FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Concursos de Projetos de I&D

Calls for R&D Projects

Voltar à descrição do projeto
Back to project description

Imprimir esta página
Print this page

Visão global da candidatura

Application overview

Ocultar todos as secções desta candidatura
Hide all sections for this application [–]

Referência do projeto
Project reference

PCIF/GVB/0057/2019 **(Lacrado a 19-02-2020 às 12:42)**

1. Identificação do projeto

1. Project description [–]

Domínio Científico
Scientific Domain

Ciências Agrárias

Área científica principal
Main Area

Gestão e valorização da biomassa nos espaços rurais

Área científica Secundária
Secondary area

(Vazio)
(Void)

Acrónimo
Acronym

VALUE2PREVENT

Título do projeto (em português)
Project title (in portuguese)

Valorização da biomassa florestal como ferramenta na gestão do risco de incêndio florestal.

Título do projeto (em inglês)
Project title (in english)

Added value of forest biomass as a tool in forest fire risk management.

Financiamento solicitado
Requested funding

290.551,25€

Palavra-chave 1	**Keyword 1**
Prevenção de incêndios	Fire prevention
Palavra-chave 2	**Keyword 2**
Valorização da biomassa	Biomass valorisation
Palavra-chave 3	**Keyword 3**
Soluções de isolamento	Insulation solutions
Palavra-chave 4	**Keyword 4**
Óleos essenciais	Essential oils
Data de início do projeto Starting date	**Duração do projeto em meses** Duration in months
01-01-2021	36

2. Instituições envolvidas

2. Institutions and their roles [–]

Instituição Proponente
Principal Contractor

SERQ - CENTRO DE INOVAÇÃO E COMPETÊNCIAS DA FLORESTA - ASSOCIAÇÃO (SERQ)
Zona Industrial da Sertã Lote 3
6100-711Sertã

Descrição da Instituição

SerQ (Forest Innovation and Competences Centre) is a private non-profit association that has the University of Coimbra (UC), the National Laboratory of Civil Engineering (LNEC) and the Sertã County (CMS) as founding partners.
SerQ´s field of activity covers the entire value chain from production to final product placement in the market. This way, the activities developed are based on three strategic axes: (i) Improvement of basic products, processes and forest services; (ii) Support for the entrepreneurial and innovation capacity of individuals and companies; (iii) Transfer of knowledge and technology.
SerQ intends to be a driving force of innovation and differentiation, investment and job creation with the strategic goal of promoting the competitiveness of the agro-forestry sector,

not only through the improvement of the raw material, but also through the development of new products and solutions, increasing the external competitiveness of companies in the sector. The main objectives are the optimization of products and productive processes as well as the qualification and quality control of products, supported on a basis of Research, Innovation and Development towards the maximization of the added value of final products.
SerQ's R & D & I strategy promotes the strengthening of scientific employment according with the Portuguese Labour Code and Decree-Law No. 57/2016, of August 29th, as amended by Law No. 57/2017, of July 19th, and complementary legislation.

Instituição Participante
Participating Institution

Centro de Ciência Viva de Proença-a-Nova (CCVFloresta)
Moitas
6150-345Moitas

Descrição da Instituição
Located in the centre of Portugal, in the municipality of Proença-a-Nova, the Associação Centro Ciência Viva de Proença-a-Nova (CCVFloresta) started its activities in 2007. It is an interactive space for scientific, technological, cultural and economic regional development, through the dynamization of the most active regional actors in these areas.
The CCVFloresta is an integral part of the national network of twenty Centros Ciência Viva (National Science and Technology Culture Agency), which was established in 1996 to promote scientific culture and technology in Portuguese society, with special emphasis on the younger population. The values of the Ciência Viva – Living Science are: MISSION, to promote active citizenship based on scientific knowledge; IDENTITY, to inspire and mobilize through science; ACTIVITY, to promote scientific culture and challenge the public to share and discuss new experiences; VALUES, to believe in social progress based on curiosity, creativity, critical thinking and the involvement of all citizens.

Instituto Superior de Agronomia (ISA/ULisboa)
Tapada da Ajuda
1349-017Lisboa

Descrição da Instituição
Instituto Superior de Agronomia (School of Agriculture/University of Lisbon - ISA), is the largest and most qualified school of graduate and post-graduate degrees in the Agricultural Sciences in Portugal, with a nationally and internationally recognized know-how. ISA's core mission is higher education, research, development, and technology transfer in scientific fields such as agriculture, forestry and natural resources management, food science, environmental engineering and landscape architecture. CEABN is a research unit from ISA, and together with CIBIO from Porto University forms the Associated Laboratory InBIO. Its mission is to create sound scientific research in ecology applied to forest and agricultural ecosystems, providing to stakeholders the scientific bases for answering management and policy questions relating to the sustainable use of resources. This laboratory has a strong scientific critical mass devoted to wildfires, forest management, ecology and knowledge transfer, and currently leads the FIRECOL, UESFOR and FORWILD research lines at the INBIO. This team has an extensive experience on forest management and wildfire research on the ecological and social dimension, both in Portugal and internationally. The InBIO is an Associated Laboratory with a key position to advise the Portuguese State on public policies relating to the conservation and management of biodiversity and the environment. Research at the InBIO aims to advance knowledge and to apply it, to addr

Proentia Lda (Proentia)
Parque Empresarial de Proença-a-Nova, Lote 10/11
6150-579Proença-aNova

Descrição da Instituição
PROENTIA - Essential Oils is a bio-company located in the centre of Portugal with the objective of producing and marketing 100% pure and natural high quality essential oils obtained by steam distillation of aromatic plants characteristic of the Proença-a-Nova, namely Esteva (Cistus ladanifer), French lavandula (Rosmarinus officinalis) and Rosemary (Lavandula pedunculata), Souther blue gum (Eucalyptus globulus), and Maritime pine (Pinus pinaster). One of the most important factors of this project is the use of the vegetal raw material that the region offers, allowing the immediate obtaining of essential oils and their hydrolates. In this way, the use of plant residues resulting from logging and the maintenance of clean forests is combined. The only residues resulting from this activity can still be used as fertilizers in agriculture or reused in biomass plants.

Universidade de Coimbra (UC)
Paço das Escolas
3004-531Coimbra

Descrição da Instituição
University of Coimbra (UC) is a reference in higher education and R&D in Portugal, due to the quality of the courses taught and to the advances achieved in pure and applied research in various scientific domains. UC pursues a policy of continuous improvement in several areas, ensuring high standards of teaching and research. The continuous technological development promoted by UC's different R&D units addresses the challenges involved in the design, operation and regulation of technologies, bringing together teachers from different scientific disciplines with a long experience in teaching, research, technology transfer and consultancy in different areas. UC offers advanced training programs that bind to technology, where we highlight those related to MIT Portugal and UT Austin Programs and Associated Laboratories. The offer in technological research makes UC a reference in R&D in Portugal, which highlights the excellence of work developed by the R&D units of UC, besides the previously mentioned Associated Laboratories. UC stands out also on technology transfer being involved in the promotion of several initiatives, like IPN Incubator and Biocant, and in the creation of diverse technological spin-offs. The UC is today an example of dynamism in its constant search for improvement and enhancement of knowledge, research and technology, contributing decisively to the improvement of science, technology and to the enhancement of knowledge as an essential element of people´s lives.

Unidade de Investigação
Research Unit

Instituto para a Sustentabilidade e Inovação em Estruturas de Engenharia (ISISE)
Departamento de Engenharia Civil
4810-282Guimarães

Unidade de Investigação Adicional
Additional Research Unit

Centro de Ecologia Aplicada Prof. Baeta Neves (CEABN/ISA/ULisboa)
Tapada da Ajuda
1349-018Lisboa

Centro de Ecologia Funcional (CFE/FCT/UC)
Departamento de Ciências da Vida, Universidade de Coimbra; Calçada Martim de Freitas
3000-456Coimbra

Instituição de Acolhimento
Host Institution

Universidade de Coimbra (UC)
Paço das Escolas
3004-531Coimbra

3. Componente Científica
3. Scientific Component

3.1. Sumário
3.1 Abstract

3.1.a Em português
3.1.a In Portuguese

A gestão florestal inclui o desbaste regular das árvores e remoção de parte da vegetação do sub-bosque. Esta redução da biomassa florestal (carga de combustível) irá diminuir a intensidade e severidade de um incêndio, especialmente se esta gestão for realizada em larga escala. Estas operações podem ser dispendiosas (trabalhos intensivos em mão-de-obra) sem garantia de retorno financeiro da biomassa obtida. Este projeto visa a valorização da biomassa florestal em áreas rurais, estimulando a economia local e a participação da população. Pretende aumentar o retorno financeiro das operações de limpeza aos proprietários florestais, incentivando a gestão do combustível e contribuindo para a prevenção de incêndios florestais pela diminuição do risco de incêndio. Simultaneamente, a valorização da biomassa pode diminuir o número de queimadas (queimas tradicionais), diminuindo

