

# FRANCE CLEANTECH REVIEW 2012



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This executive summary is an extract of GreenUnivers annual study «Panorama des cleantech en France 2012» (60 pages) covering 10 main cleantech sectors in France (solar, wind, clean transportation, waves and tidal, green chemicals, biomass, biofuels, smart grid and green building, efficiency, recycling, energy storage). The whole study (in French) can be downloaded for free on GreenUnivers.com here <http://www.greenunivers.com/observatoire/panorama-des-cleantech-en-france-2012/>.

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## FOCUS ON INDUSTRY

**2011 saw significant change in clean technology in France: sectors including solar and onshore wind power lost ground, while government support focused on the most promising industrial sectors allowing other areas such as smart meters and offshore wind power to grow in importance. While financial investors opted for caution, the large groups looked to expand through major acquisitions. These focused efforts may not pay off fully in 2012, but they will lay firm foundations for subsequent years.**

### THE MOST ACTIVE INVESTORS

**The large French groups** were particularly aggressive in clean technologies in 2011. Many of those that were already present in the sector reinforced their positions through international acquisitions. They included Total (solar power, biofuels), Schneider Electric (energy efficiency, smart grid), Saint-Gobain (green buildings) and Alstom (marine energy). Other groups also demonstrated great ambition, among them Mersen (solar power) and Technip (marine energy). They are set to continue expanding in these sectors in 2012, but doubtless with a greater measure of caution in their investments.

In the prevailing climate of fiscal restraint, the **French State and local authorities** continue to support clean technology, but are focusing their aid on the most promising sectors for growth and jobs. The sun has, accordingly, gone down on solar power, while the smart grid and sustainable mobility are receiving significant support. And ADEME, France's Environment and Energy Management Agency, which holds the purse strings in the cleantech segment of the Investments for the Future programme, is poised to step up its efforts in 2012: it is expected to commit more than €800 million to 60 projects in the first half of the year.

**Venture capital funds** are keeping a low profile: their commitments fell by approximately 30% in 2011. They amounted to €150 million over the first three quarters, and are expected to reach between €180 million and €190 million over the full year, according to our estimates, compared with €262.6 million in 2010. Many unspecialised funds were hurt by regulatory change and the crisis in solar power, which sparked numerous bankruptcies.

Similarly, **infrastructure funding** (solar power plants, wind farms, etc.) by banks and specialist funds is feeling the brunt of the financial crisis. Investments are not expected to dry up in the short term in France, but they will be focused on projects that demonstrably create value, that offer long-term visibility and for which the investment is sufficiently sized. As such, growth will probably continue, but at a slower pace.

### STATE OF PLAY AND OUTLOOK IN KEY SECTORS

#### 1) The most promising sectors

##### Smart grid

In 2011, the government confirmed a large-scale migration

to the Linky smart meter. This marks a first step that will put France in a strong position in Europe, especially since funding is provided at the same time for demonstrators aimed at achieving better grid management and since France boasts a number of world champions (Alstom Grid, Schneider Electric, etc.). ERDF (a subsidiary of EDF) is on the front lines in the installation of 35 million Linky meters, having pledged €4.3 billion to the project. But adjustments, above all regulatory, will be needed before the market can really take off. In addition to Linky, investments to develop smart grids, ranging from the management of power lines to meters in private homes, are poised to increase in the coming years: France's Energy Regulatory Commission (*Commission de régulation de l'énergie* – CRE) says that investments totalling €15 billion on power grids will be needed by 2030.

##### Green buildings and energy efficiency

Despite the numerous mechanisms in place, the government acknowledged in 2011 that France is not keeping up with the objectives set at the Grenelle Environmental Forum in 2009: the improvement in energy efficiency by 2020 compared with 2005 should reach only 17%, versus a target of 20%. New measures have been taken to speed up progress, such as the new RT 2012 thermal regulation being ushered in: it provides for energy consumption in new buildings to be cut by two-thirds compared with 2005 levels. Renovation work is also expected to accelerate, with a target of 400,000 units renovated per annum as of 2013. Thanks to this framework, and despite the overhaul of a number of incentives (reduction in sustainable-development tax credits, increase in VAT on renovation work, etc.), the sector looks promising. Within the very sizeable energy-efficiency market, the lighting segment, including light emitting diodes (LEDs), is doing particularly well, with several French start-ups taking up positions (Lucibel, HomeLights, Neolux).

##### Electric vehicles and ecomobility

Electric mobility is still struggling to establish itself. In France, registrations of electric vehicles stalled at 2,630 units in 2011, according to the French Automobile Manufacturers Committee (*Comité des constructeurs français d'automobiles* – CCFA) – a modest outcome, but nevertheless one of the highest numbers in the world. France ranked number two in Europe behind Germany in the first half of 2011. Government objectives – 400,000 electric or plug-in electric vehicles by 2015 – will undoubtedly be difficult to meet, and the sector still needs a significant reduction in costs. But orders from local authorities and businesses, and the establishment

of car-sharing schemes in cities – such as the Autolib' project in Paris – are driving the market. The gradual deployment of recharging stations on roadsides and in public car parks should also foster the adoption of electric vehicles. Other forms of sustainable mobility, such as carpooling, are also gaining ground.

## 2) The rising stars

### Offshore wind power

France has at last launched its offshore wind power programme; the call for tenders for the installation of 3 GW closed on 11 January. Winners will be announced in April 2012, and work installing the first wind turbines is expected to start in 2014-2015. A second call for tenders, again for installed capacity of 3 GW, is due in the spring. While France's objectives are much more modest than those of its more ambitious neighbours in Britain (42 GW ultimately) and Germany (31 GW), the move nevertheless represents a significant milestone. Behind the initial call for tenders, which will lead to industrial investments of around €10 billion, the country aims to build an industrial sector capable of winning a place among the global majors. France's biggest energy companies (EDF EN, GDF Suez, etc.) have formed consortia with manufacturers (Alstom, Vinci, Areva Wind, etc.), while a veritable web of subcontractors hope to benefit from the contracts.

### Marine energy

France aims to become a world leader in marine-energy technologies (tidal and wave power, ocean thermal energy). Its goal is to create an industrial sector offering at least 11,000 jobs. Factoring in floating wind turbines, current projects represent more than 10 GW. R&D investments in renewable marine energy are expected to total between €600 million and €1 billion in 2012. The most progress has been made in tidal power, where the goal is to have 100 turbines up and running by 2018. Several experiments are underway, involving large groups (EDF, DCNS, etc.) and a number of start-ups, such as Sabella.

### Green chemistry

Representing less than 8% of the chemicals industry in France, plant chemistry, which uses renewable raw materials instead of oil, is still in its early stages. But the goal is for biomass to account for 15% of supplies by 2017, and 20% by 2020. The sector is starting to take shape, under government impetus. The first two institutes of excellence in carbon-free energy – technology hubs built around this theme – are devoted to green chemistry: Pivert in Compiègne (Oise) and Indeed in Lyon (Rhône). The major chemicals companies (Rhodia, Arkema, etc.) are also moving into this field, alongside agro-industrial groups (Roquette, Sofiprotéol, etc.). They often work with innovative SMEs (Global Bionergies, Eviagenics, etc.) that have raised funds to finance their expansion.

