NEW GENERATION OF OFFSHORE TURBINE BLADES WITH INTELLIGENT ARCHITECTURES OF HYBRID, NANO-ENABLED MULTI-MATERIALS VIA ADVANCED MANUFACTURING

Workshop on lightweight, multifactional and digitalised materials for offshore wind and tidal turbines

Dissemination and Exploitation Open Day Workshop

Agenda

V3

Date: 10 October 2024
Time: 08:45 – 17:30 **(DST - UK time)**
Venue: **Homerton College**,
Hills Road, Cambridge
CB2 8PH – UK
(hybrid)

ZOOM

www.Carbo4Power.eu
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This project is supported by the European Union under the HORIZON2020 Framework Programme Grant Agreement no. 953192.

Contents

Carbo4Power Project

Carbo4Power is developing a new generation of lightweight, high strength, multifunctional, digitalized multi-materials for offshore wind and tidal turbine rotor blades that will increase their operational performance and durability while reducing the cost of energy production (bellow 10 ct€/ kWh for wind turbines and 15ct€/kWh for tidal), maintenance and their environmental impact. The innovative concept is based on nano-engineered hybrid (multi)materials and their intelligent architectures which breaks down as follows:

- Nanocomposites based on dynamic thermosets with inherent recyclability and repairability and tailored nano-reinforcements to enhance mechanical properties.
- Multifunctional nano-enabled coatings to improve turbine protection (e.g., against lightning and biofouling (e.g. 50% fouling release).
- Blade segments will be designed and fabricated by advanced net-shape automated multi-material composite technologies that will allow ca. 20% scrap reduction.
- The approach for WTB is to deliver innovative design of modular rotor blade, while the approach for TTB is aimed towards an optimal design for 'one-shot' manufacture.
- Recycling of blade materials will be increased up to 95% due to the advanced functionalities of 3R resins and adhesives with debonding on demand properties.

The strategic goal is to provide the frame which will create new pathways for manufacturing of FRPs for multiple processing life cycles, and explore the emerging valorisation opportunities in offshore energy sector. A multidisciplinary team of 18 partners (8 SMEs) from 8 countries provides technological know-how and industrial leadership, with well-balanced dissemination, communication & exploitation impact.

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The Carbo4Power is a 4-year project, which started in November 2020 and it is led by the National Technical University of Athens (NTUA). This project is funded by the H2020-EU.2.1.3. – INDUSTRIAL LEADERSHIP – Leadership in enabling and industrial technologies – Advanced materials Programme (€ 7 8 million – Grant Agreement 953192).

Meeting Venue:

The 2nd Dissemination and Exploitation Open Day Workshop of the **Carbo4Power** Project is taking place at the:

Bamford and Skillicorn Room
Homerton College
Hills Road
Cambridge
CB2 8PH

*Lunch and coffee breaks will be served at the **Ibberson Fellows' Dining Room**.*

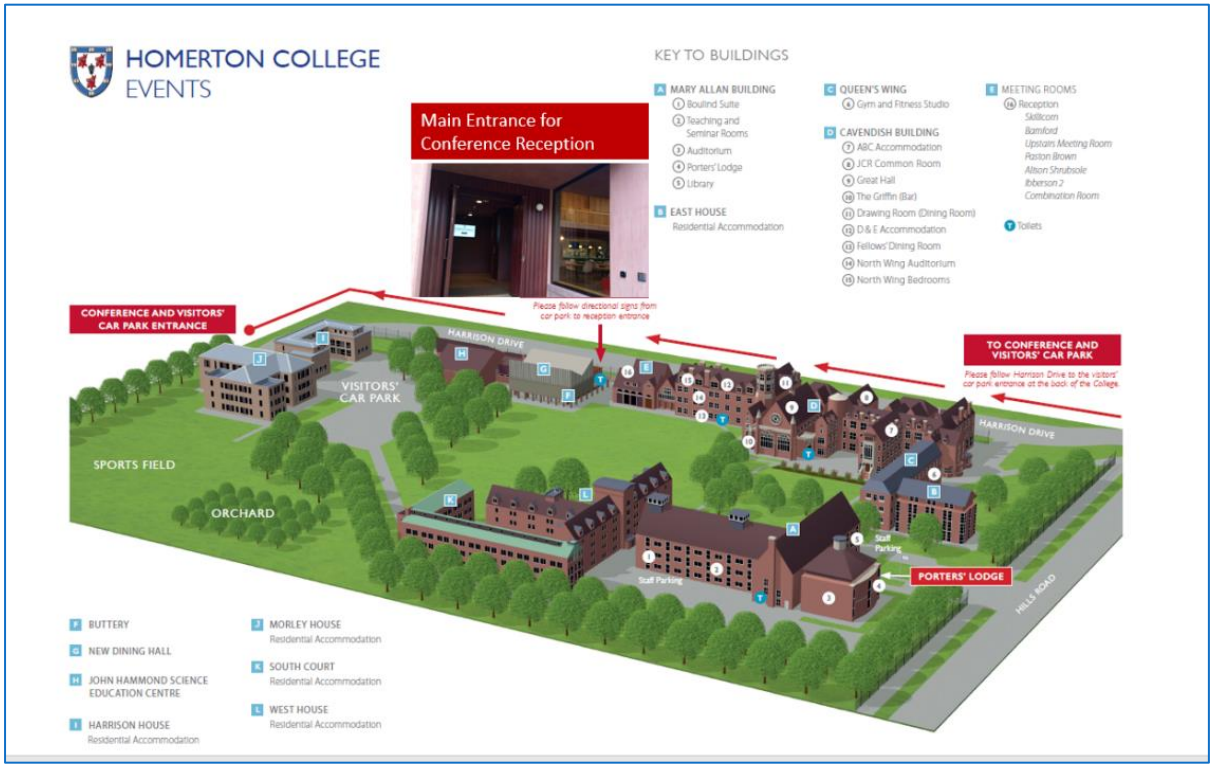
If you approach the college by foot or public transport, **Homerton College** is on the right-hand side past *Hills Road Sixth Form College*, behind the black railings. "***Carbo4Power Open Day Workshop***", will be signed posted, follow the signs to the event.

Parking at the College

There is a large car park at the rear of Homerton College which is free of charge for conference delegates. This is located at the end of **Harrison Drive**. Follow the road all the way round the back of Harrison House. Please see site plan below. Space is not guaranteed and is available on a first come first served basis.

To access the car park, key in the code 4073 at the barrier.

PLEASE NOTE THAT HOMERTON COLLEGE AND GROUNDS OPERATE AS A NO SMOKING SITE; *However, there are 2 permitted smoking locations, one at the rear conference car park and the second to the south side of the Mary Allen Building, within the MAB car park*.



Carbo4Power Open Day 2024 Workshop – Preliminary Agenda

Please take notice that all times shown in the agenda are ***UK time (DST)***

08:45 *Arrival, Registration and Refreshments* ***Fellows' Dining Room***

09:00 Welcome to the Carbo4Power Open Day & Introduction to the Carbo4Power Project

Bojan Boskovic, Managing Director, Cambridge Nanomaterials Technology Ltd (CNT)
Carbo4Power Exploitation & Dissemination Open Day 2023 Organiser

- Welcome to the Carbo4Power Open Day & round table introduction of participants
- Introduction to the Carbo4Power Exploitation and Dissemination activities
- Introduction of the workshop and organisers

09:45 Costas Charitidis & Stefania Termine, NTUA, Greece *(online speakers)*

Title: Carbo4Power Project- New generation of offshore turbine blades with intelligent architectures of hybrid, nanoenabled multi-materials via advanced manufacturing

Multi-materials for offshore wind and tidal turbine rotor blades that will increase their operational performance and durability while reducing the cost of energy production (bellow 10 ct€/ kWh for wind turbines and 15ct€/kWh for tidal), maintenance and their environmental impact. The innovative concept is based on nano-engineered hybrid (multi)materials and their intelligent architectures which breaks down as follows: i) Nanocomposites based on dynamic thermosets with inherent recyclability and repairability and tailored nano-reinforcements to enhance mechanical properties. ii) Multifunctional nano-enabled coatings to improve turbine protection (e.g. against lightning and biofouling (eg. 50% fouling release). iii) Blade segments will be designed and fabricated by advanced net-shape automated multi-material composite technologies that will allow ca. 20% scrap reduction. The approach for WTB is to deliver innovative design of modular rotor blade, while the approach for TTB is aimed towards an optimal design for 'one-shot' manufacture. v) Recycling of blade materials will be increased up to 95% due to the advanced functionalities of 3R resins and adhesives with debonding on demand properties. The strategic goal is to provide the frame which will create new pathways for manufacturing of FRPs for multiple processing life cycles and explore the emerging valorisation opportunities in offshore energy sector. A multidisciplinary team of 18 partners (8 SMEs) from 8 countries provides technological know-how and industrial leadership, with well-balanced dissemination, communication & exploitation impact. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 953192.

