



 **LABORELEC**

# [ ANALYSIS OF BIOMASS ]

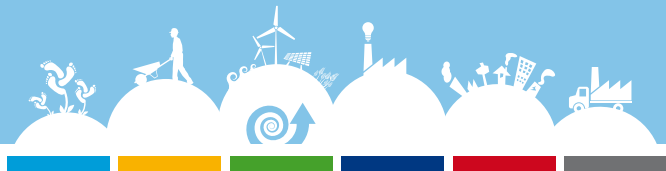
[ Optimising combustion and reducing drawbacks

- Analysis of solid biofuels
- Ash composition
- Pollutants quantification
- Expert advice



# [ THE NEED FOR ANALYSIS ]

## [ Operational problems anticipated



### [ Basic features of fuels: also true for biomass

Operating a boiler and controlling the combustion processes typically depend on knowledge of the fundamental properties of the fuel. Calorific value, humidity rate and ash content are typical examples of primary fuel attributes. As biomass is currently present in significant concentrations in fuel mixes, its basic features certainly influence the overall properties of the blend.

### [ Minimising drawbacks

Producing green energy requires careful consideration of the drawbacks of biofuels. For example, slagging, fouling and unexpected corrosion are typical disadvantages associated with use of biomass. Also, as heavy metals and other pollutants in flue gases are subject to strict environmental rules, their presence needs to be quantified.

### [ New laboratory for fast and reliable results

A thorough knowledge of biomass essential properties calls for chemical and physical analysis. Laborelec specific analytical facilities enable a fast and accurate assessment of the complete set of chemical and physical parameters of interest.



# [ SAFE AND SUSTAINABLE USE OF BIOMASS ]

## [ Beyond the analysis ]

### [ **Calorific Value** ]

The essential concern of boiler operators is to get heat. As the quantity of heat extracted is directly linked to the calorific value, determining this value is a basic step before using or purchasing a fuel.

### [ **Emissions: Nitrogen & Sulphur** ]

Besides CO<sub>2</sub>, boiler exhaust gases principally contain the so-called NO<sub>x</sub> and SO<sub>x</sub>. The production of these pollutants is directly linked to the presence of nitrogen (N) and sulphur (S) in the fuel mix. This explains why a precise quantification of N and S is needed or required for environmental reasons.

### [ **Slagging, Fouling & Corrosion** ]

Depending on the chemical composition, the melting point of ash varies substantially. This may result in the formation of ash aggregates or deposits in the boiler, which decrease the thermal efficiency. In some circumstances, boiler pipes also may get coated with glassy, corrosive layers. For all these issues, preliminary chemical analysis helps to assess the compatibility of biofuels for boilers.

### [ **Trace elements** ]

The quantification of trace elements is an important factor for different issues related to biofuels. Major examples are the valorisation of fly ash and the compliance with environmental constraints.

### [ **FAST RESULTS AS AN ESSENTIAL BENEFIT** ]

Taking decisions about purchasing fuels or fixing operational problems like slagging in a boiler cannot be put aside for months or weeks. As a consequence, a good laboratory must be able to deliver results within the shortest period of time after a sample has been received.

At Laborelec, the different analyses have been integrated into the whole analytical chain so as to minimise the so-called "time to report delivery".



