

Competitiveness and Electricity

Electricité de France Since 1946

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Introduction

French electricity's ability to be competitive must be examined in a very specific historical and institutional context. The French monopoly did not remain isolated from outside events. The top management of this public enterprise also thought in terms of competitiveness. They adapted the means of production to market conditions, at the same time respecting the obligations of a "public service." Moving from a period of scarce electricity to one of relative abundance, from a closed France to an open European market (1992), Electricité de France (EDF) was repeatedly led to change the way it marketed its product.

A State-Owned Company: Electricité de France

Nationalization

All the French companies active in the production and distribution of electricity were nationalized in 1946. At the liberation of France, by voting to nationalize, the government was aiming at several objectives: return its "natural wealth" to the nation; increase the use of electricity, which in France was lagging; modernize the various means of production by enlarging the role of hydroelectric power. Some people, especially on the Left, did not want private trusts to control an essential element in reconstructing the country. Only the State seemed capable of reconstructing the country. Thus a large majority in the National Assembly voted to nationalize electrical production. If we take a look at the text of the 1946 law,

however, it becomes clear that it covered neither the ability to be competitive nor how to manage the company. The most urgent concern was reconstructing the war-ravaged country.

Electricité de France, for National Independence

The key term during this period—as it has been during the 45 years of EDF's existence—was *national independence*. France possesses few energy resources: no oil, no natural gas (not in 1946, anyway), and little coal (before the war one-third had to be imported). The great reliance placed on hydroelectric power after 1945 has to be understood in this context. Productivity, competitiveness, and the rational use of energy were overshadowed by the top priority of the time: reconstructing the country. The same imperatives largely influenced the launching of the nuclear electricity program in 1973/1974. National self-sufficiency in the field of energy justified this kind of effort; thus, as the minister Jean Auroux declared at a press conference on July 27, 1983: “The program for energy independence is aimed at once again endowing France with the capacity for autonomous action in the world.” The main justification was therefore not competition with other energy sources.

A Strict Supervisory Authority

Electricité de France is not unique in the field of energy. Since 1946 the entire sector has been in the hands of the State: natural gas, electricity, and coal were also nationalized, and oil strictly regulated by a 1928 law. The government has the right to oversee practically all of EDF's activities, which means that EDF cannot set its rates without an authorization, because the State has a say-so about the price of electricity, just as it does about salaries and investments.

This dependence heavily influenced the evolution of electricity rates. In fact, when estimating the inflation rate in France—which is then used as a basis for salary hikes—a certain number of cost-of-living parameters are taken into account, including the price of the kilowatt-hour. So, any government eager to combat inflation or the perpetual price-and-wage spiral (a practically constant phenomenon in France since 1944) is compelled to restrict rises in the cost of electricity. The company's assets were often endangered by such a lack of freedom. Complete freedom in setting rates was enjoyed only rarely and under certain conditions. Moreover, the State, which dominates the energy sector, can favor one energy resource over another through taxes, forbidding advertising, limiting imports or exports, etc. In France the rules governing competition between the different energy sources are thus quite particular. The energy market is definitively not an example of unfettered competition!

Electricité de France in France

Controlled by the State, confident of captive markets, and, for a time, assured of healthy and regular growth (doubling of consumer demand every 10 years), EDF's sales policy during its first 20 years was characterized by mediocre dynamism. Pro-

ducers of natural gas and oil were mostly preoccupied with how to market their products, while electricity producers were reproached for their unimaginativeness and even a certain “imperialism,” their product seeming so sure of its strength. The slogan chosen at the end of the 1960s—“all electric, all nuclear”—is revealing. This kind of thinking became caricature when an executive of EDF, paraphrasing General Motors, declared “what is good for EDF is good for France. . . .”

The Factors Governing Adaptation to the Constraints of Competition

The Competition from Hydrocarbons

Within EDF, one circumstance concerning competition from natural gas must be pointed out. In 1946, electricity and natural gas were nationalized within the same company; a complex situation resolved through various compromises. More exactly, the same department became responsible for supplying both energies. This fact introduced an initial element of competition for EDF. More particularly, a natural gas deposit discovered in the South of France in the 1950s renewed this industry’s vitality. Another source of competition was obviously oil, whose price fell very rapidly toward the end of the 1960s. A third competitor quickly disappeared: coal, actively relaunched just after the war, began its final decline after 1960.

