Once we had decided on our mission, we investigated the impact of chewing gum on the streets and looked closely at the problems this can cause. The children created multimedia presentations to highlight these issues and even wrote Haiku poems to warn people of the dangers.

Having identified the problems, the next step was finding solutions. The children used the internet to research the impact of chewing gum in other countries and what the best solutions were. We found that in England, there was an initiative for 'gum only' bins that had reduced gum on the streets, saved the local councils money and the chewing gum collected had even been recycled to make other items, including the gum bins. We decided to plan and build our own gum-only bins.



Once we had created our bins, we made television adverts to promote these to the local Kommune and also to share with the community to raise awareness of the problem.



We also wanted to send our message to chewing gum companies and chewing gum consumers so developed alternative chewing gum packaging that carried warnings and information.



We now had a range of ideas and products but we needed to find a way to share our message and find people that could make our ideas a reality. We contacted Trondheim Kommune and arranged a digital meeting. The children shared their findings and pitched their idea for gum-only bins in Trondheim.



The Kommune were impressed and agreed to consider our proposals.

The next step was to promote our ideas to the wider community. We held an open day for children at the school and parents where we shared our message far and wide through presentations, games and models.



We did not stop here. We wanted our message to spread further than Trondheim, so we contacted Supernytt, a national news broadcaster for children. They decided to take on our story and our project was shown live on national television. You can watch it here: [NRK Super - Supernytt](#)



The impact of our project is still ongoing. We believe that we have altered the mindsets of thousands of people and our gum bin proposals may yet one day become a reality. The children were thrilled with the impact that their project had and were delighted to be involved in something so powerful and meaningful.

### Participants:

- Year 5 staff and pupils at Birral e International School in Trondheim (creators)
- Staff from Trondheim Kommune
- Supernytt (television broadcaster)
- Children and parents from Birral e International School in Trondheim (visitors)



## LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

Schools faced some challenges with recruiting external partners for co-creation processes, especially since the covid-19 situation forced them to keep nearly all the contact online. Thus, they used their creativity and found other ways round for cooperating with the local community. We as a HEI gave them contact information to our networks of external partners, and several schools engaged families and friends in their projects. Usually, schools and students came up with problems to explore, since business partners seemed too busy to engage in the whole process. Business partners were used mainly as experts. At primary level, whole classes were engaged in one SCP, with different sub-groups working on different subtasks. At this school level students need more guidance and they therefore found it most convenient to run the same SCP for the whole class. We also learnt that communication and exchange of information between external partners and teachers need to be promoted for students to get the most out of such collaborations.

## ATTACHMENT

*Please provide the following attachment:  
List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Plastic waste: 4 SCP
- Household waste: 2 SCP
- Food waste: 2 SCP
- Clothes waste: 7 SCP
- Packaging: 4 SCP
- Battery/phone: 3 SCP
- Others (cups, cigarette stumps, gums, etc): 11 SCP

## Regional Report on SCPs: Norway (second round)

### BACKGROUND INFORMATION

- Region (Country): NORWAY
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
NTNU, Ducky A.S. and Birrale International School

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members?  
Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

In the second round, three schools were engaged: primary school Birrale International School (BIS), middle-school Trondheim International School (ThiS) and Thora Storm upper secondary school. The number of students: 66 Year 4-5 students from BIS, 21 Year 9 students from ThiS and 22 Year 12 students from Thora Storm. In total 109 students (out of them were 59 girls) and nine teaching staff (five of them were female) were involved.

In total 173 people from the community were engaged (out of them were 81 female). The community members included external partners from business/industry (4), from non-formal learning providers (23) and from wider society such as parents, family members, other teachers in school, people in the shopping mall and on the street. Together with the students and teachers 316 participants were involved in the SCPs in total.

Various strategies were employed to engage community members. The students from Thora Storm got connected with the consultants from the enterprise through their teachers. Trondheim International School (ThiS) got in touch with Ducky AS during the first launch meeting, they

conducted SCPs together both in the first and in the second round. Their strategy for involving community members was that each student was responsible for recruiting up to five project participants from family, friends and neighbours.

The children from BIS engaged community members in the starting phase to identify authentic problems, and in the closing phase – as target of dissemination of their solutions. In the starting phase, they engaged their family; they also went out to city center, observed the nearest local shopping mall, talked with by-passers, asked them to fill in questionnaires that helped to identify authentic problems. See the Advisory Report for more examples.

The problem posed were within the following areas:

- How to get local community to reduce the electricity consumption:
  - o What motivate people to reduce the electricity consumption: money? Good name? (BIS)
  - o How to get people to reduce the average temperature in the households by one degree (BIS)
  - o Different ways to reduce electricity consumption (BIS, also ThiS and Ducky “Energy Challenge”)
- Solar energy as sources: Investigating various aspects related to the use of solar panels (Thora Storm).
- Exploring various renewable energy sources – wind power, bio-mass power, solar power, etc. (ThiS and BIS)
- Energy and well-being (BIS):
  - o What is the impact of blue light on people’s health and well-being.

Regarding challenges encountered in carrying out SCPs, it was in general challenging for the schools involved to co-create with external partners. They solve this challenge by engaging external partners in different roles, such as guest lecturers (ThiS, Thora Storm), partner in execution of SCP (ThiS and Ducky), as informants to identify problems (BIS), and as consultants in general (all schools).

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).*

*Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.*

## SCP 1

### Title: **Solar panels on rooftop of school building – a solution to the energy and climate challenges in Norway?**

For one week, autumn 2022, the science class from grade 12 at Thora Storm upper secondary school in Trondheim conducted six different SCPs. Their overall research question was: How can solar power be a solution to energy and climate challenges in Norway? One of the student groups explored how much solar energy their school could produce in one year, by installing solar panels on the roof of their school building. Their research question was: Is it wise for Thora Storm to start with solar power? The students were given a practical introduction to solar cells in a solar cell laboratory at the university. They gained theoretical knowledge with lectures from researchers from Department of Electric Energy, Norwegian university of science and technology (NTNU) and consultants from Norconsult AS.

The Department of Electric Energy works in close collaboration with industry partners to develop technology for the production of electric energy from renewable energy sources, and to contribute to research that leads to solutions for the future power grid, with high relevance for the society, addressing industrial needs and global challenges.

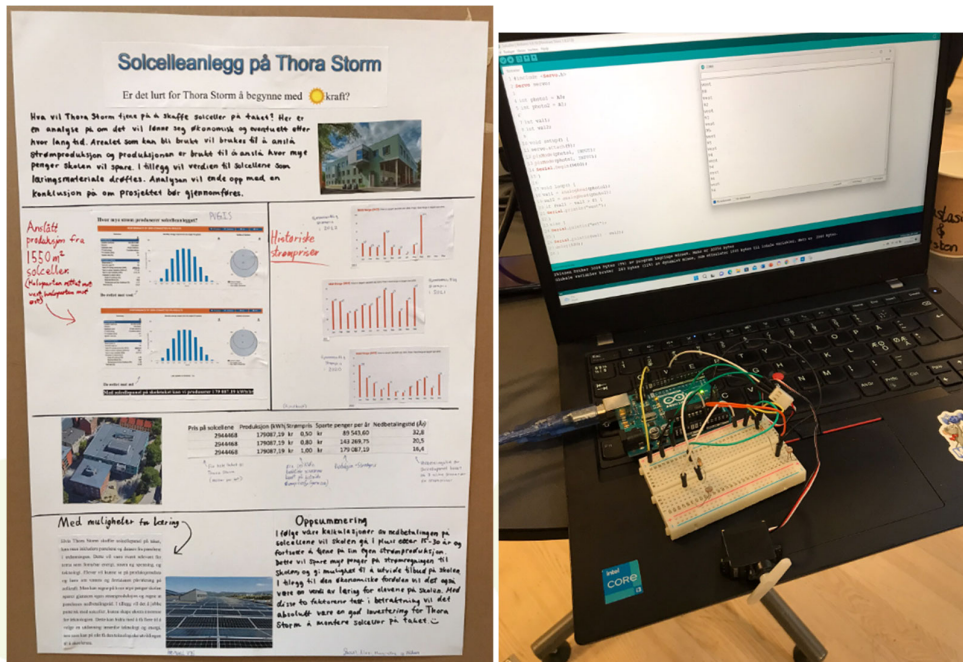
Norconsult is one of the Nordic region's largest interdisciplinary advisory groups. The company has broad and interdisciplinary expertise in all areas that affect solar energy and offers services in all phases of independent solar energy projects and other projects where solar energy is included. Their aim is to contribute to solar energy projects being solved in the best possible way according to energy yield, quality, economy and environment.

The students from Thora Storm worked intensively with their own research questions for two days. They were encouraged to involve local community members of relevance for their questions. Their results were presented at a mini conference at the school where the students presented orally and via posters. External actors from Department of Electric Energy, NTNU and Norconsult AS were present, evaluated, voted for and awarded the best contribution among the six different SCPs. The actors were impressed by the quality of students' work.

The group working with solar panels on rooftop found the following solution: Thora Storm can cover around half of its own power needs with solar panels on most of the roof surface. The plant probably has a payback period of 15-30 years. As written on the poster, the students concluded: "According to our calculations of the repayment of the solar cells, the school will turn a profit after 15-30 years and continue to earn from its own electricity production. The school will then save a lot of money on the electricity bill and can then have the opportunity to expand the offer of other things. In addition to the financial benefit, there will also be a value of learning for the students at the school. With these two factors taken into account, it will certainly be a good investment for Thora Storm to install solar cells on the roof".



Taken all the SCPs at Thora Storm into account, the class as such recommend using solar power on a much larger scale than today, as a supplement to our other renewable energy sources.



Photos: Ragnhild Lyngved Staberg



Photo: Ragnhild Lyngved Staberg

## SCP 2

### Energy Reduction Challenge

Year 9 students (MYP9) and their teachers from Trondheim International School wanted to find a way to motivate the local community to save electricity. The project involved both students and students' families. 21 students (12 female) and 3 (1 female) teachers did participate in the project. With 39 external participants from the community, a total of 60 people were involved in this SCP.

They organized their project in four phases:

#### 1. Enquiry: Learn about energy

In the first phase of the project, a professor from the University of Trondheim was invited to give a lecture on different forms of sustainable energy. The students were split up in groups. Each group enquired more about one type of sustainable energy and organized knowledge and facts that had been obtained. They prepared presentations and shared their knowledge with other students and teachers at the school by presenting the results in the form of posters on a dinner arranged for the school community.

#### 2. Action: Energy competition

They decided to conduct an energy *competition* where the students' own families and others were challenged to save energy and contacted the company Ducky for cooperation. Ducky is a young company run by young people with knowledge and commitment, and the company offers an app-based solution that let organizations quickly and easily set up challenges and help individuals, organizations and schools to monitor, learn about and improve their carbon footprint.

Each student was to ensemble their own team of 5 external members from family, friends, neighbors, etc. 258 were invited to join the competition. 60 chose to participate, forming 43 teams. This gives a participation rate of 23 %.

The competition the *Energy Reduction Challenge* lasted 14 days. The teams were to compete to save as much energy as possible. The students could monitor the progress of the competition during the whole period. After one week the students launched a planned and prepared campaign to raise attention to the importance of saving energy, with tips on how to do it.

#### 3. Reflection

The students used the results generated by the Ducky app as a starting point for their own analysis and reflection on the results. The analysis of data shows that the competition resulted in total savings of 2,700 kg CO<sub>2</sub>e (carbon dioxide equivalent), which is roughly as much as 270 trees absorb in one year. The various activities of the participants were logged and categorized under the UN Sustainable Development Goal labels.

The students identified winners of the competition, and the results of the competition were sent out to everyone who had participated.

#### 4. Going Further

As a continuation, the students themselves chose two/three forms of energy for in-depth investigation. They formulated their research questions and planned their work further.

In their work, they evaluated their sources for information and documented their own research process. Perspectives and implications of their chosen types of sustainable energy were explored and presented by writing essays.

This is a success story because the students managed to point out the great potential for energy saving that follows when each person takes some simple measures in their everyday life, and that the sum of many small contributions becomes a large savings. Through a good collaboration with an external partner, Ducky, they gained access to both knowledge and tools. They acquired external expertise early in order to build their own knowledge and they managed to engage the local community to participate. They then passed on knowledge back to the participants, so that their SCP can have an effect beyond the two weeks of the competition.

Through the work in the final phase, they have built further knowledge about energy and energy sources and about the implementation of research projects.