10:15 **Antoine De Fontgalland,** IRT Jules Verne, France *(online speaker)*

Title: Focus on the manufacturing and testing of the TTB

IRT Jules Verne, set up in 2012 as part of the Investissement d'Avenir (Future Investment) programme, is an industrial research centre dedicated to manufacturing. Its vocation is to improve the competitiveness of strategic industrial sectors in France by creating disruptive technologies for manufacturing processes.
Its mission is to speed up innovation and technology transfer to factories.

In the C4P project, the IRT is involved in a range of activities, from non-destructive testing to the production and mechanical testing of demonstrators.
The presentation will focus on the manufacturing of the TTB demonstrators and their testing.

10:35 *Discussion*

10:40 *Coffee break, Exhibition and Networking- –* ***Fellows' Dining Room***
Project online exhibition - www.windpowerexpo.net

11:15 **Alberto Fernández Vicente,** AIMEN Technology Center, Spain

Title: General capabilities of AIMEN focusing on their core competence for composite manufacturing

Lourdes Blanco Salgado, AIMEN Technology Center, Spain *(online speaker)*

Title: Successful optimization and advanced manufacturing of modular prototype blades using commercial and developed materials within Carbo4Power project.

The evaluation and optimization of materials' processability using advanced manufacturing processes, automated infusion and AFP processes adapted to process the novel 3R resin will be detailed. Furthermore, emphasis will be placed on the manufacturing strategies and processes to produce WTB demonstrators using the technologies and materials developed within the Carbo4Power project during WP1, WP2, and WP3. The design of the modular blade prototypes has been divided into 3 segments and 2 intermediate patches for cost-effective and optimized manufacturing. The prototypes, WTB demonstrators, are designed and manufactured at a scale-down of 1:20 with a total length of approximately 6 meters.

11:35 **Nadine Rehfeld,** Fraunhofer IFAM, Germany *(online speaker)*

Title: Carbo4Power: Multifunctional coating approaches for blade applications

The presentation highlights the main outcome of the coating developments and includes erosion protection, self-healing, anti-fouling, anti-ice, and drag-reducing riblet surfaces.

11:55 **Elena Jubete,** Fundación CIDETEC, Spain

Title: New resins and coatings for intrinsically recyclable and easy to maintain wind and tidal turbine blades

General presentation of CIDETEC followed by our main outcomes in the Carbo4Power project: CIDETEC is a private organization for applied research founded in 1997 that seeks to contribute value to companies by harnessing, generating and transferring technological knowledge. Located in the Donostia-San Sebastián site of Gipuzkoa's Scientific and Technological Park and with additional facilities at MUBIL, the Gipuzkoa Electromobility Hub, currently employs a workforce of 255. CIDETEC is comprised of three international technological reference institutes in energy storage, surface engineering and nanomedicine. CIDETEC is a member of BRTA (Basque Research and Technology Alliance).
Within the project CIDETEC's work has been focused in two main areas:

- Applying our patented 3R technology for the development of (nano-engineered) resin formulation(s) for the manufacturing of composite materials.
- Developing self-cleaning / hydrophobic coating for WTB and TTB.

Main results on these works will be shown.

12:15 **Matthew Gee,** The University of Birmingham, UK *(online speaker)*

Title: Structural health monitoring of composite wind and tidal turbine blades using acoustic emission

Acoustic emission has been proven to be an effective tool in detecting damage initiation and propagation in composite materials. However, quantification of damage remains a challenging issue. Within CARBO4POWER work has focused on the development of an innovative

approach based on the application of a customised acoustic emission system for the detection and quantification of damage evolution in composite wind and tidal turbine blades. The quantification methodology uses full waveform analysis which enables a more accurate assessment of the level of damage accumulation in comparison with state-of-the-art commercial systems.

Mr Zhuocheng Zhang, The University of Birmingham, UK *(online speaker)*

Title: Development and demonstration of an FE-based digital twin of a composite wind turbine blade

Digital twins of various industrial assets, including wind turbines and their subcomponents, have been a research topic of intensive interest in recent years. Maintenance planning has been deemed to benefit substantially from the effective use of accurate digital twins. Wind turbines are critical renewable energy systems with power output reaching as much as 15 MW. Such large wind turbines are typically installed offshore due to the size of the components that have to be move to the wind farm site. Wind turbine blades are critical components of any wind turbine blades with lengths reaching up to 131m. They need to be light-weight whist exhibiting high stiffness and strength. For this reason they are exclusively manufactured using composite materials. As part of the CARBO4POWER project the digital twins of the wind turbine blades demonstrated within the project have been modelled and demonstrated. The digital twins make use of the acoustic emission and strain quantum resistive sensor data input obtained through the structural health monitoring system installed during the trials carried out in the Angers test facility by IRT Jules Verne.

12:35 **Xingguo Zhou,** University of Strathclyde, UK *(online speaker)*

Title: IoT platform for offshore wind turbine blade structure health monitoring

Wind energy is a vital part of our transition to a carbon-neutral future, helping us tackle the pressing challenge of climate change. Offshore wind turbines, in particular, have an advantage over their onshore counterparts because they experience stronger and more consistent winds, allowing them to generate more electricity. However, the tough conditions at sea—like high winds, waves, and exposure to saltwater—can cause significant wear and tear on the turbines, leading to higher maintenance costs and potential damage to key components, such as the blades.
Our research introduces a cutting-edge Internet of Things (IoT) platform designed to monitor the health of offshore wind turbine blades in real time. By using advanced sensors, edge computing and predictive algorithms, this system ensures timely maintenance is performed, preventing costly damage and reducing the need for frequent, unnecessary inspections. This innovation aims to improve both the efficiency and longevity of offshore wind turbines, making them more sustainable and cost-effective in the long run.

12:55 *Discussion*

13:00 *Lunch, Exhibition & Networking – **Fellows' Dining Room***
Project online exhibition - www.windpowerexpo.net

14:00 **Peter Greaves,** Offshore Renewable Energy Catapult, UK

Title: Comparison of Carbo4Power Demonstrator FE Simulations with Tests

This presentation will cover the modelling approaches used for the C4P demonstrator blades and the structural design of the blade. A comparison will be made between modelled results and the physical tests (modal and static) of the blade which were conducted at IRT Jules Verne facilities in Angers, France.

14:20 **David Cutler**, Haydale Composite Solutions, UK

Title: Haydale – Creating Material Change

In this presentation we will present Haydale and its capabilities related to plasma functionalisation of nanomaterials. We will also demonstrate applications in composite, thermoplastic and de-icing heater ink technology.

14:40 **Spyridon Damilos,** IRES – Innovation in Research and Engineering Solutions, Belgium *(online speaker)*

Title: Expanding Social Impact Assessment Methodologies within SDGs

The European Union's commitment to significantly reducing greenhouse gas emissions by promoting renewable energy necessitates a comprehensive understanding of the societal impacts of these initiatives to achieve sustainable development. A significant challenge lies in effectively assessing the social impacts of the wind and tidal energy sector. Within the EU-funded Carbo4Power project, we addressed this issue by presenting an expanded methodology derived from the Sustainable Development Goals (SDG) Impact Assessment, specifically tailored to assess social impacts in the tidal and wind turbine blade manufacturing. The methodology focuses on social SDGs, excluding unrelated targets based on defined criteria, characterising remaining targets according to their impact and pathways, validating findings through experts' peer review, and prioritising key social targets. Through the methodology, positive contributions to various SDGs are identified, such as Good Health and Well-being (SDG3), Gender Equality (SDG5), Affordable and Clean Energy (SDG7), Sustainable Cities and Communities (SDG11), and Partnership to Achieve Goal (SDG17). This comprehensive assessment underscores the necessity of integrating social considerations into renewable energy projects by emphasising the importance of managing synergies and trade-offs to ensure balanced and sustainable outcomes.

15:00 *Coffee break, Exhibition and Networking* - ***Fellows' Dining Room***
Project online exhibition - *www.windpowerexpo.net*

15:30 **Tomás Flanagan**, EireComposites, Ireland - Guest speaker

Title: Novel and sustainable materials and manufacturing processes for wind blades

ÉireComposites is an innovative design, manufacturing, and testing company, involved in lightweight, high-performance fibre-reinforced composite materials, with an international customer base in aerospace and renewable energy. The company is delivering composite components and assemblies for international aerospace programmes and wind energy projects and is an active research partner and co-ordinator in national and international collaborative R&D programmes.
Earlier this year, ÉireComposites manufactured a 13m wind blade from Elium as part of Horizon Europe MareWind project. Elium is a thermoplastic resin which results in some advantages in terms of manufacturing and recycling. The blade has been fitted with fibre-optic sensors and is currently undergoing structural testing. ÉireComposites has previously manufactured wind and tidal turbines blades from powder epoxy. Powder epoxy is deposited onto glass fibre fabrics in solid state but it melts when processed and becomes liquid thus achieving excellent fibre wet-out. This technology is especially suitable for thick composite sections where infusions can result in dry spots and reduced strength. Powder epoxy structures up to 30cm thick have been deployed in marine applications.
The company is also involved in the Horizon Europe Blades2Circ project which focuses on next-generation wind blades based on bio-composites as well as the EuroStars Reversive project which is using reversible glues to fabricate wind blades that can been more easily disassembled at end of life. Reversive uses the 3R resin developed by Cidetec. ÉireComposites is also leading several smaller projects on wind blades which are funded by the Sustainable Energy Authority of Ireland. These include LEProtect (erosion protection), SustaBlade (sustainable materials for wind blades) and HAWK (Hibernian Wind Energy Kites), which focuses on airborne wind energy.

