

A photograph showing the back of a large audience seated in a conference hall, facing a stage where a presentation is taking place. The audience is diverse in age and appearance. The stage is brightly lit, and a speaker is visible in the distance.

Deliverable Report

First Stakeholder Engagement and Dissemination Report

The Added Value of Seasonal Climate Forecasts for Integrated Risk Management Decisions (SECLI-FIRM)

EU H2020 Project (ref. n. 776868)

D5.6: First Stakeholder Engagement and Dissemination Report

[Dissemination level: Public]

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Contributors (Consortium Party/Person)

UEA	A Troccoli, L Penny, C Goodess
ENEL	
ENEA	
Met Office	
UL	
KNMI	G Geertsema
WEMC	L Cotterill, E Bertocco
Eurac	
Alperia	

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1 Executive summary

This report (Deliverable 5.6) summarises the stakeholder engagement and dissemination activities for the EU H2020 project, *The Added Value of Seasonal Climate Forecasts for Integrated Risk Management Decisions* (SECLI-FIRM, running from February 2018 to July 2021). The report covers activity over the first 14 months of the project. The tasks included in this were originally set out in the Communications and Dissemination Plan (D5.3).

The SECLI-FIRM project has a broad range of stakeholders drawn from sectors including academia, research, industry (energy and water sectors) and government. Engagement and dissemination activities have to meet the needs of all of these groups. In order to achieve this, the SECLI-FIRM project team has set up a number of channels to communicate and disseminate information in the most effective, informative way for the different stakeholder groups. These include social media, website, video, conferences, workshops, emails and newsletters. In turn, this will maximise the opportunity to increase engagement and participation in the project.

While considering each channel in its own right, this report pays particular focus to the stakeholder workshops, which are seen as a key medium for stakeholder engagement, allowing maximum interaction and input from participants. So far, Workshops 1 and 2 of the five planned stakeholder workshops have been held. The content and outcomes of each of these events are detailed in this report, including summaries of the interactive working group activities (see [Appendices 1](#) and [3](#)) that formed a major element of the workshop, providing valuable learning that will be used as the project progresses. [Appendices 2](#) and [4](#) include a summary of feedback collected from the attendees for each workshop.

The remainder of the report looks at the development of the SECLI-FIRM website, the case study flyers which introduce and summarise each of the nine SECLI-FIRM case studies and the explainer video, produced to give an introduction and overview of the project. The report also mentions additional communication channels, and how each are used to share project information with the target audiences.

1.1 Project Objectives

The aim of SECLI-FIRM is to demonstrate how the use of improved climate forecasts, out to several months ahead, can add practical and economic value to decision-making processes and outcomes, primarily in the energy sector, but also in the water sector. This will be shown through nine case studies for Europe and South America (especially Colombia), focusing on recent seasons with anomalous/extreme climate conditions leading to problematic and quantifiable impacts for the energy and/or water industry. The case studies have been co-designed by industrial and research partners. Further information is available on the project website: www.secli-firm.eu

2 Stakeholder engagement and dissemination

Stakeholder engagement, communication and dissemination activity for the SECLI-FIRM project is covered under Work Package (WP) 5, specifically:

Task 5.2 – Plan and execute focused stakeholder roundtables and workshops, and organise other interactions with experts.

Task 5.3 – Dissemination, Exploitation, Web portal and communication material.

Task 5.4 – Co-ordination and synergies with other relevant EU projects and other initiatives.

This activity directly relates to, and is guided by, the detailed and structured Communication and Dissemination Plan (D5.3) which sets out how the objectives of the SECLI-FIRM project will be communicated to the target audiences. The plan defines the key messages and communications channels to be used for each target audience and how the success of these will be evaluated.

2.1 Communication plan objectives

The objectives of the communication plan are to:

- raise the profile of the project among end-users;
- raise the profile of the project among the climate modelling and climate service communities;
- offer end-users opportunities to influence project direction and to potentially contribute to its outputs;
- produce relevant, user-driven and scientifically robust, end-to-end proof-of-concept for end-users.

2.2 Target audiences

Stakeholder analysis has been carried out to identify the project's target audiences, to ensure communications and dissemination activity is tailored to:

- deliver the project's communication aims;
- meet the needs of each specific group, making project information meaningful and usable.

The stakeholder engagement matrix in [Table 1](#) shows these key audiences.

Table 1: Stakeholder engagement matrix participants

Stakeholder	Example of stakeholder	Communication aim	Communication channel
Energy producing companies, TSOs, Energy Market Operators	<p>Transmission System Operators (TSOs) and Distribution System Operators (DSOs):</p> <p>Alstom, Statkraft, Eon, Enel</p> <p>Energy producing companies:</p> <p>RTE, ERDF, Amprion, including ENTSO-E the European group of TSOs</p>	<ul style="list-style-type: none"> • Ensure tools developed are directly relevant • Share experience • Motivate early adopters 	<ul style="list-style-type: none"> • Website (content to include best practices, lessons learned, projects news and updates) • Case studies • Specialist workshops and training sessions • Webinar platforms, e.g. Webex • Presentations • Focus groups and questionnaires • Social media platforms (initially LinkedIn and Twitter) • Meetings and 1:1 communication, e.g. email, phone • Industry events
National, regional and international organisations	<p><u>National and Regional</u></p> <p>Agence De l'Environnement et de la Maitrise de l'Energie (ADEME), DGEnergy, DGClimate, European Environment Agency (EEA)</p> <p><u>International</u></p> <p>International Energy Agency (IEA), World Business Council for Sustainable Development (WBCSD), Global Framework for Climate Services (GFCS)</p>	<ul style="list-style-type: none"> • Share experiences • To promote project results as potential guidance to policy making 	<p>As above, plus:</p> <ul style="list-style-type: none"> • Scientific publications

Climate modelling research community	World Climate Research Programme (WCRP), seasonal forecasting producing centres	<ul style="list-style-type: none"> • Raise awareness of the SECLI-FIRM project. • Provide feedback on system performance including identification of issues where further model/system development is needed. 	<ul style="list-style-type: none"> • Scientific publications and presentations • Conference presentations (e.g. International Conference on Climate Services, EGU, EMS/ECAC)
Climate and energy service providers	Transvalor, MeteoGroup, Climate Service Center Germany (GERICS), Ouranos.	<ul style="list-style-type: none"> • Raise awareness and mobilise sector interest in complete solutions and demonstrations of the value of seasonal forecasts 	<ul style="list-style-type: none"> • Website • Scientific publications • Research output • information on the technology used and their application • Industry articles • Focus groups and questionnaires
Specialist media, wider media and general public	Horizon magazine, JRC SETIS, etc.	<ul style="list-style-type: none"> • Raise awareness of the SECLI-FIRM project • Share research findings and outputs. • Create greater understanding of the wider issues around seasonal forecasting and the benefits to the energy and water sectors 	<ul style="list-style-type: none"> • Scientific and energy industry publications • Website • Social media • Newsletters • Industry events

2.3 Dissemination objectives

As set out in the Communication and Dissemination Plan (D5.3) the overall dissemination objectives for the SECLI-FIRM project are to:

- Share research results with end-users.
- Instigate and maintain relationships between the climate and energy/water sectors.
- Contribute to the progress of seasonal forecasting sciences in general.
- Contribute to the progress of climate services, particularly through methodologies for assessing the added value of these services.
- Ensure that the project objectives, activities and outcomes reach the relevant target groups, especially end-users, in and beyond the demonstration site countries.
- Ensure transparency and visibility of the project activities to acquire the needed support from crucial stakeholders.

As results are not yet available at this stage of the project, in this first year of the project, activity has focused on instigating and maintaining relationships, ensuring that project objectives and activities reach the relevant target groups and ensuring transparency and visibility of activities to acquire stakeholder support.

2.4 Stakeholder engagement workshops

The stakeholder engagement workshops form a key communication and dissemination channel for SECLI-FIRM. Throughout the duration of the project a total of five workshops will be delivered, targeting relevant stakeholders from the energy and water sectors. Towards the end of the project stakeholders from the agriculture sector may also be involved, so as to explore possible transferrable lessons learnt during the implementation of the nine SECLI-FIRM case studies.

The workshops are seen as an evolving series of events representing the different stages and progression of the project. This means the focus of each workshop and the specific target audience will be different for each event, as defined in the strategic communication and dissemination plan. As the project progresses, the target audience ratio adjusts in favour of the energy and water industries for workshops four and five.

Workshops will take place approximately every eight months. To date (end of March 2019), two stakeholder engagement workshops have been held. The process involved in organising these, plus the content and outputs from each of the events are documented in this report.

A Workshop Organising Committee was set up for each event, to enable the project team to contribute fully to the organisation and agree which aspects of the project would be covered in each workshop. Meetings were held on a three-weekly basis and covered objectives, overarching theme and specific content, speakers, activities and logistics.

The stakeholder workshops were widely advertised to the target audience, including the scientific community, energy and water industry professionals and SECLI-FIRM Advisory Board members.

Communications were tailored to each group and disseminated through specific channels selected to ensure maximum reach (for example, targeted emails for Advisory Board members, posts on climate and energy sector forums for the scientific community).

All communications were SECLI-FIRM branded, in line with the project brand guidelines and designed for multi-channel distribution. Details of the project and workshops were also communicated through the World Energy & Meteorology Council's communications platforms. Channels used for dissemination included emails; social media using the hashtag #seclifirm; website content; climate and energy sector forum posts; the WEMC newsletter; industry and networking events.

3 Workshop 1

The first SECLI-FIRM stakeholder workshop (Milestone MS5.2 of the project's stakeholder engagement commitment) was arranged in accordance with Task 5.2 of WP 5.

Since the workshop was held shortly after the start of the project, the core theme was the overview, objectives and plan of the SECLI-FIRM project. The workshop was held at the WindEurope head office on Rue d'Arlon in Brussels (Belgium) on 7 June 2018, to coincide with EUSEW's Sustainable Energy Week which took place in Brussels from 4 to 8 June 2018.

As part of Sustainable Energy Week, the project lead, Alberto Troccoli, gave also a presentation on SECLI-FIRM at a conference held in the EUSEW Networking Village at Residence Palace on 6 June, the day before the stakeholder workshop. The event was designed to offer a venue for the EUSEW community, participants and stakeholders to foster new connections, exchange ideas and lay foundations for future cooperation.

3.1 Objectives

Given the relatively early stage of the project, the first workshop was held in association with an existing sectoral event and was fairly brief (a single morning). The number of attendees was deliberately planned to be fairly small with the focus on industrial partners and others who were likely to have a more direct interest in the case studies. In keeping with these considerations, the objectives of the stakeholder workshop, as agreed by the Organising Committee, were to:

- Show what the project is going to do and provide interaction points for others.
- Scene setting. Outline the challenges the project is trying to meet.
- Identify how stakeholders want to be involved on a continuing basis.
- Collate stakeholders' thoughts on how seasonal weather forecast could be used and in which format they are envisaging this (platform, data, service, software...).

The workshop brought together key stakeholders to discuss the following questions:

- What are seasonal climate forecasts and how could your organisation benefit from using them?
- Can seasonal climate predictions help the energy and water sectors improve management decisions and resilience to extreme climate events?
- How can you influence the project direction and contribute to its outputs?
- How can your organisation remain involved and be the first to hear about the findings of this project?

3.2 Communications

Examples of the communications produced for workshop 1 are shown below:



Figure 1 – Examples of communication material for Workshop 1.

3.3 Attendance

The workshop was targeted at key stakeholders, including the SECLI-FIRM Advisory Board, project team members from each of the partner organisations, and representatives from the water, energy operating systems and energy sector. For the first workshop, 28 delegates attended in total, five of whom were SECLI-FIRM Advisory Board members.



Figure 2 – Group photo of Workshop 1 participants.

3.4 Programme

The stakeholder workshop was held over the course of one morning from 9.00am to approximately 12.00pm. The workshop was structured to highlight some of the latest science of seasonal forecasting for energy and the potential added value of seasonal climate forecasting for industry.

The programme featured invited speakers from the scientific community and the energy sector, followed by 'roundtable' discussion sessions allowing delegates to explore cross-cutting themes relating to the nine project case studies. The full programme is shown below.

