

10 PhD positions in the EU Horizon Europe Marie Skłodowska-Curie DN Project: SEACHEM (Offshore Seaweed Aquaculture to Produce High-value Chemicals)

Applications are invited for 10 PhD positions (“Doctoral Candidates - DC”) to be funded by the Marie-Skłodowska-Curie Doctoral Network SEACHEM within the Horizon Europe Programme of the European Commission. SEACHEM is the “Training a New generation of Researchers in Offshore Seaweed Aquaculture to Produce High-value Chemicals” project. SEACHEM opens innovative opportunities in offshore seaweed production for the growing need for a cost-effective, renewable and sustainable production of high-end, high-value chemicals for the food, health, personal care and chemical industry. The environmental impact generated using fossil fuels for commodity chemicals production is a major societal and environmental concern, leading to a large (and ever increasing) interest in renewable and sustainable novel alternatives, utilizing biomass resources. The project has pooled the interdisciplinary and intersectoral expertise of leading members (6 Beneficiaries and 12 Associated Partners) located in Belgium, Ireland, France, Denmark, The Netherlands, Portugal, Spain, Sweden. The 10 SEACHEM DNs will not only receive state-of-the-art science/technology training but will also benefit from a unique soft-skills training programme. This will kick-start their careers as highly employable professionals in the EU and beyond.

Key dates

- 12 August 2022: Launch of 10 DC Positions
- 30 September 2022: Deadline for on-line application
- 15 October 2022: Circulation list “SeaChem pre-selected candidates”
- November 2022: SeaChem Recruitment Event (exact date to be announced)
- November 2022: Circulation list “recruited SeaChem DCs”
- 1 April 2023: Targeted starting date for DC contracts (or earlier, if possible)

Key background info

Number of positions available

10 PhD Positions

Project type

SEACHEM is a MSCA DN project (Doctoral Network). Each recruited researcher will be enrolled in a doctoral program in one EU Member States

Research Fields

Civil Engineering, Structural Engineering, Materials Engineering, (Bio)Chemical Engineering, Mechanical Engineering, Nautical Sciences, Bioscience Engineering, Biology, Environmental Engineering, Plant Sciences

Keywords

Aquaculture, seaweed, chemicals

Benefits and salary

The successful candidates will receive an attractive salary in accordance with the MSCA regulations for Recruited Researchers. The exact (net) salary will be confirmed upon appointment and is dependent on local tax regulations and on the country correction factor (to allow for the difference in cost of living in different EU Member States). The salary includes a living allowance, a mobility allowance and a family allowance (if applicable). The guaranteed PhD funding is for 36 months (i.e. EC funding, additional funding is possible, depending on the local Supervisor, and in accordance with the regular PhD time in the country of origin). In addition to their individual scientific projects, all fellows will benefit from further continuing education, which includes internships and secondments, a variety of training modules as well as transferable skills courses and active participation in workshops and conferences.

On-line Recruitment Procedure (see Appendix 1)

All applications proceed through the on-line recruitment portal on the <https://sea-chem.eu/> website. Candidates apply electronically for one to maximum three positions and indicate their preference. Candidates provide all requested information including a detailed CV ([Europass format](#))

obligatory) and motivation letter. During the registration, applicants will need to prove that they are eligible (cf. Recruited Researchers definition in [Horizon Europe MSCA work programme 2021-2022](#), mobility criteria, and English language proficiency):

- Supported researchers must be doctoral candidates, i.e. not already in possession of a doctoral degree at the date of the recruitment.
- Researchers must be enrolled in a doctoral programme leading to the award of a doctoral degree in at least one EU Member State or Horizon Europe Associated Country.
- Recruited researchers can be of any nationality and must comply with the following mobility rule: they must not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.

The deadline for the on-line application is **30 September 2022**. The SEACHEM Selection Committee (SC) selects between 12 and maximum 20 candidates for the Recruitment Event which will take place in Leuven, Belgium (**November 2022 – exact date to be decided**). The selected candidates provide a 20-minute presentation and are examined by the Selection Committee. In order to facilitate their travel, selected candidates (from outside Belgium) receive a fixed, lump sum of 250 Euro (paid by the inviting Supervisor). The final decision on who to recruit is communicated the day after the Recruitment Event. The selected DCs are to start their research as quickly as possible (target: February - March 2023). Prior to the recruitment event, videoconferencing (or in person, when possible) interviews between the Supervisors and the candidates will be organized. The final decision on who to recruit is communicated no later than November 2022. The selected DCs are to start their research as quickly as possible (ideally prior to 01 April 2023).

Applicants need to fully respect three eligibility criteria (to demonstrated in the Europass cv):

Conditions of international mobility of researchers:

Researchers are required to undertake trans-national mobility (i.e. move from one country to another) when taking up the appointment. At the time of selection by the host organisation, researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account.

English language proficiency: Network fellows (DCs) must demonstrate that their ability to understand and express themselves in both written and spoken English is sufficiently high for them to derive the full benefit from the network training.

