France Creates a Cutting-Edge Solar Institute

Solar R&D Center Institut Photovoltaïque d'Ile de France (IPVF) and French Government Sign Financing Agreement

Paris, October 29, 2013 – The IPVF and the French National Research Agency (ANR) have signed a six-year, €18.5 million financing agreement that allows the institute to start operating and endorses the content of its scientific programs. The IPVF is an initiative of Total, French electric utility EDF, the French National Center for Scientific Research (CNRS) and Ecole polytechnique engineering school, alongside Air Liquide, Horiba Jobin Yvon and Riber. The ANR operates it on behalf of the government agency for investment policy, Commissariat Général à l'Investissement (CGI), under the Efficacity research program to help cities meet future energy targets.

Jean-François Minster, Senior Vice President, Scientific Development at Total, will serve as the IPVF's first president: "**The Institute aims to make France a global leader in solar energy and to shape the future landscape of photovoltaics. We must support the energy transition by speeding up the development of affordable, efficient solutions."**

Research activities aim to improve existing technologies and develop new concepts. They comprise five scientific programs, focusing on:

- Materials for high-efficiency silicon cells.
- High-efficiency, thin-film solar cells made using chalcogenide materials.
- New concepts for a competitive photovoltaic industry.
- A multidisciplinary program on advanced characterization techniques, theory and modeling.
- A program dedicated to environmental impact studies.

An engine of national and European Union policies to develop renewable energies, the IPVF stresses teaching and the training of specialists so that it can become a recognized center of excellence. It has a total budget of €150 million and is scheduled to start construction in 2014 on the Paris-Saclay campus. In 2016, the Institute expects to have nearly 200 researchers from the private sector and partner public research centers and will host teachers and Master's and doctoral students. It will form partnerships with the other Saclay research clusters, the major global solar manufacturers, and small business and industry in the Greater Paris area.

About Total

Total is a leading international oil and gas company with operations in more than 130 countries. It is also a world-class chemical producer. Its 97,000 employees put their expertise to work in every part of the industry — exploration and production of oil and natural gas, refining and marketing, new energies, trading and chemicals — to keep the world supplied with energy, both today and tomorrow.

Total is striving to diversify its supply to help meet growing energy demand in the long term. Through SunPower, it is a global leader in the solar industry. Additionally, Total is actively engaged in many R&D projects focusing on renewable energies, in particular solar energy and biomass. Total was a driving force in the creation of the IPVF.

Total's R&D activities are designed to continuously improve energy-related processes. It now has 22 R&D centers worldwide and filed more than 250 patents in 2012. Total conducts an active R&D policy through an international network of top-tier partnerships with laboratories and innovative start-ups, to promote the development of efficient, competitive new technologies.

To learn more, go to www.total.com

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About EDF

The EDF Group, one of the leaders in the European energy market, is an integrated energy company active in all areas of the business: generation, transmission, distribution, energy supply and trading. The Group is the leading electricity producer in Europe. In France, it has mainly nuclear and hydraulic production facilities where 95.9% of the electricity output is CO2-free. EDF's transmission and distribution subsidiaries in France operate 1,285,000 km of low and medium voltage overhead and underground electricity lines and around 100,000 km of high and very high voltage networks. The Group is involved in supplying energy and services to approximately 28.6 million customers in France. The Group generated consolidated sales of € 72.7 billion in 2012, of which 46.2% was achieved outside of France. EDF is listed on the Paris Stock Exchange and is a member of the CAC 40 index.

In the field of renewable energies, the EDF Group is investing massively in R&D in order to identify technological gaps with significant competitive stakes and to contribute to developing the most promising industrial and commercial solutions. In particular, since 2005 EDF has invested with the CNRS and Chimie ParisTech in a Combined Research Unit: the IRDEP (Institute of Research and Development on Photovoltaic Energy), in order to create a centre of excellence dedicated to research on new-generation PV cells.

For more information: www.edf.com.

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About the CNRS

The *Centre National de la Recherche Scientifique* (National Center for Scientific Research) is a public organization under the responsibility of the French Ministry of Higher Education and Research.