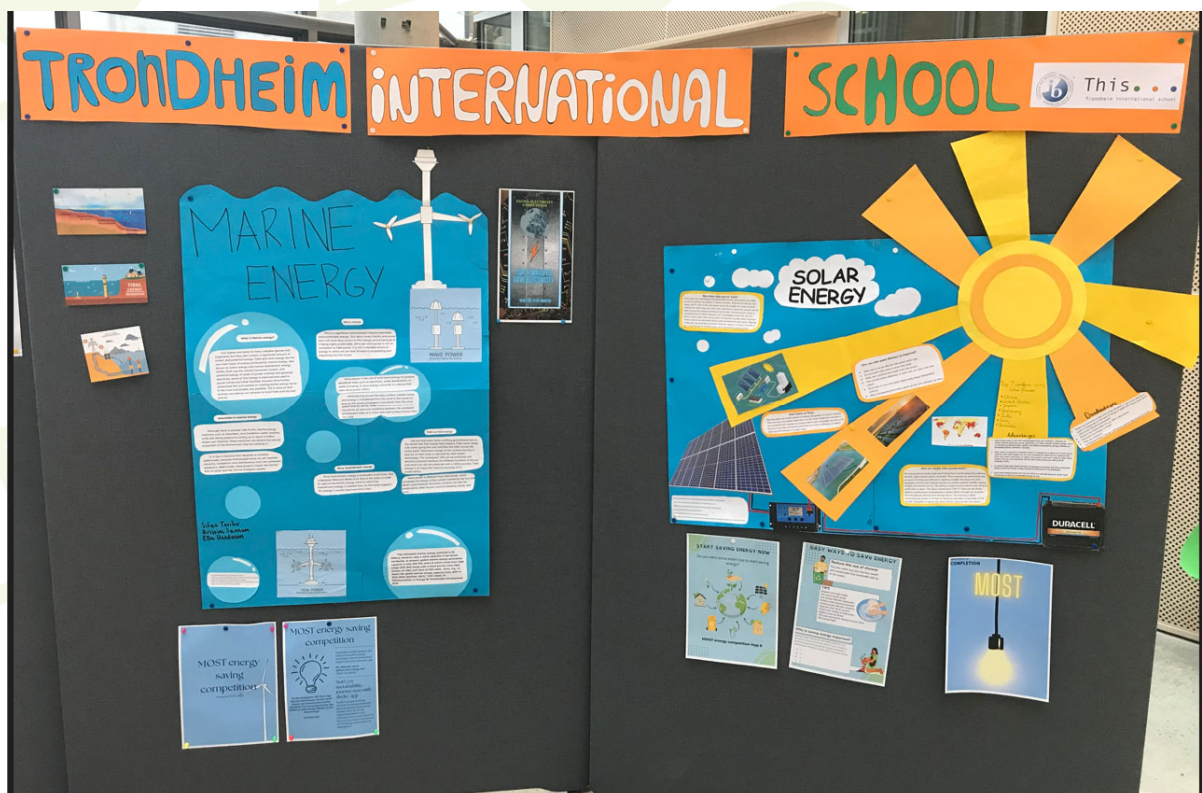
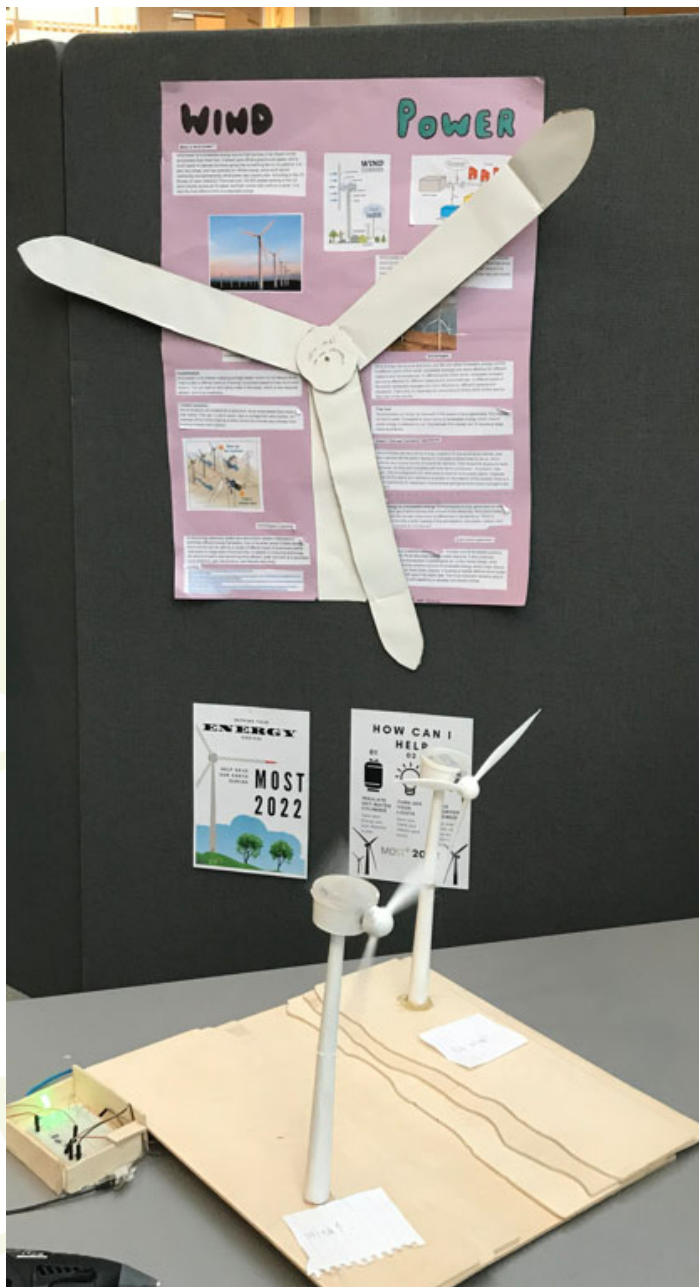


Photo: Ragnhild Lyngved Staberg





“Wind Power”. Photo: Ragnhild Lyngved Staberg



### SCP 3

## ENERGY AND WELL-BEING: How Can We Reduce the Impact of Blue Light on People's Health and Well-being?

In autumn 2022 – spring 2023 the 25 children – 15 boys, 10 girls - in Year 4 (age 9) at Birrale International School, Trondheim, Norway worked for approximately six weeks with the SCP project. Given the overarching theme of Energy, the school had to find ways how to translate the theme to make it accessible and applicable to young children, since energy is quite an abstract concept for them. Furthermore, given the project framework of being community-based, it was not obvious at the beginning what authentic problems in the community that were relevant to be solved, neither was how the involvement with the community could be made.

The school has then developed a model of SCP implementation, in which SCP was anchored in the International Primary Curriculum (IPC) (see explanation about IPC in the link given further down). The Year 4 teachers identified a teaching unit called "Full Power!" in the IPC, and with the support from the school leader and science teachers from the middle school, they worked out the teaching module so that it focused on "Well-being and the consequences of covid". The module was inspired by the fact that children and adults were, to a much higher extent than usual, exposed to digital screens during the covid lock-down period. Year 4 children started to ask themselves how too much screen time will affect our health? This question developed into more elaborated ones as they focused their SCP on the topic of BLUE LIGHT. The children investigated different aspects of blue lights, such as "What is a blue light?", "How much are people exposed to blue light?" "What risks can blue light have on people's health and well-being?" and "How can we prevent health hazards caused by blue light?". A student explained: *"Blue light is a light that comes out of the screen"*. Here they saw the connection between blue light, energy and the potential health hazard it might cause.

The school collaborated with the community by encouraging students to conduct surveys to families, friends, all teachers at the school, etc. about their daily habit on use of electronic devices, for instance asking on the average daily screen time. *"And Year 4 again, they're hoping to do more involvement through surveys and asking people. So, they sent out surveys about blue light for example and that's how they've involved people"* (School leader interview). Based on the survey data, the students made statistical analyses, they found among others that 43% of adult work requires using tablets or computers, and nearly 70% of the informants experience a sort of eye strain. The students also made research on potential problems blue light can cause, especially for children, and found that blue light can *"mess up sleeping patterns, affect the eyes, to some extent damage brain, and affect the mental health"* (Student presentation). They concluded that measures had to be taken to help people prevent further health hazards caused by blue light.

The class was divided into groups who worked in finding solutions to the different problems. Some groups worked on solutions to blue light hurting their eyes; they investigated facts about blue light and created informative posters while another made fake models of blue light filters like glasses and visors. The filters had the size of a mobile phone, a laptop screen, a

desktop screen and glasses, so they had to make measurements of those devices. They also wrote letters to the school leadership to ask for blue light filters for the school devices. The students recommended that the school invests in blue light filters.

Other groups worked on making electric circuits, created campaign videos, made games/ quizzes (Kahoot), did inquiries on electric energy, such as the advantages and disadvantages of different types of power plants (hydro, nuclear, solar, etc.) and made models from recycled materials.

The SCP allowed them also to work cross disciplinary, combining science (e.g. learning about blue light, power plants, electric circuits) with English language (e.g. by writing letters and making presentations), Design & Technology (by making models), and Mathematics (cf. measurements & calculation to make models and statistical analysis). In addition, the children developed their soft skills, such as communication, teamwork, empathy, time management, problem solving in addition to being resilient and ethical.

The potential outcome of the SCPs was to spread awareness to people of the danger that blue light can do, especially to young children, and encouragement to the school administration to invest in blue light filters for use on school devices.

#### *Dissemination*

The students shared their work with other SCP groups from outside school at the MOST Fair at NTNU. In addition, the school organized an Exit Point, where the students made exhibitions of their work and disseminated their results to parents, and to other students in school.

#### *Why is this SCP exemplary?*

This SCP is considered exemplary because it addressed real, authentic problems faced in the society, where people of all ages (from young children to adults) seem to increase their screen time in front of electronic devices in their daily life. This SCP is also exemplary because it provides a new, original angle to address problems about Energy – that is by connecting it to the health issue. In addition, by working with the SCP, the young children gain knowledge and learn soft skills that are important for their future. Since they are now aware of the effect of blue light on health, it will, hopefully, help them to be self-regulated and make wise decisions regarding their screen time.

In terms of professional development, the school leader thinks that this project has allowed the teachers to gain tremendous knowledge: *“I think for the teachers this project made them think a lot harder. They had to think of the ways to make it accessible, think of the ways they can make into community-based, and then check on the subject as well”* (school leader interview)

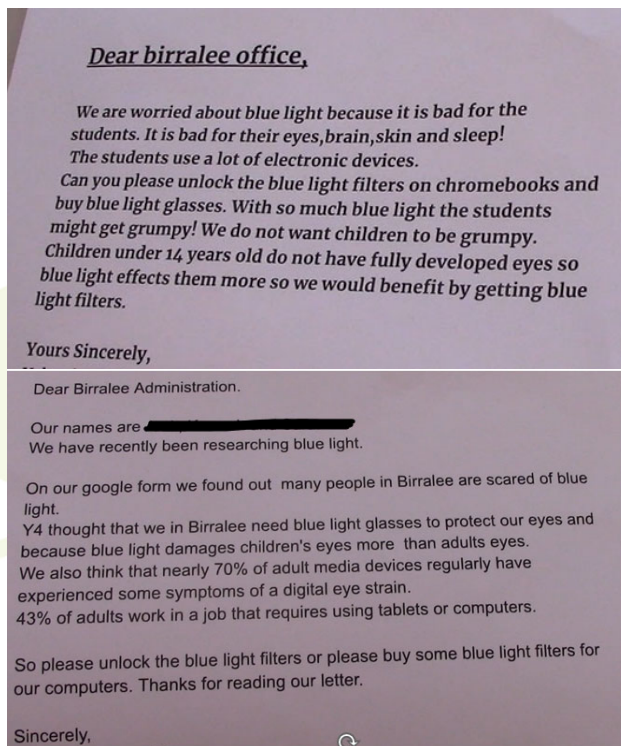
The parents too seemed to be enthusiastic that their children were involved in the SCP. Here are some comments from a parent:

*“We enjoyed the MOST project and interactions that it provided around the blue light and covered topics both at home and in the school, as well as the opportunities for students to develop their research skills”* (Parent survey)

