

## **Energy Security of Supply in France and in Mexico: Similarities and Differences to better Understand its Future**

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### **ABSTRACT**

*This paper aims to compare how two countries are facing the challenges of energy security of supply. Mexico, a member of NAFTA and a neighbor of the United States, has oil resources and is thinking how to answer to the increasing energy demand. France, one of the 27 member states of the European Union has been evolving from its position of being the “black sheep” and now displays an interesting position of protecting its national interests and its security of supply while still complying with the European vision.*

### **SECTION 1 : INTRODUCTION**

Today, a complex equation must be solved by almost all the countries in the world : provide their economy with secure and inexpensive energy (which is a strong element of competition), and reduce at the same time greenhouse gas emissions. Depending on the history, economic development level and their natural resources, the challenge of each government is different. This paper aims to compare how two countries are facing the challenges of energy security of supply. Mexico, a member of *NAFTA* and a neighbor of the United States, has oil resources and is thinking how to answer to the increasing energy demand. France, one of the 27 member states of the European Union has been evolving from its position and now displays an interesting position of protecting its national interests and its security of supply while still complying with the European vision.

A standard definition of security of supply is a flow of energy supply to meet demand in a manner and at a price level that does not disrupt the course of the economy in an environmental sustainable manner.<sup>1</sup> The concept is vast, multiform as it encompasses the whole physical and non physical supply chain. It has also important time, space and social dimensions. It can be more precisely defined as

- A reliable supply of energy.
- A reliable transportation of supply.
- A reliable distribution and delivery of supply to the final customer.
- At “reasonable price” over a continuous period.

Historically, Mexico’s energy sector has been divided into two specific and well defined segments: hydrocarbons and electricity. Since the nationalization of Mexico’s energy resources (1938 for hydrocarbons and 1960 for electricity) both markets had been dominated and controlled by three decentralized public entities of the Mexican Government: *Petróleos Mexicanos* (PEMEX) in the oil and gas industries; *Comisión Federal de Electricidad* (CFE) and *Luz y Fuerza del Centro* (LFC) in the electricity market. However, until the early 90’s there had been small exceptions to the State control in the energy markets, such as private investments in natural gas distribution and cogeneration and self-supply power plants. After a set of energy reforms, new private companies have entered the power generation segment since 1992, and the natural gas downstream activities since 1995.

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<sup>1</sup> Chevalier (2004), “Les grandes batailles de l’énergie”, Gallimard, Folio 2004.

In contrast to several European countries which benefit from raw materials, France is poor in energy resources. In order to ensure the security of its energy supplies, France's energy policy has given priority to the development of a national energy supply, most notably nuclear energy and renewable energies. The challenge for the French government and administration was to define a new national energy policy which is more in line with the European process. In the European energy market's deregulation process, France has sometimes been referred to as the "black sheep", with its national energy model built on strong state intervention, two energy champions (state owned firms EDF and GDF), nuclear power as the main source of electricity, and the French concept of "public service". At the same time, France is less dependent on energy imports compared to other Member States. Nevertheless, France is facing the same international demands and developments with the same risks and uncertainties as other EU countries. It needs to diversify its energy mix and improve its security of supply.

This paper is divided into three parts:

1. Mexican situation : Coal, natural gas and oil balances, other supply and demand issues
2. French situation : energy balance, France in the European landscape
3. How to deal the future challenges of energy security of supply?

## **SECTION 2: THE MEXICAN ENERGY BALANCE**

### **II.1 Historical balances (1973-2005)**

In 1973, Mexico was a net importer of oil and its products, and coal (Table 1). The natural gas market was self-sufficient, with the gas extracted as a by-product of crude oil. With the discovery of the *Cantarell field*, and others in the *Sonda of Campeche* in the Gulf of Mexico at the end of 70's, and with high oil prices in the market, Mexico started a strategy focused on the development of its new oil and gas reserves. Crude oil exports have thus reached 1.4 MMbd in 1990 and 1.8 MMbd in 2005. At the same time, oil products needs increased as a result of the economic growth of the country. Oil products have thus increased threefold between 1973 and 2005. In the same period, the natural gas market increased fourfold, but domestic supply has not been enough to satisfy the national demand. Today, gas imports represent between 10 and 20 % of the total consumption. Foreign coal dependency has increased from 10% in 1973 to about 50 % in 2005. The electricity market has shown the most dynamic evolution, it grew sixfold from 1973 to 2005 (Table 1).