### Biofuels

Roughly €2 billion have been invested in France over the past 20 years to build first-generation biofuel production facilities, which will largely dominate the sector until 2020. France aims to produce second-generation bioethanol by 2015

and biodiesel by 2017. A first G2 bioethanol demonstrator came into service in October 2011, and the launch of a pilot biodiesel plant is slated for 2013. The 2020 target is for 200 ktoe of G2 biofuels. However, a number of barriers – regulatory, not to mention the operation and collection of biomass – remain. Among the key players, Total has limited its investments to new generations of biofuels. Major agricultural groups (Tereos, Champagne Céréales, etc.) have also entered the segment, and 2011 also saw the rise of dynamic start-ups (Fermentalg, Biométhodes, Deinove, etc.).

### Energy storage

This highly promising market is still in its very early stages, and the great majority of French companies involved in the sector are working on pilot projects. Storage is intended above all to lift the obstacles to the mass development of intermittent energies, especially solar and wind power. In France, the main projects undertaken since 2011 have been devoted to stationary storage, especially on islands. Several fledgling companies are in the starting blocks, including McPhy Energy, which is working on a solution based on solid hydrogen.

## 3) The neglected sectors

### Solar power

2011 will go down as a bad year for the French solar-power sector. In March, three months after subsidies were frozen, the government introduced a new system whereby only small roofs (<100 kW) will continue to benefit from feed-in tariffs, but at a lower rate. Larger installations must go through a complex and capped tender process. The target of 5.4 GW of installed capacity by 2020 is ten times lower than in Germany. Ironically, France had never before seen as many photovoltaic installations as it did in 2011: about 1.5 GW were added, bringing the total to 2.5 GW by end-2011. But most of these projects got underway before the reform, and the 2012 numbers are likely to be considerably lower. The new environment triggered a series of bankruptcies, including that of Photowatt. On a more positive note, French champions are emerging in the global solar-power league tables: Total has acquired SunPower, number two in solar technology in the US, and Soitec is becoming a force to be reckoned with in concentrated photovoltaics.

### Onshore wind power

In the first nine months of 2011, 606 MW (79 farms) were connected, 30% less than during the same period in 2010. France's wind-power capacity was 6,576 MW at the end of the third quarter of 2011, across nearly 600 farms, an increase of only 10% compared with end-2010. Wind power accounted for 2.2% of national electricity consumption, a very modest level compared with Germany, Spain or Denmark. France's Commissioner General for Sustainable Development expects the country's wind market to rebound in 2012, with 391 projects with total capacity of 6.4 GW in the queue as of end-September 2011. But the Renewable Energy Association (*Syndicat des énergies renouvelables*) reckons that the pace could slow in the second half of 2012, on the back of a steep decline in the number of building permits issued since mid-2011. This, it believes, undermines the Grenelle Environmental Forum goal of 19 GW by 2020.



### 4) Sectors in full stride

#### Water

Water is still France's leading environmental industry in terms of activity and employment (112,000 jobs). The country's two market leaders, Veolia Environnement and Suez Environnement, are also dominant in the global market. The water sector is enjoying renewed interest, with the two leaders testing more intelligent water-management systems, and a stable of start-ups attracting interest from investors (Sources, etc.). New alliances are also emerging, as witnessed by the m2o city project associating Veolia and Orange in remote water-meter reading.

#### Waste and recycling

Despite a constrictive body of legislation, France is finding it hard to catch up with the European leaders in waste recovery. Government incentives have nevertheless helped bolster the recycling market – with €250 million still to come as part of the Investments in the Future programme. 2011 was a record year, with sales estimated at more than €13 billion, thanks to rising raw-material prices. But the sector could well fall victim to the economic crisis in 2012, with a slowdown already affecting industry giants Veolia Environnement and

Suez Environnement. Consolidation, which gathered pace in 2011, is expected to stall in 2012. Lastly, France harbours ambitions in respect of biogas: it aims to double the recovery of such waste by 2015. Electrical and electronic waste is another promising sector, and an attractive area for start-ups (Magic Recycle, etc.).

#### Biomass

The chief renewable energy source in France, biomass accounts for more than one-third of the growth potential of renewable energy by 2020, driven by the wood-energy sector. The feed-in tariff was cut in 2011, but ADEME's Heat Fund (*Fonds Chaleur*) contributed to the launch of 1,638 installations, 357 of which in biomass, between 2009 and 2011. Twenty-five new projects were selected in 2011. For 2012, ADEME's call for projects aims to allow the generation of 125,000 toe per annum, and France's CRE is due to launch a new call for tenders for biomass power plants. Areva has opened its first plant in France, joining the race alongside established heavyweights such as GDF Suez and Dalkia. The commissioning of large installations is likely to drive pellet production. Producers are raising funds to finance their expansion: Moulinvest and Cogra held successful IPOs in 2011. ■

# FRANCE'S CLEANTECH CHAMPIONS

**French groups showed their conquering spirit in clean technologies in foreign markets in 2011: Total acquired SunPower, America's second-ranking manufacturer of solar panels; Schneider Electric stepped up its acquisitions in energy efficiency and the smart grid; Alstom injected more money into BrightSource, a specialist in solar-thermal energy. And ambitious newcomers such as Mersen and Technip are also taking up positions. In 2012, large groups are expected to continue focusing on green business areas in their quest for sources of new growth. Spotlight on developments among the most active players.**

## 1. RENEWABLE ENERGIES & BIOFUELS

### AIR LIQUIDE

The leading global supplier of industrial gases used in the manufacture of photovoltaic panels, Air Liquide announced in September 2011 the establishment of an R&D line specialising in the manufacture of photovoltaic cells on its Saclay site, near Paris, to work on improving performances and reducing manufacturing costs. The amount of the investment was not disclosed.

2011 saw Air Liquide win numerous international contracts, particularly in China, consolidating its position as a supplier to six of the seven leading manufacturers of crystalline silicon solar cells.

### ALSTOM

Alstom's order book in the renewable-energy sectors, bolstered in large part by international hydropower contracts, topped €1 billion as of end-September 2011.

Alstom has joined forces with EDF Energies Nouvelles to respond to France's call for tenders in the offshore wind-power sector. If it wins at least 1 GW of the 3 GW up for competition, the group plans to invest as much as €100 million in plants in Saint-Nazaire (Loire-Atlantique) and Cherbourg (Manche) to produce its 6 MW turbines. Alstom, whose aim is to become a leading worldwide manufacturer of offshore wind turbines, is also in the running to build offshore wind farms in Britain, where it has plans to build an assembly line, as well as in Germany and Belgium. It also aims ultimately to enter the American and Chinese markets.

In onshore wind power, the group won a contract worth nearly €200 million for the construction and maintenance of three wind farms in north-eastern Brazil, home of its first Latin American production facility, in the state of Bahia, with generation capacity of 300 MW, commissioned in late November.

In solar power, the group has increased its stake in American player BrightSource (solar-thermal energy), investing a further €75 million, on top of the €55 million invested in 2010. The group now owns 17.8% of BrightSource, which is currently building Ivanpah, the future world's biggest solar-thermal power station, in California. Alstom is positioning itself more broadly as a turbine supplier for large solar-thermal power stations.

The group is also one of France's pioneers in marine energy: it has acquired a 40% stake in AWS Ocean Energy, a Scottish company that develops technologies using wave energy.

**Outlook:** Alstom is working on a 6 MW offshore wind turbine. The test phase for prototypes is scheduled for 2012, the launch of the pilot series is planned for 2013 and standardised production for 2014. This year, the group is also due to test its first 1 MW tidal turbine prototype, known as Beluga 9, designed as part of the Orca project, led by Alstom and involving 13 other industrial or research entities. A second tidal turbine is slated for testing in 2013-2014.

