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Graphical Abstract

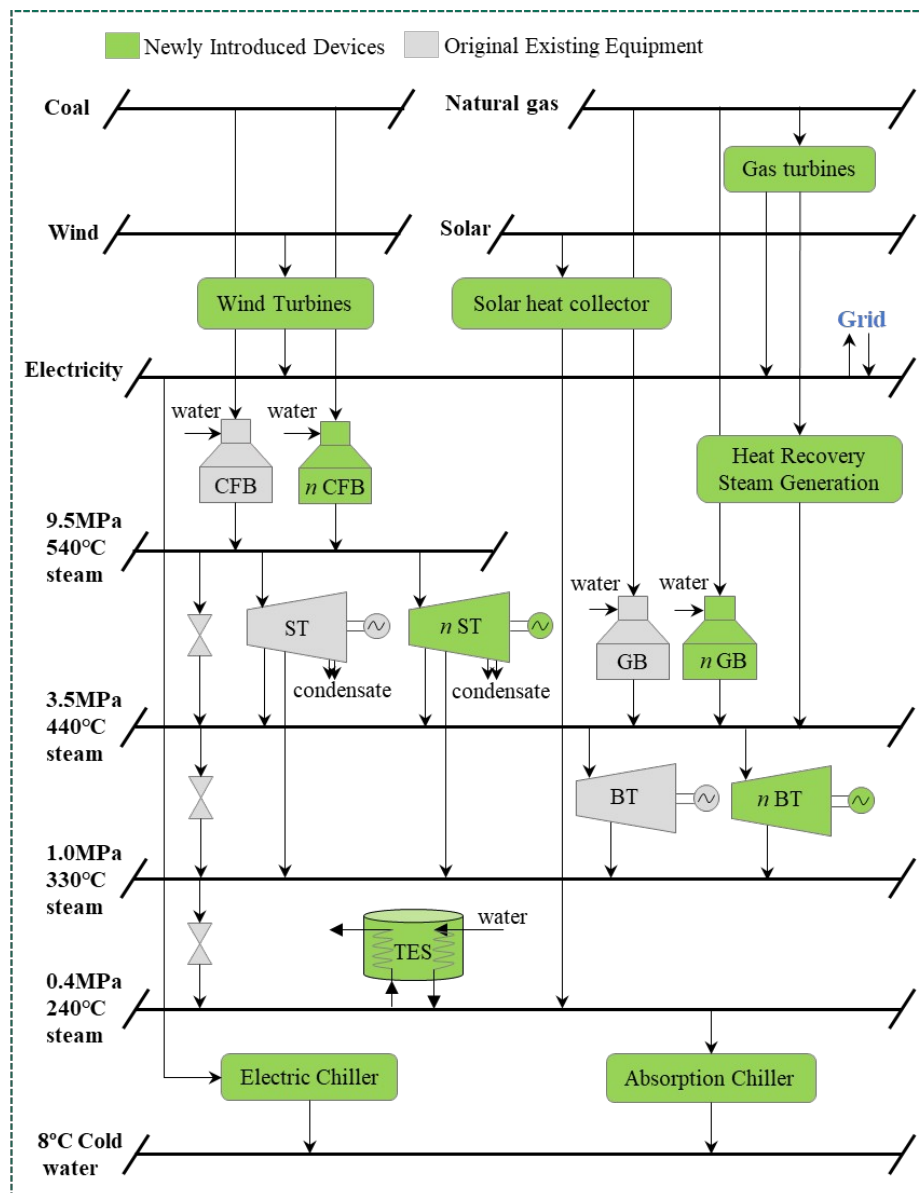
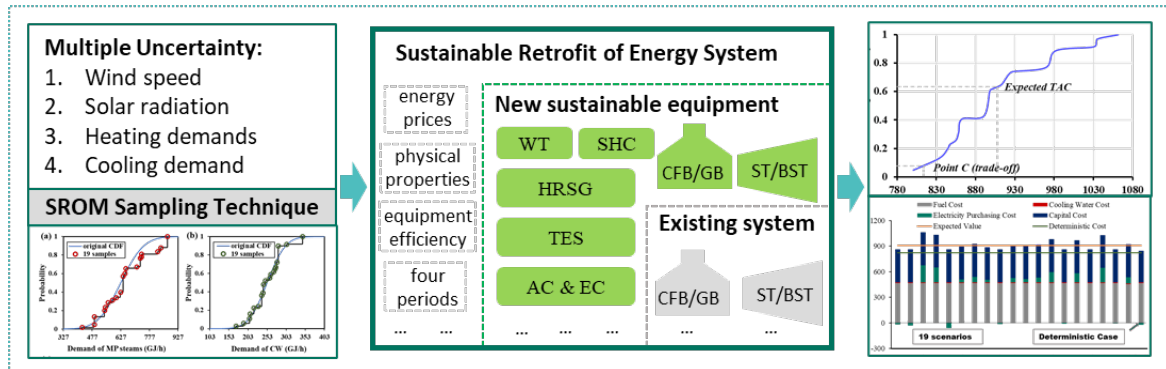


Figure 1 Proposed superstructure of sustainable energy system

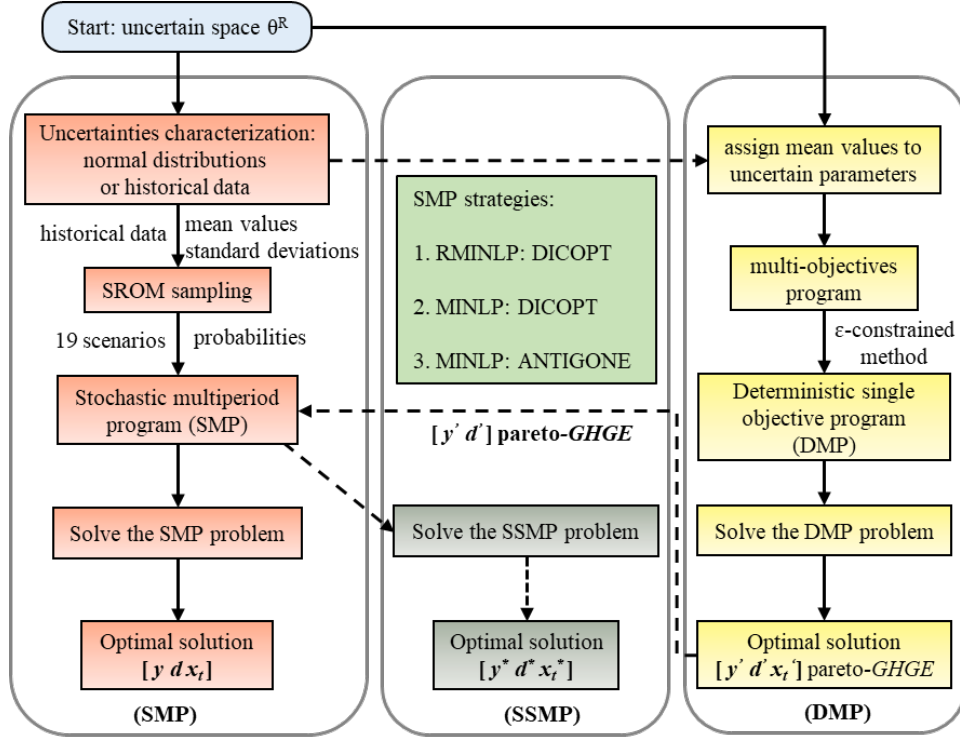


Figure 2 Schematic diagram of the optimization framework

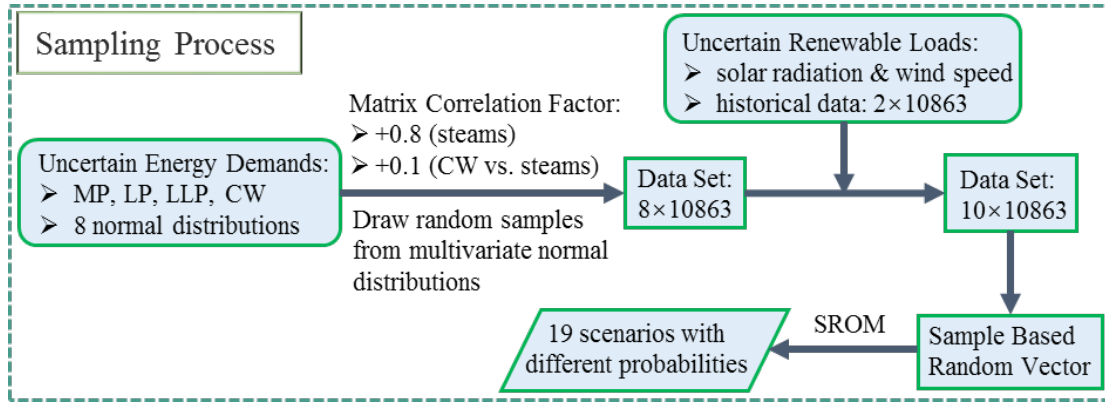


Figure 3 Implementation of SROM sampling technique

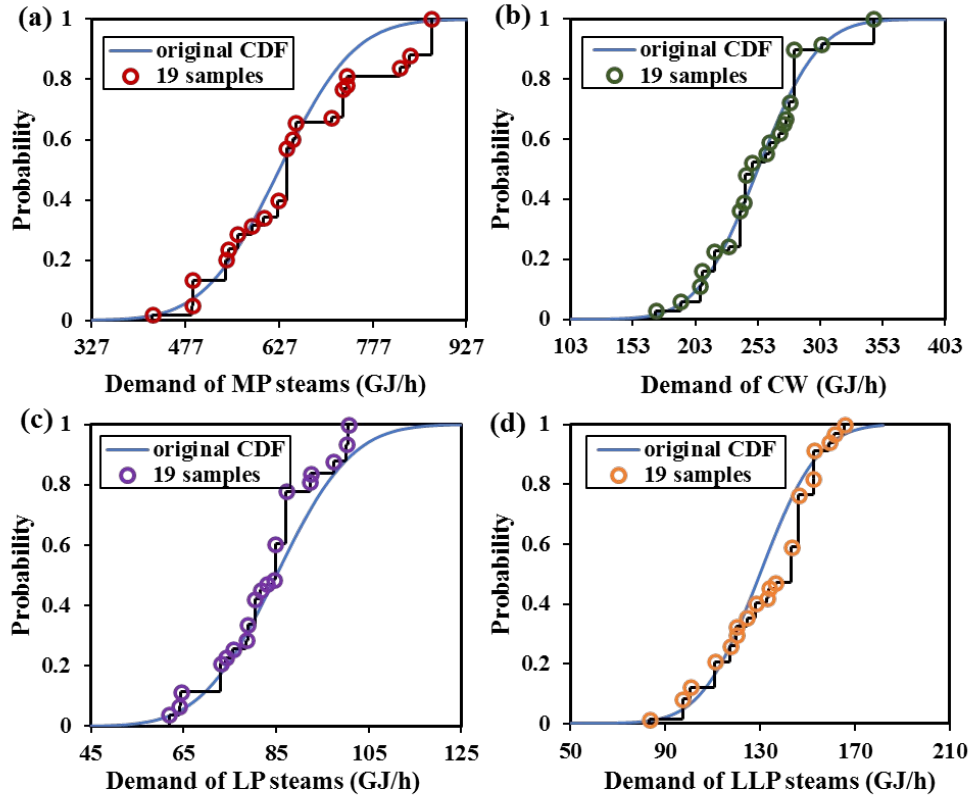


Figure 4 Comparison of the cumulative distribution functions (CDF) for energy demands in summer, between the SROM samples and the original distribution.

(a) MP steams; (b) Cold Water; (c) LP steams; (d) LLP steams

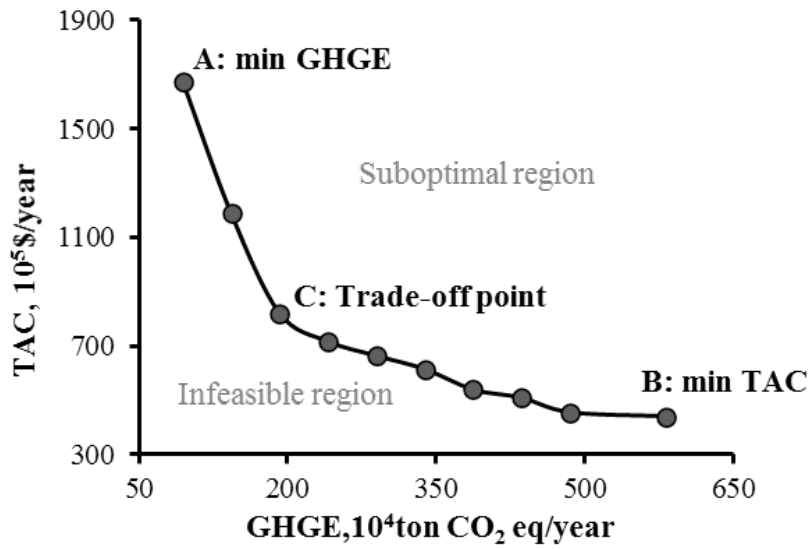


Figure 5 Pareto-optimal solutions for DMP

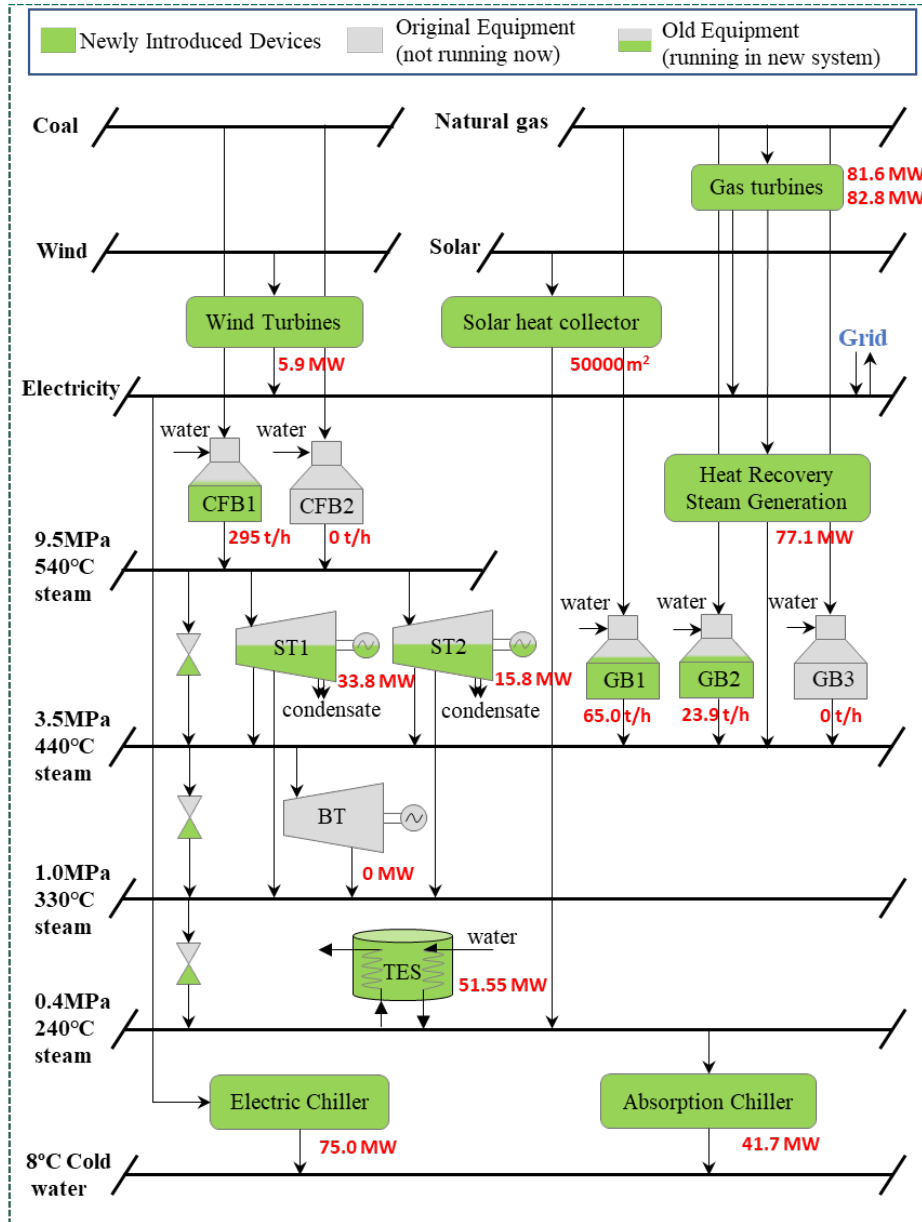


Figure 6 Configuration for solution of stochastic case

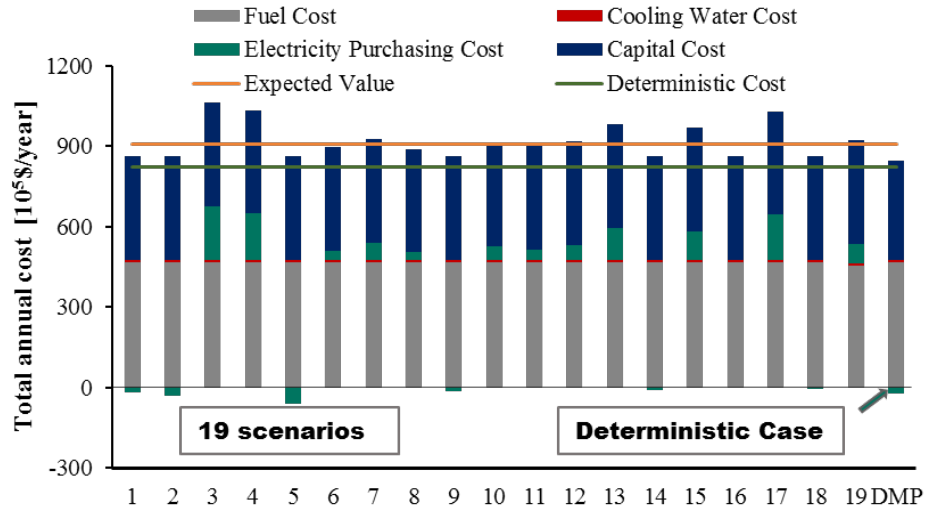


Figure 7 Distribution of the total annual cost throughout the different scenarios obtained via the stochastic optimization approach

