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Systems Integration Methodology

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Abstract

A multi-disciplinary team led by the Advanced Power and Energy Program (APEP) of the University of California at Irvine is defining the system engineering issues associated with the integration of key components and subsystems into power plant systems that meet performance and emission goals of VISION 21. The myriad of fuels, fuel processing, power generation, and emission control technologies are narrowed down to selected scenarios by a screening analysis to identify those combinations that have the potential to achieve the VISION 21 goals consisting of 60% efficiency (HHV) for coal-based systems and 75% efficiency (LHV) for gas-based systems. The selected promising cycle scenarios are then analyzed in detail to develop the performance and costs for each. The methodology used in arriving at these promising cases and the preliminary results of the cycle analyses are presented.

The technology levels considered are based on projected technical and manufacturing advances being made in industry and on advances identified in current and future government supported research such as the Clean Coal Program, Combustion 2000 (LEBS and HIPPS), Advanced Turbine Systems program, Low-Cost Advanced Fuel Cell programs, and the Flexible Gas Turbine Systems program.

Examples of systems included in these advanced cycles are solid oxide and molten carbonate fuel cells, advanced gas turbines, ion transport membrane separation and hydrogen-oxygen combustion.