The 10 available PhD positions

DC1: Strength, maintainability, and reliability of open ocean aquaculture stainless steel structures in offshore wind farms ([WP1](#))

Host Institution: [KU Leuven](#)

Country: Belgium

Supervisor: Barbara Rossi (PhD promoter, [KU Leuven](#))

Objectives: (i) to optimize novel open ocean aquaculture stainless steel structures to minimize harmful interactions with its neighboring pre-existing structures used as anchorages, hence employing pre-existing marine infrastructure advantageously as a support for seaweed cultivation, (ii) to evaluate the environmental loadings in the long-term, and (iii) to study the reliability of the system composed of the pre-existing structures and the new stainless steel structure when submitted to these complex environmental loadings.

DC1 will define optimal base materials (among duplex stainless steel grade) for load-bearing structures using a multi-criteria approach and benchmarking against existing structural concepts (planar/multiplanar) and members (bars/ropes). DC1 will analyze the stabilizing components, connections between structural members, structure-foundation bond and the connection with the pre-existing neighboring structures, providing an overview of feasible configurations and their performance in open ocean environments. DC1 will develop a Finite Element model to represent the environmental loads undergone by the structure and study their effects. DC1 will employ numerical simulations as the main research tool for testing the system's reliability. DC1 will calculate technical-economic and lifecycle environmental impacts. Iterations will happen between the different activities to guarantee an economic, efficient, reliable and maintainable system following EUROCODE criteria and with low lifecycle environmental impacts.

Expected Results: Knowledge on interactions between newly developed structures and pre-existing infrastructure. Design of complex structures following EUROCODE criteria and with low lifecycle environmental impacts

Enrolment in Doctoral degree(s): [KU Leuven](#), Arenberg Doctoral School of Science, Engineering and Technology

Planned secondments:

- **Host:** [Aperam](#), **Supervisor:** Audrey Allion **Timing:** M15-17, **Length:** 3 months, **Purpose:** training on the characterization of stainless-steel grades (Duplex, ferritic and austenitic stainless steels).

- **Host:** [CTAQUA](#), **Supervisor:** Erik-Jan Malta , **Timing:** M24-26, **Length:** 3 months, **Purpose:** training in advanced analytical procedures for seaweed composition determination.

Candidate requirements:

- You hold a master's degree in civil engineering, structural engineering, materials engineering or a related field and you thrive in a multidisciplinary research environment.
 - You have a solid knowledge of load and strength calculations of metal structures.
 - You are ambitious, well organized and have excellent communication skills.
 - You speak and write fluent English and have the ability to work effectively and collaboratively.
 - You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
 - You have demonstrated your commitment to high quality research.
-

DC2: Biofilm-induced corrosion of metal structures for aquaculture application and development of adapted corrosion sensors for optimized maintenance ([WP1](#))

Host Institution: [Institut de la Corrosion \(IC\)](#)

Country: France

Supervisor: Nicolas Larché ([IC](#)), PhD promoters: Raf Dewil and Barbara Rossi ([KU Leuven](#))

Objectives: To assess the biofilm induced corrosion processes on stainless steel structures used for seaweed cultivation.

DC2 will study the influence of biofilm as encountered in seaweed aquaculture systems on microbial induced corrosion for various stainless steel grades. DC2 will carry out long term exposure tests, during which samples will be exposed to a simulated natural environment, both sterile and bacteria cultured, allowing to follow up bacterial growth and evolution of the surface appearance of the DSS samples. DC2 will complement the exposure tests by electrochemical testing. DC2 will mainly focus on the pitting and passivation behavior of the alloys by measuring the variation of open circuit potential (OCP) with time, and by potentiodynamic polarization tests in abiotic and biotic environments. DC2 will develop and test innovative corrosion sensors (adapted for stainless steel alloys). That will be combined and linked to DC3 (Mapping of corrosion around marine structures).

Expected Results: Increased knowledge on biofilm-induced corrosion of stainless steels for seaweed aquaculture application. Adapted corrosion sensors.

Enrolment in Doctoral degree(s): [KU Leuven](#), Arenberg Doctoral School of Science, Engineering and Technology

Planned secondments:

- **Host:** [C-CUBE](#), **Supervisor:** Guus Coolegem, **Timing:** M15-18, **Length:** 4 months, **Purpose:** training on measuring and predicting corrosion very precisely in offshore applications.
- **Host:** [MRP](#), **Supervisor:** Una Brosnan, **Timing:** M28-31, **Length:** 4 months, **Purpose:** practical and theoretical training on offshore renewable development processes and global offshore renewable markets.

Candidate Requirements:

- You hold a master's degree in chemical engineering, materials engineering or a related field and you thrive in a multidisciplinary research environment.
 - You have a solid knowledge of corrosion processes, including microbial corrosion.
 - You are ambitious, well organized and have excellent communication skills.
 - You speak and write fluent English and have the ability to work effectively and collaboratively.
 - You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
 - You have demonstrated your commitment to high quality research.
-

DC3: Mapping corrosion around marine structures using corrosion sensors ([WP1](#))

Host Institution: [Antwerp Maritime Academy \(HZS\)](#)

Country: Belgium

Supervisor: Geert Potters (PhD promoter, [Antwerp Maritime Academy](#))

Objectives: To use a set of widely used sensors for the physicochemical environment of such a structure, as well as a machine learning algorithm to assess corrosion risk, before the damage has been inflicted.