Time	Title	Speaker
9:00-9:20	Welcome and Project Overview	Prof. Alberto Troccoli (University of East Anglia, UK)
9:20-9:40	The Latest Science of Seasonal Climate Forecasting	Dr Emily Wallace (Met Office, UK)
9:40-10:00	Added Value of Seasonal Climate Forecasting for Industry	Mr Jan Vorrink (TenneT, NL)
10:00-11:45	Roundtable Discussion around the SECLI-FIRM Case Studies Themes	
11:45-12:00	Next Steps and Wrap up	Prof. Alberto Troccoli

3.5 Speaker presentations

The speaker presentations are summarised below, along with links to each presentation.

[Welcome and project overview – Alberto Troccoli \(UEA\)](#)

Project leader, Alberto Troccoli, welcomed attendees and provided a short overview of the SECLI-FIRM project.

[The Latest Science of Seasonal Climate Forecasting – Emily Wallace \(Met Office\)](#)

Emily Wallace from the Met Office (UK) then spoke about advances in seasonal forecasting; how it works compared to short-term forecasting; skill and value assessment; tailoring meteorological information for specific industries and how the SECLI-FIRM project will use the latest science to optimise climate forecasting.

[Added Value of Seasonal Climate Forecasting for Industry – Jan Vorrink \(TenneT\)](#)

Jan Vorrink from the electricity transmission system operator, TenneT (NL), discussed seasonal forecasting from an industry perspective, focusing on the changing market, key tasks for the end user and using forecasting to help secure electricity supply.

3.6 Roundtable discussion around the SECLI-FIRM case studies themes

Following the presentations, the delegates split into groups for the roundtable discussion session, led by Clare Goodess and Steve Dorling from UEA.

The aims of this session were to achieve:

- Better working knowledge of participants, their networks, and their thoughts on what they view as the added value of seasonal climate forecasts.
- Greater refinement of case studies and end user input.
- Wider applications of seasonal climate forecasting beyond those in the case studies, for example for the agriculture sector.

Each group focused on one of three key themes and were led by facilitators from the project, as follows:

1. Water/Marine – Katie Chowienczyk (Met Office UK) and Gertie Geertsema (KNMI).
2. Energy Management and Energy End Users – Marco Formenton (ENEL).
3. System balancing – Jeremy Caplin (Elexon and SECLI-FIRM Advisory Board member).

The groups looked at an overview of the relevant SECLI-FIRM case study/studies and discussed the following questions:

1. Are the SECLI-FIRM case-studies focused on the most relevant seasonal forecast information and sectoral challenges and opportunities?
2. What is missing from the case studies?

3. Can you identify additional applications where seasonal forecasts may be of added value?
4. How would you like to be involved in SECLI-FIRM over the next four years?
5. What current use are you making of weather and climate information in your decision making?
6. To date, what has prevented you from using long-range forecast information (or climate information) to a greater extent within your organisation?

3.7 Plenary report backs and discussion

The key discussion points from each group were reported back to the wider attendees in plenary. All of the groups discussed the same questions as detailed above, and the outputs for each group were aligned. The output from Group 3 is shown as an example of the discussions held and is included in [Appendix 1](#).

3.8 Project illustration

To help engage the audience and to provide a talking point during the workshop, a professional illustrator was engaged to capture live the essence of the project. A full project illustration was produced, elements of which have since been used by the project team for presentations and promotional purposes (e.g., to form the What, How and Why elements of a project flyer and poster). The full illustration is shown below.

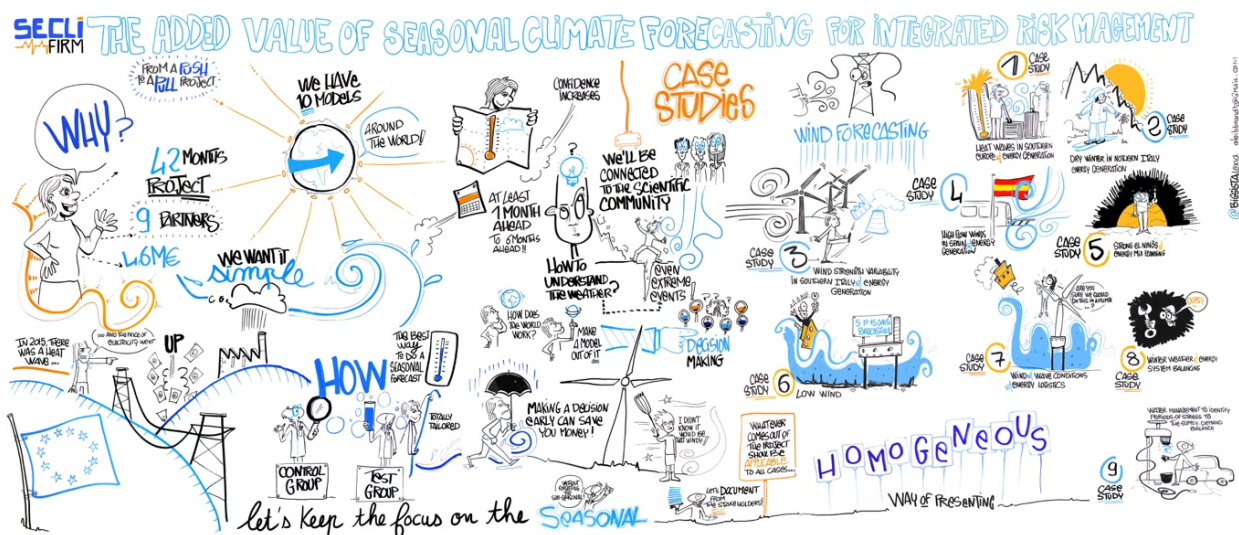


Figure 3 – Cartoon by professional illustrator (Ms Alexia Leibbrandt) capturing the Workshop discussion.

3.9 Feedback

Following workshop 1, a short feedback survey was sent out to all participants asking for their thoughts on the event. A summary of the feedback is provided in [Appendix 2](#).

3.10 Outcomes

The first SECLI-FIRM stakeholder workshop achieved its overarching objective of bringing together key stakeholders, to introduce the project and discuss the challenges ahead.

The roundtable discussions offered an opportunity for understanding stakeholders' views on the added value of seasonal forecasting in relation to specific case studies and potential wider application, and how the project's industry partners (as end users) could provide input to the case studies.

The discussions explored how stakeholders were currently using weather and climate information in their decision making and what would prevent them from using seasonal forecasting more widely. This gave the team valuable insight into potential obstacles that would discourage organisations from using seasonal forecasting going forward.

The workshop also explored how stakeholders wanted to be involved in the project overall, giving the team a good foundation upon which to build stakeholder engagement activity for the project going forward.

4 Workshop 2

The second stakeholder workshop was held at the Hotel Palazzo delle Stelline, a hotel and conference centre located in central Milan, Italy, on Thursday 17 January 2019. The theme of the workshop was '*Seasonal Climate Forecasts: Latest advances in their skill and value assessment*', which explored the ways seasonal climate forecast models can be combined to increase their value.

The workshop was structured to provide maximum opportunity for interaction and knowledge sharing across the scientific community and industry stakeholders, through a combination of project and external speaker presentations, plenary discussions, and interactive group activities.

4.1 Objectives

The workshop was planned for about three months after the start of WP2 Optimisation of climate prediction performance, and following preliminary work on Task 1.4 Review of methods for economic assessment of seasonal forecast value. Thus, it was agreed that the workshop should focus on these two aspects of work: multi-model combination and skill assessment in seasonal climate forecasting, and the assessment of the added value of seasonal forecasting for decision making. The specific objectives of the second stakeholder workshop agreed by the organising committee were:

- To introduce the nine case studies for Europe and South America, and demonstrate the collaboration between the project and its industry partners.

- To communicate the benefits of long-term seasonal forecasting for the energy and water industries.
- To understand the value of multi model combination and skill assessment in seasonal climate forecasting.
- To clarify the operational processes of our industry partners and how seasonal forecasting may be applied at an operational level.
- To strengthen relationships between research and industry partners, and increase understanding of the needs of end-users.
- To raise awareness of the project for external stakeholders within the climate and energy/water industries.

4.2 Communication

For workshop 2, the target audience included the seasonal forecasting scientific community; water and energy industry professionals; SECLI-FIRM Advisory Board members; industry partners and project team members. Examples of the communications produced for workshop 2 are shown below:



Figure 4 – Examples of communication material for Workshop 2.

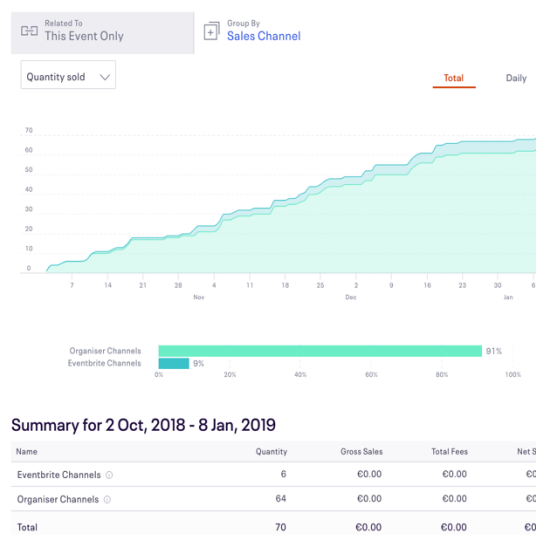
Registrations were managed via the online event management platform, EventBrite. Although communications were targeted to specific channels, the workshop was advertised as a free to attend, public event to encourage maximum interest. The organisers recognised that this would result in a number of registrations from non-attendees, however, this was anticipated and not considered an issue due to the limited number of places available.

Over 90 bookings were received in all – these were then filtered down by approximately a third through an email confirmation process, to reach the final attendee list. As interest in the SECLI-FIRM project grows, the team will review this strategy for future workshops.

The campaign was successful in attracting interest and registrations, particularly from the project's communications channels, and Workshop 2 was fully booked.

Statistics from EventBrite showed:

- The event was completely 'sold out'
- Over 90 bookings received in all
- 660 event page views.
- 91% of those booking came via the project's own communications channels – website, email links, social media.
- 9% came via Eventbrite directly.



4.3 Attendance

The second stakeholder workshop was attended in person by 52 people representing project team members from all nine SECLI-FIRM partners, Advisory Board members and external stakeholders from similar funded projects, other key climate/energy organisations and interested parties from the climate and energy sectors.

4.4 Programme

The second stakeholder workshop was a full day event split into morning and afternoon sessions. The workshop started at 9:00am and ended at approximately 16:30. The full programme for the day is shown below.

PROGRAMME

09:00-09:20	Introduction and SECLI-FIRM project overview	Prof. A. Troccoli (UEA)
09:20-09:30	SECLI-FIRM case study presentations	
Speaker presentations chaired by Dr. G. Geertsema (KNMI)		
09:30-09:45	Forecasting electricity demand in the short-term and prospective extension at seasonal scale	Mr. S. Sperati (RSE)
09:45-10:15	Seasonal climate forecasting for the energy and water industries in SECLI-FIRM	Dr. A. Alessandri (KNMI)
10:15-10:45	Seasonal climate forecast multi model combination and skill assessment	Prof. F. Doblas-Reyes (BSC)
10:45-10:55	Introduction to working groups	Dr. C. Goodess (UEA)
10:55-11:25	Coffee break	
11:25-12:45	Working groups: Seasonal climate forecast multi model combination and skill assessment	
12:45-13:00	Plenary report: Seasonal climate forecast multi model combination and skill assessment	Chair: Prof. R. Buizza (Scuola Sant'Anna)
13:00-14:10	Lunch	
The value of seasonal climate forecasts (inc. SECLI-FIRM case studies)		
14:10-14:50	Insights and experience from CLARA project	Dr. J. Mysiak (CMCC)
14:50-15:50	Interactive group exercise	Chair: Prof. S Dorling (UEA)
15:50-16:10	Coffee break	
16:10-16:40	Panel discussion	Chair: Prof. A. Troccoli (UEA)
16:40-17:00	Summary and how you can contribute to SECLI-FIRM	Prof. A. Troccoli (UEA)

The first half of the programme introduced the project and the nine case studies, followed by speaker presentations focusing on key aspects of seasonal climate forecasting, from a research and industry perspective. The sessions are summarised below, along with links to each presentation.

