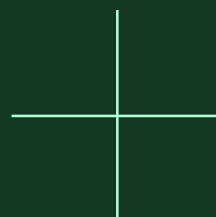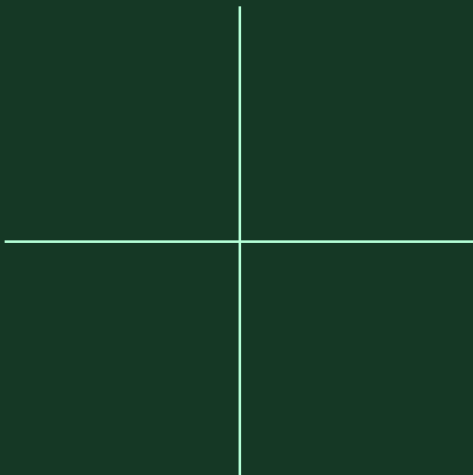# ARV
CLIMATE POSITIVE CIRCULAR COMMUNITIES

D3.2 IMPLEMENTATION PLAN OF CPCC LIVING LABS PER DEMO SITE, DEMONSTRATION OF LL
WP3 COMMUNITY ENGAGEMENT, ENVIRONMENT, AND WELL-BEING

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PROJECT INFORMATION

Project acronym	**ARV[1]**
Project title	Climate Positive Circular Communities
Project number	101036723
Coordinator	Norwegian University of Science and Technology / Inger Andresen
Website	www.GreenDeal-ARV.eu

DOCUMENT INFORMATION

Deliverable Number and Title	**D.3.2 Implementation plan of CPCC Living Labs per Demo Site** **Type: Demonstration** **This short report describes the stop-motion/video produced for the deliverable.** **Link to the videos:** **Trento: 01 TRENTO video.mp4** **Utrecht:01 UTRECH video.mp4** **Oslo: 01 OSLO stop motion.mp4** **Sonderborg: 01 SONDERBORG video.mp4**
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[1] *ARV is a Norwegian word meaning "heritage" or "legacy". It reflects the emphasis on circularity, a key aspect in reaching the project's main goal of boosting the building renovation rate in Europe.*

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	V.1	Marta Nicolau Prohens (Palma Municipality)		05/12/2023
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ABOUT THE ARV PROJECT

The vision of the ARV project is to contribute to speedy and wide scale implementation of Climate Positive Circular Communities (CPCC) where people can thrive and prosper for generations to come. The overall aim is to demonstrate and validate attractive, resilient, and affordable solutions for CPCC that will significantly speed up the deep energy renovations and the deployment of energy and climate measures in the construction and energy industries. To achieve this, the ARV project will employ a novel concept relying on a combination of 3 conceptual pillars, 6 demonstration projects, and 9 thematic focus areas.

The 3 conceptual pillars are integration, circularity, and simplicity. **Integration** in ARV means the coupling of people, buildings, and energy systems, through multi-stakeholder co-creation and use of innovative digital tools. **Circularity** in ARV means a systematic way of addressing circular economy through integrated use of Life Cycle Assessment, digital logbooks, and material banks. **Simplicity** in ARV means to make the solutions easy to understand and use for all stakeholders, from manufacturers to end-users.

The 6 demonstration projects are urban regeneration projects in 6 locations around Europe. They have been carefully selected to represent the different European climates and contexts, and due to their high ambitions in environmental, social, and economic sustainability. Renovation of social housing and public buildings are specifically focused. Together, they will demonstrate more than 50 innovations in more than 150,000 m² of buildings.

The 9 thematic focus areas are 1) Effective planning and implementation of CPCCs, 2) Enhancing citizen engagement, environment, and well-being, 3) Sustainable building re(design) 4) Resource efficient manufacturing and construction workflows, 5) Smart integration of renewables and storage systems, 6) Effective management of energy and flexibility, 7) Continuous monitoring and evaluation, 8) New business models and financial mechanisms, policy instruments and exploitation, and 9) Effective communication, dissemination, and stakeholder outreach.
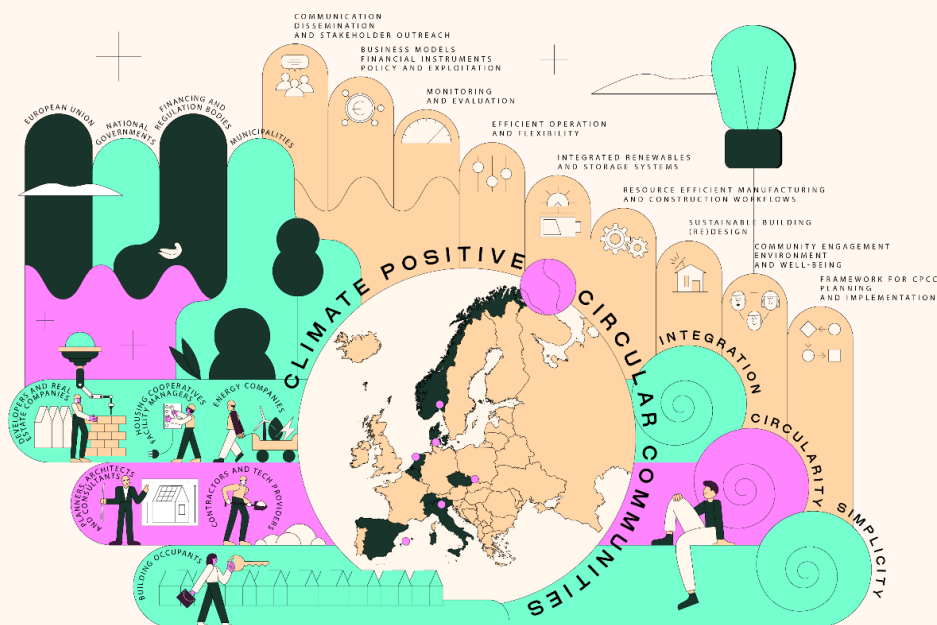
The ARV project is an Innovation Action that has received funding under the Green Deal Call LC-GD-4-1-2020 - Building and renovating in an energy and resource efficient way. The project started in January 2022 and has a project period of 4 years, until December 2025. The project is coordinated by the Norwegian University of Science and Technology and involves 35 partners from 8 different European Countries.

TABLE OF CONTENTS

1. INTRODUCTION

The aim of this short cover report is to summarise the process of making the video summary of the Utrecht, Sonderborg, Trento and Oslo demos. D3.2 is a demonstrator-type deliverable, which reflects the context of the work and the strategy of participation of the population of each demo. This cover report adds on to the cover report submitted in M13 which accompanies the two stop motion videos that have already been presented in M13, which showed the implementation plan for citizen participation in the demos of Palma and Karviná.

