MinWaterCSP

Minimized water consumption in CSP plants

Deliverable 10.5:
Communication and Dissemination Materials (part 2)
WP10, Tasks 10.2; 10.4

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Date	Version	Person/Partner	Comments
14.06.2017	REV00	Charlotte Schlicke, Kathrin Eckerlin / S2i	

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0 Publishable Summary

The Communication and Dissemination activities of the MinWaterCSP consortium comprise diverse tools and promotion material such as the website and project leaflets.

This Deliverable informs about these two tools designed to reach the following objectives of this WP:

- to **create wide visibility** and
- to ensure the acceptance of the activities, technologies and benefits of the MinWaterCSP project, among the general public and the technical and legislative audience by **awareness raising** communication actions.

Further tools are presented in other Deliverables of this Work Package.

The following tools are topic of this Deliverable:

Website address: http://www.minwatercsp.com /

Project Leaflets: http://www.minwatercsp.eu/news/mediapress/

The communication and dissemination activities are led by Steinbeis 2i GmbH.
The website is maintained by the task leader Kelvion Holding.

1 Introduction

1.1 Purpose of this deliverable

The purpose of "D10.5: Communication and Dissemination Material" is to present an update of the activities on the project website and the two project leaflets.

1.2 Contributions of partners to this deliverable

WP10 is a cross-cutting work package, thus the communication and dissemination tools support all technical actions and are dependent on input from other work packages. WP10 is working hand in hand with the exploitation activities. Therefore, all partners are involved in the tasks of WP10.

Steinbeis 2i GmbH (S2i) as WP leader of WP10 – "Dissemination and communication" is responsible for the general coordination of all actions. A communication and dissemination team (C&D team) consisting of Kelvion Holding as project coordinator, ENEXIO Mgt as technical coordinator, Fraunhofer ISE as sub-task leader for the publications / articles and S2i as WP Leader have worked closely together in the first 18 months of this action.

In order to generate an effective communication cascade from the regional to the European and international level as well as to targeted audiences, it is vital that all partners are involved and aware of the fact that they are responsible for providing input, in terms of topics and news, as well as stakeholders and communication channels that were used for the dissemination activities. This valuable input of the partners was incorporated into diverse publications. In addition, the partners identified key events at the partners' national as well as the international level which were suitable for strategic dissemination activities. All partners provided information and input on a regular basis.

2 Objectives and expected impact

The intention of WP10 is to **create a wide visibility** of the project activities and to ensure the **acceptance** of the technology related to MinWaterCSP objectives and benefits in the public by **awareness raising** communication actions.

The dissemination actions will **ensure effective communication and information** to be disseminated to **strategic stakeholders at national, EU and international level** with the intention of knowledge transfer, education and exploitation.

WP10 actions will lead to sustainable contacts with different target group:

- Enable the followers / interested stakeholders to learn from the MinWaterCSP approaches and to ensure the know-how transfer to other stakeholders via peer-to-peer exchange;
- Increase the community of interested demonstration sites and initiate the replication activities;
- Increase the awareness among technology providers and developers of new businesses;
- Facilitate networking and joint actions with other initiatives and / or projects focusing on CSP;
- Increase (potential) customer and industrial stakeholder perception for subsequent product exploitation with regard to new / improved technical solutions / technologies in the different fields of the MinWaterCSP project.

