

# WIND ENERGY DEVELOPMENT IN FRANCE IN 2005

Bernard CHABOT<sup>(1)</sup>, Laurent BUQUET<sup>(2)</sup>

(1) Senior Expert, ADEME, 500 route des lucioles, 06560 Valbonne, France

(2) General Manager, TEXSYS, 109 Avenue de Lespinet, Bât C, 31400 Toulouse, France

## 1) KEY MILESTONES

For the first time, France joined in 2005 the « top ten wind power markets » in terms of delivered wind turbines, as shown in figure 1 and the first annual wind billion kWh (TWh) was delivered to the grid in 2005 (including overseas departments and territories).

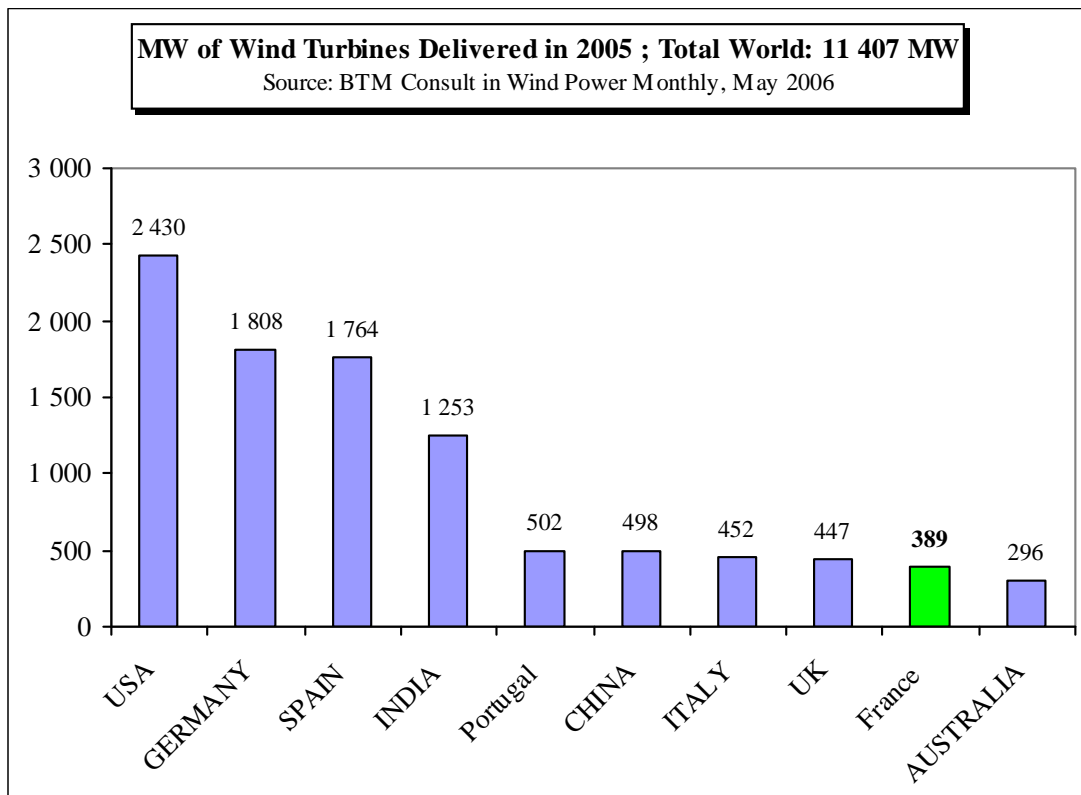


Figure 1: BTM Consult assessment of 2005 top ten wind turbines markets

Those milestones and associated trends are analysed here mainly from the data base developed for ADEME by TEXSYS and which is available from the Web site [www.suivi-eolien.com](http://www.suivi-eolien.com). Those data are based on installed and operational wind farms and not as in figure 1 on delivered wind turbines, which explains the difference of 2005 market data between figures 1 and 2 (366 MW operational wind farms instead of 389 MW of wind turbines delivered to France).

## 2) TEN YEARS OF WIND DEVELOPMENT IN FRANCE

Wind development in France from 1996 to 2005 is summarised in figure 2 both for the total operating power and for annual market. At the end of 2005, 757 MW of wind farms were in operation (continental France, Corsica and Overseas Departments and Territories), representing an increase of 94 % from the 390 MW in operation at the end of 2004. No wind turbines were decommissioned in 2005. The 366 MW installed during 2005 represent a 148 % increase from the 147 MW installed in 2004.