15:50 **Mr Ibai Santamaría,** TECNALIA, Spain - - Guest speaker (online)

Title: Embedded printed sensors: new possibilities in composites SHM

In recent years, the integration of printed sensors within composite materials has opened new frontiers in structural health monitoring (SHM). This presentation will explore the innovative capabilities of embedded printed sensors, highlighting their advantages over traditional SHM systems. Our technological center, renowned for its expertise in composite material processes and sensor printing technologies, has developed cutting-edge methods to seamlessly embed sensors within composite structures. These advancements not only enhance the accuracy and reliability of monitoring but also offer unprecedented design flexibility and integration potential. Attendees will gain insights into the latest research and development efforts, practical applications, and future directions in the field of embedded sensor technology.

16:10 **Ione Smith,** IDCORE – FastBlade, UK – Guest speaker

Title: 'IDCORE and FastBlade and their contributions to the ORE sector

Ione Smith is a doctoral research engineer on the EPSRC in Offshore Renewable Energy (IDCORE) programme, conducting her work with FastBlade. Ione's research is looking to evaluate the suitability of thermoplastic resins in the manufacture of thick-section composites found in tidal turbine blades. The project will assess the effect of different manufacturing process variables and the impacts of water ingress on thermoplastic materials in order to evaluate if they are a viable alternative to thermosets in the manufacture of tidal turbine blades. The EPSRC Industrial CDT in Offshore Renewable Energy IDCORE) is an industry-focused Doctoral Training Centre that will train 50 Engineering Doctorate (EngD) students in Offshore Renewable Energy (ORE) across five cohorts between 2024 and 2028. Operating since 2012, IDCORE has already recruited and trained more than 100 engineers in the offshore renewable energy sector.

IDCORE is a collaborative partnership of the Universities of Edinburgh, Strathclyde and Exeter, and the Scottish Association for Marine Science (SAMS). Swansea University joined as a new partner in 2024. All five institutions bring together renowned academic expertise in Offshore Renewable Energy and world class research facilities. IDCORE is a four-year programme that combines one-year of advanced training with three years dedicated to an industry-focussed research project with a range of sponsors. The IDCORE programme will train world-class, industrially focussed, research engineers, benefitting from an immersive industry experience, to accelerate the deployment of offshore wind, wave and tidal-current technologies in order to meet the UK's ambitious offshore renewable energy targets.
FastBlade is the world's first test facility that uses regenerative hydraulic technology to offer high-quality, low-cost fatigue testing of tidal blades and other composite structures. The innovative structural composites research facility was developed by the University of Edinburgh specifically for accelerated testing of stiff, slender composite and metal structures,such as tidal turbine blades, composite bridge sections and carbon fibre aircraft wing boxes. FastBlade reduces design risks for developers by providing the opportunity for more and better data sets, thanks to shorter product testing time. This enables more and faster impact-led academic research into fundamental engineering options for new, advanced materials. The accelerated testing of specimens will enable more rapid evaluation, certification and deployment of new products to market. As the world's first dedicated tidal blade fatigue test facility, FastBlade strengthens Scotland's leadership in marine energy and exemplifies the university's industrially focussed research expertise. This presentation will provide an overview of IDCORE and FastBlade and their contributions to the offshore energy sector

16:30 **Hamed Yazdani Nezhad**, University of Leeds, UK– Guest speaker

Title: Process-serving Magnetic Thermoplastics for Enhanced Composite Manufacturing: a magnetic field equipped 3D printing

The urgent need for designing multifunctional materials to serve smart manufacturing has recently been realised, i.e. a material that, once it is approached/reached by a process stimuli (heat, pressure, electromagnetic exposure, etc.) during a manufacturing, it won't be impartial (ignorant) of the manufacturing parameters for either achieving geometric features, properties or both. Generating additional functionality during 3D printing process via remote restoration of magnetisation would suggest tuning internal strain energy, and thus material properties and product shape. The current research hypothesis is that the adaptive character of a new composites manufacturing process can be achieved by using magnetic fields to assist with composites' geometric tailoring. This will allow free-form and rapid manufacturing, promoting net-zero manufacturing and sustainability.
As a case study, the research studies a composite FDM-based 3D printing process equipped with low-strength magnetic fields (< 1 Tesla) to assist with geometric tailoring. The study aims to report on a potential for significant production enhancement via rapidly generating complex geometries out of the basic geometries during polymer-composite-based manufacturing.

16:50 **Mengyan Nie,** University College London, UK **-** Guest speaker

Title: Sustainably manufactured Hybrid steel for wind turbine bearings and corrosion monitoring

Steel manufacturers Ovako recently produced hybrid steels, which offer exceptional corrosion resistance in acidic and NaCl-containing solutions while containing only 5% Cr elements. The hybrid steels also show higher strength compared to the standard bearing steel with hardness of 55-60 HRC but better hydrogen trapping capacity, which is promising to address premature failure of wind turbine bearings. In addition, I will briefly summarise the development of corrosion-based structural heath monitoring devices from previous research projects.

17:10 *Discussion*

17:30 *Closing remarks and end of session*

Note It is planned that all presentations would be followed by Q&A discussion. The organisers reserve the right to change the programme or speakers should circumstances require. For any further enquires please do not hesitate to contact directly the **Carbo4Power Open Day 2024** organiser Dr Bojan Boskovic from Cambridge Nanomaterials Technology Ltd on info@cnt-ltd.co.uk or Bojan.Boskovic@CNT-Ltd.co.uk or on his mobile phone +447780874335.

Carbo4Power Open Day 2024 Workshop - Speakers

Dr Bojan Boskovic (Carbo4Power Partner & Organiser)
Cambridge Nanomaterials Technology Ltd
14 Orchard Way, Lower Cambourne
Cambridge CB23 5BN
UK

Dr Bojan Boskovic is the Founder, Managing Director, and Principal Consultant of the company. He has more than 20 years of hands-on experience with carbon nanomaterials and composites from industry and academia in the UK and Europe. Previously, he worked as a R&D Manager at Nanocyl, one of leading carbon nanotube manufacturing companies in Europe. He also worked on carbon nanotube synthesis and applications as a Principal Engineer-Carbon Scientist at Meggitt Aircraft Braking Systems, as a Research Associate at the University of Cambridge, and as a Senior Specialist at Morgan Advanced Materials. During his PhD studies at the University of Surrey he invented low temperature synthesis method for production of carbon nanomaterials that has been used as a foundation patent for the start-up company Surrey Nanosystems. He was a member of the Steering and Review Group for the Mini-IGT in Nanotechnology that advised the UK Government on the first nanotechnology strategy policy document. Dr Boskovic was working as an advisor for the European Commission (EC) on Engineering and Upscaling Clustering and on setting up of the European Pilot Production Network (EPPN) and European Materials Charaterisation Cluster (EMCC). He has experience in exploitation and dissemination management on a number of FP7 and H2020 European projects, including UltraWire, NanoLeap, OYSTER, M3DLoC, Genesis, nTRACK, Repair3D, Carbo4Power, nanoMECommons, DOME-4.0, TRIankle, AM4BAT and BATTwin. Also, in UK Government InnovateUK funded projects, such as UltraMAT, GRAPHOSITE and HiBarFilm. He is also a

leader of two private membership-based consortiums: Nano-Carbon Enhanced Materials (NCEM) and Advanced Materials for Additive Manufacturing (AMAM).

Prof. Costas A. Charitidis (Project Coordination -online)
School of Chemical Engineering NTUA
Department of Materials Science and Engineering
National Technical University of Athens,
Greece

Constantinos Charitidis is Professor in the School of Chemical Engineering of the National Technical University of Athens and Director of the Laboratory of Advanced, Composite, Nano Materials & Nanotechnology. He is member of the Scientific Council of the Hellenic Foundation for Research and Innovation (ELIDEK). He has been elected in the Deanship of the School of Chemical Engineering of NTUA since 2017. He is one of the founding (in 2014) and organizational members of EMCC and joined (in 2020) the OMB of EMMC and recently elected as co-chair representative of the Organisational Assembly. From 2010 to 2016 he has been Director of Section III: Materials Science & Engineering of the School, while from 2011 he is Director of the Interdisciplinary Postgraduate (MSc) Program: Materials Science & Technology (NTUA). He has more than 25 years of experience in the fields of Materials Science & Nanotechnology, Carbon-based materials and Safety impacts of Nanotechnology. He has extensive R&D experience through collaborations with international research centers since he has participated in more than 60 European and National funded projects, in many of them as Scientific Coordinator (most recent are: Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, Resource Efficient Economy with a Sustainable Supply of Raw Materials NMP FP7, Horizon 2020). He is a referee in International scientific journals, evaluator & scientific advisor of R&D projects. He is in the Editorial Board Member of the Manufacturing Reviews Journal and author of several scientific books, chapters in international text books and more than 400 scientific publications in peer reviewed international journals and conference proceedings and cited ~6800 by other researchers (h-index 44).