Starting from the third conceptual pillar of the project, that of simplicity, we felt that the best way to present the work done to the population and the target group was through a visual project.

In order to facilitate dissemination of the Living Lab approach in the ARV project on social networks and in the media in general, it was considered appropriate to develop video clips, either according to a classical video methodology or in the "stop motion" methodology. This second option was agreed with the demos in order to facilitate the presentation of possible activities, either by involving minors and thus avoiding the procedure of disseminating images of minors, or by facilitating the presentation of possible activities that are difficult to capture in video images, such as the installation of solar panels or the activities that can be carried out with students in relation to the data provided by a weather station.

As indicated in Plan D3.1 Plan and overall methodology for establishing CPCC Living Labs, during the implementation phase, citizen participation activities (information activities and co-creation activities) will be planned, organized and implemented. These are the ones to be reported in the video, adapting the tone of the video to the target group of each demo.

2. OBJECTIVES

The purpose of an implementation plan is to describe the approach and citizen engagement strategy followed by the demos to approach the target groups in the neighborhood. The deliverable type is a demonstrator. Video or stop motion animation filmmaking techniques have been selected to summarise the citizen engagement activities. This report accompanies the four videos that have been produced.

The scope of this report is as follows:

1. Describe the choice of using stop motion video for communicating the citizen engagement implementation plan.
2. Present the process of making the stop motion videos.
3. Provide a concise summary of the first two year's activities and the plans ahead for the different demos.

3. CHOICE OF STOP MOTION ANIMATION/ VIDEO

The selection of the type of video has been made by each of the demos depending on the type of activities they are carrying out and the target audience.

For the case of Trento, Utrecht and Sonderborg, it was preferred to make a classic video sequence of images with audio and text, of a formal nature, due to the fact that their projects are developed around constructive technical improvements for refurbishment or improvement of energy consumption. Although there are Living Labs within them and the production of the video is oriented to the population, their target audience are in particular potential homeowners, adults or technicians in the sector.

Oslo, on the other hand, has preferred to work on developing a stop-motion video, much more attractive to younger sectors of the population, as have Karviná and Palma. The main target group of the film is the pupils and teachers at the Voldsløkka school. Other target groups are families and neighbours and the general public who are interested in the sustainable transitions, participatory processes and the ARV project. The intention was to give a short introduction to ARV and the living lab before main living lab activities commence in November 2023.

4. PROCESS OF PLANNING AND PRODUCING

Throughout M13-M24, meetings have been held with the different representatives of the demo groups to guide the implementation of the video. In order to facilitate the development process, different tools have been developed.
- On the one hand, a **SCRIPT model** that helps to design the concept and the structure of the video. It is a support tool to specify the concept of the video and to divide the parts with the message, both oral and written, that is to be given in each part. This document is collected from each of the demos and attached to this report.
- On the other hand, the demos have been provided with a **STORYBOARD model** to facilitate the organisation of the images of the video, and if they have chosen the stop-motion method to have a space where they can collect the elements, they will need to record the video (images, objects, figures, etc.).
- Finally, in order to be able to work with the same tool and thus facilitate the process of correcting and modifying the videos, the use of a video editing programme, the **Filmora programme**, has been promoted. In order to make it easy to understand and use, a tutorial was provided by the Palma demo with instructions and tips on how to use it.

The realization of this video has not been easy. Each demo is different and not all representatives are used to working with the above tools. The demos also did not have a media team to call on for support. This is why we have tried to give them as much support as possible.

Each of the demos have chosen, according to their needs, what message they wanted to explain, as well as the video methodology. Each one has been writing their message and, on that basis, developing the video with support and follow-up meetings from Palma.

The next chapter will go on to outline each demo's experience of making their video project.

4.1 OSLO

The planning and production of the stop motion film was based on teamwork. The work for this deliverable was undertaken by two researchers from SINTEF who worked on the planning and development of the stop motion film. In addition, we were able to recruit a 15-year-old assistant who is a pupil in the 9th grade at a junior high school in Trondheim. The assistant already had technical and filmmaking skills and an interest in learning about stop motion films. He was able to work for a whole week during the summer with the stop motion film. The assistant is the same age as the pupils at Voldsløkka school, the demo-project in Oslo, he is therefore the same age as the film's target group. He followed up this work during October and was able to add the finishing touches to the film.

CONCEPT

The main target group of the film is the pupils and teachers at the Voldsløkka school. Other target groups are families and neighbours and the general public who are interested in the sustainable transitions, participatory processes and the ARV project. An early version of the stop motion film was shown to pupils and teachers at the school in September. The intention was to give a short introduction to ARV and the living lab before we start our main living lab activities in November.

SCRIPT TIMING

Writing a draft of the script started the process. The script was read out loud to get the correct timing. It was then edited and some of the sequences from the script were then shortened. The next stage was dividing the script into seven parts: (1) introduction to the ARV-project, (2) overview of the Norwegian demo project, (3) Living lab, (4) art-workshop, (5) AR/VR-demo, (6) future plans and (7) involved partners (See Table 1 below).

STORYBOARD

Limited drawing skills made the storyboard less useful than it could have been. Instead of using the storyboard template with sketches, we relied on a written storyboard in an excel sheet where each line constituted a frame in the storyboard. The intention was that the description of the imagery should be as detailed as possible, so that everything was planned in detail before the next steps which was collecting images/photos/clippings and then taking the pictures to be included in the film.

We planned for one fixed background per section of the film and broke down the script for each part in smaller pieces/sequences. We planned in detail how the images were supposed to appear on the background. We aimed for approximately 7 pictures per second voice over and noted how many pictures each "frame" needed. We then adjusted the speed for images moving around on the background.

EDITING

The pro-version of the app "Stop motion" was used, which was intuitive and easy to use. Setting up the camera, finding a mounting gear and a compatible tripod was a challenge at first, but when the set-up was ready, the text-based storyboard was easy to follow. However, making a stop motion film is a time-consuming exercise requiring several hundred pictures to be taken.

When we had the set-up ready for one part of the film, we kept on working with that part (in the app Stop motion) until it was completed. When all the pictures were taken, our assistant edited the pictures making them fit with the voice over. The separate parts of the film were later imported and put together in the computer program FILMORA. A new voice over was added, and the film was edited once more to

fit to the voice over. Other members from the SINTEF and NTNU team gave input to the script and editing of the film through several of the stages. The Task Lead (Palma) helped us with adding the English subtitles in Filmora.