### **II.2 Overview of the current situation**

Traditionally, Mexico has been a net oil exporter and will continue to be at least for the following two decades. A half of its oil production is today exported and the rest consumed in the local refineries ([www.pemex.com](http://www.pemex.com)). However, its oil production seems to have reached its maximum in 2004 with 3.4 millions of barrel per day. The main oil field, Cantarell in the southeast part of the country, has started the declining process last year. On the demand side, the gasoline and diesel consumptions are expected to growth at rates of 4% per year during the following years due to the dynamics of the economy. Even if the oil production can be maintained at levels of 3.0-3.5 millions of barrel per day with enormous investments in deep water projects in the Gulf of Mexico, the rising gasoline and diesel demand will make that Mexico becomes a net oil importer in the following decades. For the natural gas, more than 1,000 MW of gas based-combined cycle electric power capacity has been installed per year since 2000 in the country in order to satisfy the requirements of electricity that have increased at a rate of more than 5 % per year ([www.sener.gob.mx](http://www.sener.gob.mx)). Domestic gas production has not been enough, and imports from the USA and other countries, in the form of Liquefied Natural Gas, have recently augmented to reach 20 % of the gas supply. In the case of coal, its participation in the primary energy supply (6%) is not significant as the crude oil and gas (more than 80%), and the country is a net coal importer. Hydro, geothermals and wind energies account for 10% of the total primary energy supply ([www.sener.gob.mx](http://www.sener.gob.mx)).

**Table 1. Crude oil, oil products, natural gas, coal and electricity balances in Mexico, 1973-2005**

	1973		1990		2005		Variation 2005/1973
<b>Crude oil</b>	<b>Pcal</b>	<b>MMBD</b>	<b>Pcal</b>	<b>MMBD</b>	<b>Pcal</b>	<b>MMBD</b>	
Production	250.7	0.5	1 471.9	2.7	1 600.9	3.3	7.4
Exports	0.0	0.0	756.4	1.4	877.2	1.8	-
Imports	35.9	0.1	0.0	0.0	0.0	0.0	0.0
Consumption	286.6	0.5	715.5	1.3	723.7	1.5	2.9
<b>Oil Products</b>	<b>Pcal</b>	<b>MMBD</b>	<b>Pcal</b>	<b>MMBD</b>	<b>Pcal</b>	<b>MMBD</b>	
Production	260.0	0.5	677.8	1.2	720.8	1.3	2.8
Exports	13.7	0.0	46.5	0.1	89.5	0.2	6.5
Imports	41.8	0.1	71.3	0.1	153.6	0.3	3.7
Consumption	288.0	0.5	702.6	1.3	784.9	1.4	2.7
<b>Dry natural gas</b>	<b>Pcal</b>	<b>Tcf</b>	<b>Pcal</b>	<b>Tcf</b>	<b>Pcal</b>	<b>Tcf</b>	
Production	117.6	0.5	255.7	1.1	293.5	1.7	3.4
Exports	0.5	0.0	0.0	0.0	2.1	0.0	4.0
Imports	0.0	0.0	15.5	0.1	76.9	0.3	-
Consumption	117.1	0.5	271.2	1.1	368.3	2.0	4.1
<b>Coal</b>	<b>Pcal</b>	<b>MMton</b>	<b>Pcal</b>	<b>MMton</b>	<b>Pcal</b>	<b>MMton</b>	
Production	14.7	3.4	32.4	7.4	51.6	11.8	3.5
Exports	0.0	0.0	0.0	0.0	0.0	0.0	-
Imports	1.7	0.4	0.2	0.0	45.5	10.4	26.4
Consumption	16.4	3.8	32.5	7.5	97.1	22.2	5.9
<b>Electricity</b>	<b>Pcal</b>	<b>BKWh</b>	<b>Pcal</b>	<b>BKWh</b>	<b>Pcal</b>	<b>BKWh</b>	
Generation	29.8	25.6	101.8	87.5	188.3	161.9	6.3
Exports	0.0	0.0	1.7	1.5	1.1	1.0	-
Imports	0.3	0.2	0.5	0.5	0.1	0.1	0.3
Losses	5.3	4.5	19.1	16.4	32.2	27.7	6.1
Consumption	24.8	21.3	81.5	70.1	155.1	133.3	6.3

Source: Sener, 1986, 1991 and 2006a.

