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Topic: SC5-01-2014

PRIMAVERA

Grant Agreement 641727

PRocess-based climate sIMulation: AdVances in high resolution modelling and European climate Risk Assessment

Deliverable D11.7

Document detailing where PRIMAVERA outcomes have been presented to end-users

Deliverable Title	*Document detailing where PRIMAVERA outcomes have been presented to end-users*
Brief Description	*Partners will participate in and/or deliver end-user workshops at relevant external events or initiatives organised by the target sectors. This will facilitate co-production and maximise exploitation and engagement.*
WP number	WP11
Lead Beneficiary	*BSC*
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1	03/7/2020	Dragana Bojovic	
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1 Executive Summary

This report lists activities where PRIMAVERA has been promoted to the user community. Priority has been given to dissemination of information to the targeted sectors, and the wider scientific and stakeholder community. The report is structured around a list of Key Performance Indicators (KPIs), proposed at the beginning of the project in D11.1, to monitor effectiveness of different engagement and involvement activities. These activities include various communication channels and tools, as well as dissemination actions, such as presentations, workshops and webinars. The deliverable also lists interactions with complementary international projects and new initiatives.

The KPI results are:

1. Number of different organisations/users in the (mailing) list: **125**
2. Number of different institutions/end-users engaged **≈ 800**
3. Number of meetings carried out every year: 56 over 4 years = **14 per year on average**
4. Total number of surveys conducted: **2**
5. Number of participants per survey: **total of 85 participants in the 2 surveys**
6. Number of interviews: **65**
7. Number of originating countries of the survey and interview participants: **16**
8. Number of workshops delivered: **11**
9. Number of participants per workshop: **5-70 depending on the workshop**
10. Number of sector specific case studies published online: **5**
11. Number of factsheets published online: **14**
12. Number of visits and downloads of factsheets: **factsheets downloaded 3013 times**
13. Number of visits to the UIP from launch to the end of the project: **3047 users, 13685 pages, average visit duration 3m33s**
14. Number of users who participated in the Data Viewer prototype evaluation: **6**
15. Number of visits to the UIP's Data Viewer from its launch to the end of the project: **1098**
16. Number of conferences attended by WP10/11 team: **30**
17. Number of posters presented: **19**
18. Number of oral presentations: **18**
19. Number of joint initiatives: **7**

20. List of joint actions with EU and other international projects: **10**
21. Number of case studies developed: **5**
22. Number of champion users involved in case studies development: **5**

We also discuss analytics for the @PRIMAVERA_H2020 Twitter account, for which there is no KPI, because the account was created after the KPIs were developed. The Twitter account was moderately successful at engaging a range of users; however, its reach would likely have benefited from being managed by a more experienced social media user.

Related deliverable D7.5 provides a summary of the ways in which outputs from PRIMAVERA have been disseminated to reach an audience of climate change scientists and scientific data users with an interest in exploiting PRIMAVERA outputs, and how this can be continued into the future.

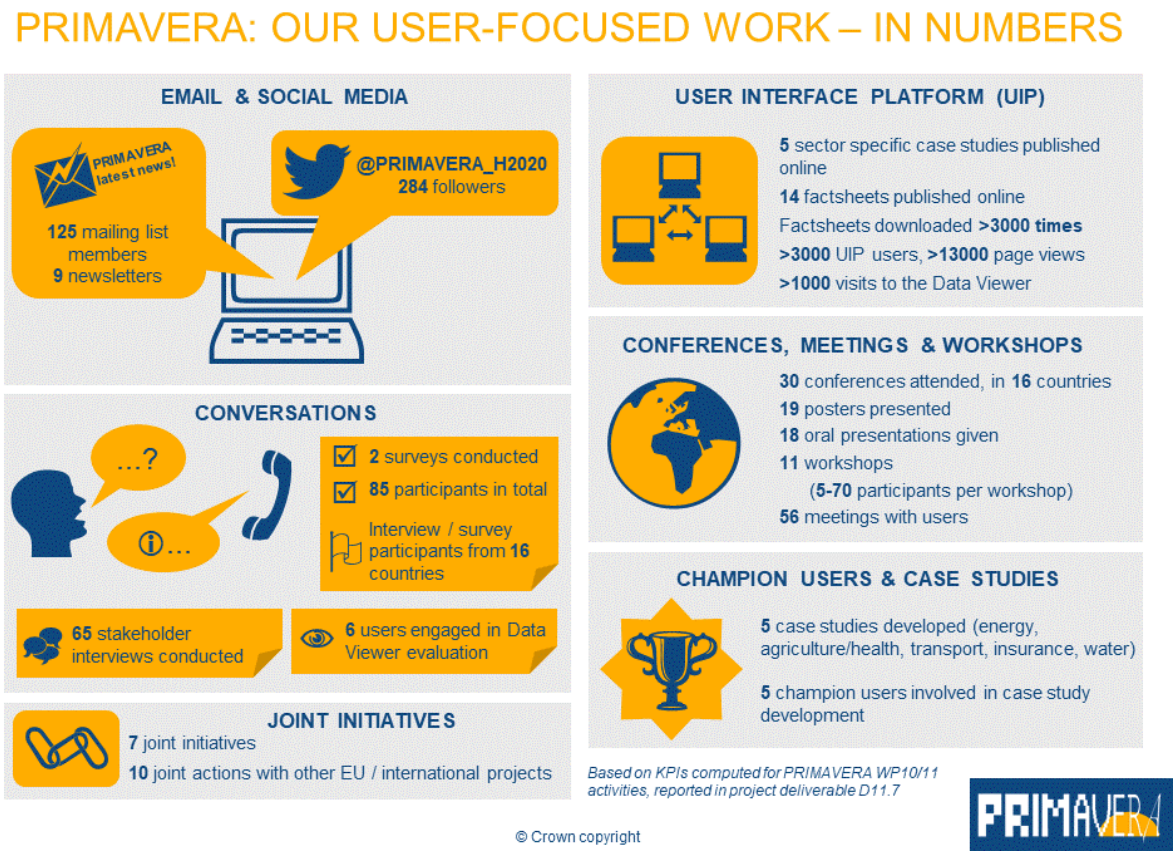

Figure 1. Visual representation of PRIMAVERA KPIs

2 Project Objectives

With this deliverable, the project has contributed to the achievement of the following objectives (DOA, Part B Section 1.1) WP numbers are in brackets:

No.	Objective	Yes	No
A	To develop a new generation of global high-resolution climate models. *(3, 4, 6)*		x
B	To develop new strategies and tools for evaluating global high-resolution climate models at a process level, and for quantifying the uncertainties in the predictions of regional climate. *(1, 2, 5, 9, 10)*		x
C	To provide new high-resolution protocols and flagship simulations for the World Climate Research Programme (WCRP)'s Coupled Model Intercomparison Project (CMIP6) project, to inform the Intergovernmental Panel on Climate Change (IPCC) assessments and in support of emerging Climate Services. *(4, 6, 9)*		x
D	To explore the scientific and technological frontiers of capability in global climate modelling to provide guidance for the development of future generations of prediction systems, global climate and Earth System models (informing post-CMIP6 and beyond). *(3, 4)*		x
E	To advance understanding of past and future, natural and anthropogenic, drivers of variability and changes in European climate, including high impact events, by exploiting new capabilities in high-resolution global climate modelling. *(1, 2, 5)*		x
F	To produce new, more robust and trustworthy projections of European climate for the next few decades based on improved global models and advances in process understanding. *(2, 3, 5, 6, 10)*		x
G	To engage with targeted end-user groups in key European economic sectors to strengthen their competitiveness, growth, resilience and ability by exploiting new scientific progress. *(10, 11)*	x	
H	To establish cooperation between science and policy actions at European and international level, to support the development of effective climate change policies, optimize public decision making and increase capability to manage climate risks. *(5, 8, 10)*		x