assim uma das causas maioritárias de ignição em Portugal [26].
O projeto centra-se no desenvolvimento de novos produtos baseados na biomassa florestal e no micélio de fungos (FM): uma aplicação associada a produtos não estruturais (por exemplo, painel de isolamento térmico) e outra para fins estruturais pouco exigentes (por exemplo, componente de partição). Para efeitos de aumento da durabilidade e valor acrescentado da biomassa, os óleos essenciais serão extraídos das matérias-primas (Cistus ladanifer, Rosmarinus officinalis e Lavandula pedunculata, Eucalyptus globulus e material de desbaste de Pinus pinaster) e testados como protectores dos produtos contra fungos. Esta valorização da biomassa florestal articula-se com a lógica da economia circular, pelo que as soluções desenvolvidas são totalmente biodegradáveis e reutilizáveis, prolongando a vida útil dos materiais. Além disso, o uso de resíduos de biomassa pode ser incluído na ideia de mudar para uma economia verde, no âmbito da estratégia de bioeconomia (Programa H2020).
Objetivos: Valorização da biomassa florestal, visando agregar valor às florestas e, consequentemente, promover a possibilidade de aumentar o rendimento dos produtores; Prevenção de incêndios florestais, aumentando a remoção de combustível e diminuindo o número de queimadas; Contribuição para a promoção da economia circular como área de desenvolvimento de projetos de empreendedorismo de base tecnológica. No geral, dinamizar as cadeias de valor associadas aos recursos endógenos naturais. O projeto está dividido em 7 tarefas que fornecem um caminho lógico e coerente da matéria-prima para os produtos finais: Avaliação e recolha de biomassa florestal; Avaliação do impacto da gestão da biomassa na prevenção de incêndio; Antecedentes para o desenvolvimento de biomateriais com biomassa florestal e fungos; Extração de óleos essenciais; Demonstração de aptidão tecnológica: desenvolvimento de produtos e testes; Mercados e marketing de produtos; Transferência de conhecimento e atividades de divulgação.
O consórcio do projeto é coordenado por um centro privado de pesquisa e inovação sem fins lucrativos (Serq-Centro de Inovação e Competências da Floresta), de duas universidades (UC - Universidade de Coimbra e CEABN/ISA/UL – Instituto Superior de Agronomia da Univ. Lisboa), uma empresa privada (PROENTIA) e um centro de divulgação científica (CCVF-Centro de Ciência Viva para a Floresta). Serão contratados os serviços de uma empresa privada de estudos de mercado. A equipa do projeto possui conhecimento sobre produtos florestais, com publicação científica internacional, experiência em coordenação de projetos nacionais e da UE e organização de conferências internacionais. A estratégia de I&D&I do SerQ promove o reforço do emprego científico através do IR deste projeto, de acordo com o Código do Trabalho Português e com o Decreto-Lei n.º57/2016, de 29 de agosto, alterado pela Lei n.º57/2017, de 19 de julho, e legislação complementar. Um grupo informal de consultoria pro-bono aconselhará a equipa em reuniões regulares programadas durante o projeto, com relação a decisões e estratégias baseadas na floresta, aplicações industriais e desenvolvimento de produtos. O grupo incluirá o consultor do projeto, e representantes do Centro Pinus e da AIMMP - Associação das Indústrias de Madeira e Mobiliário de Portugal.
Os resultados do projeto serão divulgados para a comunidade científica (através de artigos científicos e técnicos de acesso público), e industrial. O projeto será a base para teses de mestrado e doutoramento, protótipos e a submissão de uma patente. As atividades de transferência de conhecimento e divulgação garantirão que os resultados do projeto sejam bem-sucedidos na comunidade científica e no contexto da indústria, ao mesmo tempo em que projetam iniciativas eficazes de divulgação para públicos não científicos. Os resultados do projeto serão divulgados também nos canais do LinkedIn, Facebook e twitter com a criação da tag # VALUE2PREVENT.

3.1.b Em inglês
3.1.b In English

Forest management includes tree thinning and the removal of part of the understory vegetation. Reduction of forest biomass (fuel load) decreases fire intensity and severity, particularly if it is done on a large scale. However, operations can be expensive (labour intensive works) without the assurance of a financial return from the obtained biomass. The project targets the valorisation of the forest biomass in rural areas, thus stimulating the local economy and the participation of the population. It aims at contributing for a better management by enhancing the financial return of cleaning operations to the forest owners, hence encouraging fuel management and contributing to the prevention of forest fires. Simultaneously, biomass valorisation, can decrease the number of burnings (traditional burns), diminishing one of the main causes of fire ignition in Portugal [26]. It focuses on the development of new, durable and ecofriendly engineered products based on forest biomass and fungus mycelium (FM). Two solutions are envisaged: one for application associated with non-structural products (e.g. thermal panel) and another for low demanding structural purposes (e.g partition member, but still presenting enhanced functional performance in terms of acoustic and thermal insulation). For the purpose of durability enhancement and extra added value of the biomass, essential oils will be extracted from the raw materials (Cistus ladanifer, Rosmarinus officinalis, and Lavandula pedunculata, and Eucalyptus globulus, and Pinus pinaster thinning material) and tested to act as protectors of wood-based products against molds.
The valorisation of the forest biomass links with the logic of the circular economy hence the solutions developed are totally biodegradable and reusable, extending the life of materials. Moreover, the use of biomass residues can be included into the idea of changing towards a green economy, in the framework of the bioeconomy strategy (H2020 Program).
Main objectives: Valorisation of the forest biomass (including understory vegetation), targeting to add value to the forests and consequently promoting the possibility of increasing the producers' incomes; Preventing forest fires by enhancing fuel withdrawal and decreasing the number of traditional burns; Development of high performance green products for the construction sector; Contributing to the promotion of the circular economy as an area of development of technology-based entrepreneurship projects. Overall, boosting the value chains associated with natural endogenous resources.
The project has 7 tasks: Forest biomass assessment and gathering; Assessment of the impact of biomass management on fire prevention; Background for biomaterial development with forest biomass and fungi; Essential oils extraction; Demonstration of technological aptitude: Product Development & Testing; Markets and product marketing; Knowledge transfer and outreach activities. The project consortium comprises a coordination from a private non-profit research and innovation centre (SerQ - Centro de Inovação e Competências da Floresta), two universities (UC – Univ. Coimbra and CEABN/ISA/UL – Instituto Superior de Agronomia da Univ. Lisboa), a private company (PROENTIA), and a science dissemination centre (CCVF – Centro de Ciência Viva para a Floresta). Outsourcing will be provided by a market studies private company. A private consultant will follow the project and be a part of the management group. The multidisciplinary team has extensive knowledge on forest products and on fire research, with international scientific publication, experience in coordination of EU and national projects, and organization of international conferences. SerQ's R&D&I strategy promotes the strengthening of scientific employment through the PI of this project, according with the Portuguese Labour Code and Decree-Law No. 57/2016, of August 29th, as amended by Law No. 57/2017, of July 19th, and complementary legislation. An informal pro-bono consulting group will counsel the research team in scheduled regular meetings throughout the project, regarding forest-based decisions and strategies, industrial applications and product development. The group will include the project consultant and representatives from Centro Pinus and AIMMP-Association of Industries of Wood and Furniture Portugal. It is expected that project outputs succeed in the research community (open access science and patent submission), and industry context. At another level an effort is made to promote the participation of young researchers in the project, namely through Msc and PhD thesis. Pilot products are also included not only for research purposes but also as a very effective way to demonstrate the project results. To achieve the general public creating awareness of the importance of biomass management, the project results will be disseminated also in LinkedIn,Facebook and twitter channels with the creation of the ashtag #VALUE2PREVENT.

3.2. Descrição Técnica
3.2 Technical Description

3.2.1. Revisão da Literatura
3.2.1. Literature Review

The occurrence, frequency and behaviour of wildfires have varied greatly over time and space. In the 21st century, climate change is expected to create extreme weather that will expand the dry season, heat waves and droughts triggering more intense wildfires with severe environmental and economic consequences, especially in Mediterranean countries [1]. This is particularly serious in Portugal where changes in land use, abandonment of the territory, and lack of forest management have contributed to an increase in fuel load, affecting the usual fire regimes [2]. Forest management with the removal of forest biomass reducing fuel loads will tackle the risk of fire [3]. The development of renewable and natural products with new functionalities and improved performance is indispensable for the competitiveness of forest-based industries and should be a strategic issue for countries like Portugal. Moreover, the use of biomass residues can be included into the idea of changing towards a green economy, in the framework of the bio economy strategy (H2020 Program). However, only rarely do the profits outweigh the costs of biomass harvest, hence the need to develop products that provide added value [4]. Reports show that when quality residues are used, medium-low/acceptable biomaterial performance can be achieved [5]. About 75% of buildings in European Union are energy inefficient, the building sector is the largest single energy consumer, absorbing 40% of final energy, similar numbers can be found for Portugal [5]. The improvement of EU energy efficiency in buildings plays a key role in speeding up the "Energy efficiency first" initiative, in line with the 50 to 90% greenhouse gases emission reduction, agreed for 2030 and 2050, respectively. The efforts to build nearly zero-energy buildings involve research and efforts to develop ground-breaking materials, and investment that integrate operational strategies and to remove barriers in the market [6]. On the other hand, the increasing trend to clean energy strongly motivates the use of renewable resources to produce novel devices and materials [7-11]. Still, the development of biopolymers oftentimes requires demanding methods for processing their sources, namely the materials extraction and their incorporation/operability in technological systems [9]. Research work with similar objectives has been carried out in previous projects by members of this research team [5,12]. The mycelium corresponds to the vegetative part of a fungi formed by a mass of hyphae. Hypha have cell walls composed of chitin, glucans and proteins (e.g. mannoproteins and hydrophobins) with functional role in mechanical properties and morphogenesis of the fungus. Fungi are heterotrophic and feed by absorption; they are exceptional engineers capable of synthesizing enzymes that catabolize a vast variety of substrates, including the two most abundant biopolymers on earth: cellulose and lignin [13]. Fungi are also capable of synthesizing an extensive diversity of secondary metabolites, including pigments, small peptides, amino acids, and other natural products with nutritional and medicinal properties [14]. The exceptional structure and metabolism of fungi justify their application in the production of innovative mycelium-based materials. Pleurotus ostreatus and Ganoderma lucidum are white rot fungi of great interest, due to their enzymatic decomposition capabilities. Notably, both species are amply produced for their secondary metabolites. So far, the development of mycelium-based materials is related to foamy structures made by unprocessed biomass glued together via mycelia, mainly conceived by the US company Ecovative [15]. There is however a limited number of studies aiming the production of other biomaterials. [16] developed biomaterial blocks using oak wood residues (Quercus kelloggii) and Ganoderma lucidum mycelium, concluding: 1)weak resistance to compression and traction; 2)resistance of the material decreases with increasing moisture content; 3)Scanning Electron Microscopy showed that the mycelium grows without a well-defined direction but does surround wood particles of the composite. [17] in turn developed a biomaterial for the packaging of fragile materials, replacing the common expanded polystyrene, through a mixture of materials composed of mycelium of Ganoderma sp., cotton plant biomass, starch, gypsum. The inoculation was done through two different processes: 1)grain and 2)liquid. Furthermore, the study also employed particles with different dimensions, with the aim of assessing the influence of particle size in various physical and mechanical properties of the biomaterials: 1)compressive strength, 2)flexural strength, 3)modulus of elasticity, 4)density, 5)dimensional stability, 6)accelerated aging, 7)water absorption and 8)thermal conductivity. This study revealed that significantly different materials emerge depending on the employed inoculation method. The biomaterials inoculated by spores in liquid medium obtained greater mycelium distribution, ease in the process of development, and greater consistency of the final product. Conversely, biomaterials inoculated by spores in solid medium (grain) revealed a higher density, better results in terms of strength and modulus of elasticity. This study showed that besides the influence of the substrate composition, it is also important to study how the inoculation method influences the final product. This work has resulted in biomaterials with enormous potential to replace the Styrofoam plates used in industry with the benefit of being sustainable and biodegradable. Ultimately, [18] evaluated a mycelium-based acoustic absorber grown on agricultural by-product substrates, with results pointing towards an optimal performance at the key automotive road noise frequency.

