

## 5. Energy Use and Policy in France and Lessons for India

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### **Introduction**

As an economy grows and incomes rise, the demand for energy also increases. In fact evidence covering a cross-section of countries and regions clearly shows that as per capita incomes rise, so too does per capita energy use. However, the experience of the developed countries showed that along with an increase in per capita energy consumption, pollution also aggravated. This promoted efforts to find alternatives such that the growing energy needs of a country can be met without aggravating pollution. Energy is also a basic need and ensuring its availability at affordable prices without compromising economic efficiency concerns is no less important. Hence, ensuring energy security, environmentally benign energy sources, and also providing it at competitive and affordable prices is a challenge facing energy planners in developed and developing countries alike.

### **Study Setting, Objectives and Approach**

This study provides a broad overview of the French energy sector. Against the background of the world energy economy it examines the structure of the French energy sector, trends in energy production, supply and consumption, and electricity pricing and price trends over the period 1960 to 1998–2000. The study provides a comparative picture of the pre- and post- 1973 phase when the first oil shock occurred. The study also provides a comparative perspective of the French and Indian energy sectors, and possible lessons that India can draw from France's experience.

### **Major Findings**

1. Energy production and consumption across countries and regions are very skewly distributed. France accounts for one per cent of the world population, 1.3 per cent of world energy production, 3.2 per cent of world electricity consumption and about 1.7 per cent of global energy-related carbon emissions. Whereas India which accounts for about 16.8 per cent of world population, accounts for about 4.3 per cent of world energy production, 3.1 per cent of world electricity consumption and about 4 per cent of global energy-related carbon emissions. The USA, which accounts for only 4.6 per cent of the world's population, accounts for 17.5 per cent of world energy production, and for more than a quarter of world electricity consumption and carbon emissions. The OECD, which accounts for 19 per cent of world population, accounts for 39 per cent of world energy production, almost two-thirds of world electricity consumption and over half the energy-related carbon emissions. Energy intensity is very low in France and other developed countries, whereas for India and China these are relatively higher (1 and above). Per capita primary energy supply and electricity consumption for France and other developed countries is very high, whereas it was relatively low for India and China. Per capita carbon emissions for France and other developed countries is very high, whereas it is comparatively low for India and other developing countries.

2. France is poorly endowed in terms of energy resources, with the exception of uranium. Consequently France was heavily dependent on imports. This ratio, which was above 80 per cent prior to 1973, has fallen to about 50 per cent. This is primarily due to the important role played by nuclear energy in reducing France's import dependence.
3. French energy policy has been guided by three main objectives, viz., ensuring energy security, competitive and low energy prices and environmentally benign energy supplies. In addition promoting public services or general interest principle is also a goal of French energy policy. To realise this the French Electricity Act recognises the 'right to electricity' as one of the rights enjoyed by its citizens. A major factor that characterises the French energy industry is the state control and monopoly rights enjoyed by the French energy producing utilities, EDF and GDF.
4. In France over 75 per cent of the gross electricity production is accounted for by nuclear energy, which is the highest for any country in the world. As against this for India, fossil fuels contribute the largest share (80.9 per cent) of gross electricity production, followed by hydro-electricity (16.8 per cent). Among combustible fuels, coal claims the highest share both in France and India, though the share of combustible fuels in total commercial energy use in France is very low as compared to in India.
5. The analysis reveals a dramatic shift in the energy mix and production in France from 1960 to 1998. Particularly striking is the swift rise and importance of nuclear energy in France, especially after 1978, which now holds the predominant share in total energy production and supply in France. Equally striking is the steep decline in the importance and role of combustible fuels between 1960 and 1998, and thereafter.
6. Overall, total final energy consumption in France trebled between 1960 and 1998. While the share of coal declined during this period, that of crude oil, natural gas and electricity has risen.
7. An analysis of the sectoral shares in energy consumption in France between 1960 and 1998 and projections by the year 2010 reveals interesting patterns. While the share of the industrial sector in total final energy consumption has steadily declined over time, that of the residential, commercial, public service, agricultural sectors and transport sectors has steadily risen.
8. Electricity consumption in France increased six-folds between 1960 to 1998 with the residential sector recording the fastest growth, followed by commercial and public services, agricultural sector, energy sector, industrial and transport sectors. While in 1973 the industrial sector accounted for more than half the total electricity consumption, this declined to a third by 1998.
9. The use of coal for energy consumed by the industrial sector declined between 1960 and 1998, whereas that of other energy sources such as natural gas and electricity consumption has steadily risen, though slowly. Crude oil is the predominant energy source consumed by the transport sector. In the case of other sectors electricity followed by crude oil and natural gas are the main energy sources used by other sectors. The use of combustible renewables and wastes as an energy source in the other sector has registered a consistent increase between 1973 and 1998.

