



SDGine
for Healthy People and Cities

GUIDE FOR APPLICANTS



UNIVERSIDAD
POLITÉCNICA
DE MADRID

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LIST OF ACRONYMS

CET	Central European Time
ECTS	European Credit Transfer and Accumulation System
EHEA	European Higher Education Area
ESR	Early-Stage Researcher
EU	European Union
H2020	Horizon 2020
HRS4R	Human Resources Strategy for Researchers
MSCA	Marie Skłodowska-Curie actions
PCDP	Personal Career Development Plan
PRP	Personal Research Plan
R&D	Research & Development
SDGs	Sustainable Development Goals
STEAM	Science, Technology, Engineering, Architecture, and Applied Mathematics
UPM	Universidad Politécnica de Madrid
VR RID	Vice-Rectorate for Research, Innovation and Doctoral Studies

EXECUTIVE SUMMARY

The “Guide for Applicants” contains comprehensive information about Universidad Politécnica de Madrid (UPM), COFUND SDGine, and the international call launched to select and recruit 12 Early-Stage Researchers (ESRs).

1. UNIVERSIDAD POLITÉCNICA DE MADRID

Universidad Politécnica de Madrid (UPM) is the main technological university in Spain, specialized in Engineering and Architecture. It consists of 16 Schools and one Faculty, and 21 Research and Innovation Institutes and Centres. It is the main Spanish source of high impact knowledge, as UPM ranks the first position in university patent applications, and in attracting R&D European funds (+110M€ in Horizon 2020). Globally, research revenues have increased by more than 22% in the period 2016-2019, reaching 60 M€ in 2019.

The UPM is the first university in number of R&D contracts with industry, as well as in technological entrepreneurship, and in new technology ventures creation, supported by its annual programs and competitions in Innovation & Entrepreneurship, as well as by its 75 University-Company Chairs. Regarding the protection of intellectual and industrial property, and according to data published by the Spanish Patent and Trademark Office (OEPM), the UPM also ranks first in the list of patents filed in its office, with 614 patents in the cumulative period 2007-2019.

In terms of Human Resources, the UPM employs more than 2,920 lecturers and researchers (more than 365 are Full Professors), in addition to 508 researchers and technicians hired by competitive international, national, and regional programmes in 2020. This last figure is constantly increasing (41% in the period 2016-2020).

It is also necessary to highlight the commitment of the UPM to the main European research and innovation networks, and its participation in the European Institute of Innovation & Technology (EIT), as UPM is the only Spanish university, and one of the few at European level, which participates in five of these Communities.

Since 2016, UPM is undergoing a profound realignment of its missions, building on its experience, expertise, and diverse strengths, to become a university fully committed with the implantation and promotion of the Sustainable Development Goals (SDGs). Starting on 2018, UPM embarked on a deep transformation of its research goals, a process to map all university research groups and strengths with reference to the 17 SDGs. This strategy helped to identify and establish internally and externally UPM main areas of action, and through: i) Transformative Research & Development, aligning researchers and groups with the SDGs, facilitating multi-stakeholder alliances; ii) Teaching, SDGs in educational plans, Masters and Doctoral Programmes; and iii) Systemic innovation and technology transference.

UPM works actively in cooperation for development, in line with the objectives of Agenda 2030. Doctoral studies (where education, research and innovation meet) will be strategic to complete the goals by 2030. UPM provides the students with a wide and attractive Doctorate offer through its Doctorate Division & International Doctorate School. The main features for the existing 44 Doctoral Programmes are excellence, dissemination, internationalization, mobility, innovation, and entrepreneurship.

2. SDGine FOR HEALTHY PEOPLE AND CITIES

2.1. SDGine description

SDGine is a 60-month Horizon 2020 (H2020) COFUND project funded by the European Union (EU) under a Marie Skłodowska-Curie (MSCA) grant agreement. The action, with an overall budget of 1,952,640.00€, will run from 1st October 2020 to 31st September 2025. Half of these funds are provided by the EU while the other half comes from the industrial partners who have joined this initiative (Iberdrola, Repsol, Telefónica I+D, Ecoembes, Fundación Tatiana Pérez de Guzmán el Bueno, and Optiva Media). The project is coordinated and managed by the Vice-Rectorate for Research, Innovation, and Doctoral Studies (VR RID) of the UPM.

“SDGine for Healthy People and Cities” aims to devise technologies and tools that contribute to accelerate the compliance of the SDGs by tackling climate change and contributing to the needed social transformations in urban contexts. Through a world-class education and research programme, this European funded action grants 12 Early-Stage Researchers (ESRs) the opportunity to complete Industrial and International Doctorates at UPM, by enrolling in a Doctoral Programme

This project seeks to train a high-skilled and versatile future generation of researchers to become successful, responsible, and sustainable leaders in their fields. This action will provide them with the knowledge and skills to be able to embark on careers both in academia and in the private sector as well as become venture creators, while contributing to align policies and corporate strategies with the SDGs.

This action enhances mobility between countries, disciplines, and sectors, as it involves industries. Trained ESRs will become highly employable for future research positions in academia and non-academia worldwide, while our industrial partners will have a pool of industry-savvy, innovative researchers to shape new research fields. The whole program will also have an institutional impact on gender equality. Moreover, SDGine will have an overall high societal impact through the SDGs, especially those related to “Healthy People and Cities”.

The researchers will have the chance to complete a PhD degree with a 36-month employment contract which will be co-supervised by a UPM professor and a representative from one of the companies that are participating in this project. The ESRs are required, in most cases, to have a STEAM background (Science, Technology, Engineering, Architecture, and Applied Mathematics).

The selection and evaluation process will be open, merit-based, transparent, and based on international and inter-sectoral peer review. The action is also aligned with the "Charter & Code" policies for researchers’ recruitment as UPM has received the HR Excellence in Research award (Human Resources Strategy for Researchers, HRS4R) .

2.2. SDGine Research lines

All applicants can choose from a **predefined list of 22 topics** including matching supervisors, on a thematic basis (see Table 1), although only **12 positions will be funded**. The complete charts for each research line, including requisites for the candidates, are described in Annex I.

Table 1. PhD Theses topics and matching Selection Committees

COMPANY	RESEACH LINE (#)	DESCRIPTION	SELECTION COMMITTEE/ DOCTORAL AREA
Telefónica I+D	1A	Design of novel network functions, architectures and protocols based on programmable data planes	Information & Communication Technologies (ICTs)
	1B	Intent based programmable data planes for disaggregated architectures	Information & Communication Technologies (ICTs)

COMPANY	RESEACH LINE (#)	DESCRIPTION	SELECTION COMMITTEE/ DOCTORAL AREA
Repsol	2A	Deep Learning research and development for the extraction, analysis and synthesis of latent information applied to the development to soft-sensors, soft-analyzer, signal disaggregation and prediction in general	Information & Communication Technologies (ICTs)
	2B	Reinforcement Learning research and development for the control, optimization and automation of industrial assets, plants, robots and decision making for improving operations	Information & Communication Technologies (ICTs)
	3A	Simulation model for the CO2 conversion process in an e-fuels production scheme	Manufacturing & Industry (IND)
	4A	Develop an eco-driving solution that recommends the optimal speed so that vehicles can pass through successive traffic lights at the appropriate instants to save time and energy. One of the main problems to solve is the accurate prediction, in real time, of the future state of dynamically managed traffic lights under different traffic conditions and uncertainty. The solution should be oriented to a practical implementation where technologies such as V2I or V2V are not fully deployed	Manufacturing & Industry (IND)
	4B	Develop an eco-routing solution that recommends the most optimal route to reach a point, taking into account total distance, time and CO2 emissions. The route should also consider refueling/recharging stops in a way that possible queues in service stations are minimized	Manufacturing & Industry (IND)
Iberdrola	5B	Electric power demand. Analysis of the potential for the deployment of electric vehicle infrastructures	Manufacturing & Industry (IND)
	6A	Heat electrification. Electrification potential of domestic thermal installations on a national level.	Manufacturing & Industry (IND)
	6B	Heat electrification. Electrification potential of the public administration by means of a combination of electrical technologies (heat pump, solar, etc.)	Manufacturing & Industry (IND)
	7A	Digitalization. Metrics for measuring the return of digital investments in the electric power sector	Information & Communication Technologies (ICTs)
	7B	Digitalization. Potential for application of digital technologies in the value chain of the electrical industry and its regulatory framework in Europe	Information & Communication Technologies (ICTs)

COMPANY	RESEACH LINE (#)	DESCRIPTION	SELECTION COMMITTEE/ DOCTORAL AREA
	8A	Metrics and SDGs. SDG ambition needed for the next 10 years to achieve the targets 7 and 13 (they have been selected as priorities for Iberdrola). We would like to study the interconnection among SDG 7.1, 7.2, and 7.3 with the SDG 13 and its social impact	Arts & Social Sciences (SSCI)
	8B	Metrics and SDGs. SDG impact measurement: new tools to be developed to assess SDGs impact (social and environmental). We would like to study the balance among the first activity impact (negative by definition) and the positive impact we create	Arts & Social Sciences (SSCI)
Ecoembes	9A	Chemical recycling of complex packaging solutions	Manufacturing & Industry (IND)
	9B	Food contact grade on recycled non-PET packaging materials	Manufacturing & Industry (IND)
F. Tatiana Pérez de Guzmán el Bueno	10A	Development of a model for the university-city collaboration towards sustainable transformation. Application to the city of Madrid	Arts & Social Sciences (SSCI)
	10B	Universities as test beds and living labs for social and technical innovations for urban transformation towards sustainability. Application to the city of Madrid	Arts & Social Sciences (SSCI)
	11A	The natural border area of the urban area: Valuation of the ecosystem services of the natural spaces bordering the urban area	Agronomics, Forestry & Environment (AGRO)
	11B	The natural space bordering the urban area: Observation base to know the functioning of natural ecosystems	Agronomics, Forestry & Environment (AGRO)
Optiva Media	12A	AI-based conceptual content modelling and advanced user profiling for an emotionally safe TV experience	Information & Communication Technologies (ICTs)
	12B	Contribution to mental wellbeing at home via smart and hyperpersonalised content-based recommendations	Information & Communication Technologies (ICTs)

3. DOCTORATE AT UPM

3.1. Doctorate Division & International Doctorate School

The Doctorate Division and the International Doctorate School (EID) are integrated within the Vice-Rectorate for Research, Innovation and Doctoral Studies (VR RID). Both units work closely together and share resources. Their main lines of work deal with the doctorate at UPM, the six Doctoral Areas and the 44 Doctoral Programmes, as described below:

- Regulations
- Administrative procedures (co-supervision, International & Industrial Doctorates, PhD theses defence...)
- Cross-disciplinary training seminars
- Internationalization

3.2. Doctoral Areas & Doctoral Programmes

UPM Doctoral Programmes are grouped into **six Doctoral Areas**: Information & Communication Technologies (ICTs); Agronomics, Forestry & Environment; Manufacturing & Industry; Civil Engineering; Architecture; and Arts & Social Sciences (see Table 2). The main features for the existing **44 Doctoral Programmes** are excellence, dissemination, internationalization, mobility, innovation, and entrepreneurship.

Table 2. UPM's Six Doctoral Areas and 44 Doctoral Programmes attached, according to Spanish regulation RD 99/2011 (Eng., Engineering; Tech., Technology)

DOCTORAL AREA	44 DOCTORAL PROGRAMMES (DP)	
Information & Communication Technologies (ICTs) – 10 DP	<ul style="list-style-type: none"> - Mathematical Eng., Statistics and Operations Research - Software, Systems and Computing - Artificial Intelligence - Systems and Services Eng. for the Information Society 	<ul style="list-style-type: none"> - Computation Science/Tech. for Smart Cities - Telematics Eng. Systems - Communication Systems and Technologies - Electronic Systems Eng. - Photovoltaic Solar Energy - Biomedical Eng.
Agronomics, Forestry & Environment (AGRO)– 7 DP	<ul style="list-style-type: none"> - Advanced Forest Research - Eng. and Management of Environment - Complex Systems - Environmental Tech. for Sustainable Agriculture 	<ul style="list-style-type: none"> - Biotechnology and Genetic Resources of Plants and Associated Microorganisms - Project Planning for Rural Development and Sustainable Management - Agricultural Eng.
Manufacturing & Industry (IND)– 12 DP	<ul style="list-style-type: none"> - Aerospace Eng. - Automation and Robotics - Economy and Innovation Management - Engineering in Industrial Organisation - Environmental, Chemical and Material Eng. - Electrical and Electronic Eng. - Fluid Mechanics 	<ul style="list-style-type: none"> - European PhD in Industrial Management - Mechanical Eng. - Production Eng. and Industrial Design - Research, Modelling and Risk Analysis of the Environment - Sustainable, Nuclear and Renewable Energy

DOCTORAL AREA	44 DOCTORAL PROGRAMMES (DP)	
Civil Engineering (CIVIL) – 5 DP	<ul style="list-style-type: none"> - Structural, Geotechnical and Material Eng. - Naval Architecture, Marine and Ocean Eng. - Earth Informatics Eng. 	<ul style="list-style-type: none"> - Civil Eng. Systems - Technical Innovation in Building Construction
Architecture (ARCH) – 6 DP	<ul style="list-style-type: none"> - Advanced Architectural Design - Architecture and Urban Planning - Architecture Heritage 	<ul style="list-style-type: none"> - Building and Architecture Technologies - Edification Structures - Sustainability and Urban Regeneration
Arts & Social Sciences (SSCI) – 4 DP	<ul style="list-style-type: none"> - Architecture Communication - Architecture, Design, Fashion and Society 	<ul style="list-style-type: none"> - Physical Activity and Sport Sciences - Music and its Sciences and Technologies

4. SDGine PhD THESES

4.1. Supervision – Industrial Doctorate

The participation of industrial financial partners in PhD theses will lead to the completion of an **Industrial Doctorate**. ESRs will spend part of their time in the non-academic sector, as part of a win-win strategy: companies recognize the academic part of the doctorate, and PhD supervisors are committed with the entrepreneurial and labour dimension in industry. In this way, the ESRs will obtain the best of the university (a doctorate degree and research experience) and the industry (knowledge on the most cutting-edge fields and working dynamics).

UPM and the industrial partners will provide an excellent research environment, including the corresponding infrastructure. UPM, in coordination with the partner organisations will offer a rich and close supervision and a mentoring set-up to the 12 ESRs. The supervisory team will be composed by the PhD supervisor (UPM) and co-supervisor (company), the Secondment(s) supervisor(s), the Industrial tutor, and the UPM tutor.

