The worldwide demand for electric energy is slated to increase by 80% between the years 1990 and 2040. In order to satisfy this increase in load, many new generators and transmission lines are planned. Implementations of various plans that can augment existing infrastructure have been hindered due to environmental constraints, public opposition and difficulties in obtaining right-of-way. As a result, stress on the present electrical infrastructure has increased, resulting in congestion within the system. The aim of this research is to analyze three techniques that could improve the power transfer capability of the present electric grid. These include line compaction, use of high temperature low sag conductors and high phase order systems. The above methods were selected as they could be readily employed without the need for additional right-of-way.

Results from the line compaction tests indicate that line compaction up to 30% is possible and this increases the power transfer capability up to 53%. Additional advantages of employing line compaction are the reduction in electric and magnetic fields, increase in system stability and better voltage regulation.
High temperature low sag conductors that were applied on thermally limited lines were seen to increase the power transfer capability. However, a disadvantage of this technique was that the second most congested line, limits the power transfer capability of the system.

High phase (Six-phase) order system was noted to have several advantages over three phase system such as lower voltage requirement to transfer equal amount of power and lower electric and magnetic field across the right of way.

An IEEE 9 and 118-bus test system are used to evaluate the above-mentioned techniques.