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Positions open for 2021

Bioresources and Green Technologies

1. POLARISE - Pollution cOntroL And nutRient recovery from flooded SystEms

Computation for Sustainability

2. Image processing and artificial intelligence to assist human posture
3. Innovative technologies for assisting people with disabilities and older adults

Ecological Economics and Environmental Management

4. Co-Creation Process of a Management and Assessment Model for Circular Economy Transition in SMEs
5. MESH - Modelling Ecosystem Services with stakeHolders
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Energy and Climate

8. Linking debates: Energy Poverty, Air Quality, Health and Climate Change

Sustainable Water Sanitation, Wastes and Resources Recovery

9. Development of natural based products for wastewater treatment
10. Urban Reuse of Treated Wastewaters - Study and analysis of alternatives for disinfection and removal of emerging pollutants for different uses

Applications open until: 4th February 2021

Bioresources and Green Technologies

<https://www.cense.fct.unl.pt/research-areas/bioresources-and-green-technologies>
<https://resolution-lab.com>

POLARISE - Pollution cOntroL And nutRient recovery from flooded SystEms

Agriculture is the main driver to feed 11 billion people around the world. Rice is considered a staple food. Flood-based farming systems, such as rice, implies a huge quantity of agro-chemicals entering into the river in the end of growing season, providing a dramatic but diffuse source of pollution. Water bodies will be a sink of pesticides and nutrients routinely used to increase crop efficiency. The working program (WP) POLARISE emerges from the appeals of the European Union regarding pesticide contamination present in the EU Watchlist, and the need to recover phosphorus, a critical raw material (CRM) as stated in the different versions of List of CRM launched by the EU. It also contributes to the Sustainable Development Goals by providing an equitable food and quality food for everyone, without damaging ecosystems, and enforcing(guaranteeing) ecosystem services; and to the EU Green Deal by providing effective tools to maintain population health and environmental security. POLARISE focus on the development of a combined electro-reactor to remove pesticides with simultaneous nutrient recovery from irrigated rice fields before the water returns to the River Basin. It leverages the work carried out in two international projects (one ongoing) where the core team developed a pilot electro-reactor, with a filled patent, in which pharmaceuticals and other emerging organic compounds are removed between 70 and 98%, and total microorganisms (including *E. coli*) are also decreased by Log 4. A variant of this electro-reactor was also developed to provide simultaneous phosphorus recovery along with organic contaminants removal. This WP has the support of a multidisciplinary team from research/academia (RESOLUTION laboratory, in cooperation with FCT NOVA departments) in a close collaboration with agro-food sector/business, and a strong focus on education (society and interested technical parts to break barriers and make transition happen), based on the knowledge triangle.

Job position description:

In POLARISE, the candidate will work on the development of a cost effective and innovative solution to clean up floodwater before returning to the main course (upstream contamination). This is a ground-breaking approach as classical research has been mostly dedicated to the rehabilitation of contaminated agricultural soils and/or water bodies (downstream contamination). The developed scientific and technological achievements are foreseen to be widely applicable in EU flooded agricultural fields, intensive or non-intensive regime and crops. POLARISE is divided in 4 scientific activities (A) and 1 transversal activity (T) of communication, dissemination and market potential. After implementing general procedures (A1), the electro-reactor will be developed to remove pesticides and recover nutrients initially in a medium less complex than river water (A2) followed by development with real matrix till TRL3 (A3) and then process scale-up in real conditions (A4). The work will be firstly developed targeting irrigated rice fields. Development studies will be carried out in electrochemical laboratory reactors, running experiments with different conditions. Electrochemical technologies were chosen because: (i) it can be driven by a renewable energy source, e.g. solar panels, (ii) it does not require the addition of solutions or chemicals, making them environmentally friendly, and (iii) the rates of redox reactions can be controlled by adjusting electric current intensity. Monthly project team meeting will assess the project progress, comment results, and adjust accordingly. Throughout the project (T) dissemination in academia, communication with the society and policy makers as well as market analysis assessing end-users needs, stakeholders and clients (industry, farmers, etc.) promoting a participative approach will also be carried out.

