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The Role of Thermodynamics in Integrated Energy Systems

Thermodynamics is a critical subject in defining many things, and one may question to see its dimensions and directions. Here are some examples: how natural events take place around? how things work? what is possible and what is not possible? So, understanding thermodynamic concepts correctly will make someone comprehend all aspects of the life. Technically, it is essential to know thermodynamics to better design, develop, analyze, optimize assess and improve energy systems. One needs to know that thermodynamics stands on two key pillars, namely first law of thermodynamics (FLT) and second law of thermodynamics (SLT). SLT brings up two potential tools, such as entropy and exergy, which are important to consider. Out of these, exergy is the only practically leading tool for us to employ for design, develop, analyze, optimize assess and improve energy systems. This presentation will introduce thermodynamics in seven steps, discuss the concepts and the role of balance equations, cover the specific tools of exergy and their utilization effectively for the energy systems, and define performance criteria through energetic and exergetic approaches as well link to the environment and sustainable development. The presentation will also focus on integrated energy systems and their specific features and criteria to consider. A prime consideration is given to their specific design and operational aspects.