Table 1 provides an overview of the stop motions video, including the purpose of each part, the imagery used, the text of the voice over in the local language of Norwegian and the English subtitles.

Table 1. Overview of the stop motion video.

Voice over (Norwegian)	English subtitles	Timing	N. pic	Storyboard (Imagery)
Part 1: intro		(41 sec)		Background: Map of Europe.
Oslo deltar i det internasjonale forskningsprosjektet ARV	Oslo is participating in the international ARV project.	7 sec	35	The letters A R V are cut in small pieces and appears on the map.
som er finansiert av EUs Horisont 2020-program.	financed by the European Union's Horizon 2020 grant program.	4 sec	28	EUs flag moving over the map.
Visjonen i ARV-prosjektet er å bidra til en rask og storskala implementering av klimapositive sirkulære samfunn.	The ARV vision is to contribute to rapid large-scale implementation of Climate Positive Circular Communities.	8 sec	56	
Gjennom seks demonstrasjonsprosjekt testes energieffektive og sirkulære løsninger. Disse finner sted i:	Energy-efficient and circular solutions are being tested in six large-scale demonstration projects in:	10 sec	70	Clippings moving out of the frame.
Karvina i Tsjekkia	Karvina in the Czech Republic	2 sec	14	Colouring the map of Czech Republic, placing a flag in Karvina.
Utrecht i Nederland	Utrecht in The Netherlands	2 sec	14	Colouring the map of the Netherlands, placing a flag in Utrecht.
Sønderborg i Danmark	Sønderborg in Denmark	2 sec	14	Colouring the map of Denmark, placing a flag in Sønderborg.
Trento i Italia	Trento in Italy	2 sec	14	Colouring the map of Italy, placing a flag in Trento.
Palma de Mallorca i Spania	Palma de Mallorca in Spania	2 sec	14	Colouring the map of Spain, placing a flag in Palma.
og Oslo i Norge.	and Oslo in Norway.	2 sec	14	Colouring the map of Norway, placing a flag in Oslo.
Part 2: About the demo project		(59 sec)		Background: Map of Oslo
Det norske demonstrasjonsprosjektet er Voldsløkka skole og kulturstasjon i Oslo.	The Norwegian demonstration project is Voldsløkka secondary school and cultural school in Oslo.	7 sec	49	Google zoom-sequence

Her er en tidligere sementfabrikk fra 1922 blitt totalrenovert, og ved siden av står et helt nytt bygg.	An old cement factory has been fully renovated, and a brand new building stands next to it.	11 sec	77	Marking the plot at the map. Put down picture of old cement factory. Put down "1922" on top of picture. Clipping of the new buildings on top of picture of old building. Remove the picture of the old building.
I det renoverte bygget holder Kulturskolen til.	The cultural school is in the renovated building.	3 sec	21	Arrows pointing at the old building.
De tilbyr undervisning i musikk, dans, teater og visuell kunst.	They offer lessons in music, dance, theatre and the visual arts.	5 sec	35	Clippings of instruments, dancing people, paint (moving in- and out of the frame).
I det nye bygget åpnet Voldsløkka ungdomsskole høsten 2023.	The new building, Voldsløkka secondary school opened in the Autumn 2023.	5 sec	35	Arrows moving to the new school building. Clippings of books and people biking moving over the background. "2023" appears.
Voldsløkka er Oslos første plussenergiskole.	Voldsløkka is Oslo's first positive energy school.	5 sec	35	A green plus sign spins around the school.
Det vil si at bygget skal produsere mer energi enn den forbruker i løpet av bygningens levetid.	This means it will produce more energy than it uses during its lifetime.	7 sec	49	A weight balancing "consumption" and "production"
For å oppnå dette er det montert bygningsintegrerte solcellepanel over 1556 m2 på fasade- og tak.	To achieve this, building-integrated PVs are installed on the facade and roof. (1556 m^2)	8 sec	56	Arrows pointing at the facade and roof of the new building. Sun shines. A battery appears.
Solcellene skal produsere energi som tilsvarer ca 1440 kjøleskap (*med årlig forbruk på 169kwh).	The school will produce energy equivalent to around 1440 fridges.	8 sec	56	Battery is colored green. A fridge appears with the numbers "1440". Then clippings move out of the frame.
Part 3: Living Lab		(36 sec)		Background: Map of Oslo
Samfunnsengasjement og brukerinvolvering er viktig for å oppnå klimapositive sirkulære samfunn.	Community engagement and user involvement is important to achieve climate positive circular communities.	7 sec	49	Clippings of the buildings appear. People appear, speech bubbles with clippings of bikes, greenhouse etc.
I ARV-prosjektet er dette organisert gjennom Living Labs med ulike aktiviteter.	It is organized through living labs with different activities.	7 sec	49	Letters "Living lab" appear. Clipping of a person appears.
I løpet av skoleåret er det blant annet planlagt prosjektuker for elevene.	Project weeks are planned for the pupils throughout the school year.	6 sec	42	A calendar appears.

Et mål er også å involvere og engasjere nabolaget, for eksempel til en ombruksuke med for eksempel re-design og loppemarked.	A goal is to involve and engage the neighbourhood. For example, for a recycling week with re-design and a jumble sale.	16 sec	112	Clippings of people (different ages) moving around. Speech bubbles with clippings. Clippings illustrating garage sale.
Part 4: Art workshop		(34 sec)		
Våren 2023, før skolen åpnet, ble det gjennomført en workshop med elever fra Bjølsen barneskole	A workshop with pupils from the Bjølsen primary school was carried out in the spring 2023 before the school opened.	16 sec		Picture of the venue (Bitraf).
og profesjonelle kunstnere som jobber med gjenbruk.	with professional artists that worked with recycling.	7 sec		Picture from the workshop (pupils and artists)
Elevene tok i bruk materialer fra gamle bygninger som er blitt revet på Voldsløkka, og omformet disse til mosaikk-kunstverk som nå stilles ut på ungdomsskolen som elevene har begynt på.	Materials from a demolished building on the Voldsløkka site were reshaped into a mosaic artwork now displayed in Voldsløkka school.	11 sec		Pictures from the workshop (in loop)
Part 5: AR-app		(25 sec)		
I Voldsløkka Living Lab vil AR- og VR-teknologi bli brukt.	AR and VR technology will be used in the Voldsløkka living lab.	6 sec		Picture of person holding a tablet
En AR app er allerede blitt testet på skolen for å visualise en planlagt idrettshall som skal stå klar i 2027.	An AR app has already been tested to visualise a plan for a sportshall that will be completed in 2027.	9 sec		Pictures from the app.
AR-verktøyet viser ulike bygningselementer som gir brukerne informasjon om blant annet CO-2 utslippene til ulike byggematerialer.	The AR tool shows different building elements, giving users information about, i.e., CO2 emissions from building materials.	10 sec		Pictures from the app ("summary")
Part 6: Future plans		(10 sec)		
Aktivitetene på Voldsløkka vil kontinuerlig over de nester to årene involvere elevene, deres familier og nabolaget.	The activities at Voldsløkka school will continue until 2025, involving pupils, their families, and the neighbourhood.	10 sec		(Pictures will be added!)
Part 7: End picture		(7sec)		
(no voice over)	(no voice over)	7 sec		Logos: NTNU, SINTEF, Municipality of Oslo[i]