Notes: 1. Pcal =  $1 \times 10^{15}$  calories.

### **SECTION 3: THE FRENCH SITUATION IN THE EUROPEAN UNION**

The history of European nations and their respective energy reserves have implied a very high level of energy diversity throughout the European Union. When comparing European countries, it is surprising to notice the differences that exist, depending on the energy mix, industrial organization, the role played by the state, the dependence on imports, and so forth. In France, the history of energy policy has always been characterised by a very strong intervention of the state. Public firms, or controlled by the state, allowed the development of the French energy sector and played a major role in its modernization, in the promotion of independence and in security of supply. The French nuclear program, launched shortly after the first oil crisis, is a good example since nuclear power covers approximately 40% of the French energy needs (whereas the share of nuclear power in the world is about 8% in 2006). This very “hexagonal” and state oriented vision has to change with globalisation of the energy markets, the construction of the European Union, the multiplication of uncertainties and also with financial constraints facing states for energy investments.

### III.1 The French energy balance in 2006

In contrast to several European countries which benefit from raw materials (coal in Germany and Spain, gas in the Netherlands etc), France is poor in energy resources. It does not possess many energy resources immediately available: the last coal wells closed in 2004, and the natural gas layer of Lacq provides less than 1% of the national production of primary energy. The nuclear program was a response to the oil crises. France, like other industrialized countries, reacted to the two oil crises with measures in favour of the security of supply which deeply modified its national energy mix. In 2006, France has 58 nuclear power reactors with an installed capacity of 63 GW (it is the second largest park in the world after the United States). In order to ensure the security of its energy supplies, France's energy policy has given priority to the development of a national energy supply, most notably nuclear energy and renewable energies.

Between 1973 and 2005, French primary energy consumption evolved: coal now represents only 5% (15% in 1973), oil share 33% (67% in 1973), gas consumption doubled (from 7% in 1973 to 15% today), electricity consumption was multiplied by 10 (from 4 to 42%) and renewable energies represent 5% of the total (Table 2). Compared with the other OECD countries, France ranks 7th for CO<sub>2</sub> emissions per inhabitant. The most significant increase in consumption is the transports sector (20% in 1973 to 31% in 2005), while the industrial sector share decreased (from 36% to 24% in 2005) and the residential and services sectors have remained stable (43%).

**Table 2. French energy balance 1973- 2006.**

	1973	1979	1980	1990	2000	2004	2005	2006
<b>Coal</b>								
Consumption *	28	32	24	19	14	13	13	12
Production *	17	13	11	8	2	-	-	-
<b>Oil</b>								
Consumption	121	134	82	88	95	93	92	92
Production	2	2	3	3	2	1	1	1
<b>Natural gas</b>								
Consumption	13	21	23	26	38	40	41	46
Production	8	6	5	3	2	1	1	1
<b>Electricity</b>								
Consumption	8	17	62	83	109	117	117	118
Production	8	16	64	83	114	123	123	123
<b>Renewable energies</b>								
Consumption	6	9	10	12	13	13	13	13
Production	10	10	11	11	13	13	13	13

\* en Mtoe

Source : [www.dgemp.fr](http://www.dgemp.fr)

### III.2 European diversities

Among the European Union countries, significant differences subsist on the level of the four following dimensions (Chevalier, 2006) :

**1. Energy intensity** is a measure of the relationship between energy consumption and national economic production. It varies between the 25 member states. In 2005, the energy intensity varies from 125 for Denmark and 300 for Luxembourg (in Mtoe, 1995 prices). The new members present energy intensities higher than those in the older Member States. The potential for improvement is very high because their emissions of greenhouse gases per inhabitant are higher than the European average (see contribution from Lithuania in this volume). The structure of the French economy is more directed towards the services sector than other industrialized countries, which gives it a comparative advantage on the energy intensity (150 for France).

