

The overall goal of the TreeforJoules project is to identify the major factors underpinning the physicochemical properties of cell walls, the recalcitrance of which remains a key scientific challenge for establishing highly efficient, sustainably produced, second-generation biofuels. This knowledge will be invaluable for future association studies and marker-assisted breeding of elite trees for improved down-stream processing and efficient degradation thereby contributing to the KBBE goal of securing a sustainable energy supply. TreeforJoules aims are to:

- Identify and characterise the regulatory candidate genes (*i.e.* transcription factors and miRNAs) in poplar (P) and eucalypts (E) that control wood properties relevant to bioenergy through integration of existing and new transcriptomic resources, delineation of the transcriptional interactome, functional characterisation of CG in transgenic wood sectors, assessment of environmental and seasonal impacts on CG expression and correlation with biomass production of high-performing genotypes.
- Develop high throughput phenotyping for key wood and cell-wall chemical constituents, assess their impact on saccharification, bioethanol and bio-oil production, and develop and apply micro methods for phenotyping of transgenic wood tissues.
- Delineate and characterise genomic regions in eucalypts and poplar that control wood properties valuable for efficient cellulosic bioenergy production through comparative analyses at the structural (comparative genetic and physical mapping) and functional (comparative QTL mapping) levels by improving the resolution of genetic maps with markers (COS, SSRs, and SNPs) common between the genera, anchoring the genetic maps to physical maps or genome sequences, high throughput genotyping and genetic mapping, performing QTL and eQTL analyses, and dissecting and fine mapping a major QTL for lignin.
- Ensure effective collaboration through the creation of a website and a bioinformatic network to store, mine, and integrate the high throughput genomic, genetic, and phenotypic data obtained through the project for poplar and *Eucalyptus* by exploiting existing tools and databases developed through other EU and/or national projects (Evoltree, EUCANET, ANR genoplante 2010...)
- Implement project coordination and management to ensure that project tasks, milestones, and deliverables are completed on time and within budget.
- Disseminate the results and transfer tools and technologies for rapid industry application.

TreeforJoules relies on the collective translational expertise of consortium members in genomics of wood, advanced generation full-pedigree breeding populations, and existing genomic resources. The research group includes scientists from public and private organisations who are at the forefront of their fields, the active participation of Forest, Pulp and Paper, and Energy companies from France, Spain, and Portugal, as well as a German SME working to develop sustainable, ecological biorefinery concepts, systems, processes, and products.