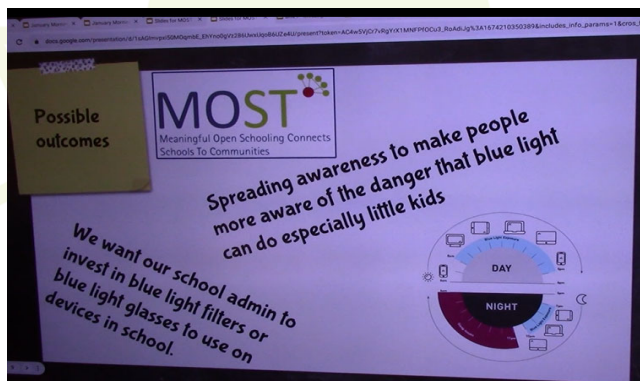
*"The main impact was to facilitate research on the given topic at home and in school, encourage shaping questions and forming them in the questionnaire, learn more about analyzing data, gain further skills in presenting and overall increased awareness" (Parent survey)*

Links:

IPC: <https://www.goodschoolsguide.co.uk/international/curricula-and-exams/the-international-primary-curriculum>



*"Examples of letters". Photos: Maria Febri*



*Photo: Maria Febri*





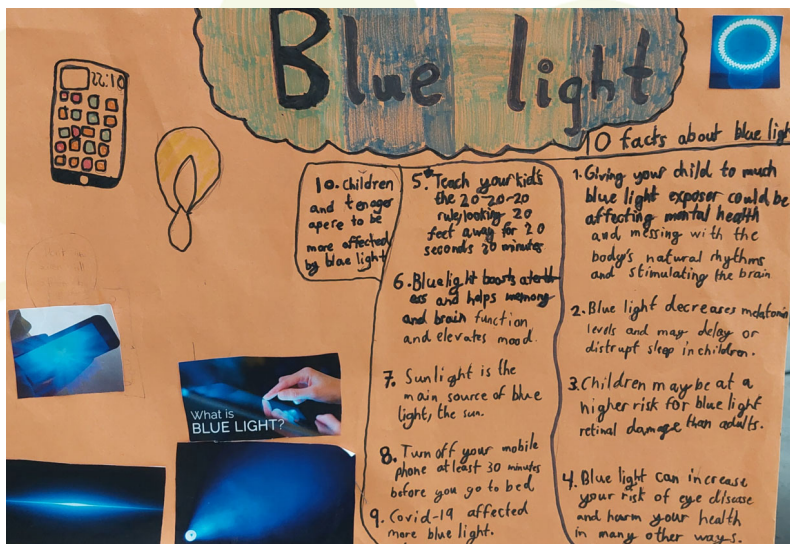
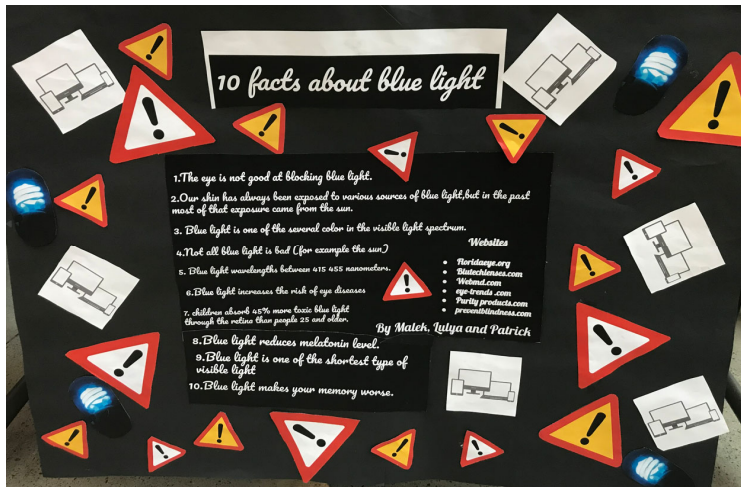
*"Statistics about blue light" Photo: Ragnhild Lyngved Staberg*

- Blue light facts**
1. Blue light manipulates the brain to think its daytime.
  2. Natural blue light makes you more happy.
  3. There are lots of colors in the visual spectrum red, orange, green, blue, indigo, violet.
  4. Researches shows that blue light from devices can change in skin cells.
  5. You should watch screen for less than 3 hours.
  6. To protect yourself from blue light every 20 minutes watch screen then you look somewhere else then look back.
  7. Blue light is a part of photodynamic therapy.
  8. The color that blocks blue light is red or orange tinted lenses.
  9. Blue light can actually make you smarter.
  10. Amber tinted glasses are the most effective ways to protect yourself from blue light.

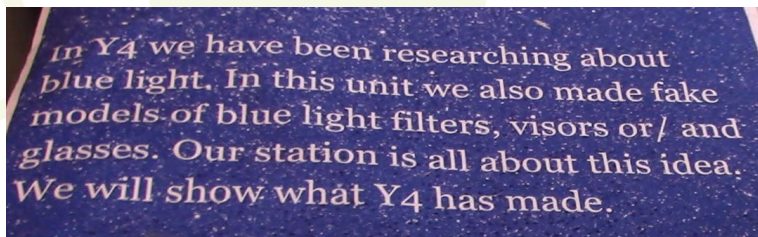
**Advice**

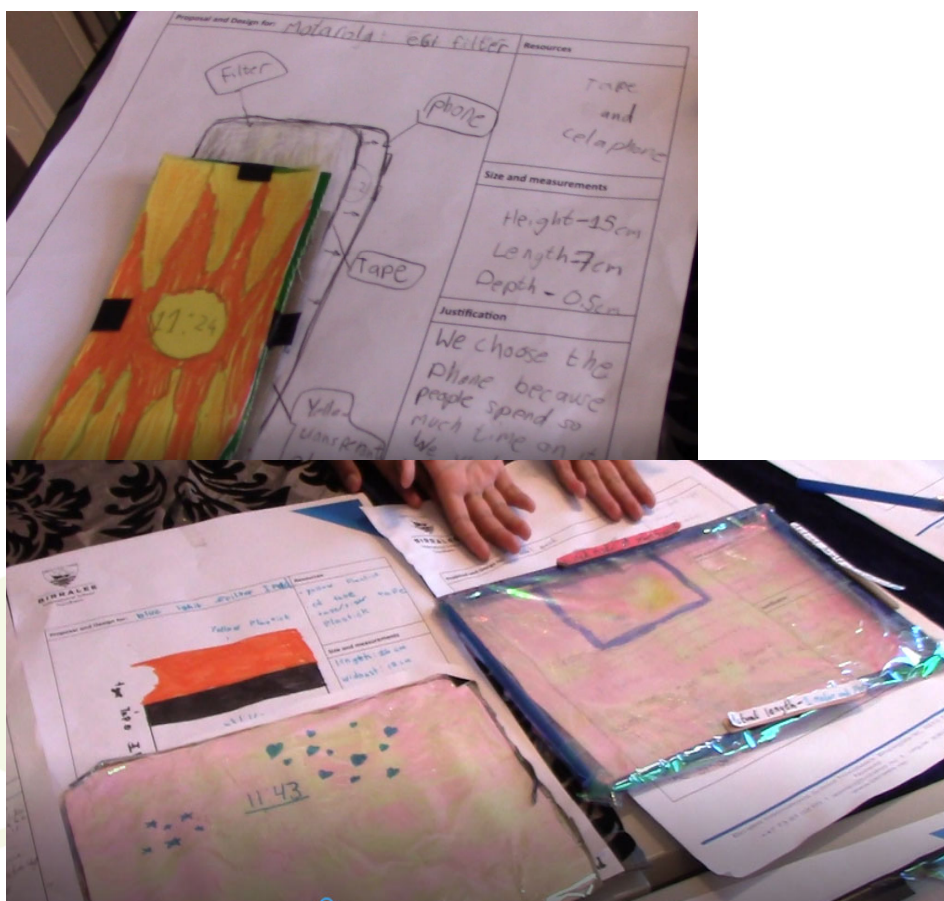
When you are going to be sleeping you should stop watching computers 2 hours before sleep. If you still want to watch your computer you could turn on blue light sensor if it has it or put a blue light filter over it. It makes you not get that much blue light in your eyes.





"Examples of poster – 10 facts about blue light and advice". Photo: Maria Febri





«Examples of filters». Photo: Maria Febri

## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

In Norway we have a high degree of gender equality compared to many other countries (e.g. <https://www.samfunnsforskning.no/core/english/publications/Infographics/5-facts-about-gender-equality-in-norway/>) .

The inclusion of girls in the SCPs has never been an issue. Girls have always been engaged in the projects on equal basis as boys. No specific strategy was required.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

- Use family members, friends, “people on the street” as community members: most often used as experts, because of their limited time. Few meetings with school and experts. When community members were family members, they were more involved over a longer time period. Difficult to engage community members for real co-creation. Family members and friends easiest to engage as community members.
- In most classes, you will find resources among family members, which could be community members. Start searching for community members among your family.
- Don’t be afraid of running SCPs at lower primary. We have seen several success stories from lower primary. Students engaged community members in their way.
- The way of working is suitable for schools that work in several weeks on one topic/project, like international schools. These schools have a tradition for inquiry and interdisciplinary approaches, due to their international primary curriculum. On the other side, the SCP way of working could lead to new approaches in more traditional schools as well.
- Energy problem is not as big in Norway as in other countries, led to a long brainstorming process to identify an authentic problem, which was also close to students’ everyday life.
- Curriculum alignment important. It is easier for schools to work with SCPs if the projects are aligned with the curriculum.



## Regional Report on SCPs: Spain (first round)

### BACKGROUND INFORMATION

- Region (Country): Spain
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):
  - University of Jaén
  - Spanish National Research Council (CSIC - Consejo Superior de Investigaciones Científicas)
  - Center for Teacher Training at Jaén
- Numbers of SCPs done in total: 24
- Numbers of schools involved in total: 15

### OVERVIEW

*Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:*

- *- The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry,..., if any) and other partners involved in the SCPs as a whole*
- The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...*
- The problems posed and covered (within waste or environmental issues)*
- The challenges encountered (if any) in carrying out the SCPs and solutions*

Students and the educational community in general from different educational levels (Early Childhood, Primary, Secondary and High Education) and school typologies (public schools, vocational training schools, Official School of Languages, Arts Schools, schools from disadvantaged backgrounds) have been the main protagonists of the SCPs. Families have been community members participating in most of the SCPs implemented in this first round of MOST. In addition, members of different sectors of the community have participated in many projects, taking an active part in their development. Thus, in the SCPs, several elderly homes have collaborated, such as the elderly home “Altos de Jontoya” from Jaén, intervening in the waste management processes and contributing to the learning of values by the students. The products resulting from various SCPs have benefited different non-governmental associations such as “Cáritas” o “Banco de Alimentos”. On the other hand, the police, forest rangers and other companies such as driving schools, architects or RESURJA (Urban Waste of Jaén) have also participated in some SCPs when the subject addressed required so. In addition, higher education institutions have acted as experts for the development of some projects (experts from the University of Jaén and the “Ramón Falcó” Arts School from Lugo).



The city councils of several towns and the Delegation of Environment at Jaén have participated in several projects as members of the community belonging to the policy sector. In addition, several SCPs have planned activities engaging a general public audience, such as communication campaigns aimed at raising awareness about environmental issues or Christmas markets selling a nice variety of products made of waste to raise funds for charity purposes.

To design and implement school community projects, the focus has been on solving real problems that affect the community and with which students can feel identified and, therefore, committed. A large part of the projects in this first round, have been born from an initial motivating activity in which the members of the community have intervened to engage students and encourage their active participation in the project (message from the police warning about the rise of pollution levels in the city, rubbish scattered around the playground...). There have also been spaces for the co-creation of strategies and solutions to address the projects, but these dynamics have involved mostly teachers and students, so this process could be enriched by involving more members of the community.

The environmental issues addressed in this first round of MOST have been waste management (reduction, reuse and recycling), with special emphasis on textile waste. In addition, challenges such as sustainable mobility and the rehabilitation of spaces have also been faced. In fact, many projects deal with themes in an interconnected way, for example, the rehabilitation of spaces has been carried out giving a second life to waste materials, so these SCPs would be directly linked to waste management.

The challenges pointed out by some participants are the lack of training about how to conduct successful SCP, the need to spend extra time in the design, planning and implementation of SCP or the difficulty of engaging all the teachers in the same school or particular members of the community. With the idea of overcoming these challenges, a series of regular meetings were established in collaboration with the Teacher Training Centre of Jaén to provide specific training and to monitoring the whole process of designing and implementation of SCP, making teachers feel supported and accompanied and providing them with opportunities to exchange strategies and good practices. In addition, the first MOST Fair had a very positive impact on participants, making them appreciate the value of the project and feeling part of a community of practice.

