In this study, a thermodynamic analysis of a novel solar power tower based multigeneration plant is presented. This plant is integrated with a thermal energy storage sub-plant in order to overcome intermittency of solar radiation. The proposed integrated multigeneration plant consists of the solar tower with thermal energy storage, Rankine cycle, organic Rankine cycle, absorption cooling cycle, hydrogen production and compression unit, hot water production and drying process. The overall energy and exergy efficiencies of integrated plant are computed as 54.15% and 51.28%. Also, some parametric analyses are performed in order to reveal how variables affect the solar plant performance.