

Pirelli Ambiente

The company

Pirelli Ambiente is the **Pirelli Group's company** formed at the start of 2005 following the integration of the operations of Pirelli & C. Ambiente and Cam Tecnologie. Pirelli Ambiente is in the business of providing **solutions for the environment and for sustainable development**.

Technology with low environmental impact

Pirelli Ambiente can offer the market a vast range of products offering a low environmental impact and a high-tech content of the highest order. Thanks to the work at **Pirelli Labs** – the Group's centre for advanced research – the company can unwaveringly focus on products and processes that are increasingly eco-compatible and on innovative solutions, for example in the fields of material science, the production of alternative energy, or "clean" energy sources.

3 business areas

Pirelli Ambiente is composed by three companies active in different business areas:

- **Pirelli Ambiente Renewable Energy** - Energy recovery from waste and renewable sources
- **Pirelli Ambiente Eco Technology** - Technology for sustainable development
- **Pirelli Ambiente Site Remediation** - Environmental remediation.

Pirelli Ambiente Renewable Energy – PARE

PARE's HQ-SRF

In the field of renewable energy sources and, in particular, of energy recovery from MSW (Municipal Solid Waste), **Pirelli Ambiente Renewable Energy**, in cooperation with Pirelli Labs, has developed and patented a **HQ-SRF (High-Quality Solid Recovered Fuel)**, the unique features of which are its composition and the way it is used. The Pirelli HQ-SRF is obtained by adding a number of components with a high calorific power to dry solid urban waste. It can be used to partially replace fossil fuels in already existing, non-dedicated, plants, such as **cement works** and **thermal power plants** and it yields significant benefits that are both environmental (recovery of energy from waste and lower emissions) and economic (lower waste disposal costs).

Feasible for U.S. and good value

In 2005 a report by **ECC (Earth Engineering Center) of Columbia University** confirmed the full feasibility of Pirelli's HQ-SRF in the U.S. while, in the same year, a study realized by **IEFE (Institute of Economy and Politics of Energy and Environmental)**, **Bocconi University**, stated that HQ.SRF enables the lowest costs among renewable energy sources.

Idea Granda and Life Cycle Assessment

The integrated system promoted by Pirelli Ambiente is successfully used by three years in the Cuneo Provincial Authority Area, where **Idea Granda** – a company controlled by Pirelli Ambiente (49%) and by Acsr (51%), a local municipally owned service provider – is operating. The **energy recovery** from waste in the area increased from **0 to 32%**, higher than the Italian and the European average levels, 7 and 27% respectively. Furthermore, according to the **Life Cycle Assessment** Study validated by **Milan-Bicocca University**, overall environmental benefits assessed at **90 and 72 times better** than the alternatives like landfill and incineration plants respectively.

In UK with
ReEnergy

In November 2005 PARE has signed an agreement with **ReEnergy Group** plc for the exploitation in the **United Kingdom** of Pirelli's patented SRF.

Clinton Global
Initiative 2006

The **Clinton Global Initiative**, the project of the William J. Clinton Foundation, bringing together a community of global leaders to implement innovative solutions to some of the world's most pressing challenges, has selected and approved **PARE's commitment** in the section Climate Changes. PARE's Commitment **is to reduce 5 million tons of CO2 over 3-5 years** through the production and sale in Europe, North America and Asia of HQ-SRF (High Quality Solid Recovered Fuel),

Pirelli Ambiente Eco Technology – PAET

Alternative fuels
and technologies

Success with technology for sustainable development can be claimed by **Pirelli Ambiente Eco Technology** thanks to the experience built up over many years by Cam Tecnologie in low environmental-impact fuels and through filter technology for particulate matter.

“White
diesel
oil”™

The product that spearheads its range is **Gecam** (its registered logo dubs it as the “**white diesel oil**”). Gecam™ is a low environmental impact fuel, patented by the Group, that reduces the polluting emissions that typify diesel oil - **fine powders** (it guarantees their reduction by about **50%**), **nitric oxides**, and **carbon monoxide**. The product is an emulsion of water (10%) in diesel oil that can be used in diesel vehicles and thermal power plants. The merits of the emulsion are due to the presence of the water, which ensures fuller hydrocarbon combustion, so cutting down on the formation of particulate matter and improving specific consumption.