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).*

### SCP 1 - MEZCLADOS – CEIP Alfredo Cazabán (Jaén)

#### “Colorful and collaborative learning: the way to inclusion”

This SCP involved 21 primary school students (second grade), 1 teacher and 13 members of the community. It was born during the last days of the previous academic course 2020/2021, when students realized that they did not know where they had to throw away the used stuff from their pencil cases: In which bin did they have to throw the waste they found? Many questions arose: “Teacher, where can I throw the old markers? And the dry glues? And the wax crayons? Facing this problem, the students investigated and discovered that the waste of school materials should be deposited in the clean point and they decided to collect all the waste of the whole schools, to classify it and to carry out a school cooperative in which to manufacture objects from the waste with the help of the residents of a Residence for the Elderly and the Art School of Lugo (Galicia). Then, they would sell those objects to donate the profits to the Food Bank of Jaén and finally recycle, where appropriate, what cannot be reused.

Thus, wondering about the waste from their pencil cases, students became deeply interested in the Colour Theory and how to make something beautiful with artistic value from school waste. To learn about how to do so, they started a collaboration with the School of Art “Ramón Falcó” in Lugo, which became an active member in the SCP, supporting and inspiring students to make their own creations. In addition, students got in touch with the Residence for the Elderly “Altos de Jontoya” in Jaén, initiating enriching interactions between the kids and the people of the residence, who got also involved in the project, sharing fundamental values related to caring, respect, inclusion and mutual support.

This project represents a successful story because it is a nice example of approaching a real problem that arises from the curiosity and concern of the students. It involved different community members, who got fully committed to the project, valuing the role of the school as a transforming agent of society. During the development of this project, the students applied mathematics meaningfully, while using calculations and making estimations for their cooperative and learnt science while trying to understand light and colour as a result of the interaction between energy and matter and when they inquired about the environmental impact of inappropriate waste handling. In addition, they discussed fundamental values related to tolerance, open-mindedness and acceptance of diversity through the study of the different colours that the human skin can have, recognising common biological features and the beauty and value of diversity.

**SCP 2 - El club L@S PEATONIN@S –Names of the public schools involved: Nuestra Señora del Rosario (Villacarrillo) and Francisco Vélchez (Arroyo del Ojanco)**

**“Small people but great citizens”**

The Early Childhood students (4 years old) of the school Nuestra Señora del Rosario from Villacarrillo and the 3-years-old students of the school Francisco Vélchez from Arroyo del Ojanco, participated in the project together. The initial motivating activity was a video of the local police showing their concern about the high levels of pollution in both towns. They asked students to become part of the pedestrian patrol collaborating to raise awareness among people of the neighbourhood about the importance of moving on foot or using sustainable transport and thus reducing the use of the car.

To do this, girls and boys identified challenges and made suggestions to overcome them. They learnt the importance to behave correctly as pedestrians, they detected possible architectural barriers, potential risks and places where mobility was somehow limited or constrained. They developed model to study the streets and how to make mobility more secure and sustainable. They got involved in the design and development of key elements such as security vests, signs of traffic, informative murals and carried out an awareness campaign against climate change. In addition, they created different routes and established the “andabús” with the help of families and the City Hall. This “andabús” consisted of groups of children who live in the same neighbourhood that meet at a particular point to walk to school, accompanied by one or more adults, who committed to being part of this initiative. In addition, a Decalogue of environmental guidelines was prepared and distributed among the inhabitants of the towns. Throughout the whole process, students learned what climate change is and became aware of the importance of carrying out small daily gestures to fight it.

This project represents a success story with a significant impact outside school. The cars that families used to take students to school in the morning and pick them up at the end of the day was significantly reduced thanks to the establishment of the “andabús”, contributing to sustainable mobility, cooperation between families and the reduction of air pollution. Therefore, this is an evidence that just a great idea, with no extra-cost or invested material, and the implication of the families can be the solution to real environmental issues affecting the town.

In addition, this project makes sense as a whole, since it is part of a problem presented from outside the school (it was the local police that warned of the high levels of pollution in the city) that requires the active participation of students. During the development of the project the students were trained about how to behave as good pedestrian and got a special card as a recognition of their good behaviour and valuable contribution. During the process, they had to inquiry about how people came to school, the potential architectural barriers and the environmental and economic impact of travelling by car, applying mathematics and science in a meaningful way and developing sustainability consciousness and scientific literacy.

### SCP 3 – Building an ecologic park - CEIP Gloria Fuertes (Jaén)

#### “From school to action”

This SCP emerged from the analysis of some of the problems of the neighbourhood surrounding the school: dirty streets, open areas next to the school usually full of waste, lack of green areas near the school, poor recycling habits and scarce recycling containers or bins in the neighbourhood.

With this in mind, the objective of this SCP was to design an ecological park for the Boulevard neighborhood, where the school was located. This park would improve life not only the neighborhood but also the city as a whole and our planet. The investment was minimal since the park would be built with recycled materials and be self-sufficient through trees with solar panels and rain collectors. Being a living project, the final product will be a model of the park that will grow little by little. This SCP has been taking place from October 2021 to June 2022, therefore it is currently under development, and involves the entire school although the actions to carry it out are different at each educational level.

To design the project, different initiatives were organized collaboratively. First of all, teachers were informed about the SCP and the next step was to involve community members to make the project come true. The different participating courses were surveyed for the possibility of having a father/mother expert in architecture. A student's father is an architect and he joined the project to help in the design of a construction plan based on the ideas that came to him as a result of the different proposals made by students and teachers. Then, each course/class began to work on their intermediate tasks and the search for solutions to build an ecological park.

In the case of the third cycle of primary school (5<sup>th</sup> and 6<sup>th</sup> grades), they were in charge of actions concerning recycling and making videos for the advertising campaign. For instance, in the subject of Natural Sciences, they investigated solid waste and its recycling process, all the research reports were collected in Google Sites. In the case of the Language lessons, they work on persuasive texts with the aim of writing a letter to convince the Mayor of Jaén of the convenience of building the ecological park for the neighborhood and for the planet. A radio program is also being developed and some advertising videos are expected to be produced. In Mathematics, a questionnaire was developed to survey the members of the educational community about their recycling habits and results were analyzed statistically. Students also took measurements on a mockup of the park to transfer them proportionally to reality, as well as actual measurements of different areas of the plot on which the park is to be built (perimeters, surfaces...). In Robotics and Computational Thinking, different proposals for designing several park elements were discussed, such as: trees with solar panels, fun containers, an amphitheater, etc. Finally, in Plastic Education, they designed different park spaces with recycled materials.

In conclusion, this SCP has contributed to raise awareness in the community about the need to improve spaces in the neighborhood where the school is located, to design proposals for the



building of an ecological park rehabilitating a deteriorated location near the school, and to encourage interaction between families in the neighborhood allowing them to enjoy a new park in the future which highlights their social impact on the community.

## LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

The most valuable experience that participants in SCPs have learned from this first round is the enthusiasm with which the students have been involved in the project, that working towards common goals makes the educational community consolidate. Starting from the fear and the gloominess usually linked to environmental issues, SCPs are an excellent empowerment tool to make students grow in awareness, commitment and action. Leaving the comfort zone of teachers and students, daring to experience other ways of doing in education, in direct contact and close exchange with the environment offers a positive learning opportunity for the student who works motivated in SCPs.

The students involved in SCPs have discovered that change begins with oneself and they have no limits, feeling that they are a crucial agent of their own learning. Students become aware of their role as active members of the community to which they belong and that they can participate in it to improve it. SCPs are a space for students to express their opinions which are listened to, thus contributing to solving real problems.

As proposals for improvement, it is indicated the need to have specific hours within the working time to better develop the project and more involvement of the school members, which would help to have a better prior planning of everything that the project entails at all educational levels. In addition, schools participating in SCPs have realized the need to participate more actively outdoors, with experts, with families... in order to get out of school and transform it into a relevant agent for the community that intervenes in the approach to global problems through their active participation in the search for solutions. Furthermore, those responsible for SCPs have become aware of the importance and necessity of teacher professional development in order to successfully implement an SCP, in particular, it is necessary to reinforce training on co-creation strategies that allow the combination of perspectives, talents and generation of creative and comprehensive solutions in which very different agents make relevant contributions playing a crucial role in the searching for solutions to the challenges addressed.

## ATTACHMENT

*Please provide the following attachment:  
List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Waste reuse: 5
- Waste reduction: 3
- Waste recycling: 3
- Textile waste: 3
- Sustainable mobility: 2
- Rehabilitation of spaces: 8

## Regional Report on SCPs: Spain (second round)

### BACKGROUND INFORMATION

- Region (Country): Spain
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):
  - University of Jaén
  - Spanish National Research Council (CSIC - Consejo Superior de Investigaciones Científicas)
  - Center for Teacher Training at Jaén

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

The SCPs developed in the second round in Spain have been very varied in school typology (public schools, vocational training schools, Arts Schools, Schools from disadvantaged backgrounds, etc.), age of the students (ranging from three to 15), topics addressed or involvement of external agents. In general, SCPs can be classified according to the participation of children in 1) one class with one teacher; 2) a set of classes (2 or 3) of the same level and from the same Educational Center; 3) SCPs of a complete Educational Center; 4) SCPs from different Centers (2 classrooms) with students of different ages. Each teacher in charge of SCP, regardless of their type, has been able to identify the strengths and weaknesses of its situation and make the most of the educational action.

Thus, for example, the projects in which different educational centers have participated have discovered ways of collaborating and developing mutual benefits, teachers have learned from each

other and students have discovered how exciting it is to collaborate with different people having very different points of view. Likewise, when the intervention involved interacting with students of very different ages, the personal enrichment has been much greater. For its part, the SCPs developed by the entire Educational Center have meant a time of collaboration and search for synergies among teachers, rethinking what is taught and how it is taught, and valuing teamwork for the development of Center. For their part, the students have enjoyed working days outside the classroom, visiting colleagues with whom they had assemblies for decision-making or showing part of their work as a basis for other colleagues to continue. Finally, those projects carried out in a single class have generated a great group atmosphere in the class itself, students have interacted more with each other and have faced common challenges, each one being able to contribute from their strengths. In this last type of SCPs we have detected that, although initially the SCP has been carried out by a single teacher, after several sessions, they have had the occasional collaborations of other Center colleagues who could join these initiatives in the near future.

There is active participation of external agents in 23 SCPs; just in four SCPs there was not possible to report the intervention of those agents, although in three of them the project will continue and this aspect will be taken into account as a proposal for improvement. 207 participants from the community are reported, the majority from wider society (161) such as the relatives of the students, members of the nursing home, members of the University of Jaén, etc. There has also been a considerable number (35) external partners from policy such as Mayors, Councilors for Education or the Environment, local representatives, etc. Finally, mention the continued collaboration with the elderly home “Altos del Jontoya” from Jaén and Associations such as Cáritas, Banco de Alimentos, Adyba, Ecologistas en Acción, etc.

Regarding the strategies used to design the SCP, co-creation was an obstacle to overcome, since most of those responsible for the SCP in the school requested specific help from external agents. This approach changed when instead of requesting help to carry out a concrete action, the problem was raised to the community and the question posed was how could you help us? Teachers identified this simple change as a turning point in their collaboration with external agents. Thus, in the SCPs reported in the second phase, co-creation materialized both at the beginning, within a professional development course for teachers, and throughout the entire project. In the aforementioned professional development course, dynamics were implemented to facilitate the co-creation of the SCP among the teachers participating in the course. It satisfied two objectives, on the one hand, to immerse teachers in real co-creation practices and, on the other, teachers initiate the designs of the SCPs co-creating with people with similar concerns and professional situations but with different classroom's context.

With reference to the problems posed and covered, and the challenges encountered in carrying out the SCPs and solutions, we can indicate that although some questions were general (Can we improve the health of our planet? How can we be more respectful of the environment?) the students generated products very specific in order to respond to the challenge. The topics covered revolve around waste management, for example, the impact on technological waste, reuse of olive oil (the main product of the economy in the area and widely used in gastronomy) or reduction of packaged



Christmas sweets. On the other hand, new topics appeared about air pollution and its consequences, study of pollution associated with school transport, plants that "clean" the air, design and creation of forest nurseries and school gardens, light pollution, etc.

Finally, the teachers responsible for the SCPs have highlighted some obstacles: the lack of time to organize and carry out the SCP, and the difficulty in engaging other colleagues in the Center as well as external agents who contribute constructively to the SCP. These obstacles were partially overcome in periodic meetings that were established in collaboration with the Teacher Training Center of Jaén.