DC3 will outfit a mobile unit with these sensors for autonomous or remote measurement of the corrosion risk in a seawater environment. DC3 will test the unit on different marine locations (calibrating the unit using existing data sets) and create a corrosion risk heat map of these locations. DC3 will optimize deployment (in terms of data storage/transfer, energy use, autonomous operation, ...) for further validation of the mobile sensor unit to assess corrosion on an underwater industrial structure such as a seaweed farm. DC3 will employ machine learning methods to develop a corrosion risk algorithm. DC3 will gather data for model development and training at different marine locations (Southend Pier (UK), Blue Accelerator (BE) and a seaweed farm on the Irish coast or in the North Sea).

Expected Results: Algorithms allowing autonomous drones to assess the onset of corrosion on submerged marine structures.

Enrolment in Doctoral degree(s): [Antwerp Doctoral School](#)

Planned secondments:

- **Host:** [SPG](#), **Supervisor:** Rahimeh N. Monemi, **Timing:** M15-17, **Length:** 3 months, **Purpose:** testing and validation of systems to measure and predict corrosion risks and rates around marine infrastructures (such as seaweed cultivation setups).
- **Host:** [C-CUBE](#), **Supervisor:** Guus Coolegem **Timing:** M28-31, **Length:** 4 months, **Purpose:** training in machine learning as a research tool in offshore applications

Candidate requirements:

- You hold a master's degree in mechanical engineering, materials engineering, nautical sciences or a related field and you thrive in a multidisciplinary research environment.
- You have a solid knowledge of sensors, machine learning and their application in real-world environments.
- You are ambitious, well organized and have excellent communication skills.
- You speak and write fluent English and have the ability to work effectively and collaboratively.
- You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
- You have demonstrated your commitment to high quality research.

DC4: Environmental Monitoring for the algae and Condition monitoring for the structures ([WP1](#))

Host Institution: [Institut de la Corrosion \(IC\)](#)

Country: France

Supervisor: Nicolas Larché (PhD promoter – [IC](#)), Raf Dewil ([KU Leuven](#))

Objectives: To develop new monitoring technologies for material and pre-existing structures as well as seaweed cultivation/harvesting structures

DC 4 will focus on advancing monitoring technologies and capabilities for both for material conditions and environmental monitoring on the structures and seaweed itself, and at the same time to increase the data analysis speed and prediction. The monitoring science development will focus on increasing capabilities to both follow and predict materials conditions and environment specific characteristics. Some examples could be the marine organism growing on structural devices "detrimental fouling" and in the seaweed collectors itself "cultivated fouling". Among others the monitoring techniques to be explored and developed will be based on image analysis, environmental sensors and also on biomarkers such as e-DNA analysis. The obtained information can then be used in the probabilistic analysis for go/no-go decisions on O&M activities and to define optimal conditions for algae cultivation. The deterioration of materials and fouling/algae formation are related to the environment (pH,

salinity, temperature etc) which means that DC4 will also gather data on environmental indicators including eDNA, to understand the environment that nurture the seaweed production that will contribute to the European and International Ocean Governance (IOG) ambitions for our oceans to be clean and healthy, resilient, productive and understood. The DC will share data with the HZS in charge of field mapping of the corrosion (Image of structures and algae) and results from water sampling analyses. The eDNA analysis will be combined with image of algae cultivation/growth rate/ to predict optimal environmental envelope for seaweed cultivation (using one or several biomarkers).

Expected Results: Novel monitoring technologies involved in the aquaculture environment to predict the optimal environmental envelope for seaweed cultivation

Enrolment in Doctoral degree(s): [KU Leuven](#), Arenberg Doctoral School of Science, Engineering and Technology

Planned secondments:

- **Host:** [KU Leuven](#), **Supervisor:** Raf Dewil, **Timing:** M19-20, **Length:** 2 months, **Purpose:** training on extraction methodologies for the high-value seaweed products
- **Host:** [RISE](#), **Supervisor:** Emiliano Pinori, **Timing:** M26-33, **Length:** 8 months, **Purpose:** practical and theoretical training eDNA analysis as a biomarker for novel monitoring techniques

Candidate requirements:

- You hold a master's degree in (bio)chemical engineering, bioscience engineering, biology, environmental engineering or a related field and you thrive in a multidisciplinary research environment.
- You have a solid knowledge material-environment interactions and environmental sampling.
- You are ambitious, well organized and have excellent communication skills.
- You speak and write fluent English and have the ability to work effectively and collaboratively.
- You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
- You have demonstrated your commitment to high quality research.

DC5: Optimization of seaweed composition under current and future environmental scenarios ([WP2](#))

Host Institution: [NUIGal](#)

Country: Ireland

Supervisor: Dagmar Stengel (PhD promoter, [NUIGal](#)), Zoe Popper

Objectives: To optimize biomass composition through selected growth parameters, such as light and nutrient regimes, supporting selection of suitable cultivation sites, depending on seaweed species and biomass requirement.

DC5 will use an experimental, lab-based approach to identify optimum growth conditions for selected species to achieve desirable biomass composition for bulk products. DC5 will identify the critical parameters controlling the accumulation of the high-value compound of interest, accounting for future environmental scenarios in situ. DC5 will optimize species-specific high-value by-products for red, green and brown algae, with key high-value compounds (depending on species) including fatty acids, carotenoids, mycosporine-like amino acids and phycobiliproteins. DC5 will consider a biorefinery approach to enable waste and cost reduction, and value creation of the biomass produced. DC5 will focus on species with an existing market for bulk biomass (e.g. due to valuable polysaccharide composition), with water quality (e.g. nutrient levels), temperature and light climate being key components for both algal biomass and compound yield.