4.2. Secondments – International Doctorate

ESRs will complete mandatory secondments of interest for the PhD thesis project (minimum 3 months outside Spain) to obtain the **International Doctorate**. Secondments will take place in prestigious institutions of higher education, universities, or research centers.

4.3. Research & Training

The ESRs him/herself will be responsible for drawing up his/her Personal Career Development Plan (PCDP) and Personal Research Plan (PRP). All ESRs will oversee their own career planning and will take responsibility for their career development with support from the supervisory team.

SDGine follows the Seven EU principles on Doctoral Training, contemplating the Triple-“i” dimension through: i) International secondments; ii) Inter-sectoral collaboration agreements with industry; and iii) Interdisciplinary PhD supervision.

Training will be close and personalized, as SDGine contemplates only 12 ESRs. It will be divided and/or focused into:

- **International & Industrial secondments** (minimum 6 months in academic or non-academic institutions)
- **Research skills:** systematic understanding of a field of study and the command of research skills and methodologies associated with their PhD thesis projects and the main disciplines of their PhD programme (RDI, publications, conferences, grants writing, communication and networking)
- **Transferable skills:** independent work, collaborative work, and development of innovative projects in international and multidisciplinary contexts (SDGs, project management, Intellectual Property Rights, Mentoring & Coaching, Entrepreneurship & Innovation)
- **Complementary skills:** teaching collaborations and cross-disciplinary training seminars.

5. WORK TERMS AND CONDITIONS

5.1. Contract & Working conditions

The selected ESRs will be employed under an **employment contract with UPM**, and will enjoy the same treatment, benefits, opportunities, standards of safety and occupational health as those awarded to researchers at UPM holding a similar position. Their **status as MSCA fellows** will be recognized in their **36-month contracts**.

Working conditions, provided by UPM, hosting institutions (secondments/stays) and industrial partners, will be:

- Incorporation into the corresponding research unit. Office and laboratory space. Collaborative environment.
- Infrastructure, equipment, and material necessary for the implementation of the PhD thesis.
- Academic, industrial, international, national, and regional partnerships. Industrial and International Doctorates.
- Administrative support: financial control, travel arrangements (conferences attending, short stays), and organisational procedures (PhD enrolment and defence).
- Welcoming services: personal and familiar advice (accommodation, schools), assistance in administrative procedures required by authorities (work permits).
- Career development monitoring and training; attendance and participation in conferences, workshops, or courses.
- Support on job and post-doctoral positions searching. Encouragement of venture creation and self-employment.

If special needs allowance is needed, UPM will apply to the Research Executive Agency for a dedicated special needs grant in COFUND (**MSCA special needs allowance**, up to 60,000.00€, lump sum per researcher).

5.2. Economic conditions (salary and research budget)

The appropriation for the recruitment of each ESR (per year) will be 40,908.00€ (with family allowance) or 34,908.00€ (without family allowance), corresponding to a gross annual salary of **32.590,82€** or **27.810,71€**, respectively (after employment taxes and social security coverage payment by UPM)

Additionally, a Research budget of 5.092,80€ to 11.092,80 will cover any cost that may arise from his/her research (equipment, conference attendance, open access fees, seminar registrations...)

5.3. Employment conditions & Social benefits

Employment conditions will be aligned with the “*Charter & Code*” for researchers, Spanish and UPM regulations. The employment contracts will be of the type “*Predoctoral Contract*” (Model 404, full-time) with UPM.

The salaries will comprise **personal income tax arrangements, social security coverage** (spouse and children will be also included in the **Spanish Healthcare System**), and **social benefits** (parental leave with full pay, contribution to pension funds, severance payment, unemployment benefits, and health and accident insurance).

Suspension of the contract will be possible according to the conditions established in the Spanish Workers’ Stand (temporal incapacity, maternity, paternity, or adoption).

UPM will place particular emphasis on the **work and family life balance**: flexible working time options, teleworking (including infrastructure, laptops, and software), reduced flexible working hours for legal guardianship reasons, summer camps for children, and extended holidays.

6. APPLICATION

6.1. SDGine website

The central portal for all information is the website (SDGine.eu). The site also includes the Applicants’ Portal. The SDGine web provides all the information and documents necessary to apply for the positions and will serve as first entry point for all information about the programme throughout its duration.

6.2. Documentation

Documents are divided into “**Supporting documentation**” and “**Application documentation required**”.

1. **Supporting documentation** comprise the documents listed below:

- Call for applicants.
- Guide for applicants.
- Frequently asked questions.
- Request for Redress.

2. **Application documentation required** will consist of the following documents and/or templates:

- **Application form** (filled-in online), requiring the candidate to provide overview information and evidence: name and surname, personal data, contact details, degree(s) obtained, transnational mobility rule compliance, and English skills.
- **Curriculum Vitae** (3 DIN-A4 pages maximum): personal, academic, and professional information, and scientific production, if any.
- **Expression of interest** (1 DIN-A4 page maximum): candidates must express their interest for one of the proposed PhD theses, giving a consistent explanation for their choice.
- **Declaration of absence of conflict of interest.**

- **Supporting academic documents:** scanned documents supporting the application required by the call and PhD thesis, such as university degrees (BSc, MSc¹), academic stays, certificates (languages, courses and seminars), and research production (in case the candidate have any).
- **Supporting personal documents:** scanned documents such as national identity card or passport, birth certificates of children, certificate of marriage, disability certificate, documents supporting the compliance of the mobility rule (city registrations, employment contracts, and/or university fees) and others.

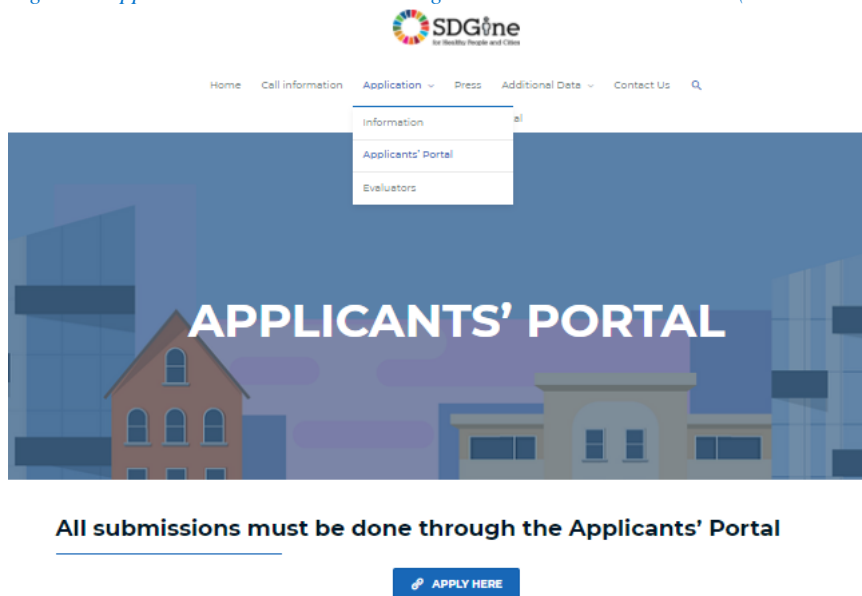
All the documents and forms must be filled in English. All the supporting documents will be uploaded in PDF format files. An application reference² will be automatically generated by the Applicants’ Portal. The submitted files will be named as follows: “application reference _ document” (e.g, SDGINE-DIR-RJTF52-36-YLVPYM_CV).

6.3. Applicants’ Portal and online submission

The electronic submission of “**Application documentation required**” and any other documents during the action will be done through the Applicants’ Portal <https://sdgine.eu/applicants-portal/> . Candidates will be provided with username and password after registration.

Screenshots of the Applicants Portal to help candidates through the application process.

Figure 1: Applicants Portal Screenshot. To get started click in the blue box (APPLY HERE)



¹ At the time of registration for the doctorate, documents should be provided duly legalized by apostille, or in their default, legalized by diplomatic means, and along with the corresponding official translation to Spanish or English. If you have studied in a European University legalization of the degree is not necessary. If necessary, it will be required to submit an original academic certificate issued by their home institution, or relevant body, indicating that the diploma obtained provides access to PhD studies in the issuing country.

² For example, SDGINE-DIR-RJTF52-36-YLVPYM

Figure 2: Applicants Portal Screenshot. To get your application started fill in your email address and the security code, press



Figure 3: Applicants Portal Screenshot. Save your application reference. Application reference appears next to the Spanish sentence "El Código de solicitud es:". In this figure the application reference is: SDGINE-APPLICANTS-STJU9D-1-S4CF5N

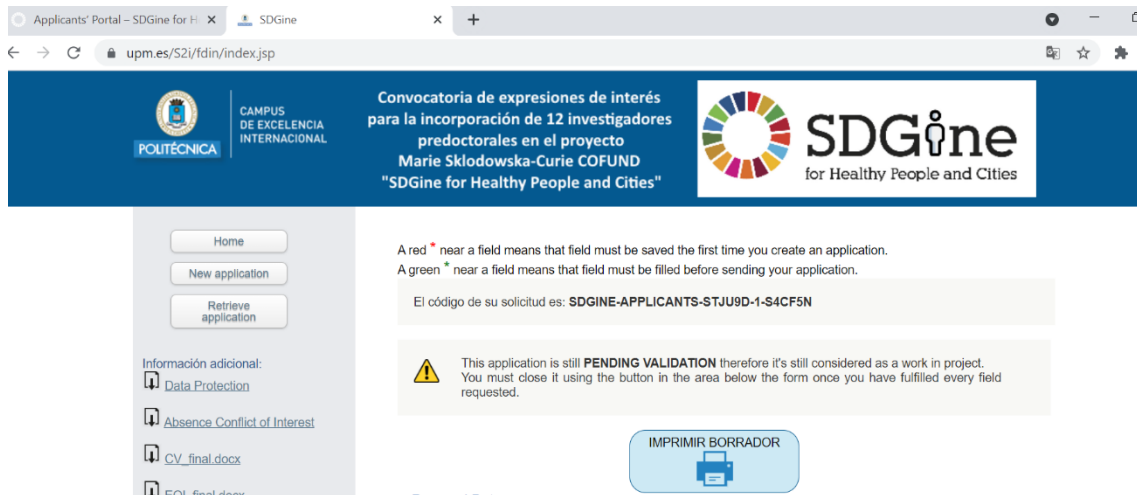
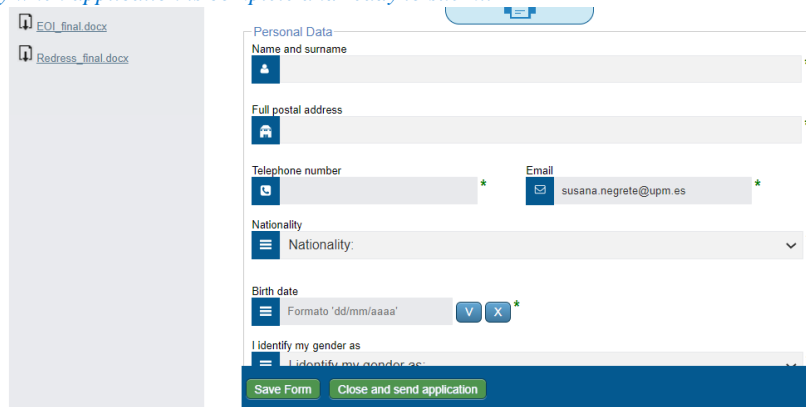


Figure 4: Applicants Portal Screenshot. Scroll down, fill in the application and Save Form. Press Close and send application only when application is complete and ready to submit



It is strongly recommended that each candidate only applies for one position.

6.4. Deadline

The deadline for applications is the 21 August 2021 at 14.00 CET Time (Brussels time)

Please, note that **UPM offers 12 funded positions, chosen from 22 topics with matching supervisors (candidates will choose which topic they prefer).**

6.5. Eligibility criteria

Applicants must, at the call deadline, comply with the following eligibility criteria (**evidence must be provided**):

- **Research experience - Early-Stage Researcher (ESR):** at the date of recruitment, candidates must be in the first four years (Full-Time Equivalent Research Experience³) of their research careers and not yet have been awarded a doctoral degree.
- **Mobility criterion (MSCA Mobility rule):** i) Researchers may be of any nationality; ii) Applicants may not have resided or carried out their main activity in Spain for more than 12 months in the 3 years prior to the call deadline (time spent as part of a procedure for obtaining refugee status under the Geneva Convention⁴, compulsory national service and/or short stays such as holidays are not considered).
- **Degree:** candidates must have completed the studies that lead to an official university degree from any country of the European Higher Education Area (EHEA) awarding 300 ECTS⁵, of which at least 60 ECTS must correspond to master level. **Or** they must have completed a degree in a University not adapted to the EHEA that gives access to doctoral studies. The verification of an equivalent level of studies to the former ones will be made by UPM when the application procedure starts.
- **Language:** candidates must have a demonstrable level of English (B2 or higher). Evidence must be provided upon application, with one of the following certificates: University of Cambridge, IELTS, or TOEFL. Exemptions: English-native speakers, or applicants who have pursued their bachelor or postgraduate studies at countries where English is the official language.

Applications received after deadlines or with conflict of interest will be rendered “not eligible”.

Revision of the eligibility criteria that apply to the call will be done after deadline. The results will be notified individually by e-mail, and the provisional list of eligible and excluded applicants will be published at SDGine website. Following the Spanish Regulations of Public Calls, time for allegations will be established: 10 working days from the date of notification to the applicants to query the results and rectify their application (redress procedure). After the abovementioned period, the applicants will receive definitive notification by e-mail indicating whether or not they have entered into the selection process, along with the definitive list of eligible applicants. The details of further procedures and deadlines will be notified to the eligible applicants individually by e-mail and published online.

³ **Full-Time Equivalent Research Experience** is measured from the date when a researcher obtained the degree entitling him/her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher is recruited, even if a doctorate was never started or envisaged.

⁴ 1951 Refugee Convention and the 1967 Protocol.

⁵ European Credit Transfer and Accumulation System.