**2. Energy dependence** continues to increase for the whole European Union which makes it more vulnerable. If nothing is done, energy dependence will reach 70% by 2030: 90% of oil needs and 80% of natural gas consumption will have to be covered by imports (Green Book, 2006). This increase of import dependence can be explained by the imbalance between European reserves (0.6% of oil reserves in the world and 2% of natural gas) and its economic needs. Primary energy production in Europe is forecast to decline while demand is going to increase. This clearly raises the question of future prices and the availability of affordable energy. France still imports half of its consumption of primary energy, against nearly the three quarters before the nuclear program. Today, France produces 138 Mtoe and consumes 276 Mtoe (in 2005). It has thus an energy independence of 50% against 26% in 1973.

**3. Diversity of the national energy mix** is the most obvious characteristic to compare member states within the European Union. The “energy mix”, or the combination of different forms of energy used, varies from one country to the next (Table 3). In certain countries like Greece, energy consumption relies exclusively on imported oil and coal. Some countries are almost completely dependent on energy imports, like Portugal. The new member countries further accentuate this picture of energy diversity with a strong dependence on Russian gas supplies (especially Hungary).

**Table 3: Primary energy consumption in 2005**

Countries	Total (Mtoe)	Oil %	Natural Gas %	Coal %	Nuclear %	Hydro %
Czech Republic	44.4	22.3	17.4	46.2	12.6	1.5
Germany	324.0	37.5	23.8	25.3	11.4	1.9
Greece	33.5	62.4	6.8	26.8	-	3.8
France	270.0	33.0	15.0	5.0	40.0	7.0
Netherlands	94.7	52.4	37.5	9.2	0.9	-
Poland	91.7	23.8	13.3	61.8	-	0.9
Portugal	23.0	66.6	11.8	16.6	-	4.8
Slovakia	18.2	19.2	29.1	23.6	22.0	6.0
Sweden	49.7	30.4	1.4	4.4	32.7	31.1
UK	227.3	36.4	37.4	17.2	8.1	0.8

*Source: BP Statistical Review of World Energy (2006)*

**4. National energy priorities** continue to dominate European energy debates. The strategic energy sector remains linked to national considerations. Certain countries are interested in nuclear energy development (like Finland), which limit the importation of CO<sub>2</sub>. France will surely not stop its nuclear program and will continue to seek maximum energy independence. A number of governments are opening again the debate over the nuclear option (United Kingdom and Spain) while other governments are looking to protect their coal industry, like Germany or Poland. At the same time, some member states have decided to proceed further with the use of renewable energy sources than laid out in European directives (Denmark, Germany, etc.). At the European level, the goal is that 12% of total energy consumption and 21% of electricity consumption will be from renewable energies by the year 2010. In France, a balance still needs to be found between relying on nuclear power with low electricity generation costs and renewable energies which need to be subsidized to help their development. "Better energy", not just "more energy", is required in this context.

Considering the French energy situation in the European Union, the challenge for the French government and administration was to define a new national energy policy which is more in line with the European process.

### III.3 French energy policy

Like all the other Member States, France has always had an own, distinct energy policy. For thirty years, the government decided on the energy policy in the name of the nation. With the process of European integration, governments lost some of their sovereignty. France is still seeking to define its national energy policy but has to take into consideration new European constraints. At present, French energy policy is defined by the Energy Act of 2005 which emphasizes French interests through four priority axes.

### **1. Energy independence and the security of supply.**

This objective is conceived in the short as well as in the long run in quantity and in price. There is a double goal: to limit the exposure of the French economy to fluctuation in energy prices and to ensure the availability of sufficient capacity to cope with problems of energy shortages.

### **2. Protection of the environment.**

Energy and the environment figure among the most important challenges of the century. In addition to this Energy bill, in the Plan "Climat" (2004), France within the framework of its Kyoto commitments decided on measures to save nearly 15 Mt of carbon equivalents per year by 2010 (which means a quartering of CO<sub>2</sub> emission by 2050).

### **3. Energy at low cost for households and industries.**

The price, quality and availability of energy are determining factors in France's competitiveness. This goal relies on our national nuclear program that allows us to have a low electricity production cost.

### **4. Social and territorial cohesion.**

It is important that the energy policy provides everyone, and in particular the most deprived in society, with access to a quality energy source at a competitive price. This concerns solidarity but also taxation, regulated tariffs, and missions of public service, such as, for electricity, obligation of supply, equal treatment of customers, etc.

