In this paper, the thermodynamic assessment analysis of two carbon dioxide cycles driven by geothermal energy with hydrogen production system is detailed investigated. This low temperature hydrogen production system is consisted of two carbon dioxide cycles, the hydrogen production process and the hydrogen storage and utilization system. The exergy destruction rates, exergy destruction ratios and exergy efficiencies of geothermal energy based hydrogen production system components and whole system are analyzed by using the balance equations, energy and exergy efficiencies. Also, the effect of some design parameters on the geothermal energy based hydrogen production and utilization system exergy destruction rate and exergy efficiency are investigated.