BET

May 2015 - April 2019

H2020-EU.3.3.6.

Robust decision making and public engagement

Objective

The development and adoption of renewable and sustainable energy has become a top priority in Europe, and is Horizon 2020's most prominent theme. Research into new energy methods required to reduce humanity's carbon footprint is an urgent and critical need, and is reliant upon a flow of newly qualified persons in areas as diverse as renewable energy infrastructure management, new energy materials and methods, and smart buildings and transport.

Bioenergy is a particularly important field in this respect as it is at the cross-roads of several important European policies, from the Strategic Energy Technology Plan Roadmap on Education and Training (SET-Plan) to the European Bioeconomy Strategy to European Food Safety and Nutrition Policy. European development in this prioritised field is stalled due to a lack of qualified personnel, a lack of cohesion and integration among stakeholders, and poor linkage between professional training and industry needs. To address these problems, BioEnergyTrain brings together fifteen partners from six EU countries to create new post-graduate level curricula in key bioenergy disciplines, and a network of tertiary education institutions, research centres, professional associations, and industry stakeholders encompassing the whole value chain of bioenergy from field/forest to integration into the sustainable energy systems of buildings, settlements and regions.

The project will foster European cooperation to provide a highly skilled and innovative workforce across the whole bioenergy value chain, closely following the recommendations of the SET-Plan Education Roadmap.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 656760. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The Hamburg Region has defined eight research and innovation strategies for smart specialization, including those directly relevant to BioEnergyTrain (energy, climate, and environmental protection) reflecting EU priorities on sustainable energy and renewables. The *Hamburg Climate Action Plan* outlines top priorities for sustainable climate action, including an increase in the use of biomass from waste materials.

Chemical and Analytical Aspects of Biorefineries The Bioresource Value Chain as a Flow Of Biomass Resources TUHH will provide know-how in chemical and biochemical utilisation of bioresources as well as bioresource logistics and AIRBUS Operations.

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Wastewater Management
and Water Protection

Dr Ina Körner | ina.koerner@tuhh.de
Eißendorfer Str. 42, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

PASSME

June 2015 - May 2018

H2020-EU.3.4.

SOCIETAL CHALLENGES
Smart, Green And
Integrated Transport

PASSME

PERSONALISED AIRPORT SYSTEMS
FOR SEAMLESS MOBILITY AND EXPERIENCE

Objective

PASSME aims to deliver industry-driven, passenger-centric novel solutions (up to TRL6) for passengers, airports and airlines to address the anticipated increase in demand for commercial flights in Europe by 2050. The goal is to reduce travel time by at least 60 minutes by integrating information between all stakeholders and transforming airport and aircraft operations and interiors to make the passenger journey time efficient, seamless, robust and accessible.

This requires significant breakthrough solutions, such as: a real-time passenger-centric system for managing passenger flows that use input from the airport and passenger to provide predictive analytics on passenger flows 20-30 minutes ahead of time; a passenger independent system for managing luggage flows that reduce the time in arrival/departure airports by at least 30 minutes and increases the control passengers have over their luggage; radically redesigned passenger-centric airport and airplane processes and facilities that enable highly personalised and less stressful experience through key touch points (check-in and boarding); and a personalised device and smartphone application that measures physiological/psychological state and links with airport/airline services to provide relevant and timely information to support the passenger in decision-making.

The research institutes (TUD, UNott, ICCS, TUHH, NLR, DLR) with interior design partners (Alma, Optimares) and communication experts (CARR) will work closely with Amsterdam and Hamburg airport clusters and KLM airlines to drive the user-centred design and evaluation methodology; to ensure the success of the solutions and that benefits will be shared with passengers, airlines and airports to have the necessary impact on the air transport system.

Linking with the Airport Council International Europe (a selection of the 450 airports) and airport service SMEs will guarantee the results will have the maximum dissemination and exploitation across EU industries.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 636308. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

In this project, TUHH will provide expertise in the analysis of airport surveys, a deep understanding of passengers' behavior based on empirical analysis as well as simulation tools to calculate passenger specific times of arrival from ground transportation and activity patterns at the airport. Main tasks to be undertaken: The TUHH has considerable experience in the analysis of statistical data using them as input for simulation models. During the project "Efficient Airport 2030" those abilities were enhanced using the micro data of the passenger survey provided by Hamburg Airport. Therefore expertise exists in preparing, harmonising and analysing large data big data from airport surveys.

In the context of "Efficient Airport 2030", TUHH was responsible for preparing, harmonising and analysing survey data provided by Hamburg Airport for developing and enhancing a transport model and carrying out accessibility analyses at the metropolitan level: passengers' times of arrival at Hamburg Airport and their transport mode to get there were analysed and simulated. Thus TUHH gained outstanding experience in dealing with big data related to air travel. The TUHH will carry out the preparation and analysis of statistical data conveying information about passengers' behaviour on the topics of:
passenger specific time of stay at the airport
passenger specific activities during the time of stay at the airport Using this empirical base, passenger activity simulation models are going to be developed for different scenario settings defined in the project.

Partner

Contact

TUHH

Hamburg University of Technology
Institute for Transport Planning and Logistics

Prof. Carsten Gertz | gertz@tuhh.de
Am Schwarzenberg Campus 3, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

NANOHYBRIDS

November 2015 - April 2019

H2020-EU.2.1.2.4.

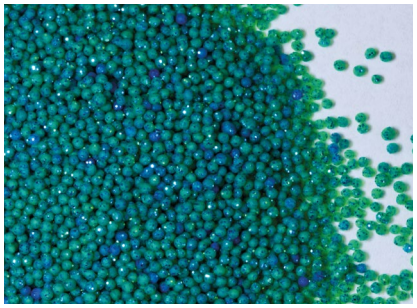
Efficient and sustainable synthesis and manufacturing of nanomaterials, components and systems

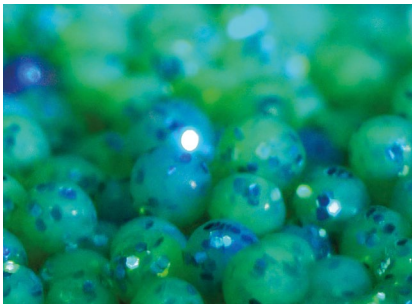
H2020-EU.2.1.2.5

Developing and standardisation of capacity-enhancing techniques, measuring methods and equipment

Nano Hybrids

NEW GENERATION OF NANOPOROUS ORGANIC AND HYBRID AEROGELS FOR INDUSTRIAL APPLICATIONS





Objective

The main objective of the project is the development of the pilot scale production system of the new generation of nanoporous organic and hybrid aerogels with multiple functions for application in gas and humidity adsorption, personal care and food. Thereby the fast manufacturing in form of spherical particles will be in focus in order to reduce the process time and to decrease the overall process costs. Thereby the purpose is to insure the high porosity and internal pore size distribution of the particles in order to provide the high surface area, pore volume and defined pore size needed for good adsorption capability. The production of organic aerogel particles in sufficient amounts will firstly enable the possibility to build prototypes for the applications in gas and humidity adsorption and food and to perform the corresponding tests.

Based on the results of the test the properties of aerogels will be fine-tuned for the corresponding real applications in industrial environments. By this means it is intended to increase the technology readiness level of organic aerogels production from TLR 4 to TLR 6 by the end of the project.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 685648. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The Institute of Thermal Separation at TUHH was the coordinator of NanoHybrids and responsible for the interaction with the EU and external actors and the scientific, technical and administrative management (WP7).

TUHH also shared responsibility for WP8 "Dissemination and exploitation" with BASF Polyurethanes (BPD) and its Linked Third Party TUTECH. Scientifically, TUHH led the work package "Establishing of the process for production of aerogels in form of (micro)particles for pilot scale" (WP4) and contributed significantly to all other work packages.

TUHH contributed to the synthesis and testing of bio-based aeroels starting on the lab scale and adjusting properties by combining different aerogel matrices producing nanoporous hybrid materials. Based on the results on the lab scale transfer of the established gel preparation procedure to the pilot scale was performed. Two different sorts of aerogels were produced: polysaccharide based aerogels requiring the solvent exchange step and polyurethane-based aerogels with direct gelation in organic solvents.

The scale up of the drying step was supported by modelling. Prototype aerogels in form of spherical particles were produced in amounts up to 50 litres in the new pilot plant at TUHH. New insights into supercritical drying of aerogels on pilot scale have been gained and upscaling to industrial pilot scale could be achieved. TUHH was involved in the adjustment of gel preparation, solvent exchange and supercritical drying so that industrial requirements for upscaling could be met.

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Thermal Separation Processes

Prof. Irina Smirnova | irina.smirnova@tuhh.de
Eißendorfer Str. 38, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

GRAPHENE CORE 1

April 2016 - March 2018

H2020-EU.1.2.

EXCELLENT SCIENCE
Future and Emerging Technologies (FET)

GRAPHENE FLAGSHIP

GRAPHENE-BASED
DISRUPTIVE TECHNOLOGIES

Objective

This project is the second in the series of EC-financed parts of the Graphene Flagship. The Graphene Flagship is a 10 year research and innovation endeavour with a total project cost of 1,000,000,000 euros, funded jointly by the European Commission and member states and associated countries. The first part of the Flagship was a 30-month Collaborative Project, Coordination and Support Action (CP-CSA) under the 7th framework program (2013-2016), while this and the following parts are implemented as Core Projects under the Horizon 2020 framework. The mission of the Graphene Flagship is to take graphene and related layered materials from a state of raw potential to a point where they can revolutionise multiple industries.

This will bring a new dimension to future technology – a faster, thinner, stronger, flexible, and broadband revolution. Our program will put Europe firmly at the heart of the process, with a manifold return on the EU investment, both in terms of technological innovation and economic growth. To realise this vision, we have brought together a larger European consortium with about 150 partners in 23 countries. The partners represent academia, research institutes and industries, which work closely together in 15 technical work packages and five supporting work packages covering the entire value chain from materials to components and systems.

As time progresses, the centre of gravity of the Flagship moves towards applications, which is reflected in the increasing importance of the higher – system – levels of the value chain. In this first core project the main focus is on components and initial system level tasks. The first core project is divided into 4 divisions, which in turn comprise 3 to 5 work packages on related topics. A fifth, external division acts as a link to the parts of the Flagship that are funded by the member states and associated countries, or by other funding sources. This creates a collaborative framework for the entire Flagship.

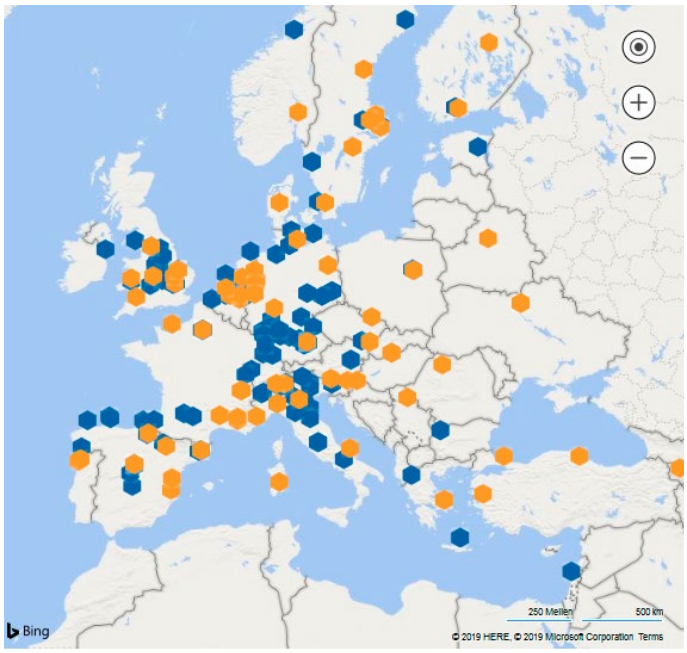
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 696656. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The Graphene Flagship is implemented as 16 work packages (WPs), 11 on specific science and technology topics and five on operative management aspects. The partner TUHH is participating in WP10, "nanocomposites". The scientific and technological challenge we wish to address in WP10 originates from a simple but fundamental concept: the extraordinary properties usually quoted for graphene (huge charge mobility, high strength, etc.) refer to single, defect-free sheets of graphene, typically obtained by mechanical exfoliation, and suspended to avoid interaction with any perturbing support. In real applications, however, graphene layers with properties always inferior to the ideal ones will need to be used. Charge and heat transport will be perturbed at inter-sheet domain boundaries, edge defects will act as electronic traps, and multilayer sheets could split apart under mechanical stress, causing material malfunction or failure. In order to have an impact upon Society, the ideal properties of single graphene heets will have to be transferred from the atomic scale to the meso-macroscopic level (continuous layers or bulk materials).