3 Detailed Report

3.1 Key performance indicators

The project defined the following list of Key Performance Indicators (KPIs):

1. Number of different organisations/users in the (mailing) list
2. Number of different institutions/end-users engaged
3. Number of meetings carried out every year
4. Total number of surveys conducted
5. Number of participants per survey
6. Number of interviews
7. Number of originating countries of the survey and interview participants
8. Number of workshops delivered
9. Number of participants per workshop
10. Number of sector specific case studies published online
11. Number of factsheets published online
12. Number of visits and downloads of factsheets
13. Number of visits to the UIP from launch to the end of the project
14. Number of users who participated in the Data Viewer prototype evaluation
15. Number of visits to the UIP's Data Viewer from its launch to the end of the project
16. Number of conferences attended by the WP10/11 team
17. Number of posters presented
18. Number of oral presentations
19. Number of joint initiatives
20. List of joint actions with EU and other international projects
21. Number of case studies developed
22. Number of champion users involved in case studies development

3.2 Dissemination results according to KPI

1. **Number of different organisations/users in the (mailing) list**

The project mailing list was developed in May 2018. The aim of the mailing list was to facilitate communication with the project stakeholders and users. The mailing list was used to promote our engagement and dissemination activities, such as project updates – e.g., news on the User Interface Platform (UIP) and launching of the Data Viewer (DV) and events, such as workshops and webinars. We sent 9 issues of the PRIMAVERA updates through the mailing list. By the end of the project, the mailing list comprised **125 members** from 90 different institutions.

2. Number of different end-users engaged

We conducted many different user engagement activities throughout the project and it is difficult to provide a precise number of users engaged:

- The surveys engaged 85 users (please see KPI no. 4)
- The interviews engaged 40 new users (please see KPI no. 6)
- Assuming an average of 25 users per conference, noting that 30 conferences were attended (please see KPI no.16) and assuming that 1/3 are 'old users' (i.e. existing contacts), an estimated 500 further users were engaged via conferences
- Workshops and webinars engaged approximately 200 more users
- We also engaged users via other meetings (mainly users that are already counted under other activities)
- We therefore estimate that we engaged around **800 users**.

3. Number of meetings carried out every year

During the lifetime of the project, we organised 11 workshops, including webinars (please see KPI no.8). In addition, some of the members of the PRIMAVERA WP10/11 team had regular or sporadic meetings with users from energy, insurance, transport, water and tourism. The frequency of these meetings has been increasing throughout the project (Figure). The earliest and most intensive collaboration has been established with the energy sector. It started in 2017 and lasted until the end of the project. Meetings with insurance started from 2019 and were intensive in 2020. The contacts with tourism were sporadic, while the meetings with transport sector happened towards the end of the project.

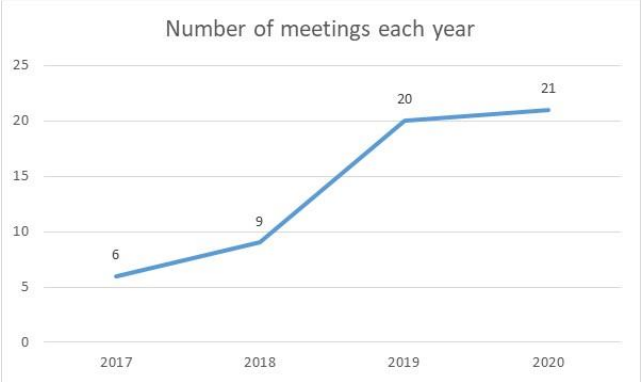

Figure 2: Number of meetings carried out every year.

4. **Total number surveys conducted**
   We were mindful about user fatigue and avoided repetitive and exploitative user engagement approaches, as much as possible. Instead, we used less "invasive" approaches, such as the UIP and invitations to events and webinars. However, at an early stage of the project we conducted a survey for the initial assessment of user needs for climate information and exploration of user needs for high resolution global climate data. We conducted another survey towards the end of the project to understand user satisfaction with the UIP. So we conducted **two surveys** in the project.

5. **Number of participants per survey**
   The first project survey aimed at understanding user needs for weather and climate information and establishing contact with users from different sectors of interest for the project. The survey was distributed to the PRIMAVERA WP10 and WP11 partners' stakeholders and through the Climate Services Partnership newsletter and promoted in the PIANC conference poster and via the @MetOffice_Sci and @climateurope Twitter feeds. Altogether 83 complete responses were received.

   The second survey about the user satisfaction with the UIP obtained only two answers by the time of writing up this report. The total number of participants in the project surveys is **85**.

6. **Number of interviews**

We conducted four different sets of interviews in the project.

The first set of interviews was a continuation of the analysis of users' needs for weather and climate data and high resolution climate data. All survey participants who stated that they were willing to be interviewed were invited, though some did not respond to the initial approach email, or to a follow-up message. A few additional approaches were made to people who did not participate in the survey. We contacted stakeholders from the three key PRIMAVERA sectors: energy, transport and insurance, as well as from the three additional sectors: water, agriculture and health. A total of **47 interviews** were conducted during the period May-September 2017.

During the development of the Data Viewer, we conducted **six** in-depth platform evaluation interviews. We also did a set of **five** evaluation interviews to improve the UIP menu.

At the end of the project, we conducted another set of interviews. To evaluate the value, relevance and usability of project outcomes, as well as remaining challenges, we conducted semi-structured interviews with **seven** champion users.

Hence, we conducted altogether **65 interviews** throughout the project.

7. Number of originating countries of the survey and interview participants

The survey responses were received from participants from 12 different EU countries (Fig. 2), while one participant was from the US. The interviewees came from the same countries. In addition, we have interviewees from Sweden, Indonesia and Bangladesh. We have altogether participants from **16 countries** in surveys and interviews.

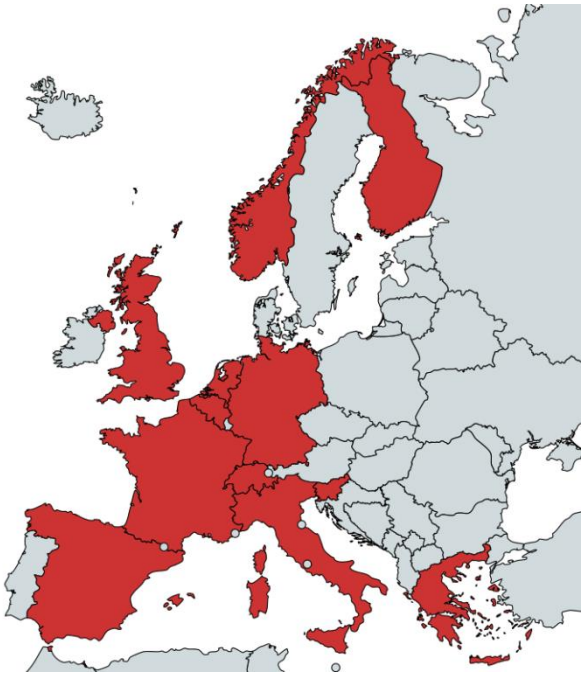

Figure 3: Survey participants' (organization) location

8. and 9. Number of workshops delivered and number of participants per workshop

We delivered altogether **11 workshops**. The list of the workshops is provided below:

1. First virtual meeting: 'User Engagement in PRIMAVERA: Progress and next steps', 14/11/2017 ***13 participants***
2. PRIMAVERA Splinter session: 'The PRIMAVERA project: Does high resolution climate modelling matter to you?', 12/04/2018 ***22 participants***
3. Climateurope festival, workshop at the marketplace: 'Business model for PRIMAVERA climate service' 19/10/2018 ***5 participants***
4. Webinar: 'How do high resolution models improve the representation of past European windstorms?', 19/03/2019 ***13 participants***

5. Webinar: 'Arctic sea ice and its importance for climate', 12/06/2019 ***12 participants***
6. ETC 2019 workshop: 'Understanding Transport Sector needs for Climate Information, via the PRIMAVERA project', 10/10/2019 ***5 participants***
7. Webinar: 'What new information do we get from climate models with high resolution?', 11/11/2019 ***9 participants***
8. "Climate impacts, vulnerability and adaptation: what it means for you", 26/02/2020 ***11 participants***
9. Webinar: 'The high-resolution revolution: an overview of PRIMAVERA science, 'big data' management, and added value for users', 21/05/2020 ***16 participants***
10. Climateurope webinar: 'PRIMAVERA User Interface Platform' 28/05/2020 ***30 participants***
11. 'Next generation challenges in Energy-Climate modelling' 22-23/06/2020 ***70 participants***

We plan to deliver at least one further webinar, for the insurance sector, based on the insurance-focused content in D10.4. For time reasons, this will take place after the formal end of PRIMAVERA. We are also exploring the possibility of delivering a transport-focused webinar on similar timescales.