PARTS, IMAGERY AND ENGLISH SUBTITLES

Images and aesthetics: A "flat" stop motion expression was chosen where clippings from newspapers and magazines that were already available were used. In addition, we communicated citizen engagement activities that had already been carried out (art workshop and AR/VR-demo). Photos were available from these activities and were included in the film.

4.2 SONDERBORG

For the Danish demo site, we have chosen to make a film and not a stop motion movie, to introduce the demo concept in the housing association where the project is established. The film was created with the help of the ProjectZero office's student assistant, Johanne Ancher Nielsen, and a professional film creator, Simon, who put images and text together into a coherent film. We, the demo-partners, have produced the text and images ourselves.

CONCEPT

The primary target group is the residents of *Andelsboligforeningen Kløver-/Hvedemarken*, which is also where our demo site is established. The film is also aimed at potential commercial partners, e.g. other housing associations. The film is also informative for citizens and politicians in Sønderborg municipality and the general housing association's interest organization Danmarks Almene Boliger (BL) and others.

The concept of the film is to show what Sønderborg's contribution to the ARV project is and thus what our demonstration consists of in relation to circular energy efficiency. We focus on showing two important elements of the demo:

1. The technical setup will recycle the heat from the service water and turn it into heat supply water for the apartments.
2. A behavioral element will make residents more aware of their use of energy in the apartment and how to reduce it e.g. by using digital equipment.

The result we aimed for at the demo site is to lower the heating bill by reducing the temperature of the return water to the district heating by using technical equipment and resident involvement.

SCRIPT TIMING

It took us some time to start planning the film and find a format that would suit our demo site. Due to fewer resources compared to other ARV partners/demo sites, we have had to change the format from a stop motion film to a film composed of images from the area and with inserted text and music.

Compiling the script took place over a period of approx. 2½ months, where we at the same time have been framing the images. It has been very important for us that the demo site is described with simple and common words and by using as few technical terms as possible, so that the target group is accommodated.

The images used were taken over a period of 6 months, from April 2023 to October 2023. We have the rights to bring the images included in the film, including those containing images of people/residents.

STORYBOARD

We have developed a storyboard based on the template we have received from the Task Leader (PALMA).

Table 2 provides an overview of the stop motions video, including the purpose of each part, the imagery used, the text of the voice over in the local language of Danish and the English subtitles.

Table 2. Overview of the stop motion video.

Tid	tema	English subtitles		Grafik	Tekst til filmen
	Sønderborg	In Sønderborg we have pledged to make our energy system carbon-neutral by 2029. This is what we call the ProjectZero Vision. ProjectZero is built on strong local commitment and collaboration.		Sønderborg og omegn billeder Evt. vise hvor Sønderborg er på et Danmarks kort	I Sønderborg kæmper vi for et CO2 neutralt energisystem i 2029, det kalder vi ProjectZero-visionen. Det gør vi igennem et stærkt lokalt engagement og samarbejde.
	Præsentere partnere i projekt	We reduce energy consumption through innovative green technologies. Sønderborg serves as one of the six designated demosites in Europe for the EU ARV project.	Viser ARV logo Visning ad partnerlogoer: SAB, PZ og Danfoss Evt. Visning af et Sønderborg kommune/By billede	Billede grafik af fx afdl. 22	Vi skaber nye grønne innovative løsninger til hvordan vi nedbringer energibehovet ved at spare på energien. Sønderborg er ét ud af 6 demosites i Europa i ARV projektet *(Vis evt. logoer fra projektdeltagere)*
0:37		Sønderborg Andelsboligforening in Kløver-/ Hvedemarken, forms the framework for the demosite in the ARV project.	Projektet i Sønderborg	Zoom ind på boligforeningen	Boligforeningen Kløver-/Hvedemarken danner rammen for demositet i ARV-projektet
0:41-0:44	Beboerne	Kløver-/Hvedemarken is a housing association. 19 apratments blocks 432 apartments 833 residents	Beboerinformation	Beboere billeder	Kløver-/Hvedemarken er en almenboligforening. 833 beboere 432 lejligheder 19 boligblokke
0:45-0:48					
0:49-0:53	Boligblokke	Buildings from 1970 Renovated in 2001 Solar cells installed in 2017	Boligsituationen	Billeder af boligblokkene og solcellerne + batterier	Bygninger fra 1970 Renoveret i 2017
0:54	Solceller	Solar cells cover approximately 40% of resident's electricity consumption.			Solceller dækker ca. 40% af beboernes elforbrug

1:01 1:03	Innovation	The apartments are heated with district heating. We explore methods to lower the return temperature to the district heating system after the heat has been utilized in the apartments.	ARV teknisk løsning	Zoom ind demoprojektets kerne (Fjernvarme logo)	Lejlighederne er opvarmet med fjernvarme. Vi undersøger hvordan vi kan reducere returtemperaturen til fjernvarmen, når varmen er forbrugt i lejlighederne.
NY		This is how we do it:			Sådan gør vi:
1:11	Teknisk	1) The elevated temperatures within the utility water system are repurposed to provide heat in the radiators of the apartments before it is returned to the district heating system.	Genanvende varme Genbrug energi - logo	Tekniske installation i kælderen (Danfoss logo)	1) Det varme brugsvand genanvendes til varme i radiatoren i lejlighederne, inden det sendes retur til fjernvarmen.
1:18-1:22	Radiator-mørkt billede				*fjernes*
1:23	Beboer	2) Through behavioral influence, residents will actively lower their individual heat consumption.	Adfærd Sparenergi logo	Billede af beboer der skruer på radiator og med ipad(Brunata)	2) Igennem adfærdspåvirkning, skal beboerne sænke deres eget varmeforbrug.
	Projektet	Residents manage their heat consumption effectively using the Brunata app, coupled with valuable insights into energy-efficient behaviors. In Sønderborg, we create the solution for an energy efficient future.	Påvisning af projektet	Feel good – vi lykkes. Besparelser.	Beboerne kan opnå en betydelig besparelse på deres varmeregning ved en bæredygtig genanvendelse af den varme der forbruges i lejlighederne. I Sønderborg skaber vi løsningerne til fremtidens energisystem.
	Afmelding			Projektpartnere	Logoer	Danfoss Sønderborg Andelsboligforening ARV ProjectZero
					PZ animation – sammen når vi nullet

EDITING

After the first draft of the film was completed, we have subsequently had 3-4 edits of the film. The edits have taken place online, where the film has been edited and adapted along with it.

