# **MEMC**

WORLD ENERGY & METEOROLOGY COUNCIL

### BRINGING TOGETHER CLIMATE SCIENCE & ENERGY EXPERTISE

HIGHLIGHTS OF OUR ICEM2019 CONFERENCE IN DENMARK INTRODUCING OUR EU H2020 PROJECT: SECLI-FIRM A NEW CLIMATE & ENERGY TOOL FOR STUDENTS AND TEACHERS

#### WEMC MAGAZINE -

2

### WELCOME TO THE FIRST EDITION OF OUR WORLD ENERGY & METEOROLOGICAL COUNCIL MAGAZINE

In this edition, we'll be focusing on the International Conference of Energy & Meteorology (ICEM 2019), as well as bringing you the latest news from the key projects we're working on with our industry and research partners.

We hope that through the combined expertise of the energy and science communities, both WEMC and the ICEM will continue to be catalysts for global and world-leading interactions. And this new WEMC Magazine aims to encourage those conversations.

### CONTENTS

A warm welcome from Prof. Alberto Troccoli3
The history of ICEM
DTU & WEMC
The ICEM 2019 Pre-Conference Seminar ••••••6
A unique ICEM workshop opportunity7
ICEM Legacy: Supporting the next generation ••••••8
A view from WESA: The final day of ICEM 2019 •••••9
New for ICEM 2019: C3S Energy Service Workshop • • • • 9
Introducing our EU H2020 project: SECLI-FIRM • • • • • 10
Three days of SECLI-FIRM ••••••••••••••••••••••••••••••••••••
C3S EDU Demo
Become a WEMC member
Become a WEMC member

The energy transition is industry knowledge, targets and undeniable. Climate impacts business opportunities as well. are taking place, and increasing, We need to also remind making the work that we do in ourselves to continue to strive the energy and meteorology to work outside of our comfort industry ever more important. zones, to avoid 'silos' and Despite best efforts, we still need collaborate as much as we to do more to communicate the can across the communities. It role of meteorology in energy could be as simple as making systems. And we need to reach a call or sending an email to out to the energy industry someone who may not be your and policy makers in a clear, natural point of contact – be it consistent way.

The ICEM helps to facilitate these conversations, and helps private providers of weather, climate and energy information share their knowledge and learnings through workshops and presentations. As the flagship WEMC event, ICEM attendees regard it as the premier conference for the exchange <u>of scientific and</u>

### LEADING THE WAY WITH THE ICEM

In the words of Line Storelvmo in a way that better matches need for improved organisation future. and, critically, taking forecasts at various time scales into consideration during the planning phase of power plants, not just during their operation, maintenance and management.

a scientist, an energy industry expert, a policy maker, etc.

Holmberg of Vestas, during the In summary, the ICEM 2019, recent International Conference provided a lot of collaboration of Energy and Meteorology opportunities, and attendees (ICEM) in Copenhagen, "The benefitted from workshops era of 'producing and forgetting' and discussions around topics is over - we need to pay more such as business opportunities, attention to how we produce data standards climate services, energy, and this should be done education and more.

what we actually need and Tobuildonthesecollaborations, consume." This has become we're planning for the next even more pressing as subsidies ICEM, and we're looking forward for wind power and other to bringing all our colleagues renewables are being phased in the energy and science out in some countries. There's a industries together again in the



PROF. ALBERTO TROCCOLI ICEM 2019 Convener Founder & Managing Director, WEMC

### A GLOBAL PLATFORM FOR ENERGY AND METEOROLOGICAL EXPERTISE

We've long felt the need for knowledge sharing across the energy and meteorology sectors to uncover innovations and solutions to climate and energy issues. So, in 2011 we set out to provide a unique platform to facilitate that – the International Conference of Energy and Meteorology (ICEM).

The inaugural ICEM, hosted on Australia's Gold Coast, attracted energy and meteorology specialists from 50 different countries, proving the sector-wide desire for collaboration. And it set in place a blueprint for our future events in France (2013), USA (2015), Italy (2017), China (2018) and our most recent conference in Denmark (2019).

Today, the ICEM is known as a global platform which brings worldleading research organisations, meteorological service providers, energy companies and policy specialists together to share expertise and discuss innovations and actions on industry issues.

#### LEADING THE ENERGY TRANSITION

In recent years, the call for more sustainable solutions to reduce the effects of climate change has grown in strength and urgency. With the combined expertise of the science, meteorology and energy communities who attend the ICEM events, we are in a unique position to help lead the energy transition.