All reported SCPs were presented at two MOST fairs, June 20 and December 20, 2022 (14 and 13 respectively), in which students had the opportunity to share their experiences, which had a very positive impact on participants. The first MOST fair had congress format and the second one took place as fair format with stands. Thus, the community of practice has grown and has been enriched by teachers and students motivated to address real environmental problems in their classrooms.

## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).

Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.

### SCP 1 - #YOHAGOMIPARTE - CEIP PADRE REJAS (JAMILENA, JAÉN)

#### "The change begins in oneself and there's strength in numbers"

This SCP focused on the renewal of habits and care of the closest environment from the school and town context. It involved the early-years and primary levels of a public school located in Jamilena, a small town near the Jaén, and took place from October 2021 to June 2022. Although many rural traditions and customs are maintained in this town, there is an excessive consumption of processed products, a misuse of means of transport and a neglected aspect of the environment. To address this issue from the classrooms, students and teachers made the educational community and the inhabitants of Jamilena participate in the importance of not only personal care, but also environmental care; promoting collaboration with the family association, the City Hall and a Secondary School. Therefore, the main challenge of this SCP was the improvement of some deeply rooted habits in the context of the school and the town which do not favor a healthy lifestyle as unbalanced eating habits or a polluted environment.

To address this issue, the teachers involved in the SCP set up an entry event to raise the awareness of students about the problem. For that purpose, they scattered garbage around the playground and passively awaited the reaction and action of the students. Then, the teaching team proposed a series of tasks in relation to the exposed situation, although students themselves decided about the actions to be taken to solve the exposed problem in each class and educational level. Some of this task involved creating an awareness campaign using statistics regarding healthy habits in our environment, collecting waste from the school, making protest in the town to raise awareness about waste reduction, posting photographs of the waste found in the town at different locations, promoting the use of bicycles for trips to school, growing a vegetable garden, etc. To make these ideas more far-reaching, students met with the city council to request their collaboration. In addition, other activities were carried out to encourage the SCP to go beyond the walls of the school as building an accompaniment patrol to come to school on foot, a healthy cooking Youtube channel involving the participation of families, a virtual solidarity race in collaboration with associations related to child illness, recycling and good habits tutorials in which the students recycling patrols trained and raise awareness on waste management of the Jamilena citizens.

The SCP was disseminated through the school website as well as on its social media. In fact, a logo and a specific hashtag (#YOHAGOMIPARTE) was used to promote the project. In addition, the SCP was presented in the 2nd MOST Fair at the University of Jaén showing posters, videos and a talk by participating students about the project. Moreover, teachers and students involved in the project created different merchandising items such as fabric bracelets or key chains designed and produced using a 3D printer in collaboration with a close Secondary Education school. Finally, the different festivities celebrated in the school throughout the months were linked to the project and, to facilitate its dissemination, choreographies and songs (working as jingles) were represented to bring it closer to the inhabitants of the town.

Some of the strengths that turned this SCP a success story included: the beginning from a real context, the used of co-creation dynamics between students and teachers to look for solutions, the key role of students as the main drivers of the SCPs, the dedication of specific spaces and time during school hours and within curriculum to the project, the collaboration between teachers, the promotion of inter-generational learning, the real impact in the town, the expected long life of the project.

Through this project the school was empowered as a relevant agent for the awareness of Jamilena about the importance of healthy lifestyle habits for the environment. In fact, this project has had a deep impact on Jamilena citizens so that the elderly people talked regularly about MOST and the participating students took ownership of the project and understood the need to include more people in the fight for their cause.



## SCP 2 - 50/50 goes out to recycle – MARCELO SPINOLA SCHOOL (JAÉN)

**“The distance to the container cannot be the excuse”**

This SCP was carried out at the Marcelo Spinola School in Jaén. It is a Catholic and concerted Center supported with public funds. There are about 325 students from three to 15 years old, from Early Childhood, Primary and Secondary Education. The geographical situation of the Center (Jaen South surrounded by other educational centers) makes them seek excellence and specialization in their professional practice, and for this reason, for many years they have given great importance to in-service teacher training in project based learning and collaborative methodologies. On the other hand, the neighborhood in which the Center is located, belongs to the old area of Jaén, implies that the area is configured in a complex network of narrow streets.

The SCP is developed within a Center project related to energy reduction (50/50 project), in such a way that 50% of the benefits obtained throughout an academic year were dedicated to improving the Centre’s energy efficiency. Between the months of October and December 2022, the Center opted to expand the project towards the field of waste management. Thus, the first step has been to identify recycling points in the neighborhood, detecting possible deficiencies and proposing suggestions for improvement to the council. Although the initial question was What can we do to encourage recycling in the neighborhood? it materialized into other more specific questions that could be addressed by the students: What do our neighbors need to recycle easily? How can we



make the recycling points in our neighborhood visible so that people can use them? Are the recycling points adapted to the neighbourhood's needs? Who and how can we inform to repair the deficiencies in the neighborhood recycling points? How can we take advantage of the waste we have? Who can help us make musical instruments with recycled material? The teachers formulated the general question but, as the project developed, the students themselves suggested questions to be addressed with the intention of answering the initial one. Thus, the students were the ones that decides about which questions should be approaches and the means to solve them. They hope, in the future, to achieve economic benefits with recycling, which they will incorporate into the 50/50 project.

- Specifically, the actors involved were early childhood education students (5 years old) and upper secondary students (14-15 years old), 3 teachers (one from Early childhood education and two from secondary education, one from Biology and one from Technology), "La Gloria" Neighborhood Association, "Fuente de la Peña" Residence for the elderly and the City hall. There was no previous relationship between the Center and the members of the community (Association and Residence) so this SCP has been an important starting point for future collaborations. The relationship with the elderly has been very enriching from different points of view since, on the one hand, their knowledge of musical instruments has been essential to design them with recycled objects and, on the other, the personal and human relationships generated in the visits have fostered mutual respect and appreciation of the other generation. The neighborhood association "La Gloria" has developed cultural visits to the neighborhood, facilitating access to recycling points and allowing young people to get to know the neighborhood in depth.

#### Solution found:

- Location of the recycling points in the neighborhood (map), analysis of the situation and detection of deficiencies (locations that are not very accessible, number of containers not adapted to the real needs of the neighborhood, etc.)
- Preparation of an interactive map (My Maps) and brochures to locate recycling points in the neighborhood and distribution of information throughout the community (neighborhood shops, bars, restaurants, locals, nursing homes, other educational centers, etc. .)
- Inform the city council of the deficiencies detected and request for demands related to the improvement of the recycling points.
- Recycling of materials for the elaboration of musical instruments with the help of the users of the residence.

The solutions have been disseminated through QR codes and have been distributed by businesses and locals in the area. These QR codes directly access the interactive map to locate the recycling points, in such a way that the neighbors know the recycling points closest to their house, which is very useful because the neighborhood is made up of narrow alleys, which makes it difficult to direct visualization of the containers.



Thus, we believe that this SCP has become a success story for the city because it has been an advantage for the residents and it has allowed recycling points to be adapted to the real needs of the neighborhood.



<https://www.google.com/maps/d/u/0/viewer?mid=15Ckk0tFspxug0JPMSLOALUuyjIF1g-w&ll=37.757823628461765%2C-3.7938035000000037&z=16>

### SCP 3 - Give a second life to your mobile- PEDRO POVEDA SCHOOL (JAÉN)

#### “The solution is in your pocket”

The Pedro Poveda School is a concerted Center with public funding with various educational levels: Early Childhood Education, Primary Education and Secondary Education. It is located in the southern area of the city of Jaén and carries out essential work there.

The SCP has been carried out by 43 students in the fourth year of Secondary Education (15 years old) together with 5 teachers and different members of the community, mainly relatives and acquaintances of the students, "Clean Point" Agency, town Hall and neighborhood Association. The students, organized by groups, have addressed the general question: how can we manage technological waste? Based on this challenge, each group of students, guided by their teachers, have decided to organize a collection of disabled mobile phones among their relatives and acquaintances. The collected mobiles were classified to be repaired and sold or to be properly recycled. Although

the teachers raised the initial challenge, the students specified the actions to be carried out. First, they thought about what to do, enhancing the capacities of each member of the team. Some of them have designed posters to request help from other students at the Center, others students decided to collaborate in classifying the material, other groups committed search for people to donate their mobile phones, and thus, collaboratively, all of them contributed to meet the proposed challenge. Thus, the students carried out multiple actions, among which we highlight the following:

- Analysis of the origin of the problem, from environmental, economic, ethical and social points of view.
- Fine-tuning of the procedure to catalogue and organize the collected materials.
- Organization of a small business for the optimization of electronic devices: collection, recycling of elements, shipment for repair, sale, etc.
- The profits obtained will be dedicated to the energetic improvement of the Center.
- Dissemination campaign.

The solutions identified for the problem of technological waste management were the following:

- Social awareness about the manufacturing process and about the use of electronic devices.
- Selective collection of electronic waste obtaining economic benefit.
- Positive impact on the energy efficiency of the school.
- Reduction of CO<sub>2</sub> emissions: 1) management of the waste generated by electronic devices, 2) reduction of energy consumption in the Center.

This SCP will be continued in successive courses, in such a way that in the next academic year students will be guided to continue with the mobile repair and recycling campaign and the phase of improvement of the Center's energy efficiency will begin. It is expected that in this phase they will install light timers and electricity consumption meters, request and install photovoltaic panels, if possible, thus seeking for neutrality in terms of CO<sub>2</sub>.

Students have disseminated the SCP through social networks and informing relatives and acquaintances

Regarding the obstacles, the beginning was uncertain, the students themselves thought of the project as a way of doing something different from their normal classes, but as the project progressed, and they saw that they had a leading role, they took the problem seriously and have become cognitively hooked on it. From their interventions, they explain to be interested in this type of project and specifically those related to caring for the environment. The students emphasize the importance of repairing and recycling mobile devices due to the scarcity of materials and the pollution generated by poor waste management.



## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

The School Community Projects that have been carried out during the second round of MOST have included the participation of 53% female students, which suggests that they have felt supported to join the projects and actively contribute to them. In addition, 81% of the teachers involved in the SCPs were women, as well as 46% of the external agents, members of the community, who could act as role models for female students. Research in science education has documented gender gaps concerning boys' and girls' engagement and achievement in maths and science. This gender gap may reflect, in part, a response to perceived stereotypes, but the use of female referents is a strategy that has proven to be effective in promoting scientific vocations in girls and reducing the existing gender gap in this area.

Apart from that, the SCPs carried out in the context of MOST have dealt with science and mathematics to solve socially relevant issues such as those related to the environment and sustainability through the action of students and many education programs aimed at improving science education for females recommended active learning and hands-on instructional strategies.



Finally, several teachers participating in SCPs have reported concerning the impact of SCPs in students that they allow them to uncover several talents and abilities hidden until then. This encouraged those students to participate with great motivation in the search for solutions to the challenges addressed, which suggests that the SCPs could be a good tool towards inclusive education.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

The most valuable outcome from the experience has been realizing how working to achieve common goals has consolidated the educational community while the students have worked motivated and empowered. Collaboration between teachers is a crucial aspect for the success of the SCPs, both between teachers from the same school and between teachers from different ones. In fact, the teacher professional development course offered parallel to the development of the SCPs to support the participants in the design and implementation of projects has tried to offer times and spaces for collaboration and co-creation between different schools, which teachers have valued very positively.

The students have learned that there are no limits, that their proposals have value and are appreciated, and that they can take action to make their resolutions a reality. In addition, apart from transversal skills, the students have learned about science and mathematics (classifications, measurements, statistics, economics, biology, energy, climate change, expression, plans...) making sense of these contents and applying them to solve real problems in close contexts. It is essential to give prominence to the students challenging them to achieve the role of expert.

Although project participants detected failures and errors as experiences from which they could learn, they consider that organization and planning are key for an SCP to be successful. In addition, they also consider that more emphasis should be placed in future editions on encouraging more collaboration from external agents and involving them in the projects through real co-creation dynamics.

Lastly, teachers demand to keep on training and have more time to dedicate to projects, since many times they have had to invest personal time in them. In addition, they would like to integrate the curriculum much more into the project and declare that many times they have realized everything that has been addressed from the project in terms of science and mathematics once the project is finished. Therefore, it is important to encourage teachers to reflect and document their experiences since they can serve as a reference for future project implementations and facilitate the organization of tasks and a deeper integration of the curriculum from the beginning.



