POLITECNICO DI MILANO

# PhD in SCIENCE, TECHNOLOGY AND POLICY FOR SUSTAINABLE CHANGE - 40th cycle

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| **Number of scholarship offered** | 1 |
| **Department** | DIPARTIMENTO DI ELETTRONICA, INFORMAZIONE E BIOINGEGNERIA |

**Description of the PhD Programme**

In a changing world, where the population is growing at worrying levels and climate change is affecting global health and the environment, the urgency of continuously adapting the planning and management of the decreasing water, energy, and food (WEF) resources, as well as preserving ecosystems, is huge. The WEF Nexus is one of the most relevant nexuses highlighted within the Agenda 2030 and provides an innovative framework to capture the interrelationships, synergies, and trade-offs between water, energy, and food demand (and supply) in different environmental contexts. This course has the ambition to develop knowledge and skills for the advanced modelling, management, and planning of the interlinked components of the WEF nexus in a changing world. Students will learn (1) how to formulate WEF management and planning problems accounting for multiple sectors, scales and complexities arising from both the coupled nature of human and natural systems and ongoing global change; (2) how to use an ensemble of (open-source) modelling tools to comparatively evaluate integrated solutions and assess the economic and environmental implications of the associated policies within a WEF Nexus and interdisciplinary approach; (3) how to move from the global challenges and drivers to the regional modelling down to local implementations and innovative opportunities; (4) about the concrete challenges and opportunities of a complex case study such as the transboundary Nile River Basin and how the knowledge gained can be transferred to other case studies elsewhere.

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## THEMATIC Research Field: TEXTILE RECYCLE TO FIBERS

| Monthly net income of PhDscholarship (max 36 months) |
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| **€ 1400.0**<br>In case of a change of the welfare rates during the three-year period, the amount could be modified. |

| Context of the research activity | |
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| **Motivation and objectives of the research in this field** | Global textile production has been steadily increasing for decades. Fast fashion products have a short life expectancy, which, together with the volumes produced, will lead to an even more rapid increase in the near future in the amount of textile waste disposed of each year. For this reason, the European Community has established the obligation to collect textile waste as a separate fraction in all EU countries by 2025. In this area, technologies for the recovery and reuse of single-fiber textiles are already known and developed, but the increasing waste will mainly consist of mixed fiber fabrics for which there are currently no consolidated recycling solutions. Consequently, the development of technologies that allow the recovery of mixed textile waste is fundamental and it is in this context that the interest in developing a project to test new technologies for the recovery of mixed cotton/polyester fibers, which will constitute the predominant part of refusal. The goal is the development of a technology based on coupled mechanical and chemical technologies to produce directly spinnable recycled fibers. |
| **Methods and techniques that will be developed and used to carry out the research** | The PhD formation will be based all on the application of chemical engineering applied to textile recycling. The starting engineering culture of the PhD candidate will be completed with management culture to produce a PhD able to manage both aspects to a process design. The LCA concept in particular will be also exploited in order to validate the sustainability of the developed processes |

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| | from the point of view of the environmental impact and of the economic sustainability. The approach to be followed will be the training on job, that conjugates experimental and modeling activities. |
| **Educational objectives** | To form a PhD able to drive the textile recycling industry into the new environmental goals avoiding all the misleading greenwashing claims. Moreover, PhD will be trained in an industrial environment on a project of industrial interest, where he/she will join engineering and management cultures. |
| **Job opportunities** | In EU about 15'000 new jobs are expected to be created in the field of textile recycling, that needs high skilled chemical process engineers embedding the concepts of the process industry with those of the circular economy. A full employment is registered so far for the PhD graduates from Politecnico di Milano |
| **Composition of the research group** | 5 Full Professors<br>5 Associated Professors<br>4 Assistant Professors<br>17 PhD Students |
| **Name of the research directors** | Prof. Maurizio Masi |

| **Contacts** |
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| maurizio.masi@polimi.it<br>Tel. 02 23993131<br>Mobile 3334349324<br>https://.cfalab.chem.polimi.it |

| **Additional support - Financial aid per PhD student per year (gross amount)** | |
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| **Housing - Foreign Students** | -- |
| **Housing - Out-of-town residents (more than 80Km out of Milano)** | -- |

| **Scholarship Increase for a period abroad** | |
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| **Amount monthly** | 700.0 € |
| **By number of months** | 6 |

| **Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information** |
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The scholarship is financed by A2A S.p.A.A2A is an Italian multiservice company, listed on the Milan Stock Exchange, which operates in the sectors of environment, energy, heat, networks and technologies for smart cities. It is active in the production, distribution and sale of electricity (second in Italy for installed capacity), gas, waste management, environmental services and the development of products and services for energy efficiency, the circular economy, electric mobility and smart cities

**Confidentiality**: since this is a thematic scholarship, the management of Confidential Information, Results and their publication is subordinate to the restrictions agreed upon with the funding company. Upon acceptance of the scholarship, the beneficiary must sign a specific commitment.

**Educational activities** (funding for participation in courses, summer schools, workshops and conferences) - financial aid per PhD student per year:
- 1st year: around 1.900 euros per student
- 2nd year: around 1.900 euros per student
- 3rd year: around 1.900 euros per student

**Teaching assistantship**: availability of funding in recognition of supporting teaching activities by the PhD student:There are various forms of financial of for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities within the limits allowed by the regulation.

The education activity included the general mandatory and free courses included in the career path of the PhD program in Science, Technology, and Policy for Sustainable Change of Politecnico di Milano.

The hosting department (Dipartimento di Chimica, Materiali e Ingegneria Chimica, Politecnico di Milano) provides a full equipped individual working position for all the enrolling time.