*Corrosion of boiler pipes*

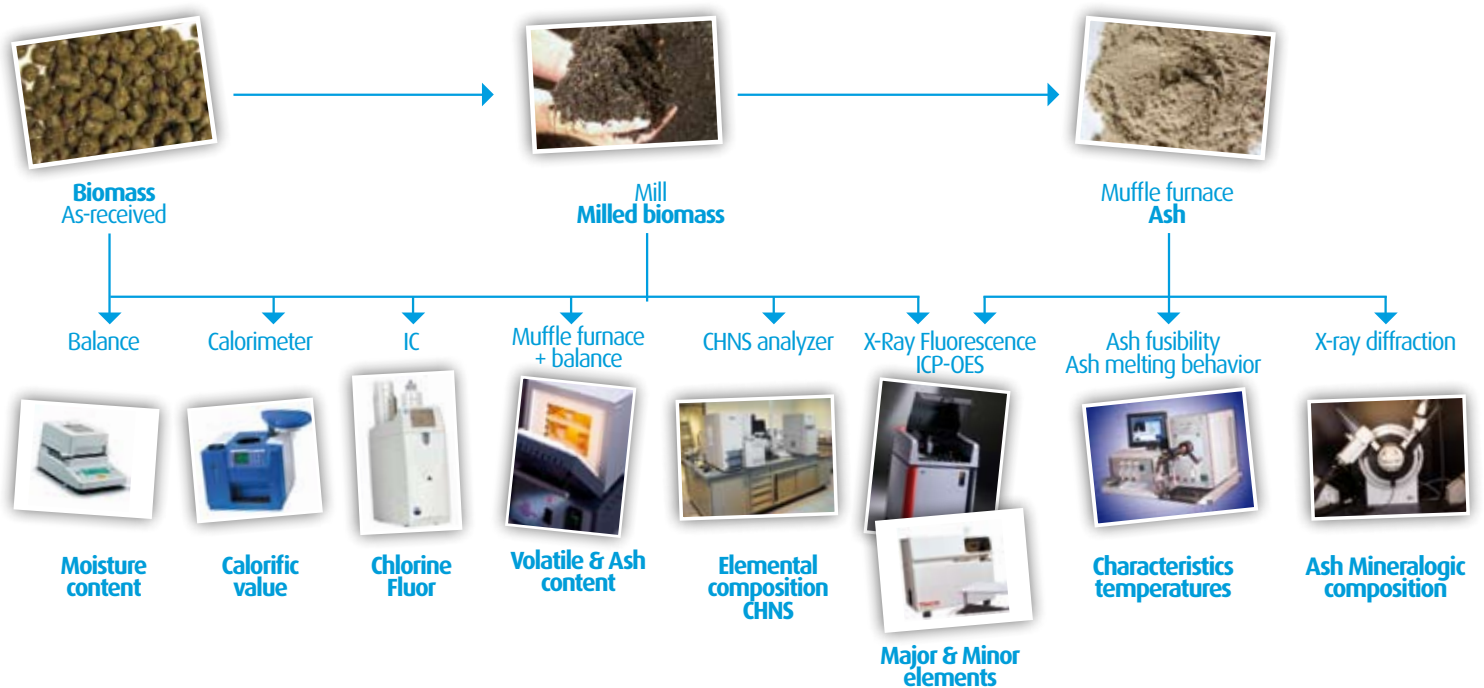
*Severe slagging inside a boiler*



# [ THE ANALYTICAL PACKAGE AT A GLANCE ]

## [ From raw biomass to analytical report ]

### Solid biofuel analysis



- Calorific value – CEN/TS 14918 : 2005.
- Moisture content – CEN/TS 14774-1 : 2004.
- Volatile content – CEN/TS 15148 : 2005.
- Particle size distribution – CEN/TS 15149-1 : 2006.

- CHN – CEN/TS 15104 : 2005.
- Chlorine & Fluorine content – CEN/TS 15289 : 2006.
- Sulphur content – CEN/TS 15289 : 2006.
- Minor & trace elements – CEN/TS 15297 : 2006.

- Ash content – CEN/TS 14775 : 2004.
- Major elements – CEN/TS 15290 : 2006.
- Ash melting behaviour – CEN/TS 15370-1 : 2006.

### [ RESEARCH AND STANDARDISATION OF ANALYTICAL METHODS ]

#### [ Biofuels are not coal ]

Analysis of coal has been investigated for decades. As a consequence, laboratories specialised in coal analysis make use of internationally recognised standards (ASTM, ISO or others). The case of biofuels differs: many aspects have not yet been completely examined and a lot of research is still on-going.

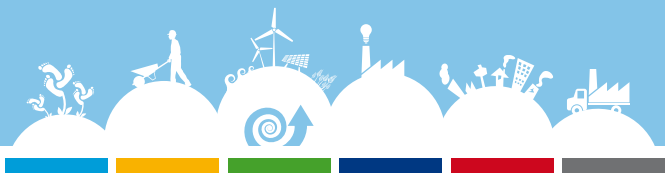
Laborelec follows the most recent Technical Specifications from the European Committee for Standardisation (CEN). In this way, we do not simply reproduce the classical schemes used for coal analysis. Current CEN technical specifications will soon be converted into official European Standards (EN, European Norm).

Besides the routine analyses, Laborelec also runs internal R&D projects on new analytical procedures. Finally, Laborelec experts also follow developments at international level, e.g. the EC funded projects BIONORM II and QUOVADIS.



# [ COMPETENCE CENTRE BIOMASS ]

[ Expert advice is more than just an analytical report ]



**Chemical analysis as such would not be that useful if it were not used as a tool to respond to industrial needs. Besides analysis, Laborelec also offers a broader range of biomass-related services. The quality of these is guaranteed by a unique combination of know-how in chemical analysis, combustion optimisation and material corrosion processes.**

## [ Fuel specifications ]

Cost, local environmental constraints, type of mill available and boiler design all have to be considered when selecting the best type of biomass in a particular case. Laborelec Biomass Competence Centre provides assistance in these matters.

## [ Milling tests ]

When a new type of biofuel is intended to be used in an existing power station, milling tests are used to verify that the existing mills will be compatible with the new biomass. Laborelec performs such tests on different types of biomass, using hammer mills or roller mills.

## [ Other services ]

The Competence Centre offers assistance for a variety of other industrial issues related to the use of biofuels. Examples are the global design of injection lines and materials corrosion problems.

## [ MODELS & SIMULATIONS ]

### [ Cheap & quick ways to get first estimates ]

Computational Fluid Dynamics (CFD) is a powerful tool to optimise the way boilers are operated. Laborelec makes use of CFD to get estimates of:

- the  $\text{NO}_x$  production level,
- the temperature profiles inside the boiler,
- the amount of unburned fraction.

In this way, CFD helps identify locations in the boiler where slagging and corrosion are most likely to occur. Other advantages of CFD are the capacity to optimise the different air flows and to find out the best locations to inject the biomass fraction of the fuel mix.

Laborelec experts also make use of other types of simulations to estimate the slagging and fouling propensity and the ash valorisation potential.



## [ FIVE REASONS FOR YOU TO CHOOSE LABORELEC ]

- You have one-stop shopping for your energy related services
- You get access to more than 40 years of experience
- You increase the profitability of your installations
- You benefit from independent and confidential advice
- You are supported by a recognized and accredited laboratory



The Technical Competence Centre  
In energy processes and energy use  
From innovation to operational assistance

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