Work package 2- Historical and recent attitude of stakeholders

# Case 11:
# EOLE 2005 wind energy programme

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*C*ultural Influences on *R*enewable *E*nergy *A*cceptance and *T*ools for the development of communication strategies to promot*E* ACCEPTANCE among key actor groups

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# 1. Introduction

This case study reviews the recent development of wind energy in France for the industrial production of electricity.

Wind energy has enjoyed an extraordinary success in the Wold and particularly in Europe in the last 20 years as an alternative source of electricity production (Appendix A). This renewal originated in the first oil shock and the consequent period of very high fossil fuel prices that followed. This pressure on fossil fuel prices initiated an important first wave of technological and industrial development largely encouraged by public resources and expectations as well as an important market opportunity in California. At the time, wind turbine makers manufactured mainly small size water pump. This first wave of investment opened the way to the technical development of large wind turbine, an obligatory passage point towards industrial electrical wind farms (Shove et al., 2000; Gipe, 1995).

Although many of the technological uncertainties were solved at the end of the 1980s[1]-, the counter-oil shock and the relatively low prices fossil fuel were selling at made wind turbines of the time uneconomical. Environmental concerns and long term perspective of fossil fuel shortage nevertheless drove a small number of European countries - Denmark, Netherlands, Germany, Spain - to encourage massive investment through a number of Governmental initiatives and incentives. At the end of the 1990s, in a new context of fossil fuel tension, considerable achievements in terms of wind turbine profitability[2] rendered the perspective of large industrial wind farms competitivity reachable as compared with fossil fuel and nuclear facilities (Chabot, 1997).

In 1996, the French Government, impressed by the voluntary energy policies carried out notably in Germany and Spain (Chabot, 1999), felt it was time to consider wind energy more seriously and to set its own wind energy programme called 'EOLE 2005'. Ten years later, wind energy seemed to be taking off in France, especially in the most recent period. This progress was however not achieved as easily as was first expected. Important social opposition was encountered by farm promoters in several regions in France.

The project EOLE 2005 will be the major focus of this case study for several reasons. First, this programme played a role of demonstrator and contributed to initiate a movement of important investment in wind farms in France. Second, major learning were made during the project. It contributed to shape both social acceptance and social resistance to wind energy technology. Third, the development of Wind energy in France depended and contributed to wider social transitions.

# 2. Country overview: the 'need' for wind energy in France

The French profile in terms of energy and electricity is rather atypical. Although energy consumption in France is comparable to other European countries[3], only about half of this consumption comes from fossil fuels - as it is importing most of it - and the other half from renewable and nuclear sources (Appendix B).

[1] Average reliability of large wind turbines jumped from 60 to an estimated 95% in the 1980s (Menanteau, 2000).
[2] Average cost of kWh production falled from 0.5 $ to 0.05 between 1980 and 2000 (Menanteau, 2000).
[3] For EU consumption/capita 3.76 tep/hab and 4.13 for France (IEA, 1998) EU 15 electricity consumption 6867 kWh/hab, France 7624 (IEA, 2005).

If we consider the electricity market alone, French specificities are even more obvious. Second producer in Europe in terms of Electricity production[4], the French industry uses relatively low amounts of fossil fuels sources to do so (In 2004, 52.5 TWh i.e 9.2% see Appendix C). Its electricity production massively relies on its nuclear industry (In 2004, 448.2 TWh i.e 78.4%), and to a lesser extent on its hydro-electricity (In 2004, 64.9 TWh i.e 11.4%), two sectors for which it is ranking in the first places amongst European nations[5]. On the other hand, this situation allows for relatively cheap prices of electricity (prices are estimated 10% lower than the average EU), both to household and to the industry, the latest being considered a key factor of competitiveness.

Limited dependence to the fossil fuels and relatively cheap and reliable access to electricity are two salient characteristics of the French energy policy. This was inherited from decisive choices made in the 1970s.

*Locked-in the 'tout nucléaire' (full nuclear)policy*

Confronted like many others to the oil shock in a context of geo-strategic crisis, and not being a member of the close club of oil producing countries - France imported more than 70% of its energy - the French Government reacted energetically by carrying out a policy aiming at preserving the Nation's 'independence'. Not depending on oil and fossil fuels too much became a major objective after the 1973 Kippour crisis. In addition with an ambitious programme of energy conservation, Nuclear energy was one of the most credible, large scale alternatives.

At the beginning of the 1970s, the nuclear *techno-economic network* in France was ready to evolve from a mere prototypic phase to a full scale energy industry[6]. The actor network covered the full value chain and had built important capabilities during the 1950-60s. Electricité de France (EDF) was the monopoly-State-owned-electricity company with a strong engineering capability (4000 people large engineering Dpt) that actively contributed to the development of the first prototypes of nuclear plants. Equipment manufacturer Framatome was the reactor builder to exploit, transfer, and adapt the Westinghouse Light Water technology on an industrial scale.

COGEMA was the State own nuclear fuel company also in charge of waste management (Finon et al., 2001). The Commissariat à l'Energie Atomique (CEA) was the high level public research agency that successfully developed French military nuclear power based on Gas Graphite technology. Nuclear safety regulation was the responsibility of Service Central de Sécurité des Installations Nucléaires, a Ministry of Industry Department, relying on the expertise of the Institut de Sûreté et de Protection Nucélaire, a CEA Department. The ties in the network were very strong as they all shared highly qualified State Engineers with a technocratic vision and obedience to the same central actor -the French Ministry of Industry, in charge of the global strategy.

Beyond technological capability, what was lacking to the network in the early 1970s was a large scale market - an important industrial experience - so important to secure standardisation, economies of scale, and ramp up learning (David et al., 1996). This is the opportunity the French energy policy offered to it by developing a long term (20 years) nuclear programme based mainly on one standardised dominant design, the Westinghouse Light Water Reactor (LWR). In the first ten years (1974-84) no less than 44 reactors were built for a total capacity of 46 GW. This policy, called the *tout nucléaire* (full nuclear), was consistent with the post war French political style of central planning and long term industrial policy developed by the State:

[4] France is second producer of electricity in Europe after Germany (respectively 562 and 594 TWh in 2004), 8th in the World, and first world exporter of electricity (IEA 2005) (Observ'ER 2005).