### AREVA

Areva Renouvelables, the nuclear group's renewable energy division, reported sales of €109 million in the first nine months of 2011, and its order book stood at €1.8 billion across all sectors (wind power, biomass, etc.) as of end-September. In wind power, its Areva Wind subsidiary has already secured firm orders for 600 MW, and expects an additional 600. Areva is part of two consortia formed to respond to France's call for tenders in the offshore wind-power sector: for the three northernmost regions, it is partnered with GDF Suez and Vinci; for the two southernmost, it has teamed up with Iberdrola and Eole-RES. The group has also selected Le Havre (Seine-Maritime) to build a 500 MW plant costing roughly €100 million if it wins at least two of the five regions up for competition.

The group is betting on solar-thermal energy, with its 2010 acquisition of Ausra, an American company founded in Australia. But its growth in this sector, which has become less competitive than photovoltaics, has been slow. It won its first substantial contract in 2011, with Australia's federal government, for the construction of a 250 MW solar-thermal power station. Subsidised by the government, the project is worth a total of about AU\$1.2 billion.

In biomass, Areva has taken 100% control of its Brazilian subsidiary Koblitz. After winning numerous international contracts (Chile, Thailand, Netherlands, etc.), Areva signed a €45 million initial contract to build a biomass plant in France.

**Outlook:** Areva is awaiting the results of France's first tender in the offshore wind-power sector. The group is aiming to achieve sales of €1 billion in renewable energies

in 2012, and to install more than 120 units of its new M5000 wind turbine by 2013. The group is also considering a €7.5 million investment to double the capacity of its wind turbine plant in Bremerhaven, Germany.

### **AXA (via its AXA Private Equity fund)**

AXA Private Equity, which aims to become a major player in renewable energy, had roughly 700 MW of installed capacity (wind, hydro, solar) in Europe in 2011. Kallista Energy, a wind-power operator acquired by the group in 2009, bought Poweo's French wind farms. This increased its generation capacity from 194 MW to 296 MW as of end-2011.

The fund has also set up the TRE Solar joint venture, in which it owns a 65% interest, alongside the Italian group Tozzi, to invest in solar projects in Italy. Three solar farms with capacity of 38 MW have already been purchased.

### **EDF Energies Nouvelles**

EDF Energies Nouvelles (EDF EN), one of the world's 10 biggest renewable-energy groups, became a wholly-owned subsidiary of EDF in 2011, which spent €1.55 billion to buy out the 50% it did not already own. The group had 3.48 GW of installed capacity worldwide as of end-June 2011, including 2.98 GW of onshore wind capacity (381 MW in operation in France). It invested more than €1.2 billion in its growth in 2011, and expects 2012 and 2013 to be very good years.<sup>1</sup>

In offshore wind power, EDF EN has set up a consortium with Alstom and Dong Energy to respond to France's call for tenders. It is bidding in four regions, and has formed partnerships with developers on specific sites: WPD Offshore (Fécamp and Courseulles-sur-Mer regions), Poweo EnR (Courseulles-sur-Mer and Saint-Brieuc) and Nass&Wind Offshore (Saint-Brieuc and Saint-Nazaire). In onshore wind power, the group has signed a framework agreement with Vestas to supply turbines between 2012 and 2014.

In solar power, where it is France's biggest operator, EDF EN had capacity totalling approximately 160 MW as of end-2011. It installed 90 MW in 2011, thanks chiefly to the Gabardan plant in the Landes region (67.2 MW).

EDF EN has focused on its solar- and wind-power activities since its disposal of Supra (biomass).

**Outlook:** EDF EN hopes to capture at least 1.5 GW in France's call for tenders in the offshore wind-power sector. In solar power, it is due to bring several new plants into service by June 2012: Toul (Meurthe-et-Moselle), with capacity of 115-135 MW; Crucey-Villages (Eure-et-Loir), with capacity of 60 MW (as opposed to 96 MW under the initial plan); and Massangis (Yonne), with capacity of 56 MW. But its major 260 MW project in Beaucaire (Gard) is still pending. The company aims to have installed capacity totalling 4.2 GW

worldwide, in solar as well as wind power, by end-2012.

### **GDF SUEZ**

GDF Suez has a number of renewable-energy subsidiaries: La Compagnie du Vent, CNR, etc. Its onshore wind-power capacity in France reached 1 GW in early 2012.

In offshore wind power, the group has teamed up with E.ON and Vinci to respond to France's call for tenders in four out of five regions: Le Tréport (Seine-Maritime – 750 MW open), Courseulles-sur-Mer (Calvados – 500 MW), Fécamp (Seine-Maritime – 500 MW) and Saint-Brieuc (Côtes d'Armor – 500 MW). In turbines, it is partnered with Areva in the first three regions and Siemens in the fourth.

In solar power, as of end-September 2011, the group had installed capacity of 37 MW, with a further 4 MW under construction in Corsica, and a project portfolio representing approximately 400 MW in development.

Via its Cofely subsidiary, GDF Suez has acquired 100% of Ne Varietur/Socram, which manages heating networks in France. It holds more than 40% of this market.

**Outlook:** GDF Suez aims to increase its installed renewable capacity by 50% by 2015 compared with 2009. In onshore wind power, the group aims to double its capacity to 2 GW by 2016.

### **MERSEN**

The former Carbone Lorraine is firmly committed to renewable energies: one of its main activities is the supply of graphite materials for the manufacture of solar cells.

In 2011, the group aimed to generate €100 million in sales in this sector, particularly in solar and wind power<sup>2</sup>, up from €82 million in 2010.

**Outlook:** by 2013, Mersen hopes to derive 25% of its sales from the renewable-energy markets.

### **SAINT-GOBAIN**

The group's solar-power division, Saint-Gobain Solar, is Europe's leading producer of solar roof tiles, and also specialises in glass for solar cells and mirrors for solar-thermal power stations. In 2011, it began the construction of a mirror production facility (Fresnel lenses) in Arizona, for future solar-thermal power stations in the western part of the US. The group is also present in the production of thin-film photovoltaic panels (copper-indium-selenium, CIS) via its Avancis subsidiary, which had increased its generation capacity from 20 MW to 120 MW as of end-2011.

Saint-Gobain Solar has joined forces with Cap Vert Energie, a producer of renewable energy, for roughly 20 projects incorporated into existing buildings in the south of France, with

total capacity of nearly 3 MW. The company also provided the photovoltaic roof tiles for the largest power plant incorporated into existing buildings in France (8.8 MW), on the Saint-Charles logistics platform in Perpignan (Pyrénées-Orientales), inaugurated in 2011.

### TECHNIP

Harbouring ambitions in marine energy, France's leading oil-services group officially launched its Vertiwind floating wind-turbine project, in association with Nénuphar, Converteam and EDF Energies Nouvelles, in January 2011. Its objective is to design, manufacture, install and test a pre-industrial prototype of a vertical-axis floating wind turbine. On 1 August 2011, Technip officially launched its operations in offshore wind power, signing a memorandum of understanding with Iberdrola to respond to France's call for tenders in two of the five regions up for competition. Technip has also acquired Subocean, a Scottish group specialising in underwater cables for the offshore wind sector.

### TOTAL

Total has become a global giant in solar power since its acquisition of a 60% stake in US manufacturer SunPower for \$1.38 billion. It has also increased its stake in French panel-maker Teneosol to 100% (excluding its overseas operations, which were kept by EDF), from the initial 50%. At the end of 2011, Total merged Teneosol and SunPower (580 MW of generation capacity in mid-2011 and 2 GW planned by 2014). It has also invested in several US solar companies, including Konarka.

