

Localizzazione e impatto ambientale dei sistemi energetici

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Presentazione

- Energy history in Italy, from late '80s to the liberalised market, short notes on nuclear energy history in Italy
- Siting of a nuclear power plant: the Italian procedure, past examples, recent developments
- Energy transportation systems and siting
- Coal - Resources classification and distribution, mines production (open pit and underground), coal preparation, safety in mines, remediation. Transportation via truck, rail, barge, ship. Gasification, liquefaction, coal-water mixtures. Transportation via slurry and coal log pipelines.
- Oil - Hydrocarbons formation, fields and crude classification, drilling technologies. Field siting and well exploitation technologies. Oil platforms, relevant accidents, maintenance, dewatering and environmental impact. Refining basics, refineries. Refining in Italy. Off-shore field licensing, crude supply to EU.
- Natural gas - Natural gas history in Italy. Methane network: pipelines, devices, compression and storage stations: siting and technological description. Design and construction of a NG pipeline, maintenance. Sub alveo and river crossing.
- Hydrogen - Hydrogen pipelines: authorisation procedures and case studies. Supergid project.
- Uranium - Uranium extraction: mines, in situ leaching, yellowcake production, refining and conversion. Transportation: via truck, via ship. Criticalities.
- Heat transportation - District heating: reliability analysis of a network
- The energy corridors in the energy modelling: detailed analysis of the captive and open sea transportation. Use of GIS tools.
- Siting problems: models and algorithms for the solution. Introduction to the siting problem in an territorial energy optimisation model.

Accident analysis in energy plants: models for evaluation of the most significant parameters during accidents and the effects on health and environment. Use of provisional models apt to a correct design of systems that prevent and mitigate accidents. In particular the following subjects will be dealt with:

- Hazardous substances: physico-chemical properties, toxicity, ecotoxicity; legislation governing their classification, labeling and Safety Data Sheets.
- Incidental releases of hazardous materials, gaseous, liquid and two phase flow: failures causes and their prevention; models to evaluate mass and flow rate versus time; prevention and mitigation techniques.
- Liquid pool evaporation: models to estimate the evaporation rate for releases on land within/without bunds.
- Vapour cloud dispersion: hints on calculation models to provide concentrations as a function of time and space in case of turbulent free jet and heavy gas releases.
- Fires: types of fires, models to provide heat flux on the receiver; personal injuries and material damages; prevention and mitigation techniques.
- Explosions: types of explosions, hints on calculation models to estimate the characteristic variables of the shock wave; personal injuries and material damages due to explosions or to fragments originated from the explosion source.

Thorough review of the fundamental concepts for the Environmental Impact Assessment (EIA), and European Legislation, National Legislation and Regional Legislation. In particular the following topics will be dealt with:

- Upgrading of the Legislation of atmospheric emissions, air quality and noise.
- Legislation concerning the protection of aquatic environment.