[5] With 63 installed GW, France is the first nuclear electricity producer in Europe, second in the world after the US (installed base in the US in 2004 reaches 98 GW). With a production of 64 TWh, France is number 2 in Europe after Norway (106 TWH in 2004 which covers almost 98.9% of its electricity needs) and 9th in the world for hydroelectricity (IEA 2005).

[6] Concept close to the filière and the value chain, more precise definition in Callon et al., 1991.

technological capacity building through strong public research support, industrial concentration in a few national champions, value chain (filière) vision, long term policy in the form of plans centrally decided and coordinated (Hecht, 1998).

Not surprisingly, in this central and technocratic context, alternatives sources of electricity remained particularly immature in France for many years. Not that these technologies had no supporters or that the nuclear turn was consensual: it was highly controversial and probably the first emblematic technological controversy.

During the late 1970s, several large demonstrations illustrated the very bad acceptance of nuclear programme in France. In front of the elitist, centralised policy, networks of resistance opposed to the implantation of nuclear plants. Nuclear plants were perceived by many citizens as highly risky and threatening to human health. Ecologist associations were particularly active in contesting the French *tout nucléaire policy* and the non-democratic style in which such important choices were made. Beyond nuclear policy, the contestation movement questioned the technocratic model of development by opposing to a State programme with scientific arguments. Particularly active was the resistance encountered in several regions against the implantation of a nuclear power plant. One major political turn has been the election of François Mitterand and the left parties in 1981. Many of the opponents were left sided and identified the nuclear policy and its decision making style with the elistist tradition of the right parties. But although the left side Government was probably more sensitive to the opponent's view, it arbitrated clearly in favour of the continuity of the French industrial policy. Nuclearization of France was therefore irreversible, although the seeds of what would become a large movement for the democratisation of technological choices was born (Gaudillière et al., 2001).

Combination of centralised decisions, State owned organisations and technological rationality proved particularly efficient in the development of the nuclear industry as it is characterised by high risk, and high risk perception, high capital intensity and long lead times, economies of scale and technological complexity. The success of the French nuclear programme legitimized the network and the institutional arrangement in which it grew (Finon et al., 2001). This know-how became internationally recognised and opened foreign markets to French nuclear engineering and equipment. The same factors also explains why France found itself locked in the *tout nucléaire policy* for a long time: a large nuclear installed based with 40 years of life expectancy, an influencial nuclear technico-economic network, a long term oriented economic calculation all contributed to the momentum.

### *The nuclear equilibrium challenged*

Several important changes affected the well established equilibrium in the last ten years.

In 1996, the European Commission took an important step into the liberalisation of energy (EU directive 92/96) that had to be translated into national contexts. In February 2000 (loi n°2000-108 on the modernization and development of the public service of electricity) suppressed EDF monopoly on the generation and distribution of electricity. The French Energy Regulation Commission (CRE) was set up to precisely make sure that fair conditions for competition were met and the Energy Transport Network (RTE) was separated from EDF to manage the national transport grid.

Globalization and liberalization dramatically increased competition on the French market, or at least contestability. First, the professional market was opened to competition for the generation and distribution of electricity: companies like Suez/Electrabel, Gaz de France (GDF), POWEO, SNET entered this new market. Increased competition, the split up of EDF and GDF, and their privatisation in 2005, contributed to provide more independence and loosen the close ties of EDF with the French State, towards governmental policies in general and nuclear programme in particular.

Introducing competition in the energy markets had important destabilisation effects on nuclear economics: everywhere, electricity operators tended to prefer off the shelf simple and standardised technical solutions for electricity generation, solutions with short of mid term lead time and very few in the world did decide to invest in nuclear plants (Finon et al., 2001). This results in a technological isolation for nuclear actors, in an overall context of public investment decrease.

The second important factor that affected the nuclear equilibrium has been the mounting pressure on environmental considerations. The Kyoto 1997 agreement, followed up by the EU 2001-77 directive assigned ambitious objectives for European countries in terms of carbon - dioxide emission reduction. In a context of regular increase of demand (under-capacity in 2010 is estimated to reach 1200 MW), meeting these objectives suppose radical changes in most countries electricity balance. For France, the EU directive translated into an objective of 21% of electricity consumption from renewable sources in 2010, meaning a 6% increase of renewable sources.

Finally - and the 1986 Chernobyl crisis contributed to this - the demand for more democratic choices as regards technological choices increased at the end of the nineties. The influence of the green party and ecological issues that sounded marginal in the 1970s became more central to society in the 1990s. The increasing role of the Office for Technology Assessment (OPECST created in 1984 attached to the Parliement) as well as the organisation of the first citizen conference on GMO in 1998, are certainly illustrative of the importance granted to more transparent and participatory decision making (the law 2002-276 of the 27th of February 2002 on local democracy is certainly is step in this direction). For the nuclear network, this might announce a drastic change of culture, as citizen adhesion could become essential to the future. In Germany and Sweden, national debates have ended-up in the phasing out of their nuclear policies.

Changes in the environment led to a period in which technological and industrial choices were reconsidered. The multiplication of national expert's reports - we have accounted six national reports on energy between 1997 and 2003[7] - indicates that energy policy is back on the agenda. All reports have stressed the risk of relying too much on nuclear and the desirability of electricity sources diversification, especially through the development of renewable energy. Wind energy, being one of the most mature industrial options, and an emblem of a more environmental society, appeared as an attractive source of energy, and even a necessary source to complement others. From this point, many politicians stressed the underdevelopment of Wind in France[8].In the recent programme law (Law n° 2005-781 of the 13th of July), the Government mentioned the objective to 'keep the nuclear option opened' - what a difference with the *Tout nucléaire policy* period!

This is the context in which wind energy started to develop in France, the project EOLE 2005 being the first national programme devoted to this purpose.

## 3. Summary: EOLE 2005 programme - preparing France for the energy transition

Launched in 1996, the EOLE 2005 programme was aimed at developing large wind turbine Technology and industry in France. It involved wind farm promoters ready to invest in the setting of power stations between 1.5 and 8 MW in metropolitan France, to be connected to the EDF electricity grid.

[7] Revol Report to the Senate on the French Energy Policy in 1997, Boisson prospective report to the General Planning Commission on Energy in 1998, Charpin prospective report on the nuclear industry, Cochet report on Energy policy to the Prime Minister in 2000, Besson Report and White paper on the Energy market in 2003, General Planning Commission prospective Report on Energy 2010-2020 in 2003.