The partner TUHH contributes in WP10 mainly to the task T10.5: "Production of Aerographite" in close collaboration with CAU (Christian Albrecht University Kiel). Aerographite is a new three dimensionally structured ultra lightweight and highly porous carbon based material. It was first introduced in 2012 in "Advanced Materials".

Partner



Partner
Associated Member

TUHH
Technische
Universität
Hamburg

Consortium
The Graphene Flagship coordinates over 150 academic and industrial research groups in 23 countries, and has more than 60 associate members.

Contact

TUHH

Hamburg University of Technology
Institute of Polymer and Composites

Prof. Bodo Fiedler | fiedler@tuhh.de
Denickestr. 15, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

ATM4E

May 2016 -April 2018

H2020-EU.3.4.7.1
Exploratory Research

ATM4E Air Traffic Management for Environment

Objective

The overall aim of ATM4E is to explore the scope for the potential reduction of air traffic environmental impacts in European airspace on climate, air quality, and noise through optimization of air traffic operations.

The project will integrate existing methodologies for assessment of the environmental impact of aviation, in order to evaluate the feasibility of environmentally-optimized flight operations to the European ATM network, including climate, air quality, and noise impacts. A preliminary modelling concept for climate-optimization has previously been developed for an FP7 European Project, (REACT4C).

The 'case-study' approach of REACT4C will be built upon and extended to a multi-dimensional environmental impact assessment, to cover climate, air quality and noise, to better understand impacts in the European airspace. Different traffic scenarios (present-day and future) will be analysed to understand the extent to which environmentally-optimized flights based on multi-dimensional environmental criteria (assessment) would lead to changes in air traffic flows and create challenges for ATM.

The findings of the project will be used to prepare a roadmap that is consistent with SESAR2020 principles and objectives, which would consider the necessary steps and actions that would need to be taken to ultimately introduce environmentally-optimized flight operations in European airspace.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 699395. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The TUHH contributed to the project ATM4E with the Institute of Air Transportation Systems (ILT). The ILT was responsible for the work package "Environmental-optimized routing impact on ATM", in which it carried out an extensive simulation and optimization of the European air traffic. After a characteristic air traffic dataset had been compiled using flight profile data from EUROCONTROL the researchers computed climate-optimized trajectories for these flights using so-called Environmental Cost Functions (ECF). To generate these multi-dimensional ECFs, including impacts on climate, noise and Local Air Quality (LAQ), partners from DLR and TU Delft developed a method that allows for the instantaneous derivation of ECFs from any given weather situation.

This new flight-planning mechanism changed the flights' routes and altitude profiles such that their environmental impact bacame minimal. Therefore, it was finally investigated to what extent this diversion would cause changes in the demand-capacity situation, i.e. whether it creates areas with an increased traffic load. These results allowed for the creation of a roadmap including suggestions for the development and introduction of such a flight planning concept for the European ATM community.

Partner

DLR

University of Reading

envisa

Manchester Metropolitan University

TU Delft

TUHH Technische Universität Hamburg

Contact

TUHH

Hamburg University of Technology
Institute of Airtransport Systems

Prof. Volker Gollnick | volker.gollnick@tuhh.de
Blohmstrasse 20, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

DECISIVE

September 2016 - October 2021

H2020-EU.3.5.4.

Enabling the transition towards a green economy and society through eco-innovation

DECISIVE

A DECENTRALIZED MANAGEMENT SCHEME FOR INNOVATIVE VALORIZATION OF URBAN BIOWASTE

Objective

The growing attractiveness of cities leads to increasing population, thus rising energetic and food demands in urban areas. This makes urban waste management increasingly challenging, both in terms of logistics and environmental or health impacts.

To decrease the cities' environmental impacts and to contribute to a better resilience of urban areas towards energy or food supply crisis, waste management systems have to be improved to increase recycling of resources and local valorization. In this context, DECISIVE proposes to change the present urban metabolism for organic matter (foods, plants, etc.), energy and biowaste to a more circular economy and to assess the impacts of these changes on the whole waste management cycle. Thus, the challenge will be to shift from a urban "grey box", implying mainly goods importation and extra-urban waste management, to a cooperative organization of intra- and peri-urban networks enabling circular local and decentralised valorization of biowaste, through energy and bioproducts production. Such a new waste management paradigm is expected to increase the sustainability of urban development by: (1) promoting citizens awareness about waste costs and values; (2) promoting renewable energy production and use in the city; (3) developing an industrial ecology approach that can promote the integration between urban and peri-urban areas, by providing valuable agronomic by-products for urban agriculture development and so improving the balance of organic products and waste in the city; (4) developing new business opportunities and jobs.

In order to achieve these objectives, the project DECISIVE will develop and demonstrate, at real scale, eco-innovative solutions addressed to waste operators and public services, consisting in: (1) a decision support tool to plan, design and assess efficient decentralised management networks for biowaste in urban areas; (2) eco-designed solid-state fermentation processes. Moreover in parallel of real scale demonstration sites, an eco-designed new micro-anaerobic digestion process will be developed and tested.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689229. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

BIEM carried out works in the related fields in previous projects and in teaching, and has a large regional and international net of contacts. For instance it was involved in chain design in a regional holistic project involving inventories of waste residues from a whole Hamburg district, following their whereabouts and suggesting improved waste collection possibilities and improved waste flow management.
The works included also waste sortings in practical scale. Works were also carried out regrading a new type of food waste collection system in householdes via kitchen food waste shredders. For the Hamburg district Wandsbek different urban biowaste streams from households and commerces were investigated in detail following the chain from generation over collection and processing till product application. The considered wastes were among others: kitchen waste, lawn cuttings, commercial fruit resitues, grease trap residues from restaurants. A special consideration had the regional product application to avoid transports. BIEM is well connected with local industry:
among others the waste collector BUHCK, the fruit processing company Fresh Factory, the local wastewater company (HAMBURGWASSER), one of the largest German energy cooperatives (Energy net Hamburg).
Internationally it is well connected by following networks: RAMIRAN (Network of Recycling agricultural, municipal and industrial residues), eseia (European sustainable energy innovation alliance), ECN (European compost network).

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Wastewater Management
and Water Protection

Dr. Ina Körner | ina.koerner@tuhh.de
Eißendorfer Str. 42, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

SARAH

October 2016 - March 2020

H2020-EU.3.4.

SOCIETAL CHALLENGES
Smart, Green And
Integrated Transport

SARAH

Increased Safety & Robust Certification for ditching of Aircrafts & Helicopters

Objective

SARAH is concerned with establishing novel holistic, simulation-based approaches to the analysis of aircraft ditching. It is build up from a consortium of experts from OEM industries, experienced suppliers of simulation technologies, established research institutions and representatives of the certification authorities. Results of SARAH are expected to support a performance-based regulation and certification for next generation aircraft and helicopter and to enhance the safe air transport as well as to foster the trustworthiness of aviation services.

Aircrafts and helicopters often travel above water and thus have to prove a safe landing under emergency conditions. The specific challenge is to minimize the risk of injury to passengers and to enable safe evacuation. Accordingly, the motion of the aircraft/helicopter along with the forces acting on the structure are studied for controlled water impact during the design phase of an aircraft. Design for ditching involves more than the analysis of loads and subsequent strengthening of the structure. It often requires adjustment campaigns for the handling of the vehicle during approach and the identification of favorable approach/flight-path conditions in line with the pilots flying capabilities to minimize the remaining kinetic energy of the vehicle to be transferred into the water.

In conclusion, a pressing need for more advanced studies to support the development of next-generation, generalized simulation-based ditching-analysis practices is acknowledged by all stakeholders. The public interest in safety makes this proposal an ideal candidate for a European research proposal.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 724139. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

TUHH leads WP2 activities where in collaboration with IBK-Innovation GMBH & CO. KG, Technische Universität Braunschweig and AIRBUS Operations they will enhance the lower-fidelity DITCH tool with respect to an advanced, two-way coupled fluid-structure approach and environmental conditions.

Established high-fidelity tools will be utilized to perform detailed hydrodynamic load studies on deformable geometries as well as high-fidelity fluid-structure interaction studies. These studies will be fed back to an improved lower-fidelity two-way coupling approach.

Moreover, TUHH will perform extensive parameter studies regarding the required spatial (axial, planar) and temporal resolution. The aim is to define quality assurance recommendations that guide the industrial user for a safe use of the ditch tool during the certification process. Results will formulate a basis for the exploitation efforts of industrial partners and support handling and design for safer ditching studies.

Partner

Contact

TUHH

Hamburg University of Technology
Institute for Fluid Dynamics and Ship Theory

Prof. Thomas Rung | thomas.rung@tuhh.de
Am Schwarzenberg Campus 4, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

SPACE AT SEA

November 2017 - October 2020

H2020-EU.3.2.5.

Cross-cutting marine and maritime research

SPACE@SEA

MULTI-USE AFFORDABLE STANDARDISED FLOATING SPACE@SEA

Objective

Space@Sea aims to develop multi-use platforms with the objective to develop safe and cost efficient deck space at sea. Due to the increasing population and scarce usable space on land, there is an increasing need for sustainable food and renewable energy from the ocean. In the future these will be supplied more and more by fish- and seaweed farms and ocean energy(floating) wind turbines. There are also geographical locations where additional housing or logistic hubs are needed. All these developments need a flexible and scalable concept that can support a multitude of activities at sea. Space@Sea consists of a group of companies, research institutes and universities that will develop a modular concept for multi-use platforms. Standardised floaters that can be produced at low cost will form the basis. The approach will reduce the cost through standardisation in a similar way that containers reduced the cost of transport in the past.Each floater can support a different function, such as: housing, renewable energy hub, aquafarming (seaweed, algae and fish farms) and logistics equipment. By combining the applications in different ways, Space@Sea will form islands according to the specifications for the location and function at hand. Three specific islands will be validated and demonstrated as part of Space@Sea: An energy hub in the North Sea, aquaculture in the Mediterranean and a floating logistics hub in the Black Sea.

To develop a safe and economically viable floating island, a floater need to be developed that can meet the requirements of the various applications and environmental conditions. At the same time these requirements will be brought together into a standardized design. Technology developments are required for the floater, the shared mooring system, coupling between the floaters and application specific developments. The Space@Sea consortium aims to overcome these challenges for a sustainable and cost efficient development of our oceans.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 774253. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The contribution of TUHH in the Space@Sea project lies mainly within the further development of the available numerical simulation toolkit for the holistic numerical assessment of offshore operations. This will ensure the precise prediction of the modular multi-body dynamics, required in order to develop an ideal shape design, operational guidelines and set the framework for the implementation of applications at low cost and an early design stage.

The vast experience in numerical modelling of marine application will be used to develop an optimized PTO-system for the extraction of kinetic energy from relative motion of the components and to develop measures to reduce ship-platform interaction and relative motion during cargo operation. The validation of the tool by employing additional tools as well as relying on measuring data from model tests allow to make the advances available for similar future projects and incorporate the results in the academic agenda.

Partner

MARIN
deltasync WATERBASED URBAN DEVELOPMENT
DST
NEMOS
TU Delft
mocean ADVANCED OFFSHORE TECHNOLOGY
Universität Rostock Traditio et Innovatio
TUHH Technische Universität Hamburg
GICON®
bluewater
WAGENINGEN UNIVERSITY & RESEARCH
UNIVERSITÄT DUISBURG ESSEN
TU Graz
Waterstudio.NL
ICE MARINE DESIGN
VAL FoU
GeoSea Geotechnical & Offshore Solutions

Contact

TUHH

Hamburg University of Technology
Institute for Fluid Dynamics and Ship Theory

Prof. Moustafa Abdel-Maksoud |
m.abdel-maksoud@tuhh.de
Am Schwarzenberg Campus 4, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

TEAMPLAY

January 2018 - June 2021

H2020-EU.2.1.1.