In biofuel, the group has invested \$105 million in an R&D programme with Amyris, an American company in which it holds a 17% stake, for the development of next-generation biofuels. The two companies have also foreshadowed the creation of a joint venture in 2012, which will have exclusive rights to produce and market biodiesel and biokerosene. It will also have non-exclusive rights to other products derived from renewable sources. Total has also acquired a 5% stake in Coskata, a US company that converts waste into bioethanol.

**Outlook:** Teneosol, which generated 85 MW in 2011, plans to increase its capacity to 110 MW in 2012. Total has also built a 50 MW solar power plant in Moselle, due to start production in 2012. The Shams Power Company joint venture, in which Total holds a 20% stake, is set to start building one of the world's largest thermal power stations, with capacity of 100 MW, in Abu Dhabi (UAE). Work is due to be completed in 2013. Lastly, the group plans to double the cell production capacity of its Belgian subsidiary Photovoltech, co-owned with GDF Suez, from 140 MW to 280 MW by end-2012.

### VEOLIA ENVIRONNEMENT

Eolfi, a Veolia Environnement subsidiary specialising in the development and operation of solar and wind power

plants, has partnered with Réseau Ferré de France (RFF) to install solar projects on some of its land, via a joint venture known as Aïrefsol Energies. But Veolia Environnement has withdrawn from Eolfi Asset Management, the management company specialising in funding wind farms developed by its parent company, Eolfi.

### VINCI

The group has partnered with Areva and GDF Suez to respond to France's call for tenders in the offshore wind-power sector. In solar power, Vinci Energies is to develop and operate an 8 MW onshore plant in Guadeloupe for Energy Caraïbes.

## 2. GREEN BUILDINGS & ENERGY EFFICIENCY

### BOUYGUES

In 2011, Bouygues launched the first home-energy monitor marketed with an Internet box in France. The service uses a platform developed by Ijenko, a start-up in which Bouygues is a shareholder. Bouygues Immobilier and Alstom have set up a joint venture, Embix, to develop energy-management and -control services for eco-neighbourhoods. One of its important projects is the IssyGrid pilot.

### SAINT-GOBAIN

Saint-Gobain now owns 100% of American company Solar Gard, a manufacturer of solar-control films that can reduce energy consumption, which owns a plant in Belgium and another in California. It is also targeting the smart-glass market, where it reinforced its presence by acquiring US player Sage in 2010.

### SCHNEIDER ELECTRIC

Schneider aims to be a world leader in energy efficiency and smart grids. It stepped up its acquisitions in 2011, with a view to expanding its presence. In the US, it spent €190 million to acquire Summit Energy, the leader in the market for energy audits. In India, it took a 74% stake in Luminous Group, a maker of inverters for solar and wind power plants, as well as storage solutions, for €215 million. In Spain, Schneider successfully closed a friendly €1.4 billion takeover bid for Telvent, a software publisher specialising in real-time management of critical infrastructures in energy, transport and water management. In China, the group acquired Leader Harvest Power Technologies, a specialist in energy-efficient industrial motors, for €450 million.

## 3. WATER MANAGEMENT & RECYCLING

### SUEZ ENVIRONNEMENT

Suez Environnement reported sales of €10.9 billion for the first nine months of 2011, an increase of 8.3%. Sita, its



# Developing clean technologies together



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French waste-management subsidiary, has signed contracts with large industrial groups including Renault (€240 million, two years) and Magnetto (€85 million, seven years).

In water, Suez Environnement is partnering GE Energy, a subsidiary of General Electric, to develop intelligent management solutions in large cities. Its Ondeo Systems subsidiary, which specialises in water-management information systems, currently generates sales of nearly €50 million<sup>3</sup>, and is expected to quadruple that number over the coming five years.

### VEOLIA ENVIRONNEMENT

Veolia Environnement, the world leader in environmental services, reported consolidated sales of €23.9 billion in the first nine months of 2011, an increase of 15.8%. The group has embarked on a wide-ranging asset-disposal programme to pay down its debt. It plans to withdraw from nearly 40 countries, and has signalled the closure of its operations in the regulated water sector in Britain and in solid waste in the US in the next two years.

Veolia Environmental Services generated sales of €7.3 billion in the first nine months of 2011. In France, growth came to 5.1%, thanks in large part to prices for recycled raw materials. In water management, the group has set up a joint venture known as m2o city with Orange, via its Orange Business Services division. Veolia's stake is 80%. m2o city offers remote meter-reading services and solutions aimed at optimising water use. It has won a contract in Greater Paris, where it plans to deploy 550,000 communicating water meters.

**Outlook:** m2o city is to be gradually phased in on sites operated by Veolia Water in 2012. Five million water meters are due to be operational within ten years<sup>4</sup>.

## 4. CO2 CAPTURE & STORAGE (CCS)

### ALSTOM

Alstom, which aims to become the world leader in the CCS market, signed in September 2011 an agreement with state-owned Chinese group Datang to develop two demonstration projects. The first will be built on a future coal-fired plant with capacity of 350 MW in Daqing, in northeast China, and the second on a 1,000 MW plant at Dongying, roughly 400 kilometres east of Beijing. The group has already committed to 16 demonstration projects worldwide.

### TOTAL

Total's tests on CO2 capture and injection at its site in Lacq (Aquitaine), in partnership with IFP Energies Nouvelles and Air Liquide, are due to continue until July 2013.

## 5. TRANSPORT & ECOMOBILITY

### BOLLORE

Bolloré's shared electric-car service, Autolib', is currently get-

ting underway in Greater Paris. Bolloré has invested €200 million in this project, which will also involve more than €80 million in annual operating expenses. The group hopes to breakeven in seven years. It also owns 100% of Pininfarina Bolloré Electric Vehicles, which produces the BlueCar electric vehicle, following its acquisition of the 50% stake previously held by Italian group Pininfarina. Bolloré has also invested €250 million in a plant manufacturing lithium metal polymer batteries on its Ergué-Gabéric site in Brittany, which is scheduled to be commissioned in summer 2012.

**Outlook:** Bolloré aims to lift its production capacity to at least 20,000 batteries a year, including the capacity of its Canadian plant, by 2013.

### PSA PEUGEOT CITROËN

In May 2011, PSA Peugeot Citroën started marketing its iOn (Peugeot), a cousin of the Citroën C-Zero, which was launched in late 2010. Thanks to these two models, PSA Peugeot Citroën sold more electric passenger vehicles than any other manufacturer in France in 2011 (49% of what remains a very small market, with sales still below 3,000). It won a substantial order for electric vehicles from General Electric, which is to purchase 1,000 vehicles by 2015. The two companies, bound by a cooperation agreement in electric mobility in Europe, are to establish a centre devoted to electric vehicles in France in mid-2012.

PSA Peugeot Citroën is also forging international partnerships to expand its range of electric vehicles (UK, Spain, Germany, etc.). With Germany's BMW, the group plans to set up an R&D centre in Munich and a production site for electric vehicles in Mulhouse, which will become operational in 2015.

### RENAULT

Renault, which aspires to become the world's leading manufacturer of electric vehicles, brought two of its planned four electric vehicles to market in 2011: Fluence Z.E. and Kangoo Z.E.

The manufacturer has beefed up its partnership with Daimler in electric vehicles by means of an agreement providing that the French partner will develop electric motors for Smart and Twingo, while Daimler will supply the batteries. Joint projects include an electric version of Smart, which could be launched in 2013.

In respect of lithium-ion batteries, delays have been logged on the planned facility in Flins (Yvelines): initially scheduled to start operating in 2012, its opening is now scheduled for 2014. The site has also lost the financial support of the government, and will now be managed by Renault's partner, Nissan. And plans for a lithium-ion battery production site in Alveiro, in northern Portugal, have been shelved.

