Recent findings indicate that the interactions among CO2, temperature and water can be substantial, and that the combined effects on the biological systems of several factors may not be predicted from experiments with one or a few factors. Therefore realistic multifactorial experiments involving a larger set of main factors are needed. We describe a new Danish climate change-related field scale experiment, CLIMAITE, in a heath/grassland ecosystem. CLIMAITE is a full factorial combination of elevated CO2, elevated temperature and prolonged summer drought. The manipulations are intended to mimic anticipated major environmental changes at the site by year 2075 as closely as possible. The impacts on ecosystem processes and functioning (at ecophysiological levels, through responses by individuals and communities to ecosystem-level responses) are investigated simultaneously. The increase of [CO2] closely corresponds with the scenarios for year 2075, while the warming treatment is at the lower end of the predictions and seems to be the most difficult treatment to increase without unwanted side effects on the other variables. The drought treatment follows predictions of increased frequency of drought periods in summer. The combination of the treatments does not create new unwanted side effects on the treatments relative to the treatments alone.