[8] In 1997, when EOLE 2005 started, two industrial wind farms were installed in France for a total 5.2 MW (Technopolis, 2001).

The programme was defined by the Ministry of Industry in cooperation with the Ministry of investment and the ministry of Research and the French Agency for the Environment and Energy preservation (ADEME) and EDF. It involved a call for proposal launched and managed by EDF in cooperation with ADEME. The call was organised in two periods (+ one specific call for French territories and Corsica). It ran between 1996 and 2000 with a general objective of increasing the French Wind energy capacity with 250-500 additional MW by 2005 dispatched in different French regions. Selected candidates would benefit a contract for 15 years during which EDF would buy their production at a guaranteed average price of 33.7 centimes/kWh (to be negotiated).

In 1996, the wind manufacturer's competence in France was to a large extent limited to small wind turbines and stations. Equipment companies were expected to get involved in the programme and benefit from it to build design, manufacturing, and project management capabilities in Large Wind Turbines wind farms.

# 4. STEP ONE: Possible futures

Two major actors have been involved in promoting the idea of wind power stations in France that took the form of the EOLE 2005 programme, namely ADEME and EdF.

EdF, with its strong R&D Department was actually a pioneer in the 1960s in terms of developing large wind turbines (the largest prototypes reached 1 MW) and envisioning Wind energy as a possible future alternative to fossil fuels. The turn of the 1970s with the *tout nucléaire policy* though, as well as the close enrolment of EdF in the nuclear technico-economic network discarded alternatives routes. In the mid 1990s, the context had changed a lot as European Market integration became a major political issue, and with it, the perspective for EdF to compete with other companies at national, European and international levels. As the nuclear choice appeared less robust, the perception of being late in terms of alternative routes became more obvious (in 1995, the installed capacity in France was 2.9 MW). In particular, the weakness of French industrial development of Wind energy - as compared to Germany, the Netherlands or Denmark - was felt with more accuracy.

Recently created ADEME (Agence de l'Environement et de la Maîtrise de l'Energie was created in 1991) was established in good part to integrate environment issues with energy policy. As an agency, its role is of expertise and advise. In fact, a first Agency that would later become the ADEME was created in parallel to the *tout nucleaire policy* in order to simultaneously contain energy consumption, the Agency for Energy Conservation (Agence pour les Economies d'Energie established in 1974). In addition to active operations to promote energy saving with professional, it conducted very successful information campaigns with consumers, the slogans of which became common sense ('La chasse au gaspi'- hunting spoilage and 'En France on n'a pas de pétrole mais on a des idées'- in France, we do not have oil, but we have ideas).

With the election of left-side President Mitterand in 1981, the agency, renamed Agence Française pour la Maîtrise de l'Energie (French Agency for Energy Management), saw its structure and missions strongly extended to include industrial heat recycling and the coordination of R&D in renewable energy - notably solar and geothermal energies. The counter-oil shock signified much less political interest, but the questions of Air pollution and greenhouse effect due mainly to fossil fuels combustion provided a renewed context for energy policy that gave raise to the ADEME in 1991 (merging AFME, Agency for Air Quality, Agency for Waste Management). Renewable energies technologies became a perfect combination of resource saving, environment preservation and energy development on ADEME's agenda. In 1995, ADEME published a wind atlas of France showing that France was the second country in Europe in terms of wind potential, but one of the last in terms of its exploitation.

EOLE 2005 was as programme focused on developing and experimenting with the large turbine technology and its integration in wind farms. Of course European references helped define assumptions about possible achievements, but home references were needed, the technological and economical feasibility of the wind *filière* needed assessment before more complete visions of the possible futures would be described. Mid 1990s, many uncertainties and debates were raised about the technological and economical future of large wind technology.

One major question was the integration of the technology in the portfolio of mastered and reliable technologies. France had a reliable experience and capability in small wind turbine technology. But, would it manage to establish the same industrial expertise and competence in Large Turbines?

Another question regarded the economic viability of the wind value chain. If wind energy was going to play a role in the future, what would this role be? Would industrial big enough equipment manufacturers invest in such competence building? What would be the technical, economical, political limits to its development? How competitive could wind energy be as compared with the nuclear or co-generation references?

The objectives of EOLE 2005 as a programme were then the following:
- catching up in terms of installed base (objective 250-500 MW by 2005),
- demonstrate and improve the techno-economical competitivity of wind energy,
- shape an industrial value chain in the country.

We also need to mention that due to important modifications in the environment during and right after the programme, the possible futures envisaged at the beginning and at the end of the project evolved dramatically. Prospective studies gradually envisioned more diversified sources of energy for the future. Environmental constraints combined with climbing energy consumption would call for renewable energies. As the most feasible and mature industrial solution, wind technology became a masterpiece in the reflections about energy policy for the future: it was not an option but a necessity. Government commitment followed accordingly[9].

## 5. STEP TWO: Varieties of expectations

Although it played an indirect role in EOLE 2005, the EU contributed greatly to framing the programme through a number of prospective and incentive reports. First, the Commission made a clear priority of an integrated and competitive Europe in the energy sector[10], later followed by more stringent directives and regulatory instruments. Second, it articulated environmental considerations and energy policy framework[11]. Pubic opinion massively friendly to ecological thesis in general claim positive affinity with wind energy each time they are asked, a symbol of green values for better environment and quality of life.

Mainly concerned with industrial and technological questions, EOLE 2005 programme remained in the French tradition of centralised decision making based on expertise, Government bodies, and key industrial players. Members of the ADEME, EdF, of the three ministries and expert State engineers defined the procedures and criteria through which installation agreements and guaranteed prices contract would be granted to promoters. Not surprisingly, the proposed

[9] Tariff instrument illustrates the increasing commitment: from a guaranteed price considered low and nogociated with EDF during EOLE 2005 (average 33.7 centimes/kwh – i.e., 5.14 €ct); with the 2000 energy law guaranteed price increased to 55 centimes/kwh (8.38 €ct) for 5 years under good conditions; then directive 26th of July 2006 guarantees 54 centimes/kWh for 15 years

[10] DG XVII prospective study on Europe of energy in 2020 for instance was integrated in later French prospective work by Senate, also White paper 'an energy policy for the European Union'

[11] 1996 Green Paper 'Energy for the future: Renewable sources of energy and the follow-up white paper in 1997.

price of electricity, the industrial and economic soundness of the projects, their potential in terms of environmentally friendly technology development, as well as their regional implantation were the main criteria for selection[12]. The selection Committee was chaired by M. Barlet (State engineer) with representatives of ADEME, EdF and the three ministries, as well as two environmental NGOs.

