

THE HEAT PUMP AS AN ALTERNATIVE TO THE
CENTRAL ELECTRIC FURNACE IN THE
TENNESSEE VALLEY

Paul G. Cooper, Rita L. Cole, and Jean S. Solari
Tennessee Valley Authority

ABSTRACT

As part of the Tennessee Valley Authority's comprehensive energy conservation program, The Energy PackageTM, the hourly heating loads of a group of homes in Nashville, Tennessee were monitored. The data from this monitoring effort were used to develop a statistical model to estimate heating load profiles for homes with heat pumps or central electric furnaces as the basic heating equipment. The statistical model was used to generate estimates of energy savings and load reductions due to displacing central electric furnaces with heat pumps in specifically defined populations. The analysis resulted in several interesting findings.

- o A comparison of the estimated constant temperature load profiles for heat pumps and central electric furnaces suggests that there is little nighttime temperature set back for heat pumps so that they exhibit a much higher load factor than do central electric furnaces. Further, heat pumps do not exhibit a marked morning peak load as do central electric furnaces.
- o The estimated peak day load profiles suggest that maximum saving occurs between 7 a.m. and 8 a.m.
- o The average coincident demand saving at 8 a.m. on the January peak day due to the displacement of central electric furnaces with heat pumps is estimated at 3.85 kW.
- o The estimated average energy saving for the 1982-1983 heating season is 3,413 kWh. For the typical meteorological year (TMY) the estimated saving is 3,703 kWh and for the 1972-1973 heating season the estimated average saving is 3,628 kWh. If September and April are included in the heating seasons, the savings are somewhat higher.