3 Digital and printed media

3.1 Overview on the updated communication and dissemination tools

C&D tools / activities	Target groups	Aim	Lead Partner	Input needed	Input provider
Project website	All (general public, power market in general, scientific/ technical audience, media)	To raise interest about MinWaterCSP, to inform (in detail) about the project, its objectives, activities, partners, news	Kelvion Holding	**Yes** Information about diff. WP content, news, activities, graphics, pictures etc.	All project partners
Project leaflet (M4)	All (general public, power market in general, scientific/ technical audience, media)	To raise interest in MinWaterCSP, to inform about the project, its objectives, activities, link to website, information about partners	S2i	**Yes** Information about diff. WP content, overall approach, graphics, pictures	C&D team, feedback round all partners
Project Poster (M5)	Scientific community, industry, policy makers, national interest groups	Special event: R&D Fair of the Engineering Faculty of Sapienza University of Rome (Ingegneria R&D)	Creation of poster: UROME	**Yes,** Feedback, graphics	SUN, Kelvion
Project leaflet (M18)	Targeted to power market in general, scientific/ technical audience	To raise interest in MinWaterCSP, to inform about the project, its objectives, activities, link to website and social media, information about partners	S2i	**Yes** Information about summary, diff. technologies, graphics, pictures	C&D Team, feedback all partners

Table 1: Table of communication and dissemination tools - overview

3.2 Project website

Lead partner: Kelvion Holding

The public website has been created by a service contractor of Kelvion Holding within the first six months of the project and has been and will be continuously updated.

Website address: http://www.minwatercsp.com / www.minwatercsp.eu

Updates made:

- **Team** – presentation of the operational level of the MinWaterCSP consortium, information on expertise and role in the project. The team has slightly changed within the first 18 months, these changes have been implemented in the "Team" area.
- **Partners** – introduction of partner organizations by short profiles. Changes in some partners' organization names have been added to the "Partners" area.
- **News** – The News section comprises three areas: http://www.minwatercsp.eu/news/
    - **Blogs** – short articles about the partners, project approach, exploitable products. Since M5, blogs have been published monthly. Up to date, 15 blogs have been published. http://www.minwatercsp.eu/news/blogs/
    - **Events** – this area is connected with the calendar in the footer of the webpage and informs about event participations, project presentations and events. Updates have been implemented continuously. http://www.minwatercsp.eu/events/categories/events/
    - **Press/Media** – this section includes the press releases, eNewsletters and project leaflets. This is a download section which provides all publishable documents of the project as well as other useful documents. Performed updates include the published newsletters (up to date: 3 editions) and press releases (up to date: 2) http://www.minwatercsp.eu/news/mediapress/
- **Networks** - Links to major websites and portals, including those managed by the European Commission, networks and platforms as well as to similar projects. Updates have been made related to the sister / similar H2020 projects: WASCOP, MOSAIC and CAPTure are presented on this site http://www.minwatercsp.eu/networks/ .
- Integration with the MinWaterCSP **social media** pages (Twitter and LinkedIn).

Input from all partners ensured up-to-date information about the achievements and the project results.

Overview on Website statistic:

This section gives a short report about the visits and visit durations on the MinWaterCSP website. This statistic is based on Google Analytics information from November 2016 to May 2017.
The data for July 2016 – October 2016 and June 2016 will be available by mid of July 2017. The data for the new visitors is an estimation at the moment, the absolute numbers will be available by mid of July and will be reported in the periodic report in Month 18.