We have sent the first draft to our internal project partners at the Sønderborg demo site, who have given their input to the film.

The film was made in Danish and later translated into English.

We will use the film on our own media platforms, including:

- Sønderborg Andelsboligforening's own website

- Danfoss when communicating the project and its solutions, for example in a commercial context

- ProjectZero on the website for citizens, politicians, and others in Sønderborg municipality.

4.3 TRENTO

Trento Living Lab video was created by DTTN staff involved in the social engagement activities at the urban level. The video-making process was supervised by the task lead PALMA. As DTTN working team had no specific video-editing skills, the creation process followed a "learning-by-doing" approach once the design of the script and storyboard was undertaken.

CONCEPT

Before delving into the making of the video, the working team considered crucial to define 1) its main objective and 2) who it was intended for (the target groups).

Providing an overview of the technical and social activities planned in Trento was assumed as the main purpose of the video, including images and highlights of some developments and achievements already reached over the first half of the project. The latter aspect was considered instrumental to increase the interest of the potential viewers and make the video more appealing.

As for the target groups, although the video is conceived to be delivered to a cross-cutting audience, it basically addresses the community members of Piedicastello – the main demo area in Trento – i.e., citizens, homeowners and residents living in the neighborhood. This rationale led to carefully consider the language register to be used in the voice over and the content selection, in order to make them as much as possible accessible to a diverse public. Additional target groups were identified in the city officers, councilors and policymakers of Trento, as well as journalists and media outlets. Given the interest raised across local construction companies towards some of the technical activities planned in Trento, the video should also take into account these entities as a relevant target group.

SCRIPT TIMING

The script development was the first operational part. To streamline the process, the text was created starting from the identification of 6 macro-chapters of the narrative, namely: 1) General intro to the ARV project and Trento CPCC, 2) The demo districts of Piedicastello and Povo 3) The new positive energy building in the "ex Zuffo" car parking lot 4) Timber-based renovation in the Povo district 5) The geothermal prototype in Piedicastello former tunnels 6) Trento Living Lab and the One-Stop-Shop approach. Once the draft script was ready, the text was gradually refined and shortened to respect the general timing recommendations agreed with the task leader. Reading it aloud helped enhance the quality of the work. An overall check of the technical terms used when describing some parts of the demo was conducted to ensure an appropriate understanding for the viewers.

The text was drafted both in Italian – the language used in the voice over – and English for the subtitles.

STORYBOARD

As the next step, a storyboard was produced by collecting images that fitted well with the script content and the general objective of the video. To facilitate the process, the storyboard template provided by the task leader PALMA was used as a reference. The materials selected to show Trento demo and the Living Lab included several pictures and graphics available since the start of ARV and stored over one year and a half of project implementation in Trento. The collection process started in Spring 2023 and ended in late Autumn 2023, slight before the delivery of the present report. This allowed to display in the video some very recent developments in Trento (i.e., the timber-based panel installed in Povo; the 2nd public meeting with Piedicastello community; the render of the positive energy building in Piedicastello). The storyboard template attached at the end of this paragraph was used to create the first version of the video. It includes the timing of all the video chapters and parts, the voice over in Italian, the English subtitles, and a brief description of the images used.

EDITING

The editing part was carried out through the FILMORA app. It allowed to combine the different visual sequences according to the storyboard as well as to overlap the voice over and English subtitles, plus some background music and visual effect. As DTTN staff was not used to managing such software, the editing phase was conducted in close cooperation with the Task Leader PALMA, especially with regards to the voice over and subtitles.

There were 2-3 preliminary versions of the video before the final one. This action was required to synchronize the pictures and voice over, by speeding up or slowing down the single parts depending on the specific needs. The audio for the voice over was recorded by one of DTTN staff members using her phone and exported to FILMORA afterwards.

Table 3 provides an overview of the stop motions video, including the purpose of each part, the imagery used, the text of the voice over in the local language of Italian and the English subtitles.

Table 3. Overview of the stop motion video.

Voice over	English subtitles	Timing	Storyboard
Part 1: ARV and Trento intro		00:53 sec	
La città di Trento partecipa al progetto Europe ARV, Finanziaro dal Programma Horizon 2020 defluxion European nell'ambito delle azioni a sostegno del Green Deal.	The city of Trento is participating in the European project ARV, funded by the European Union's Horizon 2020 program as part of the actions to support the Green Deal.	10 sec	ARV full logo
ARV intende sperimentare il concetto di Comunità Circolari Climatiche Positive, basato sullo sviluppo di approcci e soluzioni urbane innovative, sostenibili e circolari che possano essere applicate ad edifici (nuove costruzioni e riqualificazioni) e sistemi locali di energia, coinvolgendo direttamente nel processo anche le comunità locali e gli utilizzatori finali. Le attività di ARV si sviluppano attraverso 6 progetti urbani di ampia scala, coinvolgendo, oltre a Trento, le città di Sonderborg (Danimarca), Utrecht (Paesi Bassi), Oslo (Norvegia), Karvina (Repubblica Ceca) e Palma (Spagna), per un totale di 35 partner provenienti da 8 paesi europei.	ARV aims to experiment the concept of Climate Positive Circular Communities, based on the development of innovative, sustainable, and circular urban approaches and solutions that can be applied to buildings (new constructions and renovations) and local energy systems, with the direct involvement of local communities and end-users during the process. ARV activities are carried out through 6 large-scale urban projects, involving, besides Trento (Italy), the cities of Sonderborg (Denmark), Utrecht (Netherlands), Oslo (Norway), Karvina (Czech Republic), and Palma (Spain), and with a total of 35 partners from 8 European countries.	43 sec	ARV logo in the middle, surrounded by a map of the demo cities and the demo logos.