INDUSTRIAL LEADERSHIP
Leadership in enabling and industrial technologies – Information and Communication Technologies (ICT)

TEAMPLAY

TIME, ENERGY AND SECURITY ANALYSIS FOR MULTI/MANY-CORE HETEROGENOUS PLATFORMS

Objective

TeamPlay aims to develop new, formally-motivated, techniques that will allow execution time, energy usage, security, and other important non-functional properties of parallel software to be treated effectively, and as first- class citizens. We will build this into a toolbox for developing highly parallel software for low-energy systems, as required by the internet of things, cyber-physical systems etc. The TeamPlay approach will allow programs to reflect directly on their own time, energy consumption, security, etc., as well as enabling the developer to reason about both the functional and the non-functional properties of their software at the source code level. Our success will ensure significant progress on a pressing problem of major industrial importance: how to effectively manage energy consumption for parallel systems while maintaining the right balance with other important software metrics, including time, security etc. The project brings together leading industrial and academic experts in paral- lelism, energy modeling/transparency, worst-case execution time analysis, non-functional property analysis, compi lation, security, and task coordination. Results will be evaluated using industrial use cases taken from the computer vision, satellites, flying drones, medical and cybersecurity domains.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No779882. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

TUHH realise compiler techniques trading energy consumption, security, and time in a multi-objective fashion, by setting up a common compiler platform for TeamPlay architectures, finding feasible multi-objective optimisation approaches, and developing actual energy-and time-aware optimisations.

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Embedded Systems

Prof. Heiko Falk | heiko.falk@tuhh.de
Am Schwarzenberg Campus 3, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

RECONECT

September 2018 - August 2024

H2020-EU.3.5.1.2.

Assess impacts, vulnerabilities and develop innovative cost-effective adaptation and risk prevention and management measure

H2020-EU.3.5.2.

Protection of the environment, sustainable management of natural resources, water, biodiversity and ecosystems

RECONECT

REGENARATING ECO SYSTEMS WITH NATURE -BASED SOLUTIONS FOR HYDRO-METEOROLOGICAL RISK REDUCTION

Objective

RECONECT aims to contribute to European reference framework on Nature Based Solutions (NBS) by demonstrating, referencing and upscaling large scale NBS and by stimulating a new culture for 'land use planning' that links the reduction of risks with local and regional development objectives in a sustainable way. To do that, RECONECT draws upon the network of carefully selected Demonstrators and Collaborators that cover a range of local conditions, geographic characteristics, governance structures and social/cultural settings to successfully upscale NBS throughout Europe and Internationally.

The RECONECT consortium is a transdisciplinary partnership between researchers, industry partners (SMEs and large consultancies) and responsible agencies at the local and watershed/regional level dedicated to achieve the desired outcomes of the project.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 776866. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The river system of Dove and Gose Elbe, Germany, is located in the southeastern part of the City of Hamburg in the Bergedorf district and were formerly part of the inland delta of the Elbe river with marsh characteristics. Nowadays the confined river system is protected by flood protection measures from the tide influenced Elbe estuary. This river system is a part of the complex drainage system of the area Vier- und Marschlande, which also includes the river Bille and the surface waters of Schleusengraben as well as the Old and New Brookwetterung (Drainagesystem) in addition to the Dove and Gose Elbe catchment areas.

Nature-based solutions (NBS) to be implemented The main goal of the demonstration activities is the reactivation of the storage capacity of the rivers Bille, Dove and Gose Elbe, their tributaries and trenches (such as, Brookwetterung, Curslack) and their flood plains in the area of 110 km2, to create more retention volume for water during flooding. At the same time necessary stable water levels in the rivers can be provided during droughts. The functional NBS components will be (natural) floodplains and (natural) storages.

The (improved) Bille, Dove and Gose Elbe monitoring and control system will focus on:

- The conversion of grey infrastructure into hybrid solutions
- The exapansion of the existing linear and disciplinary approach into a holistic approach

Key innovations and upscaling

- Nature based restoration of landscape to manage floods and droughts utilising innovative controlling and operation of the water volume in the Bille and Dove/Gose Elbe river system.
- Upscaling possible within the Northern EU and beyond.

Partner

Contact

TUHH

Hamburg University of Technology
Institute for River and Coastal Engineering

Dr. Natasa Manojlovic | natasa.manojlovic@tuhh.de
Denickestrasse 22, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

GRAPHENE CORE 2

April 2018 - March 2020

H2020-EU.1.2.3.

FET Flagships

GRAPHENE FLAGSHIP

GRAPHENE-BASED
DISRUPTIVE TECHNOLOGIES

Objective

This proposal describes the third stage of the EC-funded part of the Graphene Flagship. It builds upon the results achieved in the ramp-up phase (2013 - 2016) and the first core project (2016 - 2018), and covers the period April 2018 - March 2020.

The progress of the flagship follows the general plans set out in the Framework Partnership Agreement, and the second core project represents an additional step towards higher technology and manufacturing readiness levels.

The Flagship is built upon the concept of value chains, one of which is along the axis of materials-components-systems; the ramp-up phase

placed substantial resources on the development of materials production technologies, the first core project moved to emphasise components, and the second core project will move further towards integrating components in larger systems. This evolution is manifested, e.g., in the introduction of six market-motivated spearhead projects during the Core 2 project.

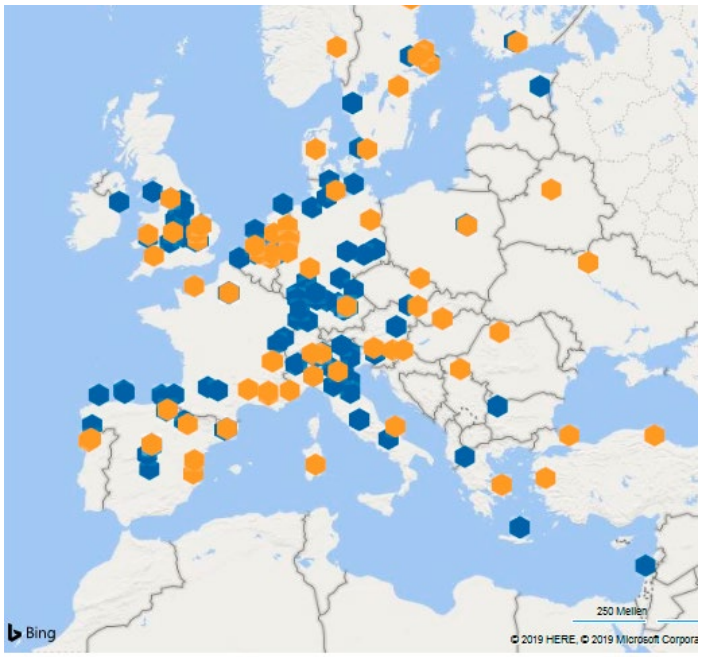
This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 785219. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The Graphene Flagship is implemented as 16 work packages (WPs), 11 on specific science and technology topics and five on operative management aspects. The partner TUHH is participating in WP10, "nanocomposites". The scientific and technological challenge we wish to address in WP10 originates from a simple but fundamental concept: the extraordinary properties usually quoted for graphene (huge charge mobility, high strength, etc.) refer to single, defect-free sheets of graphene, typically obtained by mechanical exfoliation, and suspended to avoid interaction with any perturbing support. In real applications, however, graphene layers with properties always inferior to the ideal ones will need to be used. Charge and heat transport will be perturbed at inter-sheet domain boundaries, edge defects will act as electronic traps, and multilayer sheets could split apart under mechanical stress, causing material malfunction or failure. In order to have an impact upon Society, the ideal properties of single graphene heets will have to be transferred from the atomic scale to the meso-macroscopic level (continuous layers or bulk materials).

The partner TUHH contributes in WP10 mainly to the task T10.5: "Production of Aerographite" in close collaboration with CAU (Christian Albrecht University Kiel). Aerographite is a new three dimensionally structured ultra lightweight and highly porous carbon based material. It was first introduced in 2012 in "Advanced Materials".

Partner



Partner
Associated Member

TUHH
Technische
Universität
Hamburg

Consortium
The Graphene Flagship coordinates over 150 academic and industrial research groups in 23 countries, and has more than 60 associate members.

Contact

TUHH

Hamburg University of Technology
Institute of Polymer and Composites

Prof. Bodo Fiedler | fiedler@tuhh.de
Denickestr. 15, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

STRATOFLY

June 2018 - March 2021

H2020-EU.3.4.

SOCIETAL CHALLENGES
Smart, Green And
Integrated Transport

STRATOFLY
Stratospheric Flying Opportunities
for High-Speed Propulsion Concepts

Objective

The stratosphere is the highest layer in the atmosphere where aircraft can still fly. Nevertheless, it is presently rarely exploited for commercial aviation. As Europe's Vision for Aviation predicts globally a six-fold increase in passenger by 2050, flight levels above the troposphere become attractive and maybe the only way to realize this.

While the lower stratosphere could still be reachable for classical aircraft, the higher altitudes would demand for higher speeds. Various technologies, systems and novel aircraft concepts related to high-speed transport have progressed rapidly over the last 20 years showing their technical feasibility and readiness up to TRL-3. Technology roadmaps elaborated by industrial and research teams indicated their readiness-level can easily be brought up to TRL-6 by 2035 provided the related application can be shown to be commercially exploitable.

The first project goal covers the multi-functional integration of propulsion, aerodynamics, air

frames and on-board systems across various disciplines to define and detail a high-speed aircraft configuration enabling long-haul travels.

However, Europe should have simultaneously a directive which flight altitudes are environmentally sustainable on the basis of fuel type and emission rates. This parametric mapping of the stratospheric climate impact covers the second goal of the project.

Last but not least, the potential of stratospheric flight relies also on economic viability. Apart from potential routes, aircraft capacity and performance, development and exploitation costs… the third goal will also consider human factors, social acceptance, implementation and noise issues. The present proposal will, contrary to regular viability studies, perform a bottom-up approach. The validity will follow a sound technical and scientific approach and shall demonstrate environmental and economic compatibility. This enables then a formulation of regulatory, technological and socio-economic barriers.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769246. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Since hypersonic aircraft bring both new advantages and new requirements to passengers, TUHH investigates the relationship between technical aircraft design and performance on the one hand and passenger needs, preferences, and tolerances on the other hand.

Among other aspects, research is being conducted regarding the acceleration loads passengers can tolerate during hypersonic flight. In the technical section of STRATOFLY, the TUHH assesses 4D flight trajectory calculations in context of climate- and fuel-optimized mission profiles being suitable for such hypersonic transportation vehicles.

The overall objective is not only to determine trade-offs between emissions, climate impact, and flight altitude, but also to optimize the aircraft's flight trajectories for minimal emissions and validate the stated findings by high-fidelity simulations. Finally, the detailed climate impact and emissions will be obtained by two 3D climate-chemistry models to characterize the impact of the STRATOFLY fleet emissions like NOx, H2 and H2O on the atmospheric composition of the stratosphere. The use of two models enables the identification of areas of uncertainty and allows to distinguish emissions by type and origin very accurately.

Partner

POLITECNICO DI TORINO

von KARMAN INSTITUTE FOR FLUID DYNAMICS

CIRA Italian Aerospace Research Centre

DLR Deutsches Zentrum für Luft- und Raumfahrt

Fundación Ingeniería Civil de Galicia

ONERA THE FRENCH AEROSPACE LAB

cnrs

nlr Dedicated to innovation in aerospace

FOI

TUHH Technische Universität Hamburg

Contact

TUHH

Hamburg University of Technology
Institute of Air Transportation Systems

Prof. Volker Gollnick | volker.gollnick@tuhh.de
Blohmstrasse 20, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

CLEVER CITIES

June 2018 - May 2023

H2020-EU.3.5.2.1.
H2020-EU.3.5.2.3.
H2020-EU.3.5.1.2.
H2020-EU.3.5.1.3.
H2020-EU.3.5.2.2.

CLEVER Cities

CO-DESIGNING LOCALLY TAILORED ECOLOGICAL SOLUTIONS FOR VALUE ADDED, SOCIALLY INCLUSIVE REGENERATION IN CITIES

Objective

Hamburg (DE), London (UK) and Milan (IT) have decided to create CLEVER Cities. Led by Hamburg, a well-balanced, competent partnership will position the EU as global leader in nature-based solution (NBS) innovation.