To achieve these four goals of the Energy Bill, the French government emphasizes four means:

- 1- **Control of the energy demand** through a series of incentives and programs including an innovative energy saving certificate scheme (White certificates) and tax incentives.
- 2- **Diversity of the energy mix** by increasing the use of renewable energies and keeping the nuclear option open (French German nuclear engine).
- 3- **Development of energy grids and storage capacities** to improve the safety of France's energy supply. For example, the decree of 2003 relating to the "multiannual programming of the investments of electricity production" lay down objectives of capacity to be installed.
- 4- **Research and development on energy** to meet long term challenges in terms of energy intensity, development and consumption of renewable energies.

## **SECTION IV. HOW TO DEAL WITH SECURITY OF SUPPLY ?**

### **IV. 1 Mexico is facing increasing energy demand with limited resources**

In the last three decades, energy security of supply in the country has been achieved since the two big state own companies, PEMEX and CFE, and other private companies have provided a reliable supply of energy at a "reasonable" price. In the future, the energy security of supply will be an enormous and unhistorical challenge to be faced under new conditions: increasing energy demand and restricted energy and financial resources. Different scenarios of the Mexican energy sector to 2030 reveal these new conditions.

#### **IV.1.1 Official Figures to 2015**

According to the Secretary of Energy's document on prospects for the electric power sector 2001-2010 (Sener, 2006b), installed generating capacity for public service should rise from 46 GW in 2005 to 66 GW in 2015 (Table 4). The Secretary of Energy thus predicts an average annual growth of 5.5 % in electric power demand. Combined cycle plants would provide most of the needed electricity. About 16 GW of this technology would be installed during the studied period (around 75 % of total added capacity). Combined cycle plants would dominate the power generation sector because their participation would rise from 28 % in 2005 to 40 % in 2015.

Natural gas consumption will grow from 2.0 to 3.1 Tcf mainly because of increasing demand of the power sector where a policy of installing combined cycle power plants, and substituting fuel oil by natural gas has been implemented for environmental reasons (Sener, 2006c). Natural gas production will also rise but it will not be able to meet demand, requiring imports of 0.8 Tcf of gas in 2015, which means 25 % of foreign dependency (Table 4).

#### IV.1.2 External outlooks to 2030

Two recent studies have studied Mexico's energy future through 2030. First, the International Energy Agency (IEA 2002) published the document entitled "World Energy Outlook 2002, Mexico Energy Outlook Spanish-English version". This was taken from the World Energy Outlook 2002 that presents projections up to the year 2030 of supply and demand of oil, gas, coal, renewable energy, nuclear power and electricity, worldwide and by region. With a similar scope, the study "International Energy Outlook 2006", prepared by the US Department of Energy (DOE, 2006), provides an objective, policy neutral reference case that can be used to analyze international energy markets, as its preface indicates.

Both studies estimate that energy demand in Mexico will grow at 2.5 percent per year during the period 2005-2030. The DOE study considers an annual GDP growth of 4.1 percent in the reference case. This rate seems high when it is compared with the figures observed in the period 1978-2003, when the economy grew only 2.9 percent per year. A rate situated between 2.5 and 3.5 percent is thus more reasonable.

**Table 4. Oil and Natural Gas Balance in Mexico, 2005-2030.**

	2005	2010		2015	2020		2030	
		IEA	DOE	SENER	IEA	DOE	IEA	DOE
<b>Oil (Mbd)</b>								
<b>Supply</b>	<b>3.3</b>	<b>4.1</b>	<b>4.0</b>	<b>n.a.</b>	<b>3.8</b>	<b>4.5</b>	<b>3.5</b>	<b>5.0</b>
Production	3.3	4.1	4.0	n.a.	3.8	4.5	2.7	5.0
Imports	0.0	0.0	0.0	n.a.	0.0	0.0	0.8	0.0
<b>Demand</b>	<b>3.3</b>	<b>4.1</b>	<b>4.0</b>	<b>n.a.</b>	<b>3.8</b>	<b>4.5</b>	<b>3.5</b>	<b>5.0</b>
Indigenous consumption	1.5	2.4	2.2	n.a.	2.8	2.7	3.5	3.2
Exports	1.8	1.7	1.8	n.a.	1.0	1.8	0.0	1.8
<b>Natural gas (Tcf)</b>								
<b>Supply</b>	<b>2.0</b>		<b>2.1</b>	<b>3.2</b>		<b>3.1</b>	<b>5.2</b>	<b>4.5</b>
Production	1.7		1.7	2.4		2.2	5.2	3.0
Imports	0.3		0.4	0.8		0.9	0.0	1.5
<b>Demand</b>	<b>2.0</b>		<b>2.1</b>	<b>3.2</b>		<b>3.1</b>	<b>5.2</b>	<b>4.5</b>
Indigenous consumption	2.0		2.1	3.1		3.1	4.3	4.5
Exports	0.0		0.0	0.1		0.0	0.9	0.0
<b>Electricity</b>								
Installed Generating Capacity*	<b>46</b>	<b>60</b>	<b>55</b>	<b>66</b>	<b>87</b>	<b>105</b>	<b>121</b>	<b>129</b>