Expected Results: Definition of optimum growth conditions (location, methodologies, infrastructure requirements) taking into account predicted global change scenarios.

Enrolment in Doctoral degree(s): [NUI Galway](#), Botany and Plant Science

Planned secondments:

- **Host:** [PurAI](#), **Supervisor:** Esben Christiansen, **Timing:** M10-12, **Length:** 3 months, **Purpose:** training on various seaweed cultivation techniques and how to optimise the design parameters and operational conditions to enhance biomass yields in a cost-effective way.

- Host: [INAGRO](#), Supervisor: Jan Leenknecht, Timing: M18-20, Length: 3 months, Purpose: training on the cutting-edge fermentation technologies for side streams obtained after the cascaded seaweed valorization.

Candidate requirements:

- You hold a master's degree in biology, bioscience engineering, plant sciences or a related field and you thrive in a multidisciplinary research environment.
 - You have a solid knowledge of growth conditions in a marine environment.
 - You are ambitious, well organized and have excellent communication skills.
 - You speak and write fluent English and have the ability to work effectively and collaboratively.
 - You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
 - You have demonstrated your commitment to high quality research.
-

DC6: Identifying key drivers for optimised yield of industrially important polysaccharides ([WP2](#))

Host Institution: [NUIGal](#)

Country: Ireland

Supervisor: Dr. Zoe Popper (PhD promoter, [NUIGal](#)), Dr Dagmar Stengel ([NUIGal](#))

Objectives: To define environmental conditions that favor increased production of specific polysaccharides.

DC6 will identify, through controlled growth experiments, e.g., by manipulating light-, nutrient-, CO₂-, and other parameters such as wave-action, the optimum yields of industry-identified seaweed-derived polysaccharides of high interest. DC6 will investigate growth conditions, including current environmental conditions as well as predicted climate change scenarios with a view to identifying optimal at-sea locations for cultivation that are future-proofed. DC6 will assess polysaccharide structure, including composition and degree of polymerization, depending on the tissue, and season. DC6 will investigate red, green, and brown, species of industrial importance DC6 will select that contain additional high-value components next to polysaccharides.

Expected Results: Identification of the primary drivers of seaweed polysaccharide production and the flux between different localisations i.e. carbon-partitioning, identification of at-sea cultivation sites that are future-proofed with respect to climate change.

Enrolment in Doctoral degree(s): [NUI Galway](#), Botany and Plant Science

Planned secondments:

- **Host:** [CTAQUA](#), Supervisor: Erik-Jan Malta, **Timing:** M20-22, **Length:** 3 months, **Purpose:** training in advanced analytical procedures for seaweed composition determination.
- **Host:** [BMRS](#), Supervisor: Julie Maguire, **Timing:** M30-32, **Length:** 3 months, **Purpose:** validation of lab scale results on offshore pilot-scale seaweed cultivation infrastructure.

Candidate requirements:

- You hold a master's degree in biology, bioscience engineering, plant sciences, (bio)chemistry, chemical engineering or a related field and you thrive in a multidisciplinary research environment.
 - You have a solid knowledge of analysis and properties of complex biomolecules.
 - You are ambitious, well organized and have excellent communication skills.
 - You speak and write fluent English and have the ability to work effectively and collaboratively.
 - You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
 - You have demonstrated your commitment to high quality research.
-

DC7: Microwave- and ultrasound-assisted extraction methods for the recovery of valuable components from brown seaweed species ([WP3](#))

Host Institution: [KU Leuven](#)

Country: Belgium

Supervisor: Prof. Raf Dewil (PhD promoter, [KU Leuven](#))

Objectives: To develop ultrasound- and microwave-assisted extraction methods (UAE and MAE) to recover a range of valuable components from seaweed.

DC7 will employ UAE and MAE as promising environmental-friendly intensification techniques to limit chemical, water and energy usage. DC7 will evaluate cell disruption effectiveness of ultrasonic treatment and efficient heating via microwaves. DC7 will investigate conditions that are especially interesting for thermally unstable molecules (e.g. polysaccharides) that would degrade in classical hot water extraction systems applied in current seaweed extraction methodologies. DC7 will investigate microwave-specific effects due to the activation of molecules acting as molecular radiators that may weaken or break cell walls. DC7 will optimize the MAE and UAE (reaction time, temperature, energy and chemical consumption), whereby the gel strength, viscosity and yield of the extracted polysaccharides will be assessed.

Expected Results: Novel intensified extraction methods of industrially-important brown seaweed derived products.

Enrolment in Doctoral degree(s): [KU Leuven](#), Arenberg Doctoral School of Science, Engineering and Technology

Planned secondments:

- **Host:** [BMRS](#), **Supervisor:** Julie Maguire, **Timing:** M18-21, **Length:** 3 months, **Purpose:** scale-up of the lab-scaled developed microwave- and ultrasound assisted processes.
- **Host:** [PurAl](#), **Supervisor:** Esben Christiansen, **Timing:** M30-33, **Length:** 3 months, **Purpose:** training on various seaweed cultivation techniques and how to optimise the design parameters and operational conditions to enhance biomass yields in a cost-effective way.