The Importance of Economics at Electricité de France

In a corporation of national proportions, questions of investment choices, rates, or stock management automatically assume capital importance. Errors in analysis cost taxpayers dearly. The corporation’s executives tried in several ways to introduce elements that could play the role of outside competition and increase the monopoly’s ability to be competitive. In this respect, the quality of EDF’s various executives was real: they were senior public servants or highly qualified engineers devoted to public service. They were aware of EDF’s power, its size making it the world’s leading electric company. It was essential to introduce, in one way or another, elements to safeguard flexibility in an organization that risked evolving into a gigantic bureaucracy.

An essential development was the gradual transfer of management power within EDF from engineers to economists. Men like Pierre Massé, Gabriel Dessus, Robert Gibrat, and Marcel Boiteux became the company’s foremost executives. This shift from “engineer to economist” introduced new ways of reasoning, based on the search for an economic optimum.

The Search for an Optimum Rate

In the area of electric rates, the search for an optimum rate was based on the idea of marginalism. This theory was applied as early as 1957 through a “green” rate, which seemed the best way to translate costs and accommodate consumers (even if

there is an *a posteriori* equalizing of the different residential rate levels). In this way, EDF demonstrated that it sought the optimum for the nation. This was a means of establishing EDF's legitimacy with respect to the State: "such a policy enables us to resist political pressures. It's a kind of safety rail and counterbalances the lack of competition."¹ Establishing rates according to different uses, which had ensured the prosperity of private companies before 1946, seemed discriminatory and complicated. One executive, Marcel Boiteux—a student of Marcel Allias (winner of the Nobel Prize for Economics), but above all, Manager and President of EDF—wanted to use economic calculations to find indications that are normally found in a free market. This goal was the reason behind the initiation of a new mode of calculation, the Productivité Globale des Facteurs (PGF), or Factor Global Productivity (FGP), which allowed one to compare the different electrical distribution centers. Management thus hoped to provide an incentive for those favoring more competition: "for this public service, the PGF makes size play the role that the profit plays in the private sector," an EDF economist declared.²

Contracts between the State and the Company

A shareholder whose presence is barely felt in terms of equity, the State exercises such strict control that a company like EDF has always wanted to attain the maximum amount of independence so it could act freely. This is particularly true during periods when competition becomes keener and when economic circumstances are favorable. EDF was twice able to obtain this kind of latitude from the government. In 1969/1970, EDF signed a "program contract" with the State, according to which the company committed itself to specific efforts to increase rates. With the unanimous support of the unions, this three-year period signaled the coming of age of this State-owned firm that had managed to loosen the State's stifling control. But the contract fell apart with the first oil shock in 1973, and the State resumed its firm control. This initial attempt nevertheless remained in everyone's memory, and in 1989, a new three-year "Plan Contract" was signed between these two parties (see below).

1989–1992 EDF–State Contract

EDF is committed:

1. to decrease its debt (minus 20 billion by 1992).
2. to lower its rates in terms of constant francs by 1.5 percent per year.
3. to improve the quality of its product and services (especially for hard-to-reach clients).

The State is committed:

1. to guarantee the level of rates, thus enabling the company to decrease its overall debt.
2. to grant the company more freedom, be it in respect to investments, salaries, new activities, or the means of transporting and supplying electricity.

An "Abundant and Competitive" Energy (The 1970s and 1980s)

The Development of Nuclear Energy

After hydroelectric power, nuclear energy was the most important project developed by EDF (and the atomic energy commission [CEA]). EDF's ability to be competitive had to be calculated with respect to coal and especially to fuel oil, whose price regularly dropped. Between 1964 and 1979, this role fell to the Production of Energy Origin is Nuclear (PEON) Commission.

During the 1960s, fuel oil's competitiveness (until 1975 comparisons were made of nuclear power with fuel oil and afterward with coal) was such that it was felt that the use of nuclear energy would only gain impetus over the long term. The 1970s and their two oil shocks wreaked havoc on these predictions. France became the country where nuclear power had the largest share (75 percent today). Some explanations for this are sociological (mild public resistance, strong central authority, a judiciary lacking independence, no counterstudies), but others, not including the lack of our own oil resources, are of an economic nature.

