



OFFERING TODAY THE ENERGY OF TOMORROW

PRESS PACK

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Enertime, offering today the energy of tomorrow

Everyday, we are bombarded by the constant debate with global energy supply and the difficult balance between costs to bear, risks to take and the sustainability of choices we are given.

In France, renewable energy development progresses but remains limited due to three factors: the low cost of electricity that does not even allow the replacement of nuclear plants, the lack of visibility in terms of regulations and feed-in tariffs for the main technological fields, and an industrial energy policy that has been giving historical priority to centralized power production.

It is within this context that Enertime has set two targets: to establish the company on an engineering and consulting market in Renewable energies by becoming a key player for industrial clients, while also developing technology for electricity production from renewable sources that is competitive and innovative while remaining accessible to entrepreneurs-engineers.

Expecting to find renewable energy solutions that are economically viable on a tough market, Enertime sees to take advantage of this handicap to develop, on French land, a technical solution that requires no subsidy, for both France and global markets.

This technical solution is based on the thermodynamic cycle called Rankine cycle, in memory of the 19th century Scottish scientist who theorized it. Thanks to standard modules built around a turbine-alternator set, it allows electricity production from several heat sources with a stronger reliability and lower maintenance. This also allows for it to free itself from usual steam cycle weaknesses and its avatar, the Hirn cycle, widely used in steam power plant (coal, biomass, nuclear).

These ORC (standing for Organic Rankine Cycle) machines bring economically reliable answers to problems in industrial countries as well as developing countries, especially for energy efficiency in the industry, through recovering waste heat and access to energy for everyone using biomass and thermodynamic solar power.

First ORC machines from Enertime will have an output of 1 MW electrical. The initial installation, on an industrial site for waste heat recovery on a steel furnace in a foundry, should reduce electrical consumption of the site by 30%. The second one may soon produce its first kWh from thermodynamic solar power near Themis power plant and Odeillo's solar kiln. This power plant will determine how tomorrow's energy from thermodynamic solar power can be both competitive and reliable, when adapted to people's needs in regions where solar energy is the main available resource.

Activities and sectors

Enertime grows around two core activities:

- Design, manufacturing, selling and implementation of turnkey Organic Rankine Cycle power plants.
- Engineering and consulting for industrial energy production from resources such as biomass, biogas and photovoltaic solar energy.



Biomass, biogas and
photovoltaic solar power plants

Products and services

Design, manufacturing and implementation of ORC power plants

Sectors:

- Design of turbine (with specialized partners)
- Power plants up to a few MW using Biomass and CSP Solar resources especially for non connected sites (isolated grid)
- Power plant recovering Waste heat on industrial processes
- Power plant recovering Waste heat on Diesel engine exhausts

Technology:

- Module 200°C – 1MWe « ORCHID », under development
- Other innovative modules under investigation – Please contact us

Engineering and consulting

Sectors:

- Biomass power plant with steam cycle or ORC, biomass boiler
- PV solar power plant on site or on large industrial roofs
- Electrical valorization of biogas
- Thermodynamic Solar Power plant
- Waste heat recovery in industrial processes

Services:

- Owner's engineering (feasibility, contracting, follow up on construction)
- Engineering and technical assistance
- Follow up on regulatory studies – Tenders
- Engineering consulting (with specialized partners)
- Market studies, consulting
- Technico-economic auditing – Expertise and due-diligence

ORC technology

ENERTIME develops power generating systems called Organic Rankine Cycle machines, which convert heat from renewable resources such as biomass, geothermal sources, Concentrated Solar Power or Waste Heat Recovery, into electricity.

Organic Rankine Cycles work just like steam power plants (for example, nuclear, coal and biomass power plants, etc.). The difference lies in the use of an organic fluid (cooling, hydrocarbon, etc.) as working fluid in replacement of water. The use of an ORC instead of a steam cycle is accommodating for low temperature and/or small-scale power plants.

Organic Rankine Cycle technology is a mature technology and ORC modules are already available on the market. Enertime first module is innovative for several reasons: the fluid used in the module is non-flammable and non-toxic which makes its use adapted in industrial environments. Enertime module also has the ability to operate autonomously in replacement of diesel generators not connected to the electricity grid or with operation problems.

Enertime first ORC module called ORCHID, focused primarily in the market of waste heat recovery in industrial processes and markets for access to energy in developing countries when associated with biomass boilers or Concentrated Solar collectors.