As we have seen, two different approaches were represented in the governing committee. Ministry of Environment, ADEME and NGO for the preservation of nature had expectations regarding the development of cleaner technologies for electricity production and were representing the emergence of these thematic in the political agenda. Wind energy was an opportunity to practically embed this vision of society through the diffusion of the technology.

More traditional actors like EdF or the Ministry of Industry were more interested in industrial, competitiveness and employment issues. Finally, although their representatives were certainly not directly involved, members and proponents of the nuclear techno-economic network were very strong in EdF, the Ministry of Industry, and in the State engineer corps in general[13]. They too had expectations, sometimes of a negative nature towards wind technology, representing what Latour calls the 'anti-programme' (Latour, 2005), that the proponent of Large wind turbine technology had necessarily to deal with. Many claim that wind development is mere political marketing but could not be a solution to the energy issues (JM Jancoviv, 2006)

Finally, we would not be complete if we did not mention expectations by the wind farms promoters as well as by a number of regional and local actors who would be more directly living with the wind farms. Many other actors were not included in the process, but started to develop their own positive or negative expectations as promoters informed them of their intention to build a farm in their place. Land owners, for instance, most of the time farmers, could expect to lend their land and complement their revenues. Mayors and local authorities could expect to attract some economic activity and develop local tax income in a significant way. They would also be asked to arbitrate on construction permits. Neighbours and residents would for some of them consider projects as a radical transformation of their environment.

Wind farm promoters to respond to the call were diverse: existing small wind companies (Vergnet, Germa, Cie du Vent, EED), big industry new entrants (Jeumont, Spie-Trindel, Shell, Total, Alstom, Norelec), and newly created companies (EOLE Technology) (Technopolis/CSI, 2001).

[12] EdF communiqué on call for proposal, 14th of October 1997

[13] Political competition for scarce resources between networks supporting different technologies is rational. Although in reality, more subtile and hybrid positioning are observable, especially within organisations: for instance, one of the French Company that invested greatly in large wind turbine technology is Jeumont, a subsidiary of Framatome and one of the active engineering company SIIF, a subsidiary of EdF. The same is true with fossil fuel netwoks: Shell and Total are involved in wind farms projects.

Table 5.1 *Actors, expectations and 'publics'*

| Actor | Expectations | Targeted 'public' |
|---|---|---|
| European Commission | Promote environmentally friendly energy policies consistent with Kyoto commitment<br>Shape and integrated and competitive EU market | Future European society?<br>General concern for promoting clean energies and renewables in European society |
| Ministry of Industry | Test the competitiveness of wind energy<br>Develop a French filière in the sector - capability | Politicians - Exploring options for the French energy policy<br>Industrials - Prepare French industry for the future |
| Electricité de France | Test the feasibility and competitiveness of Wind energy<br>Explore possible alternative sources of supply | Consumers - insure the long term supply of energy in a reliable manner and at low prices<br>Competitors - I'll be there as a major European player |
| ADEME | Develop a French Wind filière as an alternative to the tout nucléaire - capability<br>Promote environmentally-friendly technology for the French energy policy | Politicians and decision makers - prepare France for an environmentally friendly energy policy |
| Ministry of Territory development and Environment | Promote environmentally friendly technologies to preserve French and European environments<br>Promote more local and participatory energy projects<br>Be involved in definition of energy policy | Future generations of citizen- give them a choice in terms of development, and transmit them a preserved air quality |
| Promoters | Get a industrial experience in wind farm development<br>Be first entrant into a promising business | Unclear |
| Other local actors | Be associated to the development projects | Neighbours, peers and more broadly 'citizen' |

# 6. STEP THREE: Understanding participatory process

As we have seen, the actors involved in the decision making process were EdF, ADEME, the three ministries and two NGOs acting for the preservation of the environment, and to a certain extent promoters that submitted investments projects. As compared to the *tout nucléaire era*, this was a clear evolution, opening the negotiation game to the ministry of environment and ADEME, and associating Environmental NGO's. As a consequence, impact studies on fauna and flora were incorporated early on in promoter's project.

On the other hand, and in the tradition of France *tout nucléaire* centralised and technocratic tradition, local actors were hardly involved in the negotiation process. The rationale for this organisation is not clear when we consider the data we have and we can only develop interpretations about this. Did the programme planner underestimate the opposition they might encounter? Did they voluntarily choose to pass over possible opposition for common interest purposes? Or by tradition?

This had three major consequences[14]:

- A general misunderstanding and ignorance of local socio-culural-territorial specificities[15].
- An important confusion at the local level of decision, local authority not having clearly defined responsibilities and administrative procedures and references to grant a building permission - Was it not difficult for a mayor to ignore EdF selection committee acceptation?
- An important number of local actors inviting themselves to the participation process without being invited, and developing negative expectations about wind farms while alliances with potential.

The conception of 'space' and 'environment' carried out by different actors tended to diverge in a great manner depending on where they stand. This is visible in the competition for land in some areas between 'sensitive areas' - for instance preserved areas of the natura 2000 programme, National Parc, or landscape labelled of tourist interest or heritage - and wind farm projects. Most windy spots of Britanny for instance were subjected to intense prospection - landlords and mayors being treated as prospects - and even inflation in some land prices. Space in an empty place only on maps and most regions and Departments have their own development plans and specificities. Tensions between local, regional, national views has been a source of counter-proposition: bottom up plans of wind energy development were born in some areas through the collaboration of local associations, nature preservation NGO and locally elected authorities (Gueorguieva-Faye, 2006).

Seen from the ministry, 'space' is a market of production and consumption that need to be balanced and environment might have a very general meaning like the ADEME map of wind seem to illustrate. In this perspective, the question is how to plan for efficient projects that will both be placed in windy regions for profitability reasons and be placed in a balanced way over the territory in order to fulfil consumer's needs at affordable prices.