4.5 Introduction and SECLI-FIRM Project Overview

[The Added Value of Seasonal Climate Forecasting for Integrated Risk Assessment - Alberto Troccoli \(UEA\)](#)

Project leader, Alberto Troccoli, welcomed attendees to the workshop and provided a short overview of the SECLI-FIRM project. The presentation covered:

- **Why** this EU H2020 Research & Innovation Project – The Added Value of Seasonal Climate Forecasts for Integrated Risk Management Decisions (SECLI-FIRM)? This considered how climatic factors play an increasing key role in energy and water industry portfolio management due to changes in both the climate and industry. An example is the extreme heat wave in Southern Europe and the corresponding impact on power demand and prices.
- **How** SECLI-FIRM will assess the value of seasonal climate forecasts? This focused on the skill of seasonal forecasting and how seasonal climate forecast science can be advanced using multi-model combinations.
- **What** will SECLI-FIRM produce? This introduced the nine project case studies designed with key industry partners.

4.6 SECLI-FIRM Case Studies

[SECLI-FIRM Case Study Presentations – SECLI-FIRM Project Team](#)

This was followed by brief one-minute presentations of each of the nine SECLI-FIRM case studies by members of the project team, including Marco Formenton (ENEL – Case Studies 1, 2, 3, 4 and 5), Gertie Geertsema (KNMI – Case Study 6), Katie Chowienczyk (Met Office – Case Studies 7 and 9) and Jon Upton (Shell – Case Study 8).

4.7 Speaker presentations

The next section of the programme, chaired by Gertie Geertsema, consisted of a series of speaker presentations on:

[Forecasting electricity demand in the short-term and prospective extension at seasonal scale – Simone Sperati \(RSE\)](#)

External speaker, Simone Sperati of RSE, gave a presentation from the industry perspective, looking at the use of short-term forecasting for predicting electricity demand and the perceived benefits that extending this to the seasonal forecasting scale could bring.

[Seasonal climate forecasting for the energy and water industries in SECLI-FIRM – Andrea Alessandri \(KNMI\)](#)

SECLI-FIRM WP 2 leader, Andrea Alessandri, gave a presentation focusing on the probabilistic nature of seasonal predictions; the use of grand multi-model ensemble seasonal forecasts in SECLI-FIRM and optimisation of seasonal climate prediction.

[Seasonal climate forecast multi-model combination and skill assessment – Francisco Doblas-Reyes \(BSC\)](#)

This presentation by Francisco Doblas-Reyes of BSC focused on seasonal climate prediction and the use of multi-model combination in assessing forecast quality for the renewable energy sector.

4.8 Working groups: Seasonal climate forecast and multi-model combination skill assessment

Following the presentations, Clare Goodess (UEA) summarised the aims and logistics for the working groups on multi-model combination and skill assessment.

Facilitators and a seasonal forecasting expert for each group had been identified in advance. The delegates self-organised into five working groups trying to ensure that so far as possible all groups were of a similar size and reasonably balanced in terms of expertise/institution. The working groups considered the following questions:

Multi-model combination:

- What are the best or most promising methods for multi-model combination?
- What are the advantages of multi-model combination?
- What are the potential disadvantages of multi-model combination?

Skill assessment (including bias adjustment):

- What are the compulsory metrics we must use to assess seasonal forecast skill (considering also spatial coverage and resolution, variables, metrics)?
- What would be nice-to-have metrics we should use to assess seasonal forecast skill?
- How to best present and communicate assessments of skill (e.g. quantitative metrics, graphically, descriptive)?

The groups recorded their answers on Post-it notes and flip charts for use in the plenary session afterwards (see also photos in [Figure 5](#)). All this material has now been collated and transcribed and will form the basis for more detailed discussion by the project team.

This section of the programme concluded with a plenary session chaired by Roberto Buizza (Scuola Sant'Anna) to briefly present the outcomes of the working groups. The delegates re-grouped for the plenary report, with each group giving a one to two-minute summary of their discussion and the key outcomes.

The summary presentations of the working groups were recorded and the transcripts are available in **Appendix 3**.

4.9 Plenary report

The key summary points were summarised by the Session Chair as follows:

- Data access and availability – need to consider the cost and amount of data involved.
- Skill assessment – requires user-based valuation and quality assessment. The earlier talks were given by the people building the multi-model combinations, but there is demand for talks on the quality of the forecasts in user terms.

- Metrics – there are no unique metrics, identification/selection of metrics needs to be user led.
- Disadvantages of multi-model combinations – too large variability (spread/consistency?). We need to make sure the models are of appropriate quality, otherwise this increases variability which is not valuable.
- Deterministic answers are being sought from probabilistic data. We still need to educate people to get them to make decisions on the basis of probabilistic forecast data. Users struggle to make decisions based on a probabilistic approach.
- Science and industry must work together to define metrics that are easily understandable.
- Different ways of generating weather scenarios. Lots of possible realisations.
- Length of period covered by the case studies – 100+ years, i.e., 30 years, with 50 ensemble members.
- Extremes: how best to extract signals from multi-model ensembles? Mixing multi-model combinations and averaging could remove the extremes. Need to know how the models are combined.
- Modern producers need to make information available to modern users.
- Availability of user-based observations in the users' world, e.g. electricity load. We need to provide such data to the modellers.



Figure 5 – Working groups during the Workshop 2.

4.10 The value of seasonal climate forecasts (including SECLI-FIRM case studies)

In the afternoon, the delegates reconvened to focus on the added value of seasonal forecasting for decision making. The afternoon session began with a presentation by Jaroslav Mysiak on the CLARA project, an EU-funded project focusing on climate forecasts enabled knowledge services.

Insights and experience from the CLARA project - Jaroslav Mysiak (CMCC)

In this presentation, Jaroslav Mysiak from CMCC discussed the evaluation of climate services, including methods and tools used to assess the benefits; understanding monetary and non-monetary value and drivers for diffusion and adoption of services; creating value by targeted use of climate information and how using innovative ways to capture and define this value, characterises climate innovation. The presentation focused on the methods used in the CLARA project and showcased examples.

4.11 Interactive group exercise: Decision trees

This presentation was followed by an interactive group exercise held in plenary and led by Steve Dorling (UEA). This session focused on the development of decision trees, which have been identified by Task 1.4 as one of the most promising methods of capturing the decision-making process and then embedding quantitative estimates of the economic value of seasonal forecasts for the SECLI-FIRM case studies, as also described in the presentation by Jaroslav Mysiak.

The aim of the exercise was to begin to develop decision trees for selected case studies. The exercise started with one of the most complicated case studies in terms of the underlying decision making, **Case Study 1** – Heat waves in southern Europe and the implications for energy generation and demand.

Steve Dorling asked questions to Marco Formenton (ENEL) who is leading this case study. Other workshop participants also had the opportunity to ask questions and comment. The outcomes of the discussion were recorded graphically by Laurent Dubus (EDF, see [Figure 6](#)). Given the complexities of this particular case study, only fairly limited progress could be made in sketching out the decision tree.

The focus of the exercise then switched to what are considered two of the more straightforward of the case studies in terms of the decision-making process and which also involve consideration of climate-related thresholds and dichotomous events (discussed in the morning presentation by Andrea Alessandri). These are **Case Study 6** – North Sea wind and wave impact on maintenance planning and logistics (with TenneT as the industrial partner) and **Case Study 7** – Energy logistics: wind and wave conditions (with Shell as the industrial partner).

Steve Dorling posed questions to the industrial partners (Martijn de Ruiter, TenneT and Jon Upton, Shell) with input from Gertie Geertsema (partner lead for Case Study 6) and the wider audience. The resulting decision tree drawn by Laurent Dubus can be seen in [Figure 6](#).



Figure 6 – Drawing of decision tree for SECLI-FIRM case studies 6 and 7 .

4.12 Open discussion

The final part of the afternoon incorporated an open discussion on the workshop and the overall project. Key contributors to the workshop were asked to put forward their closing comments on the day, with further comments invited from all workshop participants. A sample of the comments made is shown below:

“Interesting to understand other industry perspectives. For Shell – wind/wave. For energy – high temperature, high a/c demand/low precipitation. There are lots of variables. Reliability of seasonal forecasting is key: ‘forecasting the change in forecasting’.”

“Demonstrates the need to continue to have dialogues, with practical information at the end.”

“Fascinating. Really shows how to protect yourself against negative outcomes. How to prevent the worst happening. Decision trees are the right way, but need to consider cost/process etc.”

“The diversity of the break out groups shows the diversity across the project.”

4.13 Summary and how you can contribute to SECLI-FIRM

[SECLI-FIRM Workshop Summary](#)

The workshop concluded with a brief wrap-up presentation by Alberto Troccoli summarising his final considerations:

- Value quantification is important but it is more critical to build trust in the relationship between climate service scientist/provider and the industry user.
- Computing skill over a long period is important but it is more critical to assess forecasts for specific cases (in a measured, non-boastful, way).
- In the end, it will be through a series of wins on specific cases that confidence is built in the users.

4.14 Poster session

As part of the registration process, delegates were invited to submit posters for a small display, accessible in the foyer outside the meeting room during morning/afternoon breaks and over lunch. Five posters summarised the SECLI-FIRM case studies, however the organisers also received a further four external submissions from ECMWF, Clim2Power, EURAC and Mynowmaps. All of the submitted posters were included in the poster display.

4.15 Feedback

Following workshop 2, a short feedback survey was sent out to all participants asking for their thoughts on the event, their key takeaways and what else they would like to be included in future workshops. A summary of the feedback is provided in [Appendix 4](#) and responses will be taken into account when organising future events. The organising committee also received a number of positive verbal comments on the day of the workshop.

4.16 Outcomes

The second stakeholder workshop for SECLI-FIRM achieved the objectives of strengthening interaction between key stakeholders within the project (WP leaders, researchers, industry partners and advisory board members), while also ensuring interested parties external to the project had the opportunity to find out more about how SECLI-FIRM's seasonal forecasting research and application can benefit the energy and water industries.

In particular the project team were keen to maximise the opportunity to gain input from Advisory Board members and make the most of their knowledge and expertise, by actively involving them in the main workshop activities.

The speaker presentations were well received, leading to insightful and informative discussion after each session, and the working groups and plenary exercise brought a dynamic and interactive element to the day. Attendees actively participated in the working group activities and the discussion that followed, as well as in the plenary exercise. Many commented on how much they enjoyed the opportunity to work with colleagues from other organisations and understand the needs of different stakeholders from the perspective of researchers and end-users.

The workshop offered a good opportunity to raise the profile of SECLI-FIRM within the energy/water and meteorology communities, with communications proving successful in attracting a wide range of stakeholders from research and industry.

The event enabled successful communication and dissemination of the project's overall aims, the nine industry case studies and the proposed long-term benefits for industry, while providing clear insight into the operational needs of industry stakeholders and therefore the requirements for successful application of the findings.

More specifically, the workshop outputs include detailed notes and documentation of the working group discussions on issues relating to multi-model combination and seasonal forecasting skill assessment. These highlight a number of stakeholder-related issues concerning communication and use as well as scientific and technical issues. This will inform WP2 work, in particular, over the coming months. The two draft decision trees produced during the interactive exercise will be further developed as part of Task 1.4 work. It is anticipated that similar decision trees will be developed for all case studies and incorporated in D1.4 Report on economic assessment methods for value-add associated with decision support tools/systems.

Thus, the workshop outcomes will allow the project team to move onto the next stage of the research (particularly in WP 2 and 3) with a clear view of how this needs to be tailored for decision making, to meet the operational needs of the industry partners and, longer-term, the most effective practical application for end-users.

The schedule for the remaining stakeholder workshops is as follows:

- Third Stakeholder Workshop – Month 20
- Fourth Stakeholder Workshop – Month 28
- Fifth Stakeholder Workshop – Month 36

The specific objectives and target audiences for each workshop will naturally evolve as the project progresses and the workshop format and content will be structured according to the needs of the project and its audiences.

5 Website

The official SECLI-FIRM website (www.secli-firm.eu) was launched in March 2018 (see also D5.2). The website provides a high-level description of the project and its objectives, as well as more detailed outputs, such as links to scientific publications, public reports, general information, news and dissemination material.



Figure 7 – Copy of the SECLI-FIRM web site landing page.

As the project progresses, the website structure and content will be revised, taking into account feedback from both partners and stakeholders, gained via regular project meetings and specific stakeholder communications. The changes made will serve more specific needs, including:

- Promoting project results, e.g. case study updates.
- Publishing news releases specifically about the project, as well as sharing wider industry updates and commentary as appropriate.
- Providing online feedback mechanisms for the target audiences, including end-users and the general public.