- **Visitors per month:**

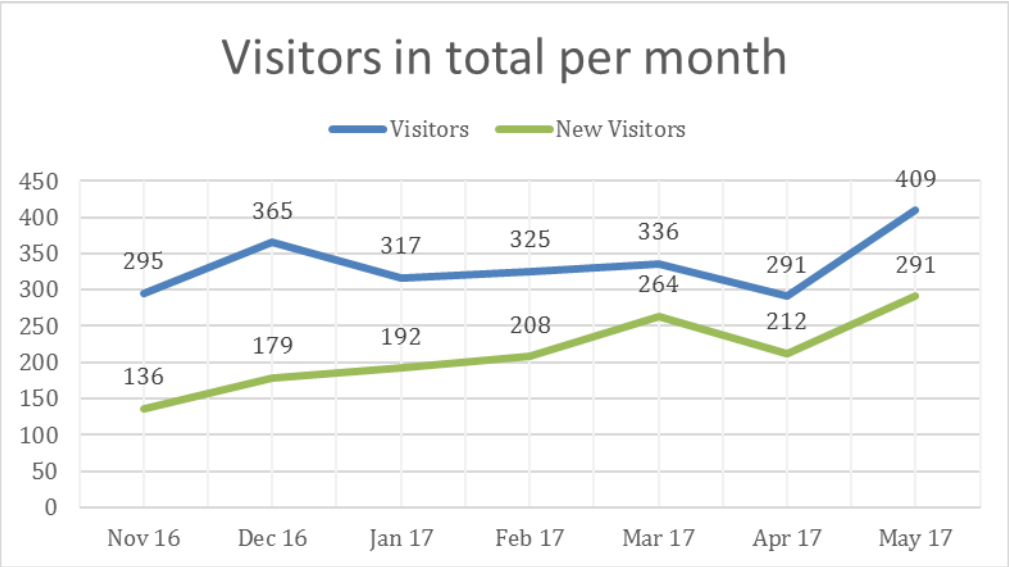

Figure 1: Visitors and New visitors on the website 11/2016-05/2017

The difference between the two curves describes the number of visitors who are returning regularly to the website. At average, 50-70 % of the visitors in a month are new.

New visitor means a site visit from an IP-address which has never before visited the website.

- **Visitors per country, top-list**

The following list shows the ranking of the seven highest numbers of visits per countries.

1	Germany
2	USA/North America
3	Africa & South Africa
4	Spain
5	France
6	Russia
7	Rest of Europe

Figure 2: Top 7 list of visitors per country 11/2016-05/2017

- **Average session duration and pages/session**

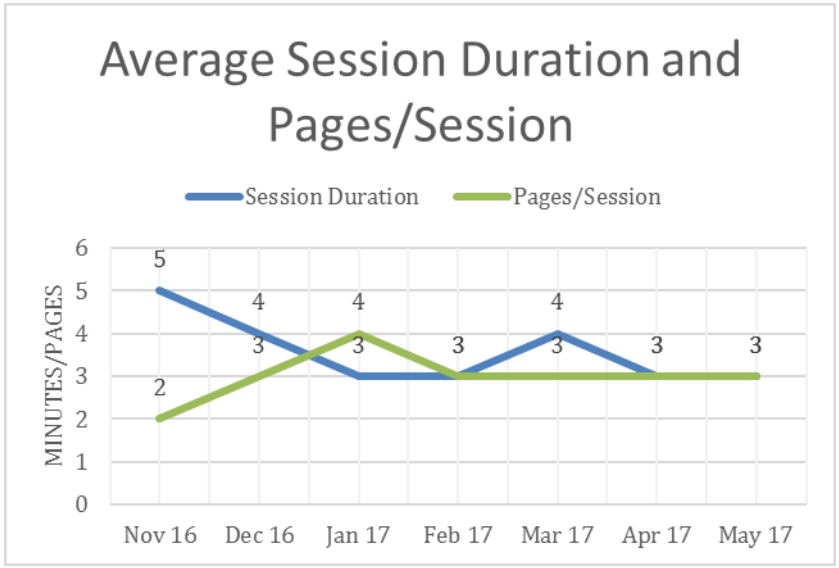

Figure 3: Average session duration and pages/session 11/2016-05/2017

The values above only represent the average. There are long session durations such as 10-15 minutes as well as short durations such as 1-2 minutes.
A more detailed statistic will be presented in the periodic report in month 18.

3.3 Project leaflet

Lead partner: S2i

Leaflets are a good medium to give a quick overview about the essential information of a project to interested stakeholders, e. g. at events and for direct contacts with stakeholders.

The publication of two leaflets was planned during the project. A first leaflet has been published in M5 and a second one has been published in M18.

Both leaflets are complementary:

- The **first leaflet** presents the overall approach and the objectives of the project. The aim is to introduce the project activities to the general public as well as to CSP stakeholders.