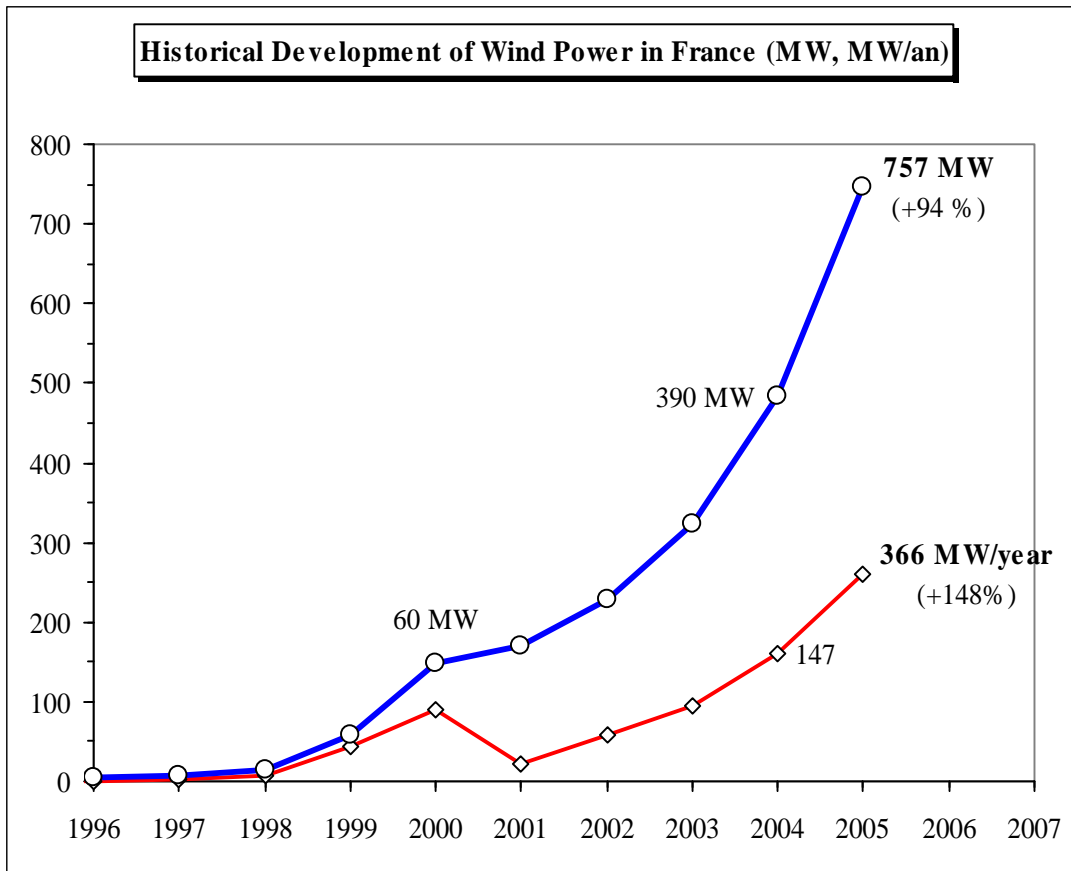


Figure 2: French wind power development (blue: end of year operating power; red: annual market).

On the 2000-2005 period, the annual growth rates were 66 % for the operating power and 54 % for the annual markets.

Although impressive, those growth rates are to be put in perspective with European installed wind power and markets figures in Europe : the French part is 1.9 % of the 40 504 MW in operation in Europe and the 2005 French market represented 5,9 % of the European wind market.

### 3) REGIONAL DEVELOPMENT

Figure 3 shows the regional distribution of the 366 MW installed in 2005. There is clear trend towards new installations in moderate windy regions (Lorraine, Champagne-Ardennes, Auvergne...). The first 4 regions represents more than half of the installed power increase in 2005 (55 %), the following seven 36 % and the 16 others less than 9 %.

The regional share of the 757 MW of total operating power at the end of 2005 is shown in figure 4. Here also the consequence of the 2001 wind tariff system is a smooth repartition of wind farms on a large part of the territory: 22 regions (of which 17 in continental France) are benefiting from wind power on the total of 26 French regions (of which 21 in continental France).