The conferences and the world-leading interactions that take place there between our communities keeps the focus on the critical issues. And helps move us all towards more sustainable and renewable energy systems.

wemcouncil.org/wp/icem/

### A SUCCESSFUL PARTNERSHIP BASED ON SHARED VALUES

The success of the ICEM 2019 is down to the hard work and dedication of both WEMC and our partner, DTU Wind Energy at the Technical University of Denmark. The conference facilitated valuable collaboration between the science and energy communities, and that collaboration is so important to the future of sustainable energy. DTU's Sven-Erik Gryning tells us more.

#### AN INNOVATIVE ALLIANCE

40 years ago, a small pioneering group shared a vision of a sustainable future and challenged themselves to create reliable, costeffective energy technology with global applications. They succeeded, and thanks to their wind turbine test station at Risø out by Roskilde Fjord, the group (known today as DTU Wind Energy) are now world leaders in wind power. It's a strong testimony showing what collaboration across disciplines and across sectors can achieve.

It's this kind of commitment to making a difference that will help us on our way to a more sustainable, efficient and resilient energy future. By sharing knowledge and developments in global, multi-sector networks, we can tackle the issues of climate change and improve the integration of renewables into our energy systems.

#### SHARED VALUES FOR SUSTAINABILITY

At DTU we've embraced the UN's Sustainable Development Goals of technology for the people and for the benefit of society. These values are also shared with the experts behind the ICEM. I'm delighted to have been able to work with them on ICEM 2019 at DTU in Copenhagen and I look forwards to any future events they host.

Sven-Erik Gryning, PhD and D.Sc; Emeritus DTU Wind Energy

### "Attending ICEM 2019 was great. I found the session regarding wind forecasting in a marine environment by Sven-Erik Gryning fascinating."

"In the C3S Energy Workshop, there was a lot of positive discussion on solar modelling with attendees, especially with those from the USA."

Roberta Boscolo, WMO

6<sup>th</sup> INTERNATIONAL CONFERENCE **ENERGY & METEOROLOGY** EXPLOITING THE LATEST WEATHER AND CLIMATE TECHNOLOGY TO TACKLE THE ENERGY TRANSITION

Yves-Marie Saint-Drennan, ARMINES

wemcouncil.org/wp/icem2019/



### TWO INDUSTRIES IN ONE CRUCIAL ÇOMMUNITY

The ICEM 2019 Pre-Conference seminar focused on two parallel tracks: 'Energy for Meteorologists' and 'Meteorology for Energy Specialists'.

It started with a full day of presentations and interactive sessions designed to give delegates an overview of all the latest research and technology being applied in the energy and meteorology sectors. Many points and recommendations emerged from these lively discussions which will be useful to support developments in energy and meteorology in the near future.

One of these presentations focused on how sharing weather and energy data, especially big data, is important for analysis and forecasting products. But the lack of data standardization and availability from various sources is an issue.

It was also mentioned that probabilistic information needs to be better communicated and integrated into risk management. And that routine feedback from the energy industry could help with the improvement of meteorological products, particularly for the evaluation of the reliability of forecasts on all time scales – from short-term (hours to days), through the medium-term (weeks to months) to the climate (years to decades). Alongside these forecast models, expert judgements are needed to ensure better quality forecasts, particularly from the market and meteorologists within the industry.

Following on from this, raising awareness of the practical issues that end-users are facing was discussed as an effective way to engage the market. For example, what issues do wind-farm operators face and what do they need to address those issues? However, it was noted that when doing so, clarity with terms is critical. The term 'risk' is associated with probabilities of events occurring; the term 'resilience' as the ability to bounce back from a severe event. And we will always have 'uncertainty' but quantifying this and trying to reduce it in the long term would be beneficial.

There were also discussions which focused on the meteorological impact on infrastructure and assets, not just energy resource and demand — better assessment of severe, extreme weather episodes is critical. For instance, by analysing the long-term climate scale through historical data (such as re-analysis) first, we can generate climate projections and scenarios after. The problem here is that there is no set-method to assess how the energy industry can best prepare for extreme events, especially in countries with no futures markets. Even when there are futures markets, there is little experience of how to price it – for instance, people want insurance against extreme events, but there are no methodologies for how to sell it, or price it.

On the face of it, more communication between the energy industry and meteorology sectors is crucial and needs to continue. In addition to this, standardized terminology and references, as well as listening to each other, adapting and keeping the message simple, need to become standard practice in order to tackle the pressing climate and energy challenges.