Effective against
particulates

Countless tests have been carried out on Gecam™ – for example, those performed by centres of excellence in research and in certifying engines and emissions, such as **Ricardo (United Kingdom)** and **TTM (Switzerland)**. More recently, **Laboratori ENI Tecnologie** and **JRC of ISPRA (the EU Research Centre)** demonstrated that use of Gecam™ is able to reduce all the major emissions: **particulate-PM (up to 60%)**, **nitric oxides-NOx (5-6%)**, and **carbon monoxide-CO (over 30%)**

Gecam™ for
public transport
and for other
uses

Gecam™ is the only eco-compatible solution adopted on a large scale in the market operating independently of the service-station network. It keeps **9,000 vehicles on the road throughout Italy and over 1,000 in France**. There are over **80 municipal authorities** where Gecam™ is the chosen fuel for public transport as well as for vehicles used in waste collection, goods carriage, and earth moving. It serves also for heating and in this connection use of Gecam™ is becoming widespread, with over **400 buildings being heated** by it: in addition to about one hundred private apartment blocks, the “white” diesel oil is in demand for heating public buildings (museums, schools, universities, and offices) in numerous towns and cities across Italy.

Economically
competitive

Today Gecam™ is also economically competitive. Indeed, it is available on the market under the same logistical and supply conditions as traditional diesel oil but at a **lower price such that normal operating costs are reduced**.

Filters for PM :
environmental
results

PAET has extended its commercial range by also offering **filter systems for particulate matter**, innovative systems that can **cut diesel-engine emissions of particulate matter by over 90%**, as demonstrated by recent tests performed by the

laboratories of ENI Tecnologie on Euro 2 and Euro 0 town-going buses and by the JRC (Ispra) EU Research Centre on Euro 3 buses.

The technology

The technology is based on filters in **porous silicon carbide**, a material that is uniquely resistant to heat and abrupt temperature changes. **Pirelli Ambiente Eco Technology is able to provide this service for use with all particulate filter technologies:** silicon carbide filters, cordierite filters, etc.

The use of Gecam™, especially that with a low sulphur content, **improves filter system performance** in terms of PM and NOx emissions. Pirelli filter systems may be **adopted for all engine-driven transport – even for Euro 0 vehicles** – powered by fuel with a normal sulphur content and anywhere that diesel engine vehicles are used.

The market

There are **over 200 Euro 0, Euro 2 and Euro 3 buses fitted with Pirelli particulate filters**. They also find application on earth-moving equipment, heavy transport, diesel trains, and electricity generating units.

A new plant in Romania

PAET will build in Romania, from January 2007, the **first plant for the production of original equipment particulate filters**. The new plant will be operative from the second half of 2008, will produce more than 1,300 tons/year of filters.

Research with LiqTech and wide scale

In January 2007 PAET has signed, together with the Danish company **LiqTech**, a **research agreement to improve the performance of Silicon Carbide (SiC)** diesel particulate filters. LiqTech will also support PAET in the development of the technology to produce, on a wider scale, SiC Diesel Particulate Filters for the original equipment market.

Awards

In recognition of its filter system **technology** for particulate matter, **Pirelli Ambiente Eco Technology** has received the "*Premio Innovazione Amica dell'Ambiente 2005*". This important award, promoted by **Legambiente** and by **Lombardy Regional Authority**, is made annually for innovative technologies, processes, products, services and handling systems that yield significant environmental improvements. The company has also received a **Special Award** for its innovative solutions promoted within the ambit of sustainable transport, in particular the **Gecam™** emulsioned diesel fuel, at the **2006 edition** of the **World Renewable Energy Congress (WREC)**, the international conference held in Florence and promoted by the University of Florence and the Centro ABITA (Bioarchitecture and Technological Innovation for the Environment).

Pirelli Ambiente Site Remediation - PASR

A long track record with the Group

As for **environmental remediation**, **Pirelli Ambiente Site Remediation** intends to make available to the market the experience it has gained in this field working with **Pirelli RE** and in connection with the industrial sectors of the Pirelli Group. The company is able to provide **comprehensive handling of remediation process work**.

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