10. Number of sector specific case studies published online

We published **5 sectoral** factsheets:

1. Atmospheric blocking and the European energy system
2. Flooding impacts on the European transport system
3. North Atlantic oscillation, wind and energy over Europe
4. Heat waves and energy over Europe
5. Extra-tropical cyclones

11. **Number of factsheets published online**

We published altogether **14 factsheets** on our User Interface Platform. We also provided a limited number of hard copies of these factsheets, which we distributed at the events and workshops. Besides five sectoral factsheets, we also published nine climate factsheets:

1. How do climate models work?
2. Does high-resolution global modelling matter?
3. Dealing with uncertainties
4. Quality of climate models
5. Uncertainty in climate projections
6. Ensembles of climate models and how they can be used

7. Data sources and risk assessments
8. Climate predictions and projections
9. Representation of windstorms by PRIMAVERA models

12. Number of visits and downloads

The fact sheets were downloaded **3013 times.** The factsheet *Uncertainty in Climate Projections* was the most downloaded one: it was downloaded 385 times.

13. Number of visits to the UIP from launch to the end of the project

The UIP was launched in October 2017. During this period, it was **visited by 3047 users**. Altogether, the platform visitors viewed a total of 13685 pages, and an average visit duration on the platform was 3 minutes 33 seconds.

14. Number of users who participated in the Data Viewer prototype evaluation

We conducted **6 in-depth evaluation interviews** to improve the usability of the Data Viewer, as reported in D11.4.

15. Number of visits to the UIP's Data Viewer from its launch to the end of the project

From its launch in February 2020 until July 2020, the Data Viewer was accessed **1098 times.**

16. Number of conferences attended

Members of PRIMAVERA WP10 and 11 team attended **30 conferences**, where they disseminated project results and engaged with project stakeholders. The list of conferences is provided in Annex 1.

17. Number of posters presented

The WP10 and 11 team presented **19 posters** at different user oriented or scientific conferences and events:

1. EGU 2017: 'Extreme future central European droughts in a high-resolution global climate model', 23 – 28/04/2017
2. ECCA 2017: 'Co-designing the next generation of climate models for a better informed society', 5-7/06/2017
3. RMetS Annual Conference 2017: 'Introducing the PRIMAVERA project', 13-14/07/2017

4. Transport Research Arena 2018 conference: ‘Exploring user needs for climate risk assessment in the transport sector: how could global high resolution climate models help?’, 16-19/04/2018[1]

5. GEWEX Science Conference: 'Extreme future central European droughts in a high-resolution global climate model', 6-11/05/2018

6. EGU 2018: ‘Exploring the added value of sub-6-hourly wind data from GCMs for energy applications', 8-13/05/2018

7. EGU 2018: ‘Influence of changes in large-scale circulation on surface wind projections for wind power over Europe', 8-13/05/2018

8. EGU 2018: 'Use of high-resolution GCM simulations for hydrological and hydropower impact research in the Upper Danube basin', 8-13/05/2018

9. ICEM 2018: ‘Exploring the added value of sub-6-hourly wind data from GCMs for energy applications', 22-24/05/2018

10. ICEM 2018: 'Influence of changes in large-scale circulation on surface wind projections for wind power over Europe', 22-24/05/2018

11. EMS 2018: ‘Exploring the added value of sub-6-hourly wind data from GCMs for energy applications', 3-7/09/2018

12. EMS 2018: 'Influence of changes in large-scale circulation on surface wind projections for wind power over Europe', 3-7/09/2018

13. Climateurope festival: ‘Co-designing the next generation of climate models for a better informed society’ 19/10/2018

14. Water science for impact international conference: 'Extreme future central European droughts in a high-resolution global climate model', 16-18/10/2018

15. ICEM 2019: 'Understanding the impact of meteorological variability on the European power system', 25-27/06/ 2019

16. EMS2019: ‘Primavera: how can NMHSs profit from high-resolution climate modeling?’, 9-13/09/2019

17. EMS2019: ‘Comparing the new homogenized E-OBS for temperature with high resolution PRIMAVERA climate simulations’, 9-13/09/2019

18. Risk Day 2020: ‘Modelling and quantifying climate risk in power system operation and planning’, 4/03/2020

[1] Due to illness of the intended presenter, this poster was unfortunately not presented in person. However a colleague (not working on PRIMAVERA) was able to take the poster to the conference, and the organising committee kindly displayed the poster on our behalf. A conference paper, which has received 116 views and 50 downloads, accompanied the poster.

19. Earth System PhD Conference: ‘Storms of the Future: Untangling the known unknown in climate change attribution using high resolution modelling’, 13-15/3/2020

18. Number of oral presentations

The WP10 and 11 team gave **18 presentations** at different user oriented or scientific conferences and events:

1. PIANC Navigating a changing climate conference: ‘Introducing the PRIMAVERA project’, 28/03/2017
2. Openmod Workshop: talk about the energy-meteorology work in PRIMAVERA, 19-21/04/2017
3. 6th European windstorms workshop: ‘Assessment of windstorm risk for the insurance industry as part of the PRIMAVERA project’, 21-23/06/2017
4. EMS/ECAC 2017: ‘Extreme future central European summer droughts in a high-resolution global climate model’, 4-8/09/2017
5. EMS/ECAC 2017: ‘User co-design of state-of-the-art climate model simulations: Towards a better-informed society’, 4-8/09/2017
6. EGU 2018: PICO session: ‘User engagement in H2020 project PRIMAVERA: progress and challenges’, 12/04/2018
7. EGU 2018: ‘Soil moisture drought and high resolution. Impact on the European agriculture’, 8-13/04/2018
8. EMS 2018: 'The representation of persistent low wind events over the UK and their forcing mechanisms by high-resolution, 3-7/09/2018
9. AMS2019, ‘Extreme events of the middle latitudes’, 6-10 January 2019
10. ECCA 2019 ‘A three-step participatory approach to climate services coproduction’, 28-3105/2019
11. ECCA 2019: ‘Are there benefits for stakeholders from representation of North Atlantic extratropical cyclones using the PRIMAVERA project high-resolution global climate models?’, 28-31/05/2019
12. ESIG: ‘Forecasting Power System Relevant Weather Events’, 5/06/2019
13. EMS2019: ‘Engagement with the finance and insurance industry for the PRIMAVERA project: Analysis of European wind storms for catastrophe modelling’, 9-13/09/2019
14. ETC 2019: ‘Understanding transport sector needs for climate information, via the PRIMAVERA project’, 9-11/10/2019
15. European Storms workshop: ‘Using PRIMAVERA models to create a European windstorm event set’, 28-30/10/2019

16. Virtual EGU 2020: 'Using PRIMAVERA high-resolution global climate models for European windstorm risk assessment in present and future climates for the (re)insurance industry', 4-8/05/2020

17. Virtual EGU 2020: 'Impact of blocking on low wind events and its representation by high-resolution GCMs: An energy perspective', 4-8/05/2020

18. Workshop on the Next Generation Challenges in Energy-Climate Modelling: 'Perspectives on the use of future climate data', 22-23/06/2020

19. Number of joint initiatives

We participated in **seven joint initiatives.** There were two joined initiatives that created three PhD positions. KNMI collaborated with the Dutch National Flood Museum, using PRIMAVERA data. The climate energy group from the University of Reading participated in two proposals and started an initiative on energy-climate modelling. Finally, Met Office had a workshop and plans for future collaboration with the transport sector in Ireland.