6.6. Selection process: remote evaluation and personal interview

REMOTE (ONLINE) EVALUATION OF ELIGIBLE CANDIDATES BY THE SELECTION COMMITTEES – EVALUATION 1

The PhD theses (and hence its applications) will be classified into the Six Doctoral Areas. Selection Committees will be composed by 2 international experts in the given area, coming from Academia or Industry (UPM experts are excluded). Experts have the right background to assess the fitting candidatures. To avoid any conflict of interest, and to ensure the highest levels of transparency, the remote evaluation will be done by Madri+d Foundation. UPM will at no time have access to the evaluators’ database, thus guaranteeing the anonymity of the process. Upon completion of the evaluation of candidatures, all the documents generated in the process (ranked lists, Evaluation Summary Reports...) will be transferred to UPM.

Each application will be evaluated independently and individually by the members of the Selection Committee in line with the “Evaluation criteria”, avoiding “Gender-nationality-age-biased” recruitment, to which end the candidates’ personal data will be anonymized, (Table 3).

The provisional ranked lists of candidates for each PhD thesis topic will be published in the SDGine website. Applicants will be notified by e-mail and candidates will have 10 working days for allegations (redress procedure) before publishing the definitive ranked lists of candidates for each PhD thesis topic (Evaluation 1 scores). Each candidate will receive a personal Evaluation Summary Report.

Table 3. Remote evaluation criteria (Selection Committees, Evaluation 1).

GENERAL CRITERIA AND ISSUES TO CONSIDER (Evaluation 1)	
CURRICULUM VITAE (CV)	EXPRESSION OF INTEREST (EI)
Threshold 3/5, Weight factor 60% (0.6), Priority 1	Threshold 3/5, Weight factor 40% (0.4), Priority 2
<ul style="list-style-type: none"> - Academic records and excellence - Professional experience, if any - Research experience and scientific production, if any - Complementary training & knowledge of English 	<ul style="list-style-type: none"> - Motivation - Statement of purpose & commitment - Choice of PhD thesis with respect to the candidate’s background

A rapporteur will oversee and monitor the whole process and report on the proceedings of the evaluation process ensuring the maximum transparency and objectivity in the evaluations. His/her identity will only be known to Madri+d Foundation and will remain anonymous to the Selection Committees Members.

INTERVIEW OF ELIGIBLE CANDIDATES BY PhD SUPERVISOR, PhD CO-SUPERVISOR, AND INDUSTRY STAFF – EVALUATION 2

Candidates who received a score above 85% in Evaluation 1 will be invited to an interview organised and conducted by the PhD supervisor, PhD co-supervisor, and industry staff, according to the evaluation criteria described in Table 4 All interviews will be internet-based using video calls and will be held in English.

The provisional ranked lists of candidates for each PhD thesis topic, will be available online and candidates will be notified by e-mail. Then feedback will be issued to the applicants (10

working days for allegations, redress procedure) before the definitive ranked lists of candidates (Evaluation 2 scores) for each PhD thesis topic are published. Notifications will be sent by e-mail to each applicant. Each interviewed candidate will receive a personal Evaluation Summary Report.

Table 4. Interview evaluation criteria (PhD supervisor, PhD co-supervisor and industry staff; Evaluation 2).

GENERAL CRITERIA AND ISSUES TO CONSIDER (Evaluation 2)		
CANDIDATES' BACKGROUND (CB)	CANDIDATES' POTENTIAL (CP)	DEFENCE OF THE EI (DEI)
Threshold 3/5, Weight factor 50% (0.5), Priority 1	Threshold 3/5, Weight factor 30% (0.3), Priority 2	Threshold 3/5, Weight factor 20% (0.2), Priority 3
<ul style="list-style-type: none"> - Presentation of the Curriculum Vitae - General scientific knowledge - Professional skills and specific knowledge 	<ul style="list-style-type: none"> - Motivation, ability to complete a PhD - Work capacity, working in teams - Personal skills: leadership, entrepreneurship, proactivity, and adaptive capacity 	<ul style="list-style-type: none"> - Presentation skills: data consistency and reasoning capacity; ability to take part in a scientific discussion - Communication skills in English

RANKED LIST WITH CANDIDATES BY THE UPM RESEARCH COMMISSION - EVALUATION 3

The UPM Research Commission will calculate and revise the average scores (Evaluation 3) of the candidates, considering both remote evaluation and interview (50/50, %) equally weighted:

$$\text{Evaluation 3} = (\text{Evaluation 1} + \text{Evaluation 2}) / 2$$

The provisional ranked lists of candidates for each PhD thesis topic will be produced. The **12 selected ESRs** will be the ones with the best scores for each pair of research lines (for example, 1A and 1B). The lists will be available online and candidates will be notified by e-mail. Then feedback will be issued to the applicants (10 working days for allegations, redress procedure) before the definitive ranked lists of candidates for each PhD thesis research lines and for the **12 funded positions** are published (Evaluation 3 scores). Notifications by e-mail will be sent to each applicant.

UPM will set up reserve ranking list for each PhD thesis position with the remaining candidates. Should a position not be fulfilled by an applicant, another candidate will be invited, based on the score obtained.

7. TIMELINE

Estimated dates are shown below⁶:

- Call deadline: 21 August 2021
- Evaluation 1 scores: 7 October 2021
- Evaluation provisional scores: 19 November 2021
- Evaluation final scores: 13 December 2021
- Contracts signing: 13 December to 13 March

⁶ These dates are tentative and could be subject to changes.

8. INCOMPATIBILITY

The employment contracts of the ESRs will be incompatible with any other grant or contract, with payments that imply a contractual link of a similar nature, or with activities that may prevent the individual from dedicating him/herself exclusively to the work that is the object of the contract. Acceptance of the contract implies carrying out the doctorate and the research work in person.

9. CONTACT DETAILS

Support service will be available during the application period via email: sdgine@upm.es

10. ANNEX I: RESEACH LINES DESCRIPTION

RESEARCH LINE 1A	
COMPANY	Telefónica I+D
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. José Ignacio Moreno Novella <i>Telecommunications Engineering School</i> <i>Telematic Systems Engineering Department</i>
PhD THESIS CO-SUPERVISOR (UPM)	Prof. Dr. Manuel Alvarez-Campana Fernández-Corredor <i>Telecommunications Engineering School</i> <i>Telematic Systems Engineering Department</i>
PhD THESIS TUTOR (COMPANY)	Mr. Rafael Cantó Palancar <i>Transport & IP Network Manager</i> Mr. Luis Miguel Contreras Murillo <i>Technology Expert at Global CTIO unit / Telefónica</i>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Title: Design of novel network functions, architectures and protocols based on programmable data planes.</p> <p>Currently 5G deployment is providing momentum to emerging technologies like software defined networks (SDNs), Network Function Virtualization (NFV) and Network Slicing (NS). In the next years programable data planes could provide the adoption by telecommunication sector of Protocol Independent Switch Architectures (PISA) as the common hardware platform to develop network specific elements as routers, switches, etc, based on programmable data planes which reduces the time to market of innovative functionalities.</p> <p>This PhD will focus on the evaluation of programable data planes and its capacity to support innovative network functionalities in a dynamic and efficient way. To support this goal, PhD will target three main topics:</p> <ul style="list-style-type: none"> - Evaluation of the State of the Art on programable data planes. Identification of architectures, protocols and processes involved. - Design of a methodology to develop new functionalities at data layer over a PISA platform based on programable data planes. - Identification, analysis and evaluation of relevant use cases for telecommunication operators in the deployment of advanced network elements. - Integration of developed solutions with existing ones to ensure smooth transition of operational networks <p>Keywords: Programable Data Planes, PISA, P4, DPDK, PROX, SmartNICs</p> <p><i>This work intends to contribute to SDG objectives on goal 9: Industry, Innovation and Infrastructures in addition to goal 4 quality education and goal 5 gender equality.</i></p>
TRAINING ACTIVITIES	<p>PhD student will be integrated in the RSTI-UPM research group activities, covering aspects related to advanced mobile network technologies (5G/6G), IoT and Cybersecurity.</p> <p>In this process, PhD will participate in meetings, seminars and research projects as well as dissemination activities. We expect that the candidate will actively publish his/her research work on conferences and journals of high impact. In addition, horizontal meetings to evaluate the progress of the work and identify relevant use cases and scenarios will be performed in coordination with Telefonica team.</p> <p>In particular we expect that PhD student will address journals on the level of IEEE (IEEE Communications, IEEE Wireless Communications) and attend conferences related with PISA, P4 or DPDK.</p>

SECONDMENT(S)	Student will have the opportunity to complete his/her training by short stays on selected sites according to the network of contacts maintained by RSTI-UPM and Telefonica.
REQUIREMENTS FOR CANDIDATES	Computer science: Master's degree or equivalent Electrical Engineering: Master's degree or equivalent Skills: Networking, Protocols, Mobile Wireless technologies, Virtualization, Programming English: Advanced / Proficiency (C1 / C2)

RESEARCH LINE 1B	
COMPANY	Telefónica I+D
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Manuel Alvarez-Campana Fernández-Corredor <i>Telecommunications Engineering School Telematic Systems Engineering Department</i>
PhD THESIS CO-SUPERVISOR (UPM)	Prof. Dr. José Ignacio Moreno Novella <i>Telecommunications Engineering School Telematic Systems Engineering Department</i>
PhD THESIS TUTOR (COMPANY)	Mr. Rafael Cantó Palancar <i>Transport & IP Network Manager</i> Mr. Luis Miguel Contreras Murillo <i>Technology Expert at Global CTIO unit / Telefónica</i>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Title: Intent based programmable data planes for disaggregated architectures.</p> <p>Currently, 5G deployment is providing momentum to emerging technologies like software defined networks (SDNs), Network Function Virtualization (NFV) and Network Slicing (NS). In the next years programmable data planes could provide the adoption by telecommunication sector of Protocol Independent Switch Architectures (PISA) as the common hardware platform to develop network specific elements as routers, switches, etc, based on programmable data planes which reduces the time to market of innovative functionalities.</p> <p>This PhD will focus on the evaluation of programmable data planes and its capacity to support innovative network functionalities in a dynamic and efficient way. To support this goal, PhD will target three main topics:</p> <ul style="list-style-type: none"> - Evaluation of the State of the Art on programmable data planes. Identification of architectures, protocols and processes involved. - Design of a methodology to develop new functionalities at data layer over a PISA platform based on programmable data planes. - Identification, analysis and evaluation of relevant use cases for telecommunication operators in the deployment of advanced network elements. - Integration of developed solutions with existing ones to ensure smooth transition of operational networks <p>Keywords: Programmable Data Planes, PISA, P4, DPDK, PROX, SmartNICs</p> <p><i>This work intends to contribute to SDG objectives on goal 9: Industry, Innovation and Infrastructures in addition to goal 4 quality education and goal 5 gender equality.</i></p>
TRAINING ACTIVITIES	PhD student will be integrated in the RSTI -UPM research group activities, covering aspects related to advanced mobile network technologies (5G/6G), IoT and Cybersecurity. In this process PhD will participate in meetings, seminars and research projects as well as dissemination activities. We expect that the candidate will actively publish his/her research work on conferences and journals of high impact. In addition, horizontal

	<p>meetings to evaluate the progress of the work and identify relevant use cases and scenarios will be performed in coordination with Telefonica team.</p> <p>In particular we expect that PhD student will address journals on the level of IEEE (IEEE Communications, IEEE Wireless Communications) and attend conferences related with PISA, P4 or DPKD.</p>
SECONDMENT(S)	<p>Student will have the opportunity to complete his/her training by short stays on selected sites according to the network of contacts maintained by RSTI-UPM and Telefonica.</p>
REQUIREMENTS FOR CANDIDATES	<p>Computer science: Master's degree or equivalent Electrical Engineering: Master's degree or equivalent Skills: Networking, Protocols, Mobile Wireless technologies, Virtualization, Programming English: Advanced / Proficiency (C1 / C2)</p>

RESEARCH LINE 2A	
COMPANY	Repsol
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. Alberto Mozo <i>Computer Systems Engineering School Computer Systems Department</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Dr. José Antonio Martín <i>Advisor, Advanced Mathematics Repsol Technology Lab</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>The main objective of this PhD thesis is the integration and adaptation of the latest trends in deep learning to the analysis of time series sensor data. Using a more specific approach, this objective can be divided into several specific goals:</p> <ol style="list-style-type: none"> 1. Pre-training models on unlabeled sensor datasets through self-supervised learning, as it is done with text and images. 2. Apply transfer learning to bring the knowledge of pre-trained models into downstream sensor-related tasks such as anomaly detection, classification or clustering, and compare their performance with standalone trained models. 3. Create methods to visualize and interpret the predictions of the trained models, from the big picture of analysing the top errors to the analysis of the interactions between neurons in the model. 4. Improve the robustness of model predictions with sensor data using techniques for uncertainty quantification in deep neural networks, such as MonteCarlo Dropout or deep ensembles. 5. Improve the quality of sensor data through deep learning based missing value imputation techniques. 6. Development of a software platform to showcase the results of the aforementioned objectives.
TRAINING ACTIVITIES	<p>The successful applicant will work in a multi-disciplinary team of computer scientists and other engineers at Universidad Politécnica de Madrid and Repsol. The candidate is also expected to attend all schools and training events organized within the company and the research group he/she works on during the PhD. Participation in outreach activities will be a part of duties too. More specifically, some of the training activities that the project will undertake include:</p>

	<ul style="list-style-type: none"> - Schools and workshops aimed to create a multidisciplinary background and train the ESR to work in multidisciplinary teams. - Training at UPM aimed to improve soft skills and extend knowledge in complementary disciplines. - Conferences and workshops outside UPM, even when the ESR does not present any research work, as long as the topic of the conference is related to the project. - Participation in the organization of training and dissemination events organised by the supervisors.
<p>SECONDMENT(S)</p>	<p>The successful candidate will undertake two secondments of 3-6 months during the project. The first one will take place during the second year of the project, with the Application Platforms and Software Systems Research Lab led by Itai Segall in Nokia Bell Labs, Murray Hill, NJ, USA. This research group has experience in the application of machine learning and deep learning techniques in real world industries. The second secondment, to be held during the third year of the project, would be carried out at Leiden Institute of Advanced Computer Science (LIACS), Leiden, The Netherlands, under the supervision of Prof. Thomas Bäck. The research LIACS is one of the top institutes in Computer Science in Europe, and has a leading experience in Artificial Intelligence (e.g. Evolutionary Computation, Natural Computing, etc.) and its application to Industry.</p> <p>Please note that the description of these secondments is tentative and can change during the course of the project.</p>
<p>REQUIREMENTS FOR CANDIDATES</p>	<p>All qualified candidates irrespective of gender or nationality are welcome to apply as long as they meet the following conditions:</p> <ul style="list-style-type: none"> - Academic degree in Computer Science or a related field (earned at the date of recruitment). - Background in machine learning, computational intelligence and/or data mining. A master’s degree or any other official qualification on these topics will be a plus. - Very strong programming skills, in languages such as R, Python, Java or C++. - Excellent spoken and written command of English is required. <p>We are looking for a talented and highly motivated candidate. He/she must have an independent and well-structured working style, as well as the ability to work in a team.</p> <p>Applicants will be required to meet the Marie Skłodowska-Curie Early-Stage Researcher eligibility criteria. In particular, at the time of appointment they should be within the first four years of their research career, have not been awarded a doctoral degree, and should not have resided in the host country (Spain) for more than 12 months in the last three years immediately before the appointment. Researchers are normally required to undertake transnational mobility (i.e., move from one country to another) when taking up the appointment.</p>