### ENGAGING ENTREPENEURS WITH INFORMAL LEARNING OPPORTUNITIES

### AN EXPERT-LED WORKSHOP ON HOW TO START AND FUND YOUR OWN WEATHER BUSINESS COMPANY.

One of the targets of the ICEM is to generate new business opportunities. To maximise this, the 2019 ICEM in Copenhagen introduced a workshop to assess the level of interest that graduate students working in the weather and climate sectors had in setting up their own business.

Many universities already offer commercial advice to students, but the idea of this workshop was to provide a more informal opportunity for would-be entrepreneurs to learn from established 'weather sector' entrepreneurs first-hand. And to gain valuable knowledge from an expert in small and medium enterprise (SME) funding. It also offered the opportunity to plug into the 'Global Weather Enterprise' – a network of organisations in the private, public and academic sectors working to create, enable and provide weather information to society. The overall aim is that this network, and the information they generate, can be used on a routine basis to save lives, improve efficiency and profitability, and to help manage and mitigate the impact of extreme weather and climate change.

The workshop featured two entrepreneurs: William Hosack, Chief Executive Officer (CEO) of Orbital Micro-Systems, and Dr. Jan Dutton, CEO of Prescient Weather Ltd. The funding specialist was Andreas Helgason Rex, CMO & Partner of Lendino – a Danish specialist in SME crowdfunding. Chairing the workshop was Ian Harper, a business journalist and conference organiser with a special interest in business start-ups and SMEs.

Audience participation was very good and the panellists felt the event had gone well and were pleased they had contributed. Bill Hosack commented,

"I thought the workshop went very well. I really liked that there was a mix of career life cycles in the room. I think more workshops like this need to be done, especially for the student scientist entrepreneurs that are just getting ready to enter the world. What might be interesting is if we had some submissions by the students of a four-up slide that one of the panellists could review and use as a business learning opportunity."

Jan Dutton and Andreas Helgason Rex were similarly enthusiastic, and all three said they would do another given the chance.

The response from the audience was very revealing. Several participants said they had no idea that there were such opportunities available in the 'weather business', while others welcomed the informal nature of the workshop, saying it was more informative than the formal service offered by their own University.



6

8

### ICEM LEGACY: SUPPORTING THE NEXT GENERATION

The work of young science and energy experts is something to be celebrated as the future of the industry, and at this year's conference, we were delighted to recognise several of them with awards.

As

the



The Young Scientist Award went to Ana Carolina do Amaral Burghi from DLR in Germany.

#### Can you tell us about your current role and what you do?

I am a PhD candidate and Research Engineer at the German Aerospace Center. The focus of my work is to include the uncertainties related to weather forecasts optimized dispatch into planning for renewable power plants with storage, especially Concentrated Solar Power (CSP) plants with thermal storage.

#### What does it mean to win the Young Scientist award?

As an engineer who has worked with and learned from experts in the meteorological industry, this award means the successful cooperation between our sectors. By understanding the effects of the weather and enabling improvements on energy dispatch planning, we've worked together to achieve great results.

What do you see as the key benefits of meteorology/climate science for the energy industry?

#### renewables worldwide, climate science gains more relevance and connections between meteorology and energy experts should be strengthened. I believe the key benefit is, by and will continue to be, the interdisciplinary work: people with collaborating, understanding energy and meteorology needs/

challenges, and generating possible improvements and solutions.

### this year's ICEM conference?

provides a great ICEM opportunity to meet qualified, motivated professionals who are embracing the challenge of bringing energy and meteorology closer together for a more sustainable environment. The workshops fascinating also facilitate discussions and I was able to reconnect and strengthen relations with people I met at ICEM 2017.

The Best Poster Award went to Hadrien Verbois from the National University Singapore. 



#### increase How long have you worked in science/energy and why did you pursue this career?

I've been in the renewable energy and meteorology field for four years. I was attracted the multidisciplinary features of the field: working computer scientists, statisticians, atmospheric physicists and engineers. It's also very motivating to be part of such a fast-evolving industry.

What do you see as the key What were your highlights from benefits of meteorology/climate science for the energy industry? Against the backdrop of climate change, meteorology and climate science are becoming critical in even more industries. In Singapore, for example, solar irradiance forecasts used to be utilized by energy markets only, but now they're used for smart buildings too.

#### The Best Poster Award is open to all delegates, what is your top tip for getting their poster to stand out above the others?

In my opinion, a good poster should highlight the substance of the work without getting lost in technical details.

