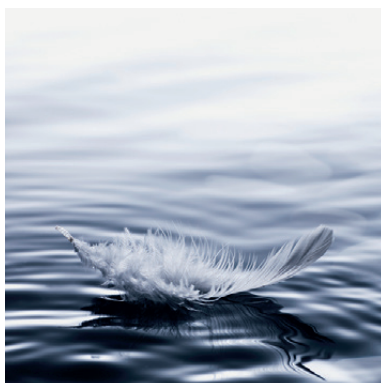


FRANCE CLEANTECH REVIEW 2015





EDITORIAL

With the energy transition act entering into force and the organisation of COP21 in Paris in December, which will put the spotlight on French climate change action, 2015 is set to be a decisive year for the green economy in France.

GreenUnivers, the leading organisation for economic and financial information on cleantech in France, and EY have jointly produced this French Cleantech Review for 2015.

The review covers public policies, funding, action among major groups and innovation strategies, with detailed analyses on key sectors.

A number of crosscutting trends have emerged:

- An upturn in capital and project investments, starting in 2014 and expected to continue this year.
- The internationalisation of business activities, particularly in the renewable energy sector. A promising middle-market sector is emerging as companies seek growth potential in new areas.
- Open innovation is promoting inclusiveness as major groups, SMEs, start-ups and public laboratories join forces and learn to work together.
- Cleantechs are increasingly digital: from eco-mobility to energy efficiency, green innovation is opening up to digital and connected technologies.
- Locally and regionally focused approaches are gaining ground, with an increase in regional calls for projects and financing mechanisms.
- The city of the future is gradually emerging with the development of intelligent networks, new forms of mobility and energy-saving buildings.

We hope you will find this report both instructive and enjoyable.

Alexis Gazzo, EY Cleantech & Sustainability Associate
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Published by GreenUnivers in partnership with EY, April 2015, Paris



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A DECISIVE YEAR

2015 is set to become a decisive year for cleantech in France, with the promulgation of the Energy Transition Act and the organisation of the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in Paris this coming December.

KEY PLAYERS AND FINANCING

Public policies have a decisive role in cleantech development, and the proposed energy transition legislation is expected to give a new boost to their development.

The draft legislation sets out ambitious French goals for the main green economy sectors: energy-efficient renovation of buildings, development of clean transport, waste reduction, promotion of the circular economy and renewable energy development.

If the energy transition is to succeed, public bodies will need to contribute, particularly the ADEME via the national Investing for the Future programme and BPIFrance, the French public investment bank. BPIFrance secured €697 million in funding for the energy transition in 2014, an increase of 25% over 2013.

The major groups are still the economic powerhouses in these different sectors. In the last two years, they have slowed down large-scale takeovers overall in favour of organic growth. Some have begun to see the fruits of their investments, such as Total with solar power (acquisition of SunPower), while others are ramping up their activities, such as DCNS in marine energy and Michelin in ecomobility. On the other hand, several major players pulled out of the sector in 2014, including Technip (offshore windpower) and Areva (solar power).

Innovation strategies are being strengthened and becoming more inclusive among large companies with a concern to keep abreast of innovations that could make a difference in the future. Open innovation is a multi-faceted trend which is producing incubators, ideas competitions and start-ups, capital investments in young companies, and so on. Several groups have set up corporate funds, such as GDF Suez, which launched a €100 million fund in 2014.

As regards financing, over a hundred companies strengthened their capital base in 2014, raising more than €700 million. Investment capital alone accounted for over two thirds of this amount, beating two records in 2014 with 86

investments absorbing a total of €469 million (+47% over 2013), according to the 2014 barometer published by the Cleantech Club of the French association of investors for growth (AFIC), with GreenUnivers and EY.

The first half of 2014 also saw numerous stock exchange transactions (e.g. McPhy Energy, Fermentalg, Innoveox and Voltalia), which picked up again in early 2015 (e.g. Oceansoft, Ecoslops and IPO now announced for Solairedirect).

Participatory seed funding via dedicated platforms is also developing.

Where project financing is concerned, 2014 saw investments in renewables picking up strongly with a total of more than \$310 billion invested according to BNEF, a 16% increase over 2013. In France, investments in carbon-free energy increased by over 25% compared to 2013, to nearly \$7 billion. Financing for the 300 MW Cestas solar park, the largest photovoltaic project in Europe, accounted for much of this rapid growth.

This upturn is reflected in the launch of new funds dedicated to cleantech infrastructure projects: examples are intermediate closing for Mirova with the European Investment Bank and the Infra fund launched by Demeter Partners.

France should remain a dynamic market in 2015, as indicated by renewed interest from financial players (infrastructure funds, banks) in recent months



KEY SECTORS

1. Renewables

■ Solar power on the mend

2014 saw an upturn in the photovoltaics market thanks to large solar power plants, although the market for small rooftop installations remained static. Solar grid connections in France totalled about 927 MW in 2014, according to the SER (umbrella organisation for the French renewables sector) and the grid operator RTE. Overall, solar power accounts for over 5.3 GW, exceeding the official target of 5.2 GW for 2020. Some downstream players have seen successful developments on the international market, e.g. Solairedirect, Neoen and Akuo Energy.

■ Marine energy: blue gold on the horizon

Although these technologies are still emerging, France, with the second largest marine area in the world, has considerable potential. Hydrokinetic power is the most advanced, with pilot projects and demonstrators planned in 2015. Shipbuilder DCNS, the backbone of the sector, have ambitious projects in almost all marine energy technologies. Major energy groups such as Alstom, EDF and GDF Suez are also moving into marine energy, and bringing in their sub-contractors. However, unlike the UK, France has few marine energy start-ups.

■ Skies clearing for onshore windpower

After a four-year decline, grid connections increased in 2014 by 963 MW in mainland France according to the SER (+12% over 2013), to reach a total of 9 GW by the end of the year, thanks to more flexible regulation and secure feed-in tariffs. Nevertheless, windpower in France covered only 3.7% of its electricity consumption in 2014, and will not achieve the 19 GW target for 2020 according to projected trends. The windpower sector is still awaiting the Energy Transition Act and the multiannual energy programming targets that are yet to be defined. Among developers and producers, GDF Suez leads the field by far, well ahead of EDF EN and a series of SMEs (Eole-RES, Valorem, Theolia, Voltaia).

■ Windpower gradually takes to the sea

Despite its long coastline, France has made only timid advances in offshore windpower. Projects totalling 2.9GW in offshore windpower have been selected under the two first calls for tenders, and a third is under preparation. To date, however, France has no operational projects, unlike the UK and Germany, and is a long way off the official 6 GW target for 2020. After the successful bid from the EDF EN-led consortium under the first call for tenders, GDF Suez won the two areas assigned in 2014. The sector is gradually becoming organised: Areva has joined forces with the Spanish company Gamesa to develop two plants around Le Havre and Alstom is building industrial plant at Nantes/Saint-Nazaire. France is lagging behind in fixed-bottom offshore windfarms, but making steady progress with floating turbines thanks to groups like DCNS or EDF and innovating start-ups (Ideol, Nénuphar).

2. Large-scale projects

■ Ecomobility solutions are overtaking electric cars

Effervescence is the rule in sustainable mobility: in project development, technical creativeness, new business models - and their yet-to-be proven cost-efficiency. Car-pooling is gaining ground, led by BlaBlaCar, which broke all fundraising records with \$100 million raised in 2014 and is only leaving a few crumbs from the table to its competitors, often in niche markets (home-to-airport journeys, commuting).

The electric car market is still on life-support. 10,000 new private cars were registered in 2014, a 7.8% increase in one year. Public grants are still indispensable (introduction of a "superbonus" announced for 2015) and the government is also relying on the deployment of battery-charging infrastructure: 7 million charging terminals are planned for 2030 as against just 10,000 available at present. The sluggish market is affecting manufacturers: Mia Electric, SITL and Lumeneo have stopped production and market leader Renault has scaled down its sales forecasts.

■ Smart grids come into their own

Surfing on a tidal wave of digital and internet tools, renewable energy integration, electric mobility, energy-saving construction projects, emerging sustainable cities and positive energy districts, smart grids have become a prerequisite for change in the energy sector. 2014 and 2015 are pivotal years, with peakload control now feasible and the widespread introduction of communicating gas meters (Gaspar) and electricity meters (Linky) expected to open up a €6 billion market by 2022.

The major groups are in the starting blocks (GDF Suez, Alstom Grid, Schneider Electric, Sagemcom), as are SMEs such as Voltalis, Budget Telecom and Direct Énergie). Gradual development downstream is expected by 2020, among manufacturers of automated systems, electrical and digital equipment, young innovation companies (Ijenko, Actility, Sigfox), telecoms and energy companies and the IT giants.

■ Huge strides still needed in green construction

To boost energy-efficient renovation of existing buildings, the French government recently launched a series of initiatives: grant reforms, introduction of the RGE guarantee, upscaled targets for the third tranche of energy-saving certification and ambitious draft legislation for the energy transition. Financial innovations are emerging (e.g. third-party financing) and the Regions are going on the offensive: creation of SPL Oser in the Rhône-Alpes region, semi-public companies in Strasbourg, a public energy efficiency service for the Picardy region, etc. In this context, construction companies (Bouygues, Vinci, Eiffage), energy suppliers (Total, EDF, GDF Suez, Direct Énergie), service companies (Dalkia, Cofely), infrastructure industries (Schneider Electric, Siemens), among others, are making a major shift towards energy efficiency. Energy efficiency in industry is only just emerging, but the introduction of compulsory energy audits in large companies should produce a leveraging effect.

■ Smart water on a roll

France is a mature market, and all players are taking an interest in intelligent water management with the deployment of smart water meters to improve monitoring of consumption. Growth potential in this segment is assessed at 10% per year, a decisive figure for investments in the relevant technologies. Two major operators, Veolia (with its M2ocity subsidiary) and Suez Environnement (with Ondeo Systems) are forcing the pace, with manufacturers (Diehl Metering, Ista) also converting their production lines.

■ Seeking the right business model for the circular economy

2014 was another difficult year for the recycling market, with the slowdown pushing raw materials prices down and reducing waste volumes. With no change in early 2015, the circular economy idea has been gaining ground, based on its global approach to waste production from eco-design to re-use. The proposed energy transition legislation aims to halve the waste quantities sent to landfill by 2025. The major groups (Veolia, Suez Environnement) are following suit and now being challenged by new players (La Poste, Orange) and start-ups.

What is the French cleantech market worth?