RESEARCH LINE 2B	
COMPANY	Repsol
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Juan C. Dueñas <i>Telecommunications Engineering School</i> <i>Telematic Systems Engineering Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Dr. José Antonio Martín Hernández <i>Advisor, Advanced Mathematics</i> <i>Repsol Technology Lab</i>
DESCRIPTION OF THE PhD THESIS PROJECT	Reinforcement Learning for proactive management of industrial networks and services. OBJECTIVES <ul style="list-style-type: none"> - Internet of Things – Industry 4.0: efficient and reliable networks and services. - Proactive management of network and services by predicting models. - Predictive models able to extract both isolated management events and events chains. - Converting predictive models into agent-based simulation models. - Optimization of management operations by means of Reinforcement Learning on simulated networks and services.
TRAINING ACTIVITIES	Methodology of Science -course Instituto de Ciencias de la Educación UPM. Seminars in transversal training Escuela Internacional de Doctorado-UPM (https://blogs.upm.es/eidoctorado/)
SECONDMENT(S)	Queen Mary University of London & Data Centric Engineering Programme. The Alan Turing Institute LIME (Learning-based reactive Internet Engineering) project. Richard G. Clegg, Steve Uhlig, Alan Turing Institute, Queen Mary University, London.
REQUIREMENTS FOR CANDIDATES	MSc in Computer Networks, Data Science, Computer Science or alike Skills: analytical capabilities, problem solving, self-management, initiative, communication Background: maths and statistics, data analytics, Python programming

RESEARCH LINE 3A	
COMPANY	Repsol
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Manuel Rodríguez Hernández <i>Industrial Engineering School</i> <i>Chemical and Environmental Engineering Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Dr. Rafael Roldán Mesa <i>Repsol S.A.</i>
DESCRIPTION OF THE PhD THESIS PROJECT	Simulation model for the Syngas Generation process in an e-fuels production scheme. Hybridization with SMR models, SMR H2 with the complete scheme. The thesis project will be focused on the development of a rigorous model of the whole Syngas Generation Unit (SGU) including the CO2 conversion in RWGS, recycles of Tail Gas from FT and purifications of streams. This model can be used for the design of a pilot/demo/industrial unit or facility in a future as well as for monitoring the unit operation. In fact, it will be a digital twin of the actual physical process that will allow to optimize the operation parameters in order to minimize carbon emissions and production costs. Basically, the thesis project will have two main phases, the first one devoted to the development of the process model and the second one devoted to the lifecycle assessment.

TRAINING ACTIVITIES	Webinars and conferences related to: <ul style="list-style-type: none"> - Synthesis of fuels and chemicals using syngas as raw material, - Purification and gas separation technologies. - Chemical engineering software simulation tools
SECONDMENT(S)	Tentative. External institutions with experience in: <ul style="list-style-type: none"> - simulation and optimization (like Imperial College of London) - syngas production, and F-T (like Norwegian University of Science and Technology – Norway) A (at least) three months stay in (at least) one external institution is expected
REQUIREMENTS FOR CANDIDATES	Degree (MSc, ...): MSc in Chemical Engineering, Industrial Engineering or Chemical Skills: <ul style="list-style-type: none"> - Languages: English: B2+ minimum. C1 will be valued. - Teamwork - Alliances generation - Proactivity and initiative - Flexibility - Leadership - Simulation, Catalysis and Chemical Engineering fundamental. - Interest to develop an R&D career. - Public communication & presentation skills Background <ul style="list-style-type: none"> - 1 or 2 years of experience will be valued

RESEARCH LINE 4A	
COMPANY	Repsol
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Álvaro Gutiérrez Martín <i>Control and Robotics Laboratory (Robolabo)</i> <i>Renewable Distributed Generation and Intelligent Control</i> <i>Telecommunications Engineering School</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Prof. Dr. Javier Juárez Montojo <i>Senior Scientific</i> <i>Repsol Technology Lab</i>
DESCRIPTION OF THE PhD THESIS PROJECT	Title: Temporal Task Allocation for the Improvement of Eco-Driving Solutions in Dynamical Traffic Environments: An Approach Based on Swarm Intelligence Description: This PhD proposal is built on the foundation of sustainable transport in cities, specifically proving noninvasive and high reliable eco-driving solutions for time and energy saving in vehicles' displacements. It focuses on the 11 th Sustainable Development Goal (SDG-11): “sustainable cities and communities” with specific impact on sustainable transport. The PhD aims to develop an eco-driving solution that recommends, in real time, the optimal speed so that vehicles can pass through successive traffic lights at the appropriate instants to save time and energy. The proposal is built on a practical application, where no infrastructure modifications are required, because of time and implementation restrictions. Swarm intelligence strategies based on temporal task allocation are selected to develop this eco-driving solution to save time and energy without the need for explicit communication. The PhD thesis will be grounded on swarm models based on stigmergy by

	<p>the observation of the environment, the car's surroundings and the traffic flow.</p> <p>As a general result, the PhD proposal aims to develop a new methodology to optimize real time actions in a dynamically managed traffic flow. Moreover, the PhD should end up with a toolkit as a software application that could improve traffic efficiency both for users and cities. Nonetheless, it will create new artificial intelligence methods based on swarm intelligence for the regulation of cities mobility.</p>
TRAINING ACTIVITIES	<p>Different training activities related to the PhD will be offered to the awarded candidate: bibliographic search, techniques for writing communications in conferences, public speaking techniques, research methodology, personal skills' courses for research, research seminars, between others.</p> <p>Moreover, the candidate will gain experience in the preparation of scientific articles in journals and conferences, with the objective of publishing several journal papers during the PhD development. Nonetheless, the candidate will co-supervise BSc and MSc Thesis in collaboration with his/her supervisors.</p>
SECONDMENT(S)	<p>Two international internships of 3 months' duration are planned in the PhD proposal.</p> <p>The first one is proposed at the middle of the PhD, to an Artificial Intelligence research laboratory. The second one, to a specific transportation lab during the third year of development. Both secondments will be finally decided between the candidate and the supervisors according to development of the thesis.</p>
REQUIREMENTS FOR CANDIDATES	<p>The candidate should be experienced in programming (using C, C++, python or any other languages), and be familiar with machine learning, swarm intelligence and deep learning concepts. The candidate should have MSc degree in Computer Science or similar. Moreover, the candidate should have a special interest in dynamical, complex, distributed and collective systems.</p> <p>Nonetheless, the candidate should have the ability to conduct innovative research, both as an independent researcher and as a strong team player.</p> <p>He/She should be fluent in English.</p>

RESEARCH LINE 4B	
COMPANY	Repsol
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. David Camacho Fernández <i>Computer Systems Engineering School</i> <i>Computer Systems Engineering Department</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Dr. Javier Juárez Montojo <i>Senior Scientific</i> <i>Repsol Technology Lab</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Over the last years, eco-routing has become a key concept in the field of vehicle routing due to the importance on reducing the fuel consumption and, therefore, the emissions of CO2 and other pollutant gases, which is currently one of the top priorities in Europe to fight against the climate change. Because of this, the procurement of eco-routes becomes a key concept in the context of the Sustainable Development Goals (SGDs), specifically, of SDG 13 (Climate Action).</p> <p>One of the main drawbacks of eco-routes is that sometimes the selected route could imply the increase of travelled distance and time, making many drivers reluctant to follow these eco-routes. However, and using new Artificial Intelligence techniques, it is possible to obtain more efficient eco-routes that could be of interest for the end-users. Following this goal, eco-routes can take advantage of a Green Light Optimal Speed Advisory (GLOSA) system in order to recommend more efficient routes. In these GLOSA systems, the</p>

	<p>optimal speed to avoid braking when approaching a light is computed. Based on historical and online data of traffic and lights status, eco-routing algorithms could recommend better routes where traffic conditions would avoid unnecessary braking. Another key concept that should also be considered in the generation of eco-routes solutions for long distance travels is the optimization of the number of recharging stops, which can be considered as a new objective of the problem. The solutions to this problem will present a series of eco-routes ordered by fuel consumption, and the end-user can decide to follow the most adequate one.</p> <p>The main objective of the PhD thesis is the development of new and innovative eco-routing algorithms, which will generate or recommend the most optimal eco-route to reach a location. This will require the modelling of the eco-routing problem through the consideration of fuel/energy constraints, speed profiles, uncertain variables like traffic and climate conditions, the GLOSA system, and other features that could be selected by the end-user. One of the research questions underlying this thesis is to find new techniques and algorithms that allow finding optimal solutions from an energy consumption perspective while optimizing end-user satisfaction. To fulfil these goals, in this PhD thesis, it is proposed to combine Deep Learning and Multi-objective Optimization methods. Different metaheuristics will be proposed and developed by the PhD candidate in order to find nearly-optimal solutions within a small amount of time (near to real-time). In addition, to deal with some uncertain variables including GLOSA, traffic, wind and climate conditions, or queues in recharging stops, Deep Learning methods will be used for the prediction of these variables given an amount of historical data (which can become huge, and therefore a big data approach must be considered). This will allow the generation of more robust eco-routes. Finally, the PhD candidate will design and implement new algorithms, tools and software that are expected to be suitable for integration with other systems (e.g. GLOSA, intelligent traffic systems, etc.), to be tested in real scenarios, or develop new software applications and innovative services for the industry (energy, automotive, smart applications), taking a step further in the future of eco-driving and eco-routing technology.</p>
<p>TRAINING ACTIVITIES</p>	<p>The PhD candidate will work in a multi-disciplinary team of computer scientists and other engineers at UPM and Repsol. The candidate will perform a series of training activities during the completion of the PhD thesis include:</p> <ol style="list-style-type: none"> 1. State of the art revision on both research methods and techniques to be applied, and tool systems currently available in this domain. 2. Participation in training events organized within the company and the research group he/she works on during the PhD. 3. Participation in scientific seminars, research conferences and (summer/winter) schools and workshops outside UPM. 4. Software implementation and validation (tools and frameworks) in real scenarios. 5. Writing and publication of journal and conference papers, both in the field of Deep learning and Metaheuristics. 6. Research internships. 7. Writing of the PhD thesis.
<p>SECONDMENT(S)</p>	<p>Tentative:</p> <ol style="list-style-type: none"> 1. Natural Computing Research Group at the Leiden Institute of Advanced Computer Science (LIACS), Leiden University, The Netherlands. Supervisor: Thomas Bäck (https://scholar.google.com/citations?user=x7LEID0AAAAJ&hl=de) 2. Chair of Computational Intelligence, Otto von Guericke University Magdeburg, Germany. Supervisor: Prof. Sanaz Mostaghim (https://scholar.google.de/citations?user=bvgkhBAAAAAJ&hl=de)
<p>REQUIREMENTS FOR CANDIDATES</p>	<p>Degree: Master's degree on the field of Computer Science/Engineering, Artificial Intelligence/Machine learning, Data Science, Electrical Engineering, or optionally Mathematics (earned at the date of recruitment). Skills:</p>

	<ul style="list-style-type: none"> - Knowledge/experience on car mechanics and/or energy consumption - Software development (AI-based applications) - Machine learning algorithms development (e.g. Deep Learning) - Optimization algorithms development (deterministic/stochastic) - Scientific outreach and dissemination - Strong programming skills in languages such as R, Python, Java or C++ <p>Background:</p> <ul style="list-style-type: none"> - Energy/industry optimization - Machine learning (Deep Learning) - Metaheuristics <p>Interests:</p> <ul style="list-style-type: none"> - Application of AI/ML techniques to Industrial problems - AI/ML research & applications - Industry research & applications <p>We are looking forward for a talented and highly motivated candidate. He/she should have an independent and well-structured working style but has to be able to work in teams as well.</p> <p>Applicants will be required to meet the Marie Skłodowska-Curie Early-Stage Researcher eligibility criteria. In particular, at the time of appointment they should be within the first four years of their research career, have not been awarded a doctoral degree, and should not have resided in the host country (Spain) for more than 12 months in the last three years immediately before the appointment. Researchers are normally required to undertake transnational mobility (i.e. move from one country to another) when taking up the appointment.</p>
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RESEARCH LINE 5A	
COMPANY	Iberdrola
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Antonio Nieto-Márquez Ballesteros <i>Industrial Engineering School Mechanical Engineering, Chemistry and Industrial design Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Dña. Beatriz Crisostomo Merino Head of Innovation Management Iberdrola
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Electric power demand. Applicability of new solutions in the decarbonization of the industrial energy model</p> <p>Currently, industrial activities consume huge amounts of energy, meaning more than 20 % of energy requirements in Europe and up to 30 % in USA. Up to a 50 % of this industrial consumption correspond to separation processes in chemical process plants, being distillation/rectification the most common operation. Worse than that, a high amount of this energy is wasted, due to the low yield of thermal process employed. The bottleneck for the reuse of this waste energy streams (gas or liquid) is their low temperature levels, making them unuseful for other heat transfer applications. However, there is a technology: “Heat pumps”, that can upgrade such streams This technology has been widely employed in air conditioning applications, but its use has been developed to a much lower extent for industrial applications. There are many examples of distillation units where heat pumps can be applied. The aim of this thesis is to focus on the dehydration of an industrial solvent, namely methyl-isobutyl-ketone, widely applied in industries like painting or coatings. The industrial system to be studied consist on two main sub-systems:</p> <p><u>The rectification unit</u>, with a feed section, a column to enhance the contact between phases and the subsequent separation, a condensation of light product and generation of reflux and a</p>