3.2.2. Plano e Métodos
3.2.2. Plan and Methods

By generating economic incentives to harvest forest biomass, forest management will have less costs for the owner, and the biomass would be culled more frequently, helping to minimise wildfire severity and frequency since the number of traditional burns could decrease. The project approach will motivate landowners to keep their properties resilient to fire and other forms of land degradation. Furthermore, by highlighting the existence of novel feedstocks, these may be industrially explored. Ultimately, by adding value to unexplored biomass feedstocks, this will promote a new outlook on these resources, and highlight the need for well-planned fuel management action. The development of construction products based on forest biomass through processing by fungi under normal environmental conditions, with no residue being produced, configures the efficient use of resources through the development of highly environment friendly production processes with minimal environmental impact. This rationale underlines the importance of this project, which focuses on the development of new, durable and eco-friendly engineered products based on forest biomass and fungus mycelium. Two solutions are envisaged: one for application associated with non-structural products (e.g.thermal panel) and another for low demanding structural purposes (e.g.partition member, but still presenting enhanced functional performance in terms of acoustic and thermal insulation). For the purpose of durability enhancement and extra added value of the biomass, essential oils will be extracted from the raw materials (Cistus ladanifer, Rosmarinus officinalis, and Lavandula pedunculata, and Eucalyptus globulus, and Pinus pinaster thinning material) and tested to act as protectors of wood-based products against molds. The objectives are: valorisation of the forest biomass (including understory vegetation), targeting to add value to the forests and consequently promoting the possibility of increasing producers' incomes; preventing wildfires by enhancing fuel withdrawal; contributing to the promotion of the circular economy as an area of development of technology-based entrepreneurship projects. Specific objectives: provide information on qualities and quantities of potential bio-based raw materials and waste; reveal optimum processing of the materials for sustainable added-value products; present examples of lab and industrially produced bio-composites for construction (specifically for insulation); demonstrate opportunities in manufacturing innovative eco-efficient products and disseminate the results to Scientific and Industrial communities.
A Technological Readiness Level 6 rating is expected since prototypes will be tested at a real scale. The consortium multidisciplinary team has knowledge on forest products and fire prevention, with high international scientific publication, experience in coordination of EU and national projects, and organization of international conferences. SerQ's R&D&I strategy promotes the strengthening of scientific employment through the PI of this project, as according with the Portuguese Labour Code and Decree-Law No. 57/2016, of August 29th, as amended by Law No. 57/2017, of July 19th, and complementary legislation. The project governance model aims to foster internal communication and facilitate the project management, while promoting scientific excellence. An informal pro-bono consulting group (project consultant - cv im attach-, Centro Pinus and AIMMP) will counsel the research team in scheduled regular meetings throughout the project, regarding forest-based decisions and strategies, industrial applications and product development. This collaboration is already secured, and support letters are attached. The consortium and the informal consulting group will meet regularly starting with a kick-off meeting, and then every 6 months ensuring a constant follow-up of the project. In these meetings the research members involved will deal with eventual update and re-distribution of tasks/sub-tasks, so that the outcomes of the project are optimized, and all the milestones and deliverables fulfilled. In these meetings the fellows will be present. Additionally, every second month the IR and Co-IR will meet to discuss project development, current results including possible risks, and consider actions adjustments to the original plan. All the information regarding work progress and data analysis will be exchanged between partners throughout the project within the scope of the milestones. PI and Co-PI have experience in managing research projects, with national and international funds of several dimensions and complexity. SerQ will provide the necessary administrative services to help the financial execution of the project. All the information regarding the project will continuously updated and kept at the SerQ cloud servers, available for all the research team to consult.
The project is divided in 7 tasks: 1) Forest biomass assessment and gathering, focuses on gathering the necessary information regarding the amount and type of forest biomass that exists in the Pilot Area established. The work will be carried out mainly by SERQ and CEABN/ISA enabling the promotion of the social awareness of local forest producers to the importance of biomass valorisation, and how that directly impacts on the decrease of fire risk, and consequently on the quality of their properties and wood. Information gathered within this task will be included in a Forest Guide for Biomass Valorisation, a project deliverable and dissemination tool. 2) Assessment of the impact of biomass management on fire prevention. This task will be led by CEABN/ISA together with SERQ, to analyse the differences on the type, quantity and structure of the vegetation, variables that have strong influence on the fuel models and consequently on fire behaviour. Also, a focus group and survey will be implemented with the forest owners and land managers to better understand their perceptions on wildfires, fuel management and their motivations to do or not this type of management. This assessment will create the basis for a better awareness and education activities to be held by CCVF. 3) Background for biomaterial development with forest biomass and fungi, focuses on selection of the best substrate formulations (forest biomass) to develop the mycelium-based material, as well as the characterization of hyphae/mycelium growth performance concerning all initial substrate formulations. The work will be carried out by UC with the participation from SERQ. 4) Essential oils extration, focuses on the production of natural oils extracted from the raw materials (C. ladanifer, R. officinalis, L. pedunculata, and E. globulus, and Pinus pinaster thinning material). This task will be carried out by PROENTIA and take place entirely in industrial environment. 5) Demonstration of technological aptitude: Product Development & Testing, focuses on the development of an appealing and technologically performing product based on forest biomass bound together by fungus mycelium. Mechanical, physical and durability tested will be carried out to forecast their performance for construction purposes. The application of oils extracted from this biomass will be tested into the final product to assess its use as wood protectors, namely for protection against mold. A patent regarding an innovative insulation solution will be submitted, provided it does not compromise the knowledge transfer and the technical information targeting forest producers and industry. The work will be carried out by SerQ, UC, and PROENTIA. 6) Markets and product marketing, focuses on the analysis of the economic viability of the processes and products developed. The studies will be outsourced by SerQ to a market studies expert company to be selected through public competition selection upon project approval. The results of this task are per se a deliverable in a form of a report. This report will be released to all partners, gaining importance to PROENTIA as it may help them address other markets that have not yet been explored. The output of this task, together with the technical viability information gathered in the previous tasks provides the project with a feasibility studies for the solutions envisaged for forest biomass valorisation to mitigate fire risk. 7) Knowledge transfer and outreach activities, will ensure that project outputs succeed in the research community, open access science and industry context, while designing effective outreach initiatives for non-scientific audiences.
The project will be the framework for 2 MSc theses and 1 PhD thesis. Project deliverables will include an annual scientific report describing activities and the results achieved. A detailed report will provide economic feasibility and market studies acting as a powerful and effective tool of knowledge transfer. Manuscripts will be produced for publication in relevant international peer-reviewed scientific research journals (open access). Technical information will be prepared targeting forest producers, who own the raw material; industries, which can transform it; architects and civil engineers, who can prescribe the products; and general public, the potential consumers. A Forest Guide for Biomass Valorisation will be published. Participations on national and international conferences and on an international fair Tektónica (reaching the producers, industry, architects, construction engineers and general public), are envisaged. Multiple effective outreach initiatives for non-scientific audiences are foreseen, targeting the promotion of social awareness and public perception of the importance regarding the importance of adding value to forest biomass as a tool in forest fire risk management, VALUE2PREVENT.