Recent additions to the website include:

- A full suite of downloadable factsheets to provide an overview of each of the nine SECLI-FIRM case studies. Each of these follows a standard template. The content was provided by WPs 1 and 5 assisted in the editing, formatting and publication process.

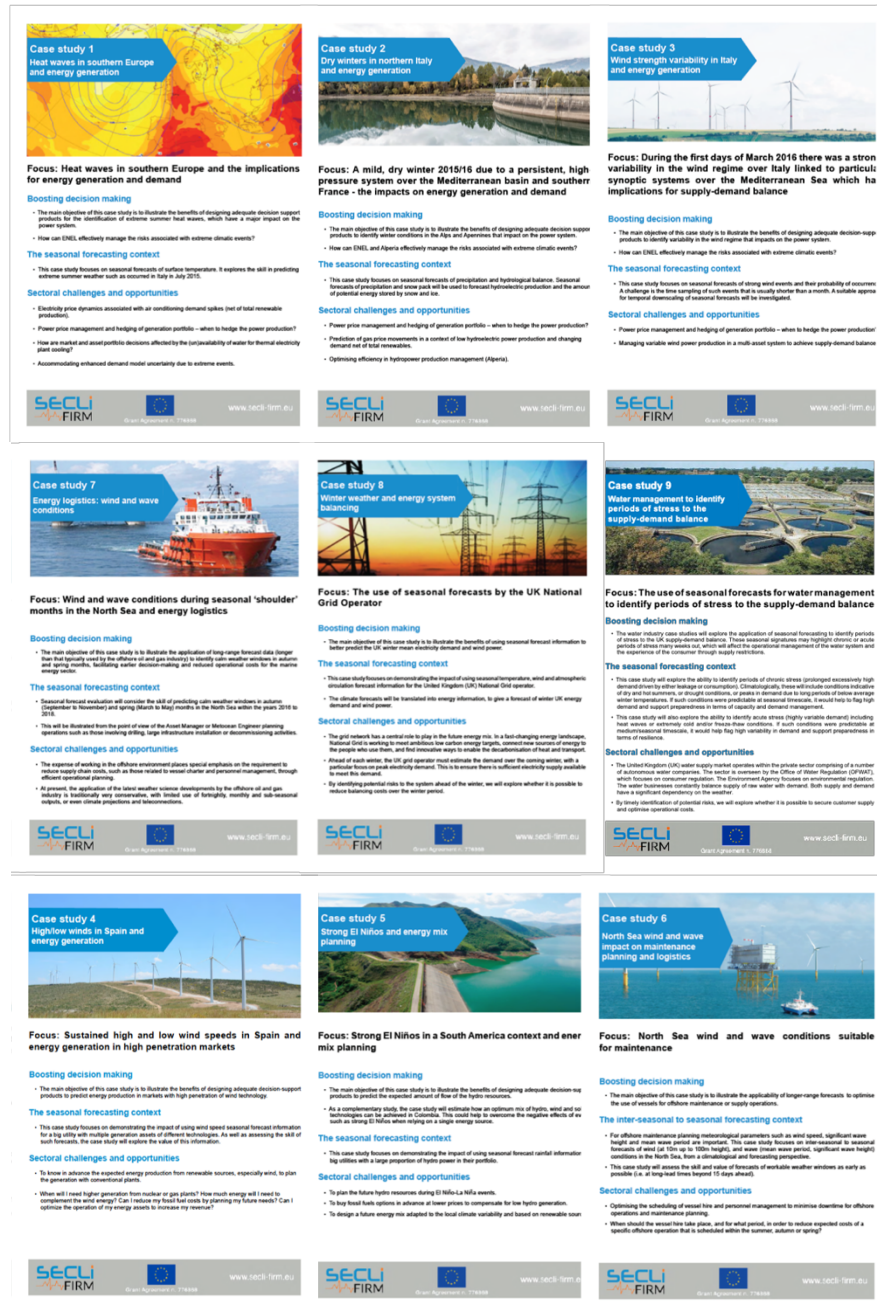


Figure 7 – Copies of the front pages of the SECLI-FIRM case studies factsheets.

- An explainer video introducing the SECLI-FIRM project, the importance of climate and weather information, and the benefits of seasonal forecasting in decision-making and risk management for the energy and water industries.

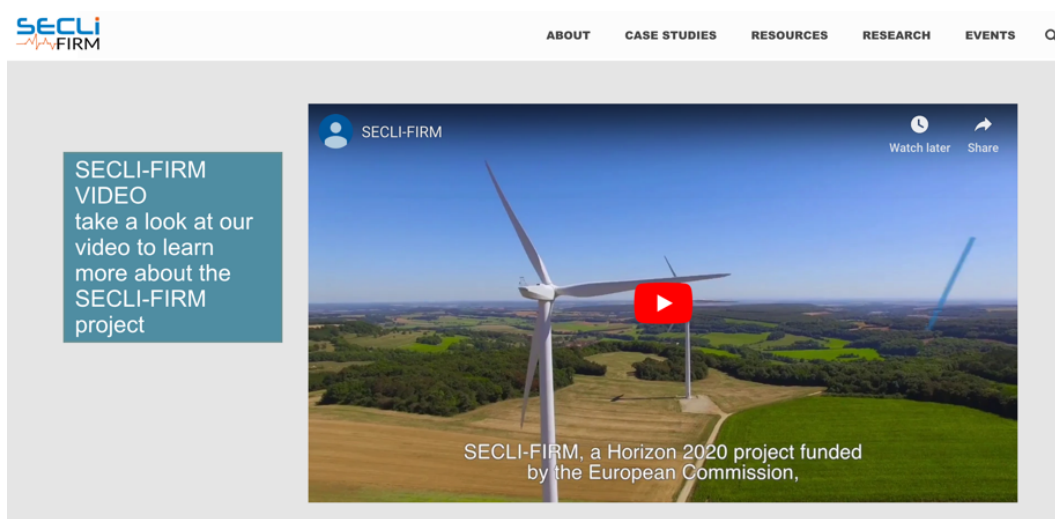


Figure 8 – Snapshot of SECLI-FIRM explainer video, available on SECLI-FIRM website.

- Updates and information on the recent stakeholder workshop in Milan, including flyers, banners, links through to the EventBrite booking page, social media links, advance programme, delegate pack and, post-event, all of the speaker presentations.

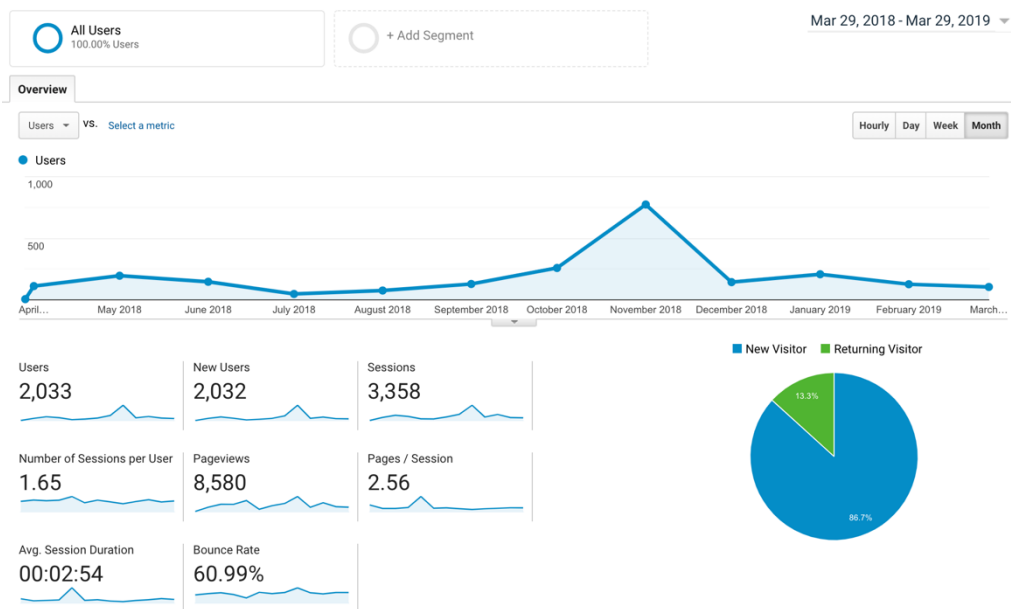
5.1 Website analytics

The following analytics cover website activity since launch up to the end of March 2019.

Visitor numbers gradually increased from launch and remained steady over the year, with a dip over the traditionally quiet summer period and a spike in November 2018, which coincides with the release of the second stakeholder workshop programme.

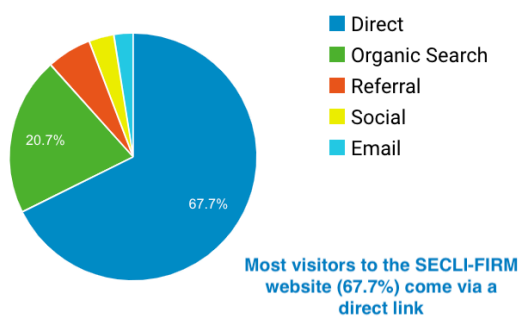
Most visitors came from the United States (40.58%), followed by the UK (15.47%) and Italy (10.89%). Most are new to the site (87%), with returning visitors accounting for 13% of traffic.

The majority of traffic reaches the site via a direct link, with the World Energy & Meteorology Council's website being the biggest referral source (35%) followed by links embedded in social media posts (29%).

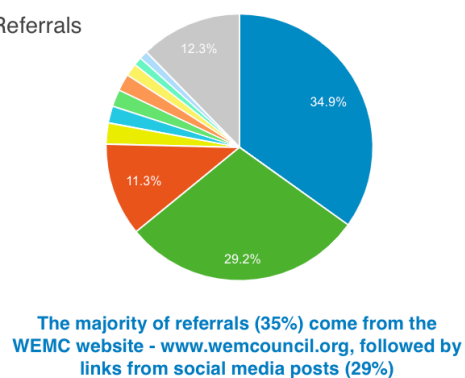


Country	Users	% Users
1. United States	840	40.50%
2. United Kingdom	322	15.53%
3. Italy	222	10.70%
4. Spain	73	3.52%
5. Belgium	57	2.75%
6. France	57	2.75%
7. Germany	46	2.22%
8. Netherlands	44	2.12%
9. China	31	1.49%
10. Canada	28	1.35%

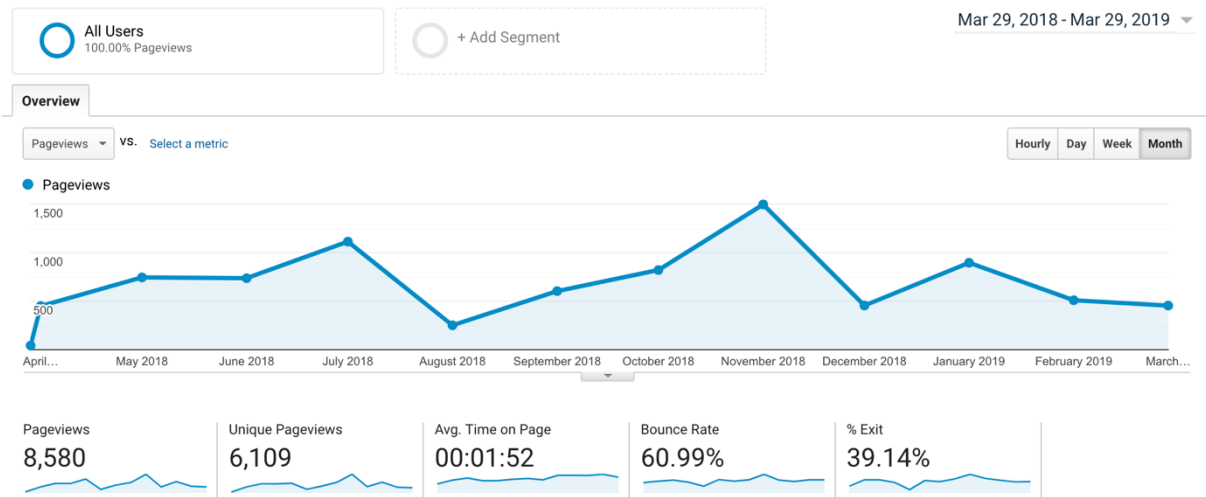
Top Channels



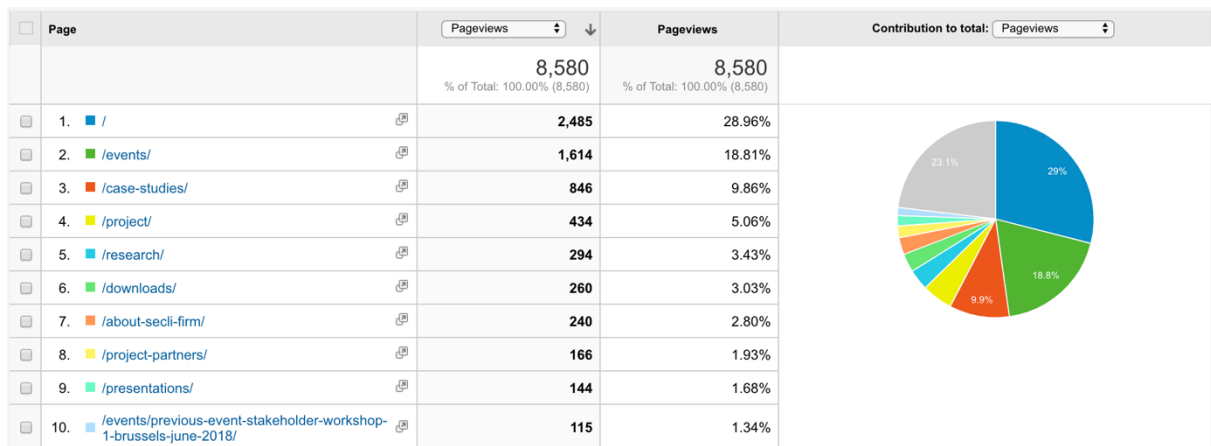
Referrals



The site received over 8,500 page views, with visitors spending almost two minutes on the page. Unique page views amounted to over 6,000.