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Computation for Sustainability

<https://www.cense.fct.unl.pt/research-areas/computation-sustainability>

Image processing and artificial intelligence to assist human posture

Modern lifestyle has made humans more sedentary than ever, with many people spending most of their time sitting, often with an incorrect posture, resulting in all sorts of pain in the body. In addition, lack of physical exercise also contribute for an incorrect posture resulting in health problems. The goal of the proposed PhD research work is to investigate the application of image processing and artificial intelligence techniques to assist and improve human posture, both for regular daily activities such as sitting, standing, or walking, as well as in sports activities. The project has the following specific goals:

- Build a computer system based on image processing and artificial intelligence to automatically detect incorrect human posture, and visually suggest a more adequate one;
- Evaluate the system in regular daily activities such as sitting and walking;
- Evaluate the system in a more complex activity, such as running or playing tennis.

If successful, the project will be able to deliver a tool that can help people to correct (or at least be aware of) their posture in regular daily activities, with obvious benefits to their health and overall quality of life. In addition, it will also be useful as a training tool to enhance performance and reduce injuries in sports activities. As a starting point, we recommend using open and freely available systems for detecting human pose in real time. One such system is OpenPose.

The project will be developed at the Computation for Sustainability group at CENSE/FCT NOVA, which has appropriate conditions to support the prosecution of the work plan. The team has experts in Artificial Intelligence, Human-Computer Interaction, Accessibility, Robotics, and Augmented Reality.

Job position description:

The work plan includes scientific and technological development, project management and communication activities. The candidate will be closely supported by his/her supervisors and members of the Computation for Sustainability group. The candidate will work through challenging and interesting research problems related to Image Processing and Artificial Intelligence applied to human posture and human movement, and will be encouraged to explore and develop his/her own ideas. It is expected that the candidate has strong skills in computer programming, data structures, algorithms, and artificial intelligence. The candidate should also be fluent in english, and have good writing and presentation skills.

The candidate will be responsible for his/her work plan activities, detecting possible issues to achieve the proposed objectives. Weekly meetings will be held with the supervisor and other team members to evaluate the project progress, discuss results, and to adjust and adapt strategies.

Contact person



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Computation for Sustainability

<https://www.cense.fct.unl.pt/research-areas/computation-sustainability>

Innovative technologies for assisting people with disabilities and older adults

The overall goal of this project is to design low cost robotic solutions to assist people with disabilities and/or older adults to perform their daily activities. This work plan has the following specific goals:

- Use inexpensive technologies, such as low powered computers (e.g. Raspberry PI or Jetson Nano) and single-board microcontrollers, to develop robotic solutions in order to allow people with motor limitations to gain more autonomy and independence.
- Explore Artificial Intelligence techniques, such as Convolutional and Recurrent Neural Networks, to design more suitable methods to assist people with disabilities and/or older adults. For instance, a system can be implemented to detect falls and other dangerous situations.
- Design and develop interaction methods based on Augmented Reality to build immersive robotic telepresence systems.
- Evaluate the above mentioned interaction methods.

Success in these goals will lead to enhancing the quality of life of people with motor limitations by providing them a better assistance and mechanisms that allow them to have a more independent life in their own homes. This work plan aims at improving robotic solutions to help older adults and those who have disabilities to have a better assistance, contributing to increase their level of independence. This project will be developed at the Computation for Sustainability group at CENSE/FCT-NOVA, which has appropriate conditions to support the prosecution of the work plan. The team has experts in Assistive Technologies, Human-Computer Interaction, Artificial intelligence, Robotics, and Augmented Reality.