CLEVER Cities applies a city centric approach, starting by key urban regeneration challenges and employing strong local partner clusters, to foster sustainable and socially inclusive urban regeneration locally, in Europe and globally. We will co-create, implement, and manage locally tailored NBS to deliver tangible social, environmental and economic improvements for urban regeneration. We are committed to make the interventions in front-runner cities (FR) cases for successful NBS and prepare robust replication roadmaps in fellow cities (FE), that also have NBS experience and expertise to offer. We will ensure long-term sustainability of actions in FR and FE by initiating urban innovation partnerships that will use SMART city principles to engage residents, establish new governance procedures, generate innovative financing and investment strategies. CLEVER Cities will employ partners' large global networks to generate rapid and durable uptake of NBS by capacitating businesses and a CLEVER Solutions Basket with innovative technological, business, financing and governance solutions, in Europe and globally.

The influential and committed FR will serve as role model for FE and global cities in East Asia and South America. All cities will actively engage in replication, thus, help to meet EU and UN sustainability goals and profile the EU as global leader in green innovation. CLEVER Cities materialises in strong local clusters around FR with partners, which can both support local co-creation as well as transversal activities with specific knowledge and expertise. This makes it a distinct, exciting project that will generate lasting results in cities and deliver a CLEVER Cities package with solutions, guidance and open-sourced data EU NBS reference framework.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776604. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The aim of the CLEVER Cities project is to promote sustainable and social inclusive urban regeneration through locally tailored nature-based solutions. The aim is to bring nature and nature conservation areas to life without increasing the pressure on them.
The potential of nature-based solutions will be tested in terms of technical, social and economic innovation. This is being done in the so called front runner cities of Hamburg, London and Milan. The experience gained there will subsequently be adopted and adapted by other cities. In addition to the administrations of the various cities, a large number of other partners are contributing their skills, expertise and experience to the project. The Free and Hanseatic City of Hamburg (FHH) is in charge of the overall project and coordinates the cooperation of the various project partners. The Hamburg project area is located in Neugraben-Fischbek. The Hamburg team consists of the following state actors: Senate Chancellery (SK), Environment and Energy Authority (BUE), Harburg District Office (BA) and State Geoinformation and Surveying Office (LGV), STEG Hamburg, HafenCity University (HCU), Hamburg University of Technology (TUHH) and Hamburg World Economic Institute (HWWI).

The TUHH involves both the Institute of Hydraulic Engineering and the Institute of Environmental Technology and Energy Economics (IUE). The IUE coordinates the local monitoring activities and takes care of the definition of measurable indicators to measure the progress and success of the project. Furthermore, in cooperation with the HCU, a theoretical framework for the transparent and harmonised determination of indicators for the evaluation of NBS is being developed.

Partner

Contact

TUHH

Hamburg University of Technology
Institute for River and Coastal Engineering

Dr. Natasa Manojlovic |
natasa.manojlovic@tuhh.de
Denickestrasse 22, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

SUCOHS

September 2018 - February 2022

H2020-EU.2.1.1.

INDUSTRIAL LEADERSHIP
Leadership in enabling and industrial technologies – Information and Communication Technologies (ICT)

SuCoHS
SUSTAINABLE & COST EFFICIENT HIGH-PERFORMANCE COMPOSITE STRUCTURES DEMANDING TEMPERATURE AND FIRE RESISTANCE

SUSTAINABLE AND COST EFFICIENT HIGH PERFORMANCE COMPOSITE STRUCTURE DEMANDING TEMPERATURE AND FIRE RESISTANCE

Objective

In order to maintain the leadership of the European aeronautics, SuCoHS will investigate potential weight and cost savings in expanding the use of composite materials in areas of demanding high thermal conditions (high temperature and fire). In particular, this project envisages new structural concepts with novel multi-material composites to provide high resistivity against thermal, mechanical and fire loading.

These developments also cater for high production rates, providing a cost competitive manufacturing process at minimum material and energy consumption, while reducing the requirement for visual inspection or rework. New solutions for structural health monitoring are considered within the structures to enable condition-based maintenance taking into account actual loading and structural conditions. Instead of an isolated investigation of innovative technologies the project will develop an integrated framework for the adaption of these promising technologies to different aeronautic components to increase efficiency during design, manufacturing and operation. Three industrial use cases are defined from real industrial design challenges to set requirements, to validate new technologies and to demonstrate technical feasibility near to operation environment: a high temperature resistance nacelle component, a composite aircraft interior shell and a tail cone panel substructure.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 769178. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The strength of fiber composite structures reduces in presence of high temperature. For conventional structures, this effect is taken into accounted by applying a knockdown factor to the strength at room temperature. Therefore, conventional fiber composite materials are typically not used for structures exposed to very high temperatures. The new materials developed in SuCoHS allow using composites in high temperature environments.

The simple knockdown factor approach however hinders the exploitation of the new materials. The knockdown factor approach implies that the worst manufacturing deviation and the worst material property occur in the same spot as the highest temperature, and at the same time as the worst-case mechanical load. Probabilistic design approaches provide an alternative to knockdown factors and allow taking into account the probability of occurrence of different effects. In SuCoHS, TUHH performs probabilistic analyses of new structures made of new material, taking into account varying material properties, manufacturing defects/deviations and varying temperature distributions. In strong collaboration with DLR, the effect of defects is determined locally and then embedded into the analysis of a component. The resulting stochastic distribution of the load carrying capability allows to define a probabilistically motivated design load for the analyzed component.

As part of the project, sensors are integrated during manufacturing, which remain in the structure in service and can be used for structural health monitoring (SHM). TUHH develops an approach for utilizing SHM data to continuously update the stochastic distribution of loads. Thereby, also the randomness of applied mechanical loads can be taking into account in probabilistic analyses. This allows determining the probability of failure of a component in service.

Partner

Contact

TUHH

Hamburg University of Technology
Working Group Structural optimization
for lightweight design (SOL)

Prof. Benedikt Kriegesmann |
benedikt.kriegesmann@tuhh.de
Am Schwarzenberg Campus 4, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

OPEN INNO TRAIN

January 2019 - June 2024

H2020-EU.1.3.3.
Stimulating innovation by meansof cross-fertilisation of knowledge

OPENINNOTRAIN
INDUSTRY 4.0 | CLEANTECH | FOODTECH | FINTECH

OPEN INNOVATION – RESEARCH TRANSLATION AND APPLIED KNOWLEDGE EXCHANGE IN PRACTICE THROUGH UNIVERSITY-INDUSTRY-COOPERATION

Objective

The overarching objective of OPEN-INNO-Train is to form an international and inter-sectoral network of organisations collaboratively working on the joint research field of Open Innovation, University-Industry Cooperation and Research Translation. To facilitate Knowledge Development and Sharing in four contemporary areas - FinTech, Industry 4.0, CleanTech, FoodTech. For globally interconnected societies, scientific research has the potential to foster yet unrealised economic growth, competitiveness, and wellbeing. The conversion of research outputs into tangible outcomes, and, ultimately, sustainable impact is critically important and needs optimising.

The process of converting research findings into economic and social benefits appears increasingly complex at a time when researchers often work in multidisciplinary teams, in a context of Open Innovation when cooperating with industry and other stakeholders. Illuminating it from the perspective of Research Translation, an approach increasingly gaining traction in the specific setting of University-Industry Collaboration, OPEN-INNO-TRAIN aims at opening the black box of knowledge conversion processes to generate and apply new insights from those four industry areas. Furthermore, OPEN-INNO-TRAIN encapsulates the development of robust Research Translation tools capable of facilitating the translation process of multidisciplinary research findings for the generation of impact. Combining scientific excellence from European and international universities, Research and Technology Organisations with hands on expertise from pioneering companies, OPEN-INNO-TRAIN will spearhead this sustainable venture using digital innovation hubs, co-tutelle, industrial PhDs, PPPs and training measures to encourage international cooperation among researchers and industry practitioners across disciplines whose final aim is to holistically foster, enhance and sustain over time the application of good research translation practices.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 823971. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Partner

Contact

TUHH

Hamburg University of Technology
Institute for Technology and Innovation Management

Prof. Cornelius Herstatt | c.herstatt@tuhh.de
Am Schwarzenberg Campus 4, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

MONACO

April 2019 - September 2022

H2020-EU.3.4.5.5.

ITD Engines Optimized UHPE flow path cooling design and testing using advanced manufacturing techniques

Manufacturing of a large-scale AM component

Objective

AM technologies are layer-based and tool-free manufacturing processes, which represent a direct interface between the virtual product development and the real-world production of final products. As fundamental part of the "industrial internet of things" (IIoT), AM is considered to be a flexible solution for a demand-driven supply of individualised products. Especially the LBM technology is considered predestined for industrial production due to its intrinsic characteristic of processing metal additively.

Moreover, physical properties similar to the ones of conventionally manufactured parts are achievable. LBM enables the flexible and fast production of near net-shape metal parts with up to 100 % density.

MOnACO aims at the design optimisation and successful additive manufacturing (AM) of a large-scale (diameter of 1 m) aircraft engine's component via laser beam melting (LBM) technology. The project contains the development of new design guidelines and tools for the redesign of large-scale LBM structures and the implementation of the complete AM process chain. In accordance to the topic description (JTI-CS2-2018-CfP08-ENG-01-32), the approach splits into three main tasks: Component analysis, design and optimization; additive manufacturing optimization and validation; component design experimental investigation.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 831872. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

In this project, TUHH will provide expertise in the analysis of airport surveys, a deep understanding of passengers' behavior based on empirical analysis as well as simulation tools to calculate passenger specific times of arrival from ground transportation and activity patterns at the airport. Main tasks to be undertaken:

The TUHH has considerable experience in the analysis of statistical data using them as input for simulation models. During the project "Efficient Airport 2030" those abilities were enhanced using the micro data of the passenger survey provided by Hamburg Airport. Therefore expertise exists in preparing, harmonising and analysing large data big data from airport surveys.

In the context of "Efficient Airport 2030", TUHH was responsible for preparing, harmonising and analysing survey data provided by Hamburg Airport for developing and enhancing a transport model and carrying out accessibility analyses at the metropolitan level: passengers' times of arrival at Hamburg Airport and their transport mode to get there were analysed and simulated.

Thus TUHH gained outstanding experience in dealing with big data related to air travel. The TUHH will carry out the preparation and analysis of statistical data conveying information about passengers' behaviour on the topics of:
passenger specific time of stay at the airport
passenger specific activities during the time of stay at the airport Using this empirical base, passenger activity simulation models are going to be developed for different scenario settings defined in the project.

Partner

TUHH Technische Universität Hamburg

AUTODESK.

TECHNISCHE UNIVERSITÄT DRESDEN

Contact

TUHH

Hamburg University of Technology
Institute of Laser and System Technologies (iLAS)

Prof. C. Emmelmann | c.emmelmann@tuhh.de
Am Schleusengraben 14, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

CIRCUIT

June 2019 - November 2023

H2020-EU.3.5.4.
Enabling the transition towards a green economy and society through eco-innovation

H2020-EU.3.5.2.
Protection of the environment, sustainable management of natural resources, water, biodiversity and ecosystems

CIRCULAR CONSTRUCTION IN REGENERATIVE CITIES

Objective

To this day, many techniques, tools and approaches have been developed and tested either on a lab scale or in pilot buildings around Europe. These demonstrations have served as great showcases for circular built environments, but they are yet to be demonstrated at higher level. Copenhagen, Hamburg, Helsinki region (City of Vantaa) and Greater London have teamed up with partners from the entire built environment value chain. The results will have a direct uptake in the value chain and enable cities to initiate circular transition. CIRCuIT will demonstrate three innovative solutions in the four cities: dismantle buildings to reuse materials; transformation and refurbishment; and design for disassembly and flexible construction. CIRCuIT will develop urban planning instruments to support cities in implementing circular construction solutions and initiate changes at system level; implement a Circularity Hub, a data platform to evaluate progress of circular economy and regenerative capacity; and set up a knowledge sharing structure, the CIRCuIT Academy, to promote upscaling of solutions. London, Hamburg, Helsinki region and Copenhagen have the ambition to bridge the implementation gap from individual pilots to the actual circular and regenerative city, by demonstrating the application of current and future developed tools and instruments for circular built environment at a city level in 36 demonstration projects. It is the intention to boost the regenerative capacity of the three cities and Helsinki region, and finalise the development of an advanced set of indicators for impact measurement in an effective and cross-European monitoring programme. The aim is to increase the regenerative capacity in the four cities, and to reduce the yearly consumption of virgin raw material by 20% in new built environments, and to show cost savings of 15%.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 821201. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The Circuit project consists of nine work packages in total. Four technical work packages (WP 3-6) on mapping flows of built environment materials and three solutions to promote transition towards circular construction (urban mining of reusable and recyclable products and materials, transformation and refurbishment, and design for disassembly and flexible construction). The technical work packages are led by three universities and research institutes (among them TUHH) and one architect company.
TUHH leads WP4 with the focus on Urban Mining and Reverse Cycles. This includes the evaluation of existing EU pre-demolition audit guidelines, the selection of reference buildings and demonstration of pre-demolition audits according to harmonized data sets, quality assessment, the evaluation of the demolition and subsequent product and material reusable and recyclable materials in new constructions.