The ICEM 2019 Best Student Presentation Award went to Joao Monteiro Correia of University College Dublin.

ICEM offers something different for every attendee, but here's what student attendee, Konstantinos Missios, MSc. from DTU's Wind Energy Student Association (WESA) has to say about his experience of the final day of the conference.

#### **INSIGHTS INTO ENERGY** AND METEOROLOGY

Two presentations drew my attention the most. 'Probabilistic short-range forecasting for icingrelated wind power production losses' by Heiner Körnich was the first. In this project, they developed probabilistic short-range forecasts of icing by combining an NWP model HARMONIE-AROME with the icing Makkonen model and an empirical production model.

The second was 'High resolution Dynamic Downscaling of CMIP5 Model Data to Assess the Effects of Climate Change on Renewable Energy Distribution in New York State' by Jeffrey M Freedman. In this study, the potential effects of climate change on the renewable energy resources of NY state are investigated, with a number of examination variables such as hub height, wind speed, cloud fraction and more accounted for.

To sum up, although it was only one day, I had the chance to learn and gain insights about the current energy and meteorology fields from both research and industrial perspectives. WESA and WEMC have my sincere thanks for giving me this chance to meet people, have discussions about the green transition and broaden my network. I'm sure that I'll make my best effort to attend the next International Conference Energy and Meteorology.

The first Stakeholder workshop was held during the sixth annual ICEM on 26 June 2019 at the DTU in Lyngby, Copenhagen. It showcased the new C3S Energy climate service and the preoperational C3S ECEM demonstrator, facilitated questions and discussions, and featured valuable case studies. The workshop was divided into three sessions to give our 60 attendees a clear view of the service and the benefits it can bring to a business.

Session one: Demonstrated how the C3S Energy operational service can benefit research, energy planning decisions and policy, in addition to the practical value of the data to the end users.

Energy.

During these sessions, several thought-provoking questions were raised on the challenges faced during the development of the C3S Energy service, the maintenance of data quality, the accuracy of forecasts and the solar variability in forecasts. But seasonal forecasting proved to be an area of marked interest in both sessions one and three – generating stimulating discussions which highlighted several factors for the team to consider in the future. These included the adoption of non-traditional renewable sources of energy, and the singular importance of accurate climate data for the energy sector. It also raised questions around how the application of advanced artificial intelligence methods could better exploit the vast climate and energy datasets.

It was a valuable experience for the C3S Energy team, and they'd like to thank all the delegates who attended. They look forward to another successful event in April 2020.

### A VIEW FROM WESA C3S ENERGY SERVICE WORKSHOP

Session two: Offered a guided tour of the C3S ECEM demonstrator over the lunch break, indicating any upcoming features in the C3S

#### Session three: Focused on how applying C3S data can extract value for businesses, using two case studies to illustrate this.



The World Energy & Meteorology Council (WEMC) was founded to help generate knowledge and expertise in weather and climate risk management for the energy industry. Working with partners and members worldwide, WEMC brings together experts from the energy and climate science communities to collaborate and share knowledge.

#### SEASONAL FORECASTING FOR RISK MANAGEMENT

One of our key projects focuses on the benefitsof Seasonal Climate Forecasting for Integrated Risk Management (SECLI-FIRM) in the energy and water industries. Launched in February 2018, SECLI-FIRM is an EU Horizon 2020 project funded by the European Union. It focuses on how longterm seasonal forecasting can help the energy and water industries with decision-making and risk management. We hope to demonstrate the benefits of these seasonal forecasting methods through a number of case studies produced with our partners and key industry stakeholders.

#### STAKEHOLDER COLLABORATION

WEMC has several partner including the University of East Anglia, Enel, ENEA, Met Office, UL, KNMI, EURAC and Alperia. And our key industry stakeholders include Shell, TenneT, Celsia, AES Chivor, National Grid and Thames Water. But we also consult with energy producers and market operators, regional to international organisations, and commercial climate service providers as part of our broader stakeholder engagement.

This collaboration and the resulting combined activity at conferences, meetings and workshops, helps us bring together significant expertise to maximise the outcomes of the project and ultimately, the practical application for end-users.



CASE STUDY 7 Energy logistics: wind and wave conditions

This case study illustrates how the application of long-range forecast data, or forecasts longer than typically used by the offshore oil and gas industries, might be used to identify calm weather windows in autumn and spring months. This can help facilitate earlier decision-making and reduced operational costs for the marine energy sector.