  This leaflet has been updated as there were some changes of partner contacts. The new version will replace the old one and will be available on the MinWaterCSP website in July 2017 (see also figures 4.a and 4.b)
  http://www.minwatercsp.com/wp-content/uploads/2016/06/MinWaterCSP_project-leaflet.pdf

- A **second leaflet** has been created to focus more on the technologies (further) developed and demonstrated in the framework of the project. It presents the benefits of the technologies and targets stakeholders in the CSP sector which are interested in cooperation and exploitation.
  The layout is similar to the first one in order to ensure a high recognition value (see also figures 5.a and 5.b).
  It will be available under the following link:
  http://www.minwatercsp.com/wp-content/uploads/2017/06/MinWaterCSP_project-leaflet-technologies.pdf

Format of all leaflets:
Format = DIN A4, folded format
Size of the leaflet: 100mm x 210mm;
Pages: 6;
Language: English

The leaflet is available as printed edition as well as electronic file.

The Partners

Kelvion Holding GmbH
Germany
www.kelvion.com

ENEXIO Management GmbH
Germany
www.enexio.com

Kelvion Thermal Solutions (Pty) Ltd.
South Africa
www.kelvion.com

Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Fraunhofer Institute for Solar Energy Systems ISE
Germany
www.ise.fraunhofer.de

Sapienza - Università di Roma
Italy
www.uniroma1.it

ECILIMP TERMOSOLAR S.L.
Spain
www.ecilimp.com

Stellenbosch University
South Africa
www.sun.ac.za

Notus Fan Engineering
South Africa
www.notus.co.za

Laterizi Gambettola srl - SOLTIGUA
Italy
www.soltigua.com

ENEXIO Germany GmbH
Germany
www.enexio.com

Institut de Recherches en Energie Solaire et Energie Nouvelles - IRESEN
Morocco
www.iresen.org

Steinbeis 2i GmbH
Germany
www.steinbeis-europa.de

Waterleau Group NV
Belgium
www.waterleau.com

The Project

Executive Summary

MinWaterCSP consortium will address the challenge of significantly reducing the water consumption of CSP plants while maintaining their overall cycle efficiency. Our objective is to reduce evaporation losses and mirror cleaning water usage for small- and large-scale CSP plants through a holistic combination of next generation technologies. Also, comprehensive water management plans for CSP plants in various locations will be developed. The MinWaterCSP consortium aims to make CSP more attractive for investment purposes in order to drive growth in the CSP plant business as well as job creation at European companies.

Duration

36 months (January 2016 – December 2018)

Consortium

The project consortium consists of 12 organisations from the following 6 countries:
Belgium, Germany, Italy, Morocco, South Africa, Spain

Photo credits: ECILIMP TERMOSOLAR S.L., ENEXIO Germany GmbH / Design: www.seabolt.net

Contacts

Kelvion Holding GmbH / ENEXIO Management GmbH
Project coordinator / Technical coordinator
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Minimized water consumption in CSP plants

MinWaterCSP

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Figure 4a: Project leaflet 1 _ update - cover-pages

Project Objectives and Technologies

MinWaterCSP will significantly reduce the water consumption of CSP plants through a holistic combination of next generation technologies in the fields of:

- hybrid dry/wet cooling systems
- wire structure heat transfer surfaces
- axial flow fans
- mirror cleaning techniques and
- optimized water management

The Approach

Plant simulation: Integrated CSP plant simulation and water management plan

Sub-system development:
- Cooling system for condensing turbine exhaust steam: Hybrid system based on dry/wet cooling system prototype testing
- Develop mirror cleaning technology to improve reflectivity and reduce water consumption. Treat used cleaning water and cooling system blow-down for re-use

Component development:
- Hybrid cooling system (combined dry and wet cooling)
- Wire structure heat transfer surface development
- Axial flow fan development and prototype testing
- Mirror cleaning system and water treatment equipment

Objectives

- Reduction of water evaporation losses by 75 to 95% compared to wet-cooling
- Improving fan performance through increased fan static efficiency
- Increase of the net power cycle efficiency by up to 2%
- Reduction of water consumption due to mirror cleaning by 25% through improved cleaning processes for parabolic trough collectors
- Development of cleaning robot for linear Fresnel collectors
- Reduction of cleaning cycles enabled by an enhanced monitoring of mirror reflectance
- Development of a comprehensive water management plan