More particularly, nuclear power costs were relatively controlled in France. Between 1977 and 1991, the cost of constructing nuclear power stations practically doubled, but coal plants experienced a similar evolution. During the entire period from 1972 to 1982 "it can be noted that nuclear energy's competitiveness compared with coal's had not changed"³ and that "nuclear power remains the economical way of producing electricity during periods of low and medium demand." During these ten years, "the cost of the kilowatt-hour rose more rapidly than expected, almost doubling,"⁴ but nuclear energy had a large safety margin over fuel oil. Nuclear energy is more economical to use than coal, given the high level of yearly consumption, which seems to be the case in resource-poor France.

Among the advantages of the French nuclear energy program, one of the most significant is the speed at which the stations are built—6 years, against 11 in Germany. Positive roles were also played by the "series" effect (an average of 8 to 18 stations ordered) and by size (an increase from 900 to 1300 MW). Standardization was emphasized. Being its own prime contractor, EDF had at its disposal abundant engineering capacity through its Equipment Department. As a result, construction costs were contained (Table 1⁵).

TABLE I Average Increase in the Cost of the Nuclear Kilowatt (1970–1982), Ignoring Inflation

Country	Percent Increase
United States	+13
Japan	+11
Western Germany	+9
Canada	+6
France	+5

A Competitive Energy

Having become abundant, electricity also showed itself to be highly competitive. Energy prices remained stable from 1950 to 1973, and the real cost of energy steadily declined. From 1970 to 1973, energy prices stabilized before a spectacular rise (1978/1979). As for electricity, its price had largely fallen in terms of constant francs until 1973, then increased for high and medium voltage, while the cost of the low-voltage kilowatt-hour continued to decrease, albeit more slowly. In terms of competitiveness, it was electricity that benefitted the most from the increase in oil prices and the end of decreasing natural gas prices. In 1973 the cost of a kilowatt-hour was seven times that of thermal combustion; by 1983, the ratio had become 2 to 1, and sometimes less.

Percentage change in the prices of various energies from 1972 to 1982, in constant francs

Electricity 100-kWh low voltage, excluding taxes, business use	+117%
Electricity 100-kWh low voltage, excluding taxes, business use	+156%
Natural gas, 100 kWh, excluding taxes, residential use	+172%

Consumer price average +181%

Regular gasoline, 1 liter	+265%
Coal, French anthracite (50-kilo sack), 1 ton	+310%
Domestic fuel oil, delivered (2000- to 5000-liter delivery), taxes included, per hectoliter	+610%

Electric rates continued to decrease between 1983 and 1988 (an average of 12 percent in constant francs), although more rapidly for large industrial customers than for residential customers. The figures given by the National Utility Service (NUS)⁶ establish that electric rates in France are in the medium range. By slowing price increases, the State favored consumers, but prevented EDF from significantly reducing its indebtedness (proportionately, EDF's level of indebtedness is nevertheless lower than it was during the period of the hydroelectric power program).

Electricity, an Answer to the Economic Crisis

To summarize, electricity fully profited from the fact that it enabled France to be mostly free from hydrocarbons. Other arguments in favor of electricity were that it represented a rational use of energy and that it was a substitute energy. In the 1980s, it was also claimed that electricity was "plentiful, not contingent on international politics, which consequently makes its price evolution mild and predictable."⁷ The government's goal was three-pronged: to prevent certain businesses from leaving; to preserve labor-intensive industries; and to introduce new, competitive products. Electricity thus became an instrument of economic reconquest (the fight

against unemployment and inflation, since the cost of electricity varies less than other products over the long term). But more important than its competitiveness was its capacity to open new markets.

New Opportunities

Electricity's competitiveness implied that its trajectory—energy “simultaneously old and new”⁸—would be from traditional mechanical uses to thermal uses. To industries, EDF stressed the adaptability of electricity and its attractive rates. Besides these points, it was increasingly argued that electricity was a clean energy, and consequently that it protected the environment.

The other decisive breakthrough of the 1980s was its adaptation for electric heating, which made it attractive for residential use. As a result, two out of every three new apartments are currently equipped with electric radiators. The cost to users is very low, since most of the money is spent “up-stream from the socket.” Although the rates are attractive, they do not seem to reflect the costs. The increase over the ten years from 1979 to 1989 has been fairly spectacular (Table 2).