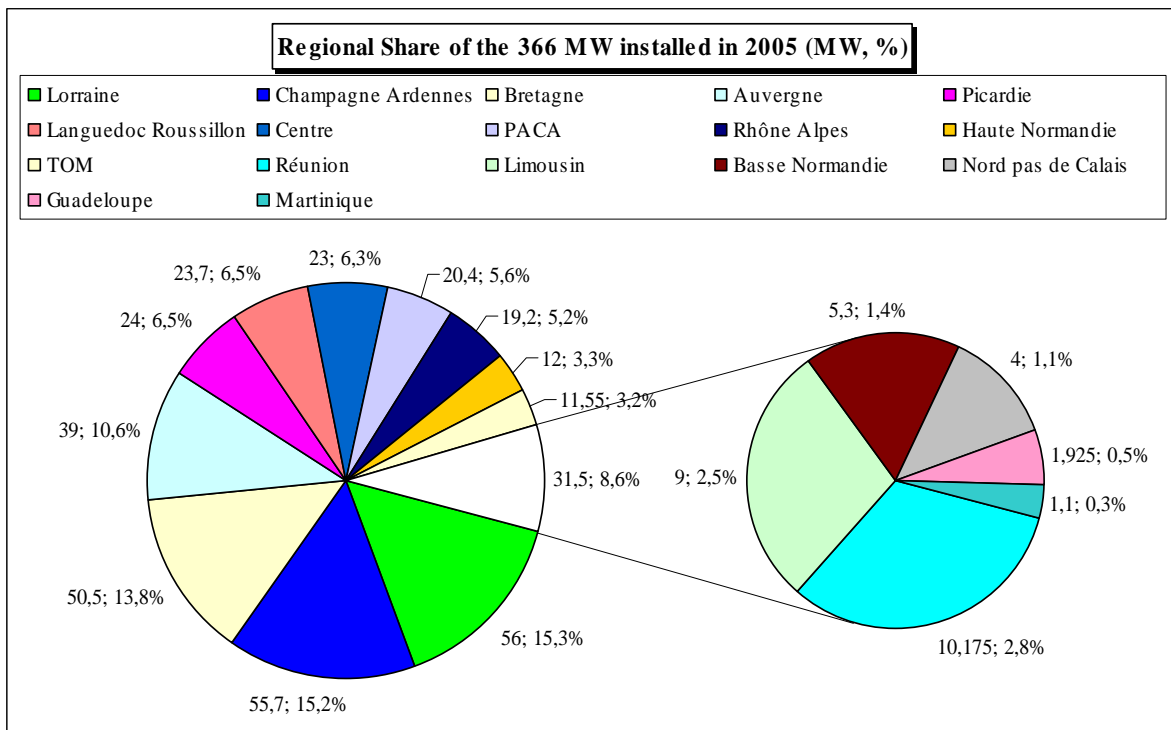


Figure 3: Regional share of the 366 MW installed in 2005 (in MW and in %)

