



**Laborelec**  
RESEARCH & INNOVATION



# EXPERT SERVICES FOR THE BIOMASS ENERGY INDUSTRY

Ensuring biomass energy value chains  
sustainable, efficient, and safe

# EXPERT SERVICES FOR THE BIOMASS ENERGY INDUSTRY

## Ensuring biomass energy value chains sustainable, efficient, and safe

Producing energy from biomass comes with significant challenges, with differences in biomass quality having a big impact on the combustion process. A wide range of pre-treatment options are available to improve biomass performance, but finding the most appropriate options is essential if energy production is to be feasible, viable, and sustainable. Biomass producers, traders and end-users must also comply with multiple sustainability and safety regulations, depending on their activity or market.

Laborelec offers comprehensive expert services for the biomass energy industry:

- We analyse biomass resources in our certified lab to help producers and operators optimize their procurement programmes.
- We identify the most viable pre-treatment pathways.
- We evaluate whether retrofitting is feasible for your fossil fuel installation.
- We guide you through your certification journey, helping you navigate the regulatory landscape.
- We accurately calculate greenhouse gas emissions across your supply chain.
- We give expert assistance during your plant's development.
- We carry out safety studies to reduce risk and assure safer operation.

Drawing on decades of experience in the energy industry, Laborelec is your partner in actualizing a sustainable, efficient, and safe biomass energy value chain.

### OPTIMIZING PROCUREMENT AND OPERATIONS THROUGH PRECISION CHARACTERIZATION

Combustion performance is significantly impacted by critical characteristics such as biomass calorific value, moisture content, and ash composition. Phenomena such as slagging, fouling, corrosion, and  $\text{NO}_x$  and  $\text{SO}_x$  emissions present serious challenges.

**Measuring biomass characteristics and assessing impact** — Laborelec offers dedicated laboratory services to measure the critical parameters of biomass fuels and assess impact on the combustion process. This allows you to make better-informed decisions about fuel procurement and address operational issues more effectively.





### **IDENTIFYING THE MOST VIABLE PRE-TREATMENT PATHWAYS**

Laborelec offers expert services to evaluate the viability of pre-treatment options including hydrothermal technologies, pyrolysis, torrefaction, and steam explosion. At our Linkebeek facility, we operate an HTC pilot installation as well as a pelletizer to carry out feasibility tests.

**Techno-economic feasibility and environmental impact** — We can analyse any type of biomass stream, including conventional sources such as ligneous and agricultural biomass, and alternative feedstocks such as sewage sludge, food waste, green waste, and digestate. For each stream, we identify the most appropriate energy valorization application including, for example, district heating, gasification, cogeneration, and boiler combustion. Our evaluation includes techno-economic feasibility and environmental impact analysis.

### **LOOKING TO RETROFIT YOUR FOSSIL FUEL INSTALLATION? HERE'S OUR QUICK SCAN**

**Feasibility check and impact analysis** — Are you considering retrofitting your fossil fuel installation to use biomass? Laborelec offers a unique and proven Quick Scan analysis to rapidly evaluate whether retrofitting is feasible, identify crucial operational considerations and risks such as slagging and fouling, and assess the potential impact on overall boiler performance.

### **YOUR GUIDE ON THE BIOMASS CERTIFICATION JOURNEY**

Laborelec offers comprehensive support for biomass certification, under the EU Renewable Energy Directive (RED), and voluntary schemes including SBP, SURE, ISCC-EU, as well as FSC and PFC certifications. Working as intermediaries between entities seeking certification and third-party auditors, we ensure verifiable compliance with all obligations.

### **Tailored assistance and ongoing support** —

We guide biomass producers, traders, and end-users through their initial certification journey, and assist certified entities in navigating new obligations. We offer tailored assistance, including audit preparation, conformity attainment, documentation organization, and ongoing support to anticipate evolving certification standards.

### **ACCURATELY CALCULATING GHG EMISSIONS ACROSS THE BIOMASS SUPPLY CHAIN**

Laborelec calculates biomass supply chain greenhouse gas (GHG) emissions, in accordance with the RED methodology, enabling existing biomass trades as well as the development of new business opportunities.