Partner

Contact

TUHH

Hamburg University of Technology
Sustainable Resource and Waste Management

Prof. Kerstin Kuchta | kuchta@tuhh.de
Blohmstrasse 15, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

GLOWOPT

September 2019 - December 2022

H2020-EU.3.4.5.5.

ITD Engines Optimized UHPE flow path cooling design and testing using advanced manufacturing techniques

GLOWOPT

GLOBAL-WARMING-OPTIMIZED AIRCRAFT DESIGN

Objective

The objective of GLOWOPT is the development and validation of Climate Cost Functions with respect to minimizing global warming and their application to the multidisciplinary design optimization of next-generation aircraft for relevant market segments. Several objectives are set in order to reach this target.

The first objective is to provide an overview of the state of the art on the scientific background of the relation between aircraft design and operation and its climate impact.

The second objective is to derive characteristic aircraft design requirements, primarily payload and range, based on statis- tical data analysis of the worldwide aircraft fleet and route structure for future entries into Service using a comprehensive air traffic forecast model.

The third objective is to develop climate cost functions for the use in the aircraft design optimisation which reliably represent the climate impact of CO2, NOx, H2O emissions, as well as contrail-cirrus effects.

The fourth objective is to perform a Multidisciplinary Design Optimisation with respect to the climate cost function to find a set of operational parameters, design parameters and aircraft technologies that minimise the climate impact of the aircraft design using an existing MDO environment that applies the developed CCFs as objective function.

The fifth objective is to perform an assessment of the aircraft designs chosen in order to quantify their impact on important metrics such as landing and take-off noise, emissions and cash operating cost.

For this purpose, a higher-fidelity simulation integrating existing flight performance, emission and climate impact models is adapted and applied to simulate the aircraft design solution in an operational environment.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 865300. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Hamburg University of Technology is the coordinator of the GLOWOPT project and carries out project management related tasks, including dissemination and exploitation of project results. The Institute of Air Transportation Systems (ILT) contributes to the project on behalf of TUHH and leads two work packages.

In the work package "Representative Route Network & Fleet" the researchers derive characteristic aircraft design requirements, primarily payload and range, based on an analysis of the worldwide aircraft fleet and route structure, which serves as characteristic geographic flight distribution to be considered in the development of Climate Functions for Aircraft Design. This aircraft fleet and route structure results from an air traffic forecast model that will be adapted and applied in the course of the project. In the "Assessment" work package finally the effectiveness and validity of the climate functions for aircraft design will be evaluated by performing a higher-fidelity assessment of the aircraft designs using a more detailed trajectory and climate impact simulation.

Partner

TUHH
Technische
Universität
Hamburg

TU Delft
Delft University of Technology

Contact

TUHH

Hamburg University of Technology
Institute of Airtransport Systems

Prof. Volker Gollnick | volker.gollnick@tuhh.de
Blohmstrasse 20, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

BIO-PLASTICS EUROPE

October 2019 – September 2023

H2020-EU.3.2.5.3.
Cross-cutting concepts and technologies enabling maritime growth

CE-BG-06-2019
Sustainable solutions for bio-based plastics on land and sea

DEVELOPING AND IMPLEMENTING SUSTAINABILITY-BASED SOLUTIONS FOR BIO-BASED PLASTIC PRODUCTION AND USE TO PRESERVE LAND AND SEA

Objective

The project BIO-PLASTICS EUROPE addresses the topic „Sustainable solutions for bio-based plastics on land and sea" (Topic identifier: CE-BG-06-2019), within the focus area „Connecting economic and environmental gains - the Circular Econonmy (CE)" and will focus on sustainability strategies and solutions for bio-based products to support the Plastics Strategy. This shall include innovative product design and business models facilitating efficient reuse and recycling strategies and solutions, including ensuring the safety of recycled materials when used for toys or packaging food stuffs.

In line with the EU strategy on international cooperation in research and innovation and in order to encourage the further replication, the European consortium is complemented by a partner in Malaysia, providing an added value and helping them to address the many problems they face.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 860407. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

One major contribution of TUHH is recognized to the topic of Plastic Waste Collection, Recycling, and Littering. Here, TUHH will focus on identification and impact assessment of key sources of land- and sea-based plastic littering. The goal is to analyze necessary waste collection and management infrastructures and to draw the attention to recycling inefficiencies. TUHH will also conduct an assessment of the impacts of bio-based and biodegradable plastics/additives on existing waste management frameworks.

Then again, TUHH will define key priority areas for waste collection and management and the development of end-of-life scenarios for key materials (guidelines).

Partner

Contact

TUHH

Hamburg University of Technology
Sustainable Resource and Waste Management

Prof. Kerstin Kuchta | kuchta@tuhh.de
Blohmstrasse 15, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

AMANECO

October 2019 - March 2023

H2020-EU.3.4.5.5.
ITD Engines
Additive manufacturing boundary limits assessment for Eco Design process optimization [ECO]

ASSESSMENT OF ADDITIVE MANUFACTURING LIMIT FOR ECO DESIGN OPTIMIZATION IN HEAT EXCHANGER

Objective

Selective Laser Melting (SLM) is key for improved design and production process of aviation parts. Applied to heat exchangers (HX), it could dramatically improve global ecoefficiency through access to radically new designs and open horizons in terms of shape, weight, efficiency. Nevertheless, some questions need to be solved regarding capability of Additive Manufacturing (AM) to manufacture thin walls, small holes/gaps, low overhang angle, resulting surface roughness and mechanical strength.

AManECO aims to enhance knowledge of metal AM and, specifically, the capability of SLM process to manufacture thin layers and wall thickness with adequate surface finish using AlSi7Mg0.6 and INCO 718 materials. In particular, to investigate aerothermal and mechanical performance of thin walls, to predict them in the design of AM-HX and consequently, be able to optimize the HX´s design process in an eco-friendly way after knowing the limits of the metal AM technology.

For this purpose, testing samples will be designed and manufactured to characterize in terms of surface properties, pressure resistance and gas tightness evaluation, equivalent stiffness and aerothermal properties. Besides, numerical studies based on FEM and CFD simulations will be done. Then, a representative design of HX based on the initial SOA of AM limitations will be optimized with the gained knowledge.

These designs, before and after optimization, will be processed and characterized. Then, a Life Cycle Inventory (LCI) database will be created to evaluate the ECO potential of the innovative HX.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 864733. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Hamburg University of Technology acts as a work package (WP) leader for two of the seven work packages of the project. Furthermore, it contributes to all of the five technical WPs.

In WP1 TUHH is involved in the design of experiments of the four preliminary test series which focus on the investigation of 1) surface and porosity properties 2) aerothermal properties 3) pressure resistance and gas tightness and 4) the equivalent mechanical stiffness of additively manufactured HXs. Preparation of the technical drawings of all samples for the preliminary test series is the main contribution of TUHH to WP2. In WP3 the four preliminary test series are carried out and additionally dimensional characterization is done.

TUHH will contribute to this WP by carrying out the equivalent stiffness characterization. Due to its expertise in the field, TUHH became the WP leader of WP4 which focusses on numerical analysis. Besides ensuring good communication between the partners participating in the WP, TUHH's content related contribution in this WP will be the conduction of FEM simulations of pressure resistance and equivalent stiffness of HX designs.

The last technical WP is WP5 for which TUHH was once more chosen to be the WP leader. Parametric optimizations of small scale heat transfer elements will be done. Additionally, topology optimization might be used to create high performance heat transfer elements. TUHH will be creating a new design for an additively manufactured HX based on the knowledge that will be obtained from WP3 and WP4 by using the best of the obtained small scale heat transfer elements.

Furthermore, burst pressure tests of the newly designed AM-HXs will be carried out by TUHH as well as burst pressure tests of reference HXs. As the WP leader TUHH will guide the communication and activities throughout WP5.

Partner

LORTEK · FIT · TUHH Technische Universität Hamburg · cidetec surface engineering · MONDRAGON UNIBERTSITATEA · EPSILON ALCEN · CTME · SAFRAN

Contact

TUHH

Hamburg University of Technology
Institute of Laser and System Technologies (iLAS)

Dr. Dirk Herzog | dirk.herzog@tuhh.de
Am Schleusengraben 14, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

LIFTWEC

December 2019 - March 2023

H2020-EU.3.3.
SOCIETAL CHALLENGES - Secure, clean and efficient energy

LiftWEC

DEVELOPMENT OF A NOVEL WAVE ENERGY CONVERTER BASED ON HYDRODYNAMIC LIFT FORCES

Objective

To date, the vast majority of wave energy converters that have been developed have attempted to exploit buoyancy or diffraction forces in the extraction of wave energy; however, the LiftWEC concept is designed to exploit the lift forces generated using a rotating hydrofoil. This radically different approach to the design of wave energy converters, provided by the LiftWEC concept, offers the opportunity of making a step-change in the potential of wave energy and thus leading the way for its commercialisation.

This step-change in the design of wave energy converters could be likened to the step-change in wind turbine performance that occurred with the introduction of high-performance aerofoils to generate lift, when compared to sails and buckets that had previously been used. In waves of limited steepness, the trajectory of a single particle of water (a drop) forms closed ellipsoidal loops. This is synonymous with a rotating velocity vector of constant magnitude for that one particle. If we now insert a hydrofoil into the water beneath the waves, the relative velocity of the particles passing the hydrofoil can be used, in combination with a suitable pitch setting of the foil, to generate lift. As the direction of the particle velocity changes over the wave period, the pitch of the foil is adjusted accordingly. Using a carefully tuned system, a constant lift can be generated.

By attaching the foil to a lever, a continuous rotary motion is induced which can be harnessed using a power-take-off system to generate electricity. Following this approach, lift-to-drag ratios of up to 10 can be reached, allowing a higher power-capture of the available wave energy. The initial concept of the lift-based wave energy converter shall be further developed to demonstrate its feasibility in realistic conditions.

While the hydrodynamic principle is straightforward for harmonic, long-crested wave excitation, certain challenges arise when exposing the concept to irregular, short-crested seas. Furthermore, as for most devices designed for deployment in offshore locations, the extreme environmental conditions have to be taken into account to ensure a reasonable life expectancy. Finally, the environmental impact of the concept has to be assessed in order to ensure the compatibility of an operating device and marine life.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 851885. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

A key factor to the success of the LiftWEC concept is its economic viability. In order to assess the Levelized Cost of Energy (LCoE) throughout the life-time of the device, reliable numerical models are needed to predict performance and loads, and design each component accordingly.

The Institute of Fluid Dynamics and Ship Theory leads the Numerical Modelling work package within the LiftWEC consortium. As leader of this work package, FDS guides the development of hydrodynamic tools to allow real-time computation of the foils in waves, in coupling with the control algorithm developed by our partners from the National University of Ireland Maynooth, as well as high-fidelity simulations to allow a detailed analysis of the flow dynamics in regular operation and in extreme weather condition.The work is conducted in close collaboration with Innosea, working on the development and integration of the control algorithm in a real-time flow simulation tool and the Ecole Centrale de Nantes, responsible for the physical model testing needed to validate the numerical tools.

Partner

Queen's University Belfast · TUHH Technische Universität Hamburg · Maynooth University National University of Ireland Maynooth · INNOSEA · Aalborg University Denmark · UCC Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland · LHEEA Centrale Nantes · CNRS · Julia F. Chozas Consulting Engineer · WavEC Offshore Renewables · University of Strathclyde

Contact

TUHH

Hamburg University of Technology
Institute for Fluid Dynamics and Ship Theory

Prof. Moustafa Abdel-Maksoud |
m.abdel-maksoud@tuhh.de
Am Schwarzenberg-Campus 4,
21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12,
21079 Hamburg

BASH - TREAT

May 2018 - April 2021

ERA-MIN Joint Call 2017

OPTIMIZATION OF BOTTOM ASH TREATMENT FOR AN IMPROVED RECOVERY OF VALUABLE FRACTIONS

Objective

While incineration established itself as the best treatment option for municipal and industrial waste, with around 90 Mt/y of waste treated in EU incinerators, the management of its main residue, that is bottom ash, rapidly became a crucial point in the waste chain.