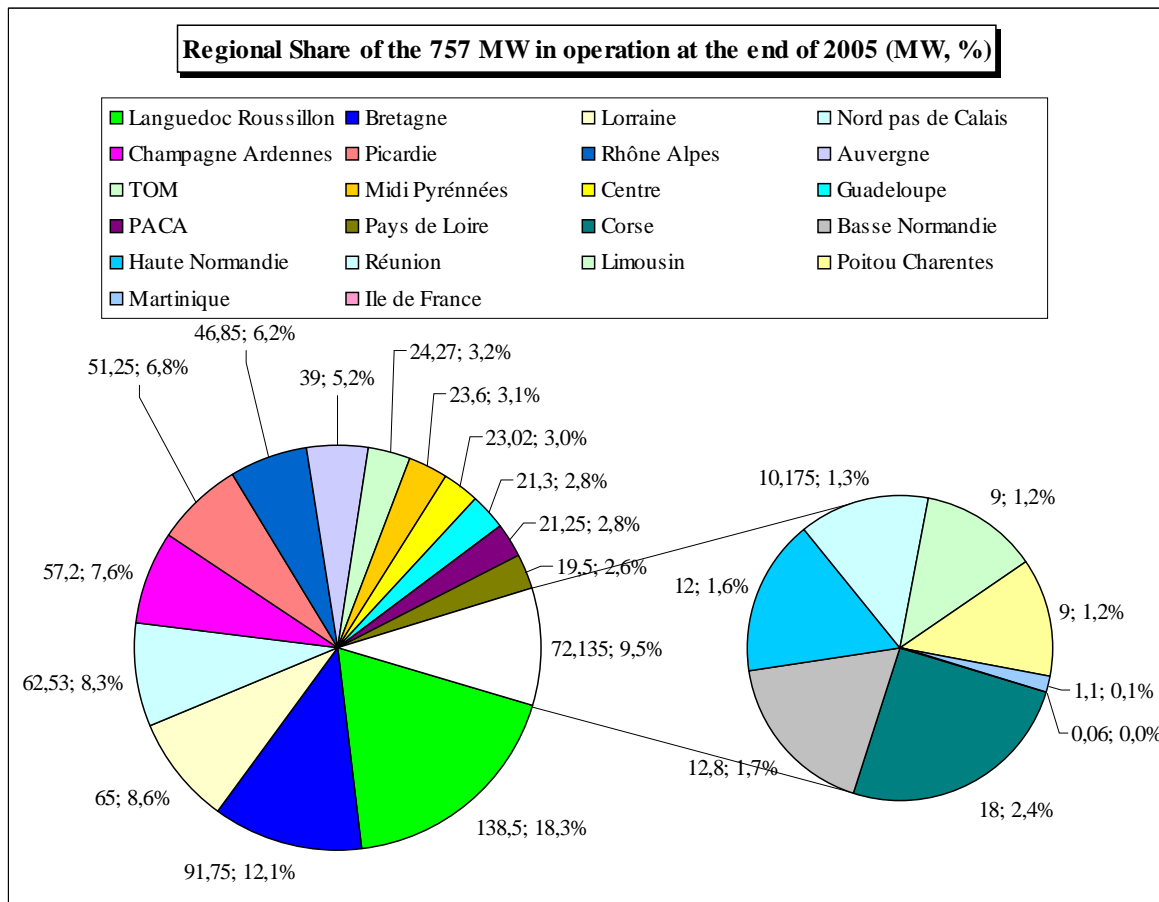


Figure 4: Regional share of the 757 MW in operation at the end of 2005 (in MW and in %)

Installed power in continental France in 2005 represents 90 % of the total operating power with only 59 % of the number of installed wind turbines. This is due to the fact that in overseas departments and territories, most of the installed wind turbines are light and tiltable ones (less than 300 kW) well adapted to those regions with high risks from hurricanes.

Continental France represents 93 % of the 366 MW installed in 2005 (341.8 MW from 233 wind turbines with an average power of 1.47 MW) and 90 % of the total operating power at the end of 2005 (682.4 MW on 565 wind turbines with an average power of 1.21 MW).

#### 4) WIND TURBINES MANUFACTURERS MARKET SHARES

The four leaders on the 2005 French markets represent three quarter of this 366 MW market.

Market share of the French manufacturer VERGNET is 7 % and it is worth to notice that the AREVA company has taken recently a 28 % share of the German REPOWER manufacturer which is clearly the 2005 leader with 29 % of the 2005 market, followed by GENERAL ELECTRIC WIND ENERGY (18 %), ENERCON (15 %) and VESTAS (14 %):