This is not easy to estimate due to the difficulty of defining an accurate and indisputable perimeter. Eco-businesses accounted for over one million full-time-equivalent jobs, according to the most recent figures for 2012 from the monitoring and statistics department of

the Commissioner-General for Sustainable Development. Production amounted to €85 billion in 2012, a 5.6% increase in one year. The balance of trade for eco-businesses was positive throughout the period from 2004 to 2012, contrary to the overall French balance of trade.

In 2012, the trade surplus rose to €3.2 billion according to the most recent customs and excise data, a €2 billion increase in one year thanks to the drop in renewable energy imports, especially for photovoltaic cells.



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PART 1

Key players and financing

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TRENDS IN PUBLIC POLICIES FOR GREEN GROWTH IN FRANCE

With 2014 marked by the draft law on Energy Transition and accompanying debates, 2015 is set to become a decisive year for cleantech in France, with the promulgation of the Energy Transition Act and the organisation of the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in Paris this coming December.

MAIN POLICY AREAS COVERED BY THE ENERGY TRANSITION ACT

The Energy Transition Act should give a new boost to the cleantech sector in France: according to government and according to ADEME estimations, the energy transition should create 100,000 new jobs by 2018.

The draft legislation sets out ambitious goals for the main green economy sectors in France: energy-efficient renovation of buildings, development of clean transport, waste reduction, promotion of the circular economy and renewable energy development.

Energy efficient renovation of buildings

The stated goals are to boost energy-efficient renovation of buildings to save fuel, reduce fuel bills and create new jobs. The draft law sets out three targets to achieve these goals:

- Energy consumption in buildings halved by 2050;
- 500 000 buildings to be renovated each year;
- 75,000 new jobs created in the sector¹.

Examples of concrete measures under the Act are construction of positive-energy buildings, creation of a guarantee fund to help finance energy-efficient renovation work in housing and the introduction of individual metering in apartment blocks to improve information for consumers on their consumption. On this point, the government estimates that deploying 35 million smart electricity meters (Linky) and 11 million Gazpar gas meters would require investments of €6 billion and create 11,000 jobs. In 2014, seven companies were designated by GRDF to manufacture smart gas meters (Gazpar) and six by ERDF to manufacture the first three million Linky electricity meters, to be deployed by mid-2015.



Development of clean transport

The State has undertaken to purchase at least 50% of clean vehicles on renewal of its fleet and has set a target of 7 million battery recharge points deployed for electric cars by 2030². This is a very ambitious goal, as only 10,000 recharge points were available in 2014.

A further goal in the draft law is to achieve at least 10% of renewable energy consumption by all transport modes by 2020. Finally, a bonus for conversion of the most polluting vehicles was announced in early February 2015 by Ségolène Royal. This could be as high as €10 000 and additional to the eco-bonus.

Fighting wastefulness and promoting the circular economy

The State's goals here are to decouple economic growth from raw material consumption and reduce waste production in the medium term: waste quantities sent to landfill must be halved by 2025, with an additional goal of recycling 60% of all non hazardous waste by 2025³.

The draft legislation provides for the gradual harmonisation of local authority waste collection systems to help citizens sort their waste more effectively. It also aims to strengthen proximity management so that waste is treated as close to the source as possible to reduce transport distances and corresponding fuel consumption.

New goals for renewable energy development

With its Energy Transition Act, France is proposing an energy strategy that brings renewable energy to centre stage, with a target of 32% of final energy consumption from renewable sources by 2030. Final energy consumption itself must halve by 2050 (compared to 2012)⁴.

The draft law also provides for a review of support mechanisms for renew-

able energy, in line with European Commission recommendations, but also with the conclusions of numerous debates in the sector over the last five years.

It provides in particular for:

- Stronger incentives via feed-in tariffs;
- Introduction of measures to facilitate local authority and citizen participation in the equity capital of businesses with projects for local renewable energy;
- Simplified project implementation procedures and faster grid connection.

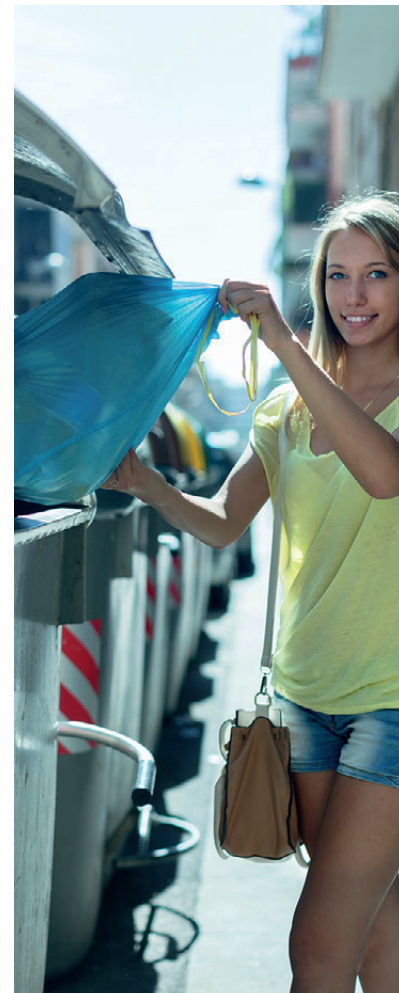
The proposed legislation aims to reform energy governance and to introduce multi-annual energy programming (PPE) with five-year operational targets in line with energy policy guidelines. By organising the structure of the energy mix, the PPE scheme is designed to provide greater market visibility for renewable energy companies. A further advance made in the draft legislation concerns nuclear power, whose share in the energy mix should drop from 75% to 50% within a so far unspecified time frame.

Reform of renewable energy support mechanisms

Optimising support mechanisms for the development of renewables is one of the main topics of debate on the energy transition. Because the costs are passed on directly to consumers, controlling the costs of power supplies to the public is a major social and political issue. The share of the consumer tax on power supplies (CSPE) allotted to support for renewable energy has steadily increased, reaching almost 60% of the total of €4.1 billion in 2014.

At present, the two main support mechanisms are:

- Compulsory purchasing, a mechanism whereby the national incumbent companies are obliged to purchase electricity from renew-



able sources at a price set by official decree for the duration of the contract.

- The tendering mechanism, which also guarantees purchases of the electricity produced, but where the sale price results from competitive tendering by energy companies.

The CRE (French energy regulator) published a report in April 2014 on the costs and profitability of renewables in mainland France, in which it analyses the compatibility of the two mechanisms in the different sectors (onshore

1. www.developpement-durable.gouv.fr/Renover-les-batiments-pour.html
2. www.developpement-durable.gouv.fr/Developper-les-transports-propres,41392.html
3. www.developpement-durable.gouv.fr/Lutter-contre-les-gaspillages-et,41395.html
4. www.developpement-durable.gouv.fr/Titre-V-Favoriser-les-energies.html

wind, photovoltaic and biomass) and according to the size of facilities. It concludes that calls for tenders should become the rule for biomass and photovoltaic energy projects as from a certain power output threshold, as they introduce competition and cater for the diversity of situations

At the regional level, the European Commission is looking to reform support mechanisms for renewables in the coming years, and to phase out feed-in tariffs. The Member states will need to shift gradually to a system of direct sales of electricity on the European market with an associated bonus. This will make calls for tenders compulsory to receive public grants as from 2017.

The State has been gradually scaling up the use of tendering mechanisms in France to increase capacities for renewable energy production (especially solar and offshore windpower).

The draft energy transition legislation also provides for a third type of mechanism based on the "contract for difference" developed in the UK. This mechanism is mainly designed for large facilities to enable them to sell energy from renewable sources at market prices, with additional remuneration in the form of a "bonus".

PUBLIC-SECTOR FINANCING FOR THE ENERGY TRANSITION

During the debates on financing for the energy transition, the ADEME estimated the additional effort required at €10-€30 billion per year above current levels.

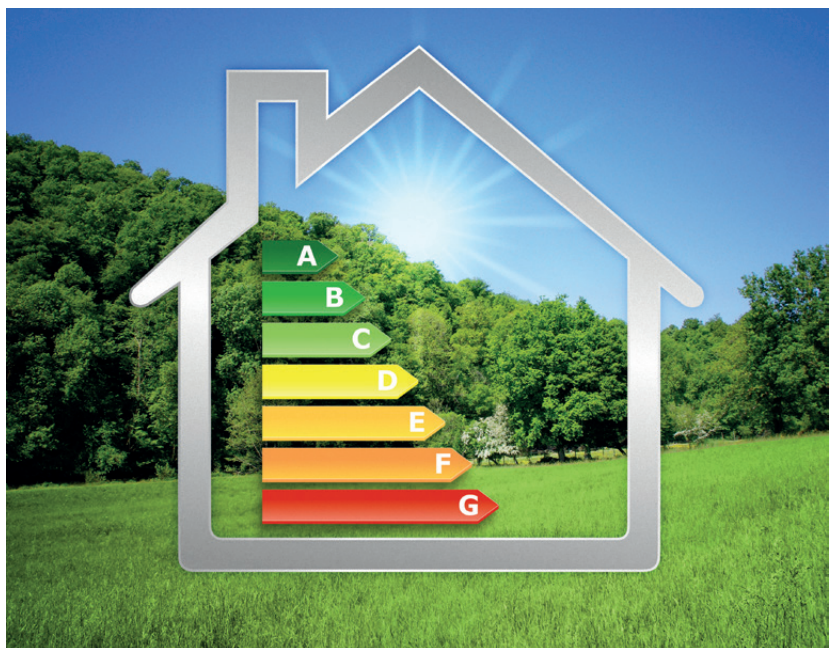
Securing private-sector financing is therefore a priority and the government has undertaken to contribute €10 billion over three years to finance incentive mechanisms and leverage other sources of funding.

Various public-sector players are therefore required to contribute, particularly the Public Investment Bank (Bpifrance) and the ADEME, with support from the Investing for the Future programme.

Strengthened means for the ADEME through the Investing for the Future programme

Since 2010, the ADEME has financed over 160 projects with budgets in excess of €1 billion under the Investing for the Future programme (IA, Investissements d'Avenir). Overall IA funding for the ADEME was increased in December 2014, with an additional €800 million for the "carbon-free energy" and "circular economy" programmes and a slight drop for the "vehicles of the future" programme.

In 2014, under the IA programme, the ADEME launched several calls for projects that had been eagerly awaited by renewable energy professionals. In particular, the call for expressions of interest (AMI) in renewables, launched in 2014, aims to finance R&D experimentation and demonstrators in five sectors: photovoltaic and direct solar energy, wind power, cold recycling and hybrid solutions. The latter two sectors are covered for the first time by an AMI issued by the ADEME.



An AMI for SME initiatives was launched under the "vehicles and transport for the future" programme in early 2015. An initial call for projects from SMEs with less than 250 employees was launched in January 2015 to release financial support of up to €200,000 per SME to develop new technologies in the road, rail, maritime and river transport sectors.