The PRIMAVERA dataset is used in Algorithmic Computing and Data mining for Climate Integrated Energy System Models (ACDC-ESM) research project (2 PhDs) funded by the Dutch Science Organization NWO. The goal of this project is to improve the models used by energy network operators to select the best combination of renewable and non-renewable energy sources under future weather conditions.

PRIMAVERA data is used in the PhD study funded by the Indonesian government and executed at KNMI on future changes in extreme precipitation, the onset and cessation of the rainy season and their impacts on hydrology and agriculture.

The Dutch National Flood Museum, funded through the national lottery, supported by KNMI used PRIMAVERA data to visualize changes in the climate relevant to the theme of the museum.

One EU H2020 proposal, and a proposal under the Research Council of Norway, were developed suggesting the use of PRIMAVERA output to force Energy system and "Nexus" models.

A workshop organised by the Met Office was held with Transport Infrastructure Ireland (TII), Met Éireann, and the Irish Government Department of Transport, Tourism and Sport (DTTaS). We welcomed 11 participants to a lively and engaging day talking about climate impacts, vulnerability, risk and adaptation, using PRIMAVERA work as a way to highlight relevant topics. One aim of the workshop was to engage TII to participate in a detailed case study for PRIMAVERA D10.4, however this was ultimately not possible due to additional time pressures (for scientists and users alike) arising from the COVID-19 pandemic. Nonetheless, we obtained information from the workshop that was used in D10.4. We received some pleasing feedback after the workshop: "*Thanks for your great work putting the day together*"; "*Good and well-thought-out interactive sessions*"; "*I can see the considerable outputs from the PRIMAVERA project being of value to many*". In addition, we hope that the new contacts in Ireland will help us to build on the existing good relationships between the two NMHSs. Some

discussions have already been held regarding collaboration between Met Office and Met Éireann in the climate services arena, for example.

An online workshop 'Next generation challenges in Energy-Climate modelling' was held on 22nd-23rd June 2020 and hosted by the University of Reading. The workshop brought together an international group of researchers working at the interface between climate science and energy applications and was well subscribed (140 applications) and attended (>70 participants each day including from US, EU, Australia, Africa and others). The participants were predominantly drawn from academia with a small but significant industry and policy presence, and included a very strong representation from energy-science experts (only 15 of 31 feedback responses indicated they had experience in climate research whereas 25 indicated they had experience in energy research). The workshop had two primary goals: firstly, to build a deeper engagement across the "energy" and "climate" research communities; and, secondly, to identify and begin to address the scientific challenges associated with modelling climate risk in energy systems planning and operations. Feedback from workshop participants was overwhelmingly positive and there was a clear appetite for further events (e.g., another workshop in ~12 months) and/or provision of training in the form of online materials and summer schools (regarding both energy- and climate- science) to promote community building.

20. List of joint actions with EU and other international projects

We have collaboration and join actions with **10 European projects.** The list of the projects sand the type of interaction is provided in Annex 2.

22 & 23 Number of case studies developed and Number of champion users involved in case studies development

We developed **five case studies** for six different sectors: energy, water, agriculture, health, transport and insurance. The detailed case studies are presented in D10.4. **Five champion users** were involved in development of these case studies.

3.3 PRIMAVERA Twitter account, @PRIMAVERA_H2020

The project Twitter account @PRIMAVERA_H2020, was established in August 2017 by the PRIMAVERA Project Manager, and managed actively by the WP11 co-leads from around October 2017 onwards. There was no KPI related to Twitter, as the Twitter account did not exist when the KPIs were developed.

Some Twitter analytics are shown in Figure 3–Figure 7. At the time of writing (mid-July 2020) there are 281 followers. The following has included a wealth of different accounts including other H2020 projects, end users, academics, EEAB members, etc.

We have sought to provide a range of information through the account:

- Promotion of our webinars, blogs, meetings, workshop, UIP, and DV
- Notifications of our presence at conferences
- Engagements with relevant hashtags (e.g. #WorldOceansDay)
- Engagement with other projects
- Updates on papers published by PRIMAVERA scientists
- Updates from the projects' General Assembly meetings
- Commentary and feedback from EEAB members

A balance of scientific/technical and creative tweets has been used, with content spanning videos, images, poems, and science/technical material. The aim has been to appeal to a wide range of different types of follower. For instance, we gained traction via the #EGU18 hashtag by tweeting invitations to our sessions in the form of poems, that were picked up by the conference's poet in residence.

The number of followers has increased steadily with time (it is not possible to track the total followers with time, as Twitter tracks new followers, but does not track when someone unfollows an account). There was only one month, Dec'19, in which the net following decreased (Figure 6).

Peaks in tweet numbers (Figure 3) and engagement levels correlated with large conferences (e.g. EGU in April 2018) and with the project's internal General Assembly meetings (e.g. GA4 in March 2019). The most popular tweets have already been discussed in D11.5.

We plan to tweet about a selection of the KPIs before the end of the project.

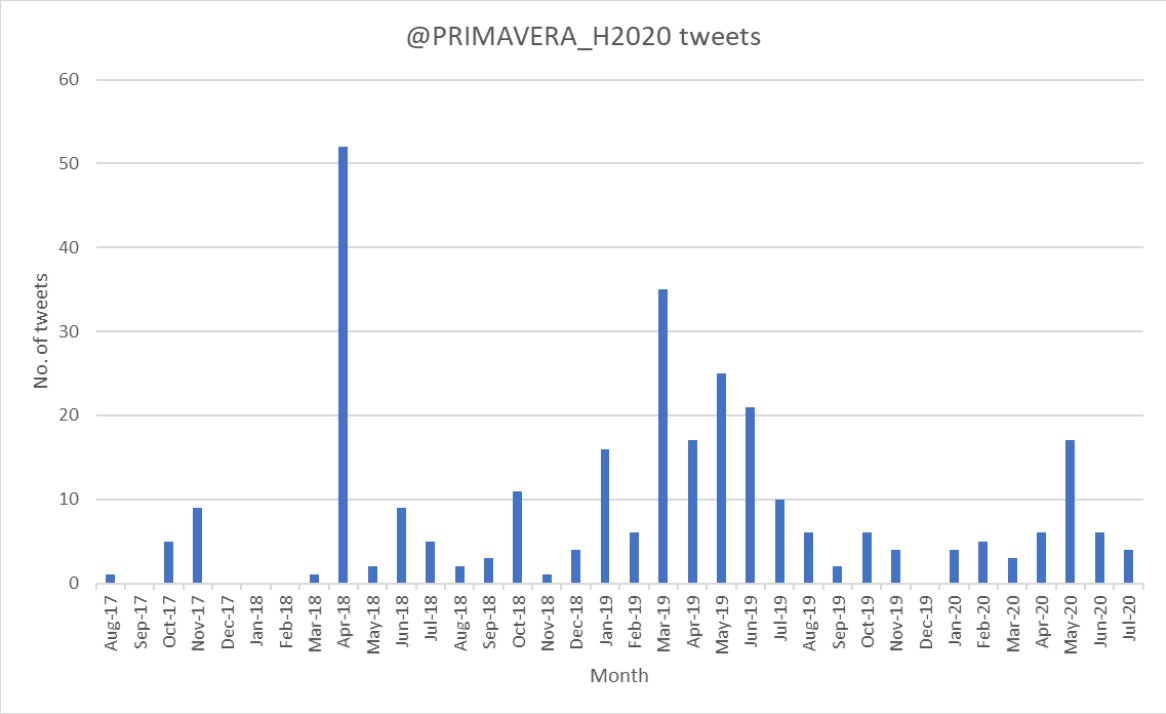

Figure 4: Tweets by @PRIMAVERA_H2020*. Note: Jul'20 values include data to 19/7/20 inclusive.*