TABLE II Electricity's Share in Energy Utilization by Sector (%)

	1979	1986	1987	1988	1989
Industry	38	47	48.3	48	49
Residential	30	44	46	47	47.7

After having lagged seriously behind industrial use, residential use of electricity in France is now 2 points above the EEC average (31.3 percent compared to 29 percent), mainly because of electrical heating. The effect is perhaps perverse. Electrical heating is a big household expense and forces EDF to meet large winter peaks in demand (during which period fossil fuels are also used to ensure supply). Between 1973 and 1987, the maximum peak demand for electricity practically doubled in France! In the final analysis, however, France uses its nuclear power plants less than some of its European neighbors use theirs⁹ (see the following table for 1987 averages, in hours):

West Germany	France	Great Britain	Belgium	Spain
6535	5090	6710	7230	6105

Opponents of an exaggerated use of nuclear power feel that this is not a very rational utilization of electricity, because it produces more kilowatt-hours than are absolutely necessary to maintain competition. Another sign of plenty is that EDF has become an electricity exporter. In January of 1990, the General Manager of EDF declared: “our major asset with respect to competition in Europe is, naturally, nuclear energy. The competitiveness of our production infrastructure has been

confirmed. The proof of this lies in our ability to export, because the company's performance, in this field of enormous competition, has significantly improved." In answer to which it might be called to mind that "EDF's declared goal for the construction of nuclear power plants was to enable prices in France to drop substantially and not to enable France to export. . . ."10

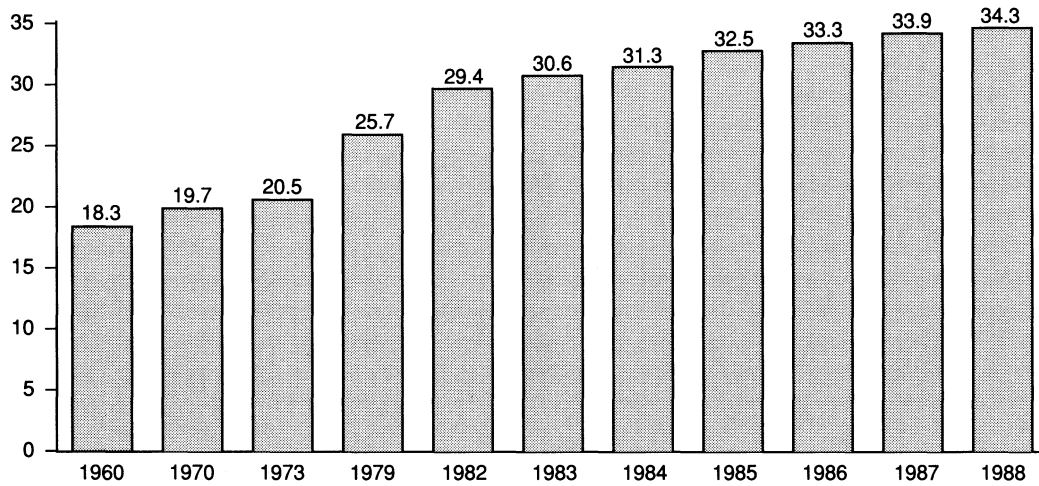
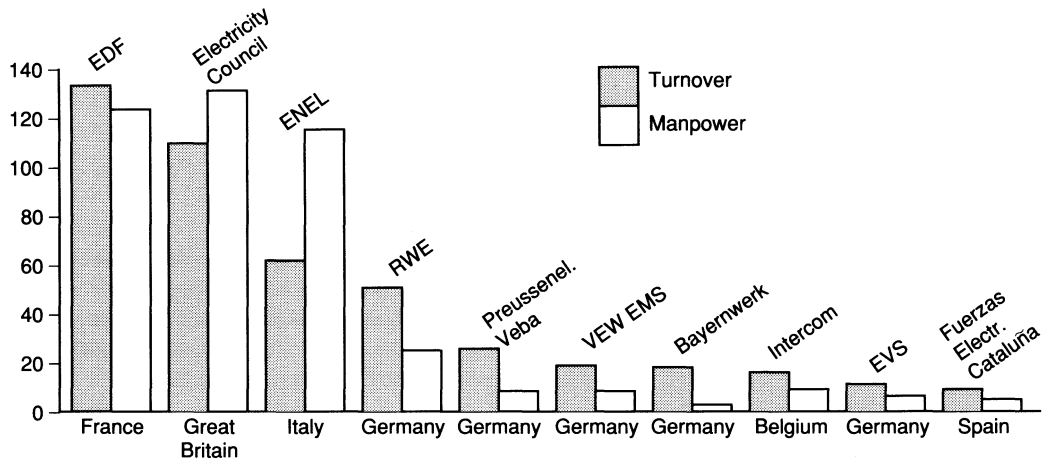
Conclusion