	<p>reboiler to generate the vapour phase. Typically, heat is withdrawn in the condensator and supplied in the reboiler.</p> <p><u>Waste energy upgrading unit</u>, in order to thermally integrate the needs of heat in the reboiler and the heat removed in the condensator. This unit consist on a heat pump and the associated hydraulic circuits.</p> <p>In addition, other waste energy streams different from those corresponding to the distillation unit will be evaluated</p> <p>A deep study of distillation parameters is needed for a right design of the energy unit and the selection of the more suitable technology (direct vapour recompression, vapour ejector...). The evaluation of the system will be carried out through simulation and optimization tools (i.e. ASPEN PLUS) looking for a technical, energetic and environmental feasible configuration.</p> <p>Practical contact with real equipment (Iberdrola) will allow for a deeper study and a better design.</p>
Tentative SECONDMENT(S)	Budapest University of Technology and Economics
TRAINING ACTIVITIES	<p>The doctoral programme that the predoctoral researcher will join, contemplates a minimum number of training activities per year, including courses in scientific writing, preparation of communications, handling of bibliographic sources, etc.</p> <p>In addition, the student will attend at least one specific course on the use of commercial chemical process simulators, either in online or face-to-face format.</p>
REQUIREMENTS FOR CANDIDATES	<p>BSc and MSc in Chemical/Process Engineering</p> <p>Strong skill in mass transfer operations and process simulation</p>

RESEARCH LINE 6A	
COMPANY	Iberdrola
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. Luis Alberto Sánchez Díez.</p> <p><i>ETSI Caminos Canales y Puertos, Civil Engineering School</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Mr. Samuel Pérez de Ramírez</p> <p><i>Iberdrola</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Heat electrification. Electrification potential of domestic thermal installations on a national level.</p> <p>The different types of housing uses, their spatial location, as well as their construction, lead to different typologies of energy consumption.</p> <p>There are very few residential buildings that enable collective forms of final energy and much less in trigeneration, basically applied in office buildings and hotels</p> <p>It would be logical for this adaptation to be originally integrated into the building and urban planning, but given the history and evolution as well as the discordance between the concepts of residential energy use and residential housing in terms of the valuation of a dwelling (which is usually valued by the surface area and much less by energy consumption) there is a disparity of configurations within the territory that make the majority of them economically and environmentally inefficient.</p> <p>The production of individual final energy for comfort has advantages, but at high costs and is environmentally inefficient.</p> <p>The idea of collective production, which in its beginnings was associated with equal cost for the end user is one of the causes of its rejection, and it has been overcome in the last decade by individual meters that particularise the consumption of collective production.</p> <p>This thesis will analyse the growth of the main cities in Spain and will formulate the integration of the thermal energy supply in the urban residential area, with the aim of using the calorific power in</p>

	the most efficient way, at the place of consumption and proposing solutions with the integration of new technologies in both new and existing construction.
Tentative SECONDMENT(S)	Spain, Basque Country: village that won the EU environmental award for its thermal distribution. Spain, Barcelona: municipal power plant of trigeneration made for the expo. Spain, Madrid. District heating at residential level in colonies: Altamira, orcasitas, ciudad universitaria and new constructions in vallecas with fuel cells. Suecia, Copenhagen; management of district heating. USA, New York City: cold bulb isimplementation in the sewage system. Modelling with Homer and other programmes for the joint management of electricity and thermal energy. Congresses and lectures associated with the topic.
REQUIREMENTS FOR CANDIDATES	Master en Ingeniería, Química ,Física o Medioambiente, Especialidad de Ingeniería mecánica o Procesos de conversión térmica.

RESEARCH LINE 6B	
COMPANY	Iberdrola
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Carlos del Cañizo <i>Solar Energy Institute</i> <i>Telecommunications Engineering School</i> Prof. Dr. Alejandro Datas <i>Solar Energy Institute</i> <i>Telecommunications Engineering School</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Mr. Samuel Pérez de Ramírez <i>Iberdrola</i>
DESCRIPTION OF THE PhD THESIS PROJECT	The main objective of the proposed thesis project is the modelling of power-to-heat-to-power storage (PHPS) systems to identify its potential role in future low-carbon energy systems and quantify the characteristics needed for this technology (efficiency, cost, ramping capabilities) to be cost-competitive. Two kinds of analyses will be implemented to this end. First, a detailed model of the technology will be built to investigate its potential use in large buildings (administrative, services and industry sector). Second, a state-of-the-art network energy model of the sector-coupled European energy system will be upgraded to include PHPS technology and evaluate its role as the system decarbonizes. PHPS is an emerging category of technologies that store electricity in the form of heat and converts it back to electricity on demand. During this conversion, waste heat is also generated and supplied to satisfy the heating demand (cogeneration). The very low cost (about 100 times lower than electrochemical batteries) and the high global efficiency of the system (> 80%) are the two main advantages compared to other energy storage systems. PHPS can be also integrated in a more complex cogeneration (heating and power) or trigeneration (cooling, heating, and power) systems that include other technologies such as solar thermal, hybrid PV / thermal, absorption chillers, heat pumps, etc. The thesis project will be aligned to the previous research activities of the Solar Energy Institute, which in recent years has proposed and developed a new kind of high temperature PHPS system that stores energy in molten Silicon at temperatures above 1000°C and converts stored heat into electricity through thermophotovoltaic (TPV) devices. The main advantage of this

	<p>system is its high energy density, higher than 1 MWh per cubic meter. The system has been developed within the framework of several national and European (www.amadeus-project.eu) projects, which have led to the development of a first laboratory-scale prototype that is available at our facilities.</p> <p>The PhD thesis project will be conducted in the frame of the Official UPM Doctoral Degree in “Photovoltaic Solar Energy”, which is an initiative aiming to train experts in all areas related to Photovoltaic Solar Energy, which has resulted in the graduation of more than 130 Doctors. The selected candidate will have access to all laboratories of the Solar Energy Institute of UPM (IES-UPM), including the experimental PHPS prototype.</p>
SECONDMENT(S)	<p>The thesis project has a planned research visit of 4 months at the Department of Mechanical and Production Engineering of Aarhus University (Denmark). The objective of this visit will be to deepen the aspects related to the role of PHPS on the sector-coupled networked European energy system. This work will be carried out in collaboration with Prof. Marta Victoria. The PhD student will benefit from the large experience of Prof. Victoria and her research group on large-scale energy systems modelling.</p>
REQUIREMENTS FOR CANDIDATES	<p>Degree: MSc in Mechanical, Electrical, Electronics, Energy Engineering or similar.</p> <p>Skills: written and oral communication, teamwork, initiative, programming. Experience with Python, open-software development in Github, and high-performance computing clusters is not mandatory but will be positively evaluated.</p> <p>Background: No professional experience is needed.</p>

RESEARCH LINE 7A	
COMPANY	Iberdrola
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. Bernardo Llamas Moya <i>Mining and Energy Engineering School</i> <i>Mining and Geology Engineering Department</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Dña. Beatriz Crisostomo Merino <i>Head of Innovation Management Iberdrola</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Digitalization. Metrics for measuring the return of digital investments in the electric power sector.</p> <p>The energy landscape is evolving. Consumers and businesses are demanding more sustainable energy options and transformative initiatives. Simultaneously, electric power companies are looking for new approaches to improve grid performance and prepare for a cleaner, distributed, and digitalized energy future.</p> <p>Companies that prioritize the integration of new technologies into their existing infrastructures and operations, getting superior performance compared to their competitors. Since reliability, resilience, and efficiency are their current priorities, they defer new capital investments in grid assets by optimizing existing equipment. Additionally, grid and infrastructure skills are critical to their future success, so they’re focusing on upskilling existing employees on emerging technologies. What justifies the need of a roadmap based on a selection of metrics for building the electric power sector of tomorrow through logical, extensible investments today.</p> <p>The main goal of digitalization of the electric power sector is to intelligently integrate, organize, and manage sources of renewable energy generation—which requires quickly assess and respond to real-time grid conditions. The motivation to increase transmission reliability is threefold: ease congestion, allow for increases in demand, and provide a greater degree of security. Energy Storage</p>

	<p>technologies arise as an innovative solution to increase the load factor of wind and solar energy. Those technologies will redefine a new electricity network with more distributed energy sources. To understand and measure how all those digital investments (IoT, blockchain, and others) in can return in the electric power sector, a set of metrics need to be displayed and tracked. For meeting that need, the methodology of this project has the goals of:</p> <ul style="list-style-type: none"> • Defining a near-future electricity system based on renewable energy and different energy storage solutions. • Reviewing common metrics already tracked by the company and by the electric sector related to digitalization using benchmarking. • Providing an evidence-based set of metrics for improving the measurement of the digital investments that the company is making toward digitalization, based on company activities • Providing a roadmap of digital investments vs. return on the business based on the metrics selected to build the electric power sector of tomorrow through logical and extensible investments • Providing an analysis of how those measurement metrics and the digital investments made by the company are aligned to the Sustainable Development Goals (SDGs), and if they are contributing to the company's performance, mainly the SDGs 7 - Affordable and Clean Energy, 8 – Industry, innovation and infrastructure and 13 - Climate Action. • Being compatible with the types of data and geographical resolution of publicly disclosed corporate data. • Being transparent, verifiable, and replicable. • Functioning consistently and uniformly for most nations of the globe. • Being able to be updated when new data or model results are available. <p>Taking into account differences in the geographical context of company activity, using a simplified method that does not introduce barriers to adoption.</p>
Tentative SECONDMENT(S)	<p>Georgia University. Wageningen University. Dublin University. Exeter University. Leoben University.</p>
REQUIREMENTS FOR CANDIDATES	<p>Degree of Energy Engineering. Degree of Environmental Engineering. Computer Science knowledge. Business knowledge or MBA is recommended. English, C1. Spanish, B1. Teamwork and proactive Skills.</p>

RESEARCH LINE 7B	
COMPANY	Iberdola
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. Ruth Carrasco-Gallego <i>Industrial Engineering School Organizational Engineering, Business Administration and Statistics Department</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Dña. Beatriz Crisostomo Merino <i>Ms. Beatriz Crisóstomo Merino, M.Eng/MBA</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Project title: Closing the loop in the electrical sector through digital value chain ecosystems</p>

	<p>Background and motivation</p> <p>The link between the Circular Economy and Supply Chain 4.0 (value chains digitalization) has been a topic in the agenda for some time, but it is only recently that the depth of this interconnection is starting to be understood.</p> <p>In this thesis project we will analyze this interlink for framing a “circular and digital electric energy value chain ecosystem” and its impact on regulation.</p> <p>A first focal point is closing-the-loop of renewable energy generation, mainly photovoltaics and wind energy. In PV installations, what end-of-use and end-of-life processes are expected for PV modules and other components, such as batteries or inverters? From a policy-making perspective, does the current regulation under the principle of Extended Producer Responsibility (EPR) and the subsequent individual collective systems (PROs) for each component, favors reuse, repair, refurbishment, remanufacturing and the “servitization” of the business model? Or is the current regulation still developed with a linear perspective that unavoidably drives to waste management and, at best, recycling? Can digitalization support an innovative service approach to PV installations? A similar analysis can be undertaken for wind turbines composites. As currently the blades recycling is an activity that is gaining great interest and digitization can help track the recycling processes thanks to technologies like Blockchain, digital technologies are key points to be considered in the research, such as Artificial Intelligent (AI), IoT, Robotics, etc.</p> <p>Another second potential focal point to ground the research lies on repurposing used electric vehicle batteries for less-demanding applications in energy storage (Bobba et al, 2019) and the interrelation between end-of-life vehicle directives and processes (currently under review).</p> <p>This background can be summarized in the following preliminary research questions: How can digitalization and supply chain 4.0 contribute to a cleaner and circular electrical system, with a focus on renewable generation? What business models are best suited for closing-the-loop? Is the current regulation the best framework to foster this systemic change?</p> <p>Research methodology and interdisciplinary approach</p> <p>The exact research methodology will be, of course, defined after profiling the PhD project research questions. However, our approach will be oriented towards mixed methods and action-based methodologies, which are very suitable for an Industrial PhD trajectory.</p> <p>Some potential methodologies include: case-based research, grounded theory, action research, collaborative management research, with further modelling if needed with system dynamics, discrete-event simulation, optimization models or other quantitative methods.</p> <p>Another value that should be remarked is the interdisciplinary approach of the project including the access to a number of diverse actors in the ecosystem: itdUPM, the EELISA proto-community for “The Circular and Regenerative Campus”, Energía y Sociedad, etc.</p>
<p>TRAINING ACTIVITIES</p>	<p>The selected PhD candidate will join the doctoral program in Engineering Management at UPM and join, if needed, all the training activities planned in the program, including basic research training (*) and the program annual workshops and other networking events both inside and outside UPM and Iberdrola.</p> <p>(*) how to carry out a literature review and building a state-of-the-art theoretical framework, how to write a scientific paper,</p>

	emotional tools for the PhD journey, philosophy of science, research methodology, etc.
SECONDMENT(S)	The thesis project has a planned research visit of at least 4 months in another Higher Education Institution (examples. INSEAD, KTH Circular Economy Initiative, Polimi, Ecole des Ponts Paristech or any other EELISA partners, MIT Centre for Transportation and Logistics, etc.) with the objective of graduating as an International UPM Doctor .
REQUIREMENTS FOR CANDIDATES	<p>Degree: MSc in Engineering, Sciences, Economics or Business Administration. Other master degrees can be considered with complementary training or professional experience.</p> <p>Skills: excellent written and oral communication in English, teamwork, systems view, connecting-the-dots, sustainability-savvy, action-oriented</p> <p>Background: No professional experience needed although relevant previous experiences will be valued.</p>