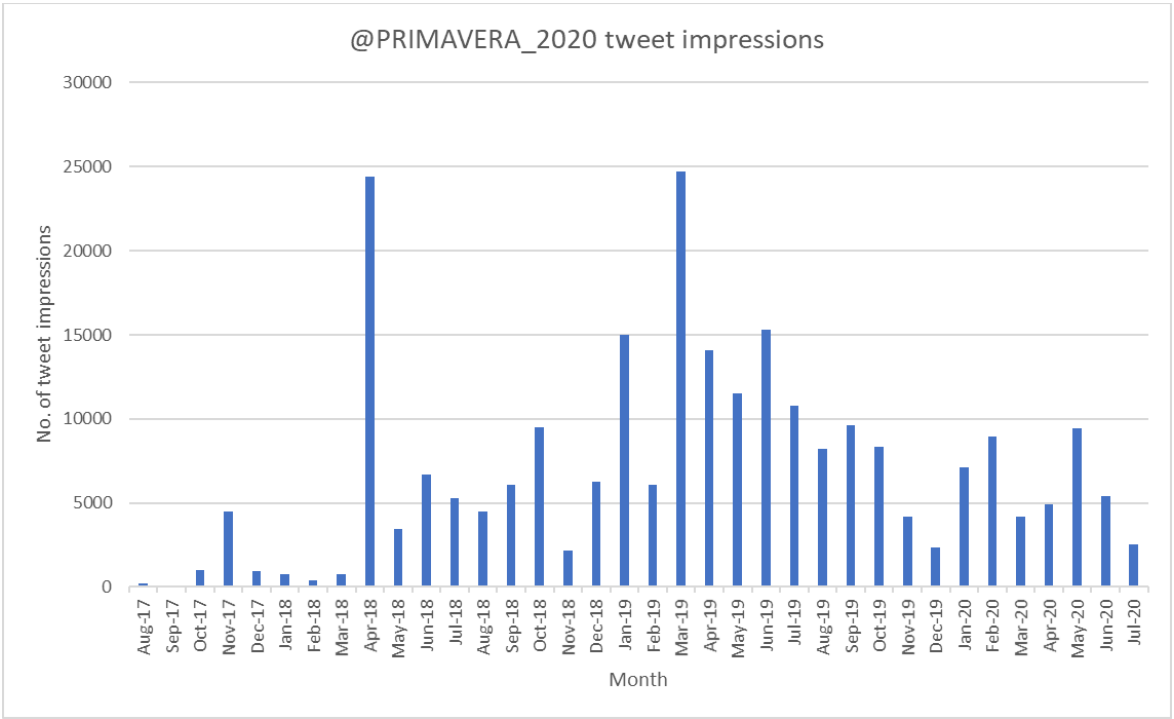

Figure 5: @PRIMAVERA_H2020 tweet impressions (number of times users saw the tweets on Twitter). *Note: Jul'20 values include data to 19/7/20 inclusive.*

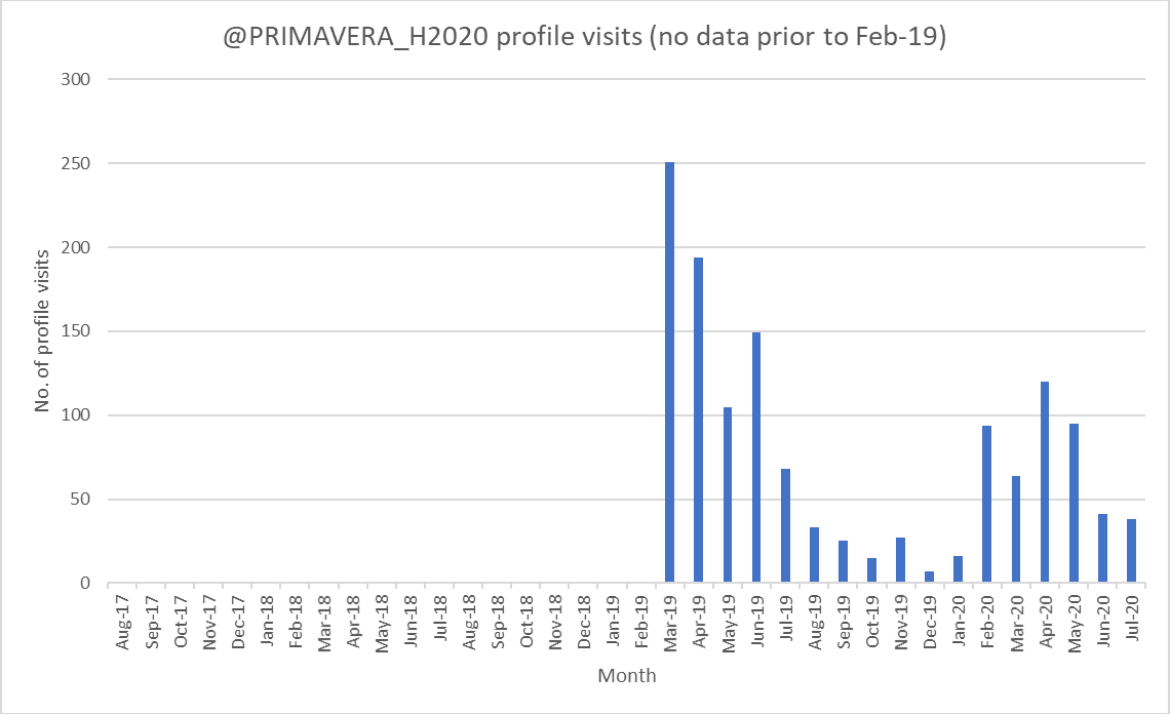

Figure 6: Visits to the @PRIMAVERA_H2020 user profile (where users look to find out more about the account). *Note: Jul'20 values include data to 19/7/20 inclusive.*

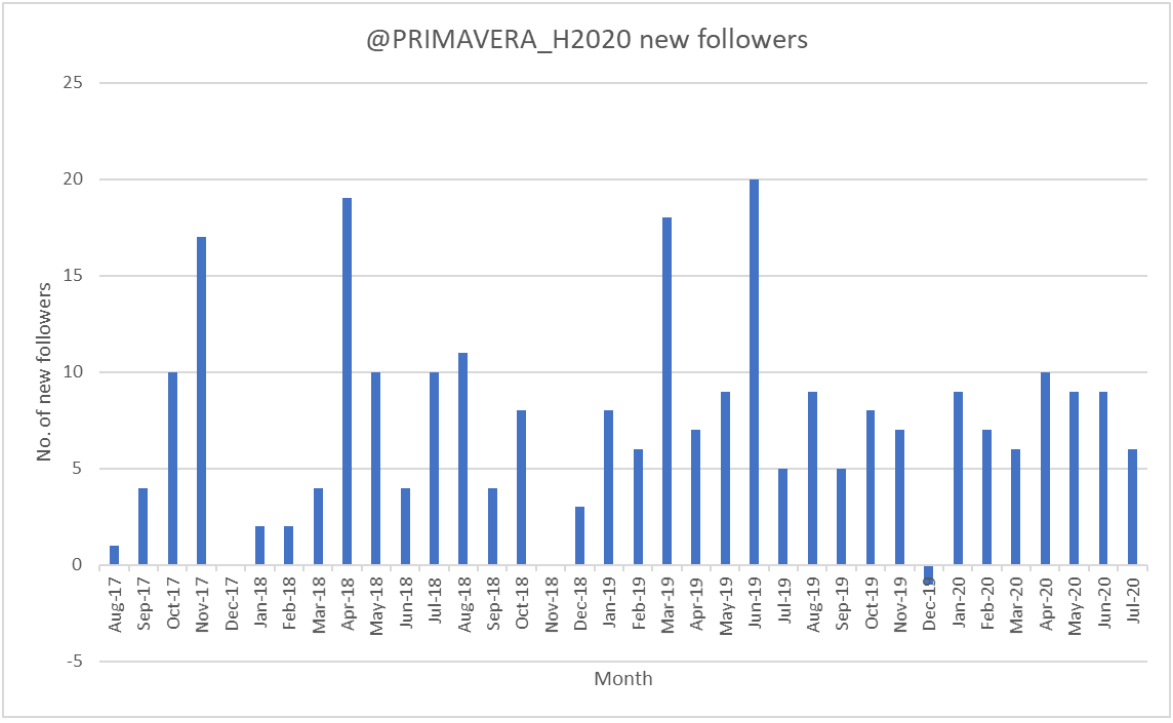

Figure 7: New @PRIMAVERA_H2020 followers. *Note: Jul'20 values include data to 19/7/20 inclusive.*