Stefania Termine (Carbo4Power Partner online speaker)
National Technical University of Athens,
9 Heroon Polytechniou str., Zographou
Athens, Greece, GR-15780

Stefania Termine is a material scientist from the department of Materials Science in University of Patras. She has received her Master studies on Material Science and Technology at NTUA. She has worked on the growth of carbon-based nanomaterials with CVD method as well as functionalization of carbon fibres with carbon nanotube with CVD and epoxy-based composite manufacturing through vacuum infusion process.

Furthermore, she is experienced in the electromechanical response and self-sensing abilities of carbon-based CFRPs though electrical resistance change method. Part of her research has been presented in national and international conferences and also has peer reviewed publication.

Antoine De Fontgalland (Carbo4Power Partner online speaker)
IRT Jules Verne
France

Antoine De Fontgalland is a research engineer in the Composite Materials Processes team at IRT Jules Verne.
Graduated in mechanical engineering from HEI Junia in 2013.
He worked until 2019 for SONACA in Belgium as Material & Process engineer in the composite R&T team, developing Out Of Autoclave processes to manufacture wing moveables for the Aeronautical industry.
After spending the Covid Years in New Caledonia as a composite materials craftman for the sport and leisure sector, he joined IRT Jules Verne in 2021, dedicating on the infusion /RTM processes with new resins such as Elium or 3R vitrimers.

Alberto Fernández Vicente (Carbo4Power Partner)
AIMEN Technology Centre
Spain

Alberto Fernández has more than 25 years of experience in the field of materials science of metallic and polymer-based composite materials. As part of his research activities, he has been involved in numerous National and European projects leading with the optimization of steel processing and laser-based surface treatment and cladding of metal-based components for improved wear and corrosion behaviour. During the last 10 years, he has oriented his research interests towards the understanding and controlling of optimized process parameters during the manufacturing of composite products, using state-of-the-art liquid composite moulding techniques and more advanced additive manufacturing processes, such as fused filament/pellet fabrication and automated fibre placement technologies. This includes the application of new spectroscopic and NDT techniques for monitoring of materials transformation and defects occurrence during laser-based AM of metals and polymers and automated laying-up of composites. In 2015, he joined the business development unit at AIMEN, where he has been significantly active in the promotion and generation of concept ideas for developing AIMEN´s R&D capabilities and competences within Regional, National and EU framework programs. This includes previous R&D topics together with digital methods applied to composite manufacturing, sensors and systems for product and process systems monitoring, functional materials for energy generation and storage, and high-performance materials for improved durability of and industrial assets. He has published more than 25 national and international paper and has collaborated and managed the elaboration phase of more than 100 proposals. Currently, he is coordinating the participation of AIMEN in several National and EU associations and elaborating the strategic vision of the Technology Centre with respect to Advanced Composite Technologies.

Lourdes Blanco Salgado (Carbo4Power Partner – online speaker)
AIMEN Technology Centre
Spain

Lourdes Blanco Salgado holds both a MSc in Chemistry (Physical-Chemistry) and a MSc in Welding Engineering from the University of Vigo (Spain). She has experience in non-destructive inspection of materials. She has more than 10 years of experience in composite materials and testing. She was involved in several projects in the field of advanced manufacturing processes for composite and multi-materials for the automotive, naval, aeronautical and wind sectors.

Nadine Rehfeld (Carbo4Power Partner – online speaker)
Fraunhofer IFAM
Germany

Nadine REHFELD (Female) has worked in the Paint Technology department at the Fraunhofer IFAM in Bremen, Germany, since 2008. She specializes in development and testing of multifunctional coatings. Nadine Rehfeld is leading the group “Functional coatings for exterior applications” and is mentor for young students und supervises bachelor and master thesis.

Dr Elena Jubete (Carbo4Power Partner)
FUNDACION CIDETEC
Spain

Dr. Elena Jubete is the business Development manager of European Programmes in CIDETEC SURFACE ENGINEERING. from 2016 – till date. She has worked as research scientist in different positions with more than twenty years’ experience in research and development of advanced polymeric materials and sensors. Elena holds a Doctor in Philosophy (PhD) from MMU- Manchester Metropolitan University, United Kingdom (2006) and a Bachelor’s degree in chemical sciences from the University of Basque Country-UPV-EHU, specialising in Macromolecules/polymers).
Currently, as business development manager, she coordinates networking actions at European level, through the framework of HEU European Programmes, with expertise in CLISTERS 4, 5 and 6, in particular in advanced materials. She is board member of ECP4 (European Composites, Plastics and Polymer Processing Platform) and representative of ECP4 in the automotive group of the Circular Plastics alliance. Additionally Elena represents CIDETEC at multiple European platforms such as EARTO Security and Defence Working group, EARPA (the association of automotive R&D organisations), Wind Europe, Materplat, SPIRE, Suschem ,Circular Biobased Europe, and EMIRI. From 2021 she has been working as Independent expert in the evaluation of HEU propososal related to materials topics for HADEA and EISMEA acting as evaluator and rapporteur of multiple proposals.

Xingguo Zhou (Carbo4Power Partner – online speaker)
University of Strathclyde
UK

Dr. Xingguo Zhou (Centre of Precision Manufacturing, University of Strathclyde) is a highly skilled professional with a strong background in Finite Element Analysis (FEA), material modelling/testing, programming and electronics. With a passion for engineering and a drive for innovation, Xingguo has conducted research and practical investigations on the mechanical behaviour and properties of different materials, ranging from metals to composites. This expertise enables him to accurately model material responses and develop robust simulation models for predicting the performance and durability of engineering structures. In parallel, Xingguo possesses a keen interest in electronics. He has applied his knowledge of electronics in the design and implementation of data acquisition systems for experimental testing setups. Their interdisciplinary background allows him to seamlessly integrate electronic sensors and measurement devices into structural testing protocols, enabling comprehensive data collection and analysis.

Mr Zhuocheng Zhang (Carbo4Power Partner – online speaker)
The University of Birmingham
UK

Mr Zhuocheng Zhang is a graduate student at the University of Birmingham, studying Materials Science & Engineering. Curious and inquisitive, with a deep-rooted passion for research and development of condition monitoring. Currently seeking to learn, design and contribute to it with the development of digital twin project for a composite wind turbine blade involving one-way fluid interaction computational method.

Matthew Gee (Carbo4Power Partner – online speaker)
The University of Birmingham
UK

Matthew Gee is a Ph.D. researcher and materials engineer at the University of Birmingham, specializing in Acoustic Emission monitoring and signal processing, amongst other Non-Destructive Testing (NDT) techniques. There is heavy utilization of data processing within this as well as assisting in future developments for digital twins of associated components and the integration of integrated on-line monitoring systems. He is also working on additional European energy projects focusing on condition and structural health monitoring of composite materials, as well as similar work on engineering components outside of these projects.

Peter Greaves (Carbo4Power Partner)
Offshore Renewable Energy Catapult
UK

Peter Greaves is the Principal R&D Engineer (Blade Structures) working in the Research Technical Capability directorate at the Offshore Renewable Energy Catapult. He studied Mechanical and Design

Engineering at Newcastle University, which led to a brief stint working in the offshore industry. After this, he obtained an MSc in renewable energy, also from Newcastle University. His doctoral studies at Durham University were focused on bi-axial fatigue testing of wind turbine blades, and he continues to be heavily involved with blade testing at ORE Catapult. His research interests are mainly on structural simulations of blades and blade testing.

David Cutler (Carbo4Power Partner)
Haydale Composite Solutions
UK

David joined Haydale Composite Solutions in May 2023 as a project engineer for several graphene / nanomaterial project both funded by industry and UK / EU grants. Research experience in polymer chemistry and electrochemistry and synchrotron radiation techniques with Loughborough University and Diamond Light Source facility. With an additional 6 years of industrial experience in the construction materials market working for Saint-Gobain, British Gypsum.

Spyridon Damilos (Carbo4Power Partner – online speaker)
IRES – Innovation in Research and Engineering Solutions
Belgium

Spyridon Damilos, Eur Ing., is a Risk and Safety Engineer at IRES, and Group Leader of the Risk and Safety Department. Holds a BSc in Chemical Engineering and an MSc in Energy Production and Management from the National Technical University of Athens (NTUA), as well as a PhD in manufacturing of nanomaterials from University College London (UCL). His main focus is on risk and safety aspects of (nano)materials and innovative processes and innovative nano-enabled manufacturing technologies, and process hazard analysis.

Guest Speakers

Ione Smith – Guest speaker
IDCORE – FastBlade
Building 29 Watt Rd,
Rosyth, Dunfermline,
KY11 2XH. UK

Ione is a doctoral research engineer on the EPSRC Industrial CDT in Offshore Renewable Energy (IDCORE) programme, conducting her work with FastBlade. Ione's research is looking to evaluate the suitability of thermoplastic resins in the manufacture of thick-section composites found in tidal turbine blades. The project will assess the effect of different manufacturing processes variables and the impacts of water ingress on thermoplastic materials in order to evaluate if they are a viable alternative to thermosets in the manufacture of tidal turbine blades.