Job position description:

The work plan includes scientific and technological development, project management and communication activities. The candidate will be closely supported by his/her supervisors and members of the Computation for Sustainability group. The candidate will work through challenging and interesting research problems related to Human Machine Interaction and User Interface Design, exploring approaches such as User-Centered Design and Ability-based Design. He/she will explore existing technologies to develop novel assistive products. The candidate will be encouraged to explore and develop his/her own ideas to solve specific problems. The research work will follow an iterative development process encompassing four major phases: (1) identification of user needs and requirements, (2) design, (3) prototyping and (4) evaluation [1]. It is essential to understand user needs for designing useful assistive technologies. Thus, the PhD candidate will use analytical tools to specify design requirements and evaluate the impact of the interaction techniques developed, both quantitatively and qualitatively. This work plan is focused on the development of novel robotic solutions to assist people with disabilities and/or older adults to perform their daily tasks. Thus, Human Machine Interaction is the main focus of this work plan. The candidate will be responsible for his/her work plan activities, detecting possible issues to achieve the proposed objectives. There will be weekly team meetings to evaluate the project progress, comment results, adjust, and adapt research strategies.

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Ecological Economics and Environmental Management

<https://www.cense.fct.unl.pt/research-areas/ecological-economics-and-environmental-management>

MESH - Modelling Ecosystem Services with stakeHolders

MESH – Modelling Ecosystem Services with stakeHolders – aims to develop integrated and participatory modelling approaches supporting holistic and cross-sectoral policies to achieve success in the conservation, restoration and sustainable use of ecosystem services. Protection of life on terrestrial and inland freshwater ecosystems is a priority highlighted in Agenda 2030 and UN's Sustainable Development Goals (cf. SDG 15). Even though up to 15% of land is currently under protection, biodiversity is still at risk and tools for participatory assessments of cross-sectoral policy impacts are still lacking. Freshwater ecosystems in particular offer many benefits to society, including clean water and air, recreation, natural resources, food, energy, as well as protection from natural disasters and mitigation of climate change. Thus, the proposed individual research project will bring forward systemic approaches for model-based policy design, analysis, and knowledge transfer. It envisages the enhancement of collaborative management of ecosystem services and a well-balanced attainment of SDGs in freshwater socio-ecological systems.

Job position description:

The successful candidate will conduct research towards a PhD degree through the implementation of the MESH workplan. The project will merge methods, theories and insights from environmental engineering, ecological economics, sustainability, and systems sciences. More specifically, the methodological approach to be promoted in this project will include: 1) a comprehensive review of needs and gaps related with methods for integrated modelling of freshwater ecosystem services in relation to achievement of SDGs. This includes stakeholder interviews across different societal groups – international organizations (e.g. UN-DSDG, ESDN), EU agencies (e.g. EEA), national agencies and river basin authorities, business sector, NGOs and academia; 2) Development of a participatory system dynamics modelling approach for studying the interrelationships between SDGs (namely, SDGs 15, 2, 6 and 13) in freshwater socio-ecological systems; 3) Empirically explore the approach by applying it to a study case in Portugal, working with the water and nature conservation authorities and local stakeholder groups; 4) Comparing and analyzing policy scenarios affecting water ecosystems health, livelihoods and food security, biodiversity, and climate change mitigation and adaptation in the studied site; 5) Developing model-based findings and best practices to promote integration of biodiversity and ecosystem services in cross-sectoral public policies and dissemination of the integrated modelling insights to the public at large. Anticipated duties include the completion of the specific proposal for the individual research project, development of the personal career development plan outlining specific training and support needs, dissemination of reports and models to relevant stakeholders, preparation of articles in appropriate scholarly journals with high impact, development of a dissemination and impact action plan, and fulfillment of PhD requirements for NOVA University Lisbon.

The workplace will be at the Campus of Caparica, School of Science and Technology, NOVA University Lisbon.

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Ecological Economics and Environmental Management

<https://www.cense.fct.unl.pt/research-areas/ecological-economics-and-environmental-management>

RPMIXES - Rural Policymixes for Ecosystems Services

A set of economic, social and environmental problems have been growing recently in Portuguese rural areas, highlighting the unsustainability of the prevailing development path. Landowners income is not sufficient to ensure adequate forest management and social and private interests are not aligned. This results in population decline, increased occurrence and severity of forest fires, expansion of invasive alien species, erosion, reduction of autochthonous species forests and biodiversity loss.