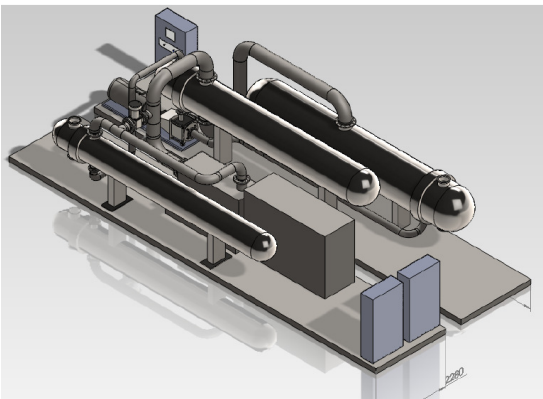
Enertime has been recognized by French Ministry of Science as a Jeune Entreprise Innovante (Innovative start-up) since October 2009 due to its activity in Research & Development for the implementation of Organic Rankine Cycle technology for biomass, thermodynamic solar power and waste heat recovery.

The ORCHID module

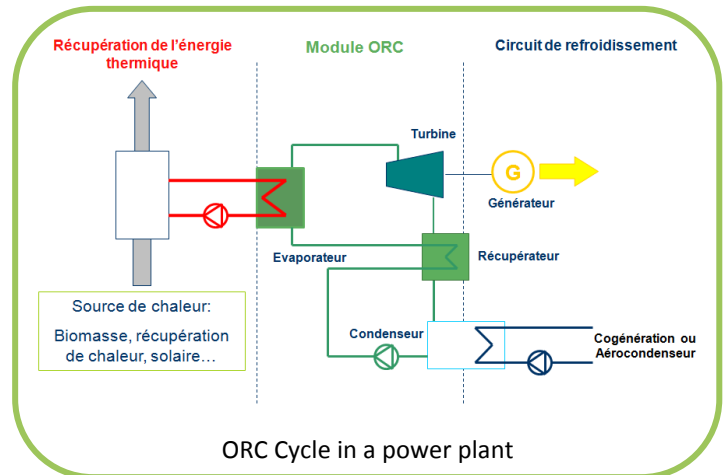
The machine currently under development is an electro-generator built to operate with medium temperatures (200°C) using a non-toxic and non flammable fluid to produce electricity in industrial environments and on isolated sites when associated with biomass boilers or Concentrated Solar collectors. These power plants will be a reliable alternative to continuously running diesel generators.

This module will be different from competitors' thanks to the following characteristics:

- ✓ Its unique capacity within the current market to operate with applications not connected to the grid for pure electricity generation (replacement of diesel generators in developing countries).
- ✓ The numerous industrial applications for available waste heat recovery in high energy consuming industries and waste incinerators in France and Europe.
- ✓ Its high efficiency in electro-generation (around 17% gross).
- ✓ Its use of new organic fluids more performing and non-flammable/non-toxic.
- ✓ Its robust and simple design based around an axial turbine developed by Enertime in partnership with *Arts et Métiers ParisTech*.



ORCHID module under development



ORC Cycle in a power plant

Flagship projects

Enertime collaborates with AMI TOTAL/ADEME, a subsidized program for energy efficiency in industrial processes to manufacture its first 1 MW ORC module. It will be implemented on a cupola hot blast furnace in the FMGC foundry in Western France (Soudan, Loire-Atlantique), to valorize waste heat into electricity.

Enertime collaborates with the AMI ADEME Thermodynamic Solar Power together with French company EXOSUN and CNRS PROMES laboratory in Perpignan to implement à 1 MW ORC plant using concentrated solar power as heat source.

The company

Created in March 2008 by Gilles David (Supelec 1982, ex COO of AREVA Bioenergies) and Fabien Michel (Centrale Paris 2005), the company consists of 11 employees and 3 partners for a turnover of 620 k€ and a balanced net profit on the second financial year (2010). The team of young, multidisciplinary engineers has been recruited from the best engineering schools in France (ECP, ESE, ENSTA, ESSTIN, ESA Angers). Several employees boast double diplomas from international universities.

Company headquarter is located 62-64 rue Jean Jaurès in Puteaux (92800), France.

Enertime has activities running in Europe, in French overseas territories, in Asia and Africa.



Enertime team

Model

Enertime reconciles engineering and consulting activities with competencies of project development and an innovative technological offer. The company aims to give the market a solution to produce electricity with renewable energies that is competitive against traditional solutions. Combining consulting with project development in renewable energies brings a unique knowledge of the market and the client's needs. This field experience brings new ideas for solutions better adapted to the market. This includes ORC modules in replacement of diesel generators or waste heat recovery on industrial kilns.

The diversity in technologies for industrial production or renewable energy, each of which has its own market, led Enertime to pursue different technologies and energy sources. Enertime's skills include technical expertise in processes, identification of renewable resources, regulatory aspects in project development and detailed design of power plants. Enertime focuses this expertise for the valorization of several energy resources: solar, biomass, biogas, waste heat recovery and in some cases, hydro power. This model proves to be particularly pertinent in the current French renewable energy markets in which companies need to diversify their activities to keep growing.

Previsions

Together with engineering and consulting activities, Enertime seeks to become an industrial ORC manufacturer. The 2014 target turnover is over 10 M€ with a net profit over 1 M€.