Dr Tomás Flanagan – Guest speaker
ÉireComposites,
An Choill Rua
Indreabhán
Galway, H91 Y923, Ireland

Tomás, CEO of ÉireComposites, has a PhD from the University of Cambridge Engineering Design Centre, focused on design project planning and management with special emphasis on risk analysis. Tomás gained experience in process modelling at Perkins Engines and Rolls Royce Aerospace in the UK as well as fatigue testing at Boeing, Seattle. He subsequently worked as a business analyst at BP UK, and as a Project Manager at BP Norway. Tomas joined ÉireComposites in 2014 as R&D director and became CEO in 2018. He is passionate about research in aerospace and renewable energy and has secured over €18Mn in R&D funding for ÉireComposites from Horizon Europe, Horizon 2020, ESA, and other sources.

Mr Ibai Santamaría - Guest speaker (online)
TECNALIA
Spain

Ibai Santamaría is an industrial engineer specialized in mechanical design, with a master's degree in renewable energies and energy efficiency, and a master's degree in project management and direction. Ibai has developed his professional career with a focus on R&D and project management and has been part of companies in the automotive sector, machine tools, and electronic development. In 2023, he joined TECNALIA as the head of the Functional Printing technology platform, where he also contributes with cross-disciplinary knowledge of product, processes and market.

Dr. Hamed Yazdani Nezhad– Guest speaker
Associate Professor in Mechanical Engineering
University of Leeds
UK

Dr. Hamed Yazdani Nezhad is an associate professor in mechanical engineering with expertise in aerospace engineering and aircraft structures, aerospace composites, composites manufacturing and multifunctional composites. He is a member of the editorial boards of several journals including the Nature publishing Journal of Scientific Reports. He is also the Editor/Author of book on 'Composites Assembly for High Performance Fastener-less Structures', and author of +100 high-impact journal papers and peer-reviewed conference articles in the area of aerospace, composite materials, structures, manufacturing and development of multifunctional composites with specific research interest in the study of smart and multifunctional polymer composites with applications in numerous sectors e.g. aerospace, automotive, and energy. He has secured multiple fundings from public and private sectors such as UKRI-Knowledge Transfer Partnership in collaboration with Airborne Composites Ltd. and City, University of London for Scalable Digitalisation of Automated Aerospace Composites (Ref. KTP013729), EPSRC Joint Manufacturing Hubs grant on Contact-less Dielectric Process Monitoring (CDPM) of Composites Manufacturing (EPSRC Composites Manufacturing and

EPSRC Metrology Hubs), Ref. EP/P006930/1, the EPSRC New Investigator project on 'Self-Tuning Fibre-Reinforced Polymer Adaptive Nanocomposite (www.STRAINcomp.com)', Ref. EP/R016828/1, EPSRC DTP grant for 'Microstructural Study of Multifunctional Nanocomposites', Ref. EP/R513027/1, EPSRC DTP grant for 'Bacterial Magnetosome Inspired Material Discovery for High Sensitivity to Ultra-low Magnetic Fields', Ref. 'EP/W524608/1, and the EPSRC Institutional Sponsorship Award for 'Dielectric Activated Resin Cure for Composite Repair (DARCRep)', Ref. EP/P511134/1. He has also led a H2020 European Regional Development Funded project, and numerous direct industrial sponsored projects.

Dr. Mengyan Nie - Guest speaker
Associate Professor
University College London
UK

Dr. Mengyan Nie is currently working as Associate Professor (Teaching) at the Institute for Materials Discovery, University College London. He received his BSc and MSc degrees in Chemistry from Lanzhou University, and PhD in Analytical Chemistry from Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China. Before joining the UCL, he has worked on multidisciplinary applied research projects and collaborated with relevant industrial leading companies and institutions. He has developed expertise in materials performance testing, chemical and electrochemical sensing, surface modification and functionalization, corrosion management, and smart and integrated microdevices.

Carbo4Power Open Day 2024 Workshop – Partners

National Technical University of Athens - R-NanoLab - Greece

Web: www.nanolab.chemeng.ntua.gr

The "**Research Lab of Advanced, Composite, Nano Materials & Nanotechnology" (R-Nano)** is situated at the School of Chemical Engineering, **National Technical University of Athens (NTUA)** in Greece. The R-Nano Lab's research group has extensive experience in Design, Production and Characterization of Advanced-, Composite- and Nano- Materials. The core expertise involves the development of carbon based novel advanced nanocomposite materials for aerospace, naval, civil engineering, and energy applications. The laboratory has been actively involved in research for more than a decade, enhancing its infrastructure and producing a large volume of peer reviewed scientific publications. It is committed to provide knowledge, services and expertise to both private enterprises and public organizations in material developing, manufacturing and testing. R-NanoLab has a strong presence in European Research Activities in Materials Science, through participation in numerous EU and national funded projects. As part of the European Technological Community, R-NanoLab is an active member of several Clusters: European Materials Characterisation Council (EMCC), European Pilot Production Network (EPPN), European NanoSafety Cluster (NSC) taking part in establishment of new standard methodologies, provide suitable background for regulation and nanosafety, and support EC policy development.

Please visit our virtual expo booth at WindPowerExpo

IRT JULES VERNE – France

Web: www.irt-jules-verne.fr

IRT Jules Verne is an industrial and collaborative research centre dedicated to advanced manufacturing technologies. Focused on the needs of 4 strategic industrial sectors – aeronautics, automotive, energy and shipbuilding – it carries out research in collaborative mode by joining forces with the best industrial and academic resources in the manufacturing field. Together, they strive to develop innovative technologies in five main research areas: Forming and Preforming Processes | Assembly and Joining Technologies | Additive Manufacturing Processes | Mobility in the Industrial Environment |Manufacturing Flexibility. The results of this research are then to be deployed in factories in the short and medium term.
In order to offer global solutions up to full-scale demonstrators, the IRT Jules Verne relies on a set of exclusive state-of-the-art equipment, including a multiaxial test bench, an automated injection platform for composites or an additive metal manufacturing platform.
Since 2012, IRT Jules Verne is in line with an ecosystem of innovation and deploys a coordinated strategy with the EMC2 Competitiveness Cluster.

Please visit our virtual expo booth at: WindPowerExpo

AIMEN Technology Center

Web: www.aimen.es

AIMEN is a Non-Profit association, located in the Northwest of Spain and constituted by about 90 companies, which supplies technological support to more than 400 companies dedicated to industrial activity related to metallurgy, automotive sector, shipbuilding, etc. It is highly specialized in materials and in advanced manufacturing technologies, especially joining technologies and laser technologies applied to materials processing, robotics and automation.

Please visit our virtual expo booth at WindPowerExpo

Fundación CIDETEC

Web: www.cidetec.es/en/home

CIDETEC is a private organization for applied research founded in 1997 that seeks to contribute value to companies by harnessing, generating and transferring technological knowledge. Located in the Donostia-San Sebastián site of Gipuzkoa 's Scientific and Technological Park, CIDETEC is comprised of three international technological reference institutes in energy storage, surface engineering and nanomedicine. Each institute has its own offices and installations furnished with top-of-the-line equipment, among them a pilot plant for integrated battery manufacture; equipment to synthesise, characterise and process polymers and advanced composites; laboratories completely equipped for surface study, characterisation and treatment; and 150 m2 of rooms classified and prepared for GMP-standard product manufacture in the biopharmaceutical sector.

Please visit our virtual expo booth at: WindPowerExpo

Innovation in Research and Engineering Solutions – IRES

Web: https://innovation-res.eu/

IRES is a research and innovation-oriented consulting company, established in 2015 providing specialized services in the fields of Environment, Health and Safety (EHS), Nanotechnology and Digitisation of Materials Characterisation, incorporating Data driven methodologies (Machine learning and Artificial Intelligence). Our team comprises of highly skilled engineers and scientists focusing on delivering customized and tailored innovative nanotechnology solutions. In detail, "green" and sustainable solutions are based on Life Cycle Assessment (LCA), Social, Environmental & Carbon footprint and Circular economy, joined with (nano)safety consulting towards accurate occupational risk evaluation and Safer-by-Design process optimization, taking into account the up-to-date EU Standards and Regulations. At the same time, our data management planning and data-driven solutions can identify and prevent potential business risks. Currently, IRES is a member of 20 EU funded research projects consortia, in the field of advanced materials, piloting, research ethics and nanosafety.

Please visit our virtual expo booth at: WindPowerExpo

Aragon Institute of Technology - ITAINNOVA

Web: www.itainnova.es/es

ITAINNOVA is the Aragon Institute of Technology, a non-profit center linked to the Department of Science, University and the Knowledge Society of the regional government of Aragon. The institute has been created in 1984 and its main facilities are located in Zaragoza, Spain.
The mission of **ITAINNOVA** is to support companies through technological research and innovation, helping them increase their competitiveness by developing new products and improving their processes, and by fostering the smart use of technology in regional, national and international contexts. The staff is composed of 240 employees, of which 18% hold a PhD degree and 66% hold a higher education degree. The Materials and Components Division, which is the main group involved in Carbo4Power, integrates 70 researchers and technicians. The division includes the Materials Laboratory, focused on new materials development, processing and advanced characterization techniques; and the Materials and Structures Modelling and Simulation group, focused on development of material models, advanced FE/CFD simulations, multiscale techniques, reduced-order modelling and optimization tools applied to product and process simulation.