**Outlook:** Twizy and Zoé are due to come to market in 2012. The group plans to invest €5.7 billion on its industrial sites, 40% of which are located in France and where 80% of its electric vehicles will be manufactured, by 2013. Renault has also set the objective of selling a cumulative 1.5 million zero-emission vehicles worldwide by end-2016.

### SNCF

SNCF has put €15 million into a new investment fund specialising in sustainable mobility: Ecomobilité Ventures. Three other large groups are involved in the project, each providing a further €5 million: PSA Peugeot Citroën, Orange and Total. With the new fund now operating, its predecessor, Eco-Mobilité Partenaires, founded by SNCF in 2008, will keep its holdings but cease its investments.

### VINCI

Vinci has sold its 50% stake in Okigo, a company specialising in car sharing, to rental giant Avis.

## 6. SMART GRID

### ALSTOM

Alstom, one of the world's three leaders in grid control systems, is building up its presence in smart grids, through its Alstom Grid subsidiary, born of the acquisition of Areva T&D's transmission arm in 2010.

Alstom Grid made numerous acquisitions in 2011: British company Psymetrix, a specialist in software applications for

controlling and monitoring power grids, and US player Utility Integration Solutions (UISOL), positioned on the adjustment of electricity consumption by demand-response systems. Between April and November 2011, the group won €1.9 billion in contracts, including two major projects in Saudi Arabia and Iraq.

**Outlook:** grid operations relating to offshore wind power accounted for more than 10% of Alstom Grid's 2011 sales, largely in the German and UK markets.

### EDF EN

EDF EN, a wholly owned subsidiary of EDF, is testing a commercial offer relating to Linky in the two regions where the communicating meter has already been rolled out, namely the Rhône and Indre-et-Loire departments. Thirty-five million Linky smart meters are to be installed in France by 2020. ■

(1) Source: GreenUnivers, 9 November 2011.

(2) Source: Interview with Luc Themelin, chairman of Mersen, GreenUnivers, 1 December 2011.

(3) Source: GreenUnivers, 26 May 2011.

(4) Source: GreenUnivers, 28 March 2011.

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**UBIFRANCE**  
**Head office**  
**77 boulevard Saint Jacques**  
**75014 - Paris**  
**France**  
**Tel. : (33) (0) 1 40 73 30 00**  
**[www.ubifrance.fr](http://www.ubifrance.fr)**



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# PUBLIC FUNDING FOCUSED ON INDUSTRY

**The French government is focusing its aid on the industry and research in some key sectors, liable to create the most jobs: electrical mobility, offshore wind power, smart grids, etc. ADEME is to plough €800 million into innovative projects by June 2012. But support for renewable-energy installations, particularly in solar power, will be limited.**

## 1 - ADEME is stepping up its aid to innovative technologies

The government has given ADEME responsibility for managing the Investments in the Future programme in its areas of competence, for a total of €2.85 billion: €1 billion for the vehicles of the future programme; €1.6 billion for "technology demonstrators and platforms, renewable energy and carbon-free power, and green chemistry"; and, finally, €250 million for smart grids.

2012 will be a bumper year for investments made by ADEME through calls for expressions of interest: ADEME's new chairman, Francois Loos, says that more than €800 million will be committed – or rather, awarded, although payments will be staggered – on approximately 60 projects in the first half.

As such, ADEME's spending this year will be considerably above the €140 million pledged in 2011, to which €200 million in commitments in the process of being finalised must be added. The rule governing the Investments in the Future programme is to allocate two-thirds of funds in the form of repayable advances and just one-third in grants.

Of the 43 calls for tender launched by ADEME in 2011, 18 fell within the scope of the Investments in the Future programme, a significantly higher number than in 2012. To date, 24 calls for expressions of interest have been announced, only seven of which are part of the Investments in the Future programme.

The main calls for expressions of interest made as part of the Investments in the Future programme in 2011 were in the following fields: plant chemistry, improving the energy performance of industrial processes and uses, advanced bio-fuels, ecomobility services, intelligent mobility systems using computers, technologies linked to hydrogen and its storage, energy storage, etc.

ADEME also has the possibility of taking minority stakes in innovative companies. It has examined several such companies, but no investments had been made as of January 2012.

## 2 - Oséo: a key role thanks to its €2.44 billion funding capacity

Oséo will play a central role in implementing the Investments in the Future programme, with its funding capacity of €2.44

billion, in the "industrial sectors and SMEs" component. Between 2009 and 2010, 38 projects received assistance totalling €291 million. Industry (energy, transport, environment, etc.) alone accounted for 30% of this amount.<sup>1</sup>

Such aid is invaluable for cleantech companies. In 2011, Oséo invested €6.7 million in the Nexstep project, put together by two SMEs (Scaleo chip and Menta, with the aid of equipment manufacturer Delphi, the CEA and IFP EN), as part of the Strategic Industrial Innovation programme, to develop a chip dedicated to measuring motors' fuel consumption and emissions. Another example is Lucibel (LED), which received €750,000 in aid in the form of a repayable advance.

In 2010, Oséo introduced subsidised green loans to finance "competitive investments meeting the goal of taking environmental issues into account" or to foster the marketing of "products designed to protect the environment and to reduce energy consumption". Companies founded more than three years ago and with fewer than 5,000 employees can take advantage of these loans, in amounts ranging from €50,000 to €3 million.

For SMEs and very small enterprises founded more than three years ago, Oséo and France's Environment Ministry will offer an Eco-Energy loan designed to help companies fund work carried out to generate energy savings, as of 1 February 2012. The loans vary in their amount from €10,000 to €50,000, and are repayable within five years. Oséo plans to distribute €100 million in loans in the early part of 2012.

## 3 - The strategic role of competitiveness clusters

Competitiveness clusters are involved in supporting cleantech industries via company networking and support for collaborative projects (see the various sector reports). In 2011, €259 million in government aid was allocated to 163 collaborative research and development projects, including several dozen attributed to clean technology projects. Public funding was increased by the Single Inter-Ministerial Fund (*Fonds unique interministériel – FUI*), which funds sectors' R&D requests, in the amount of €150 million, as well as €109 million in territorial-authority funding.<sup>2</sup>

As part of the 12th call for projects, launched in March 2011, the government is to fund 79 new projects worth €73 million. Territorial authorities and EU funds are to provide €53 million of this.<sup>3</sup>

#### 4 - Renewable energy: the role of the feed-in tariff is diminishing

**Solar power:** to date, the main form of subsidy for renewable energies (solar roofing and farms, wind farms, biomass plants, etc.) has been the feed-in tariff imposed on EDF. The March 2011 reform of the system of subsidies for solar power limited the use of the fixed and guaranteed feed-in tariff, which was only maintained for small installations (<100 kW), and for which total power is capped every year as part of a "target path" set by the government (see report on solar power). For large solar sites, feed-in tariffs will henceforth be set by tender, in a form of reverse auction launched by the CRE (see report on solar power).

For existing solar installations or those nearing completion, which benefit from the former feed-in tariffs, and for other renewable-energy facilities, the payment of this aid involves the "contribution to public service electricity" (*contribution au service public de l'électricité – CSPE*). This is a surcharge on electricity consumers' bills introduced in 2003, which reimburses EDF and local electricity distributors for the additional cost required to buy renewable electricity at the subsidised rate.

The CRE estimates the CSPE to be collected on electricity bills in 2012 at €4.3 billion, 52% or €2.2 billion of which relating to the purchase of renewable energies. Solar power's share of the total amount is growing: it is set to represent 36% or €1.5 billion in 2012, up from €1 billion in 2011.