With 80 – 85 % (w/w) of mineral fraction and a valuable 10 – 12 % of metals, the recovery of residual useful components from bottom ash is a complex challenge for EU (20 % w/w of metals contained in bottom ash are not yet recovered), that may lead to important technical, socio/economic and environmental outcomes.

BASH-TREAT objectives are: 1) a complete assessment of EU state-of-the-art bottom ash treatment options considering technical/economic/environmental viewpoint; 2) an optimization of the exploitation of the refining treatment of the fine fraction deriving from full-scale trial tests; 3) the development of EU guidelines for the enhanced and innovative full valorisation of valuable components of bottom ash (metals and mineral fraction).

What is expected from BASH-TREAT is a database with information about performances, results, characteristic of bottom ash treatment in EU and suggestion for process improvement. The validation of the data via full-scale treatment plant plants. The development of new innovative technologies for the treatment of the fine fraction in a lab scale process. The technical, economical and environmental assessment will be performed for all the aspects faced in the project. An international, interdisciplinar and intersectoral consortium composed by two universities, one research center and two industrial partners with provide different and specific expertise-competences will face BASH-TREAT research activities.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No ERA-MIN-2017_157. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Hamburg University of Technology (TUHH) is the coordinator of this project. TUHH has more than 20 years of experience in the field of landfill aftercare and incineration processes.

As an academic partner for Hamburg incineration plants, the Institute of Environmental Technology and Energy Economics is a leading contributor to the scientific research on the properties of bottom ash.

The working group "Sustainable Resource and Waste Management", led by Professor Kerstin Kuchta, has a strong expertise about bottom ash treatment and recovery/recycling of valuable fractions. The several ongoing national/international projects make TUHH fully able to coordinate BASH-TREAT.

BASH-TREAT will involve an international, interdisciplinary and intersectional consortium. TUHH will contribute with its academic and technology transfer experience on applied research on waste management, devoted to the implementation at pilot and full scale of the experimental findings.

TUHH will disseminate the results of the project and stimulate the involvement of stakeholders and of the scientific community.

Partner

Supported by

Contact

TUHH

Hamburg University of Technology
Sustainable Resource and Waste Management

Prof. Kerstin Kuchta | kuchta@tuhh.de
Blohmstrasse 15, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

AQUAHEALTH

May 2020 - April 2023

ERA-NET Cofund on Blue Bioeconomy Call 1

AquaHealth

MICROALGAE MICROBIOMES – A NATURAL SOURCE FOR THE PREVENTION AND TREATMENT OF AQUACULTURE DISEASES

Objective

Aquaculture is one of the fastest growing food sectors in the world. In order to guarantee continuous, efficient and sustainable production- and to safeguard the growth of this important sector, its protection from biological threats is crucial.

Within the AquaHealth project, an international consortium of highly experienced partners will assemble and apply an advanced 'omics toolbox on the natural synergy of microalgae and microbial consortia to discover and validate novel bioactive and prebiotic compounds for sustainable use in preventing and treating disease in land-based aquaculture systems.

Targeted classes include biofilm and microbial pathogens inhibiting enzymes, peptides and small molecules, as well as antiviral natural products such as reverse-transcriptase inhibitors. The AquaHealth project will deliver fundamental new insight into microalgae and their associated microbiomes (WP2).
Integrated 'omics approaches (WP3) and further, sequence- and function-based screening (WP4) in search for new bioactive and prebiotic candidate molecules will be applied.

The cultivation process for selected strains and consortia producing promising targets of interest will be scaled up to pilot scale and appropriate downstream processing developed and applied in order to obtain the valuable candidates for detailed characterization and testing (WP5). Economic, environmental and social impacts of novel product candidates will be assessed, as well as routes towards commercialization of identified biomolecules and technologies (WP6).

Overall, the AquaHealth project will contribute significantly to a positive development of sustainable land-based aquaculture, securing high quality food supply for world's growing population while simultaneously reducing environmental impact.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 817992. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The AquaHealth project will be coordinated by Prof. Kuchta at TUHH who is highly experienced in coordinating complex research projects at national and international level. TUHH has a clear and transparent managing structure and experienced administrative staff supporting the coordinator in AquaHealth project management.

Upon project implementation, TUHH will take lead in project formalization and establishment of the legal basis for partner interactions, as well as data, sample and knowledge exchange within the project. A data management and exchange platform will be implemented.

AquaHealth will have clear management structures allowing efficient project progress. The coordinator will be responsible for the overall management of the consortium and the communication with the ERA-BlueBio program office. In WP5, the cultivation process for selected microalgae strains will be upscaled to pilot scale in order to obtain sufficient amounts for further characterization and evaluation of commercial potential. TUHH and Sea & Sun Technology GmbH offer several reactor systems for microalgae cultivation which will be utilized for optimized production of selected strains. In the downstream processing, the most suitable harvesting technique will be defined from several methods that have been conducted at the TUHH and SST.

Partner

TUHH Technische Universität Hamburg

Universität Hamburg

SINTEF

AALBORG UNIVERSITY

Sea & Sun Technology

Contact

TUHH

Hamburg University of Technology
Sustainable Resource and Waste Management

Prof. Kerstin Kuchta | kuchta@tuhh.de
Blohmstrasse 15, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

FLYATM4E

June 2020 - November 2022

SESAR-ER4-05-2019 - Environment and Meteorology for ATM

FlyATM4E

FLYING AIR TRAFFIC MANAGEMENT FOR ENVIRONMENT

Objective

The main objective of the FlyATM4E project is to expand approved climate-assessment methods and optimization of aircraft trajectories in order to identify promising mitigation options suitable to solve the task of reducing overall climate impact of aircraft operations. The project will assess the feasibility of a concept for environmental assessment of ATM operations working towards environmental optimisation of air traffic operations. FlyATM4E will develop a concept to identify climate-optimised aircraft trajectories which enable a robust and eco-efficient reduction in aviation's climate impact. Climate optimization will take into account CO2 and non-CO2 effects, such as contrails and contrail-cirrus, water vapour, NOx and particulate emissions.

FlyATM4E will identify those weather situations and aircraft trajectories, which lead to a robust climate impact reduction despite uncertainties in atmospheric science that can be characterised by ensemble probabilistic forecasts. This will improve the assessment of aviation's climate impact. It will further identify those situations where there is a large potential to reduce the climate impact with only little or even no cost changes ("Cherry-Picking") and those situations where both, climate impact and costs can be reduced ("Win-Win"). As a synthesis, FlyATM4E will formulate recommendations how to implement these strategies in meteorological (MET) products and enable not only the understanding of ATM possibilities to reduce aviation's climate impact, but moreover how to implement such eco-efficient routing. To this end, the FlyATM4E consortium builds on its expertise covering the whole spectrum from atmospheric science and climate research to aviation operations research and aircraft trajectory optimisation.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 891317. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

TUHH contributes to FlyATM4E with the Institute of Air Transportation Systems (ILT), which is specialized on the modelling and simulation of the global impact of future air transportation technologies and operational concepts.

ILT is leading the work package named "Robust solutions under environmental uncertainties" and is responsible for determining robust climate-optimized trajectories for selected intra-European flights taking into account uncertainties in both, weather forecasts and climate impact prediction. Therefore, an unconstrained optimization method based on an optimal control approach is developed which is able to consider different ensemble members of the weather forecasts as well as climate impact predictions associated with uncertainties. Moreover, TUHH contributes to the case studies "Win-Win" and "Cherry-Picking" (see above).

Partner

DLR

TU Delft

TUHH
Technische
Universität
Hamburg

uc3m
Universidad
Carlos III
de Madrid

Contact

TUHH

Hamburg University of Technology
Institute of Airtransport Systems

Prof. Volker Gollnick | volker.gollnick@tuhh.de
Blohmstrasse 20, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

ASSUREMOSS

October 2020 - September 2023

H2020-EU.2.1.1.
H2020-EU.2.1.1.

INDUSTRIAL LEADERSHIP
Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT)

SU-ICT-02-2020
Building blocks for resilience in evolving ICT systems

AssureMOSS

ASSURANCE AND CERTIFICATION IN SECURE MULTI-PARTY OPEN SOFTWARE AND SERVICES

Objective

Continuous, distributed changes rule today's European Digital Single Market as no single company does master its own national, in-house software. Software is mostly assembled from "the internet" and more than half come from Open Source Software repositories. Security & privacy assurance, verification and process certification techniques designed for large, controlled updates over months or years, must now cope with small, continuous changes in weeks, happening in sub-components and decided by third party developers one did not even know they existed. AssureMOSS addresses these challenges to the fullest extent: « Open Source Software - Designed Everywhere, Secured in Europe ». AssureMOSS proposes to switch from process-based to an artefact-based security evaluation by supporting all phases of the continuous software lifecycle (Design, Develop, Deploy, Evaluate and back) their artefacts (Models, Source code, Container images, Services).

The key idea is to support mechanisms for lightweigth and scalable screenings applicable automatically to the entire population of software components by

- Machine intelligent identification of security issues across artifacts,
- Sound analysis and verification of changes by tracing the security and privay side effects,
- Business insight by risk analysis and security evaluation.

This approach supports fast-paced development of better software by a new notion: continuous (re)certification. AssureMOSS has assembled a team including 5 leading Universities (Delft, Gotheborg, Trento, Vienna, VU Amsterdam), 3 innovative SMEs (FrontEndART, Search-Lab, Pluribus One), 3 Large Enterprises (E&Y, SAP, Thales) and 1 Special Interest Group Organization (EU-VRi) and an Advisory Board with key figures from OSS and industry at large.
The project will generate not only a set of innovative methods and open source tools but also benchmark datasets with thousands of vulnerabilities and code that can be used by other researchers.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 952647. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

TUHH's Software Security Institute is part of AssureMOSS's work package 2. In it, TUHH partners with TU Delft, Thales Group, the University of Vienna, and the European Risk & Resilience Institute. The work package develops a closed-loop security validation approach that leverages architectural design information and builds on top of the knowledge of code, the development environment, and the deployment environment. Architectural security-aware models are detected in the code with the help of automated detectors and guidance by Development Bots; they are then used for security checks. These checks are specified in a developer-friendly way to be easily plugged in a continuous integration/delivery pipeline.

Prof. Riccardo Scandariato as head of the Software Security Institute and two of his research associates are TUHH's contributing researchers to AssureMOSS. Prof. Scandariato is further the work package leader and the scientific leader of the project as a whole.

Partner

FRONTENDART

UNIVERSITÀ DI TRENTO

SAP

VU

EY Building a better working world

TU Delft

THALES

universität wien

Pluribus One seeing one in many

EU-VRi

SEARCH-LAB SECURITY EVALUATION ANALYSIS AND RESEARCH LABORATORY

TUHH Technische Universität Hamburg

Contact

TUHH

Hamburg University of Technology
Institute Secure Software

Prof. Riccardo Scandariato |
riccardo.sccandariato@tuhh.de

Blohmstrasse 15, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

ALIGHT

November 2020 - October 2024

H2020-EU.3.3.1.3.

H2020-EU.3.3.3.1.