RESEARCH LINE 8A	
COMPANY	Iberdrola
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. María Jesús García Martínez <i>Mining and Energy Engineering School Energy and Fuels Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Mónica Oviedo <i>Sustainability Development and 2030 Agenda, Iberdrola Group</i>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Metrics and SDGs. SDG ambition needed for the next 10 years to achieve the targets 7 and 13. Study of the interconnection between SDG 7.1, 7.2, and 7.3 with the SDG 13 and its social impact.</p> <p>The goal of the PhD Thesis is to show how the Social Life Cycle Assessment (S-LCA) interconnects among SDG 7.1, 7.2, and 7.3 with the SDG 13 and its social impacts. As well as demonstrate if renewable energy companies are making substantial progress toward the SDGs, mainly the SDGs 7 - Affordable and Clean Energy and 13 - Climate Action.</p> <p>A set of science-based metrics could allow corporations and interested investors to meaningfully align their actions with the SDGs in locations around the world where they can make the greatest positive impact. Using existing data on country-level electricity generation and land transportation, a set of simple-to-implement and user-friendly metrics can be developed to evaluate the benefits that investments in renewable electricity generation and improvements in land transportation can make toward reducing CO2 and air pollutant emissions and the health impacts of air pollution.</p> <p>The first step of this work would be to review common methods to measure SDGs performance, not by reviewing all the existing approaches, but highlighting crucial weaknesses and identifying the main methodological challenges that should be addressed when answering the call for analytical tools to evaluate SDGs performance and their interconnections.</p> <p>A new set of metrics to track progress toward the SDGs, mainly to explicitly measure how progress on SDG 7 (Affordable and Clean Energy – in all its targets) consequently makes progress on SDG 3 (Good Health and Well-Being) Target 3.9 “By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination” Indicator 3.9.1 “Mortality rate attributed to household and ambient air pollution” and emissions reductions</p>

	aligned with SDG 13 (Climate Action) and 9 (Industry, Innovation, and Infrastructure) of the United Nations. A social life cycle assessment (S-LCA) would be done to identify the main social hotspots related the SDGs and the main stakeholder groups (e.g., [i] worker, [ii] consumer, [iii] local community, [iv] society and [v] value chain actors).
Tentative SECONDMENT(S)	-UCL Energy Institute, University College London, London, UK. -European Commission, Joint Research Centre (JRC), -Centre for Environmental Policy (Imperial College)
TRAINING ACTIVITIES	-Workshops on SDGs, sustainability, social LCA -MOOCs and UPM courses about paper writing and statistics
REQUIREMENTS FOR CANDIDATES	MSC on environmental sciences, Life cycle assessment

RESEARCH LINE 8B	
COMPANY	Iberdola
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Teresa Sánchez Chaparro <i>Industrial Engineering School</i> <i>Organizational Engineering, Business Administration and Statistics Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Mónica Oviedo, <i>Sustainability Development and 2030 Agenda, Iberdrola Group</i>
DESCRIPTION OF THE PhD THESIS PROJECT	Business can play a critical role in achieving the SDGs, while the Agenda 2030 poses a great challenge in promoting change towards sustainable business models. Corporate sustainability reporting is a widespread practice among organizations, and diverse standards have been developed from the business sector (e.g. Global Reporting Initiative- GRI, Climate Disclosure Standards Board- CDSB, Sustainability Accountability Standards Board- SASB, International Integrated Reporting Council-IIRC, etc.). However, specific methodologies to analyze an organization’s particular contribution to the SDGs targets in a certain geographical and sectoral context are still lacking. Moreover, social impact evaluation is particularly problematic due to its intangible nature. Several prior works can be of use but a sound methodology is yet to be developed. The objective of this PhD project is to develop a methodology for SDG assessment adapted to the private sector, and in particular to the energy sector. The subject must be approached from different contexts- government, NGOs, private organizations- and disciplines: economy, engineering, environmental sciences. An interdisciplinary approach is needed due to “wicked” nature of SDGs. The expected outcomes of the PhD are: <ul style="list-style-type: none"> • An original methodology for SDG impact assessment. • An operational tool (software) as a practical outcome of the project, with high potential to become a standard in the sector.
TRAINING ACTIVITIES	The selected PhD candidate will join the doctoral program in Engineering Management at UPM and join, if needed, all the training activities planned in the program, including basic research training (*) and the program annual workshops and other networking events both inside and outside UPM and Iberdrola. (*) how to carry out a literature review and building a state-of-the-art theoretical framework, how to write a scientific paper, emotional tools for the PhD journey, philosophy of science, research methodology, etc.

	<p>Other than that, the PhD will be organized according to the following stages:</p> <ol style="list-style-type: none"> 1. Theoretical framework: Revision of literature (prior works, and different conceptions of impact). 2. Field work: Case-study methodology in Iberdrola. 3. Results and validation of the methodology.
SECONDMENT(S)	<p>The thesis project has a planned research visit of at least 4 months in another Higher Education Institution with the objective of graduating as an International UPM Doctor. Some possibilities are: Ecole des Ponts Paristech, Brasilia University, MIT</p>
REQUIREMENTS FOR CANDIDATES	<p>Degree: MSc in Engineering, Sciences, Economics or Business Administration. Other master degrees can be considered with complementary training or professional experience.</p> <p>Skills: excellent written and oral communication in English, teamwork, systems view, project management and self-organization, action-oriented, aware of sustainability challenges and knowledge of the SDG framework.</p> <p>Background: Previous professional or academic experience in impact evaluation or monitoring would be greatly appreciated. An interdisciplinary profile would also be an asset to this PhD project.</p>

RESEARCH LINE 9A	
COMPANY	Ecoembes
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. María Dolores Robustillo Fuentes <i>Industrial Engineering School Department of Chemical and Environmental Engineering</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Dr. Jorge García Barrasa <i>Ecoembes</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Complex packaging is made of various materials that are difficult to separate and difficult to recycle mechanically. Thus, they are currently disposed of in landfills without any treatment leading to environmental problems. ECOEMBES manages household packaging wastes and wants to provide an added value to its customers and satisfy European waste legislation.</p> <p>It is of special relevance to know the behavior of non-mechanical recycling packaging within a chemical recycling process in order to screen which products are suitable for chemical recycling.</p> <p>The objective of this PhD thesis is to analyze the technical and economic viability of some of the current chemical recycling strategies to convert packaging wastes into added value products through computer simulations. The influence of the type of packaging on the efficiency of the process and on the quality of the new products will be also evaluated.</p> <p>This PhD thesis will form part of the SDGine MSCA COFUND of UPM, in which Industrial Doctorates are going to develop technologies and tools to accelerate SDG compliance through Horizon Europe Mission Boards related to climate change and societal transformations in urban contexts. In this case, it is pretended to take action for the sustainable Development Goals (SDGs) 11 (Sustainable cities and communities) and 13 (Climate action).</p>
TRAINING ACTIVITIES	<p>The cross curricular training activities will be determined by the Doctoral Program PD 05F7 - Environmental, Chemical and Materials Engineering (Doctorado en Ingeniería Ambiental, Química y de los Materiales (R.D.99/2011)) of the Polytechnic University of Madrid</p>

	<p>(http://www.etsii.upm.es/estudios/doctorados/ingenieria_ambiental.es.htm), which is completely aligned with the PhD project topic.</p> <p>The general training activities of a Doctoral Program comprise the analysis of scientific documentation, learning of research methodologies, development skills for scientific communication, participation in congress, conferences, seminars and in research projects, as well as the publication of scientific papers in high impact journals or other activities related to the development of the doctoral thesis.</p> <p>The proposed thesis has a high multidisciplinary character involving different areas such as chemical recycling of polymeric materials, thermodynamics, and computational simulation. The specific training activities will be related to the design of products and processes for the chemical industry. The PhD candidate will be trained to apply knowledge of mathematics, physics, and chemistry with critical reasoning to establish economically viable solutions to technical problems. Special relevance will be given to the use of commercial simulators, process design, phase equilibria involving polymers and polymers characterization.</p>
SECONDMENT(S)	Research stages in other laboratories and short visits in national and international collaborating centres are expected.
REQUIREMENTS FOR CANDIDATES	<p>Degree: MSc in Chemistry, Polymer Science, Material Science, Chemical Engineering, Sustainable Chemistry, Industrial Engineering, or related Subjects.</p> <p>Skills: good command of written and spoken English; good attitude to teamwork; processes modelling, data analysis and processing.</p> <p>Background in phase equilibria, polymer science and process simulation.</p>

RESEARCH LINE 9B	
COMPANY	Ecoembes
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Marina Patricia Arrieta Dillon <i>Industrial Engineering School Chemical, Industrial and Environment Engineering Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Dr. Jorge García Barrasa <i>Ecoembes</i>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>The world plastics production has reach over 360 million tonnes in recent years. However, both the high consumption of non-renewable petrochemical raw materials for its production, as well as the accumulation of large amounts of plastic waste in landfills, have generated a growing interest in seeking solutions to achieve responsible production and consumption (SDG 12). Currently more than 25% of post-consumer plastics are deposited in landfills, representing a big source of pollution that affects life in terrestrial ecosystems (SDG 15) and underwater life (SDG 14). Nowadays, the food packaging field is one of the most important application sectors of plastics.</p> <p>It has been observed that numerous polyolefin residues, polyethylene (PE) and polypropylene (PP), reach recycling plants. However, the introduction of such recycled plastic in the food packaging sector still remains a challenge and the European strategy for 2030 encourage increasing the recyclability of single use plastics as well as the incorporation of recycled plastic in new formulations (i.e., specific targets include incorporating 30% of recycled plastics in all plastic beverage bottles from 2030).</p> <p>Nowadays, although the recycling rate of PE (rPE) is high, it is mainly used in non-food applications. In fact, its recycling in food packaging is limited probably due to the additives such as fillers</p>

	<p>(i.e.: TiO₂, CaCO₃, silicates or carbon black) used to improve the overall performance. These additives appear in variable and unknown contents in recycled materials, and they can promote polymer degradation during recycling as well as the migration of packaging components to the foodstuff. This degradation of the polymer is another fundamental limitation for the use of recycled plastics. Therefore, it is necessary the development of new approaches to limit this degradation and the migration of degradation products and fillers, which will allow obtaining recycled materials with better performance and able to extend the applications of recycled plastics to the food packaging field.</p> <p>In this PhD Thesis the polymer degradation during recycling and the effect of the presence of additives and/or fillers on the properties of recycled non-PET plastics (mainly polyolefins) will be studied, with a focus on reducing migration issues. The viability of different approaches to improve the overall performance of recycled polyolefins, such as the incorporation of novel functional barriers or development of composites to reduce the migration, will be explored. As there are not safe methods to clean the recycled plastic, approved by the European Food Safety Authority (EFSA), able to allow the recycled materials to be in direct contact with food, novel functional barriers which are not so widely explored for polyolefins, but that can lead to good results will be studied.</p> <p>Another approach to be considered is the development of nanocomposites of recycled polyolefins loaded with low amounts of both, inorganic and organic fillers. In order to promote inclusive and sustainable industrialization process (SDG 9), the recycled polyolefin will be either doped with the inorganic fillers usually present in recycled polyolefins (i.e.: TiO₂, CaCO₃, silicates or carbon black) and/or organic fillers obtained from wastes coming from the agri-food industry.</p> <p>Then, the multilayer recycled-based materials will be characterized concerning the intended application in the food packaging field. Especial focus will be paid on the migration phenomenon of the different fillers and/or short polymeric chains from the packaging material to the foodstuff. The main objective is to get information regarding the possibility to extend the use of mechanically recycled non-PET plastics into food packaging applications. The results can help meet European Union policies on plastic recycling and circular economy, as well as mitigate the negative effect that non-recycled plastics produce on climate change (SDG 13).</p> <p>It is expected that high performance non-PET recycled plastics will be obtained processed by means of the already available processing technology at industrial level. The thermal, structural, mechanical, optical, barrier and migration properties will be tested. It is expected that the present research will open a new perspective for the industrial application of non-PET recycled plastics as sustainable materials for food packaging applications.</p>
<p>TRAINING ACTIVITIES</p>	<ul style="list-style-type: none"> - Specific formation in processing and characterization of plastics by experienced researchers from ECOEMBES and UPM. - PhD courses - International PhD program (International research mobility)
<p>SECONDMENT(S)</p>	<p>International research stays in other laboratories and short visits with our collaboration groups (i.e.: Civil and Environmental Engineering Department, Materials Engineering Centre, University of Perugia, (Terni, Italy); Food Packaging Laboratory (LABEN, Universidad de Santiago de Chile, Chile).</p>

REQUIREMENTS FOR CANDIDATES	<p>Degree (MSc, in Polymer Science, Materials Science, Chemical Engineering, Food Technology, Chemistry or equivalent)</p> <p>Skills: strong teamworking skills; thermoplastic processing, knowledge of polymer characterization techniques and good command of written English.</p> <p>Background: in Polymer Science and Engineering.</p>
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RESEARCH LINE 10A	
COMPANY	Fundación Tatiana Pérez de Guzmán el Bueno
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Julio Lumbreras Martín <i>Industrial Engineering School</i> <i>Department of Chemical and Environmental Engineering</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Co-Supervisor: Dr. Álvaro Matud Juristo <i>Director of Institutional and Academic Relations</i> <i>Fundación Tatiana Pérez de Guzmán el Bueno</i></p> <p>Tutor: Mr. Jesús Zamora Rodríguez <i>Director of Projects and Investments</i> <i>Fundación Tatiana Pérez de Guzmán el Bueno</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Delivery of the Sustainable Development Goals (SDGs) relies upon urban transformation processes, such as the achievement of climate neutrality in cities. This kind of transformations requires new models of efficient, effective and impactful collaboration. To develop sustainable solutions locally, strengthen connections among stakeholders, spread sustainable alternatives to the wider public, adopt non-linear and innovative working approaches, and assure an active role for local political actors, solid convening vehicles for sense-making, developing shared purpose and action planning are needed.</p> <p>Universities are particularly well-placed to create and maintain such vehicles relying on i) the combination of expert knowledge, youth talent and intangible assets such as legitimacy or neutrality; ii) their independence and capacity of developing SDG-oriented strategic programs and iii) research and training facilities that can be conceived as climate neutrality living labs. Multi-stakeholder partnerships based on the deep bond of the city council-university binomial nurtured with an active participation of corporate and civil society agents may help accelerate urban climate neutrality processes. However, universities also face a range of obstacles derived from an academic culture of disciplinary and organizational silos.</p> <p>Thanks to this research, UPM and the Tatiana Pérez de Guzmán el Bueno Foundation will have the opportunity to play a prominent role in the process of climate neutrality in the city of Madrid. Thus, the new organizational models necessary to consolidate a stable multi-stakeholder vehicle to accelerate the Madrid Climate Neutrality Roadmap will be explored, using the facilities of both institutions as living labs (particularly, the Moncloa Campus and the Finca Monte Paris). For this, the European project ‘Madrid Deep Demonstration’, a platform to reinforce the city’s climate neutrality process using a systemic innovation approach, led by the UPM and supported by the Madrid City Council and the European Institute of Technology (EIT Climate-KIC) will be conceived as one of the main cases to study in this doctoral research.</p>
TRAINING ACTIVITIES	PhD candidate will benefit from UPM-Madrid Deep Demonstration trainings such as: <ul style="list-style-type: none"> - Madrid Deep Demo periodical trainings on systemic innovation principles, multi-stakeholder working, climate neutrality processes. - Healthy and Clean Deep Demonstration cross-city sharing sessions on nature-based solutions, sustainable mobility, urban retrofitting or regulatory innovations. - UPM doctoral seminars on research methodologies.
SECONDMENT(S)	[Tentative] SDG Group. T. H. Chan School of Public Health. Harvard University. Viable Cities. KTH, Stockholm.