The most popular pages visited were the homepage with 29% of traffic, followed by the events page with 19% of traffic, and the case studies page with 10% of traffic.



6 Additional dissemination channels

Events: the SECLI-FIRM consortium have participated in a number of industry events at national, EU and international levels, including conferences, exhibitions, workshops and seminars aimed at scientists, policy makers and industry professionals. Participation has taken the form of workshops, side events, panel discussions and poster sessions, promoting the SECLI-FIRM project and the benefits of seasonal forecasting to the energy and water industries.

2018/2019 events include:

- EUSEW 2018 Sustainable Energy Week, Brussels (WEMC)
- WindEurope 2018, Hamburg (UL)
- COP24 2018, Katowicz (WEMC)
- AMS 2019 Annual Meeting, Phoenix (WEMC)
- European Climate Change Adaptation (ECCA) 2019, Lisbon (SECLI-FIRM in collaboration with the H2020 Climateurope network and the Value of Climate Services taskforce)
- European Geosciences Union (EGU) General Assembly 2019, Vienna (KNMI/ENEL)
- WindEurope 2019, Bilbao (UL)

The SECLI-FIRM project will also be represented at the WEMC International Conference of Energy & Meteorology (ICEM) taking place at the Technical University of Denmark (DTU) in June 2019. Project leader, Professor Alberto Troccoli, will present [The Added Value of Seasonal Climate Forecasting for Integrated Risk Assessment \(SECLI-FIRM\) EU H2020 project](#) in the Weather and Climate Services parallel session on Day 1 of the conference.

Networking: the SECLI-FIRM consortium are continually building their network of contacts, through collaboration with other projects in similar sectors, such as CLARA, S2S4E and MedGold, to share knowledge and key learnings. SECLI-FIRM is contributing to a taskforce focusing on the Value of Climate Services involving other H2020 projects and coordinated by the leader of the CLARA project. This work will be presented at ECCA 2019 in Lisbon. SECLI-FIRM is also a member of the Climateurope network which brings together other EU funded, seasonal forecasting projects.

Media relations: the activities and achievements of the SECLI-FIRM project are promoted at key milestones through appropriate media channels. This includes news releases, articles and interview/photo opportunities to online and print media in the environmental science and energy sectors (and in mainstream media where appropriate).



PROFESSOR PIERRE PINSON RENEWABLE ENERGY FORECASTING SEMINAR AT UEA

SECLIFIRM returned Professor Pierre Pinson to the University of East Anglia on Thursday 21 March in a seminar on renewable energy forecasting. Pierre Pinson is a Professor at the University of

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ENERGY AND METEOROLOGY EXPERTS GATHER TO DISCUSS ADVANCES IN SEASONAL FORECASTING

Over 50 experts from science and industry gathered together in UEA for the second SECLIFIRM stakeholder engagement workshop. The event, which took place on 17 January 2019 at the UEA Norwich Campus

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SECLIFIRM CONTRIBUTES TO GLOBAL CLIMATE AND ENERGY DISCUSSION AT COP24

SECLIFIRM project leader, Professor Alberto Troccoli, played a leading role in the global discussion on climate and energy at the recent United Nations Climate Change Conference (COP24) in

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SCIENTISTS AND INDUSTRY EXPERTS JOIN FORCES TO IMPROVE USE OF SEASONAL CLIMATE FORECASTS IN NINE ENERGY AND WATER CASES

Organisations from across Europe are working on nine studies to demonstrate if seasonal climate forecasts can help the energy and water sectors make more accurate predictions and

[READ MORE](#)

The SECLIFIRM project has been funded by the European Union under the Horizon 2020 research and innovation programme. The project aims to improve the use of seasonal climate forecasts in the energy and water sectors.

CONTACT US

Prof. Alberto Troccoli
Project Leader
Email: alberto.troccoli@uea.ac.uk
Phone: +44 (0)1603 253111

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ENERGY AND METEOROLOGY EXPERTS GATHER TO DISCUSS ADVANCES IN SEASONAL FORECASTING



ENERGY AND METEOROLOGY EXPERTS GATHER TO DISCUSS ADVANCES IN SEASONAL FORECASTING

Over 50 experts from science and industry gathered together in UEA for the second SECLIFIRM stakeholder engagement workshop. The event, which took place on 17 January 2019 at the UEA Norwich Campus

The workshop explored how seasonal climate forecasts can be used to improve the way that energy and water sectors make predictions and decisions. The workshop was chaired by Prof. Alberto Troccoli, SECLIFIRM project leader.

Attendees were introduced to the project and the SECLIFIRM tool, which allows users to access seasonal climate forecasts for the energy and water sectors. The workshop also discussed the challenges of using seasonal climate forecasts in the energy and water sectors.

SECLIFIRM is a project funded by the European Union under the Horizon 2020 research and innovation programme. The project aims to improve the use of seasonal climate forecasts in the energy and water sectors.

SECLIFIRM project leader, Prof. Alberto Troccoli, played a leading role in the global discussion on climate and energy at the recent United Nations Climate Change Conference (COP24) in Katowice, Poland.

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Horizon The EU Research & Innovation Magazine

ENVIRONMENT ENERGY

Managing energy demand spikes with seasonal forecasts of heatwaves and cold spells

14 August 2018

By Catherine Collin

Researchers want to make climate forecasts more accessible to help the energy and other industries better predict spikes in usage. Image credit: iPhoto, licensed under CC0

The impact of heavy droughts, heatwaves and cold spells on energy demand and supplies would be lessened with seasonal climate forecasts that allow energy companies to better predict spikes in usage ahead of time, researchers say.

Researchers already have the ability to predict what changes in climate can be expected in two to three weeks' time, or even in several months' time. Unlike weather forecasts, which look at rainfall and temperature over the following hours and days, these climate forecasts aim to predict how conditions may change compared to what is normal for that time of year. Getting access to this information, however, is difficult as it is mostly available in a highly technical format that is unreadable to non-scientists.

The energy industry is eager to get its hands on this information, as it is a valuable tool for predicting spikes in usage. Heatwaves can be particularly problematic for the energy industry because they often knock out nuclear power stations – large quantities of cold water are needed to cool down reactors, and during heatwaves and droughts, the water supply is likely to be too warm to use. This means that at the same time that energy demand is higher, the supply is compromised.

'Both the energy supply and demand are dependent on climatic factors which may be predictable,' said Professor Alberto Troccoli of the University of East Anglia, managing director of the World Energy & Meteorology Council.

'When you have events like heatwaves, the demand for energy goes up very quickly because there is more air-conditioning being used. The fact that you don't predict that, and you have all this demand, means you have to source extra electricity. Because it's not ordered in advance, they'll charge you more and the prices go up.'

Prof. Troccoli coordinates a project called SECLIFIRM, which is using models of how the climate behaves to understand what is likely to happen in the coming months.

Up until now, the energy industry has mainly looked at past climate variations, a practice known as climatology. It predicts climate patterns in the coming months. However, this method is proving to be less and less reliable as climate change results in an increase in unexpected extreme weather events, which can affect demand. By contrast, climate models are becoming increasingly popular as they are displaying some positive results for predicting extreme temperature events, for example, this year's heatwave.

'Both the energy supply and demand are dependent on climatic factors.'

Professor Alberto Troccoli, University of East Anglia

Accessible

In addition to providing a reliable seasonal forecast, the modelling tool being developed by SECLIFIRM aims to make seasonal climate forecast data more accessible for non-scientists – such as those working in the energy industry, but also in water supply, agriculture, wine production and olive oil, and even the insurance sector.

It's an example of a new type of business known as climate services, which aims to turn climate science and data into usable tools and intelligence for organisations.

Dr Albert Soret, from the Barcelona Supercomputing Center, said that in order to provide climate intelligence to businesses, it is vital to produce a seamless forecast that can be used for decision-making at different timescales.

'At the end, we want to be able to explain a story to the (energy industry), so that they will be able to make a decision for the coming weeks and months,' he said.

Soret coordinates a project called S254E, which is building an online map of Europe containing forecasts that range from one week to four months ahead.

The S254E map will highlight total installed power – the potential maximum power capacity – from wind and solar farms across Europe. The user will be able to go to a particular spot on the map and insert the timeframe that they want predictions for. The tool will then produce probability forecasts for rain, temperature, wind and other energy-specific variables.

The project is based in a supercomputer centre because climate models are systems that emulate the whole Earth system, incorporating figures for sea surface temperature, snow cover and winds at a given time, and have to be run several times to get a good prediction.

Dr Isadora Jimenez, who works on the S254E project, said: 'It's not something that you can calculate on your personal laptop.'

The S254E tool will be available by June 2019, while the SECLIFIRM tool will come online in July 2020, though a prototype will be developed sooner.

Probabilities

One of the main problems faced by both S254E and SECLIFIRM is that the energy industry sometimes expects the data to be presented in the same way as weather forecasts. However, this isn't the case, as climate seasonal forecasts are based on probabilities.

'If you're used to the weather forecast, you expect that someone will tell you the temperature's going to be 24 degrees with an error of plus or minus one degree,' said Dr Jimenez.

'In climate science we run a model a number of times, look at all the possible outcomes and results of that simulation and that gives you a probability. Climate predictions cannot tell you the weather in August is going to be 27 plus or less two degrees. They are going to tell you that you have a 70% probability of having temperatures above 24 degrees.'

With advanced information about energy shortages or surges in demand, however, companies can better organise themselves to avoid expensive fines and high energy prices. This is important because although the industry will shoulder any initial price hikes, it will ultimately be the customer who pays, according to Prof. Troccoli.

'It's the users in the end that suffer,' he said. 'If (the extreme event) has a large enough effect when energy companies revise the energy price in six months or a year, you (the consumer) will likely see that increase.'

The research in this article was funded by the EU. If you liked this article, please consider sharing it on social media.

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Stakeholder communications: internal and external stakeholders who have signed up to the SECLI-FIRM mailing list receive email updates about upcoming events, e.g. the SECLI-FIRM workshops. Project news and updates are also shared via the WEMC newsletter. A standalone newsletter for SECLI-FIRM has also been produced to share more details of the first year's activities.

Welcome to the new SECLI-FIRM newsletter

Can't see images? [Click here](#)




Welcome to the SECLI-FIRM newsletter

Welcome to the brand new SECLI-FIRM newsletter, where we'll be sharing information and updates about our EU Horizon 2020 project as it progresses.

If there's anything in particular that you'd like to see featured in this newsletter, just let us know by email at secli-firm@wemcouncil.org

You can also keep up to date with SECLI-FIRM news and announcements via [Twitter](#) (@SECLI_Firm) and our [LinkedIn](#) page.


