We present new XMM-Newton observations of the hot-gas environments of two low-power twin-jet radio galaxies, 3C 66B and 3C 449, showing direct evidence for the interactions between X-ray-emitting gas and radio plasma that are thought to determine the large-scale radio structure of these sources. The temperatures that we measure for the two environments are significantly higher than those predicted by standard luminosity-temperature relations for clusters and groups. We show that luminosity-temperature relations for radio-quiet and radio-loud X-ray groups differ, in the sense that radio-source heating may operate in most groups containing radio galaxies. If the radio lobes are expanding subsonically, we find minimum ages of $3 \times 10^8$ years for 3C 66B, and $5 \times 10^8$ years for 3C 449, older than the values obtained from spectral ageing, which would give the radio source sufficient time to heat the groups to the observed temperatures for plausible values of the jet power. The external pressures in the atmospheres of both radio galaxies are an order of magnitude higher than equipartition estimates of their radio-lobe pressures, confirming that the radio lobes are either out of equipartition or require a pressure contribution from non-radiating particles. Constraints from the level of X-ray emission we measure from the radio lobes allow us to conclude that a departure from equipartition must be in the direction of magnetic domination, and that the most plausible candidates for a particle contribution to lobe pressure are relativistic protons, an additional population of low-energy electrons, or entrained and heated thermal material.