The €4.3 billion estimate represents a 23% increase on the €3.46 billion collected in 2011, and growth of 60% compared with 2010. More than half of the increase can be ascribed to solar power. The increase is also attributable, but to a lesser extent, to wind power and higher fuel costs in areas that are not interconnected.

Electricity consumers should already be seeing more than 10% of their bill earmarked for the funding of subsidies to support solar power and other renewables, but the extra cost will remain artificially capped in 2012, and a catch-up will be necessary in subsequent years.

To cover the increase, the CSPE would need to have amounted to €13.7/MWh to finance projected charges in 2013. But the government blocked the tax at €9/MWh until 30 June 2012 and then €10.5/MWh until 31 December 2012. The outcome, according to the CRE, is that EDF could suffer a compensation shortfall of €1.3 billion in 2012, forcing the government to make up the difference.

The government has also launched a call for projects to help companies export to the emerging markets, with funding of €100 million from the Ministry for the Economy.

ADEME's Heat Fund: this can be used to fund between 20% and 60% of the cost of installing new heat production systems using renewable energy (biomass, geothermal energy, etc.). With a budget of €1.2 billion for a period of five years, it

provided support to 755 installations in 2011, for a total of €252 million.

Since the Heat Fund's creation, its support has allowed 1,638 systems to be installed, with total production of 790,000 toe per annum.<sup>4</sup>

On- and offshore wind power: in onshore wind power, the feed-in tariff is unchanged at 8.2 eurocents per kWh during the first ten years. The call for tenders for the development of 3 GW of offshore wind power capacity, closed in January 2012, represents a market estimated at €10 billion for the various players. A second call for tenders is scheduled for mid-2012, covering an additional 3 GW.

ADEME has issued a call for expressions of interest in major wind-power projects as part of the Investments in the Future programme: it aims to support innovation and critical technological building blocks to consolidate the wind-power sector.

#### 5 - Green buildings: tax assistance whittled down, but €750 million for thermal renovation

Green building subsidies have been cut this year. In November 2011, the government announced an additional 20% reduction in the sustainable-development tax credit, a refocus of the interest-free home loan to limit its cost and an increase in VAT on home renovations from 5.5 to 7%.

However, the eco-loan for subsidised housing, aimed at housing bodies and semi-public companies, frozen since May 2011 due to a dispute opposing the government and the Caisse des Dépôts et Consignations, has been reborn: the government has agreed to bear the cost of subsidising the loan, which will now be indexed to the interest rate paid on Livret A savings accounts, and will vary on the basis of the duration of the loan (15 years, 20 years, etc.). This measure is aimed at achieving the Grenelle Environmental Forum goal of renovating 800,000 social housing units by 2020.

In 2012, it will be possible to combine the eco-interest-free loan with a tax credit for households whose incomes do not exceed €30,000 per annum. Its maximum duration is to increase from 10 to 15 years for packages covering three types of work and projects aimed at achieving an overall performance. But as of 1 January 2013, the sustainable-development tax credit will be abolished for new housing, a consequence of the entry into force of the new RT 2012 requirements.

The "Habiter Mieux" ("Better Living") programme launched by the government and the National Housing Agency (*Agence nationale de l'habitat – ANAH*), due to run until 2017, aims to promote the thermal renovation of 300,000 homes whose owners or occupants are having trouble paying their power bills. Funding is borne partly by a national fund set up to encourage thermal renovation, in the amount of €750 million (of which €500 million from the Investments in the Future programme and, ultimately, €250 million paid by energy providers via the energy savings certificate system) and partly by ANAH in the amount of €600 million.



## 6 - Electric vehicles: public procurement and maintenance of the purchase premium

In April 2011, France's central procurement body (UGAP) launched its first call for tenders for electric cars. Three contracts were available, totalling more than 22,000 vehicles for government bodies and large companies. Renault won a contract for 15,637 units and PSA Peugeot Citroën 3,074 units. The third contract was not attributed; covering 3,937 vehicles, it is expected to be the object of a new procedure.

The premium of €5,000 paid on the purchase of (M1) electric cars has also been maintained.

ADEME has launched several calls for expressions of interest relating to clean vehicles, as part of the Investments in the Future programme, including tests on charging infrastructure for electric and plug-in hybrid vehicles; deployment of charging infrastructure for electric and plug-in hybrid vehicles; etc.

## 7 - Smart grid: early subsidies ahead of the launch of Linky

The government has given the green light to the deployment of 35 million Linky smart meters. The investment, borne by ERDF, amounted to €4.3 billion, 40-45% of which for equipment. ERDF hopes to recoup its investment over 20 years thanks to productivity gains. But the regulatory framework securing the business model had not yet been laid out in early 2012. This issue will need to be clarified before the call for tenders for the first batch of meters can be made (see report on smart grids). The government expects the rollout of Linky to create approximately 10,000 jobs in France.

ADEME also freed up a total of €28 million in 2011 to support six projects in the intelligent management of power systems. A total budget of €250 million is planned for this sector. ■

(1) *Five years of innovative collaborative projects: first assessment*, Oséo media statement, 12 October 2011.

(2) *Website devoted to competitiveness clusters* (<http://competitivite.gouv.fr>), 19 December 2011.

(3) *Results of the 12th call for projects for the Single Inter-Ministerial Fund (FUL)*, competitiveness clusters website.

(4) *Heat Fund, assessment and prospects*, ADEME, October 2011.

# VENTURE CAPITAL FUNDS ARE SHOWING GREAT CAUTION

**Venture-capital fund investments in cleantech companies fell by nearly 30% in France between 2010 and 2011.**

2011 was less auspicious for fund raising than 2010. Venture-capital funds invested €182.4 million in cleantech companies, according to the Barometer published by the Cleantech Club of the Association of French Venture Capital Investments (*Association française des investissements en capital risque – AFIC*), prepared on the basis of GreenUnivers data.<sup>1</sup> This amount is down 30% compared to the €262.6 million logged in 2010. There was also a big drop in the number of deals: 64 were finalised in 2011, down from 82 in 2010.

Unspecialised funds, which were very active in 2010, were more circumspect in 2011. Many had put money into solar power, and were discouraged by the sector's setbacks in the wake of the moratorium announced in December 2010, followed by a new and much less favourable set of regulations, resulting in the collapse of numerous young companies (see report on solar power).

## Corporate funds were very active

The players that remained very active include the two big French funds specialised in clean technologies: Demeter Partners, focused mainly on growth capital, with operations in France, as well as Spain, Germany, the US and Belgium; and Emertec Gestion, a provider of seed money. In 2011, Demeter invested in the capital of ACH (green building) and RPI (Renewable Power International, a Spanish company specialising in mini-hydroelectric plants), while Emertec selected HomeLights (LED) and Olygose, a fledgling green-chemistry company.

Corporate funds also remained present. The pioneer, Aster Capital, was founded by Schneider Electric in 2000. It subsequently welcomed Alstom in 2010 and chemicals group Rhodia in 2011. The Aster Fund has €85 million; it is chiefly active in energy efficiency, smart grids and ecomobility.

Blue Orange, the €50 million fund launched by Suez Environnement in November 2010, focused on the water and recycling sectors, did not announce any investments in 2011, although it looked into numerous possibilities.

SNCF, which in 2008 set up the Eco-Mobilité Partenaires fund, owner of shares in six fledgling French companies, launched a new ecomobility fund, Ecomobilité Ventures, in November 2011, in partnership with three other groups, Total, PSA Peugeot Citroën and Orange. The new fund has capital of €30 million, €15 million provided by SNCF and €5 million from each of the other participants. Ecomobilité Ventures will mainly provide seed money, but it could also look into investing growth capital. Similarly, it will not invest solely in France, but will also prospect in other European countries.