REQUIREMENTS FOR CANDIDATES	MSc degree Professional experience in multi-stakeholder environments. Preferred urban background. Capacity of analysis, autonomy, and generosity.
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RESEARCH LINE 10B	
COMPANY	Fundación Tatiana Pérez de Guzmán el Bueno
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Andrés Monzón <i>Civil Engineering School</i> <i>Transport Engineering, Urban and Regional Planning Department</i> <i>TRANSyT-Transport Research Center (www.transyt.upm.es)</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Co-Supervisor: Dr. Álvaro Matud Juristo <i>Director of Institutional and Academic Relations</i> <i>Fundación Tatiana Pérez de Guzmán el Bueno</i> Tutor: Mr. Jesús Zamora Rodríguez <i>Director of Projects and Investments</i> <i>Fundación Tatiana Pérez de Guzmán el Bueno</i>
DESCRIPTION OF THE PhD THESIS PROJECT	<p><u>Title-Sustainable mobility in university campus through social and technological innovation</u></p> <p><u>Background and Motivation</u></p> <p>The 14 campuses of the 6 public universities of Madrid Region account for 215,000 people: students, academics, and administrative staff. There is no mobility strategy which produce a non-integrated, non-smart and non-sustainable mobility patterns. A mobility survey shows a high car-dependency (48,5% of trips) and low use of sustainable modes (walk 9,5%+ bike 2%+ public transport 40%).</p> <p>The COVID-19 pandemic has brought negative changes in the mobility patterns of the university community, leading to even more unsustainable mobility behaviours: more private car and less public transport. But also positive changes: walking and cycling become an opportunity for change mobility.</p> <p><u>General Objective of the thesis</u></p> <p>To develop a methodology for smart management of mobility in university campuses, supporting <i>Sustainable University Mobility Plans</i>. Linked to <i>SDG</i>: 7, 8, 9, 11, 12, 13 & 17</p> <p><u>Specific Objectives</u></p> <ol style="list-style-type: none"> Campus to become living labs for achieving sustainable and resilient SDG through social and technological innovations. Students to become pioneers of smart and sustainable mobility patterns for changing societal habits <p><u>Expected Impacts</u></p> <p>The investigation aims to transform the mobility model in university campuses with the ultimate goal of encouraging a more sustainable and smart future. In particular, its findings will help to:</p> <ul style="list-style-type: none"> - reduce environmental negative externalities - improve livability and people quality of life - promote an efficient and resilient economic system - foster the development of technological innovations
TRAINING ACTIVITIES	<ul style="list-style-type: none"> - PhD courses both specific of the PhD Programme and transversal of the EID (International Doctoral School of the UPM) - The supervisor is coordinating EELISA-on-the-MOVE community with the goal of: <i>Planning urban transitiONs for THE MOst inclusiVE and sustainable mobility</i>. Challenges of mobility in campus are included. - TRANSyT is one of the core members of MoviTUR (www.movitur.upm.es) UPM-Innovation Hub, which organize formation activities and participate in several international research networks providing training activities: ECTRI, ERTRAC, UITP, ALICE, POLIS, NECTAR and FIT. - Conferences, Publications JCR and writing a <i>Handbook Good Practices on Mobility in University Campus</i>.

SECONDMENT(S)	<p>Tentative secondments (with a minimum of 3 months):</p> <p>1- Europe – Technische Universität München (TUM) Dr. Benjamin Brütner, Head of Research Group “Accessibility Planning“ Chair of Urban Structure and Transport Planning Co-Editor-in-Chief of Journal of Urban Mobility(Elsevier) Head of the Doctoral Training Network European Institute of Innovation and Technology (EIT) Urban Mobility.</p> <p>2.- America – UC Berkeley – USA Prof. Susan Shaheen – Civil and Environmental Engineering Dept. She co-directs the <i>Transportation Sustainability Research Center (TSRC)</i> of the Institute of Transportation Studies - Berkeley. Policy and Behavioral Research Program Leader at California.</p>
REQUIREMENTS FOR CANDIDATES	<p>MSc in Engineering, Urban Planning, Architecture, or another related field. Skills: interest and experience in sustainable urban planning. Internationally oriented candidate, interested in multidisciplinary work and team collaboration.</p>

RESEARCH LINE 11A	
COMPANY	Fundación Tatiana Pérez de Guzmán el Bueno
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. José Antonio Manzanera de la Vega <i>Forestry and Natural Resources Engineering School</i> <i>Department of Forest Engineering and Environmental Management</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Co-Supervisor: Dr. Álvaro Matud Juristo <i>Director of Institutional and Academic Relations</i> <i>Fundación Tatiana Pérez de Guzmán el Bueno</i> Tutor: Mr. Jesús Zamora Rodríguez <i>Director of Projects and Investments</i> <i>Fundación Tatiana Pérez de Guzmán el Bueno</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>Title of the proposed Doctoral Thesis: Urban and Periurban Green Infrastructures as an ecosystem service of health and biodiversity. <u>State of the art</u> Humanity is part of nature, its common home. However, in its historical development, it has evolved towards lifestyles in which the tendency has been to achieve greater autonomy with respect to the natural environment, constituting urban societies, and sometimes large metropolises. This trend has led to the loss of direct contact with the natural environment, which is still essential for the proper development of the human person. To solve or alleviate this problem, urban centers have created green areas, as a contribution to the welfare of the population, thinking of their needs. But this relationship can also be analyzed from the side of nature, as the contribution that man makes to the conservation of ecosystems, and especially biodiversity. In this way, green areas are transformed into the concept of GREEN INFRASTRUCTURES, forming part of a network of spaces and areas that connect the city with places that are unaltered or little altered and that contribute to the conservation of biodiversity. With them, human activities are integrated into a natural or semi-natural environment, and parks and gardens are endowed with ecosystem characteristics, even though allochthonous or exotic species may be used. Therefore, Urban and Periurban Green Infrastructures (UPGI) should seek their main objective, human welfare, in harmony with a contribution to biodiversity conservation. Within the objective of human well-being, health, both physical and psychological, stands out. Therefore, in hospitals it was</p>

	<p>common to have gardens that provided patients with a space for rest and recuperation outside the rooms (Zijlema, 2019). Sanatoriums were usually located in coastal or mountainous areas so that users could benefit from contact with nature. In this regard, Twohig-Bennett and Jones (2018) summarize the findings of 143 investigations in green spaces, which were defined as 'open, undeveloped places with natural vegetation' as well as urban green spaces in which parks and green areas on streets were included. The authors conclude that greater exposure to green space is associated with lower risk of type 2 diabetes (28% lower, according to data based on six studies), lower resting heart rate (2.6 beats per minute lower on average, according to 10 studies) and lower diastolic blood pressure (2 mm Hg lower on average, according to 12 studies). In addition, exposure to green spaces was also associated with better birth outcomes, with a reduced risk of preterm delivery (13%, according to data based on six studies) and less risk of failure to thrive for gestational age (19% less, according to data based on four studies). Moreover, the risk of all-cause mortality and cardiovascular mortality was found to be 31% and 16% lower, respectively, in those with higher exposure to green space compared to those with lower exposure. People with high exposure to green spaces reported better perceptions of their health status. Specifically, the probability of reporting good health was 12% higher than for people with less contact with green spaces.</p> <p>There are also indications that exercising in a natural environment has additional benefits compared to exercising indoors. Nature offers a place for stress reduction and the restoration of attention, which leads to subsequent mental health benefits. In urban settings, green spaces constitute meeting spaces, facilitating social interaction and cohesion in neighborhoods, and help prevent loneliness, contributing to improved health (Twohig-Bennett and Jones, 2018).</p> <p>Health professionals are again taking into account the potential of nature visits, not only through hospital gardens and sanatoriums close to nature, as in the past, but also as part of a structured and non-pharmacological approach to health problems, not forgetting that they can also prevent diseases and reduce the costs derived from medical care (Zijlema, 2019). UPGIs are necessary components to provide healthy, sustainable and habitable cities, according to WHO.</p> <p>In today's health landscape, respiratory diseases, and in particular viral pandemics, are related to air quality. Trees are known to help filter air pollution (particles and gases) and act as a noise-reducing barrier. They absorb heat and provide shade, lowering up to 4°C in summer. Improving thermal well-being requires increasing the cover of taller trees, reducing the percentage of paved land and designing the landscape, taking into account aesthetic aspects that improve subjective perception (Sun et al. 2017). Perceived biodiversity also turns out to be an influential component of health. The relationships for which there is most evidence are bird richness, plant species richness, habitat richness, and butterfly richness (Aerts et al. 2018).</p> <p>The work hypothesis is that urban and peri-urban green infrastructures provide multiple ecosystem services, and are a mitigator of the effect of diseases and pandemics on the health of urban dwellers.</p> <p><u>Objectives</u></p>
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	<p>The first objective of the Doctoral Thesis is to evaluate the mitigating effect of urban and peri-urban green infrastructures on pandemic damage.</p> <p>The second objective is to analyze the relationship between biodiversity and public health.</p> <p>BIBLIOGRAPHY</p> <p>Aerts, R., Honnay, O., & Van Nieuwenhuysse, A. (2018). Biodiversity and human health: Mechanisms and evidence of the positive health effects of diversity in nature and green spaces. <i>British Medical Bulletin</i>, 127(1), 5-22. Oxford University Press.</p> <p>Sun, Shibo ; Xu, Xiyao; Lao, Zhaoming; Liu, Wei; Li, Zhandong; Higuera García, Ester; He, Li & Zhu, Jianning (2017). Evaluating the impact of urban green space and landscape design parameters on thermal comfort in hot summer by numerical simulation. <i>Building and Environment</i> 123: 277-288. October 2017. https://doi.org/10.1016/j.buildenv.2017.07.010</p> <p>Twohig-Bennett C, Jones AP, 2018. The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. <i>Environmental Research</i> 166: 628-637.</p> <p>Zijlema WL et al. 2019. The longitudinal association between natural outdoor environments and mortality in 9218 older men from Perth, Western Australia. <i>Environ Int</i> 04 10;125:430-436.</p> <p><u>Scientific-technological description of the proposed PhD thesis.</u></p> <p>The proposed PhD Thesis will evaluate the ecosystem services of urban and peri-urban green infrastructures related to human health, especially in the case of pandemics. These effects will be studied at the level of public health, physical, psychological, depending on the typologies of urban and peri-urban green infrastructures, and in relation to biodiversity. Particular attention will be paid to the effects of green infrastructures on the cardio-respiratory system, mortality risk, stress level, immune system enhancement, physical activity, mental fitness and sociability. First, a representative number of large urban centers will be selected, such as Madrid and other similar cities, in which an inventory of UPGI will be carried out, requesting the data from the town planning and environmental departments and councils. At the same time, Remote Sensing and Geographic Information Systems (GIS) will be used to locate and quantify the UPGI. The UPGIs will be characterized by typology and biodiversity indicators.</p> <p>For example, Hospitales de Madrid (HM) has made available to the international scientific community an anonymized clinical database with all available information on patients treated in its hospitals for the SARS-CoV-2 virus. Similarly, other databases will be explored in the areas under study.</p> <p>Thirdly, the health data previously collected in the GIS will be geolocated to relate them spatially to the presence of UPGI and levels of biodiversity characterized in the first phase.</p> <p>Finally, a geostatistical analysis of the relationships found will be carried out, and the corresponding conclusions will be drawn regarding the objective of the Thesis and its starting hypothesis. Research methodology and work plan.</p> <p><u>The methodology and work plan will be articulated in tasks:</u></p> <p>1. Experimental analyses will be designed comparing different types of urban concentrations, by size and population density in each municipality. An exhaustive search for the presence and density of urban and peri-urban green infrastructures in large populations, and in medium and small cities will be carried out.</p>
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<p>Data sources: government agencies and spatial databases (Sentinel, Landsat, SPOT, etc.).</p> <p>2. Localities and urban districts will be classified according to the presence of protected natural or semi-natural spaces and visitable periurban forests, parks, gardens, landscaped squares, tree-lined avenues, by means of automatic techniques of Artificial Intelligence (Random Forest, neural networks, Vector Support Machine).</p> <p>3. In parallel, anonymized public health data (incidence of pandemics and other epidemics, cardio-respiratory diseases) will be collected from health authorities and hospitals, ensuring compliance with data protection laws and equivalent directives. Geolocation of health data in a GIS.</p> <p>5. Cross-analysis of the presence of UPGI and health data using geostatistical techniques.</p> <p>6. Conclusions and writing of the Thesis.</p>																																																							
<table border="1"> <thead> <tr> <th>Chronogram: TASKS</th> <th>year 1</th> <th>year 2</th> <th>year 3</th> </tr> </thead> <tbody> <tr> <td>1. UPGI characterization IV</td> <td>XXX</td> <td>XXX</td> <td></td> </tr> <tr> <td>2. Urban Typification UPGIs</td> <td>XXX</td> <td>XXX</td> <td></td> </tr> <tr> <td> Secondment at U. Cambridge/Bangor</td> <td>X</td> <td></td> <td></td> </tr> <tr> <td> Article on UPGI</td> <td>XXX</td> <td></td> <td></td> </tr> <tr> <td>3. Health data base</td> <td>XXX</td> <td></td> <td></td> </tr> <tr> <td>4. Health cartography</td> <td></td> <td>XXX</td> <td></td> </tr> <tr> <td> Secondment at U. Berkeley</td> <td></td> <td>X</td> <td></td> </tr> <tr> <td> article on biodiversity</td> <td></td> <td>XXX</td> <td></td> </tr> <tr> <td>5. Geostatistical Analysis</td> <td></td> <td></td> <td>XXX</td> </tr> <tr> <td> Secondment at U. Oregon</td> <td></td> <td></td> <td>X</td> </tr> <tr> <td> article on services ecosystem</td> <td></td> <td></td> <td>XXX</td> </tr> <tr> <td>6. conclusions and writing of the Thesis</td> <td></td> <td></td> <td>XXX</td> </tr> </tbody> </table>				Chronogram: TASKS	year 1	year 2	year 3	1. UPGI characterization IV	XXX	XXX		2. Urban Typification UPGIs	XXX	XXX		Secondment at U. Cambridge/Bangor	X			Article on UPGI	XXX			3. Health data base	XXX			4. Health cartography		XXX		Secondment at U. Berkeley		X		article on biodiversity		XXX		5. Geostatistical Analysis			XXX	Secondment at U. Oregon			X	article on services ecosystem			XXX	6. conclusions and writing of the Thesis			XXX
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<p>Expected results for the university and the collaborating entity (exploitation of results, IPR, etc.).</p> <p>The expected results for the University are the defense of the Doctoral Thesis, with at least three scientific articles in journals indexed in the JCR, as well as communications to Conferences. The interest of the collaborating entity will be emphasized in these scientific dissemination and popularization media. The Thesis will make a direct contribution to the Sustainable Development Goals (SDGs), mainly in SDG 3: Health and well-being, 9: Industry, innovation and infrastructure, 11: Sustainable cities and communities, 13: Climate action, and 15: Terrestrial life and ecosystems.</p> <p>For the collaborating entity, it will have a high impact on the dissemination of its activities to the public. Among the expected products is the generation of UPGI cartography, its ecosystem services and the analysis of environmental indicators. The results of the Thesis will have projection in the planning of UPGI in urban areas, in territorial policy, in public health, and can be used within the packages of preventive measures to mitigate and curb the harmful effects of pandemics and other diseases on health and the economy.</p> <p>The results of the project will be transferred to the national level, to the Ministry of Ecological Transition, and to other European (LIFE projects, Natura 2000 Network) and International Institutions (IUNC, WWF). This methodology will result in</p>																																																							