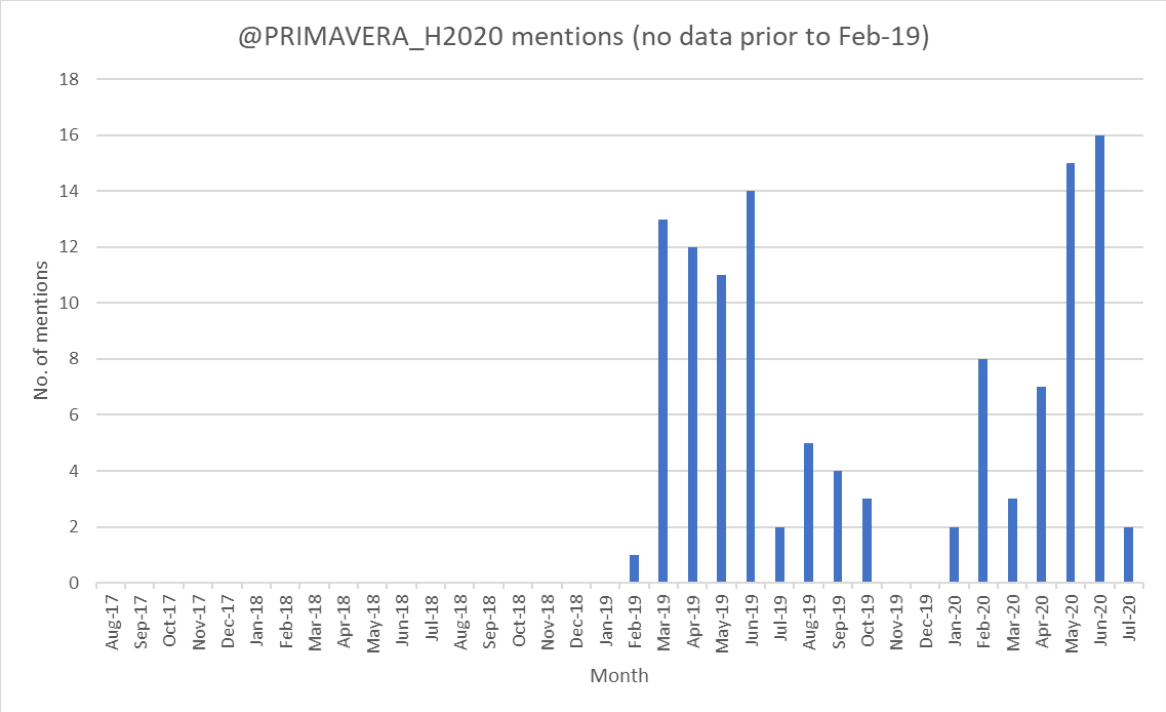

Figure 8: @PRIMAVERA_H2020 Twitter mentions (when another user mentions "@PRIMAVERA_H2020" in their tweets). *Note: Jul'20 values include data to 19/7/20 inclusive.*

4 Reflection on KPI outcomes

It is difficult to reflect on the KPI outcomes since there were no target values set (see "Lessons Learnt"). However, we can reflect qualitatively on what worked well and what could have worked better.

We have achieved successes with our direct user engagement, via the mailing list (KPI 1), meetings (KPI 3), surveys (KPIs 4 and 7), interviews (KPIs 6 and 7) and workshops (KPIs 8 and 9). We also believe our work making PRIMAVERA, and our WP10/11 work specifically, visible via conferences and similar events (KPIs 16-18), was effective and substantial.

Our indirect user engagement (KPIs 10-15) was also relatively successful. A satisfying level of interest in the UIP generally, and the Data Viewer specifically, was noted; as well as the KPI values, there were positive responses on Twitter when we tweeted about these elements (e.g. Figure 7). We are also pleased to have improved aspects of the Data Viewer usability by seeking user feedback (KPI 14).

Nonetheless, there are aspects of our work which could have gone better. Regarding KPIs 4 and 5, the first survey conducted was successful in engaging participants. The later survey about the UIP, received only two responses, despite our efforts to gather useful feedback to shape further developments to the platform. We chose to wait until after the fact sheets were fully delivered to issue the UIP survey; on reflection, it could have been better to have issued the survey earlier in the project, soon after the UIP was created.

In addition, more joint initiatives could have been undertaken (KPIs 19 and 20). However, these were areas that were more severely impacted by delays to the simulations – this is because we channelled our energy more towards keeping sector-focused users engaged in the absence of PRIMAVERA results, rather than to the joint initiatives. It is possible that better engagement via Twitter could have helped with KPI 20 (see “Lessons Learnt”).

Finally, our case studies (KPI 21) have proved very satisfying (see D10.4 for full details), and we developed or maintained several relationships with champion users (KPI 22). There were issues with engaging a transport sector champion user. Our transport engagement happened relatively late in the project – and although positive, was unfortunately disrupted by COVID-19. More generally, the engagement of champion users was another aspect of the WP10/11 work impacted by the delays to the future simulations: it was challenging to engage in a detailed and specific way on particular use cases in the absence of such material.

