



**Interview with Marco Binotti, Politecnico di Milano,**  
Coordinator of the PYSOLO project

## **PYSOLO – Making Use of Concentrated Solar Power for Biomass Pyrolysis**

**PYSOLO (PYrolysis of biomass by concentrated SOLar pOwer) offers a solution for both decarbonisation and defossilisation by preparing the ground for a fully renewable process combining concentrated solar power and biomass pyrolysis. Thanks to the use of solar heat in the pyrolysis process, the production of valuable products bio-oil, biochar and pyrogas can be maximised and the associated CO<sub>2</sub> emission minimised. This offers both economic and environmental benefits compared to conventional pyrolysis.**

### **What is innovative about PYSOLO?**

The innovation of the PYSOLO project lies in the smart coupling of concentrated solar thermal and biomass pyrolysis using a particle heat carrier to transfer heat between the two systems. The two operational units (i.e. the CST plant and the biomass pyrolysis plant) will be optimized jointly in a novel and flexible system able to deliver valuable bio-oil, pyrogas and biochar, but also able to provide balancing services to the electric grid from the conversion of the available pyrogas into electricity and with the integration of an induction heating system to absorb excess electricity from the grid.

### **Please elaborate on how PYSOLO aims both to decarbonise and defossilise the industry?**

The bio-oil, pyrogas and biochar produced by the PYSOLO process can be used for different energy and non-energy uses with minimised CO<sub>2</sub> emission. The minimisation of the carbon dioxide emissions is related to the smart use of solar heat for the pyrolysis process instead of the heat produced by the combustion of a fraction of the pyrolysis products. The carbon contained in the pyrolysis product, being of biogenic origin, represents a source of renewable carbon that can substitute the use of fossil carbon in the chemical industry.

### **How can the combination of concentrated solar power and biomass pyrolysis benefit both the economy and the environment?**

As already mentioned, conventional pyrolysis usually requires the combustion of a portion of the pyrolysis products (char) to produce the heat that sustains the endothermic pyrolysis reaction: this represents an inefficient step, as it involves the loss of high value biogenic carbon which is emitted as carbon dioxide, causing the reduction of the carbon efficiency and of the overall yield of bio-products. In PYSOLO the heat for pyrolysis is provided by the concentrated solar radiation, resulting in a substantially negative emission process, with a strong climate change mitigation potential. The biochar produced in fact can be used for sustainable agriculture, contributing to long-term atmospheric C sequestration in soil.

From the economic point of view the PYSOLO process can significantly reduce the CAPEX and OPEX thanks to the negative CO<sub>2</sub> emission, the biochar sale and the enhanced flexibility of the system that can provide ancillary services to the grid and reduce the RES curtailment.

### **What is your vision for the end of the project?**

The project is now entering in its third year, a crucial year for the experimental activity, when both the two pyrolysis units (fluidised bed and auger pyrolyser) and the rotary kiln receiver will be tested at TRL4 for 300 hours. Moreover, the testing activity will include other crucial components such as the particle/char separator, the particle transport system and the particle induction heating system. The results obtained will be of high scientific relevance and will allow us to improve the accuracy of the simulation models developed in these two years to really assess the potential of this technology. If the results at the end will be in line with our expectations, the next goal will be a further scale-up of the technology, with the testing of the integrated PYSOLO system.