There is a need to recognize that agroforestry areas provide many contributions to social well-being, besides the products traded in markets (e.g erosion control, hydrological regulation, biodiversity conservation, reduced fire risk, aesthetics, recreational and leisure opportunities or cultural identity). This project aims to contribute to the development of innovative policymixes (i.e. combinations of articulated policy instruments) to encourage the provision of ecosystem services in rural areas, including, payments for ecosystems services, offsetting schemes and financial mechanisms (e.g. forests bonds, forest funds). The goal is to propose more adequate policymixes recognizing the multifunctionality of rural agroforestry spaces and the diversity of socio-ecological-institutional contexts (e.g. farm size, land ownership, culture, ecological features, informal rules).

Job position description:

The successful candidate will conduct research towards a PhD degree through the implementation of the RPMIXES workplan. The project assumes a transdisciplinary approach, integrating, as appropriate, methods, theories and insights from ecological economics, environmental engineering, ecology and forest engineering. Main tasks to be developed: 1) comprehensive review of relevant literature; 2) identification of forest and agroforest areas main problems and changes required; 3) development of a typology of forest and agroforestry systems, considering ecological and human contexts; 4) development of proposals for innovative policies arrangements to promote ecosystem services in rural spaces, adopting a policymix approach, and including tools to support the design, implementation and monitoring phases; 5) empirically explore the proposed approach by testing its application in a case study area in Portugal in a Living Lab setting; 6) study conditions for upscaling proposed solutions.

Anticipated duties include the completion of a detailed proposal for the individual research project, development of the personal career development plan outlining specific training and support needs, dissemination of results with relevant stakeholders, preparation of articles in appropriate scholarly journals with high impact, development of a dissemination and impact action plan, and fulfillment of PhD requirements for NOVA University Lisbon.

The workplace will be at the Campus of Caparica, School of Science and Technology, NOVA University Lisbon.

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Ecological Economics and Environmental Management

<https://www.cense.fct.unl.pt/research-areas/ecological-economics-and-environmental-management>

SEASTAKE - Stakeholder-driven Sustainability and Environmental Assessment

It is paramount to include stakeholders when assessing and integrating environmental, social, and economic issues into strategic decision-making processes such as policies, plans or programmes (PPP) to better implement sustainability principles. Stakeholders are any group or individual who can affect or is affected by the choices and actions that decision-makers take. This is in line with the communicative planning theory, which argues that through a debate-based planning, civic engagement is enhanced, establishing stronger democratic values. Acknowledging this, governments are integrating stakeholders' involvement into environmental legal instruments and academia has been studying methods for an effective stakeholder engagement and integration into these processes. Sustainability and Environmental Assessment (SEA) of policies, plans (e.g. national energy and climate change plans; master urban plans) and projects (e.g. dams, highways, harbours) integrates both sustainability issues and stakeholders' inputs into decision-making processes. The adjustment of existing participatory techniques for new challenging contexts of SEA processes should be further explored and investigated.

The aim of this research project is to develop a conceptual framework to support stakeholder-driven SEA of policies, plans and projects processes, where experts and non-experts will effectively contribute to a co-creation process in the design, data gathering, effects assessment and monitoring phase of an SEA process. SEASTAKE will support the design and implementation of a co-created and collaborative SEA, which complements existing formal SEA procedures.

The project will be developed at CENSE (FCT NOVA) linked with the research area 'Ecological Economics and Environmental Management'. CENSE promotes interdisciplinary research in environmental sciences and engineering, focusing on the interaction between human and ecological systems, to promote sustainable development.

Job position description:

The successful candidate will conduct research towards a PhD degree through the implementation of the SEASTAKE workplan. The project will merge methods, theories and insights from sustainability science, sustainability assessment, stakeholder's engagement theories and citizen participation scholarship. More specifically, the methodological approach to be developed include: (i) developing a profile of stakeholder-driven environmental decision-making processes, through an integrative literature review and content analysis to key-documents; (ii) identifying key-aspects for stakeholder-driven planning and SEA processes through interviews conducted to planning and SEA practitioners and decision-makers and a specific workshop with experts; and (iii) develop a conceptual framework for stakeholder-driven SEA. Questionnaires, focus groups, interviews and participatory workshops will be used to incorporate stakeholders' inputs to the framework development.