Part 2: Trento demo districts		01:12 sec	
Le innovazioni tecnologiche previste a Trento saranno testate principalmente nel quartiere di Piedicastello, uno dei più antichi rioni della città, localizzato sulla sponda destra del fiume Adige, e presso il quartiere collinare di Povo. Negli ultimi anni il quartiere è stato soggetto ad una serie azioni di riqualificazione che hanno contribuito a modificarne l'aspetto. Inoltre si prevede anche un piano comunale di rigenerazione urbana.	The emerging technological innovations in Trento will be primarily tested in the Piedicastello district. Piedicastello is one of the oldest neighbourhoods in the city, located on the right bank of the Adige River, and in the hillside district of Povo. In the last years, the neighborhood has been subject to a series of redevelopment activities which have contributed to improving the area's appearance. Furthermore, a municipal urban regeneration plan is also envisaged.	25 sec	Satellite zoom-in on Piedicastello. Slideshow of the neighbourhood over the 2nd half of the XX century until now.
Part 3: the "ex Zuffo" parking lot		00:26 sec	
A Piedicastello il parcheggio di attestamento "ex Zuffo" ospiterà un nuovo edificio prefabbricato in legno di tipo positivo, ossia capace di generare più energia di quella necessaria al suo funzionamento. L'edificio contribuirà alla rifunzionalizzazione del parcheggio e vedrà la sperimentazione di un set di facciate innovative, le cui prestazioni saranno monitorate a fini di ricerca.	In Piedicastello, the "ex Zuffo" parking lot will host a new positive energy timber-based building, with a capability of generating more energy than operational needs. The building will contribute to the repurposing of the parking area and will test a set of innovative facades, whose performances will be monitored for research purposes.	26 sec	Zoom-in on the "ex Zuffo" car park. Slideshow of the positive energy building render
Part 4: Timber-based renovation in Povo		00:21 sec	
La prefabbricazione in legno caratterizzerà anche il secondo intervento edilizio di ARV. A Povo, presso un edificio residenziale esistente, verrà infatti testato un innovativo sistema di facciata modulare per la riqualificazione architettonica ed energetica, che consentirà di ridurre l'impatto delle attività di cantiere sugli inquilini.	Wood prefabrication will also characterize the second building intervention of ARV. At an existing residential building in Povo, an innovative modular facade system will be tested for architectural and energy retrofitting, which may reduce the negative impacts of construction works on the tenants.	21 sec	Logo of the Renew Wall technology. Pics showing the installation process of the wooden façade system in Povo.
Part 5: the geothermal structure in Trento tunnels		00:25 sec	
La produzione di energia pulita sarà infine al centro del terzo intervento di ARV. Le Gallerie di Piedicastello, infrastruttura stradale oggi dismessa e adibita a spazio espositivo, vedranno l'installazione di un prototipo di "geostruttura energetica", capace di utilizzare la massa termica presente nella montagna del Dos Trent con finalità di riscaldamento e raffrescamento.	Finally, a clean energy production will be at the core of ARV's third intervention. "Le Gallerie di Piedicastello", a disused road infrastructure currently used as an exhibition space, will sbe installed a prototype "energy geostructure, utilizing the thermal mass present in the Dos Trent mountain for heating and cooling.	25 sec	Pictures of the former tunnels as an art gallery. Scheme of the geothermal prototype to be installed there.

Part 6: Trento Living Lab and the OSS approach		01:15 sec	
In ARV il coinvolgimento attivo degli habitant e delle comunità che vivo no le are urbane ghetto di studio è un tema prioritario.	In ARV, active involvement of residents and communities living in the urban areas is a top priority.	9 sec	Picture of Piedicastello historic site, followed by some pics of the first meeting of the Living Lab
Al pari delle altre città partner di progetto, anche Trento vedrà la costituzione di un "Living Lab", funzionale all'organizzazione di attività di informazione, eventi di sensibilizzazione sulle tecnologie sperimentate e di co-creazione dell'innovazione urbana con la cittadinanza e i residenti di Piedicastello.	Similar to the other project partner cities, Trento will also apply a "Living Lab," designed to organize informative sessions, and raise awareness activities and co-creation of urban innovation through the active participation of the citizens and residents in Piedicastello.	21 sec	Slideshow on the 1st and 2nd meetings of the Living Lab
Il Living Lab di Trento – Piedicastello lavorerà in particolare alla progettazione e messa a punto di un approccio innovativo alla riqualificazione di condomini e abitazioni private, denominato One Stop Shop. Tale meccanismo intende facilitare l'incontro e l'aggregazione di domanda e offerta di interventi di risanamento, coinvolgendo direttamente i residenti del quartiere e le imprese della filiera locale delle costruzioni.	The Trento-Piedicastello Living Lab will specifically focus on the design and deployment of an innovative approach called the "One Stop Shop" to the renovation of condominiums and private apartment buildings. This mechanism aims to facilitate the match and aggregation of demand and supply for renovation interventions, involving the neighborhood's residents and businesses from the local construction value chain.	27 sec	Frames including the speakers of the Living Lab meetings.
Sfruttando i benefici e le potenzialità di replicazione su ampia scala offerte dalle tecnologie per la prefabbricazione, il One Stop Shop cercherà di promuovere un nuovo approccio alla riqualificazione, basato sul risanamento di intere aree urbane e quartieri e non solo di singoli edifici.	By leveraging the benefits and scalability offered by prefabrication technologies, One Stop Shop will seek to promote retrofitting, based on the regeneration of entire urban areas and neighborhoods rather than just single buildings.	18 sec	Infographic of the One Stop Shop approach Trento partners logos

4.4 UTRECHT

CONCEPT

The message is our video is to communicate what the Utrecht demo entails and what our living lab activities are. Our demo is complex, with several locations and multiple buildings per location. We feel offering a clear overview of our demo will help partners and stakeholders understand and this will help in the collaboration.

We decided against taking the tenants as the main audience for the video, as communication with them is done by the housing associations. Since Dutch law requires 70% of tenant support before a renovation

can commence, tenant communication is a sensitive process. The housing associations have much experience in the right tone of voice, knowledge level and steps in communicating about renovations.
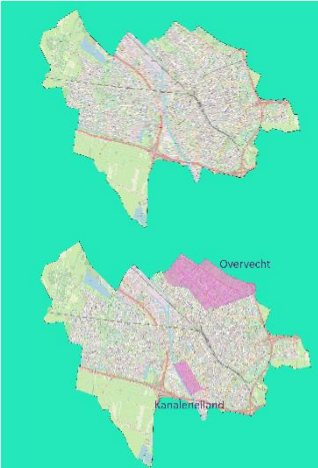
EDITING

In our video, we show in pictures the work that is being done. These visuals will help people to get a clear picture in their heads, which will help them remember. We chose recognizable pictures, that relate to what one would see if present at the demo locations.