### **Business growth through meeting RED targets** —

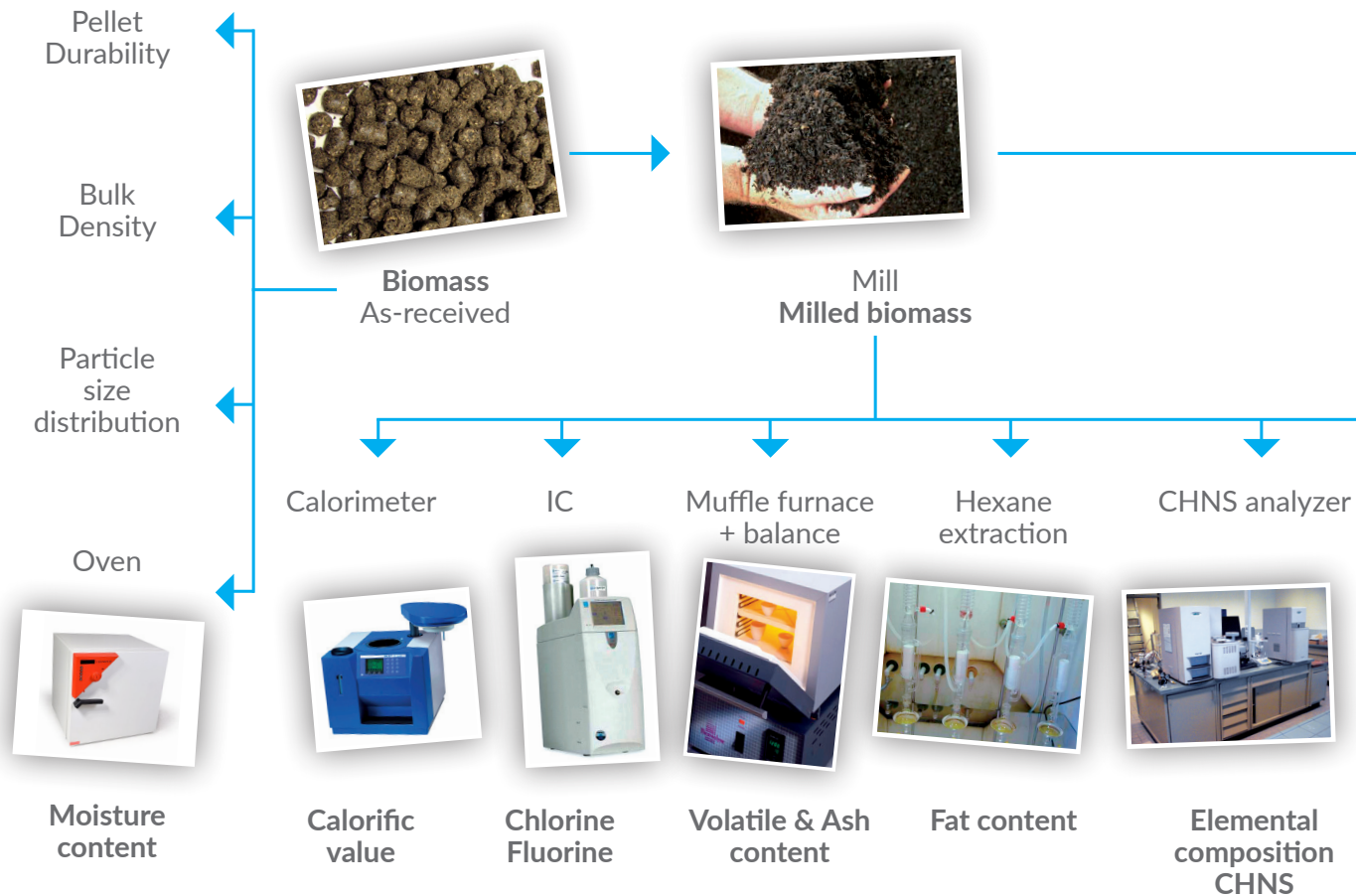
We support business growth by addressing the key issues to meet RED targets, determining the optimal biomass sourcing distance, and identifying suitable transports and processing methods. In addition, we assist trades by carrying out RED GHG calculations for biomass supplies and predicting GHG emissions at the post-transport end-user stage. We use emission factors from trusted sources, in compliance with relevant EU publications, and based on our experience of RED audits.

### **EXPERTISE AND ADVICE ON BIOMASS SUSTAINABILITY**

Laborelec offers expertise and guidance on biomass sustainability, encompassing regulations such as EUDR, EU-ETS, REDII-III, Taxonomy, and IED. We ensure compliance with evolving obligations through constant monitoring, keeping in touch with businesses about regulatory updates. We also develop practical decision-making tools in response to published legislation, empowering businesses to navigate the regulatory landscape with confidence and make informed choices.

The analytical package at a glance

# FROM RAW BIOMASS TO ANALYTICAL REPORT



## LABORELEC'S BIOMASS ANALYSIS PACKAGE AT A GLANCE

### ANALYSIS METHODS USED IN OUR LAB

- Moisture content – ISO 18134-1:2022
- Pellet durability – ISO 17831-1:2015
- Bulk density – ISO 17828:2015
- Particle size distribution (pellets and wood chips) – ISO 17830:2016, ISO 17827-1:2016, ISO 17225-4:2021
- Fines – ISO 17827-2:2016
- Calorific value – ISO 18125:2017
- Volatile content – ISO 18123:2023
- CHN – ISO 16948:2015
- Chlorine and fluorine content – ISO 16994:2016
- Sulphur content – ISO 16994:2016
- Minor and trace elements – ISO 16968:2015
- Ash content – ISO 18122:2022
- Major elements – ISO 16967:2015
- Ash melting behaviour – ISO 21404:2020