## Solar power in decline, biomass and biogas on the rise

While renewables are still cornering the largest slice of investments (€83.5 million in 2011), solar power has become less popular, losing ground to biomass and biogas. Energy efficiency (green buildings) ranks a distant second (€22.8 million in investments).

More traditional sectors such as water and recycling returned to favour in 2011. Funds are showing more interest in green chemistry, which has become a favourite sector for Emertec, while unspecialised fund Sofinnova has signalled its intention of setting up a fund dedicated to this field.

Although seed money is scarce, it could benefit in 2012 from the establishment of the €400 million National Seed Capital Fund (*Fonds national d'amorçage – FNA*), as part of the Investments in the Future programme. This fund, managed by the Caisse des Dépôts via CDC Entreprises, is to make investments in the most promising sectors for the national economy, including environmental technologies.

Many companies are expected to continue looking for funding: according to GreenUnivers' Observatory of Start-ups<sup>2</sup>, 66% of French cleantech companies founded since 2007 have raised growth capital, 33% of them having topped the €1 million mark. And 75% of these start-ups are planning to raise funds in 2012. ■

(1) Quarterly barometer of cleantech fundraising in France, published by AFIC's Cleantech Club, and prepared by GreenUnivers and Ernst & Young.

(2) Observatory of French Cleantech Start-ups, report prepared in September-October 2011, GreenUnivers.

## Change in venture-capital investments in clean technologies in France

	Sums invested (in millions of euros)	Number of companies to raise funds
2009	169	57
2010	262.6	82
2011	182.4	64

Source: GreenUnivers for AFIC Cleantech Club

# INFRASTRUCTURE: INVESTORS LOOKING TIMID IN 2012

## Analysis by PwC

The global environment for the funding of green energy projects remained extremely favourable until the end of 2011, despite the uncertainties stemming from the financial crisis. But 2012 looks set to be more challenging.

### In 2010, growth was driven by new green-energy countries and distributed energy sources

2010 was a record year, with aggregate investments of \$268 billion in assets, research, and mergers and acquisitions, according to Bloomberg New Energy Finance, a 30% increase compared with 2009.

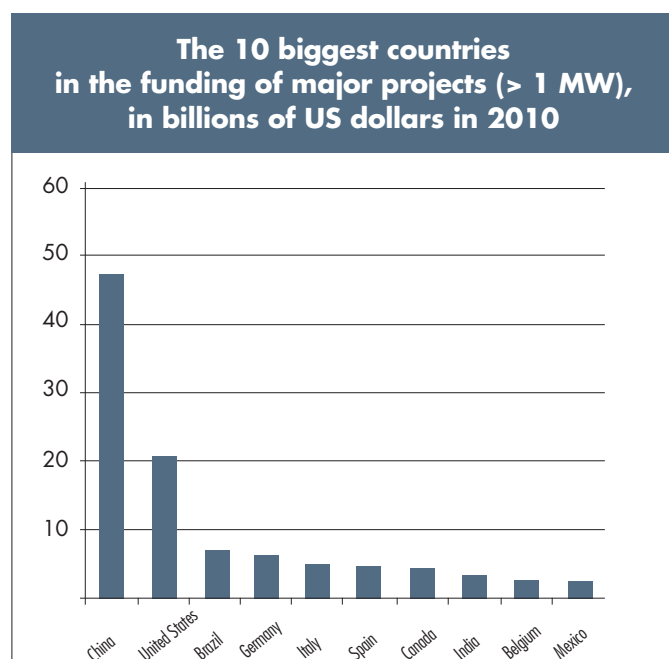
Of this amount, \$58 billion went to M&A, as opposed to €211 billion to assets (small and large installations), R&D, venture capital, etc. New investments in major projects totalled \$143 billion, 66% in wind power and 18% in solar power.

If we add in funding for small installations, the total amount invested increases to \$203 billion, and the share represented by solar power swells to 42%, broadly in line with the proportion going to wind power (47%).

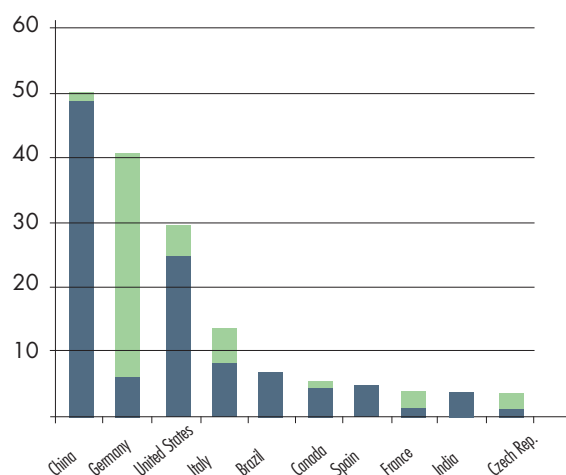
Broken down by country, 2010 was above all marked by major projects in China and the US. Germany, Italy and Spain were still major markets, but remained a notch below the leaders.

France, absent from the ranking of investments in large projects, enters the top 10 if investments in projects of less than 1 MW are factored in. Having adopted the German model of rooftop installations, France shares with its neighbour (albeit on a smaller scale) the distinction of having developed substantial distributed capacity.

**Fig. 1 - Investments in projects relating to renewable energy production by country**



### The 10 biggest countries in the funding of projects, including small projects, in billions of US dollars in 2010



Source: Bloomberg New Energy Finance, 2011

The fragmentation of installed capacity makes it difficult to analyse sector funding, or to obtain an overview.

As such, investment growth in 2009-2010 owed much to the strength of the European market for (small) rooftop solar installations, not to mention investments in China (particularly in wind power) and North America, which accounted for 65% of new investments.

By contrast, investments in assets in the European market (excluding small installations) were down 22% compared with 2009, on the heels of adverse changes to regulations. Their fall was offset by strong growth in North America (+53%), South America (+39%) and Asia-Pacific (+30%).

### Preliminary assessment for 2011 in France

Globally, and based on the first three quarters, investment grew by 20% in 2011 compared with 2010, suggesting that momentum remains strong. However, unlike 2010, 2011 was characterised by strong growth in investment in solar farms, which for the first time outweighed spending on wind power in the third quarter of 2011 (\$19.5 billion, compared with \$18 billion).

In France, whereas project funding totalled approximately €4 billion in 2010, investments amounted to €2.8 billion in the first half of 2011 alone, an increase of about 43%. This put

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### 2011 was characterised by strong growth in investment in solar farms in France

growth in France at twice the pace of the broader market, driven chiefly by solar power.

#### Photovoltaic power: developers have to use their own equity initially

There was a surge in photovoltaic solar power in first half of 2011, with 599 MW installed, corresponding to approximately €1.3 billion in equity funding and €1 billion in debt.

Although “project IRRs” are slightly lower, on average, than those achieved in wind power and biomass (about 1 percentage point lower), photovoltaic projects continued to enjoy smooth funding until September 2011. In particular, they benefited from lower risk in respect of cash flows, as shown by the generally higher debt loads (debt typically accounts for 80% of funding, as opposed to 60-70% for biomass, for instance).

Regarding the sustainability of this trend, caution is in order. There has been a catch-up effect in the project queue, where investors have sorted the good from the bad: from a starting point of 4,054 MW in December 2010, the queue had shrunk to 2,265 MW by March 2011. In 80% of cases, the decline sprang from abandonments, refusals or the weeding-out of obsolete projects. Further weeding is expected in the future, with the obligation of bringing projects into service within 18 months from the date of notification of the technical and financial proposal (see report on solar power).