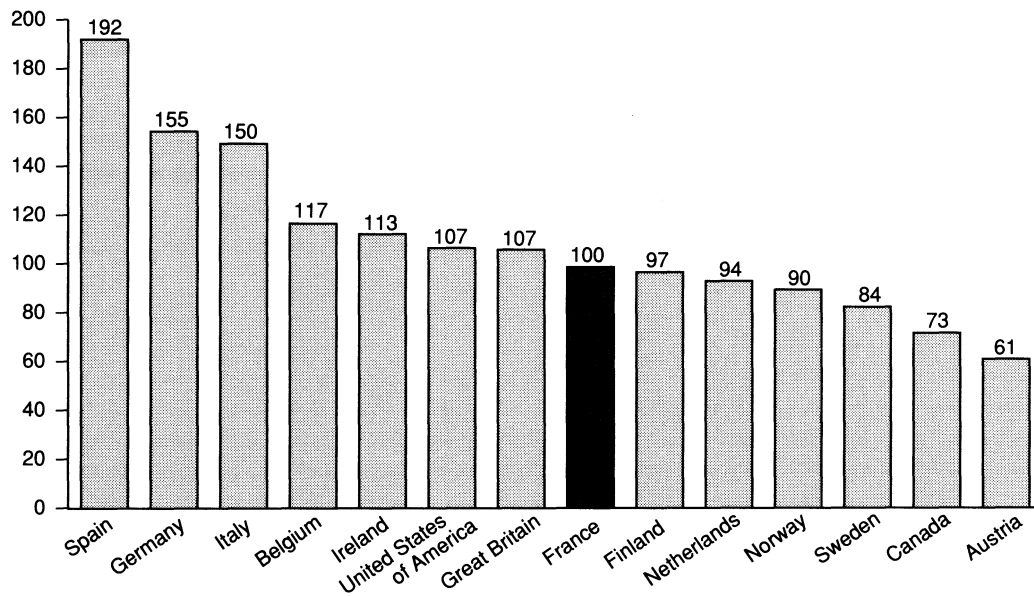
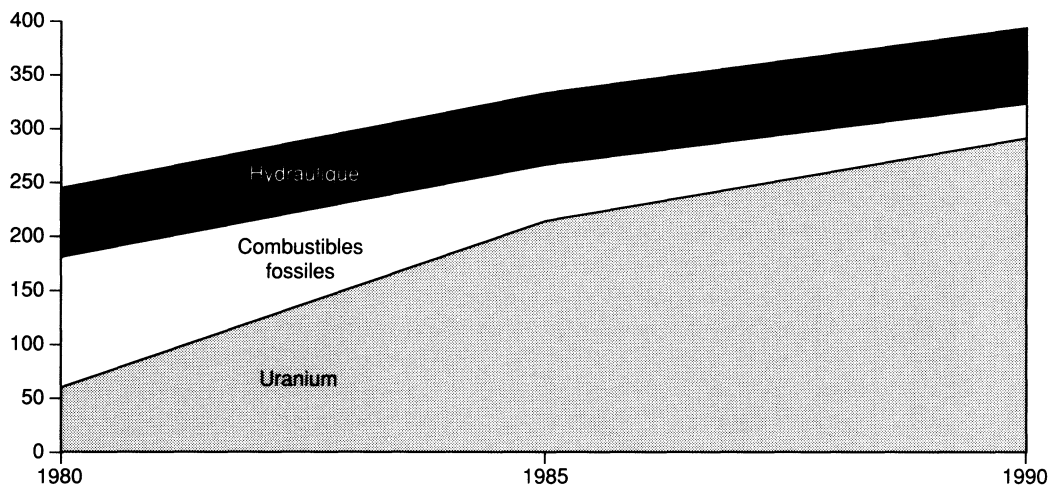
At the end of the 1980s France found itself in a radically new situation vis-à-vis electricity. Its use now doubles every 25 years instead of every 10. And yet, there is a profusion of production processes. It has become necessary, as we stated, to find new outlets and opportunities. The achievement of European unity could offer new hope—or new dangers—for EDF. On January 1, 1993, Europe should become a single market, without obstacles, without national monopolies, so that the advantages of free trade can fully develop. For EDF, that means increased rivalry on the European level and a greater degree of competitiveness with similar companies in Europe and other service companies in France. Despite a certain vagueness, since the new rules set by Brussels (headquarters of the Common Market) are not yet precisely known, EDF is actively preparing itself for its new role. The 1989 Plan Contract states the following: "The development of consumer demand takes place more than ever in competitive markets. EDF must ensure its own ability, confronted with other energies in France and also on a European energy and electricity market destined to be completely open and subjected to increasing rivalry."