3.2.3. Tarefas
3.2.3. Tasks

Lista de tarefas (7)
Task list (7)

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
1	Forest biomass assessment and gathering	01-01-2021	31-12-2022	24	19

Descrição da tarefa e Resultados Esperados
Task description and Expected results

The objective of this task is to gather information regarding the amount and type of forest biomass that exists in the Pilot Area established that comprises the "Zona do Pinhal Interior Sul", which will be used as a demonstration unit. The selection of the different types of biomass, namely Cistus ladanifer, Rosmarinus officinalis, and Lavandula pedunculata, Eucalyptus globulus, and Pinus pinaster, will be done aiming at their removal from the forest and consequent valorisation as raw materials.
A precise characterization of the different types of forest biomass will be carried out regarding, density; secondary access; cleaning predictability (to fulfil the mandatory law and to assess the availability of these materials over short, medium and long term); volumes.
Also, the necessary material for the development of the construction solution and for the oil production will be collected during the project lifetime. Hence, this task will take place in several moments along the project, coincidently in time with task 3 and 4, due to the fact for oil extraction it is imperative to have freshly cut raw material. The process of harvesting will be done according to the already well-established techniques with no disturbance of the day-today workload. SERQ and PROENTIA will be responsible for the harvesting the raw material.
Information gathered within this task will be included in a Forest Guide for Biomass Valorisation, a project deliverable and dissemination tool.
This task will be led by SERQ together with CEABN/ISA and PROENTIA.
It is expected to obtain results on:
• Characterization for the different types of forest biomass in the pilot area;
• Quantification of the availabilities of the biomass in this area.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

(B) Bolsa 2; Camila Stephanie Fernandes Linhares; Cátia dos Santos Antunes; Maria Conceição Almeida Colaço; Sílvia Maria Farinha Lopes; Sofia Knapic de Soares Ferreira;

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
2	Impact assessment of the biomass remo...	01-01-2021	31-12-2023	36	23

Descrição da tarefa e Resultados Esperados
Task description and Expected results

The objective of this task is to assess the changes on type of fuel model in the intervention area and their impacts on fire behaviour. For that, together with task 1, a detailed survey using plant species and functional traits (plant growth form) will be conducted to analyse changes on biomass management plots in relation to fire hazard reduction.
In addition, a focus group with participative methodologies will be implemented with the forest owners and land managers to better understand their perceptions on wildfires, fuel management and their motivations to do or not this type of management. This assessment will create the basis for a better awareness and education activities to be held by CCVF.

It is expected to obtain results on:

• Biomass management impact on fire hazard;
• Forest owners perception on fire prevention and motivations to take action.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

(B) Bolsa 2; Cátia dos Santos Antunes; Maria Conceição Almeida Colaço; Sofia Knapic de Soares Ferreira;

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
3	Background for biomaterial developmen...	01-01-2021	31-03-2023	27	28

Descrição da tarefa e Resultados Esperados
Task description and Expected results

It aims to select the best formulas of substrates to develop the mycelium-based material, and the characterization of hyphae/mycelium growth performance concerning all initial formulas of substrates. It is necessary to identify and select the biomass combinations that best suits mycelium growth. Because it is a primary objective to make as less disturbance as possible in the ordinary process of forest biomass collection, 2 sets of substrates will be considered: a mix of all the understory collected previously in task 1, and individually per species.
Linking the forest biomass substrates to mycelium growth: Upon the collection of the material needed, this task will contribute to in spawn on wheat seeds (produced from pure cultures, stored in dark at 4 °C until inoculation) will be used. The team has worked with G. lucidum [19] and P. ostreatus [5], two white rot fungi with high-level research interest in biotechnology and industry due to their capability to secrete enzymes that decompose cellulose, hemicellulose and lignin. The substrates formulas are autoclaved at 120°C/15 min, twice. Samples are inoculated with G. lucidum and P. ostreatus and incubated at 25–30°C and 70–80% relative humidity for 10-30 days (in dark). Monitoring on:1)the macroscopic progress of mycelium,and 2)the microscopic morphology of hyphae (initial and advanced stages). After the growth period, the substrate samples are heat treated (60°C, 2-6h) to halt fungal growth. At this stage microscopic morphology of mycelium will be assessed. Firstly, via light microscopy, to assess hyphae mean diameter, hyphae width/thickness ratio, and shape of hyphae tips. The overall mycelium growth will be characterized (mean density and width,width/thickness ratio,surface features).The hyphae and mycelium profiles will be evaluated at different growing periods (10, 20, 30 days), before and after the heat treatment. Statistical analyses (MATLAB,R) will be applied to evaluate the extension of hyphae and mycelium distributed in substrate sample.
Biophysical characterization of fungal mycelium growth: i)establish the critical factors for developing the advanced materials made with fungi, ii) set out the parameters that can be controlled and tunable during fungal growth. The activity is organized in 2 tasks: a)Characterization of biophysical properties of selected biomaterials:Pinpoint biophysical properties of mycelium for better understanding mechanisms underlying fungal growth conditions in the biomaterial. Advanced microscopy will be used to analyse and compare the morphology of biofilms in selected substrate formulations. The aim is to examine the mechanical properties of single cell layer surfaces, and to study the 3-dimensional mycelium structure. Microscopy methodology for characterization of fungal mycelium biophysical properties:1)fluorescence microscopy (Carl Zeiss Axio Observer Z1 and Carl Zeiss Axio Imager Z2, with ApoTome2), 2) confocal laser scanning microscopy (Carl Zeiss LSM 710), and 3) scanning electronic microscopy (SEM FEI-Tecnai G2 Spirit Biotwin). Fluorescent probes will be used to specifically bind different mycelium components:calcofluor white for chitin detection;ConA for cell wall matrix polysaccharides [20]. b)Macromolecular analyses of the selected biomaterials:Will produce the in-depth characterization of fungal biomass structure and monitor changes during mycelium growth, namely the main components polysaccharides, lipids, proteins and chitin. Experimental procedures: biomaterial profiles will be evaluated at different growth periods (10, 20, 30 days), before and after the heat treatment, by using mass spectrometry (MS). Statistical analysis will be applied to evaluate the fungal biomass structure and biophysical properties among the biomaterial samples selected.
Results:Selection of the best formulas of substrates to develop the mycelium-based material, hence the biomaterial at industrial level; Technical sheet regarding the fungal growth process.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

(B) Bolsa 1; Alfredo Manuel Pereira Geraldes Dias; Jorge Manuel Pataca Leal Canhoto; Ricardo Manuel Fernandes da Costa; Sofia Knapic de Soares Ferreira;

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
4	Essential oils extraction	01-09-2021	28-02-2023	18	14

Descrição da tarefa e Resultados Esperados
Task description and Expected results

This task will take place entirely at PROENTIA industrial facilities, with the participation from SerQ, promoting the immediate transfer of knowledge. Essential oils will be extracted from the raw materials (Cistus ladanifer, Rosmarinus officinalis, and Lavandula pedunculata, and Eucalyptus globulus, and Pinus pinaster thinning material). After the harvesting of the raw materials the production process starts immediately upon the arrival to the industrial facilities, where it will be sorted according to species and size. The chosen material is introduced into the distillation vessel directly through the shredder sleeve. As the filler is filled, the material is compacted.
The distillation process is made using the steam distillation method. Water vapor is produced in a boiler fed by the separate trunks in the sorting step and by the dry residues resulting from previous distillations. The steam then goes through the vegetable material and extracts the oil in the leaves, which passes through the cooler where condensation occurs by cooling. Finally, the distillate is collected in a Florentine vessel or decanter where phase separation occurs: oily and aqueous, respectively essential oil and hydrolate. By density differences, the oil is physically separated from the hydrolate.
The collected oil is then filtered and stored in stainless containers, the hydrolates are stored in reservoirs of high-density polyethylene (HDPE).
The process ends with a quality control of final product and processes, which is made by a qualitative and quantitative analysis (by gas chromatography) of each batch produced.
The distilled vegetable residue is withdrawn from the vessel and taken to the appropriate place for its natural drying to take place. Subsequently, some of these residues will be used to heat the boiler. The surplus will be accumulated and sent to biomass plants or other waste treatment plants.

It is expected to obtain results on:
• Essential oils processing characterization.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

Raquel da Silva Farinha; Sérgio Farinha Lopes; Sílvia Maria Farinha Lopes; Sofia Knapic de Soares Ferreira;

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
5	Demonstration of technological aptitu...	01-03-2021	31-08-2023	30	28

Descrição da tarefa e Resultados Esperados
Task description and Expected results

This task has 2 objectives: development of an appealing and technologically performing product based on forest biomass bound together by fungus mycelium development, while being able to forecast their performance for construction purposes; and application of the oils extracted from this biomass into the final product to assess its use as protection against mold. A patent regarding innovative insulation solutions is forecasted. The collected forest biomass will be washed, dried in a kiln, chipped into flakes and pressed in a similar way of an OSB (Oriented Strand Board) production. Different pre-processing techniques such as densification will be applied in order to improve the technological properties, it is anticipated that up to 3 will be tried (different compression levels and moisture contents). 2 solutions are envisaged: one for application associated with non-structural products (e.g. thermal panel) and another for low demanding structural purposes (e.g partition member, but still presenting enhanced functional performance in terms of acoustic and thermal insulation). Physical and mechanical characterization will be made, including the defined variations of the different pre-processing techniques. The test will be performed in small dimension specimens, suitable for a basic product characterization but not appropriate to assess their performance in the building. The number of tested samples will be defined in line with the variability of the mechanical property under test. Physical characterization includes: thermal and moisture induced dimensional variation, durability, thermal conductivity. Mechanical characterization includes: strength, deformability, creep coefficient, and panel shear using small and real scale prototypes. Also, at surface level tests will be conducted to assess colour measurement and roughness determination, hardness and wear properties. All the essays described will be made according to the appropriated European standards. Hence these products are for indoor solutions it is imperative to have a reaction to fire assessment. For this purpose, the Single Burning Item (SBI) will be followed, according to [21]. This method determines the reaction to fire behaviour of building products (excluding floorings) when exposed to the thermal attack by a single burning item (a sandbox burner supplied with propane). The reaction of the specimen to the burner is monitored instrumentally and visually. Heat and smoke release rates are measured instrumentally, and physical characteristics are assessed by observation. The durability of the solutions towards mold development will be assessed regarding the different oils extracted. The resistance of the product regarding several biodegradation processes will be established in laboratorial testing of fungal and mould biodegradation following European standards. The assessment of the product performance in the actual buildings will be done using numerical simulation through advanced models specific for each parameter. The inputs will comprise the data obtained in the previous task as well as all the other conditions to be find in real buildings (e.g openings, connection). The performance aspects include: load carrying capacity, deformability, acoustic performance, thermal performance and Life Cycle Assessment. Further experimental testing might be considered, whenever the numerical models are not able to deliver reliable results or whenever they are more complex/expensive. Real scale prototypes will be developed as a part of the dissemination process; hence a small modular structure is planned to be exposed for evaluating the public perception of this solutions. Results:Density assessment and chipping performance of the raw materials;Physical and mechanical characterisation for product performance of the solutions envisaged;Natural durability to fungus and moulds upon oil impregnation;Assessment of product performance in building environment; Reaction to fire.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