Foster European Smart cities and Communities

Make bio-energy more competitive and sustainable

ALIGHT
SUSTAINABLE AVIATION

A LIGHTHOUSE FOR THE INTRODUCTION OF SUSTAINABLE AVIATION SOLUTIONS FOR THE FUTURE

Objective

The ALIGHT project will address the global need to reduce greenhouse gas (GHG) and other air emissions in order to adapt to climate change and promote a sustainable future. It will do so through the development and demonstration of two sustainable solutions to be implemented in Copenhagen Airport (the Lighthouse airport), namely 1) the supply, implementation, integration and smart use of sustainable aviation fuel (SAF) and 2) the development, integration and implementation of smart energy system (including renewable energy sources, energy storage and energy management). On the SAF side, ALIGHT will tackle a current challenge, namely the smart, sustainable and cost effective handling of SAF in the operational context of a major airport. The project will address the SAF chain from procurement to integration and demonstration and ensure compliance with all relevant criteria, including sustainability. Within the area of smart energy, ALIGHT will address the full chain from system mapping, energy supply (including renewable energy, energy storage and geothermal energy), smart energy management to planning and demonstration in passenger transport, ground handling equipment and buildings (including heating, cooling and electricity). Field performance monitoring will be performed on aircraft exhaust-, vehicle- and air quality level. Sustainability and the reduction of GHG and other air emissions will be addressed throughout, and all components will be subject to relevant sustainability requirements. ALIGHT will bring forward the necessary solutions, knowledge, guidelines and best practice recommendations in comprehensivWith the Lighthouse project, CPH as Lighthouse with two fellow airports, will demonstrate energy-efficient, climate-friendly, fossil-free and smart solutions in preparation for upcoming massive investments in, among other things. infrastructure for biokerosene airplane fuel and electrification of vehicles and machines both in- and outside the airport.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 957824. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

A near-term and widespread market ramp-up of sustainable aviation fuels (SAF) requires effective regulatory frameworks that allow for an economic SAF utilization. However, it is furthermore important to remove operational barriers for the use of SAF so they can be seamlessly integrated in the day to day aviation operation. Within the ALIGHT project TUHH will tackle these topics.

The seamless use of SAF requires, among other things, suitable conceptes for their reporting and accounting. The different properties of SAF, e.g. sustainability properties, must be tracked along the entire supply chain and between all actors involved, such as fuel manufacturers, tank farm operators, airlines or national authorities, while SAF batches are commingled with (fossil) conventional aviation fuels in the common fuel supply infrastructure and thus cannot be physically distinguished. The already existing approaches for SAF reporting and accounting are not suitable for a mass use of SAF and may especially result in high administrative efforts if airlines want to account for the use of SAF. Also, many actors along the supply chain of aviation fuels have a considerable need for information and lack of experience in the (administrative) handling of SAF.

In addition to TUHH's expertise on SAF production pathways and their market conditions, TUHH will add knowledge and experience in the field of SAF reporting and accounting concepts to the ALIGHT project. In particular, TUHH will analyze the fuel supply chain for different SAF options that will be supplied to Copenhagen airport in the project, particularly with regard to sustainability documentation, and identify requirements for the use, supply, reporting and accounting of SAF. Based on this, proper SAF accounting concepts will be developed and evaluated in the practical context of the project with which airlines and other stakeholders can be credited for the use of SAF in a seamless manner.

Partner

Copenhagen Airports CPH · Aeroporti di Roma · Lithuanian Airports · Centralny Port Komunikacyjny · Danish Technological Institute · Brændstoflageret Københavns Lufthavn I/S · SAS · NISA Nordic Initiative for Sustainable Aviation · IATA · DLR · air bp · RSB · Hybrid Greentech Energy Storage Intelligence · BMGI Consulting · Università di Parma · TUHH Technische Universität Hamburg

Contact

TUHH

Hamburg University of Technology
Institute of Environmental Technology and Energy Economics

Prof. Martin Kaltschmitt | kaltschmitt@tuhh.de
Eißendorfer Straße 40, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

MARI4YARD

December 2020 - November 2024

H2020-EU.3.4

SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

MG-3-7-2020 - Improved Production and Maintenance Processes in Shipyards

MARI4YARD
MARI4ALLIANCE

USER-CENTRIC SOLUTIONS FOR A FLEXIBLE AND MODULAR MANUFACTURING IN SMALL AND MEDIUM-SIZED SHIPYARDS

Objective

EU shipbuilding leading edge relies in the complexity, quality, customization, delivery time and lifecycle services (e.g. in situ maintenance, repair and retrofitting) of the vessels manufactured. However, in the last decade, EU small and medium-sized shipyards (SME) have experienced a competitive drawback in their market segments due to an increase of competition from other global regions that benefits from lower labour costs or higher automation degree. Moreover, SME shipyards must also overcome a major impediment related with capital investment that can overwhelm the part cost for shipbuilding. As a result, current automation solutions based on large monolithic equipment, are not still valid for increasing productivity in SME shipyards.

Therefore, shipbuilding, and especially SME shipyards, needs novel cost-effective, reconfigurable, modular and flexible worker-centric methodologies capable of improving worker's performance and ensuring quality and precision in the execution of the labour-intensive tasks.

Mari4_YARD aims the implementation of a portfolio of worker-centric solutions, by relying on novel collaborative robotics and ubiquitous portable solutions, enabling modular, reconfigurable and usable solutions targeting the execution of labour-intensive tasks by preserving industry-specific workers' knowledge and skills. Moreover, replicability and early-adoption of the portfolio of technologies by other SME-shipyards is ensured through several actions on training, technology assessment, benchmarking… by establishing a pan-European network of Didactic Factories, offering general-purpose testbeds and showrooms, as well as providing upskilling and re-skilling of shipyards workforce.

To further maximise the impact, Mari4_YARD plans to use synergies with complementary European and national initiatives, especially those related to MG-3-7-2020. A strategy for collaboration with Mari4_CHAIN and Mari4_PRO proposals, if funded as well, has already been set up.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006798. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Production Management and Technology

Prof. Wolfgang Hintze | w.hintze@tuhh.de
Denickestr. 17 , 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

REIVON

January 2021 - June 2023

H2020-EU.3.4.5.9.

Technology Evaluator

JTI-CS2-2020-CfP11-TE2-01-14 - Reduction of the environmental impact of aviation via optimisation of aircraft size/range and flight network

REIVON

Reduction of the Environmental Impact of aviation via Optimisation of aircraft size/range and flight Network

REDUCTION OF THE ENVIRONMENTAL IMPACT OF AVIATION VIA OPTIMISATION OF AIRCRAFT SIZE/ RANGE AND FLIGHT NETWORK

Objective

The main objective of REIVON is to investigate to what extent the CO2 emissions of global aviation can be reduced via an optimisation of aircraft size/range and flight network.

The project will first identify the theoretical potentials for reducing CO2 emissions via optimised aircraft, network and frequency reductions. Hereby, three alternatives for an optimised global air transport system will be considered:

1) splitting long-haul flights into shorter legs;
2) reducing frequencies to the necessary minimum; and
3) a combination of 1 and 2.

Moreover, REIVON will assess the impacts on stakeholders of an optimised global air transport system (ATS) and will analyse potential measures to establish such a system with optimised aircraft, network and frequency reductions.

REIVON will make use of an integrated approach involving experts from multiple disciplines, including aircraft design and performance, airline fleet and network optimisation, aircraft emissions modelling, air traffic demand modelling as well as impact assessment on local and global level. The analytical steps are carried out in four technical work packages, and a fifth work package is involved with management. REIVON will use various databases and a range of state-of-the-art models and tools to support the analysis. The findings of REIVON will be documented in a number of scientific reports.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No101007659. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

TUHH is involved in REIVON with the Institute of Air Transportation Systems (ILT), which is specialized on the modelling and simulation of the global impact of future air transportation technologies and operational concepts. ILT will contribute to the project with its capabilities in airline fleet and network optimization as well as aircraft performance, emissions modelling and trajectory calculation. With its key researchers significantly contributing to the state of the art on the concept of Intermediate Stop Operations (ISO), ILT will carry out the creation of the three network alternatives (mentioned above) by optimizing the route network in work package titled ' Theoretical potentials for reducing CO2 via optimised air transport system' for various historical and future annual flight schedules. The optimization results will serve as an input for the fuel and CO2 calculation. Moreover, ILT will lead work package on ' Analysis of potential measures', tasked to investigate aspects that prevent aviation stakeholders from adopting these optimised operations and create incentives to implement such an optimised fleet and network.

Partner

envisa

TAKS Handling Systems

Manchester Metropolitan University

TUHH Technische Universität Hamburg

Contact

TUHH

Hamburg University of Technology
Institute of Airtransport Systems

Prof. Volker Gollnick | volker.gollnick@tuhh.de
Blohmstrasse 20, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

MOREANDLESS

January 2021 - December 2024

H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

LC-MG-1-15-2020 - Towards global environmental regulation of supersonic aviation

MORE&LESS

MDO and **RE**gulations for **L**ow-boom and **E**nvironemntally **S**ustainable **S**upersonic Aviation

MDO AND REGULATIONS FOR LOW-BOOM AND ENVIRONMENTALLY SUSTAINABLE SUPERSONIC AVIATION

Objective

MORE&LESS addresses the challenge of contributing to help Europe shape, together with the international community, high environmental standards in line with ICAO Assembly Resolution A39-1, by a thorough and holistic analysis of the environmental impact of supersonic aviation. MORE&LESS aims at maintaining a high level of citizens' and environmental protection at local, regional and global levels, and supports the consequent establishment of regulations and procedures for the future supersonic aviation through solid technical bases. The scientific findings in the fields of aerodynamics, jet-noise, sonic-boom, propulsion, pollutant emissions and environmental impact are in fact transposed into guidelines for the Regulatory Community. Through low and high-fidelity modelling activities and test campaigns, already accepted and validated software tools are enhanced and extended to cover supersonic aviation, to be eventually integrated into the multidisciplinary holistic framework. The application of this framework to the case-studies is the proving ground to verify that the en abling technologies of supersonic aircraft, trajectories and operations comply with the environmental requirements. The case-studies cover the entire spectrum of supersonic speed regime and include the most promising aircraft configurations, propulsive technologies and alternative fuels, such as bio-fuels and liquid hydrogen. MORE&LESS fosters international cooperation, thus paving the way towards the definition of global and internationally agreed regulations, while contributing to maintain world-class knowledge and skills in Europe in the field of supersonic aviation. MORE&LESS targets the engagement of new generations of students, scientists and engineers to inspire and challenge them to build and manage the environmentally sustainable supersonic aviation of the future.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 101006856. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

TUHH will contribute to MORE&LESS with the Instiute of Air Transportation Systems (ILT), which is specialized on modelling and simulation on of the global impact of future air transportation technologies and operational concepts. ILT will be focusing on Sonic Boom modelling and characterization, for which an already existing tool based on Ray Tracing will be further developed to not only include a geometric sonic boom carpet description , but as well characterize the "acoustic" carpet for a given loudness threshold. Furthermore, ILT will contribute by expanding the capabilities of the Trajectory Calculation Module (TCM, which was successfully applied in various projects and validated with e.g. Airbus' Performance Engineer Program (PEP) and NASA softwareFACET), which in its latest Version (3.0) will be upgraded with a routine to support the definition of operating scenarios for the introduction of a fleet of supersonic aircraft into future civil aviation. Addi onally, the TCM will be adapted for the integration into a multidisciplinary optimization framework and regulatory variables required for the future supersonic aircraft operation will be embedded.

Moreover, TUHH will also be involved in the following tasks: Airspace Integration routine; Definition of operating scenarios for the subsonic reference and supersonic fleet; Multidisciplinary Optimization Analysis Framework implementation; Noise regulations for LTO cycles including Sonic Boom regulations.

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Airtransport Systems

Prof. Volker Gollnick | volker.gollnick@tuhh.de
Blohmstrasse 20, 21079 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

SMART-ER

February 2021 - January 2024

H2020-EU.5. - SCIENCE WITH AND FOR SOCIETY

IBA-SwafS-Support-1-2020 - Support for the Research and Innovation Dimension of European Universities (Part I)

ECIU UNIVERSITY RESEARCH INSTITUTE FOR SMART EUROPEAN REGIONS

Objective

More than half the world's population lives in cities. But problems are rife in urban areas. Making cities inclusive, safe, resilient and sustainable is a United Nations Sustainable Development Goal. This requires deep changes in related research, study and management based on dialogue with society, beyond traditional physical borders or limitations like country or discipline specificities. In this context, the EU-funded SMART-ER project will develop a new model of research and innovation through an alliance of universities for virtual research, innovation and education: the ECIU University Research Institute. It will create and validate new models of performing collaborative research in a virtual environment and novel transformative approaches and practices. he ECIU University Research Institute for Smart European Regions (SMART-ER) is a research, innovation and education alliance, enabling all member universities to jointly address complex societal challenges under the UN SDG11 (Make cities and human settlements inclusive, safe, resilient and sustainable). SMART-ER, organized as a virtual research institute, designs and implements research, value-captures and delivers solutions to SDG11 challenges, identified by the ECIU University Erasmus+ project. SMART-ER, together with stakeholder groups at a local and international level, showcases and works according to a shared R&I Agenda, focused on social needs, and its implementation plan. SMART-ER will align and bring together research capacities, both scientific and management capacities, bring together researchers and share a common vision, creating a virtual research institute as an example of how to overcome the limits of each single institution.