Candidate requirements:

- You hold a master's degree in chemical engineering or a related field and you thrive in a multidisciplinary research environment.
- You have a solid knowledge of chemical conversion and separation processes.
- You are ambitious, well organized and have excellent communication skills.
- You speak and write fluent English and have the ability to work effectively and collaboratively.
- You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
- You have demonstrated your commitment to high quality research.

DC8: Enzymatic fractionation for the recovery of valuable compounds from red and green seaweed species ([WP3](#))

Host Institution: [KU Leuven](#)

Country: Belgium

Supervisor: Prof. Lise Appels (PhD promoter, [KU Leuven](#))

Objectives: To develop an enzymatic methodology under very mild conditions to efficiently extract polysaccharides from green and red seaweed species.

DC8 will employ enzymes or enzyme cocktails which are commercially obtained and enzymes extracted from e.g., specific thermophilic bacteria that are known to fractionate complex structures such as lignocellulose and holocellulose materials. DC8 will investigate these enzymes for their potential to obtain the fractionated polysaccharides. DC8 will investigate the use of commercial enzyme cocktails and enzymes obtained from dedicated bacteria for the extraction of selective polysaccharides from different types of seaweeds. DC8 will investigate the potential of enzymatic extraction for the valorization of the residual stream obtained from DC7 for the recovery of non-polysaccharide compounds (e.g., pigments and proteins). DC8 will determine the impact on process performance of the use of co-solvents for a higher extraction yield. Through application of different enzymes, DC8 will develop a selective extraction of chemical compounds from the seaweed. DC8 will analyze the recovery of chemical compounds using different enzymes in a bioreactor containing crushed seaweed, and will evaluate the extracted fractions in both soluble and residual insoluble fraction in the pellet.

Expected Results: A selective enzymatic fractionation process for the valorisation of red and green seaweed species.

Enrolment in Doctoral degree(s): [KU Leuven](#), Arenberg Doctoral School of Science, Engineering and Technology

Planned secondments:

- **Host:** [ISS](#), Supervisor: Catarina Guedes, **Timing:** M12-16, **Length:** 4 months, **Purpose:** to gain practical insight regarding the implementation of seaweed derived products in the consumer market.
- **Host:** [INAGRO](#), Supervisor: Jan Leenknecht, **Timing:** M30-32, **Length:** 3 months, **Purpose:** training on the cutting-edge fermentation technologies for side streams obtained after the cascaded seaweed valorization

Candidate requirements:

- You hold a master's degree in chemical engineering, biochemical engineering, bioscience engineering or a related field and you thrive in a multidisciplinary research environment.
 - You have a solid knowledge of enzymatic conversion and separation processes.
 - You are ambitious, well organized and have excellent communication skills.
 - You speak and write fluent English and have the ability to work effectively and collaboratively.
 - You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
 - You have demonstrated your commitment to high quality research.
-

DC9: Sustainable biorefinery of seaweed at pilot scale ([WP3](#))

Host Institution: [BMRS](#)

Country: Ireland

Supervisor: [Julie Maguire](#) (PhD promoter, [BMRS](#)), Prof. [Raf Dewil](#) ([KU Leuven](#))

Objectives: To develop sustainable procedures for the extraction of bioactive compounds from seaweed without generating biological waste.

DC9 will develop technologies to extract high-value compounds from brown seaweed (kelp) at pilot scale, following the principles of green chemistry. DC9 will reduce the use of solvents harmful to the environment and improve the sustainability of the extraction processes by using green solvents and sustainable innovative technologies (supercritical fluid, microwave, ultrasound). DC9 aims to develop extraction methods at pilot scale, to allow to test processes designed in the laboratory for volumes of 1 ton of seaweed. DC9 will investigate the role of multiple process parameters (temperature, time and solvent) on the recovery of the compounds of interest. DC9 will make a selection of green solvents, low energy consumption technologies and reduction of treatment times to improve the sustainability of the designed extraction approaches. DC9 will compare quality and quantity of compounds extracted by brown seaweed with laboratory scale and pilot scale techniques.

Expected Results: Sustainable scaled-up production of bioactive compounds from macroalgae.

Enrolment in Doctoral degree(s): [KU Leuven](#), Arenberg Doctoral School of Science, Engineering and Technology

Planned secondments:

- **Host:** [KU Leuven](#), Supervisor: Raf Dewil, **Timing:** M20-22, **Length:** 3 months, **Purpose:** learning advanced techniques in extraction technologies, more specifically ultrasound and microwave intensified processes.
- **Host:** [SPG](#), Supervisor: Rahimeh N. Monemi, **Timing:** M28-31, **Length:** 3 months, **Purpose:** training in the processing, analysis and treatment of multivariate data in a 3D spatial grids

Candidate requirements:

- You hold a master's degree in chemical engineering, biochemical engineering, bioscience engineering or a related field and you thrive in a multidisciplinary research environment.
- You have a solid knowledge of extraction processes.

- You are ambitious, well organized and have excellent communication skills.
- You speak and write fluent English and have the ability to work effectively and collaboratively.
- You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
- You have demonstrated your commitment to high quality research.