*n.a.: not available.*

*IEA- IEA (2002); DOE- DOE (2006); SENER- Sener (2006b, 2006c).*

*Mbd: million barrels per day. Tcf: Trillion Cubic Feet.*

*\* Installed capacity of the public service.*

Table 4 also compares the two studies projections of oil, natural gas and electricity that are the most relevant forms of energy for Mexico. The DOE (2006) projects a more optimistic world for oil because Mexico continues to be an exporter country in 2030 with exports of 1.8 Mbd. Instead, the International Energy Agency draws a more dramatic scenario where Mexico becomes an importer of crude oil during the third decade of the period. For natural gas, the

visions are also opposite. While the IEA projects a balance with exports, the DOE extrapolates the current market situation dominated by gas imports coming from the US. These divergent positions show the high uncertainties on the future of the oil and gas production. These uncertainties arise from the availability of hydrocarbons resources under the soil and the level of investment devoted to the development of upstream activities for example with deep water projects. With respect to electricity, its consumption is projected to rise by 3.5 percent per year in the IEA study and by 4.4 percent under the DOE scenario. These differences are also reflected in the estimates of the installed generating capacity in 2030, 121 GW for the IEA against 129 GW for the DOE.

The IEA forecasts changes in the current trends in the Mexican energy sector, from an oil exporter country to an importer one in the case of oil. In the gas market, the country becomes an exporter with the help of private investments. In the case of the DOE, these trends are not modified. It is believed that the IEA study is more politically influenced since it was prepared in co-operation with the Mexican Ministry of Energy. This imports scenario seems to be specially prepared to justify and attract more private participation in hydrocarbons projects, as: “Considerable investment will be necessary to develop Mexico’s abundant energy resources and to expand its energy infrastructure. So much depends on successful implementation of the government’s planned reform measures, which are design to attract private-sector investment into Mexico’s energy sector” (IEA, 2002, p. 74). The DOE seems to show a more independent and optimistic vision of the energy future of Mexico.

#### IV. 2 France in the European Union with the main priority of security of supply

While France tries to define and implement its energy policy, the government has to face several challenges linked to the European integration process and energy market fundamentals.

Oil and gas reserves are unevenly distributed around the globe, and the largest reserves are situated in politically or economically insecure regions (Middle-East, Russia). North Sea oil and gas fields have already been exploited beyond their peak, leaving Europe dependent on non-EU countries for future supply. The Commission “*Green Paper*” on security of energy supply (November 2000) drew a sobering picture of the EU's energy situation. If no action is taken, it predicted, the EU's energy dependency will climb from 50% in 2000 to 70% in 2030. The particular situation for the main imported fossil fuels was described as follows:

- Oil: 45% of EU oil imports originate from the Middle East; by 2030, 90% of EU oil consumption will have to be covered by imports
- Gas: 40% of EU gas imports originate from Russia (30% Algeria, 25% Norway); By 2030, over 60% of EU gas imports are expected to come from Russia with overall external dependency expected to reach 80%.
- Coal: By 2030, 66% of EU needs is expected to be covered by imports.

The “*Green Book*” published by the Commission does not yet reflect a truly common European energy policy but it highlights a certain number of principles on which the Member States agree to build the future energy system. These principles are to improve the energy efficiency, to diversify the energy mix, and to **ensure the security of supply**. These principles are (or will be) accompanied by precise national objectives with regard to: energy saving, development of renewable energies, and security storages. Nothing is obviously indicated on nuclear power but each country preserves its freedom of choice. One cannot at the same time reduce the gas emissions and close the door to nuclear power as pointed out by L. de Palacio, the former energy commissioner.