10. France ranks second and accounts for about a fifth of the total world production and installed capacity of nuclear energy in the world. The share of nuclear to total domestic electricity generation, which is 77 per cent for France is the highest in the world. Use of Pressurised Water Reactor (PWR) technology and standardisation of French nuclear plants have been major factors in making nuclear energy more cost effective than other alternatives in France. An IEA/NEA study observes that at both 5 and 10 per cent discount rates, nuclear energy is cheaper in France as compared to coal or natural gas. France is the only IEA country where nuclear energy is cheapest in base load at a 10 per cent discount rate.
11. When we compare French electricity prices with that in other OECD countries, it is seen that comparatively both household and industrial electricity prices were generally lower in France. However, the ratio of household to industrial electricity prices is generally higher in France as compared to other OECD countries. Interestingly in terms of Purchasing Power Parity (PPP), while household electricity prices in France in 1978 was relatively the highest as compared to other OECD countries, by 1998, this trend got reversed with household electricity prices in terms of PPP being the lowest for France as compared to most other OECD countries.
12. Transmission and Distribution losses for energy in France and most other OECD countries are not only less than 10 per cent of electricity supply, but also declining slowly. For India these losses are twice or thrice the proportions prevailing in France and other OECD countries.
13. Energy-related carbon emissions in France, both in absolute and per capita terms declined between 1973 to 2000, though this declining trend is not continuous. This decline is associated with a steep decline in the use of combustible fuels and a steep increase in the use of nuclear energy in France.

## **Lessons for India**

In comparing the French energy sector with that of India, and drawing possible lessons for India from the French experience we are aware of the limitations of such a comparison. While France is a developed country with whose per capita income is ten times that of India, India is a developing country with prevalence of mass poverty. Per capita energy use in France is much higher than in India. The energy endowments and mix in the two countries differ. However, ensuring energy security, competitive and low energy prices and environmentally benign energy supplies are common goals of energy policy in both countries. Both in France and India the power producing utilities are state owned and enjoy monopoly rights. Added to that in both countries militant trade unionism in power utilities has come in the way of effecting essential power reforms. However, globalisation and liberalisation policies are also having their echo in the power sector in both countries. Both countries are heavily dependent on imports for their energy needs, and hence reducing their import dependency, especially after the oil shock of 1973, has been a common goal in both countries. Hence there could be lessons that India could learn from France's experience.

1. France has successfully reduced her import dependency for her energy needs to around 50 per cent presently. Large-scale investment in nuclear projects enabled France to not only reduce her import dependency but also emerge as a major exporter of electricity in the European market. India needs to give serious thought to increasing the role of nuclear energy, which is less polluting and more cost-effective than other alternatives. Particularly India needs to explore the potential of plutonium and thorium-based nuclear reactors (instead of uranium-based nuclear reactors).
2. Unlike France, India's options are limited in that coal will continue to play an important role in total commercial energy use in India. Indian coal is of low- grade quality and hence overall carbon emissions in India will continue to rise. However, if India imports high grade coal it can help mitigate carbon emissions in India to some extent. With foreign exchange reserves exceeding USD 100 billion, India can explore this option.
3. France's innovative methods of pricing electricity may be worth experimenting with in India. India may explore the economics and feasibility of charging electricity tariffs based on peak and off-peak time consumption. This may be tried in some cities/regions on an experimental basis and then extended or discontinued.
4. India needs to give attention to reducing T&D losses and power thefts rather than taking recourse to only the 'soft option' of revising electricity tariffs upwards periodically which is hurting consumers.
5. France has been able to ensure competitive electricity tariffs since it is a global player in the energy market. India's power utilities face no such competition. Increasing competition in the power sector may provide electricity consumers with more options, which may also help them to obtain competitive and low energy prices.
6. Although promoting social objectives like maintaining geographical uniformity of electricity tariffs to benefit disadvantaged regions and low or zero tariffs for the most poor in France, is part of overall French energy goals, staff of French Public Power utilities do not enjoy the benefit of free electricity supply as extended to staff of State Electricity Boards in India. This needs to be stopped forthwith.
7. The French Electricity Act recognises a "Right to Electricity" for its citizens. The economic, legal and other implications of declaring the 'right to electricity' as one of the rights enjoyed by citizens of India is worth examining.