The PhD student will develop technologies to extract high-value compounds from brown seaweed (kelp) at pilot scale, following the principles of green chemistry. They will reduce the use of solvents harmful to the environment and improve the sustainability of the extraction processes by using green solvents and sustainable innovative technologies (supercritical fluid, microwave, ultrasound). With an aim to develop extraction methods at pilot scale, to allow to test processes designed in the laboratory for volumes of 1 ton of seaweed. They will investigate the role of multiple process parameters (temperature, time and solvent) on the recovery of the compounds of interest. They will make a selection of green solvents, low energy consumption technologies and reduction of treatment times to improve the sustainability of the designed extraction approaches. They will compare quality and quantity of compounds extracted by brown seaweed with laboratory scale and pilot scale techniques.

Specific requirements:

Desirable Experience in:

- Extraction techniques for seaweeds
- Bioactive compounds
- Completion of research activities to achieve the required quality and meeting deadlines set
- Designing and building pilot scale systems
- Statistical analysis

Essential Skills:

- Excellent organisational skills, the ability to manage a variety of tasks simultaneously, and to organise and prioritise own work with training schedule
- Excellent communication skills with clear evidence of effective presentation skills, report-writing skills, and the ability to converse authoritatively and persuasively with a range of stakeholders at all levels

Other essential criteria:

- The ability and willingness to travel regularly
- The ability to live and work in a rural remote area

DC10: Sustainability assessment brown seaweed cultivation and biorefinery systems designed according to the green chemistry principles ([WP3](#))

Host Institution: [University of Copenhagen](#)

Country: Denmark

Supervisor: Prof. Marianne Thomsen (PhD Promoter, [University of Copenhagen](#))

Objectives: to demonstrate the sustainability and viability of the SeaChem concept.

DC10 will assess technical, economic, environmental, social/business aspects, and will consider the entire value chain using a life cycle comparison approach. DC10 will define and model the conceptual process design at industrial scale. DC10 will quantify and improve the economic viability of each step of the value chain. DC10 will quantify the environmental cost and benefits of the SeaChem concept. DC10 will use environmental impact categories to quantify the contribution to selected UN SDGs and Planetary Boundaries (PB) at system level. DC10 will use the following key performance ICs quantifying fundamental earth processes: Marine and Freshwater Eutrophication and water consumption (SDG 6 and 14), land use (SDG 15) Global warming (SDG 13). DC10 will consider the full life cycle and will be carried out in accordance with the International Standards for LCA, ISO 14040/14044.

Expected Results: A novel concept of how to include ecosystem services in life cycle sustainability assessment (LSCA) of seaweed cultivation and biorefinery systems – aligning impact categories with the SDGs and PBs.

Enrolment in Doctoral degree(s): [University of Copenhagen](#), PhD school of science

Planned secondments:

- Host: [KU Leuven](#), Supervisor: Lise Appels, Timing: M18-21, Length: 3 months, Purpose: Learning advanced techniques in enzymatic extraction technologies.
- Host: [Aperam](#), Supervisor: Audrey Allion, Timing: M30-33, Length: 3 months, Purpose: training on the characterization of stainless-steel grades (duplex, ferritic and austenitic stainless steels).

Candidate requirements:

- You hold a master's degree in an engineering discipline or a related field and you thrive in a multidisciplinary research environment.
 - You have a solid knowledge of sustainability assessment, including LCA.
 - You are ambitious, well organized and have excellent communication skills.
 - You speak and write fluent English and have the ability to work effectively and collaboratively.
 - You are an enthusiastic and motivated person, ready to participate in personal training, international travel and public awareness activities.
 - You have demonstrated your commitment to high quality research.
-

DN SEACHEM project abstract and key project information

The overarching aim of the SeaChem DN project is to provide high-level training in the offshore cultivation and valorization of seaweed to a new generation of 10 high-achieving doctoral candidates (DC) and equipping them with the transferable and scientific skills necessary for thriving careers in the burgeoning area of non-land-based biomass cultivation and use. This international training program, encompassing 6 intersectoral partners (5 academic, 2 non-academic) in 4 countries, focuses on innovative technological developments across a range of interdisciplinary fields such as construction engineering, materials science, (micro-)biology, (bio-)chemical engineering, environmental biotechnology and machine learning. The success of SeaChem will be achieved by a unique combination of state-of-the-art doctoral research projects, intersectoral secondments, international mobility and unique interdisciplinary courses.

SeaChem opens innovative opportunities in offshore seaweed production for the growing need for a cost-effective, renewable and sustainable production of high-end, high-value chemicals for the food, health, personal care and chemical industry. The environmental impact generated using fossil fuels for commodity chemicals production is a major societal and environmental concern, leading to a large (and ever increasing) interest in renewable and sustainable novel alternatives, utilizing biomass resources. However, the vast supply of resources that is needed to meet the demand at a large market share, remains an unsolved challenge.