We have had great help from the Task Leader, Palma, in the editing of the video. This is highly appreciated.

In the future we might improve the video by taking video captures from the renovation in process. Ideally, we would get a response from a tenant about the experience. Also, we would like to shorten the video by making the content more concise.

Table 4 provides an overview of the stop motions video, including the purpose of each part, the imagery used, the text of the voice over in the local language of Dutch and the English subtitles.

Table 4. Overview of the stop motion video.

PART	PURPOSE/EXPLA NATION	IMAGERY	VOICE OVER and English subtitles	TIME
WHAT		Utrecht ARV logo Google Earth zoom to Utrecht: 52.091810, 5.116748 – Don't zoom all the way, just so that you can see the entire city.	Onze Utrechtse demo bestaat uit acht complexen met sociale huurwoningen. We gaan deze woningen renoveren zodat het binnenklimaat verbetert en de woningen minder energie gebruiken. *0:00 The Utrecht demo consists of eight complexes with social housing units.* *0:05 These units will be renovated to improve the indoor climate and reduce energy consumption.*	0 – 10 s
WHY			De complexen zijn gebouwd in de jaren '60 en '70 van de vorige eeuw. In die tijd was er grote woningnood. Er was behoefte aan goedkope woningen die snel gebouwd konden worden. 0:10 Our demo buildings were built in the 1960s and 70s, a time of significant housing shortage. 0:17 There was a demand for affordable, quickly constructed homes.	10-21 s
			De Utrechtse wijken Overvecht en Kanaleneiland stammen grotendeels uit deze tijd. Deze wijken zijn multicultureel en dichtbevolkt. Veel van de woningen zijn sociale huurwoningen en er wonen veel gezinnen met lage inkomens. 0:21 The Utrecht neighborhoods of Overvecht and Kanaleneiland, largely built during the housing shortage era, are multicultural and densely populated. 0:30 Many of the homes are social housing apartments occupied by low-income families.	21-35 s

			De woningen voldoen niet meer aan de eisen die we vandaag stellen. Ze gebruiken veel energie en er is onvoldoende ventilatie. Bovendien moeten de woningen van het aardgas af om de CO2 uitstoot te verminderen. In ARV onderzoeken we hoe we complexen versneld kunnen verduurzamen. 0:35 The homes no longer meet today's housing standards, with high energy usage and inadequate ventilation leading to potential moisture problems. 0:42 Furthermore, the homes need to become natural-gas free to reduce the CO2 emissions. 0:47 In ARV, we're exploring how to accelerate the renovation of these complexes.	35-51 s
			We richten ons op drie clusters van woningen. _0:51 We're focusing on three clusters of homes._	51-55 s
Site 1		Zoom on the demo map to site 1. 	De eerste is in Overvecht-Noord. Hier staan de Strooys-apartementen van woningcorporatie Woonin. Woonin bezit meerdere van deze gebouwen. Woonin laat de complexen renoveren door de aannemer Hemubo. Zo kan Woonin de renovatie versnellen, ze noemen dit de renovatietrein. 0:55 The first is in Overvecht-Noord. 0:57 Here are the Strooys apartment complexes of the housing corporation Woonin. 1:01 Woonin owns several of these buildings. 1:04 Woonin has all of their Intervam complexes renovated by the contractor Hemubo. 1:07 This way, Woonin can accelerate the renovation, they call this the renovation train.	55 s – 1:12 min

			Woonin renoveert de gebouwen tot bijna energieneutraal. De gebouwen krijgen nieuwe kozijnen, zonnepanelen, nieuwe ventilatiesystemen en isolatie van buitenaf. De gebouwen verwarmden al met stadsverwarming en dat blijft zo. Om aardgasvrij te worden, krijgen de woningen een elektrische kookplaat. Woonin onderzoekt of batterijen het elektriciteitsnet kunnen ontlasten. De batterijen slaan dan overdag elektriciteit op om als de bewoners thuiskomen de liften van energie te voorzien. 1:12 Woonin is renovating the buildings to be nearly energy neutral. 1:15 The buildings are getting new window frames, solar panels, new ventilation systems, and external insulation. 1:21 The buildings were already heated with district heating and that remains so. 1:24 To become gas-free, all apartments get an electric stove. 1:29 Woonin is investigating whether large batteries can reduce the stress on the electricity grid. 1:35 The batteries then store electricity during the day to power the elevators when the residents come home.	1:12 – 1:40
Site 2		Zoom on the demo map to site 2 Before renovation Building in renovation After renovation 	Het tweede cluster zijn vier panden van woningcorporatie Bo-Ex in Kanaleneiland. De aanpak van deze gebouwen lijkt op de aanpak van Woonin in Overvecht-Noord. Hemubo renoveert de appartementen tot bijna energieneutraal. Ook deze woningen verwarmen met stadswarmte. Zonnepanelen verduurzamen het elektriciteitsverbruik. 1:40 The second cluster consists of four buildings of the housing corporation Bo-Ex in Kanaleneiland. 1:45 The approach to these buildings is similar to Woonin's approach in Overvecht-Noord. 1:50 Hemubo is renovating the apartments to be nearly energy neutral. 1:54 These homes will also be heated with district heating. 1:58 Solar panels will make the electricity consumption sustainable.	1:40 – 2:01
Site 3		Zoom on the demo map to site	Het laatste cluster van gebouwen in Kanaleneiland is ook van Bo-Ex. Hier wil Bo-Ex een stap verder gaan. Uitstekende isolatie zorgt ervoor dat de	2:01 – 2:28

2

Before renovation

After renovation

			ruimteverwarming nog minder energie gebruikt en naar lage temperatuur kan. Elektrische warmtepompen maken deze warmte voor de appartementen en zorgen voor warm tapwater. Duizenden zonnepanelen wekken de elektriciteit op voor de warmtepompen, de ventilatie en het huishoudelijk gebruik. 2:01 The final cluster of buildings is also owned by Bo-Ex in Kanaleneiland. 2:06 Here, Bo-Ex wants to go a step further. 2:08 Excellent insulation ensures that space heating uses even less energy and can be low temperature. 2:15 Electric heat pumps provide this heat and hot tap water for the apartments. 2:20 Thousands of solar panels generate the electricity for the heat pumps, ventilation, and household use.	
Site 3 – buildin g metho d			De intentie is om de renovatie van de flats snel te laten verlopen, door de toepassing van geïntegreerde gevelpanelen. De gevelpanelen bestaan uit de isolatie, de kozijnen, het ventilatiesysteem, convectoren en alle kabels en leidingen. De gevelpanelen komen kant en klaar op de bouwplaats aan en kunnen snel aan het pand bevestigd worden. Dit verlaagt de overlast voor de bewoners. *2:29 We intent to make the renovation of the flats very fast, by the use of integrated facade panels.* *2:36 The facade panels consist of insulation, window frames, ventilation system, convectors, and integrates all cables and piping.* *2:46 The facade panels arrive ready-made at the construction site and can be quickly attached to the building.* *2:54 This reduces the nuisance for the residents.*	2:28 – 2:57 s
			Het ontwerp voor deze panden bouwt voort op een eerdere renovatie door Inside Out en de Bosgroep in Overvecht. Dit gebouw wekt zoveel elektriciteit op dat het zelfs energieleverend is. In het ARV-project onderzoeken we dit gebouw om te zien hoe we het ontwerp voor onze demogebouwen nog verder kunnen verbeteren.	2:57 – 3:16