Please visit our virtual expo booth at: WindPowerExpo

SENSE in

Web: https://sense-in.fr/en/
After 15 years of research on nano-composite sensors, the Smart Plastics Group of the University of South Brittany (UBS) in Lorient (France) has spined off its technology in 2018 and 2 researchers created **SENSE in** to industrialize innovative and customized solutions of structural health monitoring (SHM) for composites. The company now employs more than 10 people
The R&D, the production and the commercial teams are based in Lorient (Brittany, west coast of France).

Please visit our virtual expo booth at: WindPowerExpo

Fraunhofer IFAM

Web: www.ifam.fraunhofer.de/en.html

Research of practical utility lies at the heart of all activities pursued by the **Fraunhofer-Gesellschaft**. Founded in 1949, the research organization undertakes applied research that drives economic development and serves the wider benefit of society. Its services are solicited by customers and contractual partners in industry, the service sector and public administration.

The Fraunhofer IFAM is one of the most important research institutions in Europe for adhesive bonding technology, surfaces, shaping and functional materials. We put our central principles into practice: scientific excellence, a focus on the application of technology, measurable utility for customers and ensuring the highest quality. Our round about 700 employees, working in 20 departments and numerous working groups combine their broad technological and scientific knowledge and expertise into core competencies: Metallic Materials; Polymeric Materials; Surface Technology; Adhesive Bonding Technology; Shaping and Functionalization; Electromobility; and Automatization and Digitalization.

Please visit our virtual expo booth at: WindPowerExpo

The University of Birmingham

Web: www.birmingham.ac.uk

Founded in 1900, the **University of Birmingham (UoB)** is one of the leading research-based universities in the United Kingdom; the breadth of research expertise is a distinctive characteristic of

the University. University of Birmingham is 81st in the 2020 QS World University Rankings, cementing our position in the top 100 universities globally. The University of Birmingham has extensive experience of EU collaboration and partnerships and in-depth expertise of Framework Programme matters including management, reporting and auditing. The University has been involved in 315 FP7 projects and 284 projects so far in H2020 (March 2020). The School of Metallurgy and Materials at UoB is one of the European materials research centres equipped with world-class materials research facilities. Established in 1983, the Birmingham Surface Engineering Research Group (BSERG) was the first multi-disciplinary research group to be committed to the subject of surface engineering and continuous to be one of the world's premier research centres in surface engineering. The Birmingham Surface Engineering Research Group (BSERG) and Non-Destructive Testing & Condition Monitoring (NDTCM) Groups in the School of Metallurgy and Materials will be involved in this project.

Please visit our virtual expo booth at: WindPowerExpo

University of Strathclyde

Web: www.strath.ac.uk

The **University of Strathclyde** is a top ranked university in the UK national Research Excellence Framework in 2013 (top 20 overall and the manufacturing in top 10 in research power). The Centre for Precision Manufacturing (CPM) has over 40 researchers who conduct internationally leading research in materials processing, product/machine design and manufacture. The activities relevant to this project include Materials Forming Processes, Material/Structure/System Analysis, Tools, Machinery and Manufacturing System Development, Condition Monitoring, Exploitation & Dissemination.

The University of Strathclydes' operational capacity is reflected strongly by its experience in conducting world leading materials processing research and machine designs, having over 100 researchers in the directly related fields and being accessible to over 40 million pounds worthy world-class manufacturing research facilities, and substantial experience in managing large-scale collaborative RTD projects. The members of the staff of the Centre for Precision Manufacturing (CPM) have generated a series of product, process, tool and machinery designs and analysis results respectively for energy, materials, electronics, automotive, aerospace, and machinery industries. As an internationally leading research centre, the group has developed a series of forming processes, forming tools and machinery designs.

Please visit our virtual expo booth at: WindPowerExpo

Cambridge Nanomaterials Technology Ltd

Web: www.cnt-ltd.co.uk

Cambridge Nanomaterials Technology Ltd (CNT Ltd) is an innovation management and nanotechnology consulting company based in Cambridge, UK.

The CNT Ltd helps companies, academic and government institutions to develop world-class innovative solutions for nanomaterials related R&D and IPR strategy, partnership, products, technologies, funding and markets. CNT Ltd is specialised in carbon nanomaterials R&D consulting and collaborative R&D project management, including exploitation and dissemination management, consortium and supply chain building. CNT has done a number of patent landscaping and market research analysis studies regarding production and use of various nanomaterials helping to link inventors and technology developers with end-users and investors. The CNT Ltd is a leader of two private consortiums: Nano-Carbon Enhanced Materials (NCEM) and the Advanced Materials for Additive Manufacturing (AMAM) with members coming from leading multinational companies and research institutions. Through both private consortiums NCEM and AMAM, as well as private and public contracts, CNT Ltd has established strong relations to the aerospace, automotive, construction, electronics, materials development, biomedical and chemical industry.

In March 2019 CNT Ltd opened a sister company CNT Innovation based in Brussels, Belgium, with the aim to support and complement their work, especially in European related activities.

Please visit our virtual expo booth at: WindPowerExpo

Haydale Composites Solutions Ltd.

Web: https://haydale.com/

Haydale are a global technology solutions company, passionate about creating the next generation of advanced materials to improve mechanical, thermal and electrical properties for our customers products. We bring together cutting-edge technology and engineering expertise alongside our patented HDPlas® functionalisation process which revolutionises repeatable performance and continued commercialisation of nanomaterials. Our world leading HDPlas® process has the potential to be a major spearhead in the drive to keep the UK at the forefront of world technology. We have established a secure, robust and sustainable supply chain to support the manufacture of advanced materials. This enables us to deliver repeatable, consistent and outstanding performance. We are also ISO 9001:2015 and ISO 14001:2015 certified. The key to repeatable performance and continued commercialisation of nanomaterials is functionalisation. Functionalisation underpins everything we do. Haydale Graphene Industries Plc has two UK based subsidiaries: **Haydale Composite Solutions** Limited and Haydale Limited. Haydale Composite Solutions Ltd (HCS) is the Group Innovation and Application Centre based in Loughborough, Leicestershire, UK specialising in the development and application of nanomaterial enhanced polymers, composites, coatings and elastomers. The company has extensive knowledge of composites, elastomers and polymers which extends into manufacturing processes, structural design and applications across a broad range of industries. The company has a wealth of experience in the deployment of nanomaterial enhanced materials into the market, utilising the latest in computer aided design systems and has access to its own prototyping workshops for manufacturing and testing.

Please visit our virtual expo booth at: WindPowerExpo

AIDEAS OU

Web: www.aideas.eu

AiDEAS is a highly innovative technology and data solutions provider. The company is building machine learning and AI-power technology to unlock the value hidden in huge volumes of data, reducing the time to find, diagnose, comprehend and act at a speed that is impossible for humans, thereby generating new faster insights. AiDEAS portfolio is built on leading-edge AI technologies including data mining and machine learning/deep learning to (i) enable data-rich and knowledge-lean automation of valuable tasks of perception, classification and numeric prediction as well as (ii) collect,

organise, analyse and discover hidden patterns and value in voluminous amounts of structured and/or unstructured data.

AiDEAS staff comes from different computer science backgrounds with over 15 years' experience and a particular focus in developing novel algorithms as well as leading award-winning academic research for solving important existing and emerging problems in various industries such as Healthcare, Industry 4.0 and Oil & Gas. The core team of AiDEAS is also experienced in the definition, execution and management of big EU projects in the R&D area within an extended European growing network consisting of universities, research centres, SMEs and large enterprises.

Please visit our virtual expo booth at: WindPowerExpo

Bionic Surface Technologies GMBH

Web: www.bionicsurface.com/en/

bionic surface technologies GmbH (BST) is a research and development company based in Graz, Austria.

Thanks to many years of experience and know-how BST is one of the leading, globally operating companies regarding Riblets. Twenty high skilled employees (MSc & PhD level) working with a high-performance data center to improve knowledge in Computational Fluid Dynamics and testing.

Please visit our virtual expo booth at: WindPowerExpo

INEGI

Web: www.inegi.pt/en/

INEGI is an industry-oriented Research and Technology Organization (RTO) with an organizational structure based on three pillars of activity: research with applied focus, innovation and technology transfer and consulting and advanced engineering services. Recognized by the Portuguese Government as being of public utility, INEGI is currently considered an active agent playing a significant role in the development of the Portuguese industry, and in the transformation of its competitiveness model. In the KETs main fields, ongoing European-level projects are framed in H2020, FP7, ESA, CleanSky and Interreg programs. INEGI has active presence in the main European and National technology platforms and initiatives related with materials, manufacturing technologies and transports, specifically in EARTO (European Association of Research and Technology Organizations), EFFRA (related to Factories of the Future PPP), EARPA (automotive sector) ESA (aerospace sector), ACARE (aeronautics sector) and Vanguard Initiative (smart specialization). INEGI has an active role in these initiatives and has contributed to the definition of R&D&i priorities at European or national level, including the RIS3-NORTE strategy. INEGI is also present in other national and international expert panels, consulting committees, groups and societies, sectorial industry clusters (automotive, aeronautics, tooling, additive manufacturing, sea economy and energy).
With more than 30 years working on composites processing technologies, the Composite Materials and Structures Research Unit (UMEC), of which we are part, is one of the key units of INEGI with relevant experience in sectors such as the aerospace, automotive, sea, energy, construction, among others.