(B) Bolsa 1; Alfredo Manuel Pereira Geraldes Dias; Ângela Marta Ferreira das Neves; Camila Stephanie Fernandes Linhares; Cátia dos Santos Antunes; Hélder David Silva Craveiro; Jorge Manuel Pataca Leal Canhoto; Ricardo Manuel Fernandes da Costa; Sílvia Maria Farinha Lopes; Sofia Knapic de Soares Ferreira;

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
6	Markets and product marketing	01-01-2022	31-12-2023	24	1

Descrição da tarefa e Resultados Esperados
Task description and Expected results

The studies will be outsourced by SerQ to a market studies expert company be selected through public competition selection upon project approval.
The specifications asked to the expert company will comprise the following information:

1. Characterization of the world market:
1.1. Recent world market developments in the sectors related to the main products, their quantities and prices;
1.2. Characterization of the most important countries in terms of production, import and export of the various products;
1.3. Identification of key policies for the sector (European, other);
1.4. Prospects of the evolution of the world market for the various products under study.

2. Market analysis and national policy:
2.1. Developments in the domestic market in the recent past regarding the main products, their quantities and prices;
2.2. Analysis of the market in regional terms - areas by systems of occupation of soils and estimated production;
2.3. Analysis of production, transformation and distribution - study of the value chain;
2.4. National forest policy and the evolution of public support - CSFs and others;
2.5. Total investment in the sector.

3. Valuation of products under development:
3.1. Identification of existing market competitors;
3.2. Analysis of market prices of identical or similar products;
3.3. Valuation of products under development.

4. Main market players in national and regional terms - associations, major companies, public bodies.
5. Prospects for market developments and national policies.

The objective of this task is to analyse the economic viability of the processes and products in order to tackle the economic challenges that hinder the implementation of the envisaged solutions at a larger scale. The results of this task are per se a deliverable and will allow to achieve a detailed SWOT analysis.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

Sofia Knapic de Soares Ferreira;

Ordem Order	Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Duração Duration	Pessoas * mês Person * months
7	Knowledge transfer and outreach activ...	01-01-2021	31-12-2023	36	65,8

Descrição da tarefa e Resultados Esperados
Task description and Expected results

It is expected that project outputs succeed in the research community, open access science, and industry context. Also, multiple effective outreach initiatives for non-scientific audiences are foreseen.
Project deliverables will include an annual scientific report describing activities and the results achieved under the underlying rationale. Apart from the technical feasibility of the solutions envisaged provided by the results of the different tasks, a detailed report provides economic feasibility and market studies acting as powerful and effective tool of knowledge transfer.
Deliverables: D1: Survey of the local forest owners; D2: Progress report for the first year; D3: Progress report for the second year; D4: Technical sheet of the developed insulation solutions; D5: Report on Markets and product marketing; D6: Forest Guide for Biomass Valorisation; D7: Final report.
Scientific papers towards the international research community, will be published on international referred journals in the area (preferably in open access journals). Technical information will be prepared targeting forest producers, that own the raw material, industry, that can transform it, and architects and civil engineers, that can prescribe the product, and general public, the potential consumers. A forest biomass user guide for bioproduct opportunities will be published.
The project will give the framework for two Ms.D theses and one Doctoral thesis.
The outreach activities will include participation on national and international conferences (reaching the national and international community) and on an international fair "Tektónica" (reaching the producers, industry, architects, construction engineers and general public). A final workshop on the development of an innovative and sustainable engineered product will be organized. Participation in the dissemination of science for young people will be made by offering summer training to secondary school students through the programme Ciência Viva. A specific dissemination of the potential economic value of the technology developed and product competitiveness will be made in the network of SMEs and end users, already well established by all partners.

Membros da equipa de investigação nesta tarefa
Members of the research team in this task

(B) Bolsa 1; (B) Bolsa 2; Adriana Lourenço; Alfredo Manuel Pereira Geraldes Dias; Ângela Marta Ferreira das Neves; Camila Stephanie Fernandes Linhares; Cátia dos Santos Antunes; Hélder David Silva Craveiro; Jorge Manuel Pataca Leal Canhoto; Maria Conceição Almeida Colaço; Marta Isabel Palhim Cardoso; Nuno Miguel Pequito Cardoso; Raquel da Silva Farinha; Ricardo Manuel Fernandes da Costa; Sérgio Farinha Lopes; Sílvia Maria Farinha Lopes; Sofia Knapic de Soares Ferreira;

3.2.4. Calendarização e Gestão do Projeto
3.2.4. Project Timeline and Management

3.2.4.a Descrição da Estrutura de Gestão
3.2.4.a Description of the Management Structure

The project governance model aims to foster internal communication and facilitate the project management, while promoting scientific excellence. In the kick-off meeting, that will gather all the consortium along with the informal consulting group (external to the project consortium), workplan milestones, outreach strategy and foreseen publications will be addressed. The informal consulting group includes the project consultant (CIENCIA ID: 1A1F-F254-5CBB, cv in attach), representatives from two non-profit entities (Centro Pinus and AIMMP) and will counsel the research team regarding forest-based decisions and strategies, industrial applications and product development. This collaboration is already secured, and comfort letters are attached (.pdf).
Immediately upon project approval the scholarships processes will start and advertised following an efficient, transparent, supportive and internationally comparable manner, namely using EU portals like EURAXESS or ERACAREERS.
Throughout the project every second month the IR and Co-IR will have a project meeting to discuss the project development, current results including possible risks, and consider actions adjustments to the original plan to mitigate the risks. All the information regarding work progress and data analysis will be exchanged between partners throughout the project within the scope of the milestones
Meetings between all the partners will be scheduled on a regular basis (every 6 months) with the presence of the consulting group. For every activity there will be a meeting (face to face or via web) at the beginning, at the end and, at least, once every four months. In these meetings the research members involved will deal with eventual update and re-distribution of tasks/sub-tasks, so that the outcomes of the project are optimized, and all the milestones and deliverables fulfilled. In these meetings the fellows will be present.
PI and Co-PI have large experience in managing research projects, with national and international funds of several dimensions and complexity. SerQ will provide the necessary administrative services to help the in the financial execution of the project. All the information regarding the project will be held in the servers of SerQ with links to the rest of the consortium in order that all the research team members can access in the cloud the latest versions of the documents and data. All the information regarding the project will continuously updated and kept at the SerQ cloud servers, available for all research team members to consult.

3.2.4.b Lista de Milestones
3.2.4.b Milestone List

Data Date	Designação da milestone Milestone denomination
01-04-2021	Information regarding the different types of forest biomass

Descrição
Description

Information regarding the species, density, secondary access, cleaning predictability and volumes available. List of questions for the surveys to be conducted with the local forest owners.

Data Date	Designação da milestone Milestone denomination
01-06-2021	Characterization of fungal mycelium & Substrates formula

Descrição
Description

Assessment of the two sets of substrates:individually per species(C.ladanifer,R.officinalis,L.pedunculata,P.pinaster,E.globulus),and a mix of all species. This includes information on

the characterization and proportion of raw materials and the evaluation of the hyphae/mycelium growth performance.

Data Date	**Designação da milestone** Milestone denomination
01-08-2021	Biochemical characterization of fungal mycelium

Descrição
Description

Biochemical profiles of selected composite biopolymers, namely polysaccharides, lipids, and proteins, towards the fully characterization of the controlled processes during the mycelium.

Data Date	**Designação da milestone** Milestone denomination
01-01-2022	Essential Oils Extration

Descrição
Description

Technical sheet for each essential oil produced using, individually, Cistus ladanifer, Rosmarinus officinalis, Lavandula pedunculata, Pinus pinaster and Eucalyptus globulus.

Data Date	**Designação da milestone** Milestone denomination
01-08-2023	Product development and validation

Descrição
Description

Development, optimization and validation of the solutions, including all the parameters that are relevant for insulation construction applications. of the final product. Essential oil application to the insulation solutions and establishment of the protocols for the durability tests.

Data Date	**Designação da milestone** Milestone denomination
01-08-2023	SWOT analysis

Descrição
Description

Achieve of a detailed swot analysis of the envisaged products, targeting the creation of a higher demand at a national scale.

3.2.4.c Cronograma
3.2.4.c Timeline

Ficheiro com a designação "timeline.pdf", no 9. Ficheiros Anexos, desta Visão Global (caso exista).
File with the name "timeline.pdf" at 9. Attachments (if exists).