Bpifrance financing for the energy and environmental transition up by 25%

In 2014, funding from Bpifrance for the energy and environmental transition rose by 25% over 2013 to €697 million. The stated aim is to achieve €800 million per year as from 2017 for SMEs and middle-market companies. 2014 also saw the launch of a second tranche of "green loans" (€340 million) for industrial companies undertaking resource optimisation projects. This is an instrument dedicated to projects for transforming production systems and will help to drive demand for innovative technologies and services.

Bpifrance action to support EET in local areas also includes equity investments (€52 million):

- direct equity investments to support renewable energy companies (e.g. Neoen and Nénuphar), electric traction companies (Ez Wheel), fuelwood companies (Palette Gestion Service), etc.
- funds of funds, in particular through the Emertec 5 seed fund launched in 2013 for companies involved in energy, green chemicals and environmental services.

Local authorities are key to the energy transition

In the fields of public transport, urban development, water and waste management and energy-efficient renovation of public buildings, financial support for local authority investments is a key issue for the energy transition.

During the energy transition debate, several measures were announced to facilitate financing for renewables in local areas, including a new €400 million package to double the ADEME heat fund in 2017 and a €100 million package to finance 1,500 biogas projects over three years in rural areas. Several local authorities are currently setting up regional funds to finance the energy transition and energy-efficient renovation of buildings. Particular examples include the Languedoc-Roussillon and Aquitaine regions.

PROSPECTS FOR 2015

After more than two years of national debate on the energy transition, the draft Energy Transition law should be adopted by the end of June 2015. Assuming a timely conclusion to the regulatory studies involved, it is to be hoped that this new legislative and regulatory framework will secure the market visibility that the renewable energy sector has lacked in recent years. France is one of Europe's most attractive markets in the renewable energy sector and this should improve further in 2015.

Other important initiatives are expected in 2015 (contract award under the third call for tenders for large solar power facilities, launch of new calls for tenders for marine energy, etc.). COP 21 in December will give France a crucial opportunity to demonstrate its capacities for innovation to become a "major ecological powerhouse"⁵, as called for by the government.

1. Source : www.developpement-durable.gouv.fr/IMG/pdf/9-_brochure_transition_energetique_pour_la_croissance_verte.pdf



Interview with Pascal Lagarde

Executive director for international affairs, strategy, studies and development with Bpifrance

An interview by Alexis Gazzo, EY

"We firmly believe that companies involved in the EET have substantial potential for growth, both in France and abroad"

Y – What is Bpifrance's position on the energy and environmental transition (EET)?

Bpifrance is supporting French SMEs and middle-market companies in this sector, in line with its core mission as specified in its principles of intervention. The EET is a key sector for France in terms of growth, exports and employment. The successes of companies such as NEOEN and McPhy show that French players have real market potential in this sector.

What are your main methods of intervention in the EET field?

We have three main methods. The first is to support innovative companies by combining innovation grants (€87 million in 2014) and zero interest loans with equity investments in EET businesses at the venture capital stage.

We invested €52 million in equity capital in 2014, with a view to €400 million in investments over the 2014-2017 period as a whole. These investments are either:

- Direct, via the Ecotechnologies Fund managed by Bpifrance Investissement, which was awarded €150 million under the Investing for the Future programme;
- In funds of funds, to support specialised funds such as Emertec and Demeter.

The second method involves boosting growth among operators with a view to the development of the SME and middle-market sector, essentially via loans to companies involved in renewable energy. Bpifrance financed investments of €697 million in 2014, a 25% increase over 2013. This puts us on track to achieve our target of €800 million in financing per year by 2017.

We also have a specialised fund for the fuelwood sector (€25 million), where the market structure is still developing.

In parallel, Bpifrance launched a €425 million fund in late 2014 to invest in companies promoting industrial projects (SPI companies). Although this fund is not sector-specific, a significant share of the dealflow is likely to be EET-related.

The third method focuses on the transformation of companies in all sectors via support to their eco-investments. The "green loan" mechanism, in particular, is used to finance investments in optimising resource management, and therefore to improve business competitiveness. To follow the first "green loan" operation (450 loans totalling €300 million from 2009 to 2013), Bpifrance is launching a second operation totalling €330 million.

What trends do you anticipate on the EET market?

As it is currently hard to predict how the business model for renewable energy production will develop, the structure of financing for these projects will probably need to evolve. We are also seeing the return of "classic" financing on this market, albeit with some reluctance as regards long-term commitments or financing for sectors with specific risks (biogas, marine energy). Among other potential Bpifrance solutions, we are working on possibilities for using part of the €16 billion guarantee fund provided for by the Juncker Plan for strategic investments. We will also be launching export credit products which are likely to concern many EET-related companies given the surge of interest in these topics on the export front. More generally, we firmly believe that companies involved in the EET have considerable growth potential, both in France and abroad. This is reflected in the steady expansion of our "green exposure" in recent years. These developments show that our decision to make the EET a key component of our strategy is well founded, and we believe that our interventions in this field are set to increase substantially in the years to come.

FRANCE'S CLEANTECH CHAMPIONS

The major groups are still the powerhouses of green business. They have slowed down large-scale takeovers in favour of organic growth and partnerships with promising start-ups. Some have begun to see the fruits of their investments, like Total with solar power (acquisition of SunPower), while others, such as Michelin, are ramping up their activities on these new markets. Other have pulled out, such as Technip from offshore windpower and Saint-Gobain and Areva from solar power.

1. RENEWABLE ENERGY AND BIOFUELS

AIR LIQUIDE

Air Liquide, the world's leading industrial gas company, has recently been increasing its investments to strengthen its positions on the biogas and hydrogen markets.

It acquired a 5% share in Fonroche Biogaz, through its Air Liquide Advanced Business branch. The two companies will be co-developing projects for biogas purification and recovery. The group has also acquired the Swedish company FordonsGas, which designs and operates bio-NGV filling stations. It has also acquired equity in the Belgian company Xylowatt (clean gas production from biomass and waste) via its investment vehicle Aliad.



This corporate fund has also acquired shares in French start-ups Avenisense (onboard sensors measuring fluid properties) and Sigfox (IoT networks).

Air Liquide also signed a cooperation agreement with the CEA on materials and manufacturing methods for the factories of the future, digital technologies and connected objects. They are already working in tandem on new energy systems and in particular on a pilot production unit for second-generation biofuels and on hydrogen fuel.

ALSTOM

Alstom's energy division was sold for €12.35 million in 2014 to the American giant General Electric. The operation is to be finalised in the second half of 2015. However, the European Commission opened an in-depth enquiry into the takeover last February. If the operation goes through, three joint-venture companies will be set up, for renewables, including hydroelectricity and offshore wind power, grid operation and nuclear power.

Renewables development at Alstom has focused on wind power, with over 3,500 onshore turbines installed with a total output of almost 6.5 GW. In early 2015, the company strengthened its industrial facilities in Brazil - its largest market with over 3 GW installed or being manufactured by late 2014 - by opening a third plant to manufacture turbine towers, in partnership with a local group, Andrade Gutierrez.

In offshore wind power, the group inaugurated its two Saint Nazaire plants (western France) in 2014, which manufacture the 6 MW Haliade turbine. These sites will ultimately employ 300 people and produce 100 nacelles per year. They will be the wind turbine production sites for the three French windfarms at Saint-Nazaire, Courseulles-sur-Mer (Calvados) and Fécamp (Seine-Maritime), awarded to the EDF EN/Dong Energy/Alstom consortium.

Alstom signed its first offshore wind-power contract abroad with the US Deepwater Wind company to supply five turbines for a pilot windfarm offshore from Rhode Island.

The group moved into offshore wind-power with a partnership agreement signed in October 2014 with DCNS to develop and market an integrated 6 MW semi-submersible turbine. The first turbine is expected to be towed out to sea in 2017 or 2018.

In marine energy, Alstom moved into hydrokinetic power with the award, under the Hydrokinetics AMI : call for expression of interest, and together with GDF Suez, of a contract to equip a pilot windfarm in the Blanchard current (Lower Normandy).

Alstom is also involved in solar concentrators via the US company BrightSource Energy, in which it is a leading shareholder. The group also closed its €625 million financing package for the 121 MW Ashalim plant in Israel, which is due to open in 2017.

However, BrightSource withdrew from one of its major projects, for the Palen plant in California.

In geothermal energy, finally, Alstom won a €61 million contract in February 2015 in Indonesia, with the local oil and energy company Pertamina.

AREVA

The Areva group announced orders for projects totalling 2.8 GW at the start of 2015. In 2014, under a consortium led by GDF Suez, Areva won the two windfarms tendered for in the second French call for bids, at Saint-Brieuc (Brittany) and Le Tréport (Upper Normandy), totalling 1.5 GW. It also won the contract for the 350 MW Wikinger windfarm in Germany, developed by Iberdrola.

Areva set up a joint venture with the Spanish company Gamesa, which is aiming to win 20% of the European market by 2020. This new company will integrate technologies and teams from both groups to develop a new-generation 8 MW turbine.

It is taking an interest in floating wind turbines through its equity investment in the start-up company Nénuphar, which is designing a vertical-shaft turbine.

In biofuels, Areva signed a flagship contract in 2014 with the Brazilian energy company Bolt Energias for the construction of a 150 MW biomass plant. Areva's 2014 turnover in this sector amounted to €52 million, a 24% drop compared to 2013. The group may withdraw from biomass activities as part of the overall restructuring plan it announced last March.

In 2014, Areva had already pulled out of solar concentrators, a technology that has not yet demonstrated sufficient cost-competitiveness. Areva had moved into this market in 2010 with the purchase of the Australian company Ausra.

BOUYGUES

This group is positioned as an overall operator of major infrastructure for renewable energy production, via its subsidiary Bouygues Énergies & Services. It launched a solution using drones to inspect photovoltaic power plants and was selected by energy developer and producer Neoen to build three ground-mounted photovoltaic plants (25 MW) with trackers, in the Landes.

EDF ÉNERGIES NOUVELLES

This specialised EDF subsidiary achieved a €1 billion turnover in 2014, and a net profit of €124.4 million. By the end of 2014, it owned a net capacity, installed or under construction, of 7 GW, including 80% abroad. EDF EN was already operating in 18 countries when it acquired an 800 MW project portfolio in Brazil in early 2015.

In France, the group had 666 MW in windpower and 211 MW in solar power (net operating capacity) at the end of 2014.

The group has posted net windpower capacity, installed or under construction, of 5.9 GW, and 747 MW in solar power. It has projects totalling 16.8 GW in the pipeline, mainly windfarms (13.7 MW), but with an increase in photovoltaic projects (3.1 GW as against 2.5 GW in 2013).

