Reduced-activation steels for fusion reactor applications were developed in the 1980s to replace the commercial elevated-temperature steels first considered. In the United States, this involved replacing Sandvik HT9 and modified 9Cr-1Mo steels. Reduced-activation steels, which were developed for more rapid radioactivity decay following exposure in a fusion neutron environment, were patterned after the commercial steels they were to replace. The objective for the reduced-activation steels was that they have strengths (yield stress and ultimate tensile strength from room temperature to 600°C) and impact toughness (measured in a Charpy test) comparable to or better than the steels they were replacing. That objective was achieved in reduced-activation steels developed in Japan, Europe, and the United States. Since the reduced-activation steels were developed in the 1980s, reactor designers have been interested in designs for increased efficiency of future fusion plants. This means reactors will need to operate at higher temperatures—above 550°C, which is the upper-temperature limit for the reduced-activation steels. Although the tensile and impact toughness of the reduced-activation steels exceed those of the commercial steels they were patterned after, their creep-rupture properties are inferior to some of the commercial steels they replaced. Furthermore, they are much inferior to commercial steels that have been developed since the 1980s. Reasons for why the creep-rupture properties for the new commercial ferritic/martensitic steels are superior to the earlier commercial steels and the reduced-activation steels were examined. The reasons involve compositional changes that were made in the earlier commercial steels to give the new commercial steels their superior properties. Computational thermodynamics calculations were carried out to compare the expected equilibrium phases. It appears that similar changes in composition may be possible within the context of the reduced-activation criteria to develop improved reduced-activation steels. This possibility will be described to explain how a new generation of reduced-activation steels could be developed.