On the other hand, indeed, wind farm projects would be installed in rural areas or in isolated places. Seen from a home in a 200 inhabitants village 'space' is the villagers place, environment their air, their landscape, their community, their memories, their own projects, their legacy (for a romanced sketch, Marcel Pagnol). For example, several observers noticed the 'neo-rural' category - retired people or people commuting to their distant work - were particularly opposed to industrial projects like wind farms. Most of them had chosen rural area as a personal lifestyle project, for its quality of air, its quietness, its views. The installation of five wind turbines 70-100 meters high, additional local tax of € 100,000, land rental of € 10,000 a year could induce enormous changes for the place and for the surrounding villages. And these changes might well appear irreversible or at least not be easily stopped once installed (lifespan for a wind turbine is 20 years).

The denial of local actor's participation had a critical impact on projects and their acceptance. In most cases, residents were informed by promoters very late in the process and felt they did not have their word. It had a dramatic effect on the radicalisation of positions as an impressive number of local associations pro and cons were emerging in the process: the Vent de Colère (Wind of Wrath) federation gathers some 200 opponents associations, the Planète Eolienne (Windmill planet) federation counts 25 of pro wind members associations. Some estimates mention figures as high as 60% of projects failed due to social opposition (Libération,

[14] Even after EOLE 2005, it took time for the Government to consider the necessity and modalities of local actor's participation. This evolved in 2003 with the organisation of a national debate on energy policy. Most of the participatory procedures then came from local initiatives in a bottom up manner.

[15] For instance, Britanny and Languedoc-Roussillon, the two most interesting regions in terms of wind potential happen to also be two touristic regions, so countryside beauty is a direct source of income. Britanny habitat is very fragmented, with a lot of dispatched houses, so installation of numerous wind turbines raise a specific risk of fragmentation. Also, there are numerous area called 'sensitive' because of their natural or touristic interest, and of course, these are often the best areas for wind. Another example is the tradition of technology opposition in Britanny: one of the only case in which the state went backward in a project of nuclear installation was in Roscoff.

26/05/2005[16]). This is certainly exaggerated but some associations like Vent de Colère ('winds of wrath') encourage systematic trial against administrative agreement that block the process. Although the real impact of opposition is difficult to measure, there is a general agreement that social acceptance became a major problem for wind in EOLE 2005.

Table 6.1 *Forms of participation in the EOLE 2005 programme*

| Type | Organisers | Place | Involvement | Purpose |
|---|---|---|---|---|
| Informal meetings | Resident resident associations | Local public place | Local residents | Discuss issues and concerns and decide action |
| Associations | Resident People sharing concerns of views | Local public place | Local resident national militant | Structure collective actions against Wind farms/for wind farms |
| Petitions | Network of mayors | Parliament | Networks of pro-wind mayors | Pressure to get favourable laws |
| Protest letters | Resident Resident associations Local associations | Prefecture (regional authority) | Residents Resident associations local associations | Demonstrate opposition/support to wind project |
| Media articles | Local and national associations, Gouvernment, EdF, ADEME, journalists | Local, regional and national media (includes TV) | Local residents Mayors associations other concerned parties | Argument and debate in favour or against wind farms |
| Internet sites and forums | Variety of concerned actors blogers | Web | Readers and forum participants | Inform/convince/ mobilise 'public' |
| Public meeting and conferences | National associations ADEME promoters | Local public place | Local residents Mayors | Informing/convinc e resident and local decision makers about the interest of Wind energy |
| Open day | Promoters ADEME | Installed wind farm | Target residents neighbours | Demystify and show wind farms to citizen |
| Trials | Local and federal associations of opponents | Tribunal | Local and regional authorities | Block wind farm project |
| Counter-proposal | Local associations unsatisfied with central planning | Townhall and Department and region councils | Citizen | Promote wind energy plans as a local development policy |
| Cooperative wind farm | Local residents unsatisfied with promoters projects | Wind farm | The community | Develop their own wind farm for their own use |

[16] For the first call, Tchenopolis /CSI estimates show that abut 50% of project were realised (within a three years delay). EdF however estimates that most projects will finally be implemented, although delayed.

# 7. STEP FOUR: Realities

Many observers considered EOLE 2005 as a failure. Indeed, the installed base at the end of the programme in 2000 seemed relatively limited: 55.7 MW installed in metropolitan France in 2000. It is claimed that EOLE 2005 was not attractive enough to promoters. They did not come in numbers in part because of low economic incentive negotiated by Edf in terms of pricing[17].

Overall, 55 were selected projects in four years for an estimated potential capacity of 361.4 MW (Technopolis/CSI, 2001). Half of the projects and 65% of this potential capacity were enlisted at the very end of the programme in the last 1999-2000 call. The actual realisation of this potential suffered from delays - 36 to 42 months of realisation on average for a project - and some projects were abandoned.

Technical, economic and administrative factors contributed to this situation and in all cases, a lack of procedures, of industrial and administrative references. Technico-economic conditions for successful wind farms were instable and not well known: in some cases, promoters changed their turbines as new technology with better performance were made available during the project, in many cases, the connection to the grid was technically more complicated than anticipated. Administrative conditions for local licence delivery did also suffer from a lack of clear references. These references also evolved under the pressure of opponents who fought on the administrative rules and won a number of trials against promoters or the administration. Also, the implementation of wind farms often required to change the local rules of construction licence delivery (land occupation plan POS) (Technopolis/CSI, 2001).

As we have seen, EOLE 2005 was envisioned as an experimentation programme. Even if expectations have evolved rapidly towards more performance and installed base calculation, the initial objectives were also to shape the techno-economic network, develop capabilities, get better references in terms of wind farming potential and conditions. From this point of view, as we have seen, and although the learning process was not fully achieved in 2000, at least it was initiated in a favourable manner. As for the industrial filière, it was emerging in the large wind turbine business and ready for the rapid scale up that is going on for a few years.

EOLE 2005 also initiated important adjustment of the French energy policy. It included more favourable incentives for project promoters (guaranteed price and period are now considered attractive and lead time estimated about seven years), and the possibility to file projects directly at local level, EdF becoming a player itself. In the last years, wind capacity has boomed and projects have multiplied.

[17] The first calls did not attract much candidates but the number of project submitted raised drastically in 1999-2000 to reach a total 400 filed for 55 selected. EdF indeed played a decisive role in the selection committee and negotiated low prices of electricity in order to select the economically robust ones.

