

RESEARCH LINE 7B	
COMPANY	Iberdola
PhD THESIS SUPERVISOR (UPM)	Prof. Dr. Ruth Carrasco-Gallego <i>Industrial Engineering School Organizational Engineering, Business Administration and Statistics Department</i>
PhD THESIS CO-SUPERVISOR (COMPANY)	Dña. Beatriz Crisostomo Merino <i>Head of Innovation Management Iberdrola.</i>
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</p>

	<p>actors in the ecosystem: itdUPM, the EELISA proto-community for “The Circular and Regenerative Campus”, Energía y Sociedad, etc.</p>
TRAINING ACTIVITIES	<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, emotional tools for the PhD journey, philosophy of science, research methodology, etc.</p>
SECONDMENT(S)	<p>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.</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, connecting-the-dots, sustainability-savvy, action-oriented</p> <p>Background: No professional experience needed although relevant previous experiences will be valued.</p>