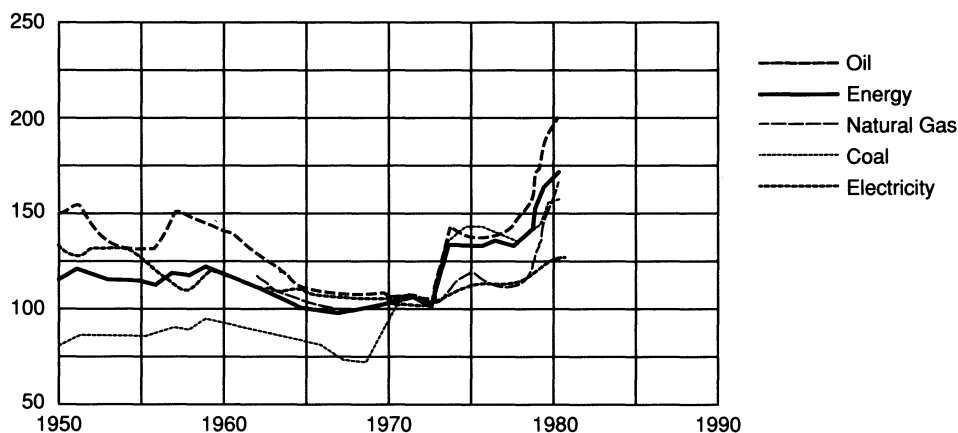
This statement presupposes, in particular, a change in the makeup of this company of engineers, where some voices deplored the lack of an energetic attitude about sales and marketing. Concerning the reforms that EDF is undertaking with an eye to the single European market, the General Manager declared in 1990: "This is a veritable cultural revolution for the company which will progressively change the mentality of its agents from the traditional one stressing means to one that is results-oriented." This new challenge also presumes the loss of uniquely French attitudes in favor of those emphasizing Great Europe. Being the two countries with the largest public enterprises, France and Italy (the share of the leading supplier in France, 94 percent; in West Germany, 18/20 percent; in Great Britain, 12 percent) are also the two countries with which the ad hoc committees in Brussels are the most concerned. Still unknown is whether, as in America, a common carrier will be the solution adopted. In any case, EDF has the advantage of being the leading European exporter of electricity, even if the quality of this electricity is often mediocre (problems with micro-power-cuts).

Defending themselves against European competition is a new challenge for French public firms. Legal upheavals (partial privatizations?) are predictable. People's attitudes will have to change. The notion of public service will increasingly have to be reconciled with the demands of competition and the ability to be competitive. Nevertheless, far from the rather bureaucratic image generally ascribed to monopolistic public corporations, EDF's history reveals that this giant—more

than 100,000 agents—knows how to adapt to economic and technical challenges. EDF is a typically French model that will, after a half-century of existence, have to prove its viability.







Notes

1. F. Picard, A. Beltran, and M. Bungener, *Histoire de l'EDF* (Paris: Dunod, 1985), p. 201. (The man speaking is Paul Questiaux, former Financial Manager of EDF.)
2. Louis Puisseux, *Histoire de l'EDF*, op. cit., p. 221.
3. *Rev. Energ.*, No. 364, May 1984, p. 249.
4. *Ibid.*, p. 248.
5. C. Flavin, "Nuclear power: The market test" (Washington: Worldwatch Institute, 1983). Quoted by D. Finon, "Nuclear power between hope and resignation," in *Energie Internationale* (Paris: Economica, 1987/1988) p. 163.
6. An international advisory company dealing with the purchase of electricity by enterprises (users whose monthly consumption is 450,000 kWh for a subscribed capacity of 1000 kW). This company was created in the United States in 1933. It is currently located on five continents, and has been in France since 1972.
7. *Rev. Energ.*, No. 344, May-June 1982, p. 602.
8. *Ibid.*, p. 606.
9. United Nations Bulletin (Electricity in Europe), quoted by Luigi de Paoli, *Energie Internationale* (Paris: Economica, 1989/1990), p. 165.
10. *Rev. Energ.*, No. 431, June 1991, p. 443.