	software that will be registered as intellectual property and can be integrated into GIS applications and portals.
TRAINING ACTIVITIES	<p>The candidate will be trained on knowledge of the natural environment, ecology and biodiversity, ecosystem services and environmental indicators, as well as technological tools, remote sensing and GIS, statistics and geostatistics. In addition, it will make relevant contributions to areas of public health and urban planning.</p> <p>The candidate will benefit from national and international contacts established by the research group. One of the academic objectives of this Thesis is the realization of the International Doctorate, for which it is necessary that the doctoral candidate carries out stays of at least three months of duration in foreign research centers. These stays will be hosted by research teams at the forefront of studies on the ecological characterization and biodiversity of wild areas. Therefore, the PhD student will benefit from learning remote sensing-based analysis technologies and their use in urban and peri-urban planning.</p>
SECONDMENT(S)	<p>Tentative secondments</p> <p>Among the most important contacts of the proposer and his SILVANET Research Group are:</p> <p>the Universities of Cambridge and Bangor in the United Kingdom, where the PhD student will stay in the fourth quarter of the first year, and the Universities of California Berkeley (stay in the third quarter of the second year) and Oregon (United States, where he will stay in the second quarter of the third year).</p>
REQUIREMENTS FOR CANDIDATES	<p>Degree (MSc, ...): To be in possession of an official diploma of Bachelor's degree, first cycle Degree, or equivalent, plus one of university Master's degree, or equivalent, provided that at least 300 ECTS credits have been obtained in all of these two teachings.</p> <p>Skills: knowledge of Remote Sensing, GIS, R, (Geo)statistics and programming will be welcome.</p> <p>Background: Forestry, Environmental Sciences, etc.</p>

RESEARCH LINE 11B	
COMPANY	Fundación Tatiana Pérez de Guzmán el Bueno
PhD THESIS SUPERVISOR (UPM)	<p>Prof. Dr. Carlos Gregorio Hernández Díaz-Ambrona <i>Agricultural, Food and Biosystems Engineering School Department of Agricultural Production (PhD in Agro-environmental Technology for Sustainable Agriculture)</i></p>
PhD THESIS CO-SUPERVISOR (COMPANY)	<p>Co-Supervisor: Dr. Álvaro Matud Juristo <i>Director of Institutional and Academic Relations Fundación Tatiana Pérez de Guzmán el Bueno</i></p> <p>Tutor: Mr. Jesús Zamora Rodríguez <i>Director of Projects and Investments Fundación Tatiana Pérez de Guzmán el Bueno</i></p>
DESCRIPTION OF THE PhD THESIS PROJECT	<p>The natural space bordering the urban area: Observation base to know the functioning of natural ecosystems.</p> <p>This proposal will study Four pillars of sustainability: Environmental, Social, Economic, and Governance applied to the functioning of natural systems in border, semi-natural, and extensive agricultural areas (agro silvo pastoral dehesa) so as to fill an important scientific gap. The issue is relevant worldwide, given the complexity of managing these spaces, as can be seen in the unfortunate events of large forest fires that have affected catastrophically from California to Australia, not only due to the cost of human lives, but also due to the loss of their natural</p>

	<p>values. Also due to the role that these buffer spaces present for the deposition of tropospheric ozone and other elements such as nitrogen. It is necessary to provide scientific knowledge for a better integrated and sustainable management of these frontier environments.</p> <p>To know the operation of High Natural Value spaces in the surroundings of large city and their metropolitan area. It proposes a new reflection of the dialogue between country and city. The idea of a green corridor around the city of Madrid (the so-called “Bosque Metropolitano”, metropolitan Forest) and its connections to the surrounding forest, requires studying how this space can function. The metropolitan forest raises the connectivity of the green infrastructure of the city and its surroundings, so it also transcends the peri-urban space, the European Union catalogs the spaces of High Natural Value in application of the Habitat Directive 92/43/EEC, as dehesas, and most of the peri-urban environment of the city of Madrid some of its elements are declared a World Heritage Site. Buffer zones in Mediterranean environments are very fragile. Especially the Mediterranean vegetation and the pastures in particular are especially sensitive to changes. This comparison will allow a better analysis of extensive grazing systems and a better understanding of their implications on the conservation of terrestrial ecosystems (SDG 15) and on climate action (SDG 13). Mitigation and adaptation to climate change (SDG13): Agroforestry systems, which integrate practices that combine a woody component (tree or bush) with an agricultural component, are characterized by greater carbon sequestration in the woody component and in the soil compared to exclusively agricultural systems. For the study of the possibility of adaptation and mitigation, the use and improvement of the Dehesa Model © software created by AgSystems. The management of space on the edge of urban areas has to take into account the establishment of a dialogue between urban, rural and environmental space. This trinomial lays the foundations for the development of this thesis project. Inappropriate management of animals, domestic or wild, can have disastrous consequences.</p>
TRAINING ACTIVITIES	<p>The cross curricular courses offered by the International Doctoral School (EID).</p> <p>Specific training activities to the development of the doctoral thesis: developing and writing a thesis, participation in congress or conferences, published papers, participation in research project.</p> <p>Training in system dynamics modelling.</p> <p>Ecosystem-based adaptation.</p> <p>Training in on innovation for more sustainable and resilient cities.</p>
SECONDMENT(S)	<p>Tentative secondments (with a minimum of 3 months)</p> <ol style="list-style-type: none"> 1.- IABS (Instituto Brasileiro de Desenvolvimento e Sustentabilidade) in Brasil to study the Project Cidade Inclusiva (Maceio, Alagoas). 2.- The University of Melbourne (Melbourne, Australia). The Victorian Eco-Innovation Lab (VEIL) is a research-design-action group focused on innovation for more sustainable and resilient future cities. It is an interdisciplinary group whose work is engaged with and embedded in industry, government and society. 3.- Zamorano University (Tegucigalpa, Honduras), Uyuca Biological Reserve (RBU). The Uyuca Biological Reserve provides ecosystem services of great value, especially potable water for Zamorano community. The University manages nearly 3000 ha of forest in which students take part by means of the learning by doing training program

<p>REQUIREMENTS FOR CANDIDATES</p>	<p>Degree (MSc, Engineers, ...): Master in Strategies and Technologies for Development , Specific Training Course “SDGs and cities”, MSc in Agro-Environmental Technology for Sustainable Agriculture and similar studies.</p> <p>Skills:</p> <ul style="list-style-type: none"> - In fields related to the environment or sustainable agriculture, agronomy, agricultural engineering, forestry, environmental sciences, ecology and similar career - Multidisciplinary and transversal skills - Capacity for comprehension and correct spoken and written communication, including the comprehension and use of specialized language (English and recommended Spanish) - Capacity to work as part of a group in multidisciplinary, multicultural and international teams. - Capacity to formulate creative solutions to problems involving consideration of social or ethical responsibility. - Adaptability, initiative, capacity for independent learning, the ability to manage frustration, and emotional intelligence. - Capacity to carry out R&D+i projects, designing and conducting experiments, analysing results and drawing conclusions. - Communication skills. <p>Background:</p> <ul style="list-style-type: none"> - Graduates with science, technology, engineering, art and applied mathematics backgrounds. - Understanding of and ability to apply environmental assessment and management methodologies in agronomy and forestry
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<p style="text-align: center;">RESEARCH LINE 12A</p>	
<p>COMPANY</p>	<p>Optiva Media</p>
<p>PhD THESIS SUPERVISOR (UPM)</p>	<p>Prof. Dr. José Manuel Menéndez García <i>Telecommunications Engineering School Signals, systems and radio communications department</i></p>
<p>PhD THESIS CO-SUPERVISOR (COMPANY)</p>	<p>Dr. Iñaki Martínez Sarriegui <i>Head of Research & Innovation at Optiva Media</i></p>
<p>DESCRIPTION OF THE PhD THESIS PROJECT</p>	<p>Content consumption habits are changing, with increasingly demanding consumers that require total control of what, when and where they consume, and with old (linear TV) and new (VoD, streaming) paradigms coexisting.</p> <p>This favours the emergence of new technological and business actors, creating an overwhelming collection of available contents, growing every day with the addition of new series and films in an increasing offer of platforms and streaming services.</p> <p>In this context, actual techniques for content search and indexation fail at providing high-level semantic capabilities, especially in textual documents when capturing the intention and/or the underlying narrative structure. The result is a huge amount of information and metadata inaccessible to automatic processing and ‘unembraceable’ by humans.</p> <p>The most direct consequence of this is that <i>end-users spend more than 30 minutes a day</i> deciding what to watch on TV, and frequently ending in selecting a content that doesn’t fit their interests or their actual mood, and that will usually be later discarded.</p>

	<p>While for most people this generates only some discomfort and the obvious feeling of wasting their time, in people with mental conditions like depression it could lead to anxiety episodes and other more severe complications derived from idling and, especially, for ending with the selection by discard of a content that could be harmful in psychological terms.</p> <p>In this doctoral thesis, we propose addressing this problem by means of the work in two areas: <u>Conceptual Content Modelling</u> and <u>User Profiling</u>, the outcomes of which will be combined to create an advanced recommendation framework for a ‘safe’ TV experience for people suffering from mental conditions, ultimately contributing to their wellbeing.</p>
LIST OF TRAINING ACTIVITIES	<ul style="list-style-type: none"> - Doctoral courses at UPM - Dedicated training on Digital and Pay TV at Optiva Media with technical support from the GATV-UPM. - AWS AI-ML tools webinars and specific company courses at Optiva Media - Attendance at International Artificial Intelligence conferences related to the thesis project like AIME, AIAI; with active participation on practical workshops. - Short stays of the student in institutions of recognised prestige in the field of the doctoral thesis.
SECONDMENT(S)	<p>Tentative</p> <ul style="list-style-type: none"> - Computational Intelligence Group, Vrije Universiteit (Netherlands) <ul style="list-style-type: none"> o https://cs.vu.nl/ci/ - Digital Health & Wellbeing Group, Fondazione Bruno Kessler (Italy) <ul style="list-style-type: none"> o https://www.fbk.eu/en/digital-healthwellbeing/ - Fraunhofer FOKUS (Germany) <ul style="list-style-type: none"> o https://www.fokus.fraunhofer.de/en/fokus/research-topics/ai - LIAAD, Artificial Intelligence and Decision Support Centre of the INESC TEC (Portugal) <ul style="list-style-type: none"> o https://www.inesctec.pt/en/centres/liaad#intro - Centre for Research & Technology Hellas (Athena, Grecia) <ul style="list-style-type: none"> o https://www.certh.gr/root.en.aspx
REQUIREMENTS FOR CANDIDATES	<ul style="list-style-type: none"> - Degree (MSc, ...) <ul style="list-style-type: none"> o MSc in Statistics, applied mathematics, Computer Science or related discipline. - Skills <ul style="list-style-type: none"> o Strong problem-solving skills o Ability to communicate complex data in a simple, actionable way. o Ability to work independently and with team member from different backgrounds. o A drive to learn and master new technologies and techniques. - Background <ul style="list-style-type: none"> o Proficient with one or more programming languages, preferably Python and/or C++ o Knowledge of a variety of ML techniques: NLP, clustering, decision tree, ANN, DL, RNN, ... o Pattern recognition and predictive modelling experience o Knowledge of cloud infrastructures like AWS and their AI tools and services

RESEARCH LINE 12B	
COMPANY	Optiva Media
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Carlos Á. Iglesias <i>Intelligent Systems Group</i> <i>Telematic Systems Engineering Department</i> <i>Telecommunications Engineering School</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Dr. Iñaki Martínez Sarriegui <i>Head of Research & Innovation at Optiva Media</i>
DESCRIPTION OF THE PhD THESIS PROJECT	Title: Exploiting Knowledge Graphs for Improving Mental Wellbeing at Home through Content-based Recommendations The PhD thesis aims at researching on personalized content recommendation algorithms for selecting videos. One of the goals of the projects is reducing users' frustration when selecting videos and contribute to user personal well-being. To this end, the project will explore the usage of Knowledge-Graph based Recommendation Systems. The PhD thesis will be developed in a combined academic and industrial settings, from an industry-driven perspective. Candidates are expected to publish in highly refereed journals and conferences. The grant will support a research stay of 3 months.
SECONDMENT(S)	The hosting research centre of the research stay will be decided during the PhD studies. Some potential hosting research centres are University of Torino (Italy), University of Minho (Portugal), Fondazione Bruno Kessler (Italy), and Open University (UK).
REQUIREMENTS FOR CANDIDATES	Degree: Master's degree in computer science or other relevant disciplines. Skills: Python, Pandas, Scikit-Learn, Linked Data Technologies. Background: Artificial Intelligence, Machine learning, Natural Language processing. Strong motivation to do research on data management and doing interdisciplinary research. Communication skills and teamwork.