

Focus 02

Electric heating: not so virtuous!

"We have a serious problem with electric heating in France. It was a mistake to develop it. One could think it was possible to do it because we have a very large nuclear fleet, but then it leads to peaks of electric consumption in winter time. [...] It is French folly to aim for transforming electricity into heat, a nonsense from the point of view of thermodynamics."

Nathalie Kosciusko-Morizet, Secretary of State for ecology, interview in *Le Monde*, 1st October 2008

The 'all electric, all nuclear' wave on which France had ridden since the 1970s in the name of its 'energy independence', and which had led to extensive use of electric heating based on joule effect, received a sizeable new justification from the mid-1990s in the shape of nuclear power's more or less complete lack of emissions of CO₂, the main greenhouse gas. It was an excellent sales pitch for the heating salesmen and EDF alike.

However, matters were not so simple. Even in France, where nearly 80% of electricity is nuclear-generated, electric heating requires the use of fossil-fuel-generated electricity with its attendant CO₂ emissions – in winter, the peak heating demand is very often met by fossil-fuel generation. As a result, the Environment and Energy Management Agency (Agence de l'environnement et de la maîtrise de l'énergie – ADEME) and EDF announced average emissions of 180g per kilowatt hour for domestic electric heating over the period 2000–04. This represents a modest saving by comparison with modern gas heating (<10%), although a more significant one as compared with oil heating (40%), as Table 8 shows.

Table 8 Comparison of the CO₂ emissions of different methods of heating in France not involving electricity exchanges with European countries

Method of heating	CO ₂ emissions per kWh	Δ compared to electricity
Electric heating in France supplied by the <i>national</i> generating fleet*	180 g	—
Natural gas*	195 g	+8%
Domestic heating oil*	310 g	+72%

*Assumptions: electric heating efficiency = 1, gas boiler efficiency = 0.95, oil boiler efficiency = 0.85.

Source: ADEME / EDF, 2005

In short, a France self-sufficient in electricity shows a saving in CO₂ emissions, albeit a modest one. **But what about the present situation, now that Europe has pressed ahead with its internal electricity market?**

The electricity consumed by domestic heating in France is not only French: it is European. Moment by moment, the network manager finds the cheapest available electricity on the European market. ADEME and RTE, the Gestionnaire du Réseau de Transport d'Electricité (operator of the national electric grid), which manages France's electricity network, have calculated the effects of the opening of this market on CO₂ levels per kilowatt hour of electric heating, as shown in Table 9.

Table 9 Comparison of the CO₂ emissions of different methods of heating in France in the context of the European electricity market

Method of heating	CO ₂ emissions per kWh	Δ compared to electricity
Electric heating in France supplied by the <i>European</i> generating fleet	500 to 600 g	—
Natural gas	195 g	-60% to -67%
Domestic heating oil	310 g	-38% to -48%

Source: ADEME / RTE, 2007

The table shows that, in the context of the European market, electric heating becomes a catastrophe in CO₂ emission terms – with emissions two-and-a-half to three times as bad as they would have been if gas boilers rather than convection heaters had been installed in our houses! Installing heat pumps does admittedly bring an improvement in CO₂ levels. But such pumps must achieve an average annual performance coefficient of a factor of three to achieve performance comparable to gas heating, which is not the case for the air/air pumps which are at present the most widely sold.