

Unit 12 - Week 10 - Primary Energy Analysis, Net Energy Analysis

Course outline

How does an NPTEL online course work?

Practice Assignment

Week 1 - Introduction

Week 2 - Energy and quality of life, Country energy balance

Week 3 - Energy Economics

Week 4 - Energy Resources

Week 5 - Non-Renewable Resource Economics

Week 6 - Preferences, Utility and Social choices

Week 7 - Public and private goods, Externalities

Week 8 - Energy and Financing

Week 9 - Input-Output Analysis

Week 10 - Primary Energy Analysis, Net Energy Analysis

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● Lecture 20B: Primary Energy Analysis- Part 2

○ Lecture 21A: Net Energy Analysis-Part 1

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Week 11 - Net Energy Analysis (Continued), Energy Policy

Week 12 - Energy policy (continued), Future Energy Systems

Text Transcripts

Assignment 10

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-04-08, 23:59 IST.

1) Life cycle analysis can be used to evaluate:

1 point

- Global warming potential
 Eutrophication potential
 Acidification potential
 All of the above

No, the answer is incorrect. Score: 0

Accepted Answers: All of the above

2) Which of the following statement(s) is/are true?

1 point

- EROI of electricity generated from coal is greater than EROI of coal
 EROI of electricity generated from coal is less than EROI of coal
 EROI of electricity generated from coal is equal to EROI of coal
 EROI of electricity generated from coal first decreases, then increases.

No, the answer is incorrect. Score: 0

Accepted Answers: EROI of electricity generated from coal is less than EROI of coal

3) A pulverized coal fired power plant has a power output of 100 MWe. It has an annual average capacity factor of 75%. The coal mining and transport efficiency is 90%. The boiler efficiency is 90%. The coal combustion efficiency is 98%. The thermal efficiency of the power plant is 38%. The generator efficiency is 98%.

1 point

Calculate the total input primary energy required (in Tera joule (TJ)) per year to operate this power plant. (1 Tera Joule (TJ) = 10^{12} J = 10^6 MJ)

- 2774 TJ/year
 4994 TJ/year
 10002 TJ/year
 7884 TJ/year

No, the answer is incorrect. Score: 0

Accepted Answers: 7884 TJ/year

4) For the Q.3, calculate the amount of CO₂ emissions generated (in million tonnes (MT)) per year, if it operates using an Indian coal (locally available coal), having a calorific value of 20 MJ/kg, which has a carbon content of 60%. (1 tonne = 1000 kg, 1 million = 10^6)

1 point

- 2.25 MT CO₂ /year
 0.34 MT CO₂ /year
 0.86 MT CO₂ /year
 0.45 MT CO₂ /year

No, the answer is incorrect. Score: 0

Accepted Answers: 0.86 MT CO₂ /year

5) A gas based power plant, which uses imported natural gas as the fuel, also has the same power output of 100 MWe and an average annual capacity factor of 75%. It has a total input primary energy of say, 5000 TJ/year.

1 point

From a primary energy analysis point of view, out of coal based plant and gas based plant, which is more favourable?

- Coal power plant
 Gas power plant
 A trade-off needs to be made
 Any of the two options can be preferred.

No, the answer is incorrect. Score: 0

Accepted Answers: Gas power plant

6) The above mentioned gas based power plant generates around 0.5 MT CO₂ / year and has a capital cost of say, Rs. 60,000/kW, whereas the coal fired power plant has a capital cost of Rs 50,000/kW.

1 point

From an overall (energy, environment and economics) perspective, which option seems to be more favourable/viable?

- Gas power plant
 Coal power plant
 Any one of the two option can be preferred
 A trade off needs to be made

No, the answer is incorrect. Score: 0

Accepted Answers: A trade off needs to be made

7) Which of the following is /are true?

1 point

Life cycle analysis can be performed using:

- Cradle to Gate Approach
 Gate to Grave Approach
 Cradle to Grave Approach
 Gate to Cradle Approach

No, the answer is incorrect. Score: 0

Accepted Answers: Cradle to Gate Approach
Cradle to Grave Approach

8) There are two different primary energy source (fuel) options, 'A' and 'B', for generating electricity, which are to be compared using net energy analysis. The total output energy values for option 'A' and 'B' are 400 GJ and 600 GJ respectively, whereas the input energy for both the options are 300 GJ.

1 point

Calculate the net energy ratio (usually expressed as X:1), for both the options.

Which option for generating electricity is more favorable/viable from a net energy point of view?

- 1.33:1, 2:1 Option 'A'
 1.33:1, 2:1, Option 'B'
 1.33:1, 2:1, some trade-off is necessary
 0.75:1, 0.5:1, Option 'A'

No, the answer is incorrect. Score: 0

Accepted Answers: 1.33:1, 2:1, Option 'B'

9) A coal fired power plant has a life of 30 years. It generates around 4000 GWh of electricity per year. The EROI of the electricity generated from the coal power plant is 13.3. How much total input energy does the power plant consume over its life time?

1 point

- 301 GWh
 53200 GWh
 9023 GWh
 8094 GWh

No, the answer is incorrect. Score: 0

Accepted Answers: 9023 GWh

10) The total input energy required for operating a 2 kW rooftop solar PV plant, having a life of 25 yrs is 29.37 GJ. If the solar PV plant operates at an average capacity factor of 30% over its entire lifetime, calculate the net energy ratio (usually expressed as X:1) of the solar PV system.

1 point

- 15.2:1
 8.2:1
 16.1:1
 13.1:1

No, the answer is incorrect. Score: 0

Accepted Answers: 16.1:1