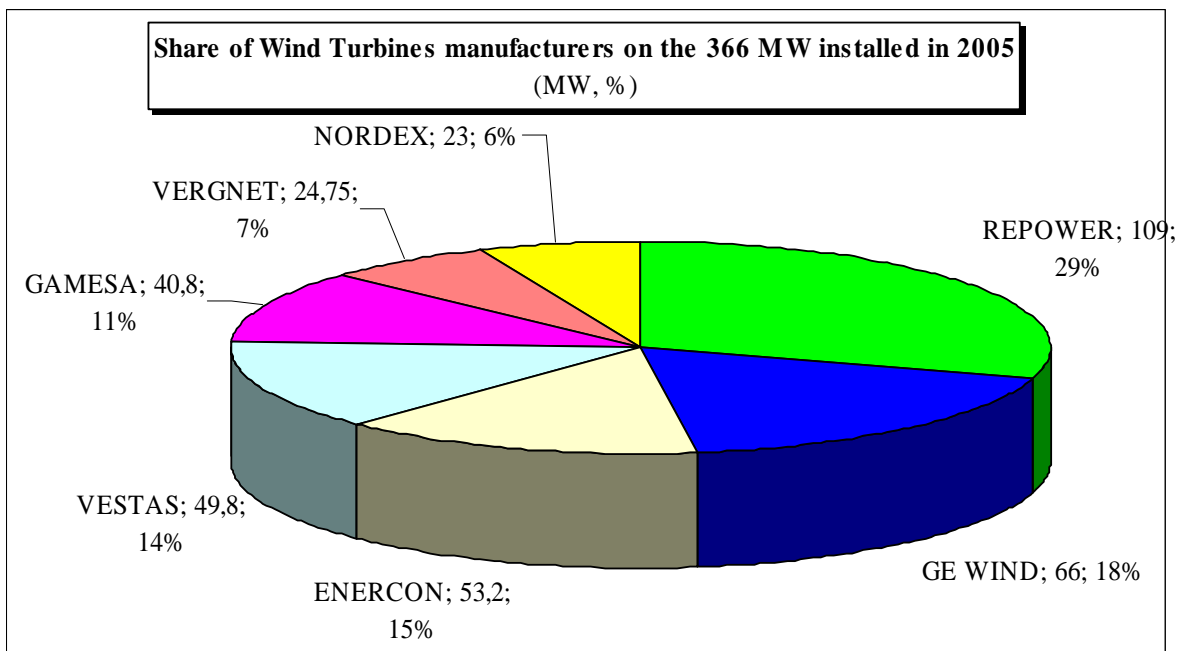


Figure 5: 2005 Market shares of wind turbines manufacturers

So the tend towards concentration in the world wind energy market is taking place also in the French market. And the fact that all major players of the world wind market are now also active in France shows that the French wind power market is now fully considered as a major one as already seen in figure 1.

As shown in figure 6, market shares on the total of 757 MW in operation at the end of 2005 have changed from the past. Major players are now REPOWER (17 %), GENERAL ELECTRIC WIND ENERGY (16,3 %), VESTAS (15,4 %), NORDEX (14,6 %), ENERCON (11,3 %) and GAMESA (9,8 %). The total for the two French manufacturers VERGNET and JEUMONT (this last company ceased to manufacture its J48 model in 2005) amounts to 11,8 %.

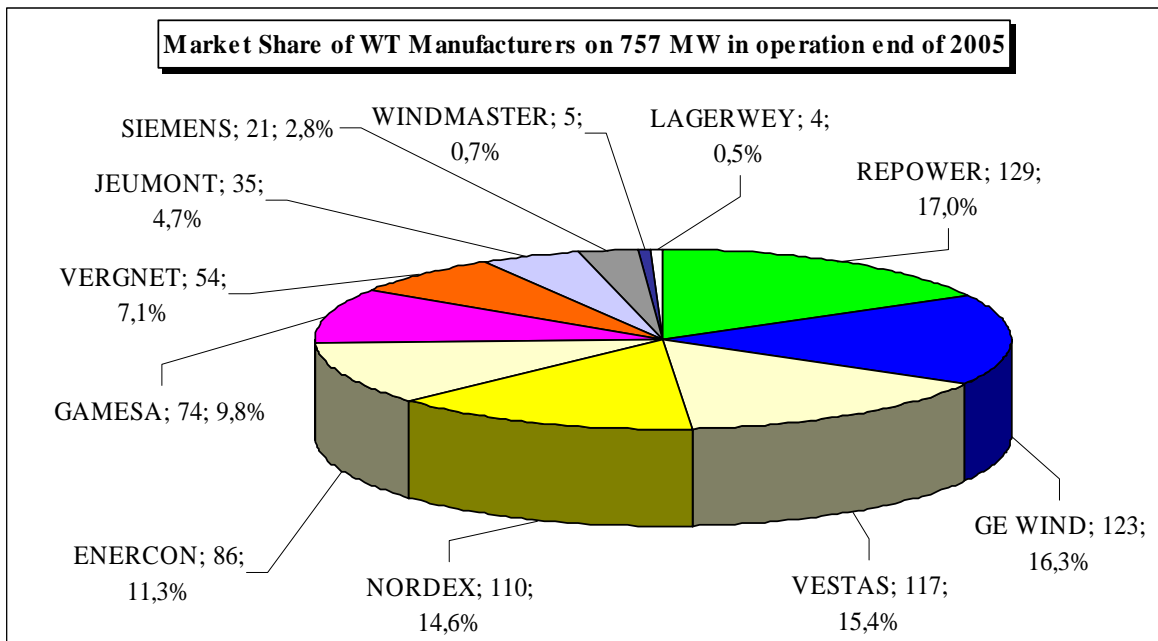


Figure 6: total market share of wind turbine manufacturers (on 757 MW)