In spite of the energy diversity of the European Union, a common vision has always been shared by all the Member States over energy development for the future. The publication of the *Green Book* reaffirms the principle of solidarity between the countries in the European Union. Completion of the internal market, environment protection, and security of supply are the common energy battles that call for a common solution. Unity of the 25 member countries appears as the only means to meet the energy challenges of the 21<sup>st</sup> century. To move from a shared vision to a European energy policy, large steps are necessary but could be accelerated by a common foreign energy policy. Foreign policy relates to dialogue with the large exporting countries (Russia, OPEC), with the large consumers (the United States, China, Japan, India) and also with the poorest countries (where more than one billion individuals do not have access to electricity). It would permit the European Union to speak with a “one and unified voice” in international energy negotiations. The globalisation of energy-environment problems makes the multiplication of the international dialogues in bilateral or multilateral forms essential. France needs to figure out how to be part of the European process while still protecting its



national ideas. France could play a significant role and even try to be a model in the European Union. Thus, France might evolve from “black sheep” to an energy model based on better energy intensity, energy independence, low electricity costs, energy capacities storages and, low emissions. France just needs to figure out how to deal with its long history of state intervention in energy sectors. The European energy market is in its move, slowly with recurring national protectionisms, obstacles and contradictions. Nonetheless it is our future.

## **SECTION V. CONCLUSION**

Security of energy supply is a recurrent concept in national energy policies and also at the European and worldwide levels. At the world level, the more visible energy hunger of the world population raise some questions about supply. The debate concerning the peak oil reminds us that the resources of fossil fuels are physically limited, that price ultimately guarantees the balance between supply and demand. In this context, the United-States, China, India and other countries are fighting to secure access to oil and gas resources while oil and gas rich countries strengthen the control over their domestic resources. The increasing US demand for imported natural gas disrupts the world gas market. All these elements are bringing new threats for Europe’s energy supply and they could comfort the trend toward higher prices. On the other hand, the question of climate change is more and more considered as a very serious question which could oblige us to change our pattern of energy consumption. This general situation of uncertainties and tensions is providing new reasons to think about security of energy supply and to envisage actions for improving it.

In November 2000, the European Commission issued a green paper. This report carried a strong warning about European dependence on imported energy that could increase from 50 % in 2000 to 70 % in 2020-2030. The European Parliament and the Council passed their agreements, stressing the importance to minimize the risks of dependency both by the EU and the member states. Since then, terrorist attacks, storms, accidents, blackouts, wars, surges in fuel prices are threatening directly energy supply.

During last years, the French and Mexican governments have been deciding on the energy policy in the name of the nation. With the process of economic integration (European Union and NAFTA respectively), the French government lost some of its sovereignty and, in the case of Mexico, the energy policy is still dictated by the government according to national laws since NAFTA’s energy considerations are very limited.

Mexico has a lot of things to learn from the French experience on policies ensuring the energy security of supply and the way how they are implemented. Some elements of the Energy Act of 2005, like control of the energy demand, diversity of the energy mix and research and development on energy, can be used as an excellent example of energy policies to be followed by Mexico. In brief, the Mexican energy resources seem no to be enough to satisfy the increasing future demand and, if its people does not begin to do something today, a serious problem of energy security can be appeared in the following years.

France needs to figure out how to be part of the European process while still protecting its national ideas. France could play a significant role and even try to be a model in the European Union. Some national fears need to disappear (end-users, Unions...) and some national advantages need to be highlighted (nuclear plants competitiveness, CO<sub>2</sub> emissions, renewable energies, white certificates...). France is less dependent on energy imports compared to other Member States in the European Union. Nevertheless, France is facing the same international demands and developments with the same risks and uncertainties as other EU countries. It needs to diversify its energy mix and improve its security of supply. Thus, France might evolve from “black sheep” to an energy model based on better energy intensity, energy independence, low electricity costs, energy capacities storages and, low emissions. France just needs to figure out how to deal with its long history of state intervention in energy sectors. The European energy market is in its move, slowly with recurring national protectionisms, obstacles and contradictions.

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