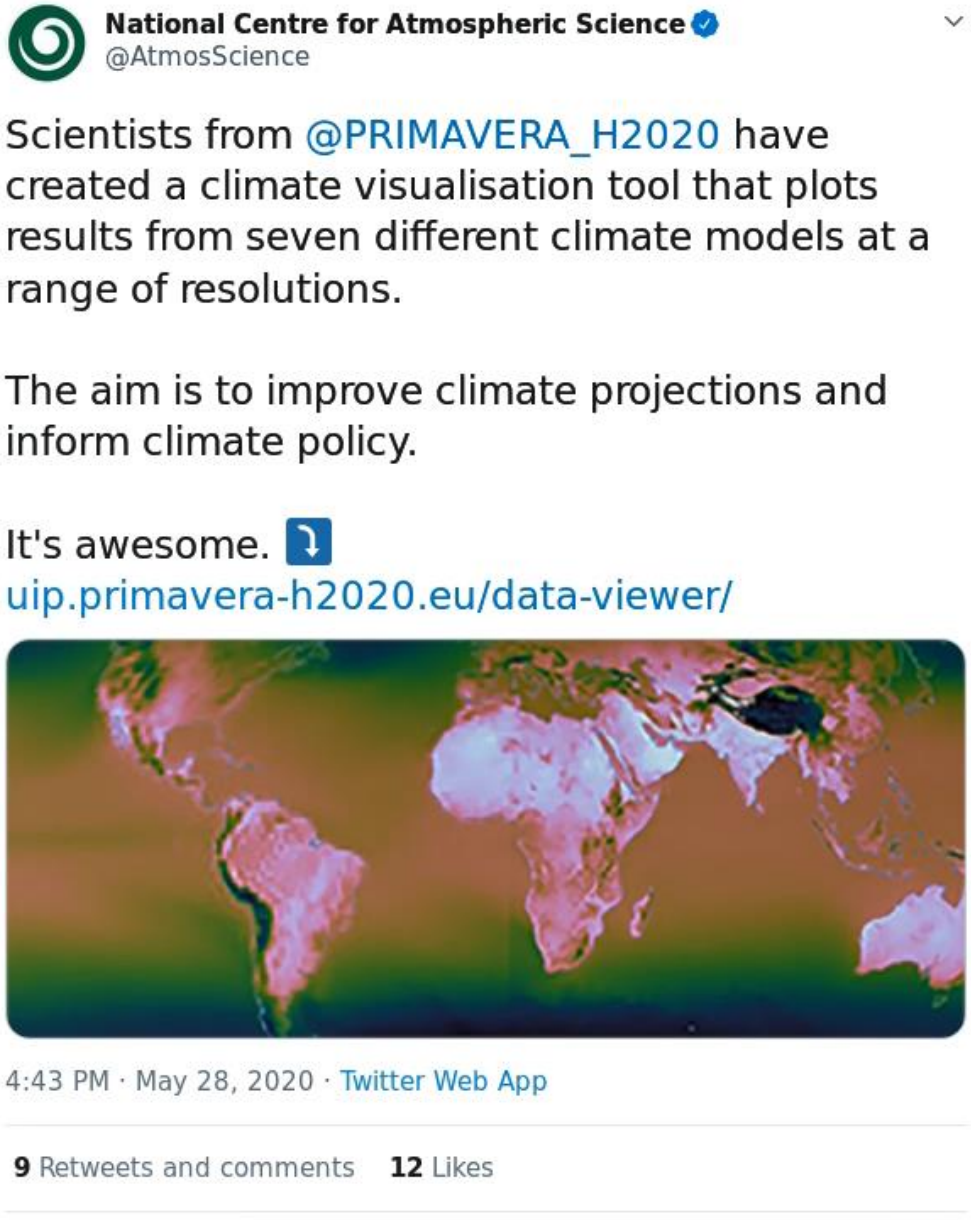

Figure 9: example of positive Twitter feedback for the Data Viewer

5 Lessons Learnt

Use of manageable and meaningful KPIs: KPI no. 2 was not easy to track, and had to be estimated. Similarly, KPI nos. 3, 5 and 9 were of the form “number of X per Y”, which was not necessarily a meaningful metric. A better metric might have simply been to compute the “total number of X across the project”, e.g. “total number of survey participants” rather than “participants per survey”.

Target values for KPIs: KPIs are usually used to monitor progress against specified targets. Although we developed many KPIs, we did not set ourselves target values for any, perhaps because, at the beginning of the project, it was not clear in all cases what would be reasonable targets to set. Nonetheless, it would have been possible to set targets for some, based on reasonable assumptions. For instance, for KPI nos. 16, 17 and 18, a target could have been set based on the number of WP10/11 members, expectations around how many conferences each WP member might attend across the project, and the likely split between oral and poster presentations.

Effective record-keeping: We needed to keep a well-organised and regularly updated project ‘diary’ in order to track all relevant events, on the one hand, and all the user-oriented activities that we have conducted, on the other. This also demanded coordination between all these activities and project scientists, e.g., coordinating project scientists who participate at certain events to maximise PRIMAVERA visibility and the contact with users. The careful monitoring of (for example) conference presentations throughout the project made it easier to compile this deliverable.

Management of Twitter account: The WP11 co-leads are relatively inexperienced Twitter users; it is likely that engagement would have been enhanced by having the Twitter account managed by a more experienced social media user, better-versed in maximising the reach of the account. Similarly, effective engagement on Twitter is very time-consuming, and it could have been better to have this engagement task allocated to a project team member, rather than WP co-leads.

6 Links Built

As presented in this deliverable, we built links with the broader stakeholder community and, particularly strong links, with a few champion users from the targeted sectors. We also built links with other projects, while PRIMAVERA inspired a few new initiatives.

The KPI listed in this deliverable relate to work developed throughout the project. One good example are case studies developed in collaboration between WP10 & WP11 and all other WPs and presented in D10.4. Generally, the links between WP10 and WP11 members were strong during the lifetime of the project. This strong collaboration between communication and user engagement experts and impact researchers facilitated access to and collaboration with broader stakeholder community and strong project visibility.

Annex 1

Table 1 Conferences and events attended by WP10/11 team

Conference	Date/Location	Who Attended from WP10/11	Reasons for attending	How was PRIMAVERA presented/ Comments
HC3S ECEM/Clim4Energy Symposium	22-23/02/2017 Barcelona, Spain	Dragana	Informal presentation of PRIMAVERA, improving the project visibility	Preliminary flyer was shared. Informal discussions about PRIMAVERA. Emma Suckling mentioned PRIMAVERA in her presentation
C3S General Assembly	6-9/03/2017 Toulouse, France	Dragana, Daniel	Informal presentation of PRIMAVERA, improving the project visibility	Flyer was shared. Informal discussions about PRIMAVERA. David Hein mentioned PRIMAVERA in his presentation
PIANC - Navigating a changing climate conference	27-28/03/2017 Brussels, Belgium	Erika	Invited by PIANC contact to attend and present	Presentation: 'Introducing the PRIMAVERA project'
Climateurope Festival	5-7/04/2017 Valencia, Spain	Janette, Dragana	Informal presentation of PRIMAVERA, improving the project visibility	Informal discussions about PRIMAVERA
Openmod Workshop	19-21/04/2017 Frankfurt, Germany	Paula	To engage with energy system modellers	Presented a 5min short talk on the work of the Energy Meteorology group at the U. of Reading and mentioned PRIMAVERA
EGU General Assembly	23–28/04/2017 Vienna, Austria	Eveline	Attend Session HS2.1.1: 'Hydrological extremes: from droughts to floods'	Poster 'Extreme future central European droughts in a high-resolution global climate model'
ECCA2017	5-8/06/2017 Glasgow, UK	Dragana, Erika, Eveline	Poster presentation and improving the project visibility	Poster: 'Co-designing the next generation of climate models for a better informed society'
C3S EQC workshop	12-14/06/2017 Barcelona, Spain	Dragana	Participated in the User requirements parallel session	Shared experience from PRIMAVERA
6th European windstorms workshop	21-23/06/2017 Reading, UK	Julia	To give a talk and connect with insurance companies	Talk 'Assessment of windstorm risk for the insurance industry as part of the PRIMAVERA project'. Lots of interest from (re)insurance companies after talk. Quite a few people volunteered to be interviewed.
RMetS Annual Conference 2017	13-14/07/2017 Exeter, UK	Julia	To present a poster	Poster 'Introducing the PRIMAVERA project'
EMS/ECAC 2017	4-8/09/2017 Dublin, Ireland	Erika, Galia, Eveline, Gerard	To provide two presentations	Presentations: Gerard: 'Extreme future central European summer droughts in a high-resolution global climate model' and Erika: 'User co-design of state-of-the-art

