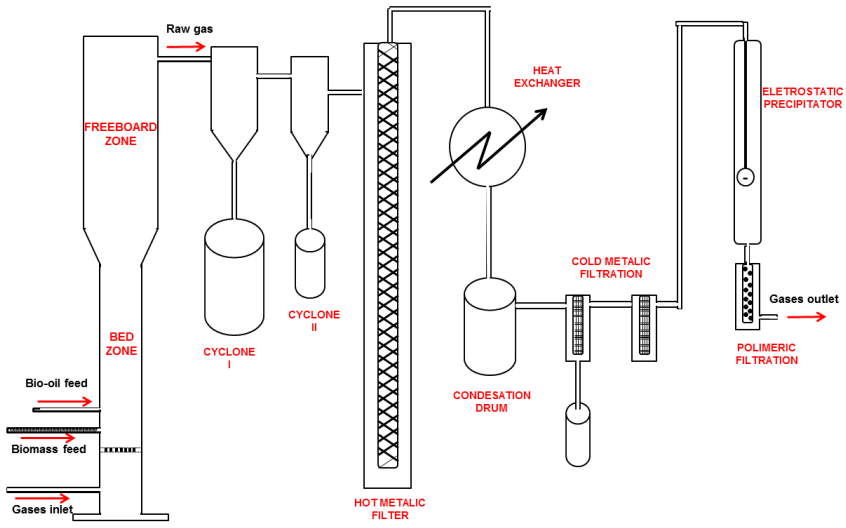
TASKS OF INSTITUTE OF TECHNOLOGICAL RESEARCHS OF SÃO PAULO STATE IN THE BIOVALUE PROJECT

Laboratorial structure of the Institute

In 2017, IPT acquired a continuous lab-scale plant to conduct researchs aimed at developing gasification and pyrolysisl processes of biomasses and residues.

The equipment is designed for analyzing the main parameters of gasification and pyrolysis processes of solid and liquid fuels and residues. The reactor is of the bubbling fluidized bed type with continuous feed flow in the order of 1 - 2 kg / h and it has a temperature control system, where the set points are keeped by the action of electrical resistances that heat the gasification agents, reactor, cyclone and hot metallic gas filter



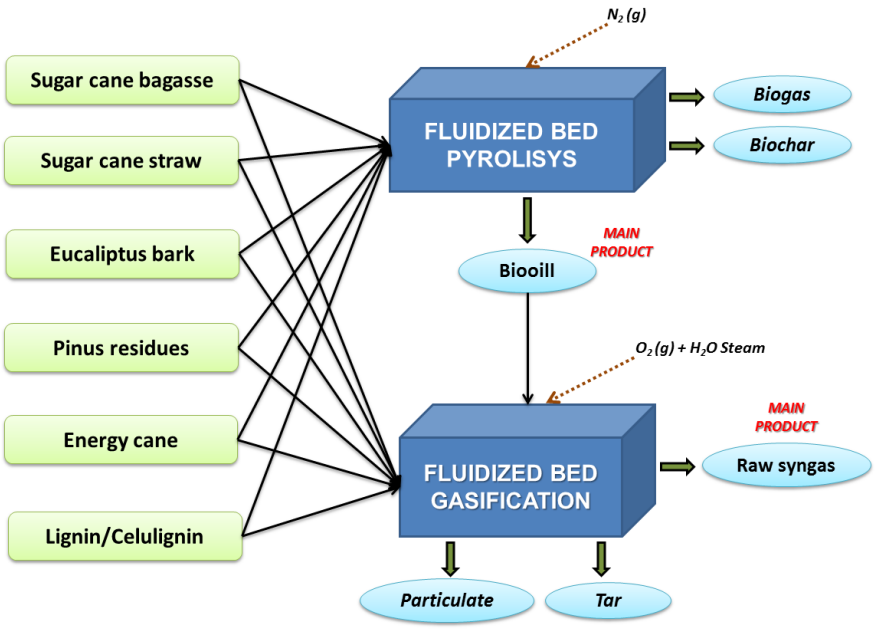
The equipment allows the characterization of the particulates collected in the cyclones, the residual material of the bed, the bio-oil (or tar) obtained in the cold gas cleaning system composed of a condenser, metallic filters and electrostatic precipitator.

In addition, the gases formed are characterized by continuous analyzers of the main compounds (H_2, CO, CO_2, CH_4). With all the data collected in the experimental tests it is possible to make mass and energy balances, obtain process yields, balance of contaminants etc.

IPT` tasks in the project

The IPT will be the Brazilian research institution responsible for the initial studies in experimental bench scale of the project, conducting analyzes and obtaining preliminary results and observations of gasification and pyrolysis in a bubbling fluidized bed of all selected biomasses. Comparing with the data review of the technical literature on these processes, the impacts of some of the process variables will be analyzed, for example:

- ✓ influence of temperature on the quantitative and qualitative aspect of the formation of bio-oil in pyrolysis;
- ✓ distribution of the main critical contaminants in the fractions of the process (charcoal, bio –oil/tar, bed retention), the main ones being sulfur (S), nitrogen (N), chlorine (Cl) and potassium (K);
- ✓ use of ores as catalytic additives in the bed (dolomite, limestone, magnesite, etc.) in order to reduce tar in gasification;
- ✓ Analysis of the energy efficiency of processes.



This Figure presents the structure of IPT's tasks throughout the project summarized in laboratorial tests with the analysis of the pyrolysis and gasification process for each one of the selected biomasses.