GEMASOLAR Plant, property of Torresol Energy © SENER

Cleaning Technology property of ECILIMP

Expected Impact

MinWaterCSP will increase technology performance by:

- introducing dry/wet hybrid cooling systems
- developing compact heat exchanger technology based on wire structure surfaces
- introducing treatment of used mirror cleaning water
- recycling of waste water streams

Technology performance improvement has the following impacts:

- reducing cooling system capital and operating costs
- increasing net power output and saving water
- expanding CSP technology to locations with limited water supply
- reducing dependency on fossil fuels and making CSP more attractive for investors
- reducing impact on the environment during the entire life-cycle
- saving material by using novel wire structure heat exchanger concepts

Figure 4b: Project leaflet 1 _ update - inner pages

Figure 5a: Project leaflet 2 _ cover-pages

Technologies and Benefits

Hybrid (dry/wet) cooling system

CSP plants are typically located in arid regions and subsequently often make use of dry-cooling systems instead of smaller and more effective wet-cooling systems. A novel hybrid (dry/wet) cooling system is being developed.

The Benefits

- Reduction of overall water consumption relative to evaporative cooling systems while maintaining cycle efficiency or offering improved efficiency relative to dry cooling systems
- Improved power cycle efficiency

Corrugated textile fabric forming a heat transfer surface area for flat tube air-cooled condensers.

Wire structure heat transfer surfaces

Wire structures are heat transfer enhancement technologies suitable for dry-cooling applications and are manufactured from metal textile fabrics. The structures allow high heat transfer rates at reduced fin material quantities, thus saving energy and resources. Computational Fluid Dynamic simulations and experimental investigations are being undertaken in order to adapt this technology to air-cooled condensers, which form part of the steam cycle in CSP plants.

The Benefits

- Reduced material quantities
- Reduced overall finned tube bundle mass in air cooled condensers
- Increased heat transfer surface area and heat transfer coefficients
- Increased overall performance of dry-cooling systems
- Increased attractiveness of dry-cooling from a cost and performance point of view

Axial flow fans

Large diameter axial flow fans are installed in air-cooled condensers, which are typically used in CSP plants. Potential improvements are identified in the fields of aerodynamic design, manufacturing techniques, electrical drive systems and noise reduction in order to improve the overall performance of dry-cooling technologies with particular reference to reducing auxiliary power consumption.

The Benefits

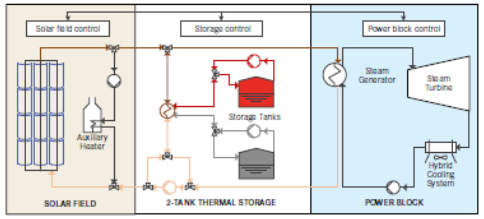
- Improved large axial flow fan static efficiency
- Improved structural design techniques to enable fan operation in safe margins away from mechanical excitation frequencies
- Improved drive torque to weight ratio
- Reduced tonal noise of the overall cooling plant

Mirror cleaning

Mirror cleaning improves mirror reflection and therefore available input heat in CSP plants. Cleaning technologies for heliostats and parabolic trough mirrors are improved to reduce water consumption through the re-cycling of cleaning water. A new agile mirror cleaning robot and receiver cleaning device for linear Fresnel technology is developed. A mobile device for soiling and cleanliness measurements is used as part of the overall optimization of the mirror cleaning process.

The Benefits

- Reduced water consumption
- More realistic and reliable models for reflectiveness to monitor the cleaning cycles
- New cleaning robots for linear Fresnel mirrors
- Improved mirror soiling predictions and cleaning strategies



Schematic of the ColSimCSP simulation model of a parabolic trough collector plant with the novel Hybrid (dry/wet) cooling system.