3.3. Referências Bibliográficas
3.3. Bibliographic References

Referência Reference	**Ano** Year	**Publicação** Publication
1	2019	**García-Llamas P., Suárez-Seoane S., Taboada A., Fernández-Manso A., Quintano C., Fernández-García V., Fernández-Guisuraga J.M., Marcos E., Calvo L. 2019. Environmental drivers of fire severity in extreme fire events that affect Mediterranean pine forest ecosystems. Forest Ecology and Management, 433: 24-32. https://doi.org/10.1016/j.foreco.2018.10.051https://www.sciencedirect.com/science/article/pii/S0378112718314397**
2	2014	**Pausas J.G., Keeley J.E. 2014. Abrupt Climate-Independent Fire Regime Changes. Ecosystems, 17: 1109–1120. doi: 10.1007/s10021-014-9773-5. https://link.springer.com/article/10.1007/s10021-014-9773-5**
3	2016	**Anderson N., Mitchell D. 2016. Forest operations and woody biomass logistics to improve efficiency, value, and sustainability. Bioenergy Research, 9: 518-533. doi: 10.1007/s12155-016-9735-1. https://www.fs.usda.gov/treesearch/pubs/50966**
4	2019	**Strandgard M., Turner P., Mirowski L., Acuna M. 2019. Potential application of overseas forest biomass supply chain experience to reduce costs in emerging Australian forest biomass supply chains – a literature review, Australian Forestry. DOI: 10.1080/00049158.2018.1555907 https://doi.org/10.1080/00049158.2018.1555907**
5	2017	Pires BFS. 2017. Desenvolvimento de Biomaterial para Isolamento Térmico a partir de Resíduo Agroflorestal e Micélio de Fungo." Development of biomaterial for termal insulation from Universidade de Coimbra. Coimbra: Departamento de Engenharia Civil. In Portuguese
6	2017	**European Commission, 2017 (European Commission, 2017) https://ec.europa.eu/clima/policies/strategies/2050_en**
7	2001	**Niemeyer, C. M. 2001. Nanoparticles, proteins, and nucleic acids: Biotechnology meets materials science. Angewandte Chemie- International Edition 40, 4128–4158 http://onlinelibrary.wiley.com/doi/10.1002/1521-3773(20011119)40:22%3C4128::AID-ANIE4128%3E3.0.CO;2-S/abstract**
8	2013	**Meyers, M. A., McKittrick, J., Chen, P. Y. (2013) Structural Biological Materials: Critical Mechanics-Materials Connections. Science 339, 773–779. doi: 10.1126/science.1220854 http://science.sciencemag.org/content/339/6121/773/tab-article-info**
9	2015	**Wei, K., C. Lv, M. Chen, X. Zhou, Z. Dai e D. Shen. 2015. Development and performance evaluation of a new thermal insulation material from rice straw using high frequency hot-pressing. Energy and Buildings, 87: 116-122. https://doi.org/10.1016/j.enbuild.2014.11.026 http://www.sciencedirect.com/science/article/pii/S0378778814009578**
10	2017	**Haneef M., Ceseracciu L., Canale C., Bayer I.S., Heredia-Guerrero J.A., Athanassiou A. 2017. Advanced Materials From Fungal Mycelium: Fabrication and Tuning of Physical Properties. Scientific Reports, 7:41292:1-11. doi: 10.1038/srep41292 https://www.nature.com/articles/srep41292**
11	2019	**Appels F.V.W., Camere S., Montalti M., Karana E., Jansen K.M.B., Dijksterhuis J., Krijgshelda P., Wösten H.A.B. 2019. Fabrication factors influencing mechanical, moisture- and water-related properties of mycelium-based composites. Materials and Design, 161: 64–71. https://doi.org/10.1016/j.matdes.2018.11.027 https://www.sciencedirect.com/science/article/pii/S0264127518308347**
12	2016	**Martins, C., Dias, A. M. P. G., Costa, R., Santos, P. 2016. Environmentally friendly high performance timber–concrete panel. Construction and Building Materials, 102, Part 2, 1060-1069. https://doi.org/10.1016/j.conbuildmat.2015.07.194 http://www.sciencedirect.com/science/article/pii/S0950061815302166**
13	2008	**Bouws H., Wattenberg A., Zorn H. 2008. Fungal secretomes-nature's toolbox for white biotechnology. Appl Microbiol Biotechnol 80: 381–388. doi:10.1007/ s00253-008-1572-5. http://link.springer.com/article/10.1007/s00253-008-1572-5**
14	2014	**Azul A.M., Nunes J., Ferreira I., Coelho A., Veríssimo P., Castro P., Trovão J., Campos A., Freitas H. 2014. Valuing native ectomycorrhizal fungi as a forestry component for sustainable and innovative solutions. Botany 92:149-160. doi: 10.1139/cjb-2013-0170 http://www.nrcresearchpress.com/doi/abs/10.1139/cjb-2013-0170#.WQH61LHGzBU**
15	2016	**Ecovative (2016) http://www.ecovativedesign.com/. Ecovative Design, New York, US. https://www.ecovativedesign.com**
16	2013	**Travaglini S., Noble J., Ross P., Dharan C. 2013. Mycology Matrix Composites, Proceedings of the American Society for Composites – Twenty-Eighth Technical Conferences, Berkeley California http://www.mycoworks.com/wp-content/uploads/2014/04/UC-Berkeley-Mycology-Matrix-Composites-ASC-Conference-Paper-13-May-2013-2.pdf**
17	2012	**Holt G.A., McIntyre G., Flagg D., Bayer E., Wanjura J.D., Pelletier M.G. 2012. Fungal Mycelium and Cotton Plant Materials in the Manufacture of Biodegradable Molded Packaging Material: Evaluation Study of Select Blends of Cotton Byproducts. Journal of Biobased Materials and Bioenergy, 6(4): 431-439. http://www.ingentaconnect.com/content/asp/jbmb/2012/00000006/00000004/art00012?crawler=true**
18	2013	**Pelletier MG, Holt GA, Wanjura JD, Bayer E, McIntyre G. 2013. An evaluation study of mycelium based acoustic absorbers grown on agricultural by-product substrates. Industrial Crops and Products, 51: 480-485.**

		https://doi.org/10.1016/j.indcrop.2013.09.008 https://www.sciencedirect.com/science/article/pii/S0926669013005050
19	2018	**Ozcariz-Fermoselle M.V., Fraile-Fabero R., Girbés-Juan T., Arce-Cervantes O., Oria de Rueda-Salgueiro J.A., Azul A.M. 2018. Use of lignocellulosic wastes of pecan (Carya Illinoinenses) for cultivation of a medicinal mushroom (Ganoderma Lucidum) from the Iberian Peninsula. Revista Iberoamericana de Micologia, 35(2):103-109. https://www.ncbi.nlm.nih.gov/pubmed/29731312 doi: 10.1016/j.riam.2017.09.005.**
20	2015	**Steudler S., Thomas, B. 2015. Better One-Eyed than Blind—Challenges and Opportunities of Biomass Measurement During Solid-State Fermentation of Basidiomycetes. Adv Biochem Eng Biotechnol, 149:223-52. DOI 10.1007/10_2014_300 https://www.ncbi.nlm.nih.gov/pubmed/25860889**
21	2010	EN 13823:2010: Reaction to fire tests for building products; Building products excluding floorings exposed to the thermal attack by a single burning item.
22	2018	**Knapic S., Santos J., Santos J., Pereira H. 2018. Natural durability assessment of thermo-modified young wood of Eucalyptus spp. Maderas. Ciencia y tecnologia. 20(4). Retrieved from http://revistas.ubiobio.cl/index.php/MCT/article/view/3159**
23	2016	**Machado J.S., Santos S., Pinho F.F.S., Luís F., Alves A., Simões R., Rodrigues J.C. (2016). Impact of high moisture conditions on the serviceability performance of wood plastic composite decks. Materials and Design, 103: 122–131. https://doi.org/10.1016/j.matdes.2016.04.030 https://www.sciencedirect.com/science/article/pii/S026412751630497X**
24	2017	**Knapic S., Santos C.P., Pereira H., Machado J.S. 2017. Performance of expanded high-density cork agglomerates. Journal of materials in civil engineering, 29(2). doi:10.1061/(ASCE)MT.1943-5533.0001718 https://ascelibrary.org/doi/10.1061/%28ASCE%29MT.1943-5533.0001718**
25	2018	**da Costa R.M.F., Simister R., Roberts L.A., Timms-Taravella E., Cambler A.B., Corke F.M.K., Han J., Ward R.J., Buckeridge M.S., Gomez L.D., Bosch M. 2018. Nutrient and drought stress: implications for phenology and biomass quality in miscanthus. Annals of Botany. http://dx.doi.org/10.1093/aob/mcy155. https://www.ncbi.nlm.nih.gov/pubmed/30137291**
26	2019	Colaço, M.C., 2019, Reaprender a vivir cos incendios forestais nun contexto de cambio climático. In Proxecto Batefogo (ed) Árbores que non arden: As mulleres na prevención de incendios forestais. pp. 127-146. ISBN: 978-84-949154-6-8

3.4. Publicações Anteriores
3.4. Past Publications

Referência Reference	Ano Year	Publicação Publication
22	2018	**Knapic S., Santos J., Santos J., Pereira H. 2018. Natural durability assessment of thermo-modified young wood of Eucalyptus spp. Maderas. Ciencia y tecnologia. 20(4). Retrieved from http://revistas.ubiobio.cl/index.php/MCT/article/view/3159**
23	2016	**Machado J.S., Santos S., Pinho F.F.S., Luís F., Alves A., Simões R., Rodrigues J.C. (2016). Impact of high moisture conditions on the serviceability performance of wood plastic composite decks. Materials and Design, 103: 122–131. https://doi.org/10.1016/j.matdes.2016.04.030 https://www.sciencedirect.com/science/article/pii/S026412751630497X**
24	2017	**Knapic S., Santos C.P., Pereira H., Machado J.S. 2017. Performance of expanded high-density cork agglomerates. Journal of materials in civil engineering, 29(2). doi:10.1061/(ASCE)MT.1943-5533.0001718 Knapic S., Santos C.P., Pereira H., Machado J.S. 2017. Performance of expanded high-density cork agglomerates. Journal of materials in civil engineering, 29(2). doi:10.1061/(ASCE)MT.1943-5533.0001718 https://ascelibrary.org/doi/10.1061/%28ASCE%29MT.1943-5533.0001718**
25	2018	**da Costa R.M.F., Simister R., Roberts L.A., Timms-Taravella E., Cambler A.B., Corke F.M.K., Han J., Ward R.J., Buckeridge M.S., Gomez L.D., Bosch M. 2018. Nutrient and drought stress: implications for phenology and biomass quality in miscanthus. Annals of Botany. http://dx.doi.org/10.1093/aob/mcy155. https://www.ncbi.nlm.nih.gov/pubmed/30137291**
26	2019	Colaço, M.C., 2019, Reaprender a vivir cos incendios forestais nun contexto de cambio climático. In Proxecto Batefogo (ed) Árbores que non arden: As mulleres na prevención de incendios forestais. pp. 127-146. ISBN: 978-84-949154-6-8