Please visit our virtual expo booth at: WindPowerExpo

BioG3D- New 3D Printing Technologies

Web: http://biog3d.gr/

BioG3D is an R&D company, dedicated to innovative 3D printing solutions and “smart” product customization. **BioG3D** team consists of Additive Manufacturing and Computational Design specialists, Materials and Mechanical Engineers, aiming to provide end-to-end solutions and 3D printing services, from initial conception to functional prototype production. The company's mission is to enable new uses for the unique potential offered by Digital Manufacturing, by employing advanced feedstock materials, cutting-edge physical and digital tools to optimize designs, towards a holistic approach for

the fabrication of fully customized products that incorporate advanced functionalities. In this context, BioG3D team has leveraged its experience and know-how to cover the whole range of Additive Manufacturing process chain, from advanced design, custom robotic solutions, AM process optimization and design verification, as demonstrated through numerous EU-funded projects.

Please visit our virtual expo booth at: WindPowerExpo

ORE Catapult

Web: https://ore.catapult.org.uk/

ORE Catapult was established in 2013 by the UK Government and is part of a network of Catapults set up by Innovate UK in high growth industries. It is the UK's leading innovation centre for offshore renewable energy.

Independent and trusted, with a unique combination of world-leading test and demonstration facilities and engineering and research expertise, ORE Catapult convenes the sector and delivers applied research, accelerating technology development, reducing risk and cost and enhancing UK-wide economic growth.

Active throughout the UK, ORE Catapult has operations in Glasgow, Blyth, Levenmouth, Aberdeen, the Humber, the East of England, the South West and Wales and operates a collaborative research partnership in China.

Please visit our virtual expo booth at: WindPowerExpo

Carbo4Power Open Day 2024 Workshop - External Participating Organisations

Airbus Commercial

Web: www.airbus.com

Airbus pioneers sustainable aerospace for a safe and united world. The Company constantly innovates to provide the most efficient and technologically-advanced solutions in aerospace, defence, and connected services. In commercial aircraft, Airbus offers the most modern and fuel-efficient airliners. Airbus is also a European leader in defence and security and one of the world's leading space businesses. In helicopters, Airbus provides the most efficient civil and military rotorcraft solutions worldwide.

Airbus approaches sustainability by respecting the planet, valuing people and enabling prosperity. These guiding principles are embedded in our operations and activities.

EURECAT Technology Centre

Web: https://eurecat.org/home/en/

Eurecat is the main technological centre in Catalonia and the second largest private research organisation in southern Europe.

It brings together the experience of more than 750 professionals who generate an annual revenue of 62 million euros and provides services to nearly 2,000 companies.

Applied R&D, technological services, highly specialised training, technological consultancy or valorisation and exploitation of industrial property are some of the services that Eurecat offers to both large and small and medium-sized companies in all sectors.

The technological centre participates in more than 200 large national and international R&D&I consortium projects of high strategic value and has 200 patents and 10 spin-offs. The added value that Eurecat provides accelerates innovation, reduces spending on scientific and technological infrastructure, reduces risks and provides specialised knowledge tailored to each company. Eurecat has twelve centres in Spain and in 2020 opened its first international headquarters in Chile.

Please visit our virtual expo booth at: CircularEconEXPO

CircularEconEXPO

Avanzare Innovación Tecnológica

Web: www.avanzarematerials.com

At avanzare we aim to bring disruptive change to industry. The next generation of mobile devices, vehicles, household appliances, industrial equipment, medical devices, footwear, packaging, as well as sustainable and smart construction, will require new advanced, more versatile and high-performance materials.

We are specialized in the development, production and commercialisation of advanced functional materials for both emerging applications and alternatives to traditional materials.

Our materials are high performance solutions based on nanotechnology, 2D materials (graphene and other two-dimensional materials) and new emerging materials. We also produce nanointermediates (dispersions of our advanced materials) that allow easy integration by the end customer and facilitate internationalisation.

Please visit our virtual expo booth at: GraphenEXPO

TWI

Web: www.twi-global.com

TWI is one of the world's foremost independent research and technology organisations, with expertise in materials joining and engineering processes as applied in industry. TWI specialises in innovation, knowledge transfer and in solving problems across all aspects of manufacturing, fabrication and whole-life integrity management. Established in Cambridge, UK in 1946, the organisation has gained a first-class reputation for service through its teams of respected consultants, scientists, engineers and support staff. With around 800 employees, it works with over 1800 Industrial Member companies in over 70 countries. TWI currently operates from 54,000 square metres (581,000 square feet) of manufacturing, testing and training space; five UK and 13 overseas facilities serve both its Industrial Membership and its training and examination needs. A successful international Training and Examinations programme sees around 25,000 students trained each year in welding and inspection technologies.

Please visit our virtual expo booth at GraphenEXPO

IDCORE – FastBlade

Web: https://idcore.ac.uk/
www.fastblade.eng.ed.ac.uk/

The **EPSRC Industrial CDT in Offshore Renewable Energy (IDCORE**) is an industry-based Doctoral Training Centre and a partnership of the Universities of Edinburgh, Strathclyde and Exeter, and the Scottish Association for Marine Science. Ione's industrial sponsor is **FastBlade,** the world's first test facility to offer regenerative fatigue testing of tidal turbine blades and other composite structures. There is significant variability in turbine designs between developers and the facility has been designed to accommodate these variations and provide long-term testing that is energy efficient. Ione's work is just one element of the offering they are developing for the industry.

TMBK Partners Sp. z o.o.

Web: www.tmbk.pl

TMBK Partners is an SME that specialises in the manufacturing of innovative products and provision of services in the area of materials engineering. TMBK Partners mainly specialises in the production of thermoplastic CNT-doped veils and strips. The services offered by TMBK Partners primarily involve issues relating to integration of nano-enabled products with customers' materials and technologies in order to give the final products the desired features and characteristics.

Please visit our virtual expo booth at: UltraWirEXPO

E.G.O. Elektro-Gerätebau GmbH

Web: www.egoproducts.com/en/

The **E.G.O.-Group**, with its headquarters in Oberderdingen, Germany, is known as one of the world's leading suppliers for household appliances manufacturers. In considerably more than half of all cases,

people around the world who cook with electricity or gas will do so using products from E.G.O. It all began more than 99 years ago, when company founder Karl Fischer developed the first series-ready electric hotplate. What's more, the "core values" summed up in the words made by E.G.O., are found not only in the stove, but also in washing machines, driers and many other household appliances. The supplier covers four different fields of activity: Heating, controlling, transforming and connecting.
The E.G.O.-Group employs more than 5,300 people worldwide in 14 distribution and production companies in 12 different countries.

Graphenea

Web: www.graphenea.com

Graphenea is a graphene materials manufacturing company. Graphene develops optimized graphene materials for industrial and research needs. Graphenea has developed graphene oxide based additives for industrial applications.

Please visit our virtual expo booth at: GraphenEXPO & UltraWirEXPO

Nanografi Nano Technology

Web: www.nanografi.com.tr

Nanografi Co was founded in 2011 as a nanotechnology startup that manufactures and creates a market for critical nanomaterials such as carbon nanotubes (CNTs) and graphene. After successfully producing various types of CNTs, we began to explore the applications of different nanomaterials such as metallic nanoparticles, metal oxides, carbides, and clay nanostructures. As a result of these research and production efforts, we launched a wide range of products to the local market in the second half of 2014. In 2015, the demand in the local market increased, and our company began to develop new applications of nanomaterials according to our customers' needs, from new-generation lightweight materials to high-performance composites for aircraft. At the same time, the miracle material "graphene" and its various derivatives were successfully launched on the market.

Please visit our virtual expo booth at: GraphenEXPO

University of Leeds - Adventurous Composites Research Group

Web: https://eps.leeds.ac.uk/mechanical-engineering/
https://www.researchgate.net/lab/Adventurous-Composites-Research-Group-Hamed-Yazdani-Nezhad

Leeds is among the top ten universities for research power in the UK. Our academic breadth, commitment to quality and determination to make a genuine impact on the world around us enables us to achieve extraordinary results in:

- Creating knowledge through research and innovation.
- Disseminating it through excellent student education.
- Applying it to make a difference to society, culture and the economy.

The research at the **Adventurous Composites Research Group** maps across a broad range of discovery, design and development activities on high-performance polymer composite structures, composites manufacturing, nanocomposites and multifunctional composite materials, utilising a variety of fundamental scientific and applied research at TRL1-3 blue sky upto TRL6 applied demonstration. The group along with its external and internal partners aims to develop state-of-the-art developmental activities (modelling, synthesis, fabrication, manufacturing and assembly/joining) for pioneering composite materials and their manufacturing.