## 5) THE FIRST ANNUAL BILLION kWh IN 2005

The threshold of the TWh of annual wind energy production has been passed for the first time in 2005: the measured production on the 470.54 MW under production monitoring as reported on the web site [www.suivi-eolien.com](http://www.suivi-eolien.com) was 803 GWh and the best estimate of the total production of the other wind farms is 257 GWh leading to an estimated total slightly beyond 1 TWh.

The growth above the estimated 2004 production (600 GWh) is 77 % and production has more than doubled from the 455 GWh production in 2003. It is to note that after the first GWh of grid connected wind production in 1992, ADEME has then announced that the target to multiply by a factor of 1 000 this production level could be achieved by 2005<sup>1</sup>...

This 1.06 TWh production level represents 0.22 % of the French national electricity consumption (482.4 TWh in 2005<sup>2</sup>), 1.9 % of the 2005 French hydropower production (56 TWh) and 25 % of the other renewable energy sources based power (4.3 TWh in 2005, including wind power).

Considering a mean ratio of 8 000 kWh of total electricity consumption per people, wind power represented in 2005 the total electricity consumption of a town larger than 132 000 inhabitants, such as Metz, Nîmes or Aix en Provence. With a mean ratio of 2 300 kWh per people wind power represented also in 2005 the specific domestic electricity consumption of a town of more than 1.24 million inhabitants, around the total of people living within the Marseille and the Lyon cities (respectively around 797 000 and 445 000 inhabitants).

Potential production during a complete normal windy year of the 757 MW total operating wind power at the end of 2005 can be estimated at around 1.67 TWh/year.

Table 1 shows the regional share of the estimated 2005 production and the estimated potential production on a complete year. The windy Languedoc-Roussillon region alone represents one third of the 2005 and the potential full year production. With the four succeeding regions (Nord Pas de Calais, Bretagne, Rhône Alpes and Midi Pyrénées) the corresponding total is two thirds. The other 12 continental regions represent one fourth and non continental regions (Corsica and Overseas Departments and Territories) contribute to 7.5 %.

The complete year estimated production represents a capacity factor of 25.1 % (2 200 equivalent hours per year at rated power) and a specific yield of 740 kWh/m<sup>2</sup>.year.

<sup>1</sup> Proceedings of the ADEME Wind Energy Seminar, Sophia Antipolis, October 1st and 2<sup>nd</sup>, 1992.

<sup>2</sup> Data in this paragraph from: RTE, "L'énergie électrique en France en 2005", January 2006.

Table 1: 2005 wind power production data by region:

REGIONS	P	P/S	Ea 05	%	Ea pot 06	Nh pot 06	Eas pot 06
	MW	kW/m2	GWh	in 2005	GWh	h/year	kWh/m2.y
Languedoc Roussillon	139	0,421	350	33,0%	397	2 864	1 206
Nord Pas De Calais	63	0,366	132	12,5%	140	2 241	821
Bretagne	92	0,424	93	8,7%	181	1 978	839
Rhône Alpes	47	0,399	66	6,2%	108	2 308	922
Midi Pyrénées	24	0,441	61	5,8%	61	2 602	1 146
Others Cont. Regions	319	0,382	279	26,3%	671	2 102	802
Corsica + DOM + TOM	75	0,372	80	7,5%	111	1 488	554
<b>TOTAL / average</b>	<b>757</b>	<b>0,394</b>	<b>1 061</b>	<b>100%</b>	<b>1 670</b>	<b>2 206</b>	<b>739</b>

Over-costs paid for wind power production represented in the past a small part of the public service charges fund set up by the February 2000 French law on electricity (called the “CSPE” fund). In 2004, the last year with complete data published, wind power represented 2.2 % of the CSPE fund of 1 533 M€ of which 74 % are dedicated to mandatory power purchase agreements and 26 % to over-costs in non-interconnected zones (Corsica and Overseas Departments). On the over-costs from those mandatory power purchase agreements, wind power represented only 3 % in 2004 (45 M€, compared to hydropower (11 %, 125 M€), other renewables (4 %, 45 M€), CHP (75 %, 851 M€), MSW (4 %, 45 M€) and other sources (3 %, 34 M€ mainly from diesel-based peak power plants).