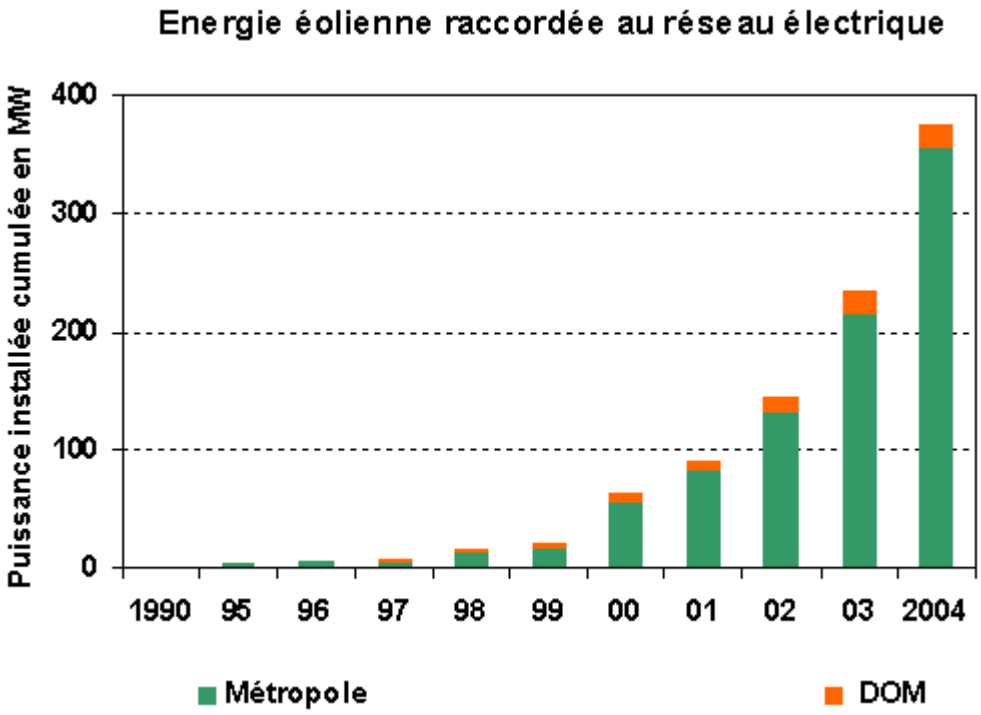


Figure 7.1 *Cumulated installed wind capacity in France*
Source: Ministry of Industry, DGEMP.

The real unexpected difficulty came from the social acceptance of large wind technology. It came as a surprise for two main reasons. First because national environmental NGOs and institutions were pushing the technology as an example of a new model of eco-development and benefited from an extremely positive perception from the public. As Diana Gueorguieva puts it in a synthetic formula '*the specificity of this conflict comes from the fact that the environmental arguments are referred to by both sides: pro and against wind farming*' (Gueorguieva-Faye 2006 wt). We could add to this the surprise to see an alliance between pro-nuclear and opponent to large wind. It was all the most difficult to anticipate than opposition did not pre-exist but was to a large extent shaped in the process of industrial wind farm diffusion. Second reason relates to the central vs local decision-making process that drove many residents and even local authorities to feel excluded from the projects. Central planning of the nuclear time met with a new rural society mixing community tradition and participatory values. This local human reality was often neglected by promoters who did not promote the local appropriation of their projects.

On the other hand, EOLE 2005 has helped different actors to realise the importance of social acceptance of technology and the necessary role of participatory processes to promote industrial projects such as wind farms in rural areas. In 2003, ADEME has elaborated a clear diagnosis of what was at stake in social opposition to industrial wind farms and has developed guidelines for more participatory project management (ADEME, 2003). At a more local level, departmental authorities (departmental council, Equipment Direction, Environment direction) in Britanny have reflected on processes and criteria that would be more respectful of local contexts and be better articulated to local economic policy. At a governmental level, participation has also made its way as a principle, and the national policy shows signs of democratisation and more open debates[18]. This will be all the more important that the number of projects submitted by wind farms promoters to regions has considerably augmented in the last few years. Some proponents

[18] The 2005 law on energy was prepared by a national debate on energy policy. Some observers estimated that it was not yet satisfying and a number of national and international NGOs organised their own 'true debate' on energy policy in paralell

of wind energy even start to consider that over investment in some areas might well raise new issues and problems inked to concentration or fragmentation of land.

It is certainly true that the centrally planned process of investment and the lack of involvement of local actors contributed to radicalise the positions in a controversial manner. But it also resulted in the creation of a large number of local associations, and many residents and citizen got involved in the debate, but also in the negotiation of projects for their localities. The controversy generated a number of collective actors that could intent actions together and appropriate their territory. It could be an important resource for more decentralised ways of energy production in the future (Le Monde, 21/2/2006). In Ardeche and in Finistère for instance (Dinéault, St Thégonnec, St Agrève), several cooperative projects of wind farms were born recently: initiated by alliance of villages, by groups of farmers. This is closer to the German and Danish models of decentralised energy production. In this context; wind could become an instrument of radical change of society.

In addition, in a number of regions, local decision makers had to arbitrate construction permits and develop competences and administrative procedures to do so. With wind, and more broadly with renewable energies, many regions and department got committed much beyond administration and the role of executing central decisions. The difficulty encountered in EOLE 2005 by central planners provided them with what some regions considered as an opportunity to develop a local, more bottom up dynamic of collective projects. Beyond wind farms, several local and regional actors envisioned wind technology as an instrument of a regional energy policy[19]. Energy policies then are seen as one element of a more integrated territorial development (tourism, wind farms, agriculture, protected landscape…).

In the 2000, one of the key questions will then be the model of development chosen as a number of contradictory trends are emerging: new waves of opposition appeared in the years 2000 to denounce the turn from farm to plants:

- Increasing concentration of projects (larger installed capacity of farm - some projects reaching more than 100 turbine, 90 MW in the range of € 100 Million -, bigger wind turbines, frequent extension of existing wind parcs).
- The intensification of land occupation (multiplication of farms in a fragmented landscape, explosion of projects filed directly at the local level - 660 files being processed in august 2006[20] (Associated Press, 8/8/2006; Le point, 4/8/2005).

# 8. Lessons learned

*1. Situating the stage of techno-economic development*

EOLE 2005 is a demonstration project aiming at driving France from a prototype stage of large wind to an industrial stage. Most uncertainties are linked to industrial fit, plant optimisation, economical use of a relatively mature technology.