				climate model simulations: Towards a better-informed society'
EGU2018	8-13/04/2018 Vienna, Austria	Dragana, Janette, Bernd, Helen, Paula, David & Eveline	To participate in Climate and risk session, present posters, present at Pico session, organize a splinter session	Splinter session: 'The PRIMAVERA project: Does high resolution climate modelling matter to you?' PICO session: 'User engagement in H2020 project PRIMAVERA: progress and challenges' Posters: 'Exploring the added value of sub-6-hourly wind data from GCMs for energy applications', Paula Gonzalez and David Brayshaw; 'Influence of changes in large-scale circulation on surface wind projections for wind power over Europe' Paula Gonzalez, David Brayshaw, and Giuseppe Zappa; 'Use of high-resolution GCM simulations for hydrological and hydropower impact research in the Upper Danube basin', Philipp Stanzel, Paula LM Gonzalez, Harald Kling, and David J Brayshaw
GEWEX Science Conference	6-11/05/2018 Canmore, Alberta	Eveline	To present a poster	Poster 'Extreme future central European droughts in a high-resolution global climate model'
5th International Conference Energy & Meteorology (ICEM)	22-24/05/2018 Shanghai, China	David	To present 2 posters	Posters: 'Exploring the added value of sub-6-hourly wind data from GCMs for energy applications' and 'Influence of changes in large-scale circulation on surface wind projections for wind power over Europe'
Adaptation Futures 2018	18-21/06/2018 Cape Town, South Africa	Dragana	Informal presentation of PRIMAVERA, improving the project visibility	Presented PRIMAVERA factsheets at the EC booth
EMS 2018	3-7/09/2018 Budapest, Hungary	Paula, Janette	To present 2 poster and give a talk	Posters: 'Exploring the added value of sub-6-hourly wind data from GCMs for energy applications', Paula LM Gonzalez and David J Brayshaw; 'Influence of changes in large-scale circulation on surface wind projections for wind power over Europe', Paula LM Gonzalez, David J Brayshaw, and Giuseppe Zappa; Paula's talk: 'The representation of persistent low wind events over the UK and their forcing mechanisms by high-resolution GCMs'
Water science for impact international conference	16-18/10/2018 Wageningen, Netherlands	Eveline	To present a poster	Poster 'Extreme future central European droughts in a high-resolution global climate model'

Climateurope festival	17-19/10/2018 Belgrade, Serbia	Janette, Dragana	To participate in the market place and present PRIMAVERA	Market Place and presentation in the breakout session Poster : 'Co-designing the next generation of climate models for a better informed society'
AMS2019	6-10/01/2019 Phoenix, USA	Galia	Presenting PRIMAVERA user-relevant science highlights	Oral presentation: 'Extreme events of the middle latitudes'
ECCA2019	28-31/05/2019 Lisbon, Portugal	Dragana, Erika	To provide 2 oral presentations	Dragana's presentation: 'A three-step participatory approach to climate services coproduction' Erika's presentation: 'Are there benefits for stakeholders from representation of North Atlantic extratropical cyclones using the PRIMAVERA project high-resolution global climate models?'
ICEM2019	25-27/06/2019 Copenhagen, Denmark	David's postdoc Hannah Bloomfield	To present a poster	Poster: 'Understanding the impact of meteorological variability on the European power system'
SIG (Energy Systems Integration Group) workshop on Meteorology and Market Design for Grid Services	4-6/06/2019	David's postdoc Hannah Bloomfield	PRIMAVERA project and science included in talk on weather risk for electricity systems	Talk: 'Forecasting Power System Relevant Weather Events'
EMS2019	9-13/09/2019 Copenhagen, Denmark	Julia, Gerard	To provide 2 posters and 1 oral presentation	Julia's talk: 'Engagement with the finance and insurance industry for the PRIMAVERA project: Analysis of European wind storms for catastrophe modelling' Gerard's posters: 'Primavera: how can NMHSs profit from high-resolution climate modeling?' and 'Comparing the new homogenized E-OBS for temperature with high resolution PRIMAVERA climate simulations'
ETC 2019	9-11/10/2019 Dublin, Ireland	Galia, Erika	To give a small workshop about user needs from climate models for the transport sector and an oral presentation	Oral presentation: 'Understanding transport sector needs for climate information, via the PRIMAVERA project'
European storms workshop 2019	28-30/10/2019 Birmingham, UK	Julia	To give a presentation and establish contacts with insurance companies	Talk: 'Using PRIMAVERA models to create a European windstorm event set' Initiated collaboration with Aon (champion user), and lead to several phone calls with other (re)insurance companies (MS Amlin, Partner Re)

Risk Day 2020	4/03/2020 Glasgow, UK	Paula	To present a poster	Poster: 'Modelling and quantifying climate risk in power system operation and planning'
Earth System PhD Conference	13-15/03/2019 Jena, Germany	Linda van Garderen (student of Eveline & Gerard)	To present a poster	Poster: 'Storms of the Future: Untangling the known unknown in climate change attribution using high resolution modelling'
EGU2020	4-8/05/2020 Online	Julia, Paula, David, Reinhard Schiemann	To give presentations	Julia's presentation: 'Using PRIMAVERA high-resolution global climate models for European windstorm risk assessment in present and future climates for the (re)insurance industry' David and Paula's presentation: 'Impact of blocking on low wind events and its representation by high-resolution GCMs: An energy perspective'
Climateurope festival	Scheduled for June 2020, but will be delivered as a series of online sessions over a few months	Janette	To give a session with presentation and discussion	Session on the drought of 1921 and how historical information can be used for research and decision-making
Workshop on the Next Generation Challenges in Energy-Climate Modelling	22-23/06/2020 Online	Paula, David	To organize and coordinate the workshop and give a keynote talk	Paula's keynote talk: 'Perspectives on the use of future climate data'

Annex 2

Table 2: List of joint actions with EU and other international projects

Project Name	Type	Objectives/ targeted sectors	Mechanism of PRIMAVERA's engagement with this project	How was the interaction achieved / Comments
APPLICATE	H2020	Arctic stakeholders + other sectors in Europe that can be affected by changes in the Arctic	BSC's KTT co-coordinates User engagement and dissemination WP	Discussed about available data and need for high resolution PRIMAVERA data for the APPLICATE user group. Shared experience and knowledge from user engagement activities, as well as communication and dissemination materials.
Climateurope	H2020	Network of climate services users and providers	KNMI and BSC participate in Climateurope	Distributed PRIMAVERA materials at two Climateurope festivals. Presented PRIMAVERA at the Climateurope festival's market place in 2018. PRIMAVERA participated at Climateurope webinars. The cross-promotion of webinars via the two projects' Twitter accounts. KNMI will present the PRIMAVERA drought storyline on the third (virtual) Climateurope festival in September 2020.
CRESCENDO	H2020	Europe's coordinated contribution to CIMP6	UKMO is involved	Meeting between two projects on 6th February 2017 where we discussed our approaches to and experience from user engagement.
EUCP	H2020	Provision of seamless climate information from seasonal forecast to climate projection. Case studies for water, energy and agriculture.	BSC participate in user engagement activities.	Shared knowledge from user engagement activities in PRIMAVERA and what we learnt about the energy and water sectors. Promoted PRIMAVERA dissemination materials, the UIP and the DV to EUCP partners. The cross-promotion of webinars, meetings and publications via the two projects' Twitter accounts
S2S4E	H2020	Climate forecast for energy	BSC coordinates S2S4E, U Reading leads WP	Interacted with energy users, members of the S2S2E consortium to better understand theirs needs and decision-making contexts. Promoted PRIMAVERA UIP and DV to S2S4E technical partners form the energy

				sector. The cross-promotion of webinars, meetings and publications via the two projects' Twitter accounts
MED-GOLD	H2020	Climate services for agriculture	BSC participates	Exchanges knowledge gained from the agricultural community. Promoted PRIMAVERA dissemination materials, the UIP and the DV at MED-GOLD events.
C3S_512	C3S	Quality Assurance for the C3S Climate Data Store	BSC coordinates C3S_512	Shared experience from user engagement activities in PRIMAVERA. Discussed about the high resolution climate data with the C3S_512 user group.
WISC	C3S	Insurance	UKMO participates	Meeting with some WISC project members about PoC stage of project and feedback they recieved from insurance industry - this informed method for PRIMAVERA windstorm event set; Spoke to WISC operational team member at conferences to ensure no duplication of work, etc.
MAGIC	C3S	Insurance, energy, water management, coastal areas	BSC (Dragana) coordinates user consultation WP	Access and contribution to C3S User requirements database was informative for PRIMAVERA early explorations about user needs
IS-ENES2 – Clim4impact portal		Impact portals	KNMI participates	KNMI colleagues organized short trainings and webinars explaining how people to get access to climate model data, including the PRIMAVERA high resolution runs