Those over-costs are calculated by the French Regulatory Authority for Energy (CRE) from a mix of 2004 prices for electricity from the French POWERNEXT and the German EEX power markets. As power prices on those markets are increasing, it is anticipated that the over-cost paid by final consumers will increase in 2005 and 2006 far less than the corresponding wind energy production increase. In this hypothesis, their relative level based on the 2004 one would be around 0.6 € per inhabitant and per year, representing less than half a liter of gasoline or the order of magnitude of electricity cost saved by replacing a 100 W incandescent bulb by a 20 W fluorescent one and using it during two months.

## 5) PROSPECTS AND CONCLUSIONS

Wind power still represents the major part of new files for grid connection for electricity from renewable energy sources in France. According to EDF, on a total of 2 974 MW of files under consideration for grid connection (at the distribution level) at the end of March 2006, 92 % (2 745 MW) were wind projects, followed by projects based on Municipal Solid Waste (77 MW), biogas (71 MW), hydropower (49 MW), biomass (21 MW) and photovoltaics (11 MW). It is to note that to be included in those data, projects must have received before their building permit.

The amount of projects for biogas, biomass (including from MSW), geothermal (0 MW of projects at the moment) and photovoltaics will increase dramatically in the near future as new tariffs for power from those technologies will be published during the summer and the fall of 2006. New tariffs will be published also for wind power, but as their present level is considered not too low, the expected relative changes will be minor compared to those for other renewable energy technologies.

To facilitate the development of wind power projects, a letter has been sent on June 19<sup>th</sup> 2006 by the Ministry of Ecology and Sustainable Development and the Ministry of Industry to the Préfets (French Governments representatives in each department) detailing guidelines<sup>3</sup> to assess the projects sent by local municipalities concerning their application for dedicated “Zone de Développement de l’Eolien” (Zones where to develop wind projects in order for them to benefit from wind tariffs), as defined in the July 13<sup>th</sup> 2005 French law on Energy (the said “POPE law”).

An other very positive signal has been given also recently for wind power development in France: On July 9<sup>th</sup>, 2006 an “Arrêté PPI” (a decree on provisional requirements for future investments for power production in 2010 and 2015, as required from the February 2000 French law on electricity) has been published by the French Government<sup>4</sup> with the following targets for wind power installed capacity:

- End of 2010: a total of 13.5 GW (12.5 GW on shore and 1 GW offshore).
- End of 2015: a total of 17 GW (13 GW on shore and 4 GW offshore).

<sup>3</sup> Document available for example from : [www.planete-eolienne.fr/documents/circulaire\\_19juin2006\\_ZDE.pdf](http://www.planete-eolienne.fr/documents/circulaire_19juin2006_ZDE.pdf)

<sup>4</sup> Document downloadable from : <http://www.legifrance.gouv.fr/WAspad/UnTexteDeJorf?numjo=INDI0607832A#>

Attaining this new 2010 official target will be challenging, but we have seen that a large number of projects are already planned and that the new framework defined by the ZDE guidelines is now clear, and so, with the assumption that the new 2006 wind tariffs will continue to ensure a fair profitability to investors, a new impetus to wind power development in France would allow to be as close as possible to this ambitious target.

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Useful information sources for wind power in France:

[www.suivi-eolien.com](http://www.suivi-eolien.com) ; [www.ademe.fr](http://www.ademe.fr) ; [www.enr.fr](http://www.enr.fr) ; [www.fee.asso.fr](http://www.fee.asso.fr) ; [www.planete-eolienne.fr](http://www.planete-eolienne.fr) ;  
[www.minefi.gouv.fr](http://www.minefi.gouv.fr) ; [www.ecologie.gouv.fr](http://www.ecologie.gouv.fr) ; [www.edfdistribution.fr](http://www.edfdistribution.fr) ; [www.rte-france.com](http://www.rte-france.com) ; [www.cre.fr](http://www.cre.fr)

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