CSP plant simulation software / Water management plan

The simulation software ColSimCSP is being further developed and eventually used for simulation and optimisation of CSP plants. This includes parabolic trough, solar tower and linear Fresnel technologies for the evaluation of the overall cycle performance and water consumption. Overall water management concepts for CSP plants will be designed, covering the whole chain from sourcing via treatment to distribution.

The Benefits

- New software integrating the new hybrid cooling system and its novel features as well as the conventional cooling systems for comparison purposes
- Integrated energy model including techno-economic evaluation and optimized water management and consumption
- New centralized and decentralized water treatment systems
- Implementation of mirror cleaning schedules in the overall plant simulation

Expected Impacts

- Reduced cooling system capital and operating costs
- Increased net power output and saving water
- Expanding CSP technology to locations with limited water supply
- Reduced dependency on fossil fuels and greater financial attractiveness of CSP
- Reduced impact on the environment during the entire life-cycle of a CSP plant

Figure 5b: Project leaflet 2 _ inner pages

3.4 Project poster in month 5 by UROME

For a special event for academia, UROME produced a MinWaterCSP poster.

- Title of the fair: R&D Fair of the Engineering Faculty of Sapienza University of Rome (Ingegneria R&D)
- Date: 4th May 2016
- Target Audience: Scientific community, industry, policy makers, national interest groups
- Size of audience: approx. 400

Poster Exhibition of different European and international projects on research and network activities in the different UROME departments, to share experience and to stimulate further international collaboration and academic community interest.

Event was done in collaboration with ERASMUS Plus projects of Sapienza University of Rome.

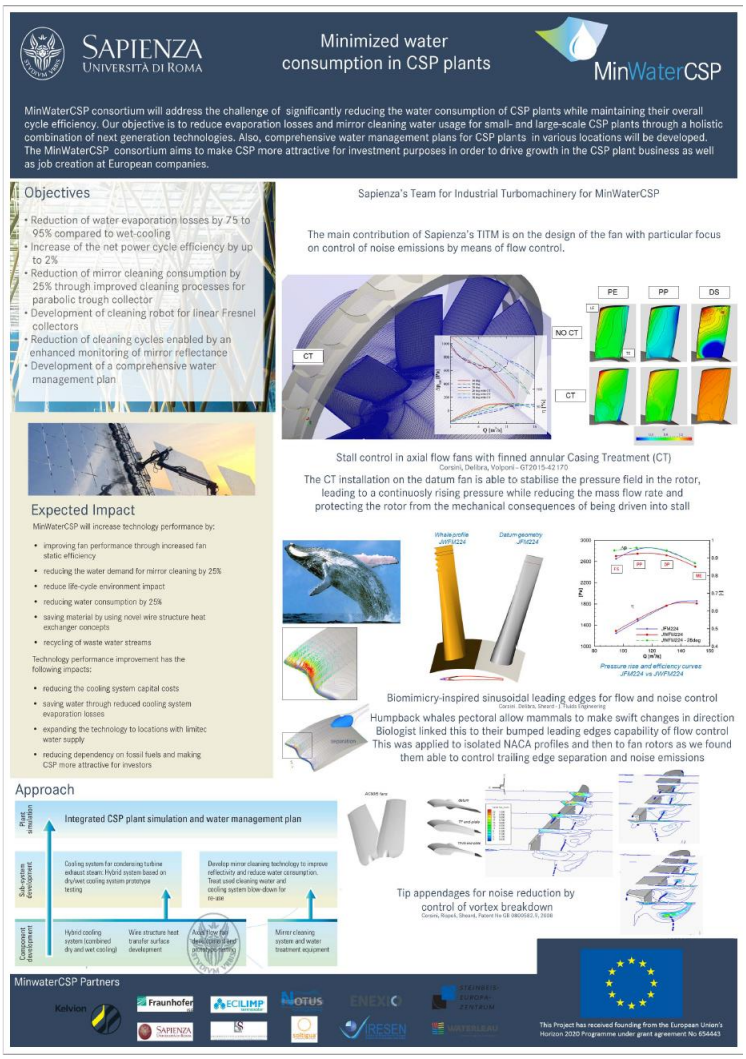


Figure 6: Project poster for special event

4 Communication levels and Target Audience

4.1 EU level

At EU level, European stakeholders, initiatives, projects etc. will be informed about MinWaterCSP. Each partner will be in contact with their EU representatives and stakeholders.