4. Equipa de investigação
4. Research team

4.1 Lista de membros
4.1. Members list

Nome Name	Função Role	%	CV nuclear Core CV	CV
Sofia Knapic de Soares Ferreira	Inv. Responsável	55	✓	CIÊNCIAVITAE
Alfredo Manuel Pereira Geraldes Dias	Co-investigador Responsável	15	✓	CIÊNCIAVITAE
Hélder Craveiro	Investigador	10	X	CIÊNCIAVITAE
Jorge M. Canhoto	Investigador	15	✓	FCT-SIG
Maria Colaço	Investigador	20	✓	CIÊNCIAVITAE
Ricardo Costa	Investigador	15	X	CIÊNCIAVITAE
Camila Linhares	Bolseiro	25	X	CIÊNCIAVITAE
Cátia Antunes	Bolseiro	30	X	CIÊNCIAVITAE
Adriana Lourenço	Outro	30	X	FCT-SIG
Ângela Neves	Outro	15	X	FCT-SIG
Marta Cardoso	Outro	30	X	FCT-SIG
Nuno Cardoso	Outro	30	X	FCT-SIG
Raquel Farinha	Outro	15	X	FCT-SIG
Sérgio Lopes	Outro	15	X	FCT-SIG
Sílvia Lopes	Outro	15	X	FCT-SIG

(O curriculum vitae de cada membro da equipa está disponível clicando no nome correspondente)
(Curriculum vitae for each research team member is available by clicking on the corresponding name)
Total: 15

4.2. Lista de membros a contratar durante a execução do projeto
4.2. Members list to hire during project's execution

Membro da equipa Team member	Função Role	Duração Duration	%tempo %time
(B) Bolsa 1	Bolseiro	36	100
(B) Bolsa 2	Bolseiro	24	100
Total: 2			

5. Outros projetos
5. Other projects

5.1. Projetos financiados
5.1. Funded projects

(Vazio)

(Void)

5.2. Candidaturas similares
5.2. Similar applications

(Vazio)
(Void)

6. Indicadores previstos
6. Expected indicators

Indicadores de realização previstos para o projeto
Expected output indicators

Descrição Description	2020	2021	2022	2023	2024	Total
A - Publicações Publications						
Livros Books	0	0	0	0	0	**0**
Artigos em revistas internacionais Papers in international journals	0	1	2	3	0	**6**
Artigos em revistas nacionais Papers in national journals	0	0	1	1	0	**2**
B - Comunicações Communications						
Comunicações em encontros científicos internacionais Communications in international meetings	0	2	6	9	0	**17**
Comunicações em encontros científicos nacionais Communications in national meetings	0	0	1	1	0	**2**
C - Relatórios Reports	0	1	1	1	0	**3**
D - Organização de seminários e conferências Organization of seminars and conferences	0	1	4	4	0	**9**
E - Formação avançada Advanced training						
Teses de Doutoramento PhD theses	0	0	0	2	0	**2**
Teses de Mestrado Master theses	0	0	2	2	0	**4**
Outras Others	0	0	0	0	0	**0**
F - Modelos Models	0	0	0	0	0	**0**
G - Aplicações computacionais Software	0	0	0	0	0	**0**
H - Instalações piloto Pilot plants	0	0	0	0	0	**0**
I - Protótipos laboratoriais Prototypes	0	0	1	1	0	**2**
J - Patentes Patents	0	0	0	1	0	**1**
L - Outros Other						
	0	0	0	0	0	**0**
	0	0	0	0	0	**0**
	0	0	0	0	0	**0**

Acções de divulgação da actividade científica
Scientific activity spreading actions

The outputs of the project comprise an ambitious set of initiatives and documents, aiming at achieving not only the technical community but also the public in general. It is expected that project outputs succeed in the research community, open access science, and industry context. A patent regarding an innovative insulation solution will be submitted, provided it does not compromise the knowledge transfer and the technical information targeting forest producers and industry. Also, multiple effective outreach initiatives for non-scientific audiences are foreseen.
The outreach activities will include: Annual workshops to be integrated in a RoadShow NetWork targeting the stakeholders (with special concern towards forest producers associations and other private entities responsible for forest management, and industries). These workshops will be open to the public in an effort to create awareness in the general population to this important issue; Participation on national and international conferences (reaching the national and international community) and on an international fair "Tektónica" (reaching the producers, industry, architects, construction engineers and general public); A forest biomass user guide for bioproduct opportunities will be published, targeting forest producers, that own the raw material, industry, that can transform it, and architects and civil engineers, that can prescribe the product, and general public, the potential consumers; Real scale prototypes will be developed (a small modular structure is planned to be exposed for evaluating the public perception of the developed insulation solutions; Scientific papers towards the international research community, will be published on international referred journals in the area (preferably in open source journals with Q1); Final workshop on the development of an innovative and sustainable engineered product.
At another level a significant effort is made to promote the participation of young researchers in the project, namely through Msc and PhD thesis. Pilot products are also included not only for research purposes but also as a very effective way to demonstrate the project results. To achieve the general public creating awareness of the importance of biomass management, the project results will be disseminated also in LinkedIn, Facebook and twitter channels with the creation of the ashtag #VALUE2PREVENT.

7. Orçamento
7. Budget

Instituição Proponente
Principal Contractor

SERQ - CENTRO DE INOVAÇÃO E COMPETÊNCIAS DA FLORESTA - ASSOCIAÇÃO

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	0,00	0,00	0,00	0,00	**0,00**
Missões Missions	0,00	1.500,00	2.500,00	2.500,00	0,00	**6.500,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	1.000,00	5.000,00	3.000,00	0,00	**9.000,00**
Registo de patentes Patent registration	0,00	0,00	0,00	8.000,00	0,00	**8.000,00**
Adaptação de edíficios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	1.125,00	3.125,00	5.125,00	0,00	**9.375,00**
Subcontratos Subcontract	0,00	0,00	26.500,00	26.500,00	0,00	**53.000,00**
Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	2.000,00	5.000,00	7.000,00	0,00	**14.000,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**5.625,00**	**42.125,00**	**52.125,00**	**0,00**	**99.875,00**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	0,00	0,00	0,00	0,00	**0,00**
Total	**0,00**	**5.625,00**	**42.125,00**	**52.125,00**	**0,00**	**99.875,00**

Instituições Participantes
Participating Institutions

Centro de Ciência Viva de Proença-a-Nova

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	0,00	0,00	0,00	0,00	**0,00**
Missões Missions	0,00	0,00	0,00	0,00	0,00	**0,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	0,00	0,00	0,00	0,00	**0,00**
Registo de patentes Patent registration	0,00	0,00	0,00	0,00	0,00	**0,00**
Adaptação de edíficios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	750,00	2.250,00	3.250,00	0,00	**6.250,00**
Subcontratos Subcontract	0,00	0,00	0,00	0,00	0,00	**0,00**
Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	3.000,00	9.000,00	13.000,00	0,00	**25.000,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**3.750,00**	**11.250,00**	**16.250,00**	**0,00**	**31.250,00**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	0,00	0,00	0,00	0,00	**0,00**
Total	**0,00**	**3.750,00**	**11.250,00**	**16.250,00**	**0,00**	**31.250,00**

Instituto Superior de Agronomia

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	7.164,00	14.328,00	7.164,00	0,00	**28.656,00**
Missões Missions	0,00	1.000,00	1.500,00	650,00	0,00	**3.150,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	3.000,00	1.300,00	200,00	0,00	**4.500,00**
Registo de patentes Patent registration	0,00	0,00	0,00	0,00	0,00	**0,00**
Adaptação de edíficios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	2.791,00	4.907,00	2.753,50	0,00	**10.451,50**
Subcontratos Subcontract	0,00	0,00	0,00	0,00	0,00	**0,00**
Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	0,00	2.500,00	3.000,00	0,00	**5.500,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**13.955,00**	**24.535,00**	**13.767,50**	**0,00**	**52.257,50**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	0,00	0,00	0,00	0,00	**0,00**
Total	**0,00**	**13.955,00**	**24.535,00**	**13.767,50**	**0,00**	**52.257,50**

Proentia Lda

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	0,00	0,00	0,00	0,00	**0,00**
Missões Missions	0,00	0,00	0,00	0,00	0,00	**0,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	2.500,00	3.000,00	3.000,00	0,00	**8.500,00**
Registo de patentes	0,00	0,00	0,00	0,00	0,00	**0,00**

Patent registration						
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	625,00	750,00	750,00	0,00	**2.125,00**
Subcontratos Subcontract	0,00	0,00	0,00	0,00	0,00	**0,00**
Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	0,00	0,00	0,00	0,00	**0,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**3.125,00**	**3.750,00**	**3.750,00**	**0,00**	**10.625,00**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	0,00	0,00	0,00	0,00	**0,00**
Total	**0,00**	**3.125,00**	**3.750,00**	**3.750,00**	**0,00**	**10.625,00**

Orçamento de Auto-Financiamento
Self-Financing Budget

Proentia Lda (Proentia)