SECLI-FIRM stakeholder workshop



Over 50 experts from the energy and water industries and the seasonal forecasting community, attended our second stakeholder workshop which took place in Milan in January. The event focused on the latest advances in seasonal forecasting and their skill and value assessment. A full summary, including speaker presentations, is available on our website.

[Stakeholder workshop summary](#)


Professor Pierre Pinson webinar



Pierre Pinson, Professor at the Technical University of Denmark's Centre for Electric Power and Energy, visited the University of East Anglia recently to give a seminar on renewable energy forecasting. The session was also broadcast as a webinar.

[Find out more](#)


SECLI-FIRM case studies



The SECLI-FIRM project focuses on nine global case studies, designed with our industry and research partners, which aim to assist the energy and water sectors in risk management decision making. You can find and download all our case study factsheets using the link below.

[See our case studies](#)

SECLI-FIRM video



If you'd like a more detailed insight into the project, our SECLI-FIRM video is well worth a look. The video is designed to give an overview of the project and explain the value and application of season climate forecasting for the energy and water industries.

[Watch the video](#)

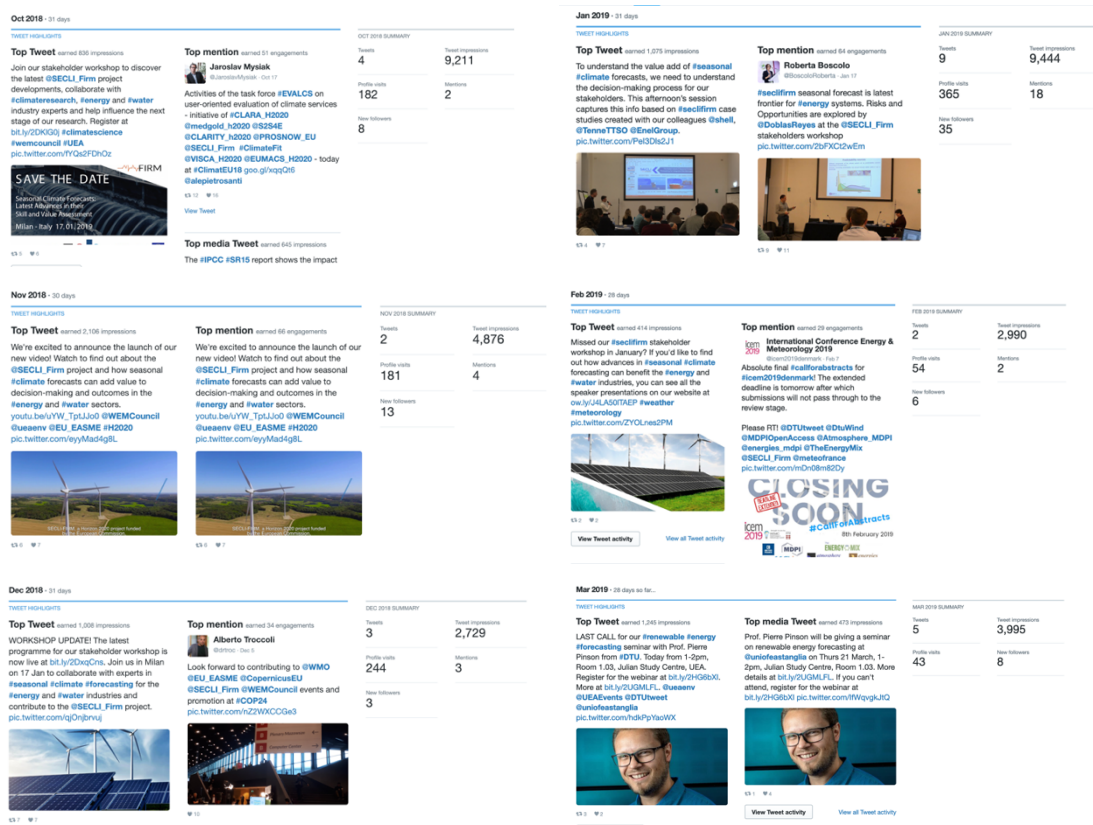
SECLI-FIRM
Grant Agreement n. 776868
Director: a.broccoli@uea.ac.uk
Project Manager: lesley.penny@uea.ac.uk

[TWEET](#) [FORWARD](#)

You receive emails from us as you have shown interest in our work. Don't want to see messages from us anymore?
[Unsubscribe here](#)

Social media: the project has its own Twitter and LinkedIn accounts for dissemination of project updates, events, commentary and relevant industry updates from stakeholders and partner organisations. Twitter has been used as the main social media platform, due to it being a more established platform with a broader audience, giving greater opportunities for interaction and engagement. Posts have centred around the project case studies and the stakeholder workshops, with live tweets posted from the most recent event in January gaining good interaction and impressions. Going forward, as results become available, social media will be used as a key platform for sharing these.

Examples of top posts and analysis from the last six months are shown below.



Branded materials: a suite of SECLI-FIRM branded materials has been developed to create a strong and recognisable visual identity for the project. Examples of these have been included throughout this report. We also have branded conference collateral including a pull-up banner, tri-fold leaflet and stationery items for promoting the project at events.

Project reports: all relevant project deliverables in report format and defined as public have been published on the SECLI-FIRM website for open access.

Official EU communication channels: Information about project milestones will be forwarded to the relevant EU dissemination portals, including Cordis Wire (<http://cordis.europa.eu/wire/>).

The SECLI-FIRM consortium will also aim to submit project news and events via other European Commission channels including:

- [Horizon](#) magazine
- [Research*EU focus](#) magazine
- [European Commission's Research & Innovation events listings](#)

7 Summary

During the first year of the project, activity has focused on building relationships, ensuring that project objectives and activities reach the relevant target groups and acquiring stakeholder support through clear and visible promotion of activities, in line with the dissemination objectives.

Through the use of the channels detailed in this report, interest in the project and participation in stakeholder activities has grown, as demonstrated for instance by the increase in attendees between the first two workshops. Work will continue to increase engagement via existing channels such as the website and social media, and as the project progresses, further opportunities for stakeholder and engagement activity will be explored.

During the second year of the project, as results from the case studies become more robust, activity will move towards the key dissemination objective of sharing research these results with a wide range of stakeholders.

Key measurable targets for this stage of the project will be to:

- Increase attendance at stakeholder activities.
- Continue to build engagement via Twitter and LinkedIn.
- Create more interaction with stakeholders, via networking and events.
- Drive more website traffic and increase the number of repeat visitors to the site.
- Grow the SECLI-FIRM mailing list to increase opportunities to engage via email.

Appendix 1 – Workshop 1 Roundtable Discussion

An example of the discussion during one of the three roundtables at Workshop 1 is provided here.

Questions and discussion – Focusing on the System Balancing Theme (National Grid)

Are the SECLI-FIRM case-studies focused on the most relevant seasonal forecast information and sectoral challenges and opportunities?

Yes, the seasonal forecasting information has the opportunity to provide considerable value to National Grid.

What is missing from the case studies?

The missing piece of the jigsaw is the strong user requirements. From their previous work at National Grid Jeremy and Shanti highlighted the clear advantages of using seasonal forecast information to improve decision making, but could see that without stronger engagement from the current teams it was hard to ascertain exactly how the data could be tailored, or for the benefits to be fully realised and calculated by National Grid.

Can you identify additional applications where seasonal forecasts may be of added value?

This topic was not covered in detail.

How would you like to be involved in SECLI-FIRM?

Participants requested regular newsletters updating on progress within SECLI-FIRM, and an ability to feedback to influence the project. Attendees were keen to be made aware of future workshops or public events. In particular, Ilaria was interested in hearing about how economic value was calculated, and potentially influencing methods. Participants suggested user groups for each case study, so that material can remain as relevant to the wider stakeholder group as possible.

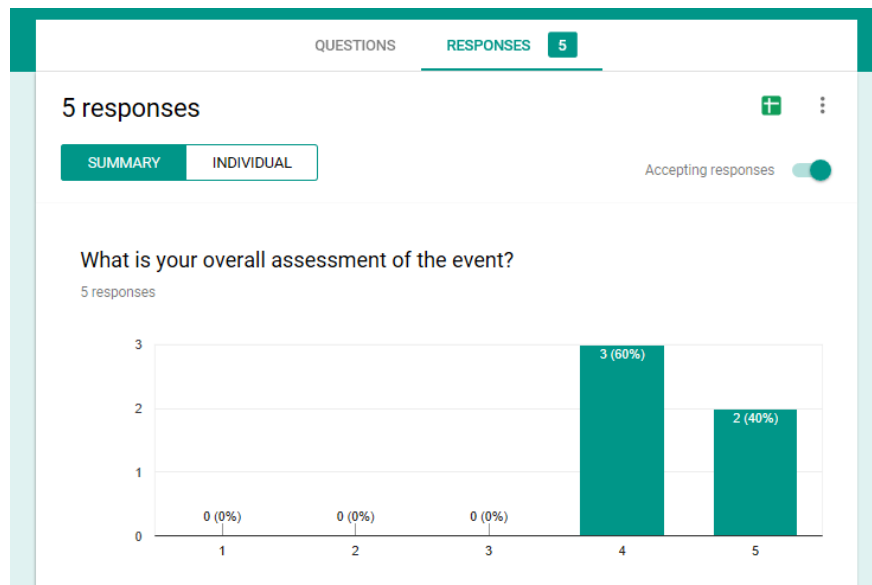
What current use are you making of weather and climate information in your decision making?

Ahead of each winter National Grid estimate the electricity demand over the coming winter, with a particular focus on peak electricity demand conditions. This is to ensure there is sufficient electricity supply available to meet this demand. Currently an estimate of winter demand is made using historical data, assuming the climatological risk of demand. Additionally, National Grid attend Winter Climate Briefings provided by Hazel Thornton at the Met Office to UK Energy stakeholders. These are not currently actively used in decision making.

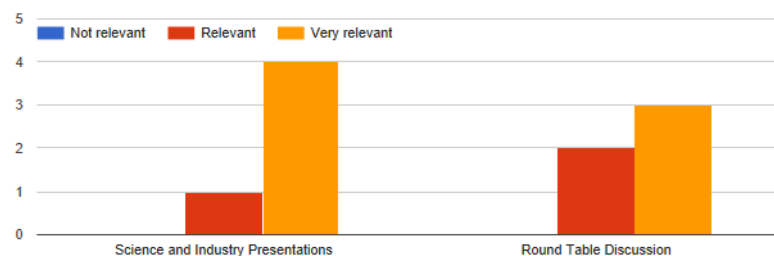
To date, what has prevented you from using long-range forecast information (or climate information) to a greater extent within your organisation?

To data information has not been available in a format suitable for decision making – it is generally not detailed enough, and so does not fit well with decision making processes.

Appendix 2 – Workshop 1 feedback



Which sessions did you find most compelling?



Which topics or aspects of the workshop did you find most relevant?

5 responses

The workshop session was useful to get input from other stakeholders. It was also interesting to hear briefly about the other projects. I enjoyed all the talks

discussion around the added value of seasonal forecasts for industry

The industry presentations

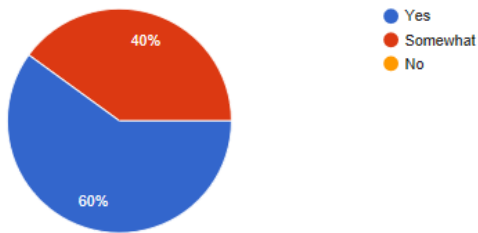
MO presentation

Case studies discussion



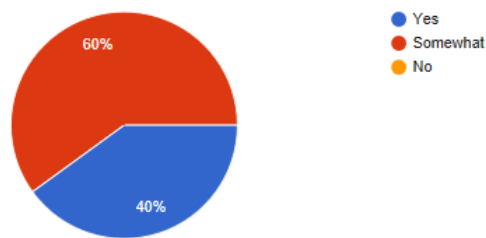
Did the knowledge and information gained from participation at this event meet your expectations?