It means, in fact, to implement a new model of doing research and innovation without walls, because:
is a way to leave behind the ivory tower, promoting dialogue with society; it will overcome the limitations of disciplines, sectors and countries; it will be mainly based on setting a virtual collaborative environment
All partners will join efforts to develop and test transformative approaches focused on R&I that are so needed:

Mapping relevant information regarding ECIU University resources and infrastructures, practices and actors needed to move to the second phase; Developing the internal plans, procedures, training contents and platforms that will allow the creation and the operability of the SMART-ER

- A capacity building programme (Seed Programme and SMART-ER Academy) and citizen science initiatives that will be used as a testbed to put into practice all built mechanisms and structures
- Validating the pilots and procedures
- Producing guidelines and toolkits for tested models replication and practices of reference.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 101016888. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Process Imaging

Prof. Alexander Penn | alexander.penn@tuhh.de
Denickestrasse 17, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

ICLIMABUILT

March 2021 - February 2025

H2020-DT-NMBP-05-2020

Open Innovation Test Beds for materials for building envelopes (IA)

FUNCTIONAL AND ADVANCED INSULATING AND ENERGY HARVESTING/STORAGE MATERIALS ACROSS CLIMATE ADAPTIVE BUILDING ENVELOPES

Objective

iclimabuilt project aims to form a cross-domain business ecosystem combining the capabilities of different experts, building the connection between suppliers and users, based on the cooperation within interdisciplinary entities to support new product development/upscaling and testing, satisfy customer needs based on a case-by-case assessment of the underlying barriers of each technology, and eventually incorporate the next round of innovations in building envelope materials and technical systems. iclimabuilt will do so with the aim to accelerate the development of additional leading-edge technology

by focusing on:

- materials development (for improved thermal and functional performance of building envelope solutions)
- design and assembly of technical systems (fully customizable, flexible, modular and de-mountable aesthetic designs)
- monitoring and characterization strategies to support decision-making (fully monitored living labs and non-residential nZEBs)
- dissemination and exploitation activities (increased market and societal acceptance of validated products through the testbed)
- refined and expedited access to financing solutions to reinforce the competitiveness and extroversion of SMEs.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 952886. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

Within this project, the TUHH cooperates with various industrial or academic partners to develop new specific thermal insulation materials containing aerogels. The benefit of including aerogels in these materials is their low thermal conductivity, which is even lower than air or conventional insulation materials. To utilize this property for insulation materials, the TUHH provides different types of aerogels (silica and biobased) for insulation in cement / concrete-based materials for wall facades or insulation in sandwich wall panels and omniphobic coatings for smart window applications. To reach industrial applications as well, a scale-up of the existing aerogel production line at the TUHH is carried out. During this project, a production capability of 2000 lt. aerogel particles is envisaged, which means a 4-fold increase in the production capability.

Partner

Contact

TUHH

Hamburg University of Technology
Institute of Thermal Separation Processes

Prof. Irina Smirnova | irina.smirnova@tuhh.de
Eißendorfer Str. 38, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

TUSAIL

March 2021 - February 2025

H2020-EU.1.3.1.

H2020-EU.1.3.1. - Fostering new skills by means of excellent initial training of researchers

MSCA-ITN-2020 - Innovative Training Networks

tusail

TRAINING IN UPSCALING PARTICLE SYSTEMS: ADVANCING INDUSTRY ACROSS LENGTH-SCALES

Objective

The overarching objective of TUSAIL is to train 15 creative, entrepreneurial and innovative Early Stage Researchers (ESRs) in developing, applying and validating novel methodologies for upscaling of particulate systems across the length-scales and this way to help advance the innovation capacity in European industry. Training and research of the ESRs will be structured involving multiple disciplines (physics, engineering, informatics and mathematics), internationally covered by all partners, and involving state-of-the-art research and transferable, intersectoral skills from both academia and industry. This will deliver a cohort of experts in upscaling techniques able to eliminate industry's reliance on traditional, costly pilot plants and thereby enhance European competitiveness, reducing risks and saving valuable resources. The ambitious training goal will be completed by top-edge research in three research WPs that address three complementary methods to modernise upscaling with an overarching WP that combines calibration and validation, targeting applications in real-life industrial practice. The TUSAIL multidisciplinary team with top level academic institutions, complemented by leaders in the field from the nonacademic sector, will deliver ESRs with strongly enhanced career perspectives and the ability to address critical challenges in the field and at the same time strengthen Europe's human capital base in R&I.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 955661. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

The TUSAIL project is implemented as 7 work packages (WPs) with 6 partner institutions from university and 5 from industry. TUHH (Institute of Solids Process Engineering and Particle Technology - SPE) is participating in 6 of the 7 WPs and leads the WP1 – population balance models (PBM) in cooperation with Technische Universität Braunschweig, Process Systems Enterprises Limited, Nestlé and Johnson Matthey PLC.

PBM is a process modelling framework that tracks the evolution of classes of particles as they undergo rate processes, such as aggregation and breakage, thereby being capable of modelling a full industrial process. At present, however, the rate kernels in PBM are largely empirical and extremely difficult to determine experimentally, so the predictive capability of PBM models can be rather poor. WP1 aims to deploy DEM/DEMCFD particle simulations to develop physics-based models of the rate processes to inform the rate kernels in PBM and provide a much-improved upscaling approach to simulate the time-dependent behavior of industrial processes. The particle informed PBM models can be further embedded into less detailed dynamic flowsheet simulations to further upscale towards models for interconnected processes in a complete industrial system. WP1 has 5 ESR focusing on the unit operations of milling and agglomeration and two ESR are located at the TUHH (SPE).

Partner

THE UNIVERSITY of EDINBURGH

UNIVERSITY OF TWENTE.

Technische Universität Braunschweig

UNIVERSITÀ DEGLI STUDI DI SALERNO

TUHH Technische Universität Hamburg

PSE A Siemens Business

P&G

JOHANNES KEPLER UNIVERSITÄT LINZ

Nestlé

JM Johnson Matthey Inspiring science, enhancing life

DCS COMPUTING

Contact

TUHH

Hamburg University of Technology
Solids Process Engineering and Particle Technology

Prof. Stefan Heinrich | stefan.heinrich@tuhh.de
Eißendorfer Straße 40, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

TIME-X

April 2021 - March 2024

H2020-JTI-EuroHPC-2019-1

CNECT.C – Digital Excellence and Science Infrastructure

C.2 – High Performance Computing and Quantum Technology

TIME PARALLELISATION: FOR EXASCALE COMPUTING AND BEYOND

Objective

Recent successes have established the potential of parallel-in-time integration as a powerful algorithmic paradigm to unlock the performance of Exascale systems. However, these successes have mainly been achieved in a rather academic setting, without an overarching understanding. TIME-X will take the next leap in the development and deployment of this promising new approach for massively parallel HPC simulation, enabling efficient parallel-in-time integration for real-life applications. We will: Provide software for parallel-in-time integration on current and future Exascale HPC architectures, delivering substantial improvements in parallel scaling; Develop novel algorithmic concepts for parallel-in-time integration, deepening our mathematical understanding of their convergence behaviour and including advances in multi-scale methodology; Demonstrate the impact of parallel-in-time integration, showcasing the potential on problems that, to date, cannot be tackled with full parallel efficiency in three diverse and challenging application fields with high societal impact: weather and climate, medicine and fusion. To realise these ambitious, yet achievable goals, the inherently inter-disciplinary TIME-X Consortium unites top researchers from numerical analysis and applied mathematics, computer science and the selected application domains. Europe is leading research in parallel-in-time integration. TIME-X unites all relevant actors at the European level for the first time in a joint strategic research effort. A strategic investment from the European Commission would enable taking the necessary next step: advancing parallel-in-time integration from an academic/mathematical methodology into a widely available technology with a convincing proof of concept, maintaining European leadership in this rapidly advancing field and paving the way for industrial adoption.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 955701. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein. This project also received funding from the German Federal Ministry of Education and Research (BMBF) grant 16HPC048.

SPONSORED BY THE Federal Ministry of Education and Research

Contribution of TUHH to the project

Through DR, TUHH will contribute to the development of robust extreme-scale PinT solvers and their application in large-scale simulations in Electromagnetics and Weather and Climate. DR has extensive experience in the development of efficient numerical algorithms, their implementation for HPC systems and their application in engineering or the physical sciences. He has developed numerical methods for models in atmospheric science, geophysics, fusion reactors, robotic manipulation and combustion engines.

Partner

KU LEUVEN

Technische Universität München

BERGISCHE UNIVERSITÄT WUPPERTAL

TECHNISCHE UNIVERSITÄT DARMSTADT

TUHH Technische Universität Hamburg

JÜLICH Forschungszentrum

École des Ponts ParisTech

Università della Svizzera italiana

SORBONNE UNIVERSITÉ

UNIVERSITÉ DE GENÈVE

Contact

TUHH

Hamburg University of Technology
Institute of Mathematics

Prof. Daniel Ruprecht | ruprecht@tuhh.de
Am Schwarzenberg-Campus 3, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg

EHAWEDRY

July 2021 - June 2025

H2020-EU.1.2.1. - FET Open

FETOPEN-01-2018-2019-2020 - FET-Open Challenging Current Thinking

EHAWEDRY

ENERGY HARVESTING VIA WETTING/DRYING-CYCLES WITH NANOPOROUS ELECTRODES

Objective

Huge amounts of energy are wasted as low grade heat during conversion, transportation and end use. While several technologies can convert heat into electricity, none of them is cost-effective for the conversion of low-grade waste heat. EHAWEDRY proposes a radically new concept for converting low grade waste heat into electricity. EHAWEDRY will couple charging/discharging cycles of electrochemical super-capacitors with the drying/wetting of their nanoporous electrodes, exploiting the proportionality of the capacitor capacity to its electrode/electrolyte contact area. Previous attempts to couple charging/discharging cycles with changes in the electrode/electrolyte contact area aimed at harvesting the mechanical energy used to drive the change in the contact area. The power generated by these mechanical energy harvesters is relatively low, mainly because they have to use smooth capacitor plates (electrodes) to avoid generating too large capillary forces counteracting the harvested displacement. EHAWEDRY proposes a paradigm shift from the energy harvesting strategies previously used.
Instead of mechanically changing the electrode/electrolyte contact area by displacing smooth electrodes, EHAWEDRY will change the electrode/electrolyte contact area by modifying the electrolyte level within nanoporous electrodes through drying/wetting cycles. The use of nanoporous electrodes will increase by many orders of magnitude the electrode/electrolyte contact area, which will translate into several orders of magnitude larger amounts of harvestable energy per cycle. Via pioneering fundamental research, EHAWEDRY targets the generation of a harvester prototype that reaches a volumetric power densities of the order of 10 kW/m3, comparable to established waste heat recovery technologies such as Rankine cycle engines, but with advantages in terms of cost, design flexibility, scalability and potential for the cost-effective harvesting of low grade waste heat without upgrading.

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 964524. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Contribution of TUHH to the project

In the consortium Huber group will contribute to the materials synthesis (monolithic nanoporous silicon) as well as in the experimental characterization of the imbibition, drying and cavitation dynamics in porous media as well as the interplay of mechanics and fluidics in nanoporous electrodes.

Partner

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

TUHH Technische Universität Hamburg

IREC Shaping Energy for a Sustainable Future

cnrs

F.D. Ovcharenko Institute of Biocolloidal Chemistry NAS Ukraine

Universität Hamburg DER FORSCHUNG | DER LEHRE | DER BILDUNG

R2M RESEARCH TO MARKET SOLUTION

termigo microclimas

Contact

TUHH

Hamburg University of Technology
Center for Integrated Multiscale Material Systems

Prof. Patrick Huber | patrick.huber@tuhh.de
Eißendorfer Straße 42, 21073 Hamburg

Tutech

Tutech Innovation GmbH
Consultancy & Competence Developement

Monica Schofield | euoffice@tutech.de
Harburger Schloßstrasse 6-12, 21079 Hamburg