Company philosophy

Enertime is a small scale company SAS (*Société par Actions Simplifiée*) with a capital of 90,930€ of which every permanent employee holds shares.

Enertime's ambition is to create today the renewable energy for tomorrow through:

- Innovation to improve access to energy for the masses.
- Valorization of existing sustainable resources.
- Supporting our clients towards a clean and carbon free production of energy.

For example, Enertime refuses to use agricultural land for the implementation of on-field solar plants. We also always study the supply plan of each biomass power plant developed by the company. By doing this, we confirm the availability of sustainable biomass resources and focuses in particular on power production not connected to the grid and industrial scale solutions to promote access to energy.

Partner laboratories and experts

- ✓ The Thermodynamics laboratory of Liège University in Belgium, for the conception and optimization of ORC systems.
- ✓ The fluid dynamics laboratory DYNFLUID of Ecole Nationale Supérieure des Arts et Métiers in Paris (today called *Arts et Métiers ParisTech*) for conception of turbomachines.
- ✓ CNRS PROMES laboratory in Perpignan for the study and conception of thermal storage systems.
- ✓ CEA LITEN laboratory in Grenoble for innovative technologies of heat exchangers.

International

Since its creation in 2008, Enertime has been focused towards international markets. This strategy comes from those who have a strong, active interest in the success of the company and its future goals. The founders, as well as the engineering team members, have spent a significant amount of time abroad, either for professional experience or during graduate studies. Gilles David, Enertime's President, has worked 20 years abroad including 5 years as Sales Director of Cegelec/Alstom Hydroelectric Power Plant division followed by President of Alstom in the Philippines. It is in this country that Enertime signed a partnership with the local company Novergy who represents Enertime in the archipelago. Fabien Michel, Enertime's cofounder, Director and partner, has spent a year in Brazil for Areva Bioenergies, where he specialized in Biomass cogeneration project development in Latin America.

Today, the engineering team members speak 7 languages and deal with clients in Africa, South-East Asia, the Caribbeans and in Europe.

This global open minded view is coupled with a strategy for innovation targeting competitive applications without subsidies, allowing a smooth development of societies, with less impact from regulated markets.

International references (1)

Confidential client, [Western Europe](#), July – November 2011:

Economic analysis of biomass power plants in order to develop a tool to audit potential projects.

Agence Française de Développement, [Sahel](#), December 2010 – January 2011:

Comparative study for power supply to a city not connected to the national grid with photovoltaic power plant + diesel engines vs Concentrating Solar Power + heavy fuel oil. Study of power storage solutions.

Kingdom of Morocco – Centre for the Development of Renewable Energies, [Morocco](#), December 2010 – Present:

Identification of a business portfolio for renewable energy assets in 3 Moroccan provinces. Study performed in partnership with local company Team Maroc.

Agro-Food industry, [Hungary](#), December 2009 – June 2010:

State of the art of spent wash combustion in biomass boilers.

International references (2)

Investor, South-East Asia, October 2010 – March 2011:

Market study and Identification of a business portfolio for renewable energy assets (biomass, biofuels, solar) for a European investor.

French industrial, Brazil, June 2010:

Technical diagnosis of thermodynamic cycles for bagasse cogeneration plants in sugar and alcohol factories in Brazil.

Agence Française de Développement, Thailand, August – November 2010:

Mission of consultancy on the assessment of innovative biomass projects in Thailand: context analysis; meeting with project developers; definition of *Best practice* criteria to provide financial support to the projects.

Agence Française de Développement, Egypt, July – September 2010:

Technical assistance for the audition of a specification to perform a feasibility study for a 20 MWp solar plant, on behalf of *New and Renewable Energy Authority* (NREA), Egypt.

UNIWAX, Textile Factory, Ivory Coast, April – July 2010:

Feasibility study for a cogeneration biomass power plant / biomass steam boiler valorizing feedstock from rubber tree plantations.

ENERVANTAGE/CAPIZ Sugar, Philippines, January – October 2010:

Feasibility study for a bagasse cogeneration plant in a sugar mill in the Philippines.

Investor, Europe, July – August 2010:

Evaluation of operational and technical aspects of a >20MWe biomass cogeneration plant business plan in Europe.

Agro Food industry, Poland, December 2009 – May 2010:

Feasibility study for a cogeneration biomass power plant or a biomass steam boiler using energy crops and forest biomass.

Agro-Food industry, Hungary, December 2009 – June 2010:

State of the art of spent wash combustion in biomass boilers.

Industry, Philippines, December 2009 – January 2010:

Feasibility study for the valorization of waste heat from kilns into steam or electricity and for the substitution of actual wood boiler using for drying purpose in a Philippine activated carbon factory.

FFEM (Group Agence Française de Développement), Central Africa, September 2008 – May 2009:

Technical assistance for biomass cogeneration power plant projects in central Africa for the valorization of wastes from saw mills.