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	2.500,00	3.000,00	3.000,00	0,00	**8.500,00**
Missões Missions	0,00	0,00	0,00	0,00	0,00	**0,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	0,00	0,00	0,00	0,00	**0,00**
Registo de patentes Patent registration	0,00	0,00	0,00	0,00	0,00	**0,00**
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	625,00	750,00	750,00	0,00	**2.125,00**
Subcontratos Subcontract	0,00	0,00	0,00	0,00	0,00	**0,00**
Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	0,00	0,00	0,00	0,00	**0,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**3.125,00**	**3.750,00**	**3.750,00**	**0,00**	**10.625,00**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	0,00	0,00	0,00	0,00	**0,00**
Total	**0,00**	**3.125,00**	**3.750,00**	**3.750,00**	**0,00**	**10.625,00**

Universidade de Coimbra

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	14.546,00	14.675,00	14.805,00	0,00	**44.026,00**
Missões Missions	0,00	0,00	0,00	0,00	0,00	**0,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	9.500,00	9.000,00	5.600,00	0,00	**24.100,00**
Registo de patentes Patent registration	0,00	0,00	0,00	0,00	0,00	**0,00**
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	6.788,75	6.668,75	5.851,25	0,00	**19.308,75**
Subcontratos Subcontract	0,00	0,00	0,00	0,00	0,00	**0,00**
Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	1.500,00	3.000,00	3.000,00	0,00	**7.500,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**32.334,75**	**33.343,75**	**29.256,25**	**0,00**	**94.934,75**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	1.609,00	0,00	0,00	0,00	**1.609,00**
Total	**0,00**	**33.943,75**	**33.343,75**	**29.256,25**	**0,00**	**96.543,75**

Orçamento Global
Global budget

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Recursos Humanos Human resources	0,00	21.710,00	29.003,00	21.969,00	0,00	**72.682,00**
Missões Missions	0,00	2.500,00	4.000,00	3.150,00	0,00	**9.650,00**
Aquisição de bens e serviços Service procurement and acquisitions	0,00	16.000,00	18.300,00	11.800,00	0,00	**46.100,00**
Registo de patentes Patent registration	0,00	0,00	0,00	8.000,00	0,00	**8.000,00**
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	**0,00**
Gastos gerais Overheads	0,00	12.079,75	17.700,75	17.729,75	0,00	**47.510,25**
Subcontratos Subcontract	0,00	0,00	26.500,00	26.500,00	0,00	**53.000,00**

Demonstração, Promoção e Divulgação Demonstration, Promotion and Publication	0,00	6.500,00	19.500,00	26.000,00	0,00	**52.000,00**
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	**0,00**	**58.789,75**	**115.003,75**	**115.148,75**	**0,00**	**288.942,25**
Instrumentos e equipamento científico e técnico Instruments and scientific and technical equipment	0,00	1.609,00	0,00	0,00	0,00	**1.609,00**
Total	**0,00**	**60.398,75**	**115.003,75**	**115.148,75**	**0,00**	**290.551,25**

Plano de financiamento
Finance plan

Descrição Description	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**
Financiamento solicitado à FCT Requested funding	0,00	60.398,75	115.003,75	115.148,75	0,00	**290.551,25**
Financiamento próprio Own funding	0,00	3.125,00	3.750,00	3.750,00	0,00	**10.625,00**
Outro financiamento público Other public-sector funding	0,00	0,00	0,00	0,00	0,00	**0,00**
Outro financiamento privado Other private funding	0,00	0,00	0,00	0,00	0,00	**0,00**
Total do Projecto Total of the project	**0,00**	**63.523,75**	**118.753,75**	**118.898,75**	**0,00**	**301.176,25**

8. Justificação do orçamento
8. Budget rationale

8.1. Justificação dos recursos humanos
8.1. Human resources rationale

Tipo Type		**Nº de pessoas** No. of persons
(B) Bolsa		1
Duração (em meses) Duration (in months)	**Custo envolvido (€) *(calculado)*** Total cost (€) *(estimated)*	**Outros custos (€)** Other costs (€)
36	38.304,00	5.722,00

Justificação do financiamento solicitado
Rationale for requested funding

The scholarship requested is needed for tasks 1, 3, 4, 5 and 7.
Responsibilities: field and laboratory work, preparation of samples, data analysis, preparation of scientific articles. The fellow will provide assistance to the work developed by UC and by SerQ.
Other costs contemplate social security and work insurance.

Tipo Type		**Nº de pessoas** No. of persons
(B) Bolsa		1
Duração (em meses) Duration (in months)	**Custo envolvido (€) *(calculado)*** Total cost (€) *(estimated)*	**Outros custos (€)** Other costs (€)
24	25.536,00	3.120,00

Justificação do financiamento solicitado
Rationale for requested funding

The scholarship requested is needed for tasks 1, 2, 3, and 7.
Responsibilities: field and laboratory work, preparation of samples, data analysis, preparation of scientific articles. The fellow will provide assistance to the work developed by ISA/CEABN.
Other costs contemplate social security.

8.2. Justificação de missões
8.2. Missions rationale

Tipo Type	**Nº de deslocações** No. of participations
Trabalho de campo	10
Local Venue	**Custo envolvido (€)** Cost (€)
National	3.500,00

Justificação do financiamento solicitado
Rationale for requested funding

Field Work.

Tipo Type	**Nº de deslocações** No. of participations
Participação em congressos	19
Local Venue	**Custo envolvido (€)** Cost (€)
National and International	6.150,00

Justificação do financiamento solicitado
Rationale for requested funding

Participation in national and international conferences.

8.4. Justificação de aquisição de bens e serviços
8.4. Service procurement and acquisitions

Tipo Type	**Custo (€)** Cost (€)
Aquisition of services	8.500,00

Justificação do financiamento solicitado
Rationale for requested funding

Consumables for oil extraction process.

Tipo Type	**Custo (€)** Cost (€)
Aquisition of services	6.500,00

Justificação do financiamento solicitado
Rationale for requested funding

Laboratory consumables (biology).

Tipo Type	**Custo (€)** Cost (€)
Aquisition of services	17.600,00
Justificação do financiamento solicitado Rationale for requested funding	
Consumables related to the reaction to fire tests.	

Tipo Type	**Custo (€)** Cost (€)
Aquisition of services	9.000,00
Justificação do financiamento solicitado Rationale for requested funding	
Consumables for field work and for mechanical and physical tests.	

Tipo Type	**Custo (€)** Cost (€)
Aquisition of services	3.000,00
Justificação do financiamento solicitado Rationale for requested funding	
Consulting services for the partner ISA/CEABN.	

Tipo Type	**Custo (€)** Cost (€)
Aquisition of services	1.500,00
Justificação do financiamento solicitado Rationale for requested funding	
Consumables.	

8.6. Justificação do Equipamento
8.6. Equipment rationale

8.6.1. Equipamento já disponível para a execução do projecto
8.6.1 Available equipment

Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Mechanical testing machine	shimadzu	ag-250knis	2006
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Testing lab equipment for biological durability	various	various	2010
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Hydraulic actuators (universal) 25 KN	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Hydraulic actuators (universal) 50 KN	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Hydraulic actuators (universal) 100 KN	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Hydraulic actuators (universal) 500 KN	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Tensile machine 500 KN	various	various	2016
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Assembly table	various	various	2016
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
UV- DNA/RNA Chamber	various	various	2016
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Mill (wood chips)	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Microscope	various	various	2019
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Fluorescence microscopy	LEICA	DM4000	2012
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
equipamento para Single Burning Item	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
equipamento para ensaio de pequena Chama	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
equipamento para ensaio de Painel Radiante	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
equipamento para ensaio de não-combustibilidade	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year
Bomba calorimétrica	various	various	2015
Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Ano** Year

Hot-Disk TPS 2500s	various	various	2015

8.6.2. Discriminação do equipamento a adquirir
8.6.2. New equipment requested

Tipo de equipamento Equipment type	**Fabricante** Manufacturer	**Modelo** Model	**Custo (€)** Cost (€)
Computer desktop	various	various	1.609,00

Justificação do financiamento solicitado
Rationale for requested funding

Computer for field data and treatment acquisition.

8.7. Justificação de registo de patentes
8.7. Patent registration

Tipo Type	**Custo (€)** Cost (€)
International patent	8.000,00

Justificação do financiamento solicitado
Rationale for requested funding

Submission of an international patent request.

8.8. Justificação de adaptação de edifícios e instalações
8.8. Adaptation of buildings and facilities

(Vazio)
(Void)

8.9. Justificação de Subcontratos
8.9. Subcontract

Designação
Designation

Subcontract

Custo
Cost

53.000,00

Justificação do financiamento solicitado
Rationale for requested funding

The studies comprised in task 6 - Markets and product marketing will be outsourced by SerQ to a market studies expert company to be selected through public competition selection upon project approval.

8.10. Justificação de Demonstração, Promoção e Divulgação
8.10. Demonstration, Promotion and Publication

Designação
Designation

Knowledge transfer and outreach activities

Custo
Cost

52.000,00

Justificação do financiamento solicitado
Rationale for requested funding

Rationale for requested funding
- organization of outreach initiatives for non-scientific audiences
- road show.
- organization of workshops
- participation in national and international fairs
- publications of scientific papers in open access journals
- edition of the forest biomass guide
- promotion material (flyers, posters , etc.)

9. Ficheiros Anexos
9. Attachments

Nome Name	Tamanho Size
Jose_Saporiti_CV_Cienciavitae.pdf	128Kb
PCIFGVB00572019_Timeline.pdf	85Kb
support letter AIMMP.pdf	445Kb
support letter Centro Pinus.pdf	37Kb
Suppot letter José Saporiti Machado.pdf	1079Kb

19-02-2020 16:13:50

REPÚBLICA PORTUGUESA | CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR