As the energy consumption in the world has increased enormously with population growth and higher living standards, the global environmental problems (such as global warming, depletion of Earth's ozone layer, acid deposition, land degradation, biodiversity loss, deforestation, desertification, waste management, etc.) have been caused. Nowadays, the energy requirement necessaries a focus on alternative energy resources without abandoning fossil fuels. The efficient utilization of energy sources is one of the most significant missions in advanced energy processes to reach. The integrated energy processes for multi-generation aims generates different beneficial outputs using the same energy input. The power, fresh water and air, heating and cooling applications, domestic hot water are the great products that provide our life services. The hydrogen and other synthetic fuels are other beneficial outputs taken into consideration. The integrated gasification combined cycles have been described as the commercially attractive coal or biomass sources to electricity plant, with the improving of coal or biomass gasification cycles, and also hot gas clean-up systems. On the other hand, the integrated gasification combined cycles are the very complicated processes primarily due to the integration of gasification cycles and the combined processes, and the presence of various chemical reactions in gasification cycles and in hot gas clean-up systems. In this book chapter, the feasibility of integrated gasification combined cycles for multigeneration aims is investigated through thermodynamic modeling. The comprehensive thermodynamic assessment of each system components is considered by using energetic and exergetic analysis viewpoint. Furthermore, the exergy destruction analysis is conducted to identify and quantify the significant sources of exergy destruction in the investigated cycles. Moreover, the environmental impact assessment is investigated to quantify the amount of carbon dioxide (CO2) emissions in the investigated gasification cycles.