



Signature of a research contract on 2nd generation biofuels

press release

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Research & Development at Air Liquide

With its **1,000 employees of 35 different nationalities**, spread over its eight main centres in Asia, Europe, and the USA, **Research & Development** creates sustainable value for Air Liquide and its customers by exploring new technological territories to address the challenges facing the Group and society.

Air Liquide has just signed a **partnership agreement** with the CEA (Commission for atomic energy and alternative energies in France) aiming to develop a **second generation biofuel production pilot unit** in France.

As part of this partnership, the CEA will develop a chain of processes – on the Bure (Meuse) - Saudron (Haute-Marne) site, and in the CEA-Grenoble centre – for grinding, pressurising, measuring, and transporting **solid biomass (wood** in particular) in order to inject it into a burner, with a view to minimising the energy used for this pre-processing.

For this project, Air Liquide will develop a new **combustion** technology that uses a **burner** running on **oxygen** instead of air. This pressurised, high-temperature oxygen combustion will make it possible to **transform solid biomass directly into synthesis gas**.

The synthesis gas made by this process can then be processed to ultimately produce **an extremely pure and energy-efficient synthesis fuel**.

All of the R&D work related to pressurised combustion with oxygen will be carried out in Air Liquide's Research Centres in **Paris Saclay (France), Frankfurt (Germany), and Newark (USA, Delaware)**, as well as in partnership with international research institutes.

This work will contribute to the eventual emergence of a new sector for **creating value from this biomass through second generation biofuels**.

As part of its policy to reduce greenhouse gas emissions in Europe, the European Union has set an objective of 20 % of renewable energies used within the EC by 2020. Unlike first generation biofuels, second generation biofuels use agricultural and forestry waste, without competing with food usage.

François Darchis, Senior Vice-President and a member of Air Liquide's Executive Committee, commented: **"We are delighted about this research partnership with the CEA, which is a leading French player in the field of energy. Air Liquide is involved in concrete projects that aim to develop cleaner energies: second generation biofuels and hydrogen energy will help to reduce CO₂ emissions in the coming years. Innovation is at the core of Air Liquide's strategy."**

Second generation biofuels

Second generation biofuels have no impact on food requirements, as only agricultural and forestry by-products are needed to produce them. These biofuels, which are characterised by their high level of purity and the absence of sulphur, not only have excellent combustion properties for motors, but they also generate **less greenhouse gas emissions during use** than standard fuels.

***Air Liquide is the world leader in gases for industry, health and the environment**, and is present in **80 countries** with **close to 50,000 employees**. Oxygen, nitrogen, hydrogen and rare gases have been at the core of Air Liquide's activities since its creation in 1902. Using these molecules, Air Liquide continuously reinvents its business, anticipating the needs of current and future markets. The Group innovates for the good of society while delivering profitable growth and consistent performance.*

***Innovative technologies** that curb polluting emissions, lower industry's energy use, recover and reuse natural resources or develop the energies of tomorrow, such as hydrogen, biofuels or photovoltaic energy... Oxygen for hospitals, home healthcare, fighting nosocomial infections... Air Liquide combines many products and technologies to develop valuable applications and services not only for its customers but also for society.*

***A partner for the long term**, Air Liquide relies on employee commitment, customer trust and shareholder support to pursue its vision of sustainable, competitive growth. The **diversity** of Air Liquide's teams, businesses, markets and geographic presence provides a solid and sustainable base for its development and strengthens its ability to push back its own limits, conquer new territories and build its future.*

***Air Liquide explores the best that air can offer to preserve life, staying true to its Corporate Social Responsibility and sustainable development approach**. In 2012, the Group's revenues amounted to **€ 15.3 billion** of which 82% were generated outside France. Air Liquide is listed on the Paris Euronext stock exchange (compartment A) and is a member of the CAC 40 and Dow Jones Euro Stoxx 50 indexes.*