Tecnalia Research & Innovation

Web: www.tecnalia.com/

TECNALIA is the largest center of applied research and technological development in Spain, a benchmark in Europe and a member of the Basque Research and Technology Alliance. We collaborate with companies and institutions to improve their competitiveness, people's quality of life and achieve sustainable growth. We do it thanks to people who are passionate about technology and committed to building a better society.
We have a multi-sectorial and multi-technological perspective, and are active in various fields: sustainable mobility, smart manufacturing, digital transformation and
circular economy, among others. In the FUNCTIONAL PRINTING PLATFORM, we are a group of scientists and technicians developing solutions for this areas, based on the integration of advanced functionalities by means of functional material selective deposition. At the functional printing lab we

have diverse capabilities to print these inks and adhesives by screen printing and different jetting techniques, as well as hybridizing discrete components. This enables adding value to diverse products such as composites, textiles or 3D objects; which can now incorporate sensing, heating, illumination or RF communication functionalities.

Leitat Technology Center

Web: www.leitat.org

Leitat is a technology centre at both state and European level. With more than 100 years of history, it has a team of 400 professionals, experts in applied research, technical services and management of technological and innovation initiatives. Leitat provides social, industrial, economic and sustainable value, offering comprehensive solutions in multiple sectors and areas: health & biomedicine, development of new materials, eco-sustainable production, occupational health prevention systems, revaluation of waste and use of natural resources, interconnectivity and digitization of industry, green energy and maximization of energy efficiency. Leitat develops R&D+i projects for companies and institutions, as well as leads competitively funded research projects both within the framework of the European Union and the Ministry of Science and Innovation.

Please visit our virtual expo booth at: CircularEconEXPO

Sigmatex Ltd

Web: www.sigmatex.com

For well over 30 years, **Sigmatex** has been a pioneer in the design, development and manufacture of carbon fibre textiles to the composites industry. As one of the world's leading independent converters of carbon fibre, Sigmatex supplies advanced composite materials that make a positive difference to people's lives throughout the automotive, aerospace, marine, energy, space and sports and leisure markets.

From our state-of-the-art manufacturing locations in Europe, America and Asia, we are unleashing the unlimited potential that carbon fibre has to be a technology enabler. With the widest array of conversion technologies available, coupled with an unrivalled range of carbon fibre grades, including recycled materials, our innovative, customised carbon textile solutions are truly designed for performance.

Sigmatex develops and manufactures carbon fibre textiles for composite material applications. From global locations, Sigmatex supplies spread tow, 2D woven, unidirectional, multiaxial (non-crimp), 3D and recycled textiles across a broad range of industries. Sigmatex's proven capability converts millions of pounds of carbon fibre each year for major projects that require high levels of quality and reliability. Sigmatex works with customers to create carbon fibre textiles which meet various requirements including fibre orientation, crimp, drapeability, thickness and resin permeability. These textile solutions often require an innovative approach to textile design and process which is the core strength of Sigmatex.

Please visit our virtual expo booth at; CircularEconEXPO

NOVITOM

Web: www.novitom.com

Novitom is an independent company, specialized in 3D material characterisation, NDT and analysis based on advanced imaging techniques including synchrotron technology.
As a pioneering service provider, Novitom uses cutting-edge, non-destructive 3D tools and develops specific measurements and protocols to meet the needs of its customers in terms of material characterisation and product/process control.
Founded in 2011 by two researchers from the French National Research Center (CNRS), Novitom is now present on two sites: one in the immediate vicinity of the European synchrotron source ESRF (The European Synchrotron) within the Grenoble science hub and the other at the heart of the science & technology campus of the Paris-Saclay research cluster nearby the French national synchrotron SOLEIL.
Reactive and dynamic, Novitom is present in numerous sectors of activity serving industry leaders as well as SMEs, research institutes and academia.

University College London - UCL

Institute for Materials Discovery

Web: www.ucl.ac.uk

UCL is a diverse global community of world-class academics, students, industry links, external partners, and alumni. Our powerful collective of individuals and institutions work together to explore

new possibilities. Founded in 1826 in the heart of London, UCL is London's leading multidisciplinary university, with more than 16,000 staff and 50,000 students from over 150 different countries.

EireComposites

Web: www.eirecomposites.com

ÉireComposites was established in 1998 and has over 60 employees. The company operates an accredited composites manufacturing and testing facility in Inverin, Galway. We are an innovative design, manufacturing and testing company involved in lightweight, high performance, fibre-reinforced composite materials, with an international customer base in space, aerospace, renewable energy and industrial composites. We are an active research partner and co-ordinator in national and international collaborative R&D programmes.

Nanyang Technological University

Web: www.ntu.edu.sg

A research-intensive public university, **Nanyang Technological University**, Singapore (NTU Singapore) has 35,000 undergraduate and postgraduate students in the Business, Computing & Data Science, Engineering, Humanities, Arts, & Social Sciences, Medicine, Science, and Graduate colleges.
NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Earth Observatory of Singapore, Nanyang Environment & Water Research Institute and Energy Research Institute @ NTU (ERI@N).
Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

Cranfield University

Web: www.cranfield.ac.uk/manufacturing
www.cranfield.ac.uk/centres/enhanced-composites-and-structures-centre

Cranfield has a distinctive approach to manufacturing research. We combine expertise in design, technology and management along with research into materials sciences together, all with a focus on manufacturing.
We teach more than 300 postgraduate students in areas ranging from manufacturing technology to systems and management. Research students work in fields as diverse as ultra-precision engineering to the novel application of Virtual Reality technologies to support maintenance and through-life engineering services. We work in Technology Readiness Levels (TRL) 1-6.
Cranfield offers a part-time executive manufacturing Master's programme to develop industry professionals who can lead business change and innovation. From 2016 we will also run a Manufacturing Leadership Programme for SMEs and a Manufacturing Directors Programme.
We work with more than 1500 businesses and governments around the world. Through our industry connections guest lecturers, often senior managers in leading companies, provide insight into current industry challenges. Many industry contacts actively recruit our graduates.

Simperler Consulting

Simperler Consulting is an independent scientific consultancy with experience in materials modelling software and a training,exploitation, and dissemination specialist for inter(national) scientific projects. Simperler Consulting is offering a variety of services around Materials Modelling in Collaboration with Goldbeck Consulting.

University of Bolton

Web: www.bolton.ac.uk

At University of Bolton we are a community of professionals committed to developing our students for their professional lives.
With a student body of around 13,000 you will get the best of all worlds at Bolton. You will be based on a modern, compact campus where no-one feels anonymous and, with small teaching groups on many courses, you can be sure you are a name, not just a number. Bolton itself is a friendly, thriving town close to the big cities of Manchester and Liverpool.
Our teaching quality has consistently won the highest ratings possible from the Government's quality control agency and we have professional accreditation for more than 30 of our teaching programmes.

Centro Tecnológico CTC

Web: centrotecnologicoctc.com/

The Component Technology Centre (CTC) is a private, non-profit foundation serving society and the industrial sector.
Its main objective is to contribute to economic and social development, helping companies to evaluate the technological viability of their ideas, as well as to technically execute their research, development and innovation projects, as part of the science-technology-business system.
The CTC has an operating model based on sector-based Business Units, with a clear customer orientation, adding value to each project it develops, thanks to the specialization, training and efficient management of its human team, made up of 30 people, including doctors, graduates and mid-level graduates.
The projects developed at the CTC have, as one of their objectives, the minimizing of the impact on the environment and the maintenance of a correct environmental performance, through the sustainable management of its resources, the application of responsible environmental policies of its subcontractors and the evaluation of the environmental impact of its projects.

The activity sectors on which it focuses its work are: Aerospace, Nuclear Energy, Renewable Energy, Automotive and a technological line oriented towards Advanced Materials.

Onyriq

Web: www.onyriq.com

ONYRIQ is a customer oriented R&D company in the field of polymeric materials, formed by a team with more than 10 years of experience in the development and implementation of both national and international research projects.

Our aim is to develop and bring to market, together with our customers, new products that positively impact all over the society, throughout a comprehensive and tailored process adapted to the needs of our clients.
Due to the versatility of polymeric materials, our activity targets a wide range of markets, being able to display projects related to diverse sectors such as aerospace, prosthetics & health, agro & food or additive manufacturing, among others.

Brunel Composites Centre (BCC)

Web: https://www.brunel.ac.uk/research/Centres/Brunel-Composites-Centre

Brunel Composites Centre (BCC) is a distinguished academic research group dedicated to advancing the field of composites research, with a strong emphasis on applications within the automotive, wind energy, aerospace, and marine sectors. BCC serves as a critical link, operating at the intersection of academic knowledge and industry needs. Its primary mission is to assist industry partners by facilitating the seamless transfer of cutting-edge academic research findings related to novel composites processing composites performance and composites digital solutions into tangible, real-world industrial applications. This collaborative effort between BCC and industry fosters innovation and accelerates the adoption of advanced composites in various sectors.

Please visit our virtual expo booth at: GraphenEXPO