The latter condition is a particular source of concern for investors, who in some cases have not been shy about calling on developers to fund projects out of their own equity initially, subsequently offering to refinance them once the asset has been completed and brought into service.

#### Wind power: significant investments in the offshore segment

The first half of 2011 saw a sharp decline in installations, with a near 30% drop in installed capacity (to 340 MW) compared with the first half of 2010. This represents funding of just €500 million, of which €400 million in debt.

Victim of a regulatory environment in which complexity is growing (see report on wind power), onshore wind farms owe their development to favourable economic factors, this source of energy being the most competitive in respect of production costs per kWh.

The offshore wind-power segment is the focus of a good deal of attention. In a highly favourable overall environment, with substantial investments in Europe (from funds such as Blackstone, which recently announced plans to invest more than

€2 billion in offshore wind power in Germany), most offshore wind farms have been funded by developers out of their own equity. This funding structure reduces some of the risks associated with the industry, by “diluting” them in the parent company’s business portfolio.

Project funding remains fairly scarce, given the risk perceived by investors and the amounts required, i.e., roughly €3.5 million per installed MW, in farms that routinely exceed 100 MW.

#### Biomass: attractive projects

Less conspicuous, electricity generation from biomass continues to attract investments in France, due to the attractive feed-in tariffs for power derived from this source: they were doubled

### Electricity generation from biomass continues to attract investment thanks to attractive feed-in tariffs

at the start of 2010 to a range of 12.5-15 eurocents per kWh. “Project IRRs” can accordingly come to 8-9%, or 1 to 2 percentage points higher than for solar and wind power.

The government continues to support the sector, its objective being to increase installed capacity from 700 MW in 2010 to 2.3 GW by 2020, with France being home to Europe’s second-largest stock of wood. We estimate that the sector has attracted nearly €1 billion in funding since early 2011, of which €600 million in debt.

Funding for biomass projects also reflects the perception of slightly higher risk compared with other energies, with a debt/equity ratio of 60-70%.

#### Investors are highly selective

It should be noted that financial bodies’ selectivity has been reinforced, and that a secondary market is emerging around capacity, either already in service or under construction. This is particularly the case among investors looking for stable cash flows or utilities in search of carbon-free electricity. While IRRs remain relatively attractive and the security of contracts is highly prized in this period of great economic uncertainty, the issue of credit availability is starting to be felt, with a slowdown in investment among French banks (or increased precaution on their part) apparent over recent weeks. Advance signals, noted among European funding agencies, also point to tougher borrowing conditions in the coming months.

Banks are taking particular care to comply with the new financial ratios imposed on them: since July 2011, they have reined in long-term lending that requires increased provisions and overweighting that negatively affects their ratios.

#### Several threats to funding

Against this backdrop, what is the state of renewable-energy



project funding in France? There currently appear to be two threats weighing on investment in this sector:

- Major regulatory change over recent years, clouding visibility on the sector environment, has made investors more cautious about projects' feasibility and has sometimes also impacted ROI (reductions in feed-in tariffs, etc.).

- Highly leveraged because of its low risk (debt of 60-90%, depending on the project) and its capital intensity, renewable-energy project funding would be particularly vulnerable to a scarcity of debt.

In regard to equity funding, the sector is highly fragmented. Players include big energy groups like EDF Energies Nouvelles, GDF Suez and Neoen (which recently acquired Poweo's renewable energy division). Foreign groups are also present, with Germany's E.ON and Italy's Enel among the most active.

There are also numerous private-equity funds specialising in infrastructure investments, hailing both from France (123Venture, Natixis, etc.) and abroad (especially from the UK and Germany, such as Allianz Specialised Investments, etc.). AXA Private Equity is also very active in the acquisition of capacity already in service, particularly in wind power.

It is difficult to determine how such a multitude of players will change their investment strategies in 2012.

However, a number of undertakings appear to have been made by domestic players and via support from the European Investment Bank (EIB), implying that activity will not cease abruptly in early 2012:

- on the equity side, Caisse des Dépôts continues to fund

projects and has maintained a commitment to keeping investments on a similar level as in the past. The funds associated with corporate banks (Eurofideme, BNP Paribas Clean Energy Partners, etc.) have raised substantial sums that are likely to be invested soon.

- on the debt side, the EIB continues to release funds to finance installations. For instance, as part of its subsidised loan scheme launched in September 2010, the EIB recently provided more than €700 million to regional banks in France's Midi-Pyrénées, in conjunction with partner banks (Crédit Agricole, Banque Populaire, Caisse d'Épargne Midi-Pyrénées), thereby allowing €20 million of photovoltaic projects to be funded.

While, at first glance, these elements are reassuring, the sums involved are not sufficient in view of either France's growth ambitions or past rates.

In addition, banks could tighten access to credit by imposing very restrictive conditions on project funding. They could, for instance, require developers to fund the entire project during the construction phase, only stepping in to provide refinancing – a pattern that is already evident today.

Conclusion: there is no debate about the medium-term funding of installations, but there is a large measure of uncertainty overhanging short-term funding.

As we have noted, investments are expected to continue in France in the short term, and are likely to be focused on projects demonstrating a capacity to create value, namely ones that make real economic sense, offer visibility over time and, often, represent a sufficiently sized investment. As such,

**Fig. 2 - Several significant players in the funding of renewable energy projects in France**

Funding body	Amount (€m)	Maturity	Type of funding	Type of projects funded
Caisse des dépôts	154	2008-2010	Equity	542 MW, with priority going to solar and wind power (105 projects in 32 departments).
	135	2011-2013	Equity	500 MW, with priority going to thermal energy (biomass), followed by marine energy.
Eurofideme (Natixis)	250	2012	Equity	Already €54m committed in 2010. Funds projects in the pre-construction phase in France and Europe. Co-invested in Curbans with GDF-Suez.
Natixis	n.c.	n.c.	Debt	In the first nine months of 2011, Natixis funded 1.1 GW of capacity in solar, wind and biomass.
EIB and regional banks	400	2011-2014	Debt	The EIB has provided the Crédit Agricole, Banque Populaire and Caisse d'Épargne regional banks in Languedoc-Roussillon with €200m, and these partners have added a further €200m to fund PV projects of varying sizes (200 MWp in 2014).
National banks	n.c.	n.c.	Equity and debt	Partnership between Oséo and Société Générale in the co-funding of PV projects. BNP Paribas is active in both debt and equity funding through its BNP Clean Energy Partners fund (€437m raised as of end-2010).
Crédit Coopératif				Crédit Coopératif makes virtually all of its energy investments in renewable energy.

growth is expected to continue, but probably at a slower pace.

Most of the projects receiving funding will be drawn from the existing pipeline, which raises the question of the strength and sustainability of these investments. Due to the tightening of the regulatory environment, project pipelines are likely to fill up at a much slower pace than in the past – something that is already reflected in investment on wind-power capacity over the year.

The impact on the solar-power sector will probably be visible when projects currently underway have been taken out of the queue. This could happen in 2012. A decline in demand could reduce the adverse impact of a drying-up of liquidity.

Lastly, France's presidential election will be a factor of considerable uncertainty in 2012, especially if regulatory changes

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Ultimately, the “green” electricity generation model will have to start its transition towards competitiveness in relation to conventional solutions

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ensue, in a coercive or incentive direction (environmental standards, obligations to consume a quota of green electricity for industry, etc.).

Ultimately, the “green” electricity generation model will have to start its transition towards competitiveness in relation to conventional alternatives, and to pursue its economic maturation in order to remain an attractive investment outlet. ■