It has developed Operations and Maintenance (O&M) in particular, with 30% growth to 11.7 GW by the end of 2014. It has also been active in the development and sales of structured assets, totalling 798.5 MW (including 610 MW of windpower) as against 480 MW in 2013.

EDF EN is one of the winners of the AMI for hydrokinetic turbines in the Blanchard current offshore from Lower Normandy. With its Normandie Hydro project, developed with DCNS, it plans to install 7 pre-commercial 2 MW hydrokinetic turbines with a com-



bined output of 14 MW. Connection to the grid is planned for 2018.

EDF

To finance its renewable energy and energy efficiency projects, EDF joined forces with the asset management specialist Amundi to set up a joint management company that aims to raise up to €1.5 billion from March to December 2015.

In 2014, Electranova Capital, EDF's investment fund managed by Idinvest Partners, invested in the German company Sunfire (fuel cells and electrolysis) and in the French company Leosphere (remote sensing with Lidar, for windpower in particular).



GDF SUEZ

GDF Suez is positioned as a major player in the energy transition. It is the leading windpower producer in France (more than 1.2 GW with, in particular, its Compagnie du Vent and Maïa Eolis subsidiaries) and in Belgium (Electrabel subsidiary). It aims to double its installed renewable energy capacity in Europe (wind power, solar power, hydropower, biomass, biogas) from 8 GW in 2014 to 16 GW by 2025.

GDF Suez is looking to speed up its development of onshore windpower, which stood at 2.8 GW (built) in ten European countries in mid-2014, and in photovoltaic energy (156 MW). It is also aiming to ramp up R&D in organic photovoltaic power and storage.

In offshore windpower, the consortium led by GDF Suez, with Areva, EDP Renewables and Neoen Marine,

won the two contracts under the second French call for tenders, reversing the failure of its bid to the first call. The Deux-Iles (Brittany) and Tréport (Normandy) windfarms will have a combined capacity of 1 GW. Construction should begin in 2019-2020 with commissioning planned for 2021.

Outside France, GDF Suez increased its stake in the UK with the purchase of windpower developer West Coast Energy (over 650 MW installed), with which it had been working since 2008.

In solar power, GDF Suez was selected for 10 photovoltaic projects with a combined capacity of 53.35 MW. In hydro-kinetic energy, GDF Suez is one of the winners of the AMI for the Blanchard current turbines. With Alstom, it will build four 1.4 MW turbines for a pilot 5.6 MW windfarm.

GDF Suez signed a contract in Marseille to construct the first marine geothermal power plant and is also developing biogas and biomethane injection into the gas network.

To finance its green projects, the group launched a €2.5 billion green bond issue. In 2014 it also launched a €100 million corporate fund, GDF Suez New Ventures, which has already concluded investment contracts with Powerdale, a Belgian company specialising in energy control and electric vehicles, Tendril, a US company specialising in customised management solutions for energy services and Sigfox, a French start-up.



SAINT-GOBAIN

Saint-Gobain discreetly pulled out of the German photovoltaic energy market by selling its Avancis business to the CNBM group (China National Building Materials). It also sold Solarkauf, its photovoltaic brand, to the Swiss company Luxra.

SOLVAY

Solvay Energy Services, the chemical company's subsidiary specialising in the energy transition, moved into the emerging torrefied biomass market, investing €22 million to set up a joint company with the US start-up New Biomass Energy, in which it has a 50.1% equity stake.

TOTAL

The Total group has become one of the world leaders in photovoltaics thanks to its US subsidiary SunPower, which achieved a \$3 billion turnover in 2014 (+20% over 2013) and a net profit of \$246 million (+157%).

SunPower is planning to treble its production capacity in the next 5 years, from 1.3 GW/an in late 2014 to nearly 4 GW in 2019. A new 350 MW plant will be coming on line in the Philippines in 2015, and the group is already working on another with a production capacity of 800 MW.

From the manufacture of solar panels, SunPower diversified into the downstream market when it moved into the buoyant segment of residential rooftop panels and services. In 2014, it acquired Dfl Systems (large high-performance solar farms) and SolarBridge Technologies (micro-inverters). It also invested \$20 million in Tendril (customised management solutions for energy services).

Total Energy Ventures, Total's corporate investment vehicle, increased its investments in 2014, particularly in renewable energy companies such as Sunverge Energy (intelligent solar power management) and Sunfire (power-to-gas).

SCHNEIDER ELECTRIC

This group is developing on the solar market, to which it supplies equipment (inverters) and services (maintenance). In France, in association with Eiffage and Krinner, it won the contract to design, build, operate and maintain the planned 300 MW solar farm at Cestas, near Bordeaux, developed by Neoen. The plant will be ready for commissioning in October 2015 and will be the largest in Europe to date.

TECHNIP

This specialised energy engineering group announced in September 2014 that it was closing its offshore wind-power business unit set up in 2011 and employing 200 people in Scotland. Technip pulled out of the Nénuphar floating windfarm project and is discussing its involvement in the Saint-Brieuc (Brittany) offshore windfarm with the Ailes Marines consortium.

2. ENERGY EFFICIENCY AND SMART GRIDS

AIR LIQUIDE

Air Liquide acquired an equity stake in the French start-up Solumix (construction MATERIALS) via its Aliad investment vehicle.

ALSTOM GRID

Now among the world leaders in smart networks with ABB and Siemens, Alstom Grid won a €41 million contract in India to supply a surveillance system to monitor electricity flows through the entire Indian grid. In France, Alstom Grid signed an agreement with the start-up Ijenko to market integrated solutions for intelligent homes combining energy control boxes with cloud computing services. A “grids” joint venture is to be set up as part of its planned merger with General Electric.

EDF

The EDF-Veolia agreement on their joint company Dalkia expired at the end of 2014. Veolia took over all international Dalkia activities, while its activities in France (including Citelum) reverted to EDF.

At the start of 2015, EDF announced the merger of EDF Optimal Solutions, its energy services branch with Dalkia. Both brands will continue to exist. The aim of the merger is to develop complementary design and implementation solutions, especially for eco-neighbourhoods, energy efficiency in buildings and industrial solutions.

EDF Luminus, EDF’s Belgian subsidiary, acquired Dauvister, an energy services company, for €1.8 million. EDF’s Electranova Capital fund, took part in the venture round organised by Techniwood, which manufactures insulating panels.

GDF SUEZ

Via its Cofely subsidiary, GDF Suez added to its energy efficiency portfolio in the US with its \$335 million (€246 million) purchase of Ecova, a pioneer in the sector.

GDF Suez subsidiary GrDF awarded contracts for the manufacture of the planned Gazpar communicating gas meter (to Sagemcom, Itron, Kerlink and others). Prototypes will be tested in 2015 before the deployment of 11 million gas meters from 2016 to 2022, worth an estimated €1 billion.

In February 2015, the GDF Suez corporate fund invested \$7.2 million (€6.3 million) in the US company Tendril (customised management solutions for energy services). The two companies also set up a partnership to prepare the new start-up’s move into the European market.



LAFARGE

As a construction materials group, Lafarge took part in the second venture round organised by the US start-up Solidia Technologies (eco-materials).

LA POSTE

La Poste, a public company, moved into the smart home market with the creation of a digital control hub to pilot all connected objects and services in the home, including alarms and intelligent meters. Its Docapost subsidiary joined forces with the consumer electronics company Archos to develop new digital products and services linked to connected objects.

SAINT-GOBAIN

Saint-Gobain invested in Qivivo, a start-up in Nantes specialising in smart thermostats and associated services.

SCHNEIDER ELECTRIC

This group has ambitions on the energy management market. In January 2014, it announced the launch of Wiser, its household energy management solution, with which it is aiming to equip 100,000 households by 2020.

Via the multicorporate Aster Capital fund, in which it has invested along with Alstom, Solvay and the European Investment Fund, Schneider also acquired equity in the start-up Digital Lumens (LED, USA) and in Iceotope (Green IT, UK).

SOLVAY

Solvay Energy Services joined forces with the Caisse des Dépôts and Japanese company Marubeni to finance energy efficiency projects in industry, for the Solvay group and other clients.

3. WATER MANAGEMENT AND RECYCLING

SUEZ ENVIRONNEMENT

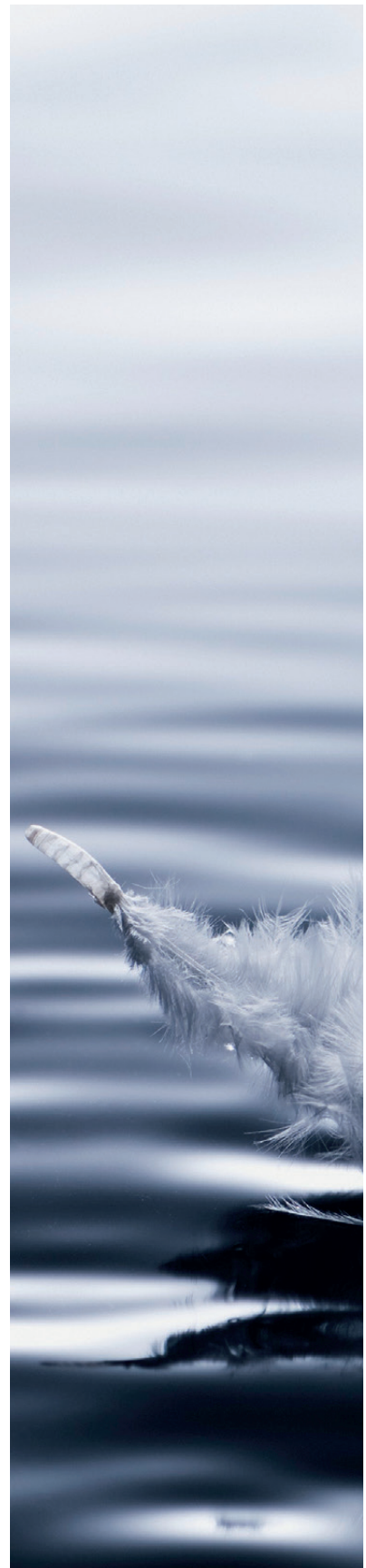
The group's 2014 turnover was stable compared to 2013 at €14.3 billion, with net profits at €417 million, an 18% increase. In Europe, the water sector earned €4.4 billion in turnover, and waste (treatment and services) €6.3 billion. Outside Europe, the group's turnover rose to €3.4 billion, increasing sharply in Africa, the Middle East and India.

Via Degrémont, Suez Environnement invested in Evatherm (water treatment) and in early 2015 acquired Poseidon, a Canadian company specialising in separation systems for industrial water treatment, and in the British B&V Group, which is involved in chemicals for water treatment and in infrastructure and services for industry.