## Solid biofuel analysis



Muffle furnace  
Ash

Direct Mercury  
Analyzer



Mercury

X-Ray Fluorescence  
ICP-OES



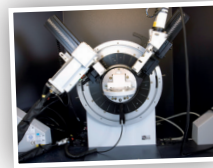
Major & Minor  
elements

Ash fusibility



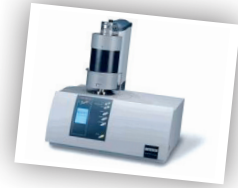
Characteristic  
melting  
temperatures

X-ray diffraction



Ash Mineralogic  
composition

TGA-DSC



Thermal  
behaviour

### OPTIMIZING EXISTING METHODS AND DEVELOPING NEW TESTS

Laborelec is constantly investing to optimize existing methods of analysis and develop new tests to better address operational issues relating to biomass combustion.

### ANALYZING A WIDE RANGE OF FUELS RAPIDLY AND WITH PRECISION

We carry out rapid and precise analysis, encompassing a wide range of biomass fuels, including white wood pellets, wood chips, black pellets, agricultural residues, SRF pellets, and alternative biogenic streams. The quality of our laboratory work is assessed externally each year.

### SUPPORTING THE DEVELOPMENT OF NEW STANDARDS

We also actively support the ongoing development of new test standards by participating as experts in the work of CEN TC 335 and ISO TC 238 for solid biofuels.



### **SUPPORTING DEVELOPERS OF CONVENTIONAL AND DISTRICT HEATING SYSTEMS AND BIOMETHANE PLANTS**

Laborelec offers invaluable expertise to biomass plants developers, recognizing biomass as a crucial resource for generating green energy. We offer services for a wide range of installation types, including conventional power plants, district heating systems, and biomethane plants.

#### **Assistance prior to and during plant development**

— Acting as owner's engineer, we carry out pre-feasibility and feasibility studies, defining technical specifications, conducting risk assessments, and assisting in supplier selection for handling, milling, pelletizing, and drying equipment, as well as burners and flue gas treatment systems.

We meticulously evaluate suppliers, reviewing their designs and technical solutions to facilitate project planning and execution, while mitigating potential technical risks.

### **EXPERT SAFETY STUDIES FOR LOWER RISK AND SAFER OPERATION**

Laborelec offers comprehensive safety support for biomass projects, ensuring compliance through expert safety studies. We conduct collaborative hazard identification (HAZID) and hazard & operability (HAZOP) studies with developers, operators, and equipment suppliers. We then draw up proposals aligned with ATEX regulations, including zoning definitions in conformity with IEC 60079.

#### **Identifying hazards and developing safety protocols**

— Through meticulous analysis and risk assessments, we identify potential hazards and develop robust safety protocols to mitigate risk in existing plants as well as new projects. Clients benefit from making informed design choices, minimizing the risk of unexpected failures and outages, and putting in place robust safety measures for optimal hazard detection and prevention.

# ABOUT LABORELEC

A leading expertise and research centre with operations over the whole energy value chain, Laborelec draws on the skills of 370 specialist engineers and technicians, the company supports large numbers of customers in the areas of power generation, transmission, distribution, storage, and final use, with a particular focus on the energy transition and achieving net zero carbon.

Laborelec is the only service provider totally independent from equipment manufacturers in the global energy business, allowing the company to make unbiased recommendations.

In addition to operational assistance, we manage complementary R&D projects, allowing us to stay abreast of latest developments, with direct benefit to the support we offer customers.

As part of a larger group engaged worldwide, Laborelec also has access to a wider range of knowledge and services within ENGIE to better respond to customer needs.

## ABOUT THE LABORELEC BIOMASS LAB

With over 30 years' experience in converting conventional power plants to biomass, the Laborelec biomass lab follows closely the evolution of sustainability standards, nurturing contacts with local regulators, and actively participating in various working groups on subjects like ISO norms, sustainability standards, and biomass ash valorization.

The lab supports the entire biomass energy production value chain, from feedstock sourcing and characterization to regulatory compliance and safety assessment.

It draws its strength from teamwork and the multidisciplinary collaboration of experts ready to tackle the most complex biomass-related problems.

## CONTACT

Want to know more? Email us at [biomass.laborelec@engie.com](mailto:biomass.laborelec@engie.com).





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## FIVE REASONS FOR YOU TO CHOOSE LABORELEC

- Wide range of technical competencies in Electricity Generation, Grids, and End-Use
- Increased profitability and sustainability of your energy processes and assets
- Unique combination of contract research and operational assistance
- Independent advice based on certified laboratory and field analyses all over the world
- More than 60 years of experience

### WOULD YOU LIKE TO KNOW MORE?

[ENGIE Laborelec](#)

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