

Welcome and Introduction to the Airborne Wind Energy Conference 2021

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Dear conference participants, dear friends,

welcome to Milano and welcome to the 9th international Airborne Wind Energy Conference! We are excited to present you an inspiring program in a beautiful location.

A renowned, global excellence center of fashion and design, Milano is Italy's financial, commercial and industrial capital, at the heart of one of the most industrious regions of Europe. It hosts countless cultural landmarks, like the Duomo cathedral, the Castello Sforzesco, and Leonardo da Vinci's Last Supper in Santa Maria delle Grazie.

And on June 22-24, 2022 Milano is also the global hub of the Airborne Wind Energy industry! The scientific program includes:

- Four plenary sessions with keynote talks by prominent speakers working in the field of renewable energy and airborne wind energy, spanning policy and strategic visions, industrial and business developments, and academic research:

Stephan Barth, Chair of the International Energy Agency's Wind Technology Collaboration Program (IEA Wind TCP);

Paula Nardone, Associate Professional at the International Renewable Energy Agency (IRENA), in the area of Renewable Energy Markets and Technology;

Stephan Wrage, CEO and Managing Partner at Skysails Power GmbH;

Christopher Vermillion, Associate Professor at North Carolina State University at Charlotte;

Philip Bechtle, Privatdozent at the University of Bonn.

- Twelve contributed talk sessions in three parallel tracks with altogether 63 presentations
- Two poster sessions, each preceded by plenary spotlight presentations, with altogether 26 poster presentations
- Two panel discussions which include a further 5 presentations by AWE OEMs.

All abstracts presented in this book have undergone a peer review process, and we want to thank all authors and all reviewers for having contributed to a high quality scientific program, as we believe. We also thank all members of the programme committee for their work and support in the abstract reviewing process.

In the now well-established tradition of AWEC, we decided to rename the three main conference auditoria after renowned "researchers". We chose for the occasion three famous Italian explorers and pioneers:

- "Room Colombo" honoring Cristoforo Colombo (1451 – 1506), the Italian explorer and navigator who completed four voyages across the Atlantic Ocean and achieved the first European contact with the Caribbean, Central America, and South America;



Politecnico di Milano, view of the Building 1 from Piazza Leonardo da Vinci.

- “Room Vespucci” honoring Amerigo Vespucci (1451 – 1512), the Italian explorer and navigator from whose name the term “America” is derived;
- “Room Polo” honoring Marco Polo (1254 – 1324), the Venetian explorer, merchant and writer who reported for the first time in Europe many aspects of the then-mysterious culture of the Eastern World.

Indeed, the people that attend and present their work at the conference are the explorers and pioneers of Airborne Wind Energy Science and Technology, which is today in a clear and well-sustained transition from an early-stage concept to a commercial renewable energy solution. Amid up and downs, we see a steady increase of support and interest in AWE, resulting in solid and growing activities of research and development, testing, standardization, and global collaborations. Today, we witness the first commercial systems in the 100-kW range in operation, the development of joint worldwide collaborative projects such as the IEA Task 48, several sector studies carried out or being started and a growing number of projects featuring public-private collaborations.

When it comes to industrialization and commercializa-

tion, engineering and design are key elements, which are remarkably represented by the conference venue. The main conference building is in the Leonardo Campus of Politecnico di Milano, named after the Italian polymath, draughtsman, engineer, scientist, theorist, sculptor, painter and architect Leonardo da Vinci (1452-1519). The Politecnico di Milano is a founding member of Airborne Wind Europe and active participant in the ongoing IEA Task 48 as well as in several projects and collaborations with AWE companies and research groups. We are sure that the conference venue and environment, in the classrooms where thousands of students daily participate to lectures in STEM disciplines, will stimulate fruitful discussions and exchange of experiences among all attendees.

An important aspect of a -finally again!-in-presence conference is the social program, to foster collaborations, new ideas, and networking. That of AWEC 2021 includes:

- a visit to Politecnico di Milano’s wind tunnel, one of the largest in Europe, and a welcome cocktail on June 22 in Politecnico’s Bovisa campus;
- lunches and coffee breaks at the conference premises;

- a banquet in the Liberty-style Osteria del treno, a piece of Milanese history, built as a club for railway workers at the nearby Stazione Centrale.

The event would not have been possible without its sponsors (listed on pages 8–9), to which we express our sincere gratitude.

We also warmly thank the people at Politecnico di Milano who contributed to the local organization, in particular Laura Brambilla and Martina Spinelli (DEIB communication), Francesco Esposito (logistic services), Isabella Pedone, Rosa Petrelli (DEIB admin), and Luigi Esposito Feudale (CIT services), and the people who contributed to the editing of this book, Filippo Trevisi and Nicolas Kessler.

AWEC 2021 takes place at a unique point in history, after two years since the Covid-19 pandemic outbreak. At the same time, a war that most people in the world

thought impossible is raging in Europe since more than four months, exposing once more the geo-political implications -besides the environmental ones- of a society that heavily depends on non-renewable and geographically concentrated fossil fuels to supply most of its primary energy demand.

Hoping that peace will return soon, in these dreadful times we like to attribute to AWEC 2021 an additional value, as a symbol of a new beginning and restart of in-presence interactions towards the common goal of making the abundant, widespread, renewable and sustainable high-altitude wind resource reliably available to humanity.

We wish all AWEC 2021 participants a fruitful and inspiring experience.

Sincerely,



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