Also, instruments to anticipate on dynamics are crucial. Controversy evolved over time, issues and position change (Latour, 2005). Snapshots might be dangerous in terms of project management or public policy: the intensification and concentration of wind energy in France generates new waves of opposition involving some actors that had so far been proponents. It seems necessary to consider the dynamics of the controversy. This might prove tricky at early stages: opponents shaped their expectations during the programme.

[19] This means the delegation of a certain authority of the government in terms of energy policy to the region in amore decentralised way.

[20] In Britanny in 2004, 53 wind turbines on 8 parcs, but 30 licences delivered for new parcs and several hundred filed (AFP, 3/12/2004).

*2. Understanding local context and the broader societal trends*

EOLE 2005 was an important catalysis in the transition towards a renewed energy policy in France: diversification of energy sources, decentralised energy policy, more attention paid to social acceptance and participation. In turn, EOLE 2005 stake also evolved in accordance with broader trends of the French society: the ascent of environmentally friendly energies, the fragilisation of the nuclear techno-economic network.

A second aspect regards the articulation of global political agendas and the way they are implemented. The question of project managers competence and competence building proved central in the diffusion of wind technology in France.

Finally, in operational terms, the question of the level of analysis and intervention is raised: in our case, it would have been very different to consider and act at the local level of a wind farm (project level), at the departemental or regional level (territorial development issues), at the programme level (EOLE, 2005), or even at the higher level of wind development in France.

*3. What is acceptance?*

We are not going to solve the question with just this case but a number of observations seem interesting. First, if we were not yet sure, social acceptance is not a question public attitude towards technology: in France, vast majority of people claim to be favourable to wind technology. Second, acceptance is a dynamic of participation (in a broader sense than the one defined by project promoters: some actors might feel sufficiently concerned to participate without being invited). It involves at least two kind of actors: those who define a programme or policy, those who are suppose to accept it or not. People who feel concerned about the implications of wind farms development start to act in order to ease or counteract it. The dynamics of their interaction defines acceptance. In the case of wind, the gap between the two kinds of actors was filled by a number of intermediaries. Third, acceptance articulates very local aspect with more general issues: resident associations battling against one specific wind farm sometimes ended up criticising the wind energy policy as a whole. Conversely, nationally organised NGOs discussing of wind technology in general might end up taking position in a local context.

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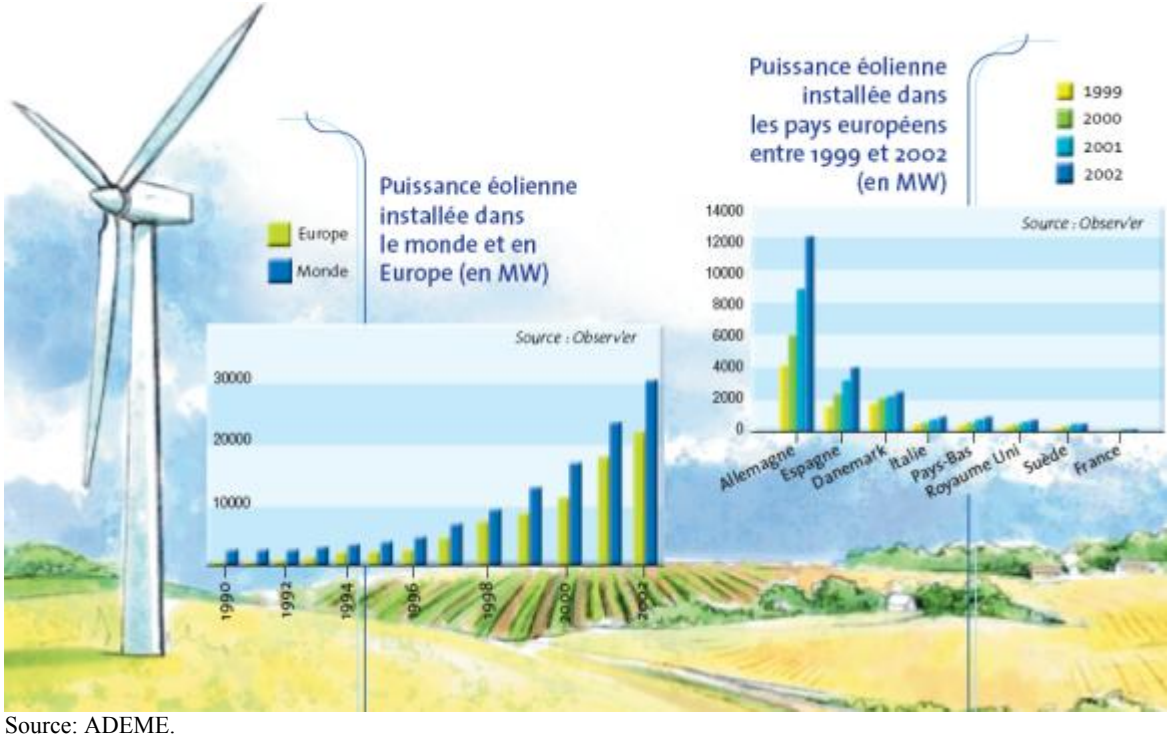
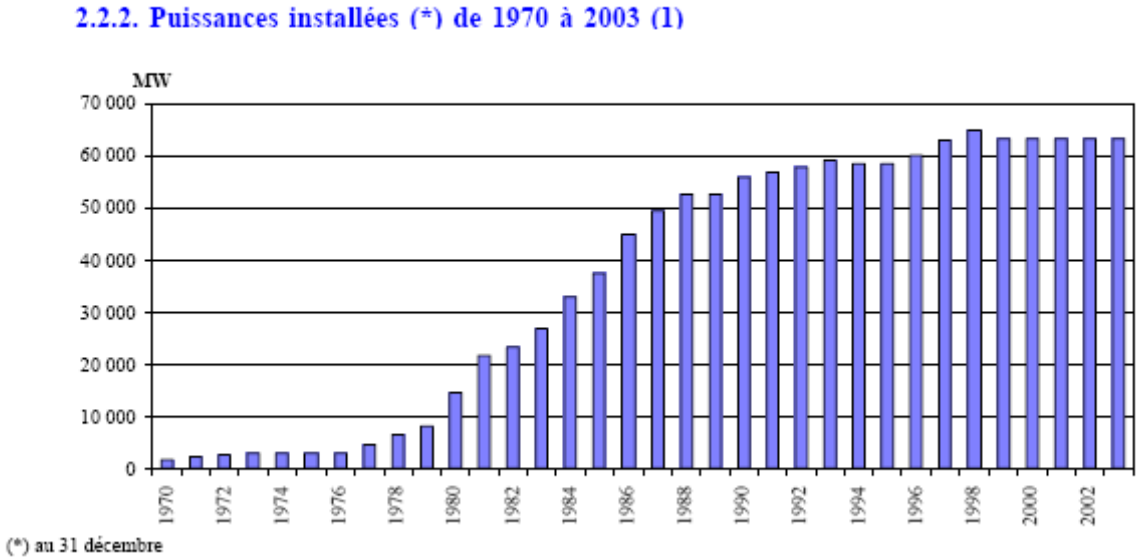
## Appendix A The booming installed capacity of wind energy in the world