5 responses



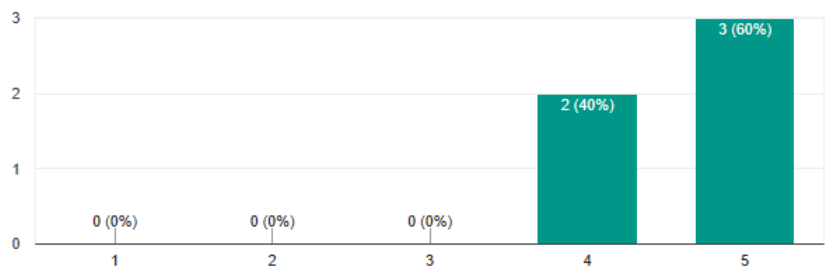
Will the knowledge and information gained from participation at this event be applicable in your work?

5 responses



Please comment on the organisation of the event.

5 responses



Do you consider a workshop to be an effective way to engage with stakeholders in the energy and water sectors?

5 responses

It is a very effective way to interact with stakeholders who are already engaged with the project. The problem is in getting non-engaged stakeholders to attend the event. When I was at National Grid I would see invites to events like this, but would not have the time, or the travel budget, to attend. I was occasionally able to send members of my team to events within the UK, but foreign travel required so many approvals that it was almost impossible (regardless of the fact that it was cheaper to go to Brussels than it would have been to go to the Met Office in Exeter). International travel can be a blocker to people being allowed to attend.

Yes. A workshop allows discussing stakeholders needs and what can be provided by the scientific partners.

One of the ways, however more targeting engagement particularly with industry is required in my opinion

yes

Yes, definitely!

Comments & suggestions (including formats of future events & communications from the project)?

5 responses

Would be interesting to hear a bit more about some of the case studies - maybe 2 or 3 in a bit of detail at each meeting.

An open webinar - just an hour overview of the project - may attract attention.

Communications aimed at people in industry not currently involved in the project needs to be short. When I worked at National Grid I typically got about 150 emails a day (including weekends). I would have been no different to other people in similar jobs. For an unsolicited email I would typically read the first two sentences and then decide to delete, forward to someone else in my team, or occasionally to read. All coms has to grab attention fast enough to get past that initial hurdle.

We should try to attract more participants from both the industry and the scientific community.

Include some testimonials from industry as to how this project could help them.

more time for the round tables

1/2 day is too short. Would recommend a "full" day

Appendix 3 – Workshop 2: Multi-Models and Skill Assessment Plenary Report

Working groups on seasonal climate forecast multi-model combination and skill assessment, SECLI-FIRM WS2, Milan, 17th January 2019

Five working groups of about 8-10 people discussed the two sets of questions below for about one hour. The facilitators and seasonal forecast experts were identified in advance – but pairings and rooms were allocated on the day. All other participants were asked to self-organise into groups to try to ensure so far as possible all groups were of a similar size and reasonably balanced in terms of expertise/institution.

Three groups met in the main meeting room, two in smaller break-out rooms. All flip charts were brought into the main meeting room for the plenary report back which was chaired by Roberto Buizza. Each group had one minute to report the highlights from their group discussion, and then Roberto ‘summarised the summaries’.

Multi-model combination:

- What are the best or most promising methods for multi-model combination?
- What are the advantages of multi-model combination?
- What are the potential disadvantages of multi-model combination?

Skill assessment (including bias adjustment):

- What are the compulsory metrics we must use to assess seasonal forecast skill (considering also spatial coverage and resolution, variables, metrics)?
- What would be nice-to-have metrics we should use to assess seasonal forecast skill?
- How to best present and communicate assessments of skill (e.g. quantitative metrics, graphically, descriptive)?

Group 1 (Toscanini)

Facilitator/Rapporteur: Marc Zebisch

Seasonal-forecast expert: Roberto Buizza

MM combination		
Performance of combination is application dependent	Representations of extremes?	Tailored averaging?
		Weighting?? (local, parameter) Season,...Resolution
Advantages		
For seasonal: Not one model is the best	Confidence and probability information	
Disadvantages		
How to communicate complexity of MME to users?	Need to access more data → costs	High variability → How to reduce??
Very heterogeneous customer needs		

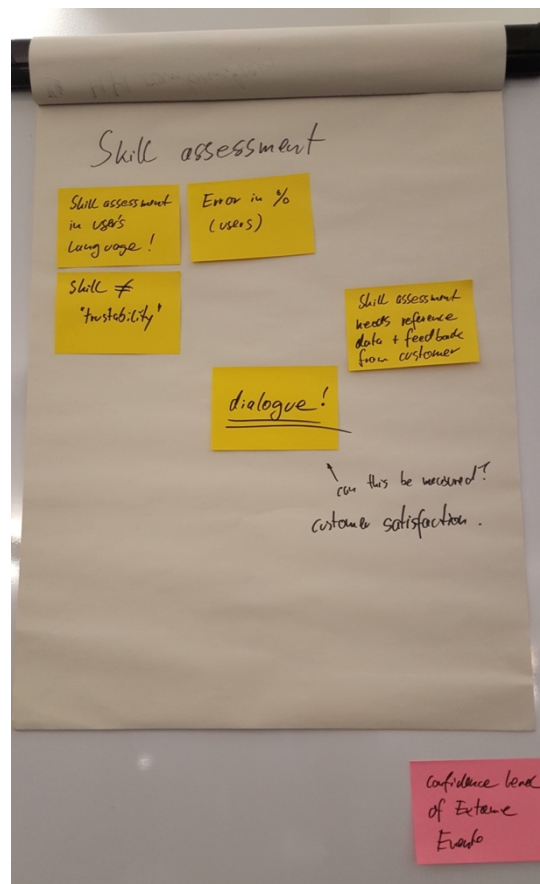
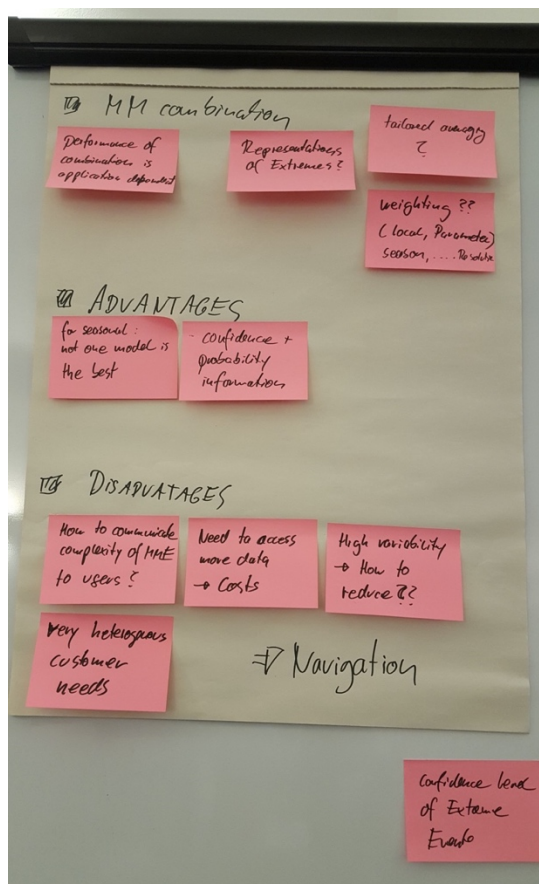
Navigation
Confidence level of
extreme events

Skill assessment		
Skill assessment in user's language!	Error in % (users)	
Skill ≠ "trustability"		
		Skill assessment needs reference data + feedback from customer
	<u>Dialogue!</u>	

Can this be measured?
Customer satisfaction.

Plenary report back Group 1 – Marc Zebisch

- Multi-model combination – there is not one best method/combination – it depends on the user application.
- More questions were identified from users in the group e.g., weighting (tailored averaging for an application, particular parameters/region?), representation of extremes, how to consider user questions.
- No one model is best – so combining them allows statements to be made about confidence/probability.
- But it becomes very complex with a lot of information to communicate. And you need to access more data.
- Producers need to help the user to navigate through the jungle of different models and methods – it's very hard for the user to decide what to use.
- There is a difference between mathematical skill scores/metrics of interest to the producer and issues of trustability and applicability which are important for the user. Metrics relevant for the latter issues may be very different. Need to define these things in a dialogue – on a case-by-case basis.



Group 2 (Toscanini)

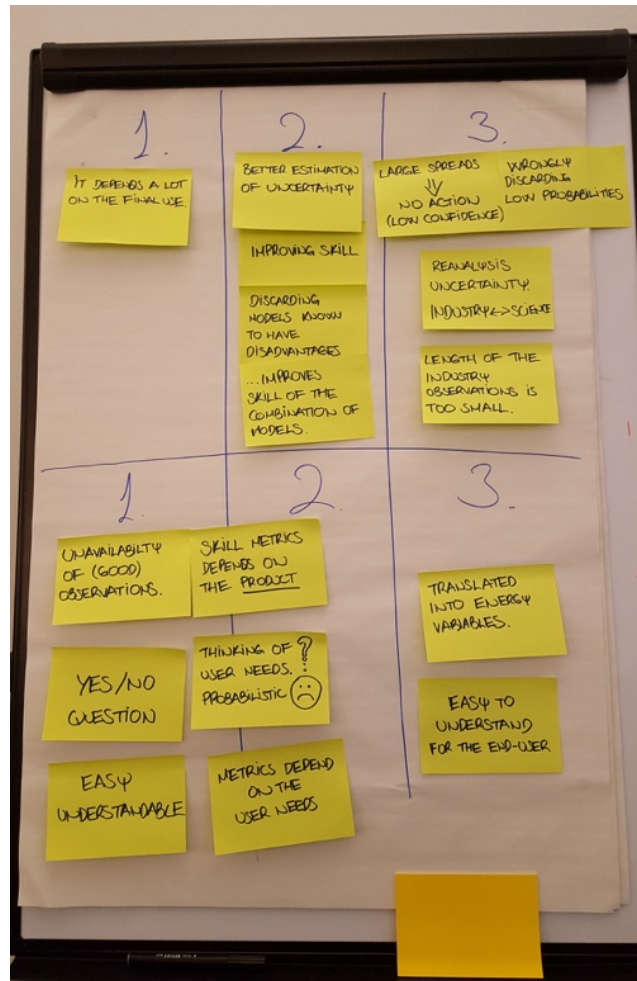
Facilitator/Rapporteur: Gertie Geertsema

Seasonal-forecast expert: Francisco Doblas-Reyes

1	2	3	
It depends a lot on the final use	Better estimation of uncertainty	Large spreads ↓ No action (low confidence)	Wrongly discarding low probabilities
	Improving skill	Reanalysis uncertainty Industry ↔ science	
	Discarding models known to have disadvantages	Length of the industry observations is too small	
improves skill of the combinations of models		
1	2	3	
Unavailability of (good) observations	Skill metrics depends on the <u>product</u>		
Yes/no question	Thinking of user needs? Probabilistic ☺	Translated into energy variables	
Easy understandable	Metrics depend on the user needs	Easy to understand for the end-user	

Plenary report back Group 2 – Gertie Geertsema

- People prefer deterministic answers. Need to consider personal attitudes to probabilistic situations, e.g., with 60% chance of rain tomorrow, one person will take their raincoat while another will say 'oh wow, the sun will shine'.
- Too preliminary to answer which are best/most promising models/combination methods.
- Advantages – skill is improved and better information about uncertainty.
- Potential disadvantages – personal issues need to be considered again. If there is a large spread there is a possibility that people will not take action even if action is necessary/useful. If there is a strong probability of an event then people may discard low probability outcomes.
- Scientists, industry, meteorologists, end users need to talk and work together alongside each other – considering applications/user needs.
- Metrics need to be co-defined (according to user needs) and easily understandable (ultimately it's a yes/no deterministic answer/response that is needed). Metrics which are very difficult to understand cannot be used.
- Need long period, ~100 years, to calibrate multi-models and determine skill – and industry data may not be available for such a long period.



Group 3 (Toscanini)

Facilitator/Rapporteur: Pascal Mailier

Seasonal-forecast expert: Anca Brookshaw

Multi-model combination

- (*) Best method depends on the nature of the problem (decision) and should be present as a full spectrum of possibilities → comparison, engagement
- (2) Assessing the uncertainty – multi-model approach
- (3) Context of decision (use of information) may constrain the multi-model full potential → communication of uncertainty is a challenge

Skill assessment

- (1) Understanding the different attributes
No combination of attributes exists

- Skill is assessed depending on user-driven attribute priority
- Understanding terminology – common meanings
 - co-design of the products
- (3) contingency table for the particular event/risk analysis
- (2) metrics/scores from contingency tables
- (3) meaningful vs possible
- Whatever is best for the users.