In January 2015, Suez Environnement signed an agreement with three Chinese partners to set up a joint company in soil remediation.

A particular aim is to provide urban solutions to place the group in a key position for sustainable urbanisation. The group is also forging ahead in desalination: with its shareholder GDF Suez, it signed a research agreement with the Masdar Institute of Science and Technology in Abu Dhabi to develop seawater desalination at a plant running on 100% solar power.

With Blue Orange, its corporate fund, Suez Environnement invested in the Agri-Esprit start-up (software for sustainable agriculture).



VEOLIA ENVIRONNEMENT

The world's largest water and waste treatment group went back into the black in 2014: three years of restructuring and cost-cutting produced a net profit of €246.1 million after a €153 million loss in 2013, with turnover up by 4.9% at €23.9 billion (at constant exchange rates), mainly thanks to emerging markets and new industrial clients.

Water treatment is the main earner, with an €11.2 billion turnover in 2014, up by 5.3% at constant exchange rates. Growth was particularly high in the Asia-Pacific industrial water sector.

Turnover for waste treatment was €8.5 billion (+ 4.6% at constant exchange rates). Turnover in France was stable, with business volumes increasing by 0.4% and prices by 0.7%. Sales in Germany dropped, but bounced back in the UK.

To clear its debts, the Veolia group sold off its water, waste and energy businesses in Israel. It also sold its 60% shareholding in the Marius Pedersen Group, which specialises in the management and treatment of solid waste in Denmark, the Czech Republic and Slovakia.

It joined forces with IBM to develop smart water and urban waste management. It is currently deploying water treatment solutions in Lyon (France) and Tidworth (UK).

The group is taking a keen interest in the circular economy in particular: it believes that the market could amount to €30 billion by 2020 and is aiming for €3.8 billion in turnover in this sector by that year, as against €2.5 billion in 2014.

4. FIXED-LOCATION STORAGE**AIR LIQUIDE**

Air Liquide invested in McPhy Energy, a specialist in solid hydrogen storage, which floated on the Stock Exchange in the first half of 2014.

AREVA

The French nuclear power group is actively involved in the power storage sector. In 2014, it signed two agreements with Schneider Electric: one to develop its Greenergy Box, an energy management and storage solution for hydrogen fuel cell production, and the other to work on solutions based on so-called "continuous battery power" technology for large-scale electricity production and long-duration storage.

Areva also set up a joint venture with Ceth2 (renamed Areva H2Gen). This Smart Energies subsidiary is the French specialist in PEM (Proton Exchange Membrane) inverters, a technology developed to produce hydrogen from water and electricity.

SCHNEIDER ELECTRIC

Schneider Electric signed two energy management agreements with Areva in 2014 (see above).

5. TRANSPORT & ECOMOBILITY**AIR FRANCE**

In October, Air France launched its Toulouse/Orly service as a "Lab'Line for the future" to showcase its "sustainable transport" innovations. The weekly flight will be 10% biofuel-powered for one year.

AIR LIQUIDE

Air Liquide, the market leader in fuel-cell mobility, already has over 60 hydrogen filling stations worldwide. The group opened new filling stations for the general public in the Netherlands and Japan and announced a network of 12 more stations in the north-east of the USA, to be developed with the car-maker Toyota.

Air Liquide joined the Ecomobility Ventures fund through its capital-risk subsidiary, Aliad.

ALSTOM

Alstom Grid signed a memorandum of understanding with G2mobility, a start-up based in the Paris Region, to co-market recharging solutions for electric cars. The two companies are also involved in Eco2Charge, a smart recharge solution for businesses piloted by Bouygues.

BOLLORÉ

Bolloré continued to deploy Autolib', its electric car sharing service in the Paris region, aiming to install 1100 stations in 2016 (as against 900 in 2015) and 6,600 terminals (4,700 in 2015). With 200,000 subscribers signed up since the launch of Autolib' in 2011, the service is expected to break even as from this year.

Via its subsidiary Blue Solutions, Bolloré is developing car sharing net-

works elsewhere in France (Lyon, Bordeaux) and abroad (Indianapolis, USA) and charging networks (London, UK). It also launched its "blue zone" solutions for emerging countries, especially in Africa, based on integrated energy production, storage and distribution.

In early 2015, the Bolloré group was authorised by the government to deploy 16,000 recharging points in France over four years, thus becoming the country's leading operator of recharge terminals. It will be investing €150 million in this project.

Bolloré signed an industrial cooperation agreement with Renault to assemble its Bluecar fleet at the Renault plant in Dieppe (Normandy). The joint venture is to be set up to market electric car sharing solutions on the same lines as Autolib' in the Paris region, with Bolloré holding 70% of its capital.

BOUYGUES

Bouygues Énergies & Services is making strides in charging infrastructure: it is leading the Eco2Charge programme, a new solution for smart recharge terminals developed in partnership with Renault, Alstom, Embix, Nexans, Actility and research centres (CEA and the University of Saint-Quentin-en-Yvelines). The consortium invested €13.2 million in the technology, with State support via the Investing for the Future programme; its market launch is planned for 2016.

EDF

The European Commission gave the green light to EDF to install 200 rapid recharge terminals along French motorways and in peripheral areas of major cities in 2015. The project is supported by the EU's TEN-T programme (Trans-European Transport Network).

GDF SUEZ

In March 2014, the Compagnie nationale du Rhône (CNR, a GDF Suez subsidiary) received ministerial authorisation to create a corridor of rapid recharge stations along the Rhone transport corridor. 52 stations will be deployed, starting in 2015.

MICHELIN

Michelin acquired a stake in Symbio FCell, a company based in the Grenoble area, which designs and integrates fuel-cell systems to extend the range of electric cars.

In January 2015, the Michelin group joined SNCF, Total, Orange and Air Liquide as an investor in the Eco-Mobility Ventures fund.

PSA PEUGEOT CITROËN

Ville Fluide, a car-pooling start-up based in the Paris region in which Peugeot had invested €1 million, announced that the service would shut down in March 2015.

On the electric car front, only 163 Peugeot iOn vehicles were registered in France in 2014, according to Avère, the national association promoting electric transport.

RENAULT

Renault again topped the electric car-making league table in 2014. In the passenger car segment, it sold 5,970 Zoe models, and 2,657 Kangoo ZE models in the utility vehicle segment. In January 2014, however, Renault announced that the manufacture of its Fluence ZE model was to be de localised to South Korea as the car had not been a success in France, with only 18 vehicles registered in 2013.

The group signed a cooperation agreement with Bolloré to assemble its Bluecar model at the Renault plant in Dieppe (Normandy). A joint company is to be set up to market electric car sharing solutions, with longer-term plans for a new series of Renault vehicles powered by Bolloré's Lithium Metal Polymer Battery.

Finally, Renault signed a framework agreement to expand its cooperation on eco-mobility with La Poste. The agreement provides for the development of utility vehicles of different sizes and connected services to optimise the use of electric vehicles.



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OPEN INNOVATION IS GAINING GROUND

Innovation is a major factor of competitiveness and growth for large business groups. Opting for openness by setting up incubators, ideas competitions and start-ups, even investing in new company equity, are increasingly seen as essential to keep abreast of innovations that could make a difference to the future.

Open innovation, according to a MEDEF survey on the subject in late 2014¹, is "the capacity to mobilise not only in-house resources but also the external ecosystem to boost a company's innovation dynamics". Open innovation in practice means engaging in technical or commercial collaboration with start-ups, solving problems with external experts and launching ideas competitions or calls for internal or external projects². Taken to its logical conclusion, open innovation will eventually involve investing in a start-up company.

Open innovation is booming: 56% of cleantech start-ups engaged in cooperation with a major group in 2014, as against 50% in 2013, according to the start-up observatory GreenUnivers³. Although they collaborate in many different ways, 56% of the start-up companies surveyed established client/supplier relationships with the groups, and the same percentage engaged in co-development.

Harnessing the collective intelligence

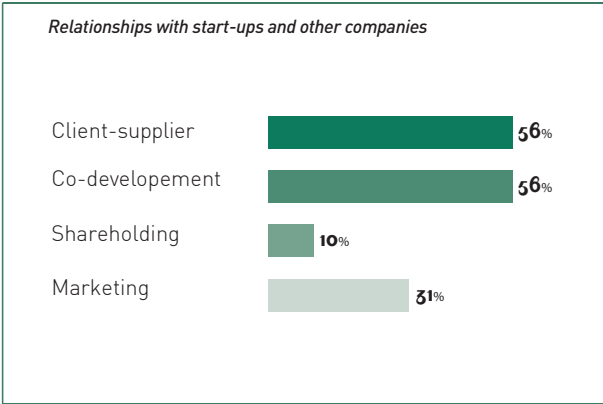
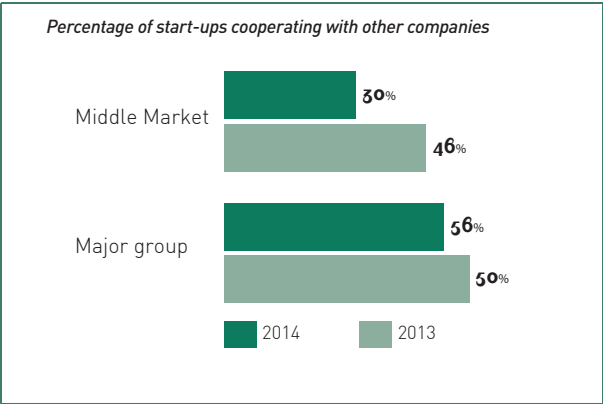
In every case, the approach reflects a new policy for openness among business groups, which until now had kept to "integrated systems leaving little room for 'different' players such as laboratories and start-ups and to long business cycles that have little relevance to young companies", explains Olivier Duverdier, CEO of the Ecosys Group, a service company specialising in eco-technologies and IT and Chair of the MEDEF's Open Innovation Committee.

What are the priorities? To anticipate trends and ensure responsiveness to new technologies or new business models to keep ahead of the competition or move into new markets or regions. To the companies that took part in the MEDEF survey, open innovation is primarily a way of keeping abreast of developments and generating new ideas, and 77% say they mainly use open innovation to support radical rather than incremental innovation.

The need for a change in business culture

"Open innovation does not just mean giving money to a start-up. It means doing new things and doing them differently, with more collaboration, more sharing and much more flexible working methods, and therefore working better and more closely with the business ecosystem", explains Olivier Duverdier, who believes that today's increasingly open, mobile and international young executives, who are therefore also more opportunistic and responsive, are a real asset.