			2:58 The design for these buildings builds on a previous renovation by Inside Out and the Bos-group. 3:04 The building generates so much electricity that it is even energy positive. 3:09 In the ARV project, we are investigating this building to see if we can further improve the design of our demo buildings.	
			Ook is er bij de renovaties van deze complexen aandacht voor de wensen en behoeften van bewoners en de omwonenden. Deze activiteiten noemen we het ARV-living lab. 3:18 Attention is given to the wishes and needs of residents in the renovation process. We call these activities the ARV living lab.	3:16 – 3:26
			Zo kunnen bewoners in de Woonin flats zelf de afwerking van hun woning kiezen. 3:27 Residents of Woonin can choose some of the finishing of their homes themselves.	03:26 – 03:30
			En krijgen mensen hulp van energie coaches bij het terugdringen van hun energieverbruik. 3:31 And people get help from energy coaches in reducing their energy consumption.	03:30 – 03:35
			Ook voeren de woningbouwcorporaties en sociale partners "sociaal renoveren" uit waarbij bewoners vóór, tijdens en na de renovatie van hun woning hulp krijgen aangeboden. 3:36 The housing corporations and social partners also carry out "social renovation", offering residents help before, during and after the renovation of their homes.	03:35 – 03:46
			Zo maken we wonen in Utrecht leefbaarder, aantrekkelijker en beter voor de aarde. 3:47 This is how we make living in Utrecht more livable, more attractive and more friendly to the planet.	03:46 – 03:52
Ending				

5. REFLECTIONS

The development of this deliverable (in the form of a demonstrator) has been a great learning experience for all the demos. Initially, it was considered that in order to facilitate the dissemination of information in our media, it would be more pleasant and easier to understand to make a simple video, adapted to the public and the context of each demo. However, after a year of working with the different teams, we felt that this was perhaps an objective that has meant a much greater effort and workload for the teams than we thought it would be.

Leaving aside different problems that are common in the workflow, such as team changes, long-term absences of partners and other circumstances that intervene in the development of the work, we have seen that the development of this deliverable in video format has involved or put into practice competencies that the representatives of this work package find challenging.

To complement these difficulties, a high level of compensation work had to be carried out by the Task Lead, Palma, to be able to complete the work and deliver it on time.

As a learning experience, it is considered appropriate to point out that in cases of using innovations in methodology such as these, it might be appropriate to introduce training capsules beforehand or to analyze whether the competencies required for the development of these activities exceed the profile of the team members.

6. FUTURE PLANS

6.1 OSLO

We will continue to use the stop motion film to promote the ARV project in the school. It is an easy way to remind pupils what ARV is working on and why we would like to involve them in our activities. Voldsløkka school has an information screen where the film can be presented and a website where people outside the school can look for information about events and happenings at the school. The film will also be used to promote the ARV project within different contexts outside the school for example scientific conferences and we will encourage our colleagues and the wider organisation at NTNU and SINTEF to use the film when they are presenting ARV.

Overview of the planned future activities in Oslo LL:

Project week, No 2 Circularity week	Co-creation of physical space, event for the neighbourhood, link to VR/AR activity, Use input from pupils from ARV week.	Pupils, teachers, family, neighbourhood, other schools	May 2024
Project week, No 3 Energy transition week	Activities at school, link to VR/AR activity, Event for parents or neighbourhood/community	Pupils, parents, teachers, neighbourhood, other schools, city	2024/2025 tbd
Digital, international workshop with schools	Digital workshop with the ARV schools. Exchanging ideas and experiences from LL`s.	Youth ambassadors from different ARV demos	Tbd, during 2025

6.2 SONDERBORG

In response to the rising energy prices, there is a plan to organize events that align with residents' immediate financial concerns, aiming to capture a broader spectrum of resident interest. To encourage active participation in energy-saving behaviors, the promotion of the Brunata app is prioritized, enabling residents to monitor their daily energy consumption easily. Additionally, there is a focus on implementing brief and efficient event formats. These formats are designed to communicate essential messages effectively and facilitate straightforward information dissemination, making it easier for residents to grasp and apply the knowledge in their daily energy usage.

6.3 TRENTO

Trento Living Lab video can be a useful communication resource to be used in the upcoming public meetings and workshops to be organized in the Piedicastello district. Furthermore, it can be also disseminated through Trento partners communication channels to promote the project.

Overview of the planned future activities in Trento LL:

3rd ARV update meeting in Piedicastello	Periodic event to keep the community updated on the progress of the project in the district.	Citizens, residents, homeowners, local associations, policy-makers	2024 tbd
One Stop Shop matching sessions	An event cycle dedicated to sustainable technologies to renovate residential buildings.	Homeowners, social housing, condominium administrators, companies from the local construction value chains	First semester 2024
OSS on-site citizen engagement workshop	Awareness raising event on sustainable renovation solutions, best practices, available technologies.	Homeowners, social housing, policy makers and stakeholders from the construction sector	2024 tbd

6.4 UTRECHT

Our activities in 2024 center around the renovation of the Bredero buildings in Kanaleneiland and Woonin's renovation in Overvecht. In Kanaleneiland, housing association Bo-Ex will start their user engagement process and tell the tenants about the planned renovation of their apartments. As the law requires 70% tenant support, this is an important process for our demo. Meanwhile, Woonin will evaluate the energy coaching approach that has been used so far and see if the market has better solutions to offer. The municipality of Utrecht will gather all housing associations active in the municipality to see if the social renovation approach can be adopted city wide.

ACKNOWLEDGEMENTS AND DISCLAIMER

PARTNER LOGOS

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CLIMATE POSITIVE CIRCULAR COMMUNITIES

ARV