# PhD in Chemical Engineering

## Research Title: “Management and transformation of sanitary wastes into a high energy value fuel from wastes”
## [Gestione e trasformazione del rifiuto sanitario in un combustibile da rifiuto ad alto potenziale energetico”]

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| **Funded by** | Technologies for Waste Management s.r.l. (TWM) |

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| **Supervisor** | TWM: Dr Domenico Napoli (domenico.napoli@twmproject.it)<br>PoliTo : Prof Stefania Specchia (stefania.specchia@polito.it) |

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| **Contact** | TWM: www.twmproject.it<br>PoliTo:<br>www.disat.polito.it/research/research_groups/chenergy/green_energy_engineering |

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| **Context of the research activity** | This scholarship refers to an industrial collaboration with TWM.<br>Nowadays, medical waste management is receiving greater attention due to potential health risks arising from inappropriate disposal and treatment of the waste. Med-wastes refer to any waste generated from health care industry such as hospitals and medical laboratories. Med-wastes contain a variety of potential infectious and toxic materials (needles and syringes, soiled dressings, anatomical parts, pathological wastes, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials). Poor management of med-wastes potentially exposes health-care workers, waste handlers, patients and the community to infection, toxic effects and injuries, with a high risk of polluting the environment. Thus, it is essential to segregate all med-waste materials at the point of generation, for an appropriate and safe treatment and disposal.<br>Recently efforts have been devoted by the company TWM and PoliTO in a new process to treat med-wastes close to the production sites, with the aim to reduce their transportation |

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| | costs, sterilize and energetically valorize them.<br>The process consists first in a smart collection of med-wastes at the hospitals (with specific selection and separation of the wastes, considering that on average they contain from 20 to 40% of plastic materials). Then, med-wastes are grinded and sterilized. The product, the so-called sterile fluff, possesses an average LHV of 25 MJ $kg^{-1}$. Fluff can be gasified to produce syngas for feeding internal combustion engines, or fuel cells units, for valorizing its intrinsic energy. |

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| **Objectives** | The main purpose of this PhD is focused on the design and realization of the process able to treat med-wastes. In particular, after collection and management, med-wastes will be:<br>- Finely grinded<br>- Subjected to evaporation to remove liquids<br>- Sterilized (achievement of specific time/temperature conditions to obtain the total reduction of microbial load)<br>- Cooled and dried for stogare<br>- Gassified<br>- Syngas cleaned-up<br>All the research work will be performed in strict cooperation PoliTo-TWM. |

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| **Skills and competencies for the development of the activity** | Degree in Chemical (or Mechanical/Energetics) Engineering. Strong skills in heat/mass transfer and balances. Basic skills of modeling. Strong interest in a hot-topic on environment an energy. Strong personal motivation. |