## Regional Report on SCPs: Sweden (first round)

### BACKGROUND INFORMATION

- Region (Country): Sweden
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Högskolan för lärande och kommunikation, Jönköping University  
Uptech, Jönköping Municipality
- Numbers of SCPs done in total: 43
- Numbers of schools involved in total: 19

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:

- The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry, ..., if any) and other partners involved in the SCPs as a whole
- The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...
- The problems posed and covered (within waste or environmental issues)
- The challenges encountered (if any) in carrying out the SCPs and solutions

To start this report, we will describe our overall approach to engage schools and external actors in initiating, starting, and running SCPs. Our strategy has been to build on existing initiatives as much as possible. Initiatives that share common features with the open schooling idea, projects, activities, etc. whose DNA, so to speak, incorporate addressing societal challenges within the STEM-field, believes in corporation between schools and other actors, etc. We started scanning our local networks, contacted key persons, discussed, got feedback, new contacts, in a cyclic manner in the beginning of the MOST project. Due to the Corona situation we also early decided to keep an active role in all SCPs on our own (at least one person from our core group is connected to each SCP), not to burden teachers with additional workload in an already extreme situation. In this way we also eased the threshold for schools to join our SCPs, not having to lead everything on their own. In a similar way we worked with engaging and selecting external representatives that we pair with the SCPs. Generally external representation, that is persons representing business,

companies, organizations, municipalities, etc. are engaged in more than one SCP. This means that in the numbers presented below, there are persons counted more than once, and all persons are not unique, due to the way data is asked for. We also believe that this approach will increase the possibility to continue working in an open schooling manner after the end of the MOST project. Our experience so far, is also that it is also a more effective way of using resources, at least in terms of manpower.

A comment. In this way of working, the launch workshops, were not critical in attracting actors from schools and externally. Our launch workshops were more used to introduce to persons already willing to participate, what we call our SCP Clusters.

A SCP Cluster is a group of SCPs that share the same characteristics but are run by different teachers and pupils, but often with the same external representation. Up to today we run four SCP Clusters, with between 1 and up to around 20 SCPs in each, see below for exact figures. The four clusters are: a) Wasteyard Safaris, b) Solar Cars, c) Littering and d) Waste films.

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP).  
For each story, please give a more detailed information on the problem posed, strategies to start up SCPs,  
who were involved, ways of working and solutions found. Explain also why this SCP has become a success  
story for your region (country).*

All examples below comes from our Swedish MOST website, where these narratives are presented in Swedish.

<https://ju.se/puf/most>

or

<https://ju.se/forskning/forskningsinriktningar/praktiknara-utbildningsforskning-puf/most--meaningful-open-schooling-connects-schools-to-communities.html>

NOTE: Below in the text there will be links to other websites, go to the link above for direct access to all of these. All pictures shown below, and more, are also accessible there.

### Wasteyard Safaris

Classes in all cohorts may book a Wasteyard safari. The classes are bussed out to a sorting yard where the children can discover the sorting yard's "Big Five"

The idea of these sorting yard safaris is for the children to learn in a fun way about recycling, waste, sorting at source, the cycle and what people can contribute to improving the environment.







Photo: Patrik Svedberg

Wasteyard Safaris has been running since the start of the MOST project and will continue in 2022. Until 2021, around 20 classes have participated in our SCPs and learned more about how we can improve the environment, valuable knowledge that children hopefully carry with them throughout life.

Here you can read more about Wasteyard Safaris and also book a visit. [Link to another website](#), opens in a new window. See website above for direct links.

Media about Wasteyard Safaris Link to another website (Swedish TV), opens in a new window. See website above for direct links

Contact:

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## Reduce littering at school

The principal, teacher and caretaker at Rosenlundsskolan in Jönköping noticed that the littering of the schoolyards had increased, especially during the weekends. With this fact as a basis, a project started.

In May 2021, the students in year 4 at Rosenlundsskolantog, together with Marlene Svensson, waste educator from June Avfall & Miljö, produced sticky notes that were placed on the school's bins. In June, they also painted green footprints leading to the trash cans.

Already at the beginning of November, you can see an improvement with less littering.







## Waste films

### Business-oriented students create waste films

Young business-oriented high school students have competed with self-produced films in a film festival. The films are about how important it is to recycle waste - an important knowledge for students in their future professional lives.

Together with June Avfall & Miljö, high school students from Thoréns Business School in Jönköping have become acquainted with different types of waste at the sorting yard. After that, the students immersed themselves even more in waste management and formed groups that each present waste in a self-produced film. The films cover food and residual waste, metal, electricity, hazardous waste and plastic.

### *Film festival*

The films participated in a film festival that the business high school arranged on Friday, September 25, 2020, where the film about residual waste was named the winner.

Watch the winning film here. [Link to another website](#), opens in a new window.

### *Important with waste management*

Some of the students chose Thorén's Business School because they want to study to become brokers and lawyers. They were a little surprised that waste management appeared on the schedule but now think that waste management can be linked to several topics.

- We did not know that there were such hazardous substances in electrical waste, says Absan Ahmed, who is in his first year of the Business Program. She points out that it is very important that we care about how we handle waste because it is harmful to humans, animals and nature.

- The biggest winner is the environment, according to Kristoffer Krantz, marketing manager at June Avfall & Miljö. According to him, cooperation with the younger generation on waste prevention measures is an investment in the future.

- Preventive work increases young people's sense of participation and responsibility at the individual level, which increases the chances that they will continue to work for a sustainable and circular economy, Kristoffer Krantz concludes.







## Solar cars race 2021

HLK contributed with a solar car race to the regional Climate Week

The University of Learning and Communication (HLK) at Jönköping University (JU) organized a solar car race for **small** cars during Climate Week in Jönköping County, 16-23 September.







Slideshow from the solar car race 2021 at Atteviks. More pictures exist on the webb, see link above in this document.

Climate Week is an annual event organized by the Climate Council in Jönköping County, which includes Jönköping University (JU). Climate Week aims for Jönköping to reach the vision of becoming a Climate-Smart Plus Energy County by 2045 by 2045.

A recurring activity during Climate Week is the solar car race, which this year is arranged by HLK through the project MOST. The competition took place at the car company Atteviks in Jönköping and high school students in Jönköping County who study technology were invited to participate. The students' self-built and maximum 15-centimeter-wide cars were powered by a battery that was charged with solar cells and sometimes during the competition day also by lights so that they would achieve full effect.

*The JU Solar Team sat on the jury*

The students were divided into a number of teams, which competed with their cars in three categories: Speed, innovation and design. The JU Solar Team had two seats on the jury that selected the winning entries. A total winner was also nominated and awarded the competition's hiking prize. It went to the team with Emma Liljedahl, Abbas Qhaimi and Filip Svärd at Aleholmsskolan in Sävsjö.

- I was a little unsure, but thought we had a chance to win and it was fun to come here and see the other entries in the competition, says Abbas Qhaimi.



He and his car-building colleagues made their car as light and stable as possible and that the weight was evenly distributed, which they emphasized in their presentation to the jury. They had also added a power button to save battery power.

"Technology education should be exposed more"

Emma Liljedahl, who was one of the few girls in the competition, was proud of the victory and the car that her team produced. She reads the technology program because she is interested in the subject and logical thinking in general. She thinks that technical education should be more exposed to girls and will after high school continue to study to be an architect.

Sara Sterne, chair of Girls in Stem (Science, technology, engineering, and mathematics) and who studies mechanical engineering at Chalmers University of Technology, was the project manager during the solar car race.

- I am here to get more girls to discover the fun of technology and all the good things you can do with technology, she says.

"Nothing stereotypically funny"

Sara Sterne mentions that the solar car race is not a stereotypical boy event and that more girls should have been there.

- We have not turned specifically to girls before the solar car race and unfortunately there are few girls in the technology classes who have come here. Girls often do not take up as much space as boys in such contexts. That is why it is important to show that technology events are not just for boys, she says.

#### *Teams of the year*

Aleholmsskolan, Sävsjö - 3 teams

Brinellgymnasiet, Nässjö - 3 teams

Finnvedens Gymnasium, Värnamo - 3 teams

Gnosjöandans Kunskapscenter, Gnosjö - 2 teams

[Read more about Climate Week 2021. Link to another website, opens in a new window.](#)

[Read more about the Climate Council. Link to another website, opens in a new window.](#)

#### *Media interest*

[P4 Jönköping broadcast to and from during the day. Link to another website, opens in a new window.](#)

SVT Jönköping was on site to interview students and Jesper Boesen from Jönköping University, who is responsible for the MOST project. [Link to another website, opens in a new window.](#)

SVT Jönköping also interviewed Sara Sterner, who led the day, about the network Girls in STEM of which she is a part. [Link to another website, opens in a new window.](#)

The SVT program Landet runt picked up the feature from SVT Jönköping. Approx. 9.55 into the program.

\* Here you can read about the Solar Car Race 2019.

## LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

Our strategy has been to build on existing initiatives that share common features with the Open schooling idea as much as possible. This means projects and activities addressing societal challenges within the STEM-field and that believes in corporation between schools and other actors, etc.

We also started scanning our local networks, contacted key persons, discussed, got feedback, new contacts, in a cyclic manner in the beginning of the MOST project. We worked with engaging and selecting external representatives that we could pair with the chosen SCPs. Generally, the external representations are people from businesses, organisations, municipality staff and HEI staff, that are engaged in more than one SCP. Our experience so far, is that this is an efficient way of using human resources.

With this strategy, the launch workshops, were not critical in attracting actors from schools and external bodies. Our launch workshops were more of an introduction to the persons already willing to participate in what we call our SCP clusters. We believe that this strategy has been successful this far as we have performed 43 SCPs this far.

Due to the Corona situation we early decided to play an active role in all SCPs ourselves (at least one person from our RST is connected to each SCP), not to burden teachers with additional workload in an already extreme situation. Not having to lead the projects on their own, lowered the threshold for schools to join our SCPs.

## ATTACHMENT

- Please provide the following attachment:  
List of topics covered in SCPs first round and the numbers of SCP in each topic.

Total number of participants of all SCPs implemented in the first reporting period	Total number of all participating students	Number of participating female students	Total Number of all participating teaching staff	Number of participating female teaching staff	Total number of all participants from community	Number of female participants from community
Waste yard safaris: 594 Solar cell cars: 130 Littering at Rosenlundsskolan: 27 Thorén Business school, waste films: 39  Sum: 790	Waste yard safaris: 441 Solar cell cars: 100 Littering at Rosenlundsskolan: 21 Thorén Business school, waste films: 30  Sum: 592	Waste yard safaris: 235 Solar cell cars: 20 Littering at Rosenlundsskolan: 10 Thorén Business school, waste films: 15  Sum: 280	Waste yard safaris: 43 Solar cell cars: 20 Littering at Rosenlundsskolan: 1 Thorén Business school, waste films: 4  Sum: 68	Waste yard safaris: 26 Solar cell cars: 5 Littering at Rosenlundsskolan: 1 Thorén Business school, waste films: 2  Sum: 34	Waste yard safaris: 110 Solar cell cars: 10 Littering at Rosenlundsskolan: 5 Thorén Business school, waste films: 5  Sum: 130	Waste yard safaris: 4 Solar cell cars: 5 Littering at Rosenlundsskolan: 4 Thorén Business school, waste films: 3  Sum: 16

→ Please specify the total number of participating citizens in the following types

Total number of participants from community	Number of citizens from business/industry	Number of citizens from policy	Number of citizens from non-formal learning providers	Number of citizens from wider society (e.g. family, neighbourhood etc.)
Waste yard safaris: 110 Solar cell cars: 10 Littering at Rosenlundsskolan: 5 Thorén Business school, waste films: 5  Sum: 130	Waste yard safaris: 105 Solar cell cars: 2 Littering at Rosenlundsskolan: 0 Thorén Business school, waste films: 3  Sum: 110	Waste yard safaris: 0 Solar cell cars: 2 Littering at Rosenlundsskolan: 1 Thorén Business school, waste films: 0  Sum: 3	Waste yard safaris: 5 Solar cell cars: 6 Littering at Rosenlundsskolan: 4 Thorén Business school, waste films: 2  Sum: 17	Waste yard safaris: 0 Solar cell cars: 0 Littering at Rosenlundsskolan: 0 Thorén Business school, waste films: 0  Sum: 0

## Regional Report on SCPs: Sweden (second round)

### BACKGROUND INFORMATION

*In Sweden we have arranged all our SCPs in what we have called SCP Clusters. Within each cluster several SCPs has been run. The four clusters are: Wasteyard Safaris, Solar Car race, Wastefilms and Littering at Rosenlund's School.*

- 
- Region (Country): Sweden
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):
  - School of Education and Communication, Jönköping University
  - Upptech Science Park, Jönköping Municipality
  - Affiliated, June Avfall & Miljö (A local waste company owned by three municipalities)

### OVERVIEW

*Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:*

*1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole.*

*In the second round we followed the overall structure developed in the first round with four SCP clusters (described below), but with some new schools. Mainly the same external partners were re-used in the second round, with a few additions from some new external partners. Below we will report our "results" per each SCP Cluster.*

**Wasteyard Safaris:** *In the second round we arranged a total of 11 SCPs during a two-week period (with 11 classes ranging from preschool to upper secondary. For each SCP mainly the same external partners were engaged, June Avfall & Miljö (a waste pedagogue and three waste yard staff persons), School of education and communication, Jönköping University (one researcher), Upptech Science Park (pedagogue). This means that this Cluster in the second round engaged about 300 pupils, some nearly 40 teachers and 6 external persons.*

**Solar car race:** *In the second round we arranged a total of 9 SCPs. The number of SCPs needs an explanation. Each participating school had several school projects that developed and built solar cars. From each school cars were nominated to participate in the Solar Car race day (a fixed date each year that also was one of our MOST fairs). These specific cars and the students, teachers and external partners resulted in 8 cars participating in the Race, since one car didn't show up. During the race day each car competed in three categories 1) Speed, 2) Design and 3) Innovation. The race day (aka MOST fair) comprised of races in heats, presentations in front of a jury and voting for the best design. The external partners were School och*



education and communication, Jönköping University, Upptech Science Center, JU-Solar Team, Atteviks, Ung företagsamhet, GirlsinSTEM and Teknik College. The whole event was covered by several media including Swedish radio, Swedish Television and a local newspaper. In total around 60 participants, pupils, teachers and external partners attended the event.