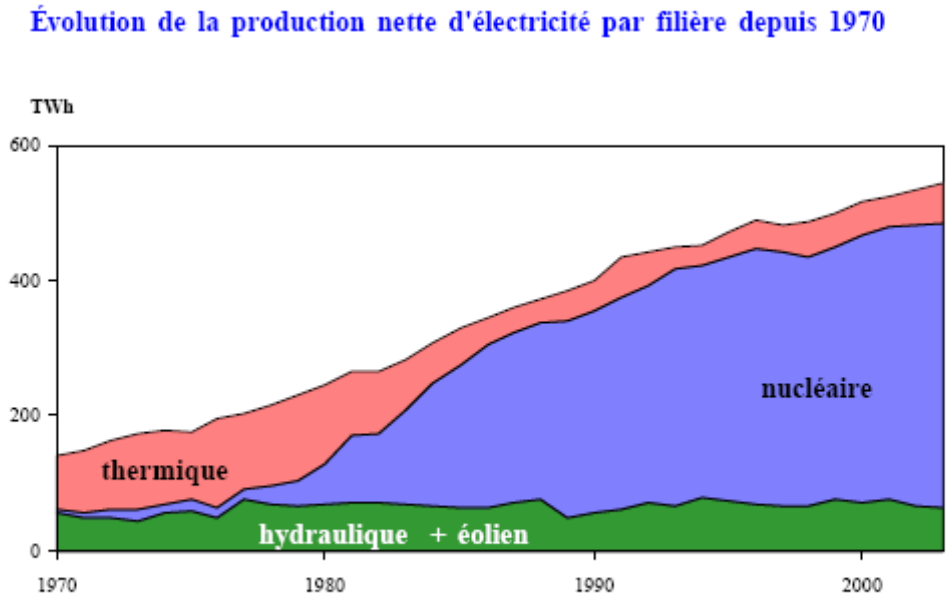

Source: ADEME.

## Appendix B Cumulated installed capacity of nuclear energy in France



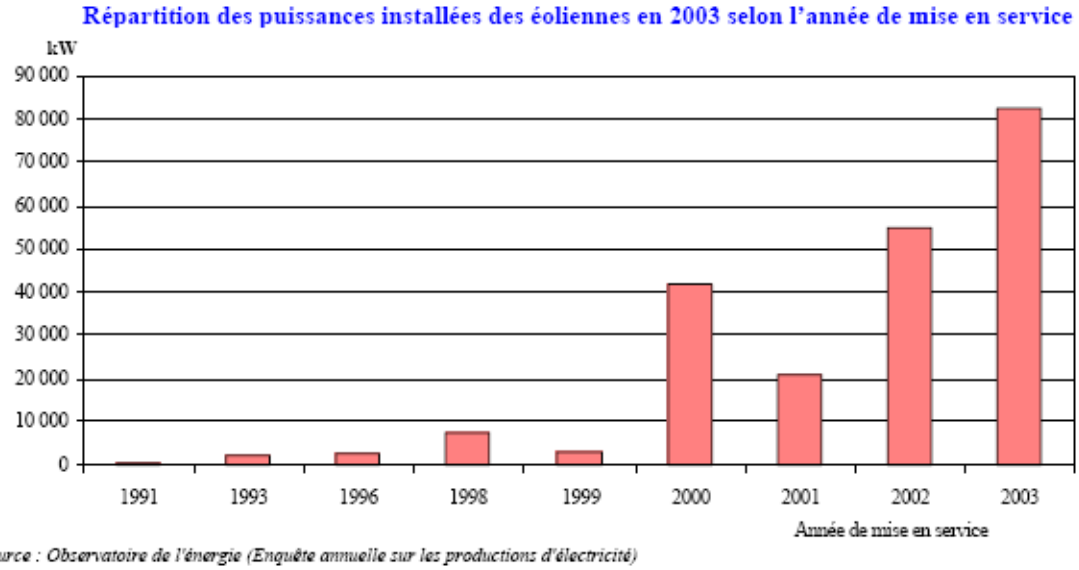

Source: Ministry of Industry.

## Appendix C Evolution of electricity production by source in France




Source: Ministry of Industry.

## Appendix D Installation of wind capacity per year in France (1991-2003)



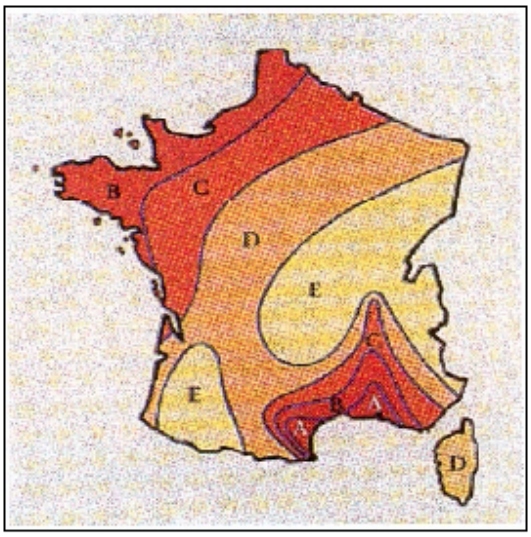

Source: observatoire de l'énergie, ministry of Industry. The wind map of France.

# Appendix E The windmap of France

**Carte des vents en France :**

Vitesse moyenne du vent, en km/h, à 50 m au niveau du sol et selon le relief :

| | |
|---|---|
| A | de 21,6 à 41,4 |
| B | de 18,0 à 41,4 |
| C | de 16,2 à 36,0 |
| D | de 12,6 à 30,6 |
| E | de 10,8 à 25 |




Source ADEME.