

# Fossil Energy Extraction, Processing & Distribution (2015): Grades 9, 10, 11, 12, Higher Education

Adopted 2015

**Evaluate and analyze the role of fossil fuels in providing the world energy needs.** FSEP.01

- 01. Analyze fossil fuels as a principle of energy science.** FSEP.01.01
  - a. Identify the main types of fossil fuels (e.g. crude oil, natural gas, coal). FSEP.01.01.A
  - b. Describe the byproducts of fossil fuels and their effects on the environment. FSEP.01.01.B
  - c. Discuss the formation of fossil fuels and their potential as an energy source in the future. FSEP.01.01.C
  - d. Describe the primary process for extracting energy from fossil fuels. FSEP.01.01.D
  - e. Correlate the positive and negative aspects of fossil fuels as an energy source. FSEP.01.01.E

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- 02. Examine the classifications of fossil fuel technology.** FSEP.01.02
  - a. Critique natural gas as a fuel source and its transformation from methane to carbon dioxide and water vapor. FSEP.01.02.A
  - b. Critique fuel oil as a fuel source and its transformation from carbon and hydrogen to carbon dioxide and water. FSEP.01.02.B
  - c. Critique coal as a fuel source and its transformation from carbon and hydrogen to carbon dioxide and water. FSEP.01.02.C
  - d. Differentiate among the utilizations of the types of fossil fuels (e.g., transportation, electric generation, heating). FSEP.01.02.D

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**03. Analyze the types of technologies developed to make use of coal.** FSEP.01.03

- a. Describe the functions and operations of crushers, pulverizers and stokers. FSEP.01.03.A
- b. Explain the functions and operations of circulating and bubbling fluidized beds. FSEP.01.03.B
- c. Discuss the functions and operations of integrated gasification combined cycles. FSEP.01.03.C

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**04. Explain the issues affecting the transportation and storage of fossil fuels.** FSEP.01.04

- a. Explore the technical issues affecting the compression and transportation of natural gas. FSEP.01.04.A
- b. Explore the technical issues affecting the transportation, heating and aboveground storage of fuel oil. FSEP.01.04.B
- c. Explore the technical issues affecting the transportation, storage and handling of bituminous coal, sub-bituminous coal and lignite. FSEP.01.04.C
- d. Analyze the economic issues affecting modes of transportation, handling, storage and distribution of fossil fuels. FSEP.01.04.D

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**05. Explain how fossil fuels are utilized to produce electrical energy.** FSEP.01.05

- a. Describe the functions of fossil fuel systems (e.g., air and gas flow, water and steam, wastewater, ash and ash byproduct) in generating plants. FSEP.01.05.A
- b. Describe and diagram the function of the turbine generator in generating plants. FSEP.01.05.B
- c. Explain and diagram the function of the generator step-up (GSU) transformer and switchyard. FSEP.01.05.C

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**06. Explain the issues and trends affecting the extraction, distribution and storage of fossil fuels** FSEP.01.06

- a. Describe the major barriers to extracting fossil fuels from the earth. FSEP.01.06.A
- b. Contrast current and projected levels of consumption to available resources. FSEP.01.06.B
- c. Discuss the political complications with obtaining raw resources from foreign sources. FSEP.01.06.C
- d. Examine the capacity of the U.S. fossil fuel processing industries to meet future consumption. FSEP.01.06.D
- e. Analyze the current condition of the distribution and storage network (e.g., pipelines, freighters, tankards, distribution centers). FSEP.01.06.E
- f. Compare consumption in terms of time of day, demand and peak power available. FSEP.01.06.F

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**07. Explain the process and techniques used in fossil fuel exploration and extraction.** FSEP.01.07

- a. Differentiate between common rocks and minerals associated with petroleum. FSEP.01.07.A
- b. Understand sedimentary rocks deformation and basic oil traps. FSEP.01.07.B
- c. Explore fundamental mapping methods. FSEP.01.07.C
- d. Understand mapping layers using geographic information systems. FSEP.01.07.D
- e. Perform simple global positioning maneuvers using a handheld GPS device. FSEP.01.07.E
- f. Recognize source rocks and the generation, migration, and accumulation of petroleum. FSEP.01.07.F
- g. Differentiate between the various types of petroleum exploration techniques. FSEP.01.07.G
- h. Explore the mechanics of drilling a well. FSEP.01.07.H
- i. Examine various artificial lift methods. FSEP.01.07.I
- j. Understand fluid surface treatments and storage. FSEP.01.07.J
- k. Recognize the similarities and differences between onshore and offshore drilling and production methods. FSEP.01.07.K