Anticipated duties include the completion of the specific proposal for the individual research project, development of the personal career development plan outlining specific training and support needs, dissemination of results to relevant stakeholders, preparation of articles in appropriate scholarly journals with high impact, development of a dissemination and impact action plan, and fulfilment of PhD requirements for NOVA University Lisbon.

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Ecological Economics and Environmental Management

<https://www.cense.fct.unl.pt/research-areas/ecological-economics-and-environmental-management>

Co-Creation Process of a Management and Assessment Model for Circular Economy Transition in SMEs

The concept of Circular Economy (CE) is an approach to transform the current economic system to a logic of reducing, recycling, and reusing. The European Commission CE Package will also impact small and medium-sized enterprises (SMEs) through the support of CE strategies and practices, since SMEs are facing more difficulties in this way. However, formalization of processes and tools to implement the co-creation practices by engaging multiple stakeholders are lacking yet. Co-creation can be defined as: “a process through which user becomes better off in some respect or which increases the customer’s well-being”. Multiple stakeholders (e.g. customers, consumers, government agencies, universities, civil society) can be involved in a co-creation process of CE on SMEs, however, their role in co-creation remains unclear. This project aims to determine how CE management and assessment models can be co-created by involving multiple stakeholders to conduct co-creation processes of CE transitions on SMEs. The project will also assess how co-creation of CE management and assessment models in SMEs contributes to the CE transition, the 17 Sustainable development goals (SDGs), and the reduction of negative impacts on the economy, environment and society. The project will be developed at CENSE (FCT NOVA). CENSE promotes interdisciplinary research in environmental sciences and engineering, focusing on the interaction between human and ecological systems, to promote sustainable development. CENSE is organized in five main research areas, including ‘Ecological Economics and Environmental Management’. The latter gathers a wide diversity of skills and research topics, including valuation of ecosystem services, sustainability assessment, participatory decision-making and ecological-economic modelling. It is acknowledged as one of the leading groups in Ecological Economics and Sustainable Development research in Europe.

Job position description:

The successful candidate will conduct research towards a PhD degree through the implementation of the project work plan. To do so, making active inclusion of multiple stakeholders is a requirement to progress to a more effective CE. The research to be carried out in the proposed project will yield both, explanatory, and prescriptive knowledge by including 4 main stages: i) Developing a theoretical foundation, by carrying out a systematic review of relevant literature in the fields of transition management, circular economy, sustainable business models, co-creation processes and qualitative and quantitative content analysis to key-documents ii) Co-developing a conceptual CE management and assessment model for SMEs, based on the results of the systematic review through interviewing key stakeholders (e.g. policymakers, customers, citizen, NGOs, start-ups, among others) iii) Selecting the criteria to choose the case studies and then transversal analysis on selected case-studies through semi-structured interviews, iv) Developing the elements for co-creating a framework for the CE management and assessment model by integrating the requirements collected from multiple stakeholders in the preceding stages as well as previous literature review on CE assessment, through (in person and/or virtual) participatory workshop, and v) Developing the methods to assess the sustainability and circularity performance of proposed co-created CE management and assessment model through quantitative sustainability and circularity indicators. In the entire project, content analysis, (online-in person) participatory workshops and semi-structured interviews will be used to incorporate the active involvement of stakeholders as a transversal process in all stages and co-create a framework towards CE transitions.

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Energy and Climate

<https://www.cense.fct.unl.pt/research-areas/energy-and-climate>

Linking debates: Energy Poverty, Air Quality, Health and Climate Change

The work will be carried out at CENSE- Center for Environmental and Sustainability research, FCT NOVA. CENSE promotes interdisciplinary research in environmental sciences and engineering, focusing on the interaction between human and ecological systems, to promote sustainable development. CENSE is organized in five main research areas, including ‘Energy and Climate’ where the work will be conducted. The latter gathers a wide diversity of skills and research topics, promoting EU decarbonization and energy policies. The team has extensive expertise on EU and national research projects, assessments for policy support at national and local level, initiatives of interaction with society, training activities, collaborative processes and stakeholders engagement with multiple collaborations with public and private organizations, dissemination of knowledge, and dialogue encouragement between policy and science.