Research Objectives:

- Develop new, cost-effective and sustainable offshore aquaculture technologies to be integrated in pre-existing offshore infrastructure (e.g., windfarms, uncommissioned drilling rigs) in which the durability of integrated stainless-steel structures in the highly exposed marine environment will be assessed and monitored
- Develop future-proof advanced seaweed cultivation technologies by defining current and future optimal conditions for offshore seaweed aquaculture. Geo-mapping will be applied to pinpoint ideally geographical locations for optimum seaweed growth and yield
- Develop cutting-edge sustainable extraction techniques by applying intensified chemical (microwave and ultrasound) and enzymatic processes capable of recovering a large spectrum of high-value compounds, to be further used in high-end applications

General coordinator for DN SEACHEM:

Prof. Raf Dewil (KU Leuven)
raf.dewil@kuleuven.be

Project Manager DN SEACHEM:

Giorgian Dinu (KU Leuven)
giorgian.dinu@kuleuven.be

SEACHEM Consortium:

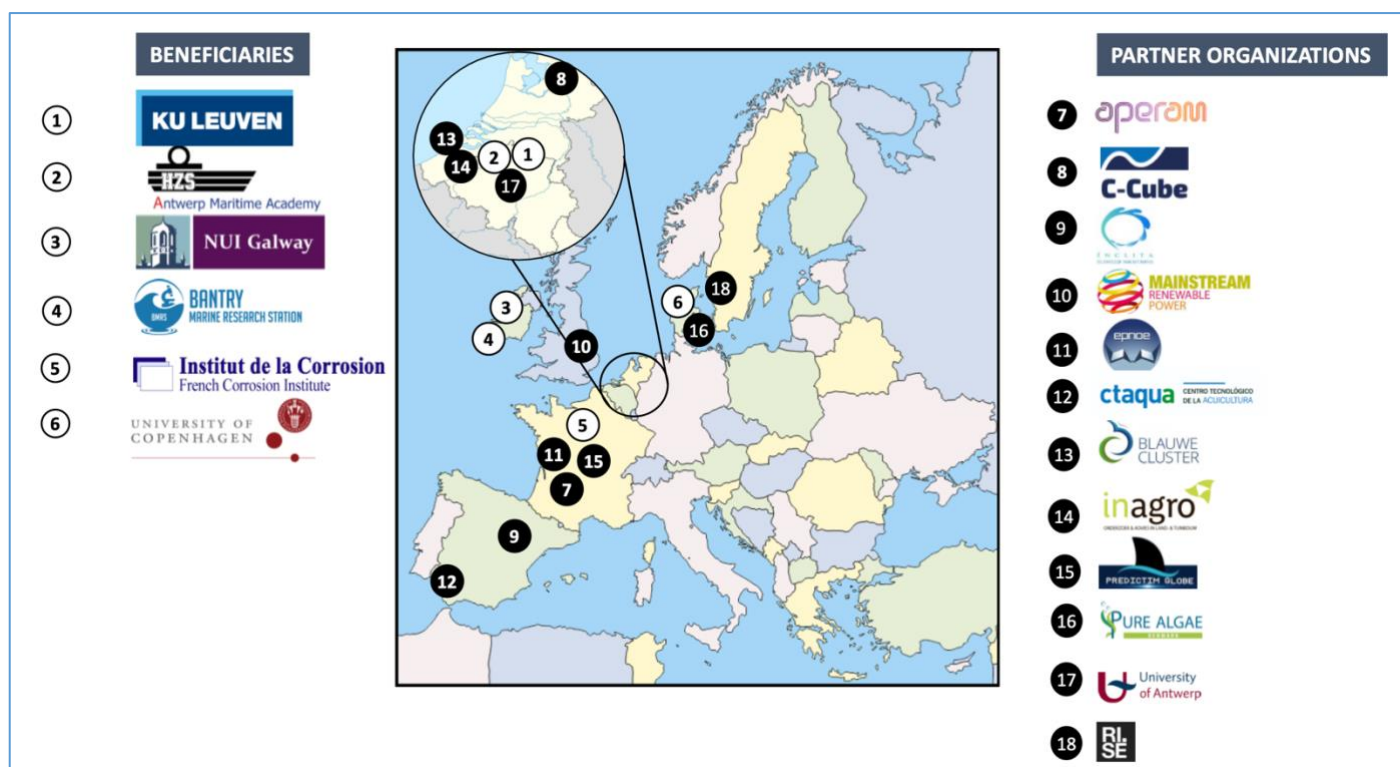


Figure 1: SEACHEM CONSORTIUM

SEACHEM Work Packages and DCs distribution:

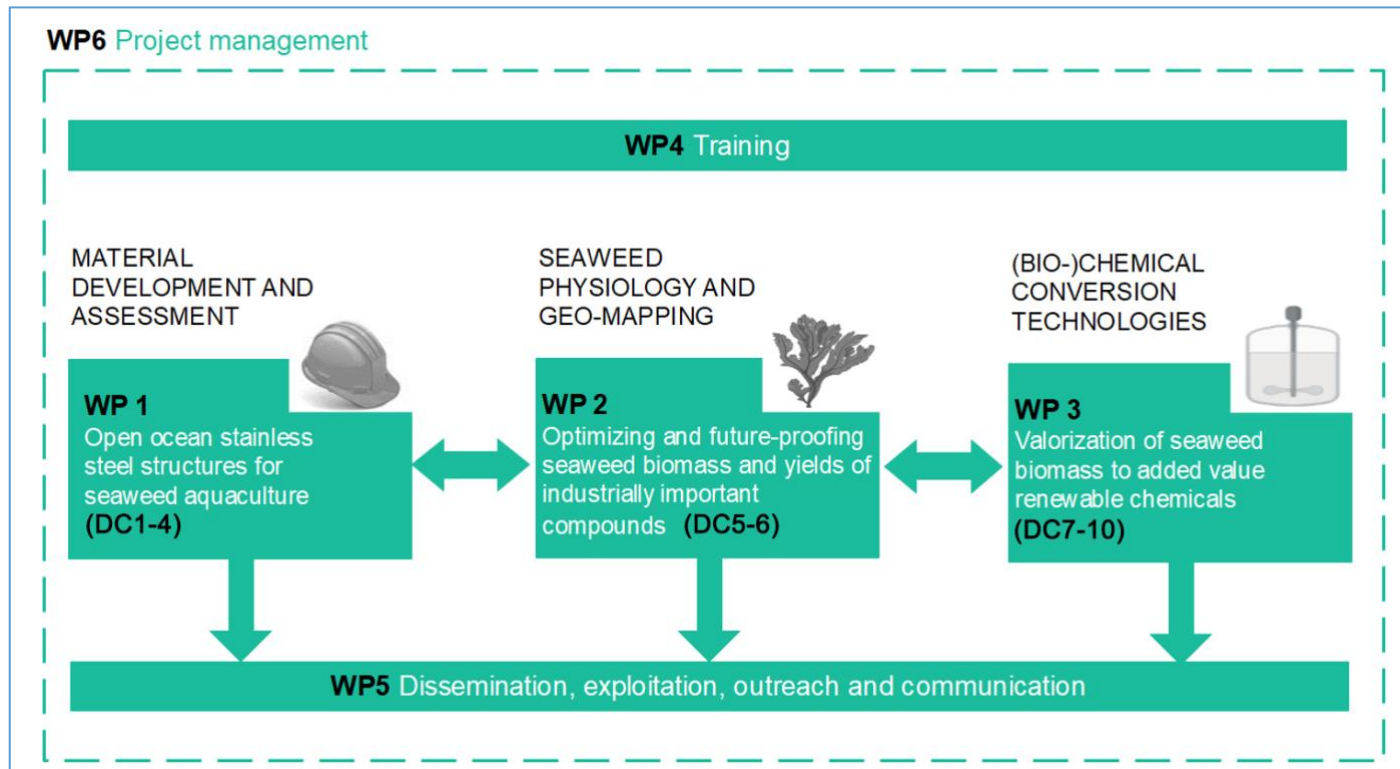


Figure 2: SEACHEM Work Packages and DCs

Appendix 1: Recruitment Procedure and Principles

A SEACHEM recruitment webpage is put on-line (August 2022), as part of the SEACHEM project website: <https://sea-chem.eu/>

Key dates

- 12 August 2022: Launch of 10 DC Positions
- 30 September 2022: Deadline for on-line application
- 15 October 2022: Circulation list “SeaChem pre-selected candidates”
- November 2022: SeaChem Recruitment Event (exact date to be announced)
- November 2022: Circulation list “recruited SeaChem DCs”
- 1 April 2023: Targeted starting date for DC contracts (or earlier, if possible)

Applications are made through an on-line, eligibility-proof form on the SEACHEM recruitment webpage. The candidates apply for a maximum of three specific DC positions and list their order of preference. The Supervisors provide the names of their preferred candidates to the Selection Committee (SC), which in its turn produces a short list of candidates: 2 per position. As such a maximum of 20 DCs (from an initial expected pool of 120-200 candidates) are invited to the Recruitment Event (Leuven, M2).

Each candidate gives a presentation and is interviewed by the SC. After a thorough evaluation, the candidates are ranked and a collective decision is made. In this way a complementary team of DCs can be assembled, as positively experienced from previous similar recruitment events.

In case not all 10 DCs can be recruited during the collective Recruitment Event, the recruitment procedure is “decentralised”, meaning that the involved supervisors continue the search for good candidates. The SC is kept informed at all times when new eligible candidates appear. The SC makes an official complaint in case the Code of Conduct for the Recruitment of Researchers is breached. The involved supervisor is then expected to find another candidate. Recruitment problems are also, if still needed, discussed during the SC meeting (M7) in order to deliver specific action plans to target specific networks relevant for the vacant DC positions.

All details concerning the recruitment-procedure principles are communicated on the on-line application portal, so that potential DCs know exactly what to expect and are stimulated to apply. All recruitment (pre and final selection) is in line with the European Charter for Researchers, providing the overarching framework for the roles, responsibilities of both researchers and employers. The Code of Conduct for the Recruitment of Researchers functions ensures that the selection procedures are transparent and fair.

The recruitment strategy of SEACHEM fully complies with the Code of Conduct definition of merit. For example, merit is not just measured by a researcher’s grades, but on a range of evaluation criteria, such as teamwork, interdisciplinary knowledge, soft skills and awareness of the policy impact of science.

The SC has members of each gender and considers the promotion of equal opportunities and gender balance as part of the recruitment strategy. Also, in view of the RRI principles, special efforts are made to attract women DCs from new EU Member States.

SEACHEM aims for a gender balanced participation of DCs in the network. Researchers are employed on fixed-term contracts and are registered as staff candidates for PhD degrees. Therefore, they are entitled to pension contributions, paid holidays, and other benefits as governed by the universities and industrial companies.

For any inquiries regarding the recruitment procedure, please send an email to info@sea-chem.eu