Our partners at the Met Office and Shell have been exploring weather pattern typology as a mean's of characterising the large-scale circulation, which is more predictable than the actual weather itself at long lead-times. Building on a previously developed preliminary outline of the concept, significant improvements have been made. It now better accounts for seasonality in the wave climates used for the downscaling, where a probability distribution for each weather pattern is computed using a rolling three-month window centred on each day.

We'll considerer long-term statistics and specific (discrete) events to establish how early adverse weather events (resulting in significant operational downtime) could have been identified. Then we'll use that to build industry 'trust' in longer-range products and demonstrate how it could've been of benefit in previous/historic examples.

### WORKSHOPS, MEETINGS AND STAKEHOLDER **ENGAGEMENT**

Norwich, UK.

Our busy three-day programme of events included two stakeholder workshops days, as well as an evening of cross-sector networking on 18th September, followed by a meeting of the SECLI-FIRM Advisory Board on 19th September.

Led by project leader, Alberto Troccoli, the Advisory Board meeting consisted of presentations by the leaders of the Work Packages followed by lively Q&A sessions. The highly productive meeting reviewed the project progress and assessed the quality of work undertaken so far while gathering feedback from the Advisory Board. This led to dynamic discussions around the project capabilities and the needs of the end-users. And the question of exploitation was discussed at length to determine what sustainable activities could be undertaken once the project is finalised.

The general reception of the achievements to date were encouraging, but the Board felt the key messaging could clearer. They also mentioned the need for broader external communication with users outside of the climate and energy sectors. Delivered at various levels, these communications should clearly outline the key messages to maximise uptake whilst factoring in the role of economics as a key driver of change. At the same time, communications also need to be considered by the project as it progresses, so that project output is not oversold. On the Board's recommendation, the current communication focus is on promoting each of the nine SECLI-FIRM case studies by means of tailor-made videos. These work to reinforce the message of the four-page brochures available on the project site (http://www.secli-firm.eu/).

The outcome of this positive meeting of energy and climate industry experts was the re-enforcement of the willingness to continue working together to promote the integration of seasonal climate forecasts into energy and water applications. And of our dedication to the development of a system to be routinely used by the energy and water industries.





#### The third SECLI-FIRM workshop was held in September 2019 at Dunston Hall Hotel in

#### FIND OUT MORE

Full details about SECLI-FIRM including project news, an introductory video, the nine case study factsheets and interviews with the project team members can be found at secli-firm.eu

Follow us on Twitter for all the latest project updates:



eurac



### A NEW CLIMATE AND ENERGY EDUCATIONAL TOOL FOR HIGH SCHOOL STUDENTS AND TEACHERS

wemcouncil.org/wp/projects/c3s-climate-and-energy-education-demonstrator/



### JOIN THE WEMC COMMUNITY

### WHO BECOME A WEMC MEMBER?

WEMC members come from all across the energy, water and science sectors, but what makes us a community is our one common aim – to work together using our shared knowledge and expertise to help create more efficient, sustainable and resilient energy systems.

Scientific research on weather and climate, and how it applies to the energy sector, is at the heart of what we do.

Educating present and future generations about the importance of climate change and the energy transition is a crucial part of our work. If you're in education, we'd love to work with you.

data and learning.

### JOIN US TODAY

WEMC membership is FREE, so if you share our aim and you'd like to contribute to our work, join us today. You'll get exclusive access to data, research and educational resources, as well as memberonly discounts and the opportunity to collaborate with your peers through our Special Interest Groups. Visit wemcouncil.org for more information about becoming a WEMC member.

12

JOIN WEMC **MEMBERSHIP** IS FREE wemcouncil.org



i!i.



We work closely with our energy sector partners to find ways to tackle the energy transition. Our ultimate goal is to help the energy sector create cleaner, more resilient energy systems through the use of proven and reliable scientific

We work with experts from leading energy and water companies. Whether you work onshore or offshore, in wind, wave or solar energy or if you're interested in innovative ways to tackle the energy transition, get in touch.



#### IN PARTNERSHIP WITH

## DTU

#### PROUDLY SPONSORED BY



### GET IN TOUCH

FOR MORE INFORMATION ABOUT ANY OF THE PROJECTS OR ACTIVITIES FEATURED IN THIS MAGAZINE, PLEASE VISIT OUR WEBSITE OR CONTACT US VIA ONE OF THE METHODS SHOWN BELOW.

THANK YOU FOR READING



www.wemcouncil.org



twitter.com/WEMCouncil



info@wemcouncil.org



www.linkedin.com/company/worldenergy-&-meteorology-council