This strategy based on "openness for progress" is encouraging major groups to review their practice and adopt new, more flexible and more efficient forms of organisation. "Even though we believe change is needed, it isn't easy", admits Jean-Pierre Pélacier, who is in charge of Open innovation at i-Lab, the New Ideas laboratory at Air Liquide. It means adapting procedures, and doing it fast, because large groups and start-ups are completely asymmetrical in the way they function".



The new procedures will only endure and take on an important role if there is real commitment to progress at the highest levels and real team involvement. At GDF Suez, for example, Jean-Louis Blanc, the director for marketing, innovation and new skills, is directly responsible to the CEO, Gérard Mestrallet, and is a member of the executive board.

GDF Suez pulls out all the stops

GDF Suez is one of the most aggressive players in open innovation. Its business landscape is changing radically, with the energy transition, the need to control consumption and the advent of decentralised production and NICTs. "This is the reason for last year's launch of an operation to speed up innovation in three priority areas: energy for the future, cities and mobility and home comfort", explains Stéphane Quéré, the group's director for innovation.

The operation was launched in-house with, for example, innovation trophies and the launch of a social network, which already has 7200 members, but also in the external ecosystem where several levers were brought into play. These include a digital platform for calls for projects (urban mobility and biogas for example), and local events such as our first "Innovation Day", which was attended by some 30 start-ups, collaborators, and clients in the Lille region and was associated with relevant prizes and competitions (e.g. the City of Paris Innovation Awards).

Building up an ecosystem

Air Liquide has a history of innovation with its major clients (Total, Shell) and university laboratories across the world and has been opening up to smaller companies in recent years, with a focus on eco-technology start-ups and SMEs, explains Jean-Pierre Pélicier. These agreements benefit both parties: they provide a shortcut to

new technologies for Air Liquide, and they help start-up companies to speed up their development.

The i-Lab involves 20 people with different and complementary backgrounds who decipher trends and test ideas with end-users. As well as direct collaboration with innovating companies, the lab also organised an ideas competition for European architecture students to work on the air and gas separation plant ("tomorrow's oxygen factory").

The French version of the worldwide Cleantech Open programme to identify cleantech start-ups, established by Ecosys, also aims to develop relationship between major groups and young companies. It involves 53 partners, 20 industries, 17 investment funds, 3 ministries and Climate-KIC, the European Institute for climate-related technology. "The idea is to boost cross-fertilisation to generate opportunities and common ground among players who might never meet up otherwise", explains Olivier Duverdier. The basic idea is "to build up the ecosystem, break down barriers and, especially, get practical".

Private incubators take off

Private incubators offer hosting facilities, advice, links with the ecosystem financing to help large groups and start-ups work together on topics of common interest, such as connected mobility for Renault or street furniture for JCDecaux, and to learn more about each other's approaches and goals.

GDF Suez set up an incubator for better energy in cities ("Pour une meilleure énergie dans la ville"), in partnership with Paris&Co (formerly Paris Région Lab), the centre to promote economic development, innovation and attractiveness in Paris. It is now hosting its first five start-ups, selected through a call for projects: Datapole, Énergiency, Partnering 3.0, Sharette and Smart Impulse. These five young compa-



nies developing services, products and technologies, energy efficiency and cities, will each receive coaching and mentoring from the group's in-house experts. "Ultimately, our goal is to bring a different perspective to our new business ventures, more openness and faster development of new products and services. The principle is mutual support for business development", says Stéphane Quéré.

Air Liquide, also with Paris&Co, set up an incubator on urban air quality ("Respirer dans la ville"), which is already hosting Airboxlab, Air Serenity, Natural Grass and Partnering Robotics. In 2015, it will be launching an industrial design competition on this topic.

1. *Baromètre de l'innovation ouverte 2014*, réalisé par le Comité Open Innovation au sein de la Commission Recherche/Innovation du Medef.
2. Voir le référentiel *Innovation Nouvelle Génération*, publié par Bpifrance en février 2015.
3. Étude réalisée en février 2015 auprès de 117 start-up, dans le cadre de l'Observatoire des start-up de GreenUnivers, en partenariat avec KIC InnoEnergy, DDIDE, Demeter Partners et Emertec Gestion.

Investing in equity

To strengthen strategic cooperation, large groups are increasingly acquiring equity - usually as minority shareholders - in young companies. The wave of corporate investment funds is spreading as others follow the pioneering example of Schneider Electric: Total, SNCF, Suez Environnement, EDF, Air Liquide and many more.

In 2014, GDF Suez set up its €100 million New Ventures fund. The group has already invested in start-ups in the commercial development phase, such as Powerdale in Belgium (energy control and electric mobility), Tendril in the US (Management solutions for energy services) and Sigfox France (network for the "Internet of Things" - IoT).

A recent GreenUnivers study¹ covers 84 investments in start-ups made from 2010 to 2014 by some 20 French groups. Energy and utility companies² 5 are the most active, with 34 investments, ahead of industrial groups³ 6 with 29 investments.

Preferred investment targets? Not surprisingly, the rapidly evolving energy sector tops the list (50% of investments, with 22% for renewables, 14% for storage 14% for energy efficiency), ahead of eco-mobility (11%) and construction/eco-materials (10%).

Energy, the leading sector for start-ups

The majority of eco-innovative start-ups in France are in the energy sector.

Of the 593 start-ups established since 2008 listed in the 2015 GreenUnivers survey⁴ on cleantech start-ups*, 21% of working on renewables and 20% energy efficiency.

Transport is in third place (16%).

These were already the three most active sectors in 2011, but renewable energy accounted for 42% of start-ups. Various difficulties (moratorium on solar power, complex, wind power, regulations) have slowed its dynamics. With 20% of start-ups in 2011, energy efficiency has been remarkably stable. With only 10% of start-ups in 2011, transport has surged, mainly thanks to the success of eco-mobility (carpooling and car sharing).

Geographically, the Paris region tops the list for start-up numbers (35% of companies established since 2008), ahead of the Rhône-Alpes (15%) and PACA (11%) regions.

1. GreenUnivers, Open Innovation survey, January 2015. www.greenunivers.com/2015/01/dossier-open-innovation-sur-quelles-start-up-misent-les-grands-groupes-121789/
 2. Areva, EDF, GDF Suez, Suez Environnement, Total.
 3. Air Liquide, Alstom, DCNS, Mersen, Schneider Electric, Technip.
 4. GreenUnivers Cleantech start-up survey 2015, in partnership with KIC In-noEnergy, DDIDE, Demeter Partners and Emertec Gestion.

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ÊTRE UTILE AUX HOMMES

RECORD FUNDRAISING FOR BUSINESSES

More than 100 French cleantech companies increased their capital in 2014, raising a total of more than 710 million. While investment capital is the main source of financing by far, stock market transactions are on the increase and crowdfunding is emerging.

Funding sources for French cleantech companies are increasingly diversified, ranging from investment capital, industries and stock markets to business angels and crowdfunding. This is a welcome trend given that R&D is often a lengthy process before companies can market their innovations, which forces them to raise funds to support their cash flow.

In 2014, 102 French cleantech companies raised a total of more than €710 million, according to the GreenUnivers survey¹.

This very substantial amount is primarily the result of a few large stock market transactions in the first half of 2014, which raised €100 million for Voltalia, the renewable energy developer and producer, €40.4 million for Fermentalg, a young green chemicals company and €32 million for McPhy Energy, a solid hydrogen storage specialist. After flatlining in the second half of the year, stock market flotations picked up again in early 2015.

The second reason is the surge in capital investments, which have provided two thirds of funding.



1. STRONG CAPITAL INVESTMENT DYNAMICS

Investment funds broke two records in 2014: 86 investment operations (81 in 2013) worth a total of €469 million, according to the 2014 survey by the French association of investors for growth (AFIC) Cleantech Club, conducted with GreenUnivers and EY².

1.a Green energy back on form

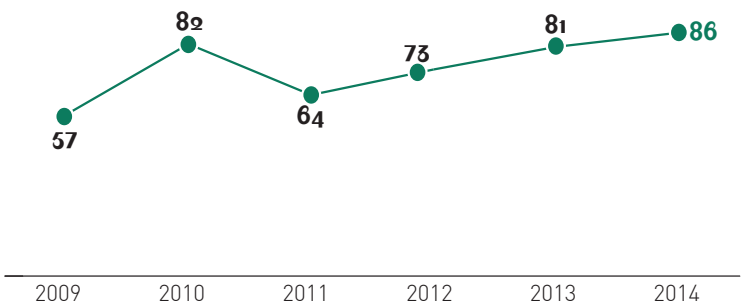
In numbers of operations, energy efficiency is the most active sector with 25 investments, ahead of renewable energy (16) and transport and recycling (11 each).

In terms of value, however, renewables top the list by far, with €191 million raised from investment funds, or 41% of the total amount invested. This sector had not been top of the list since 2011, when changes in solar and wind power regulations had plunged companies into a crisis and discouraged investors.

Two types of renewable energy companies raised funds in 2014. The first were energy developers and producers that had reached a critical size and needed to finance their international expansion and new project contracts (solar power plants, wind turbines), like Voltalia and Neoen, which completed two of the year's three largest operations. The second were young companies developing innovative technologies such as floating wind (Nénuphar, Ideol) and hydrokinetic turbines (Sabella).

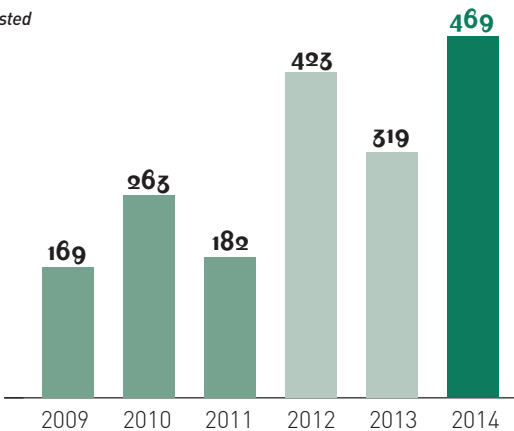
Transport is now in second place with €97.5 million invested (21% of the total). However, BlaBlaCar's record fundraising operation alone accounts for 70% of the total: the carpooling giant collected €73 million from its traditional shareholders and from Anglo-Saxon investment funds (Accel Partners and Lead Edge Capital).

Number of fundraising operations



source : Club Cleantech-Afic/GU/EY

Amounts invested



source : Club Cleantech-Afic/GU/EY

The other companies are essentially start-ups offering new services (car sharing and carpooling to and from airports, private car leasing) via web platforms: OuiCar (private car leasing), Mobility Tech Green (car sharing), TravelerCar (car sharing for holiday travel, etc.).