Founded in 1939 by governmental decree, CNRS has the following missions:

- To evaluate and carry out all research capable of advancing knowledge and bringing social, cultural, and economic benefits for society.
- To contribute to the application and promotion of research results.
- To develop scientific information.
- To support research training.
- To participate in the analysis of the national and international scientific climate and its potential for evolution in order to develop a national policy.

As the largest fundamental research organization in Europe, CNRS carried out research in all fields of knowledge, through its seven institutes:

- Institute of Biological Sciences (INSB)
- Institute of Chemistry (INC)
- Institute of Ecology and Environment (INEE)
- Institute for Humanities and Social Sciences (INSHS)
- Institute for Information Sciences and Technologies (INS2I)
- Institute for Engineering and Systems Sciences (INSIS)
- Institute of Physics (INP)

And three national institutes:

- National Institute for Mathematical Sciences (INSMI)

- National Institute of Nuclear and Particle Physics (IN2P3)
- National Institute for Earth Sciences and Astronomy (INSU)

CNRS encourages collaboration between specialists from different disciplines in particular with the university thus opening up new fields of enquiry to meet social and economic needs. CNRS has developed interdisciplinary programs which bring together various CNRS departments as well as other research institutions and industry.
For more information: http://www.cnrs.fr/
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About the École Polytechnique
Largely internationalized (30% of the student body, 20% of faculty members), École Polytechnique combines research, education and innovation at the highest scientific and technological level. Its three graduate programs –Ingénieur Polytechnicien, Master's and PhD – are highly selective and promote a culture of excellence with a strong emphasis on science, combined with humanist traditions. École Polytechnique educates responsible men and women who are prepared to lead complex and innovative activities which will meet the challenges of 21st century society. With its 21 laboratories, all joint research facilities with the National Center for Scientific Research (CNRS), the École Polytechnique Research Center works to expand the frontiers of knowledge in the major interdisciplinary issues faced by science, technology and society. As a ParisTech member institute, École Polytechnique is also one of the driving forces behind the Paris Saclay Campus project, along with its 22 academic and scientific partners.
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About Air Liquide
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.
Air Liquide is the leader in special gases and liquid precursors necessary for solar cell manufacturing, serving more than 110 customers, 8 of which are among the top ten world players. To satisfy and anticipate the customer needs, Air Liquide invent new molecules and processes. In 2012,
Air Liquide installed in its Paris-Saclay Research Center a pilot line to produce solar cells and a characterization platform.They are currently available for IPVF research activities.
With more than 1000 researchers, in 3 continents, R&D creates value for Air Liquide and its customers by exploring new technological territories to address the challenges facing Society.
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About HORIBA Jobin Yvon

Jobin Yvon is a french optics heritage company, founded in 1819 to polish Agustin Fresnel's original mirrors. Now an international SME with 600 people (including 300 in France) and a turnover of 100M€, the company is a world leader on its niche markets, diffraction gratings, Raman spectroscopy and spectrofluorescence.
Since 1997, it belongs to the Kyoto based Japanese group HORIBA (1B€ and 5000p, including 1700 in Europe), active in automotive test systems, environmental monitoring, medical diagnostic, semicon equipment and scientific instrumentation.
HORIBA Jobin Yvon opened on the campus of Ecole Polytechnique in Paris Saclay cluster, a new 6500m^2 facility, housing it R&D centre and the European headquarter of HORIBA.
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About RIBER
Riber designs and produces molecular beam epitaxy (MBE) systems as well as evaporation sources and cells for the semiconductor industry. This high-technology equipment is essential for the manufacturing of compound semiconductor materials and new materials that are used in numerous consumer applications, such as new information technologies, OLED flat screens and new generation solar cells.
Implementing its expertise in the field of ultra-thin layers deposit, RIBER has developed a range of high capacity cells allowing its industrial customers to lay down accurately large quantities of complex and corrosive materials, necessary to manufacture new generations of CIGS technology thin layer solar cells.
Riber recorded €27.4 million in revenues in 2012 and employs 111 people. The company is ISO9001 certified. Riber is listed on NYSE-Euronext Paris, Compartment "C", and is part of the CAC Small, CAC Mid & Small, CAC Technology and CAC T. HARD. & EQ indices. Riber is one of the best-rated companies in the Gaïa-index, the leading SRI index for French mid-caps.
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