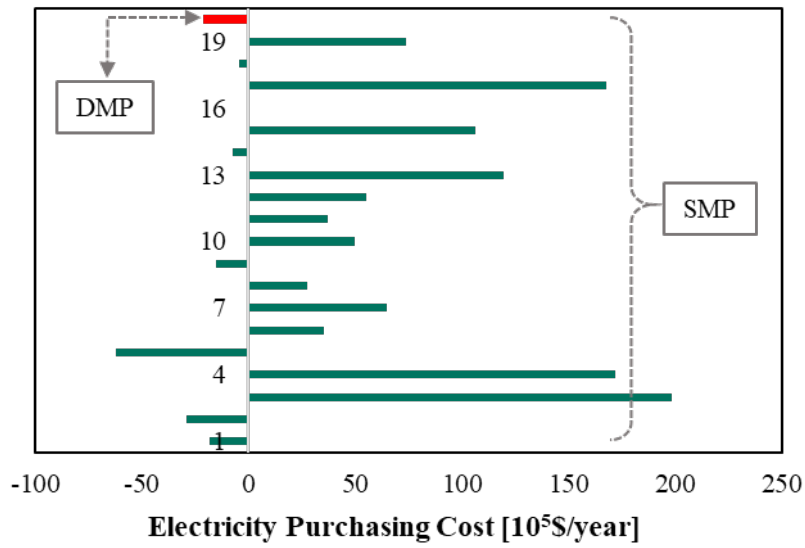


Figure 8 The distribution of electricity purchasing cost for the deterministic (DMP) and stochastic (SMP) cases

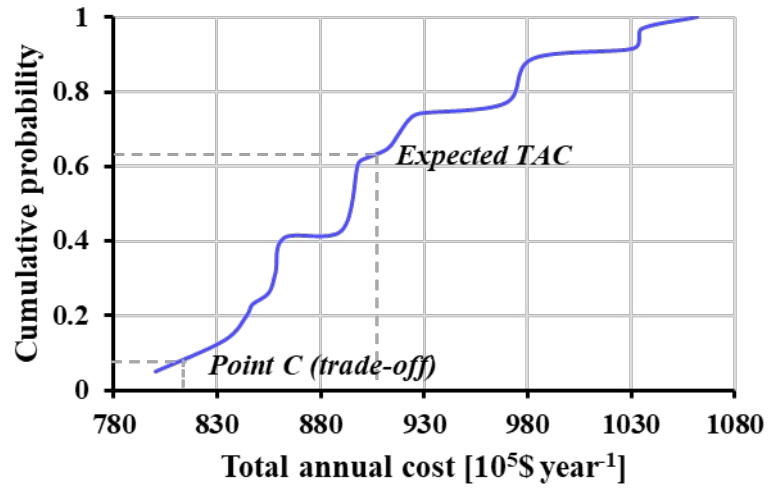


Figure 9 Cumulative probability curve obtained for the optimal economic performance of the energy system

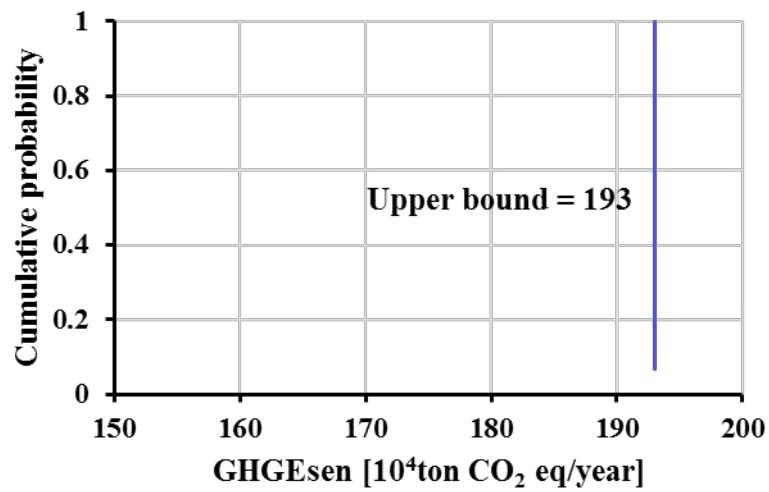


Figure 10 Cumulative probability curve for the optimal environmental performance