Energy efficiency is in third place with €73.5 million raised, or 16% of total investments. The two main developments in this sector were the deployment of mass-market digital applications with new services linked to connected objects (e.g. Smart Home International), and products for professional and industrial buildings (Enertime, Qualisteo).

Two mature sectors attracted only small investments in 2014: water, air and soil, treatment and recycling. In recycling, however, although the amounts are small, the number of operations is quite large, as several young innovating companies closed their venture rounds (e.g. Green Creative, Lemon Tri).

Hi-tech companies are spreading their wings in two new sectors: energy storage and green chemicals. Some have successfully got through the first stages and are now reaching for the skies (McPhy Energy, Fermentalg), while others are getting ready for take-off (Nawa Technologies, Ynsect).

1. GreenUnivers : article du 6 février 2015
www.greenunivers.com/2015/02/bilan-des-levees-de-fonds-dans-les-cleantech-en-france-en-2014-122784
2. Baromètre semestriel sur les levées de fonds en France, réalisé à partir des données de GreenUnivers avec le cabinet EY, pour le Club Cleantech de l'Afic. Seuls les investissements des fonds sont intégrés. Pour les opérations réalisées via la Bourse, seule la part apportée par les fonds d'investissement est intégrée dans le baromètre. Ainsi, pour Voltalia, 93 millions d'euros ont été comptabilisés sur les 100 millions collectés au total.



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Demeter Partners funds can support companies in all stages of development: creation, growth, LBO, with unit amounts from €0.5 to €15M.

Demeter Partners has supported SMEs in the eco-industry and eco-energy sectors mainly situated in France, Germany in Spain, since 2005.

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Demeter 2 and Demeter 3 Seed Funds are supported by the European Union via the Competitiveness and Innovation Framework Programme (CIP).

i.b. Innovation capital leads the field

By maturity dates, innovation capital accounts for 55% of the amount invested, or €258 million. The new national seed capital fund (FNA) has had little impact so far, and initial venture rounds have remained stable.

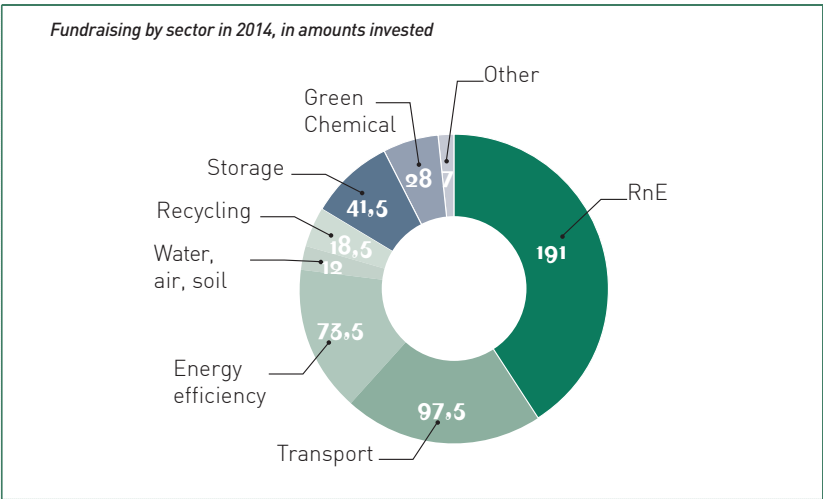
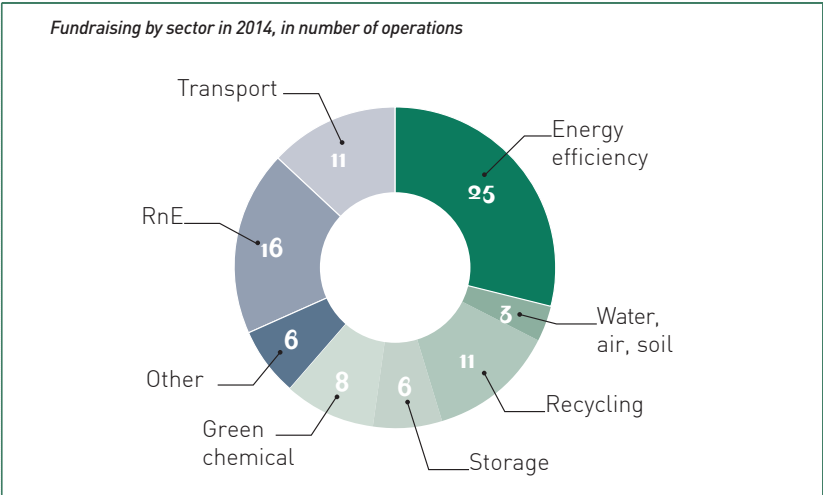
“Exits” are rare, and this is not sending the right signals to investment funds or to young companies. Acquisitions by groups are few and far between: in 2014, TMW and Orège, two water treatment companies, were acquired by the Eren group, founded by Pâris Mouratoglou and David Corchia, both former directors of EDF EN, and Ubeequo (car sharing for companies and local government) was acquired in early 2015 by Europcar.

On the investment side, the two main cleantech funds in France, Demeter Partners, which covers the full range of seed capital for infrastructure (€390 million under management) and seed capital specialist Emertec Gestion (€150 million under management) are the most active.

While non-specialist funds have been largely absent in the last three years, corporate funds are gaining ground. These are central to the open innovation strategy adopted by large business groups. GDF Suez established a €100 million fund in 2014: GDF Suez New Ventures, which has made two investments to date, in the Belgian company Powerdale (energy control and electric mobility) and the US company Tendril (smart energy management solutions).

EDF has also been very active through the Electranova Capital fund, of which it is the strategic sponsor and which it manages in partnership with Idinvest Partners.

Other active industrial investors include Suez Environnement via its Blue Orange fund, Air Liquide via its Aliad vehicle and the Total Group through Total Energy Ventures, which



has mainly acquired equity in US companies.

Among multi-corporate funds, the pioneer, Aster Capital (Schneider Electric, Alstom, Solvay, European Investment Fund), is continuing operations in France and internationally. Two new companies, Air Liquide and Michelin, joined SNCF, Orange and Total as shareholders in Ecomobilité Ventures, which has been managed since 2014 by Blue Invest, an affiliate of Idinvest Partners.

Among the major players, finally, the ADEME eco-technologies fund managed by Bpifrance acquired shares in promising companies such as Ijenko (smart homes) in 2013 and 2014.

2. MORE STOCK MARKET FLOTATIONS

Following several operations at the end of 2013 (e.g. Carbios and Orège), the first half of 2014 saw a large number of stock market flotations that raised significant amounts of capital. McPhy Energy (solid hydrogen storage solutions) set the ball rolling with €32 million raised from its Euronext flotation in Paris, which was oversubscribed eight times over. Next came Fermentalg (green chemicals) with €40.4 million, Innoveox (waste treatment) with €15.5 million and Lucibel (LED) with €7.6 million.



Voltalia, which was already listed, increased its capital by €100.1 million and moved from the free market to Euronext.

The abrupt closure of the stock market window after the first half of 2014 forced Deinove (green chemicals) to abandon its capital increase attempt in July. Other companies also postponed their stock market flotation plans.

The depressed financial markets picked up after six months with new IPO issues in early 2015. Oceansoft (connected sensors for industry and the environment) raised €8.6 million in January with an offering that was oversubscribed by 130%. Ecoslops (marine fuel oil produced from petroleum sludge) followed suit in February with similar success: €18 million raised with an offering oversubscribed by 200%.

In early March, Solairedirect announced a Euronext Paris flotation for the first half of 2015, from which it hopes to raise hundred and €175 million.

3. CROWDFUNDING TAKES OFF

Another strong trend that has emerged is participatory project funding via Internet platforms.

In France, an exhaustive series of regulations that entered into force on 1 October 2014 provided crowdfunding with a framework and a boost. The different forms of participatory funding (donations, loans) include equity crowdfunding, which allows natural or legal persons to acquire shares in a company. Equity crowdfunding is used to raise seed capital.

The numerous platforms offering investment opportunities to private individuals include Wiseed, Anaxago, SmartAngels and many others

Several cleantech start-ups have raised capital in this way in recent months. Examples include Canibal (recycling), Naïo Technologies (sustainable agriculture) and New Wind (small windfarms). Crowdfunding plat-

forms may be used alongside business angels or seed capital funds.

Crowdfunding is also being used for renewable energy projects to raise capital (Lumo) or loans (Lendosphere).



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Key facts & figures...

- 1**
Founder
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French Ministries (sponsors)
 - 4**
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PROJECT FINANCING BACK IN BUSINESS



FINANCING FOR RENEWABLE ENERGY PROJECTS BOUNCES BACK IN 2014

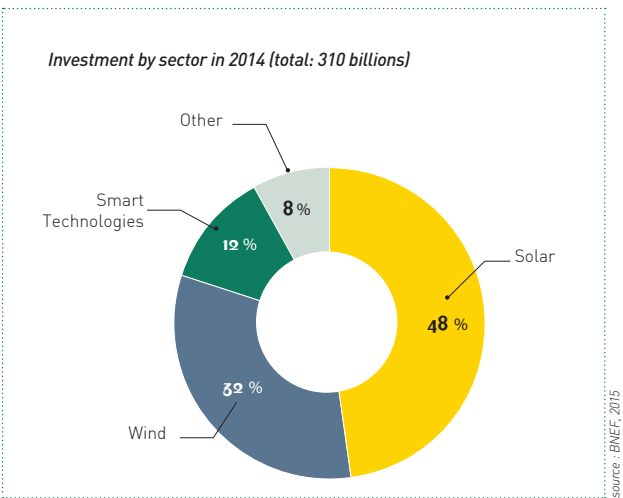
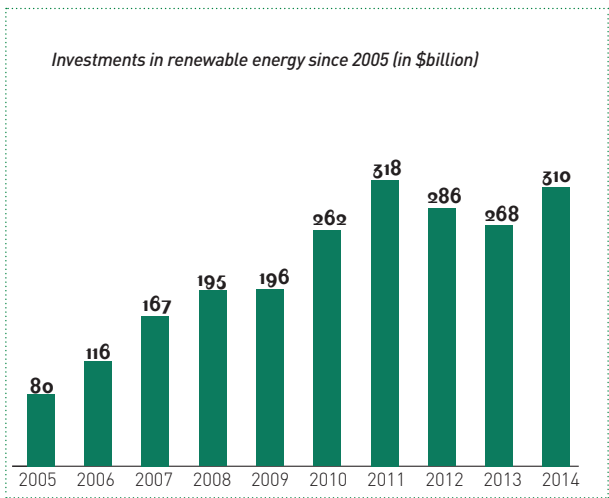
With over \$310 billion invested¹, financing for renewable energy projects rebounded strongly in 2014 with a 16% increase over the previous year. This is very close to the record \$318 billion invested in 2011, which was followed by a significant drop in the next two years (\$268 billion invested in 2013).