Additionally team members are part of international networks relevant to the proposed topic and have an extensive track record on multiple approaches for energy poverty analysis, air quality assessment and decarbonization strategies.

Anticipated duties include the completion of a detailed proposal for the individual research project, development of the personal career development plan outlining specific training and support needs, dissemination of results with relevant stakeholders, preparation of articles in appropriate scholarly journals with high impact, development of a dissemination and impact action plan, and fulfilment of PhD requirements for NOVA University Lisbon.

Job position description:

Energy poverty is a multi-faceted phenomenon, often interpreted alternatively as an energy, a social or a poverty-related policy question, creating the conditions for silos and fragmented responses. Between 50 to 120 million households in the EU are estimated to be experiencing this problem, with evidence showing that different regions present individual their own energy poverty inflected characteristics. Though, living in inadequately heated or cooled homes with proper indoor air quality is known to have detrimental implications on physical and mental health, as well as well-being. The poor energy efficiency of the building stock with high presences of mold and deterioration, low levels of energy consumption and use of inefficient equipment offers the opportunity to further investigate in multiple regions/cities the health dimension affecting energy poor consumers with social and energy considerations of poverty. This PhD should aim to deepen the understanding of the interlinks between energy efficiency, energy poverty, climate change, air quality and health exploring potential co benefits, policy design and trade offs.

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Sustainable Water Sanitation, Wastes and Resources Recovery

<https://www.cense.fct.unl.pt/research-areas/sustainable-water-sanitation-wastes-and-resources-recovery>

Development of natural based products for wastewater treatment

The main objective to be investigated under this working plan is the development of natural based solutions for wastewater treatment. Water scarcity is both a natural and man-made problem. Fresh water is not well distributed around the world, and is wasted, polluted and unsustainably managed. Wastewater treatment plants (WWTP) combat this problem by treating wastewater that can be reused or discharged back into the environment. However, nowadays new challenges facing Europe's WWTP include improving sustainability. These challengers are also reinforced by the United Nations in Sustainable Development Goals, namely goals 6 (Clean Water and Sanitation) and 9 (Sustainable Development). Wastewater managers should increase the possibilities to embed wastewater treatment in a circular economy and become "ecologically sustainable" systems which is a very important nexus in SMART cities. Thus, this work pretends to develop and study the use of natural polymers as eco-friendly and sustainable water treatment technologies. First, a new low-cost product will be developed, based on waste (re)use. Second, this new product will be used to treat wastewater ensuring an environmentally responsible release of wastewater and the protection of water quality, thus contributing to ecosystem preservation, sustainable development and circular economy, evaluated by preliminary LCA and economic analyses.

Work will be developed in CENSE, in University of Algarve and FCT NOVA. These two institutions are equipped with all the necessary resources to develop the proposed work, namely HPLC-PDA, TOC, CQO/CBO analysers, zeta potential and light scattering, FTIR, etc.. CENSE promotes interdisciplinary research, focusing on the interaction between human and ecological systems for sustainable development. Sustainable water sanitation, Wastes and Resource recovery and the Research Area that will guide the proposed work plan at CENSE.

Job position description:

The work plan comprises scientific and technological development, and dissemination and communication activities. The candidate will be closely supported by the supervisor team. The work plan is divided in four main scientific tasks:

T1. Development and synthesis of the natural polymer: Different natural materials (agro-wastes) and techniques will be applied, always focus on the lowest manipulation of the materials. When justified, materials will be characterized from light, confocal or scanning electron microscopy images, FTIR spectroscopy, elemental analysis, X-ray diffractometry, Brunner-Emmet-Teller specific surface area, etc. as well as assessment of porosity and size distribution.

T2. Wastewater treatment experiments: For the selected material(s), wastewater treatment processes will be evaluated using synthetic model waters and real wastewaters at laboratory scale. Synthetic model wastewater allows the control the wastewater characteristics and more easily understand results. Some of the processes that will be studied include coagulation/flocculation, flotation and adsorption, but other may be studied depending on the proposed material(s) characteristic(s).