Plenary report back Group 3 – Pascal Mailier

- Best and most promising multi-model methods – all depends on the problems of the user. There are different models with different properties – need full engagement of users to determine 'best' for each use case.
- Advantages of using multi-models – representation of uncertainty. Disadvantages – might take you away from the context of the decision. Need to consider the constraints of decision making.
- Need to use metrics addressing the different attributes of the forecast.
- Skill assessment should depend on user – i.e., it should be user-centric. But there are no compulsory metrics – can't provide a standard list.
- A good communication process is needed. With both providers and users involved.
- Contingency tables could be a good way of presenting skill assessments. With users central to the skill assessment process.

① The best method depends on the nature of the problem (decision) and should be present as a full spectrum of possibilities
→ comparison, engagement

② Assessing the uncertainty
Multimodel approach

③ ~~CONTEXT OF DECISION~~
~~USE OF INFORMATION~~
may constrain the multimodel full potential
→ Communication of uncertainty is a challenge

SKILL ASSESSMENT

① UNDERSTANDING THE DIFFERENT ATTRIBUTES

~~NO~~ NO COMBINATION OF ATTRIBUTES EXISTS

SKILL IS ASSESSED DEPENDING ON USER-DRIVEN ATTRIBUTE PRIORITY

→ UNDERSTANDING TERMINOLOGY - COMMON MEANINGS

→ CO-DESIGN OF THE PRODUCTS

③ CONTINGENCY TABLE FOR THE PARTICULAR EVENT / RISK ANALYSIS

② METRICS FROM CONTINGENCY TABLES
SCORES

③ MEANINGFUL VS POSSIBLE
WHATEVER IS BEST FOR THE USERS

Group 4 (Strehler)**Facilitator/Rapporteur: José Vidal****Seasonal-forecast expert: Andrea Alessandri****Multi-model**

- * Real problem: Outlook (4 months ahead) risk of collapse in node boundaries
- * Need very different models from diff institutions because we want to capture all variability
- * Calibrate models with observations and exclude unmeaningful members
- * Adv: Capture full variability, evolution, extremes
- * Dis: Members out of realistic range

Skill

- * T2m ⇒ skill scores are by gridpoint (either deterministic or probabilistic)
- * Teleconnection indices?
- * Skill | by area
| by range of values

Plenary report back Group 4 – José Vidal

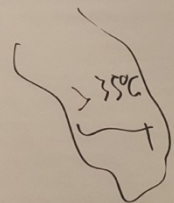
- Discussed a ‘real world’ problem: the need for an outlook four months ahead to assess the risk of collapse in electricity supply node boundaries. So, need to look more at extremes.
- Need different models for different situations – and to capture tails of distributions (i.e. more interested in variability rather than average). And need to exclude unmeaningful models/ensemble members (based on comparison with observations).
- Advantage of using multi-models is to capture variability, evolution and extremes.
- For skill scores, for electricity demand applications T2m is the important variable. Skill information is generally calculated by gridpoint – how meaningful is this for users?
- It might be more meaningful to provide skill scores for teleconnection indices.
- Skill scores for the whole domain may not be meaningful for applications. Would be better to have them for particular areas, e.g. where electricity demand is high (rather than areas where no one lives) and for user-relevant variables.

12:30 - 12:40 MULTJ-MODEL

- * Real problem: Outlook (4-14) risk of collapse in node boundaries
- * Need very different models from diff institutions because we want to capture all variability
- * Calibrate models with observations and exclude unrepresentative members
- * Adv: Capture full variability, evolution, extremes
- * Dis: Members out of realistic range

SKILL

- * T2m \Rightarrow SKILL scores are by gridpoint (either deterministic or probabilistic)
- * Teleconnection Indexes?
- * Skill by area
by range of values



Group 5 (Marinetti)

Facilitator/Rapporteur: Katie Chowienczyk

Seasonal-forecast expert: Philip Bett

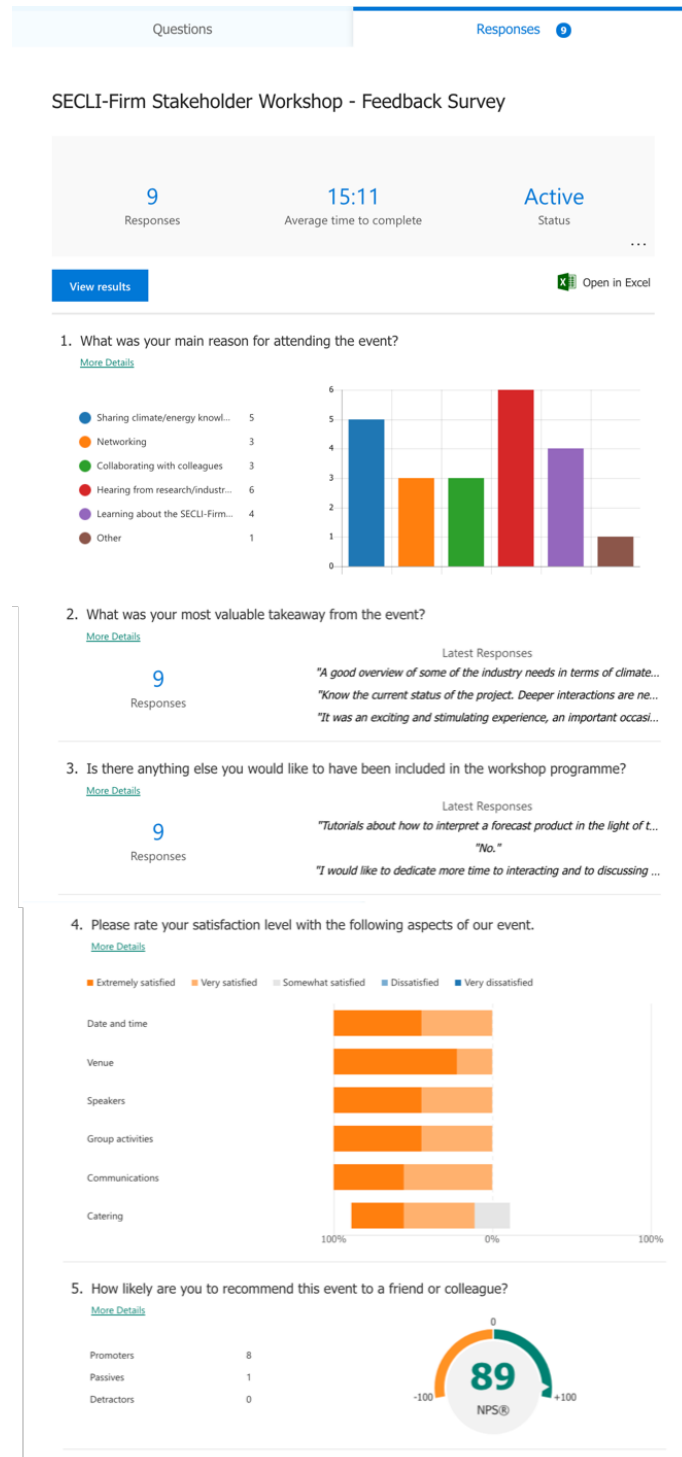
Is there a benefit to less formal combinations – e.g., “manually” considering the different systems’ outputs by eye, instead of an “automated” combination of data? Maybe it depends on the required update frequency, e.g. having monthly meetings to consider available systems.	How can we know how to weight different models in combination? e.g. by skill of parameter of interest?but the skill might be very uncertain? Or by representing <u>processes</u> of interest?	At what point would you train the impact model if you are using a multi-model approach?
Some parameters might only be available from one system e.g. wave model parameters	Often need multiple variables, so need a way of combining <u>coherently</u> between different variables (e.g. retain coherence between temp and precip)	Multi model, the weighting must be tailored on the final goal of the project (e.g. geographical area, variable, season)
How would you do a multi model approach on weather types?	Using NMME – as it is freely available (what we’re doing already) + ECMWF. Combining using our own statistical model (focusing	- Importance of independence of the models for the multi-model combination - skill of the models is related to the representation

	on ocean data parameters) → more predictable e.g. C3S, NMME	of physical processes (e.g., dynamical vegetation). Some processes are particularly important for some regions and seasons.
Important aspects of skill. Understanding what could 'go wrong' and rapidly change a forecast, e.g. a sudden stratospheric warming	<u>Verification</u> Did we get the direction of a trend correct? (up vs down). What was the mean error in the forecasts (even if provided probabilistically)	Scenarios with clusters of probability → translate with experience - establishing threshold with user
Decisions are made on many other conditions than just the climate! This makes assessing the skill very difficult sometimes	Reducing down to <u>dichotomous</u> events help when assessing skill/verification of <u>decision</u> <u>making</u> – instead of continuous skill scores Yes/No – did it/not happen?	Variance – best/worst case scenario
Econometric skill measures Margin <u>Profit</u> Risk Main goal is to reduce the risk to the company!	Being able to make a decision, when you couldn't before without a seasonal forecast, is useful in itself	

Plenary report back Group 5 – Katie Chowienczyk

- What are the best multi-model methods? Should use models that are as independent as possible.
- Didn't really identify disadvantages. But it is not necessarily clear what is the best method. At what point would you use your impact model? Would you need to train it on all forecasting models? What to do if parameters/variables are only available from one system?
- Also discussed skill assessment and identified two steps.
- First, understanding skill and verifying forecast performance for particular parameters, e.g., temperature/rainfall.
- Second, understanding user requirements. Potentially, while have continuous scores (e.g. r2 values) for underlying variables, in terms of user needs it may be better to think about dichotomous events, i.e., yes/no events/decisions.

Appendix 4 – Workshop 2 feedback



Breakdown of responses

1. What was your main reason for attending the event?

9 Responses

ID ↑	Name	Responses
1	anonymous	["Sharing climate/energy knowledge and information", "Networking", "Collaborating with colleagues", "Hearing from research/industry experts", "Learning about the SECLI-Firm project"]
2	anonymous	["Sharing climate/energy knowledge and information", "Networking", "Hearing from research/industry experts", "Learning about the SECLI-Firm project"]
3	anonymous	["Sharing climate/energy knowledge and information"]
4	anonymous	["Hearing from research/industry experts"]
5	anonymous	["Hearing from research/industry experts", "Learning about the SECLI-Firm project"]
6	anonymous	["Hearing from research/industry experts"]
7	anonymous	["Sharing climate/energy knowledge and information", "Networking", "Collaborating with colleagues", "Hearing from research/industry experts"]
8	anonymous	["Member of Advisory Board"]
9	anonymous	["Sharing climate/energy knowledge and information", "Collaborating with colleagues", "Learning about the SECLI-Firm project"]

2. What was your most valuable takeaway from the event?

9 Responses

ID ↑	Name	Responses
1	anonymous	Excellent talk by Paco, and good discussion about the scope of the case study assessments
2	anonymous	insights on the way to build full-value chain climate services for energy and the formulation of energy case studies
3	anonymous	The view on the different climatic models existent and why the combination of different models is more fruitful than the use of a unique model.
4	anonymous	It is always useful to be able to discuss technical aspects of topics such as weather forecasts with other users and providers, because it helps provide a broader understanding. The range of speakers and industry partners helped achieve this aim.
5	anonymous	The energy industries want the climate forecast output from the perspective of change in energy variables(Gigawatt-hour) rather than the meteorological variables(temperature, precipitation etc) as their economic model only allows input of such variables. To make the decision based on the climate model output, they would want the output in a deterministic value rather than probabilistic but as the nature of the climate model output is in probabilistic nature, they should be willing to consider it in a similar way.
6	anonymous	Being part of the project and providing feedback through discussion is very fruitful

3. Is there anything else you would like to have been included in the workshop programme?

9 Responses

ID ↑	Name	Responses
1	anonymous	No
2	anonymous	more visibility on the industry side
3	anonymous	No.
4	anonymous	not really.
5	anonymous	None.
6	anonymous	Balance the time from the breakdown groups even if it means cutting down tea breaks or be part of it. Maximise experts time while they are present there
7	anonymous	I would like to dedicate more time to interacting and to discussing with other participants, in order to share knowledge and ideas.
8	anonymous	No.
9	anonymous	Tutorials about how to interpret a forecast product in the light of the forecast quality estimates available.

The Added Value of Seasonal Climate Forecasting for Integrated Risk Management (SECLI-FIRM)

For more information visit

www.secli-firm.eu

or contact the SECLI-FIRM team at

info@secli-firm.eu



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