See [Solbilsrace 2022 - MOST - Jönköping University \(ju.se\)](https://ju.se)





**Waste films:** In the second round we arranged 5 SCPs where the SCPs worked on waste management from an entrepreneurial perspective. The overall idea was that whatever kind of business the students will engage in in the future, waste management will always be a component of starting a company. Therefore the students had to develop competence in the area. All students came from an upper secondary school with business orientation. Starting by going to the waste yard to learn about the different waste fractions, etc they started their project work. Each group has one fraction to work with and made a film: residual waste, dangerous waste, plastic, metal and electronic waste. The SCP work was finalised in a film festival where the students presented their films in front of a jury. This festival day was one of our MOST fair for the second round. External representation consisted of June Avfall & Miljö (a waste pedagogue, one CEO and a communicator), School of education and communication, Jönköping University (one researcher) and Upptech Science Park (pedagogue). These external persons were also the jury. 15 students, two teachers, the school's principal and five external persons attended the fair, in total 23 persons.

**Littering Rosenlund school:** In the second round this SCP was done in collaboration with the Wasteyard safari and two of the classes that joined the safari also continued the Littering project at Rosenlund school. The classes engaged were special needs classes. After going to the Safari, the pupils produced aluminum sculptures from the waste. The school also participated in the national campaign "cleaning up your neighborhood" where about 250 students from all classes were allocated an area each, that they cleaned up. The project was enriched with a "talking waste bin" on their school ground to inspire the children to pick up litter from the ground and throw it in the bin. The bin made different sounds when fed with litter. Apart from the cleaning up campaign, two classes together with teachers, a principal and a caretaker worked in the SCP, with external representation from June Avfall & Miljö (a waste pedagogue), Ung företagsamhet (pedagogue) and Upptech Science Park (pedagogue). In total 260 pupils, 60 teachers and assistants and three external people worked in the SCP. See pictures below.



*2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...*

*In the second round we followed the overall structure developed in the first round with four SCP clusters. For the waste yard safari we invited new schools to participate, but in the three other SCPs basically the same schools as in the first round participated, but with new classes. Mainly the same external partners were re-used in the second round, with a few additions from some new external partners. The question of co-creation was applied to different degrees in the different SCP clusters where e.g. the waste yard safaris were more of a predefined format offered to schools whereas in the other end the Littering project at Rosenlund school was clearly of co-creation nature since the topic and dilemma had arisen from that specific school. In the second round less effort was made to attract schools since most of the schools had heard of this project from the first round and we faced no problems in attracting participants.*

*3. The problems posed and covered (within energy or environmental issues)  
 See above for respective SCP cluster.*

*4. The challenges encountered (if any) in carrying out the SCPs and solutions  
 Mainly the second round ran very smoothly. But one challenge we faced was connected to the pre- and post-questionnaires, teachers found them unproportionally demanding, and we couldn't collect as many we had wished for. This was partly since we had a large proportion of younger pupils and their teachers didn't find it meaningful to answer the questionnaire.*



## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).

Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.

### SCP 1 Solar car race day

As our first success story, we share an article on the solar car race day. This feature article is published in Swedish on our Swedish MOST site. We have made a simple translation from Swedish to English to give you a glimpse on one part of that SCP. The race day was covered by TV, Radio and newspapers.

#### *Solar car race 2022*

*Technical students competed in a solar car race*

*On Monday, October 17, the Solar Car Race started at the car company Atteviks as part of Climate Week. Technology pupils from the county's upper secondary schools were invited to compete with their cars in the categories Speed, Design and Innovation.*

*Climate Week runs between 17 – 23 October in Jönköping County with a variety of activities to provide increased knowledge and inspiration regarding the transition to a climate-smart society. A recurring activity during Climate Week is the Solar Car Race, which is led by the University of Learning and Communication at Jönköping University and the EU project MOST, in which Upptech also participates.*

*The jury consisted of representatives from Atteviks, JU Solar Team, Ung Företagsamhet and Solbilracet's project manager Jesper Boesen. The jury also awarded a walking prize which went to the team that was most successful in the sub-competitions.*

*In addition to being part of the jury, the JU Solar Team displayed parts of their full-size solar car and answered questions from the students. They build the solar car themselves and will compete next year in the Bridgestone World Solar Challenge in Australia.*

*There was a good atmosphere at the competition and the happiest was probably the team with Filip Andersson, Jesper Johansson and Mohammed Al Daabais from Aleholmsskolan in Sävsjö, who won both the speed prize and the walking prize with their car, which they have aptly named the Turbo car.*



*- It has been a great day and we are glad that we won so much. The race was quite even, but our car went very straight, which is probably why we won. We built the car in school before the summer holidays, but there has been some work with it outside of school as well. We did a 3D-print of the car's chassis at home, they say.*

*Jesper Boesen, director at the University of Learning and Communication and project manager for the second year of the Solar Car Race, is satisfied with the event.*

*- It is fantastic to see the enthusiasm and commitment from the students. I think events like this are important for several reasons. It's genuine learning joy, where students have fun and learn about solar cells and the environment, he says.*

See also for more pictures and media coverage: [Solbilsrace 2022 - MOST - Jönköping University \(ju.se\)](https://www.ju.se/solbilsrace-2022-most-jonkoping-university)

## SCP 2 Wastefilms 2023

The second success story is also covered in a feature article on our Swedish MOST site

*Waste films created by pupils at Thorén Business School*

*Young business-oriented upper secondary pupils have competed with self-produced films in a film festival. The films are about the importance of reduce, reuse and recycle - important knowledge for the students in their future professional life.*

*Upper secondary pupils in year 1 from Thorén Business School in Jönköping, have become familiar with different types of waste during a study visit to the waste yard. The students have immersed themselves even more in waste management and formed groups that present one type of waste each in self-produced films.*

*The project has resulted in five films about residual waste, metal, electrical waste, dangerous waste and plastic. During a closing film festival, the groups presented their work and their film.*

*A jury of representatives from the University of Learning and Communication at Jönköping University, Upptech, Thorén Business School Jönköping and June Waste & Environment, selected a winning film, which was a film about residual waste.*

*The project is one of several SCPs (School-Community Projects) in the MOST project, which stands for Meaningful Open Schools To Communities, which is an EU project.*

See more for pictures, films etc: [Avfallsfilm 2023 - MOST - Jönköping University \(ju.se\)](https://www.ju.se/avfallsfilm-2023-most-jonkoping-university)

## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

All our SCPs have had a relatively equal proportion of boys and girls, with one exception the solar cars which had a higher proportion of boys. These pupils came from more technical programs where there is a domination of boys. Since the majority of SCPs have been run class wise, where all pupils have engaged there hasn't been an explicit need to address girls in any other way the boys. All pupils have been addressed in an equal way. From our participation, and from reports from teachers, we haven't experienced a gender difference in participation from either girls nor boys.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

We would say that there are so many lessons learned from this project. For us there hasn't been a big difference between the two rounds, apart from the fact that it was easier the second year since the overall format was established in the first round. If we would highlight one thing, then it would be the joy of seeing young people being proud of their work and their results. We have seen so many pupils who really have shined! We heard a lot of reports from teachers who said that a particular pupil did such a great job, something they usually don't show in an ordinary school setting. We also heard from many pupils that being part of this have led to them learning new things in a new way, far from the typical classroom experiences.

## Regional Report on SCPs: Turkey (first round)

### BACKGROUND INFORMATION

- Region (Country): TURKEY
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Hacettepe University  
Ministry of National Education
- Numbers of SCPs done in total: 34
- Numbers of schools involved in total: 14

### OVERVIEW

*Please provide a short overview (0,5 - 1 page) of the SCPs from the first round in which you outline:*

34 SCPs were implemented in the first round. All SCPs' leaders used the INCREASE road map in the SCPs. Primary school students, some of their families, directors of schools, and other stakeholders who are engineers, business workers, NGO members, etc. attended the SCPs.

The SCPs related to the waste theme focused on the 5R of Zero Waste; Refuse, Reduce, Reuse, Recycle, and Rot. For example, students determined the total amount of waste oil in their homes in a year and carried out an investigation about community awareness for waste oil. Students tried to produce new materials from the unused thing in their homes from the perspective of the Reuse.

For the energy management theme, SCPs mainly focused on energy saving in homes and schools, the awareness of alternative energy sources, and the effective use of energy. For example, students investigated car routes for saving fuel.

## SUCCESS STORIES

*Please provide three SCPs that represent success stories from your region (1-1,5 page each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working and solutions found. Explain also why this SCP has become a success story for your region (country).*

### SCP 1: Increasing awareness about alternative energy sources

Students aimed to determine community members' awareness about alternative energy sources and provide them information about alternative energy sources including research and innovation in this field.

The students held an online meeting with a science teacher, assistant principal, parents, and an electrical engineer who was responsible for alternative energy sources used in Van province. Based on that meeting, students constructed their interview questions to discuss with the community members. The questions are below.

- What is the renewable energy source?
- What is the most used renewable energy source in Turkey?
- How many kW of electrical energy can a standard solar panel generate on a sunny day?
- Do you save energy in your home? If do not, what can you do?

Each student in the SCP contacted some community members and carried out interviews. The students asked the interview questions and after the given answer they gave information about the answers of the questions.

What is the renewable energy source? The questions and given main information are below.

What is the renewable energy source?

*The students explain what renewable energy and renewable energy source are after given explanations.*

What is the most used renewable energy source in Turkey?

*The students give information about the percentages of used renewable energy sources in Turkey in terms of given answers.*

How many kW of electrical energy can a standard solar panel generate on a sunny day?

*The students give information about the size of standard solar panels, generating electrical energy in one hour on a sunny day, etc.*

Do you save energy in your home? If do not, what can you do?



After the interview, the students attended the online interactive MOST fair and shared their experiences with the participants.

This SCP has a success story since the students behaved as science citizens and science communicators. The awareness of community members and their knowledge about alternative energy sources were increased in this way.

## SCP 2 Possible alternative energy sources for school and home

Students investigated the process of generating electrical energy with solar energy systems at schools and homes. They focused on calculating the cost of constructing solar energy systems in schools and homes.

The SCP leader followed the INCREASE road map to carry out the SCP. In line with this, the leader invited community members, electrical engineers, mechanical engineers, and workers in a company that serves in the energy field and installs energy panels. For the co-creation stage, two online meetings were carried out. The stakeholders and the students reflected on the importance of energy saving, the energy production methods widely used in Turkey, and installing solar panels in a building in the first meeting. Some stakeholders and the students studied the cost of the solar panel system, the needed panel amount, school electric bills, and time for gaining profit from the system in the second meeting. The stakeholder displayed the preliminary work for the system. A picture of the system is presented below.