T3. Preliminary environmental assessment: A preliminary environmental assessment will be made of the technology proposed and by comparing with the reference – the use of the synthetic commercial products – or by looking at induced versus avoided environmental impacts potentials originated from the various emissions and flows inventoried. Life Cycle Analysis (LCA) will be used since it is a well-established methodology for evaluating the environmental sustainability of a process or a product throughout its whole life cycle.

T4. Dissemination and communication activities: Work results will be disseminated using: i) at least, 3 peer review articles; ii) 3 scientific conferences communications, iii) communication with the society, end-users and stakeholders; and iv) PhD thesis.

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Sustainable Water Sanitation, Wastes and Resources Recovery

<https://www.cense.fct.unl.pt/research-areas/sustainable-water-sanitation-wastes-and-resources-recovery>

Urban Reuse of Treated Wastewaters - Study and analysis of alternatives for disinfection and removal of emerging pollutants for different uses

The quality and availability of water have been decreasing and the fragile management of these resources have all contributed to the global water crisis. This concern was reinforced by the UN with ODS 6. Developments in wastewater treatment have been considered as a possible alternative to reverse world water scarcity trend. The reuse of wastewater comprises not only the disinfection, which is a regulated requirement but also the removal of emerging pollutants (EP), that have been detected recently in wastewater treatment plants discharges since conventional treatment processes cannot entirely remove them. These group of substances comprises pharmaceutical contaminants including antibiotics and also endocrine disrupting compounds (EDC), like hormones. Regarding antibiotics, there is a concern due to antibiotic resistant genes and as for EDC, it's reported several problems, eg. in reproductive systems, and increase in the incidence of breast, testicle and prostate cancers. Adding to these facts is the need of implementing a circular economy in the water sector, demanding that the vision changes and that the nowadays wastes become the future resources. The main objective of this project proposal is to develop new wastewater treatment methodologies and/or technologies to remove EP from wastewaters in an economically, environmentally viable and sustainable approach, aiming their reuse. These methodologies must also include the wastewater final disinfection concern, a fundamental step to its reuse. The development of different wastewater treatments such as the reuse of water treatment plant sludges containing high concentrations of active carbon as adsorbent material and the use of peracetic acid or other non-harmful reagent, both are economic and environmental advantageous and especially easily incorporable in the current WWTP. Work will be developed in CENSE - FCT NOVA and in University of Algarve.

Job position description:

The work plan comprises scientific and technological development, and dissemination and communication activities. The candidate will be closely supported by the supervisor team. The workplace will be at the Campus of Caparica, School of Science and Technology, NOVA University Lisbon.

T1. Preliminary Tests, Wastewater and water treatment sludges characterisation: The main objective of Task is to adapt and to optimise the detection and quantification methods of the EC in wastewater flows to accomplish the detection limits established in the watch list of EU. In this phase, the final effluent of five WWTP will be selected and characterised (depending on the characteristics of the effluent and treatment system) and Water treatment plant sludges containing activated carbon from five different locations will be characterised to study the potential adsorption of these compounds to these sludges. This task will support the assays performed in task 2. T2. Emerging Pollutants removal study: In this task, several treatment methods will be studied, namely, chemical treatments (advance Oxidation Processes) - three disinfectants, PAA, PFA and chlorine, will be evaluated for each compound and their mixture, physical separation treatments, namely membrane-based processes and adsorption processes, i.e. the use of water treatment plant sludges containing activated carbon to incorporate the circular economy concept. The EP were selected based on their importance and impact. Account was also taken of the representativeness of these in final WWTP effluents and their extrapolation to other compounds, namely other EP. T3. Design concepts, criteria's and parameters: The main design concepts, criteria's and parameters will be systematized for easier integration in the existing WWTP. A calculation of head losses (energy demand) and technical and mechanic requests to perform each treatment solution will be also provided. T4. Dissemination and communication activities: Work results will be disseminated using: i) at least, 3 peer review articles; ii) 3 scientific conferences communications, iii) communication with the society, end-users and stakeholders; and iv) PhD thesis.

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