
Environmental impact of energy systems

Finalità

The course is aimed to study of interactions between the environment and energy conversion systems, with particular reference to pollution processes (both chemical and thermal) and to the impacts related to power plants. Students will be provided with fundamentals required for the understanding of most important solutions and techniques to limit the effects of the use of power plants, with reference to the actual knowledge and to engineer responsibilities in this field.

Programma

General aspects and considerations. Thermal machinery and power plants. Thermal and chemical pollution from power plants. Combustion processes: chemical reactions, formation mechanisms of pollutants, evaluation of products from combustion processes. Fuels and related characteristics. Internal combustion engines: emissions from spark ignited and Diesel engines, effects of operating parameters, reduction of pollutant formation processes, after-treatment systems. Steam power plants: environmental impacts and pollutant emissions, techniques for combustion control and abatement of pollutants formation, flue-gas after-treatment systems. Gas turbine power plants: emissions from stationary and mobile plants, combustion chambers characteristics and pollutants formation, techniques for the control of combustion processes. Alternative energy sources and related environmental impacts. Renewable energy sources. Methodologies and instrumentation for emissions measurements. Environmental legislation and regulations

Attività d'esercitazione

Applications on combustion processes: products formation and energy release.

Technical visits to power plants and energetic systems, with particular reference to pollutants abatement systems and to emissions measurement devices.

Modalità d'esame

Oral

Propedeuticità

Macchine AB

Testi consigliati

A.Gambarotta, A.Peretto, M.Bianchi, "Impatto Ambientale dei Sistemi Energetici", Ed.Pitagora, Bologna, 2004