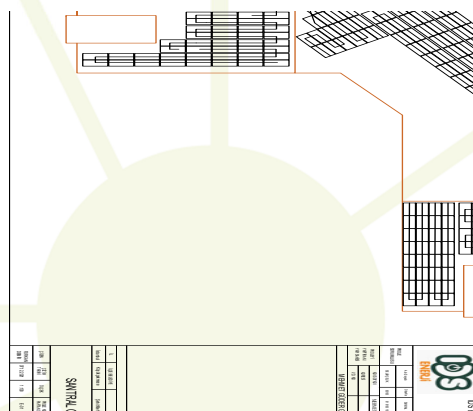


Figure 1. School solar panel system

In the Act stage, the students collected their school and home's electric bills, examined their school construction plan to calculate the size of its roof, and calculated the size of their home roof. After that, they calculated how many solar panels would be needed for their schools or homes to generate needed energy. They calculated the cost of the number of solar panels, compared the cost of the electricity consumption, and calculated how long it would take to cover the costs and move to an advantageous position.

The students presented their results in an online interactive MOST fair and evaluated the project process.

This SCP has a success story since the students worked as engineers on a daily life problem and reached real results. behaved as science citizens and science communicators.

### SCP 3 Investigation of waste oil amount

In this SCP, students tried to determine the amounts of waste oil produced at homes and calculated the average amount of waste oil that a person produce in one year.

- The students were brought together with stakeholders who are a manager of a chamber of commerce and industry, two people from NGOs related to the environment, and community members, in a meeting for the co-creation stage. They discussed what waste oil is, the production of waste oil in the food sector, industrial sector, and homes, the responsibility of the municipalities for collecting it from home as well as decided to investigate it for homes.

The students collected data during five days and analyzed this data. Students calculated the average amount of waste oil that one person produces in one year based on the data. The result shows that one person can throw or accumulate an average of around 1 L (956,665 mL) waste oil in one year.

The SCP leader presented the SCP process at the International STEM Education Conference and the students shared their results in an online interactive MOST fair and evaluated the project process.

This SCP has a success story because the students worked effectively with people from the industry, NGOs, and the community. Additionally, the results and process of the SCP were announced to large audiences.

### LESSON LEARNT

*Please reflect on what you have learned from the first round that may be useful for the second round and beyond the MOST lifetime.*

- The SCPs that contain a process in which students use some data collection devices such as a pH sensor, and a conductivity sensor, have attractive implementation processes. Students engage easily in these SCPs.
- Online co-construction meeting facilitates bringing stakeholders and students together.
- Interactive online MOST fair provide us opportunities to bridge for different regions and to reach lots of people effectively.

## ATTACHMENT

*Please provide the following attachment:*

*List of topics covered in SCPs first round and the numbers of SCP in each topic.*

- Soil pollution and soil quality: 1 SCP
- Water pollution and water quality: 4 SCP
- Wastes in homes: 1 SCP
- Waste oil: 2 SCPs
- Reuse: 2 SCPs
- Recycling: 3 SCPs
- Reduce: 1 SCP
- Rot: 1 SCP
- Energy saving: 11 SCPs
- Alternative energy: 3 SCPs
- UV project 1 SCP
- Smart home/school system: 4 SCPs

## Regional Report on SCPs: Turkey (second round)

### BACKGROUND INFORMATION

- Region (Country): TURKEY
- Partner Institutions (HEI+ other partner institution(s) in MOST Consortium from your country):  
Hacettepe University  
National of Ministry Education

### OVERVIEW

Please provide a short overview (0,5 - 1 page) of the SCPs from the **SECOND ROUND** in which you outline:

1. The participants, meaning the schools (either primary, lower and/or upper secondary), the community members (either parents, business partner, elderly home, ....), the policy makers (e.g. municipality, ministry..., if any) and other partners involved in the SCPs as a whole
2. The general strategies that have been applied to establish the SCPs: Did you apply co-creation? To what extent? Which strategies did you use to engage community members? Or other strategies...
3. The problems posed and covered (within energy or environmental issues)
4. The challenges encountered (if any) in carrying out the SCPs and solutions

The students in the second round were middle school students, and some had taken part in various SCPs in the first round. Examples of community members in the second round were parents, computer engineers, electrical companies, plumber, mechanical engineers, owner of natural cooling underground storage, owner of thermally cooled storage, energy engineer, solar panel company, and greenhouse energy systems builder. In addition, science teachers, maths teachers, and school administrators were involved in many SCPs.

INCREASE road map was followed in all SCPs.

A two-step way was followed in determining the SCP topics. In the first step, the implementation teacher was informed about the INCREASE roadmap and asked to conduct an opening lesson with her students. The teacher and students identified possible topics that they would like to work on. Based on the topics identified, the teacher created a short briefing document on what they would like to research, the community dimension and possible stakeholders. In the second step, this



document was reviewed by the regional support team, and feedback was given. Once a researchable SCP topic was agreed upon, the INCREASE roadmap was followed.

In each SCP, the co-create step was carried out. In the co-creation step, difficulties were encountered, especially involving students in the research planning process and determining the evaluation dimension. To involve community members in the process, the school administration, teachers or people with whom the students could communicate directly and with whom they had good and strong ties.

Some SCPs addressed in the second round were carried out with different students in different schools. The energy theme ranged from natural cooling underground storages to greenhouses, from the ideal height of natural gas cookers to using paper napkins in schools, were addressed.

During the implementation process of SCPs, difficulties were generally experienced in the co-create stage. In the co-creation phase, there was a problem involving students in the research process planning. This difficulty was overcome by trying to get as many opinions as possible and trying to keep the interaction at high levels.

## SUCCESS STORIES

Please provide three SCPs that represent success stories from your region from **SECOND ROUND** (1,5 - 2 pages each SCP). For each story, please give a more detailed information on the problem posed, strategies to start up SCPs, who were involved, ways of working, **solutions found and where & how these solutions have been disseminated**. Explain also why this SCP has become a success story for your region (country).

Please elaborate on **solutions found** since they are needed for D4.1 European report on issues tackled and solutions found in the SCPs, and on **dissemination** since WP7 needs this for reporting.

### SCP 1: Paper Napkin Project

#### The aim of the SCP

It was aimed to calculate how much energy and financial savings could be achieved by using a dryer instead of paper napkins at school and to create awareness of energy saving.

#### Community Dimension of the SCP

- Preventing the increasing cost of paper napkins at school,
- Reduction of wood consumption
- Reduction of carbon emissions
- Establishing a relationship between efficient use of energy and ecological balance
- Creating awareness of saving by observation and research

The prominent features of the project

- Establishing cooperation between the school and the company during the project process.
- The company donated four drying devices to the school.

- The school's budget allocated for equipment purchase was used to meet the school needs of girls.
- The meeting with the company officials shaped the research process.

### Invite

In the project, 10 students and five stakeholders participated voluntarily. The school's science teacher, math teacher, vice principal, and electricity company officials were the stakeholders.

### Co-create

Two online meetings were held during the co-creation stage. In the first meeting, the following items were discussed.

- - Napkin expenses of the school,
  - Materials used in napkin making,
  - Damages to nature caused by the use of napkins,
  - Electricity consumption cost of electric hand dryers,
  - Comparison of napkin sustainability and electrical energy,
  - Carbon emissions,
  - How the paper napkin and hand dryers can be compared in terms of energy consumption?

In the second meeting, energy efficiency and the advantages of these dryers in terms of energy consumption were discussed with the official of the donor organisation.

### Act stage

Observations were made, and data were collected on the use of paper napkins in the toilets as girls and boys groups. The average number of napkins used was found, and the average annual cost was calculated by researching the price.

Kross Electric Company, which sells hand dryers, was contacted and informed about the project. The company donated hand dryers to the school.

The average drying time was calculated by observing, and the average annual electricity cost was calculated.

The average annual cost of paper napkins for the school is 44300 Turkish liras (2200 Euros)

The annual energy consumption of the devices is 136,5kW

Average annual energy consumption cost of the devices (446 Turkish liras) (22 Euros)

### Share

The results obtained were presented the MOST Fair held on November 26-27, 2022 and on the school notice board.

### Evaluate

With the transition from using paper napkins to drying devices at school, 0.6 tonnes of paper will be avoided. In this way, approximately ten trees will be saved, 45000 lt of clean water will not be polluted, 1.8 tonnes of CO2 will not be emitted, and 16.2 m3 of waste space will not be used.

## SCP 2: Energy Savings in Underground Naturally Cooled Warehouses

### The aim of the SCP

In the project, it is aimed to compare the current status and characteristics of naturally cooled underground warehouses in Cappadocia province and the energy costs of natural storages with thermally cooled storages.

### Community Dimension of the Project

- Impact of naturally cooled underground warehouses on the environment,
- Environmental impact of naturally cooled underground warehouses,
- Cooling costs of thermally cooled warehouses,
- Environmental impact of thermally cooled warehouses,
- Contribution of naturally cooled underground warehouses to regional employment.

### Invite

In the project, 11 students and nine stakeholders participated voluntarily. Science teachers, owner of naturally cooled underground warehouse, owner of thermally cooled warehouse, the school principal and academicians were the stakeholders.

### Co-create

In the online meeting attended by the stakeholders, information on warehousing activities in the region was discussed. In addition, it was planned to carry out research on the products stored in naturally cooled underground warehouses, cooling energy costs of naturally cooled underground warehouses, the conditions required for long-term storage of stored products, energy costs in aboveground warehouses to create storage conditions for products.

### Act stage

Data were collected from warehousing stakeholders and managers of warehouses in the region. The general characteristics of the warehouses, cooling systems, their susceptibility to daily and seasonal temperature changes, humidity levels, annual electricity consumption of natural underground and thermally cooled aboveground warehouses were determined. Data were collected on the products stored in the warehouses and the storage periods of the products.

### Share

The result that the energy costs of natural warehouses in the region are very low compared to thermally cooled warehouses was shared on the boards in school and on various social networks. The results were also presented the MOST Fair held on November 26-27, 2022.

### Evaluate

The underground warehouses carved into the tuff rocks in Cappadocia province create a warm environment in winter and a cool environment in summer.

In these warehouses, only the cold air of the warehouse is utilised without using any equipment to cool the environment. In addition, there is no loss in the products other than the damages caused during collection and transport, and due to its properties, such as constant temperature and humidity balance, the natural structure of the stored products is preserved without deterioration.

### SCP 3: Solar Energy Source of Our School

#### The aim of the SCP

In the project it is aimed to investigate how much solar panels benefited from solar panels in the solar panel established school, the amount of energy produced and energy marketing.

#### Community Dimension of the Project

- Opportunities to utilise solar energy as an alternative energy source,
- Economic profits related to energy production and marketing,
- Gaining awareness about solar panels.

#### Invite

In the project, 10 students and eight stakeholders participated voluntarily. Some students from different educational levels interested in the subject also participated. Energy engineer and solar panels company, science teachers, pre-service science teachers, academicians, school administrators, parents, and visiting students were the stakeholders.

#### Co-create

The research process of the project was planned together with the stakeholders in an online meeting. In addition, the following issues were addressed.

- The amount of energy consumed by our school per month,
- Selection of solar panels,
- The number of solar panels needed to generate all energy from the sun,
- The area of the school roof,
- Calculation of how many panels can be used on the school roof,
- Points to be considered in the placement of panels.

#### Act stage

The number of solar panels was calculated according to the amount of energy our school needs per month. During the calculations, the required number of solar panels with dimensions of 1665 cm x 996 cm on the roof area of 1617 m<sup>2</sup> was determined as 570. The information obtained from the stakeholders that the school consumes an average of 14,577 kW of energy per month, and graphs



of how much energy was saved thanks to solar panels were drawn. While saving energy, at the same time, the profit from the electricity generated is determined.

### Share

The students both informed their close environment about the ways in which the energy needed is obtained from solar panels and shared information about the ways to be followed for energy saving. The results were also presented the MOST Fair held on November 26-27, 2022.

### Evaluate

During the project process, it was evaluated how alternative energy produced by solar panels could be gained, the project process and whether the project achieved its objectives.

## GIRLS PERSPECTIVES

*Please reflect on to what extent the SCPs have been inclusive for girls. Please also give examples on strategies employed to engage girls.*

More than half of the student participants of the SCPs conducted consisted of female students. This situation was explained to the implementation teacher for the inclusion of girls. It was emphasised that as many female students as possible should be included in the research.

## LESSON LEARNT

*Please reflect on what you have learned from the second round that might be useful for others to know beyond the MOST lifetime.*

The presentation of the students' projects at the MOST Fair greatly motivates them. We think the co-create and act phases of the activities in which family members can also be involved in SCP are more effective.

In the co-create phase, it is quite difficult to determine a common method for research with stakeholders and students. They remain less active compared to stakeholders. Efforts should be made to keep students active.