Via Social Media (LinkedIN, Twitter, joint LCE LinkedIN Group), MinWaterCSP is connected with stakeholders at EU level.

4.2 National level

Stakeholders at national level often have to be addressed in their national language. This means that all communication and dissemination activities at this level will be done by the national project partners. For some cases, there is only one partner per country who is naturally responsible for the activities in his/her country (e.g. Spain, Morocco, Belgium). In the countries with more than one partner (e.g. Germany, Italy, South Africa), coordination between these partners is necessary. To prevent duplications, those partners will also inform the Communication and Dissemination team about their activities and contacts. These contacts will be used to disseminate the project leaflet and the website.

Partner short names	Country
Kelvion Holding	Germany
Fraunhofer	Germany
ENEXIO	Germany
S2i	Germany
Kelvion	South Africa
SUN	South Africa
Notus	South Africa
UROME	Italy
SOLTIGUA	Italy
ECILIMP	Spain
IRESEN	Morocco
Waterleau	Belgium

Table 2: Consortium listed according to country

4.3 Regional level

Stakeholders at regional level also need to be addressed in their local language. Local partners do already have existing networks of media and stakeholders, which they can efficiently use for their activities.

As the MinWaterCSP project partners are mainly located in different regions, all partners are responsible for information activities within their regions and via their channels.

4.4 Target Audience

The Project leaflets are one of several tools that are used as digital and printed material. The target audience is similar to the audience of the website, also the share of audience is similar for most groups.

The target group listed in the table below is envisaged by the whole set of digital and printed media in MinWaterCSP (blue column). This means by: project leaflets, roll-up banners, poster, articles, blogs, press-work and social media.

The following table shows also the actual share of reached target audience by the website, the poster and the leaflets within month 5 – 18 (green column).
The periodic report (in month 18) will give the whole picture of all digital and printed media, which will target also to initiatives and other bodies.

Communication Tools Target Group	Printed and / or digital materials	Reached by Poster and Leaflets (Month 5-18)
Power market	15%	46,5 %
National interest groups	15%	7,4 %
Representative bodies	15%	2,2 %
National bodies	15%	0,3 %
Legislative bodies	5%	4,9 %
CO_2 reduction initiatives	15%	0,3 %
Academia	20%	38,3 %

Table 3: Communication audience to be reached by print / digital media

5 Gantt chart

During the progress of the project, most of the tasks are ongoing; as the dissemination actions follow the technical WPs. The Gantt chart below demonstrates month 7 to 18.

		2016						2017					
TASK	ACTIVITY	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
		7	8	9	10	11	12	13	14	15	16	17	18
10,2	**MinWaterCSP Website**												D10.5
10.2.6	Website updates												
10,3	**Identification of stakeholders for distribution activities**												
10,4	**Printed and digital meterials for communication and dissemination**												
10.4.1	Leaflet 1 (update in M16/17), Leaflet 2												D10.5
10.4.2	Press Releases							D10.3					
10.4.3	Publications							D10.3					
10.4.4b	eNewsletter #2							D10.3					
10.4.4c	eNewsletter #3												
10.4.5	Blogs / short articles							D10.3					
	Social Media (Twitter, LinkedIN)							D10.3					
10,5	**Events**							D10.4					
10.5.2	Workshops/Joint events with other projects							D10.4					
10.5.4	External Events: Presentations, Participation							D10.4					

Table 4: Gantt chart for WP10, for month 7-18

Current status of starting and ending of task (Annex I – DoA)

Modifications to the DoA related to starting and ending of tasks, no affect to Deliverables or budget

D= Deliverable reports with included task report