This improvement was driven by strong demand, especially in the solar power sector, which attracted half of all in-

vestments. The growth in solar power (+25% over 2013) is largely due to the steadily falling costs of photovoltaic technology the last five years. Growth in windpower was slower (11%), although 2014 was a record year for investments in offshore wind, with over \$19 billion raised.

The smart technologies sector (including intelligent power networks, energy storage, energy efficiency and elec-

tric mobility), accounting for 10% of investments, grew by 10% over 2013. Biofuels, biomass and small hydropower projects (less than 50 MW) are stalling, with a decline in investments.



FRANCE IS ONE OF EUROPE'S MOST ATTRACTIVE MARKETS

In France, investments in carbon-free energy increased by over 25% compared to 2013, to nearly \$7 billion. Financing for the 300 MW Cestas solar park, the largest photovoltaic project in Europe, accounted for much of this rapid growth.

This upturn is reflected in the launch of new funds dedicated to cleantech infrastructure projects. In particular, Mirova achieved initial closing in July 2014 of its specialised Eurofideme 3 fund for renewable energy infrastructure and in 2015 obtained €40 million in support from the European Investment Bank. Similarly, Demeter's infrastructure fund (Demeter 4 Infra) closed at 50 million € in February 2015, and Aqua Infrastructure is also being launched on to the French market.

There are striking contrasts in other European countries: while investments plummeted in Italy and Austria, mainly as a result of regulatory changes or uncertainties, investments in the Netherlands trebled with financing for offshore wind farms.

NEW SOURCES OF RENEWABLE ENERGY FINANCE ARE EMERGING

Several instruments of particular note in the landscape of renewable energy financing, especially Green Bond issues and crowdfunding, but also the Green Climate Fund, which, after a long gestation period, was finally given substantial means of over \$10 billion at the end of 2014.

OVER \$50 BILLION IN GREEN BONDS ISSUED BY THE END OF 2014

The green bonds market, which finances infrastructure projects to benefit the environment (renewable energy, water, waste, biodiversity, etc.), saw unprecedented growth in the last two years. While the market had already seen exceptional growth in 2013, green bond issues more than trebled in the following year. By the end of 2014, the green bonds market had reached \$53.2 billion in value, according to the Climate Bond Initiative.

Initially, in 2007-2008, the majority of green bonds were issued by multilateral funds, especially the World Bank and the EIB, but other players are now taking over.

Several bilateral development agencies issued green bonds 2014, such as KfW (Germany), FMO (Netherlands) and AFD (France), which issued \$1 billion last September² in the form of 10 year "climate bonds" to finance projects with a direct impact on greenhouse gas reduction.

Some large energy companies have also issued green bonds to finance renewable energy projects. Examples are EDF, Iberdrola and GDF Suez.

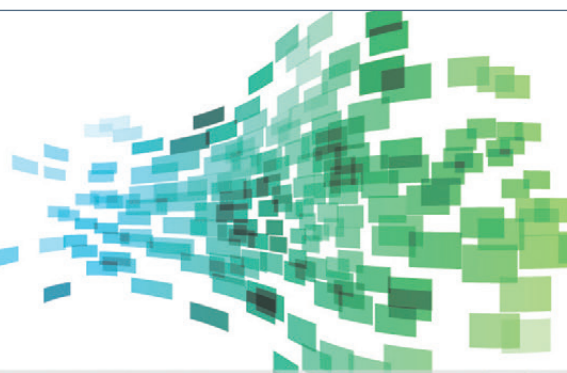
The latter group raised €2.5 billion in May 2014, in the largest green bonds issue to date.

The largest projects financed in 2014 were

1. Bloomberg New Energy Finance, Rebound in clean energy investment in 2014 beats expectations January 2015

2. These are 10-year maturity bonds with a 1.37% coupon and have the same ratings as the AFD - AA (Standard & Poor) et AA+ (Fitch)

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Utilities have given a boost to the market by increasing the volume of Green Bonds and diversifying currencies. This has increased market liquidity, which is essential to its expansion.

Investors have been showing more interest in these bonds, with all green bond issues substantially oversubscribed. As examples, the GDF Suez Green Bond issue was oversubscribed by 300% and the EDF issue by 200%¹. Green bond issues do not only concern the energy sector, as shown by the recent €480 million Paprec issue or the “Blue bonds” issued by the EIB for the water sector.

The Green Bonds rush is part of a wider trend of growing interest in the integration of environmental, social and governance issues (ESG) in investment products.

The current debate on “stranded assets” and the exposure of institu-

tional investors to oil and carbon price volatility risks should reinforce this trend.

The market is becoming structured, with the launch of the Green Bonds Principles in January 2014 on an initiative from a consortium of 25 banks (HSBC, Citi, Crédit Agricole, JPMorgan Chase, BNP Paribas, etc.).

CROWDFUNDING TAKES OFF

Crowdfunding is an innovative fundraising method through which private individuals and communities can acquire shares in projects of every type.

Although the amounts are still small compared to the capital investments required to develop renewable energy projects², crowdfunding has the advan-

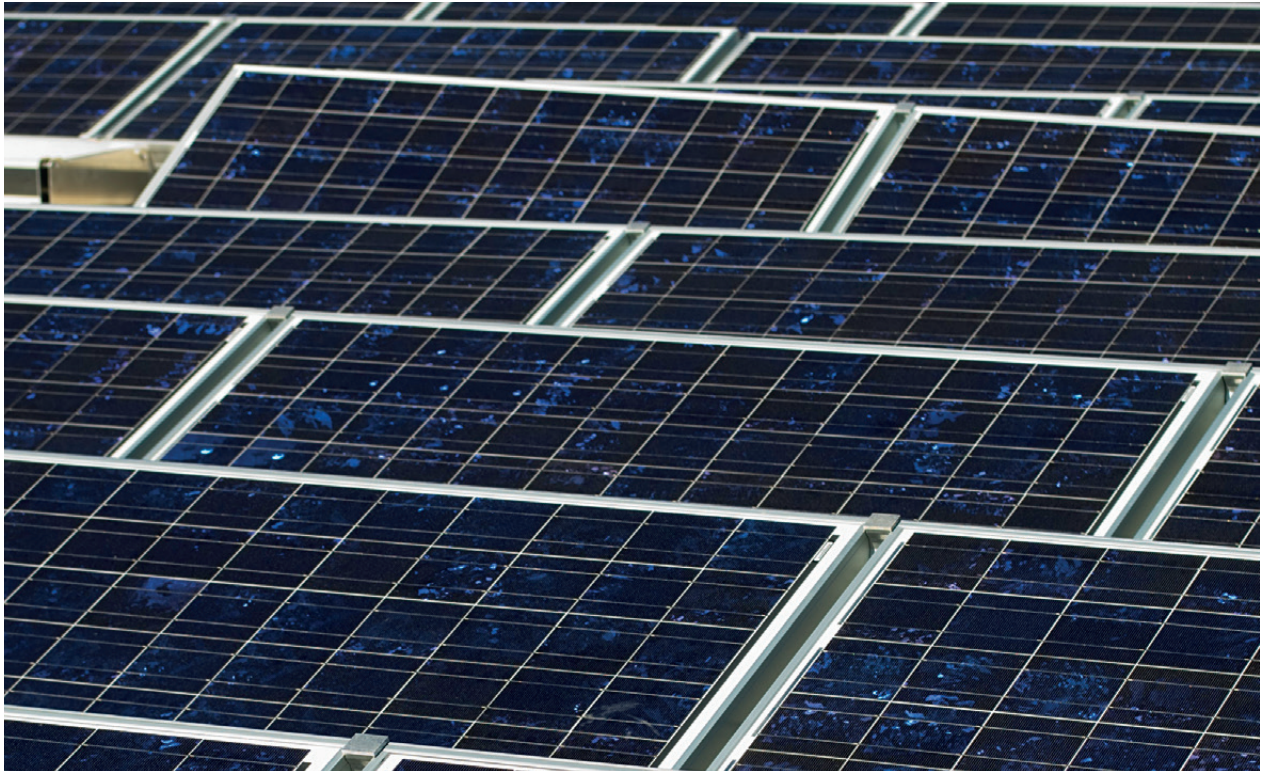
tage of mobilising private savings and directing funds towards local projects.

Several crowdfunding platforms in Europe and the US are already raising funds to invest in renewables. As an example, Abundance Generation has invested more than \$13 million since 2011 in renewable energy projects involving over 1,500 investors.

In France, several crowdfunding platforms have developed in the renewable energy segment in the last five years. With Lumo, for example, web users can purchase bonds to finance collective renewable energy projects, usually in collaboration with local authorities.

1. Source: Bonds and Climate Change, the state of the market in 2014, Climate Bonds Initiative

2. In France, the government decree on participatory financing published in the Official Journal on 17 September 2014, caps crowdfunding capital at €1 million per project.



GREEN CLIMATE FUND (GCF): READY TO TAKE OFF AT LAST

The Green Climate Fund, implemented by the UN to support climate change action in developing countries, aims to raise \$100 billion by 2020.

With capital contributions to the Green Fund of more than \$10 billion in 2014, including \$1 billion from France, the process that began with the Copenhagen and Cancun COPs has finally reached a successful outcome. The GCF is expected to act as a catalyst for climate change and adaptation programmes in developing countries and is set to become a cornerstone of the financing architecture to fight climate change.

PROSPECTS FOR 2015

France should continue to be a dynamic market in 2015, as indicated by renewed interest from financial players (infrastructure funds, banks) in recent months. Thanks to clarifications in the regulatory framework, several new investment vehicles will be in a position to provide diversified financing solutions for the energy transition and environment sectors.

International growth in renewable energy investments will be largely driven by the emerging economies. These markets offer considerable development opportunities for the French cleantech sector. Africa is a case in point, where innovative financing facilities for the private sector are growing rapidly. For example, the African Renewable Energy Fund (AREF), officially launched in June 2014 with capital of \$100 million, is aiming for \$200 million by the end of 2015. In early 2015, the Access Energy Ventures

fund was officially launched in partnership with Schneider Electric and several development agencies. This €54.45 million fund is looking to invest in some twenty African SMEs with the aim of supplying electricity for 1 million people by 2020.

These instruments complement the many initiatives from funding agencies across Africa, such as the World Bank's launch of the "scaling solar" programme in February 2015, which aims to create a significant market for private-sector solar power projects in Africa. These various initiatives should open up new opportunities for the region, which still has a great deal of largely under-used potential in the environment and renewable energy sectors.



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