

# MAYA VIDYA NIKETAN

## Summer Vacation Homework Worksheet — Cluster 4 (Classes IX – X)

*Theme: Energy Security, Geopolitics, and Sustainable Solutions*

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### Overview

The recent global conflicts have exposed the world's fragile dependence on fossil fuels. When supply chains break, nations face "Energy Deficits." As a student of Cluster 4, your task is to analyze this crisis through the lenses of Science, Economics, and Policy.

### Part 1: Social Science & Geopolitics – "The War-Energy Nexus"

**Context:** Many European and Asian countries rely on specific regions for natural gas and oil. When wars occur, sanctions and pipeline damages lead to a global price hike.

#### 1. Research & Define:

- Define "Energy Security."
- Identify two major global conflicts from 2022–2024. How did they specifically impact the price of LPG (Liquefied Petroleum Gas) or Petrol in India?

#### 2. Mapping Exercise: On an outline map of the world, mark the following:

- Three "Oil-Rich" nations (Middle East/West Asia).
- One nation currently leading in **Green Hydrogen** production.
- The route of a major international gas pipeline (e.g., Nord Stream or TAPI).

### Part 2: Physics & Technology – "The Efficiency Frontier"

**Context:** To solve the deficit, we don't just need *more* energy; we need *better* technology.

#### 1. The Solar Calculation:

A standard Solar Photovoltaic (PV) panel has an efficiency of 20%. If the Sun provides 1000W of energy per square meter ( $1\text{kW}/\text{m}^2$ ), and you install  $10\text{m}^2$  of panels on your roof:

- (a) What is the actual Power output in Watts?
- (b) If your house requires 5kWh of energy per day, for how many hours must the sun shine at peak capacity to meet your needs?

#### 2. Innovation Spotlight: Research "Green Hydrogen."

- Write the chemical equation for the electrolysis of water.
- Explain why Green Hydrogen is considered a "Strategic Asset" for India's energy independence.

### Part 3: Mathematics & Economics – "The Cost of Dependency"

**Context:** Use the following hypothetical data table to answer the questions.

Year	India's Energy Demand (Mtoe)	% of Energy Imported	Avg. Cost per Barrel (\$)
2021	800	75%	\$70
2024	950	82%	\$110

1. **Growth Analysis:**

- Calculate the percentage increase in India's energy demand from 2021 to 2024.
- Calculate the total cost of imports for 100 barrels in 2021 vs. 2024.

2. **Data Visualization:**

- Create a **Double Bar Graph** comparing "Energy Demand" and "Import Percentage" for the years 2021 and 2024.
- **Inference:** Based on the graph, explain why a "deficit" occurs when global wars disrupt supply.

## Part 4: English & Creative Expression – "The Diplomat's Voice"

**Context:** You are the Energy Minister representing India at a mock UN Climate & Security Summit.

1. **Persuasive Writing:** Write a **Formal Letter (150–200 words)** to the Secretary-General of the UN.
  - Argue that "Peace is a prerequisite for Sustainable Energy."
  - Suggest two ways the UN can help developing nations protect their energy grids during global conflicts.
2. **Vocabulary Builder:** Find and use the following words in your letter: *Volatility, Infrastructure, Resilient, Sovereignty, Mitigation.*

## Part 5: Art Integration – "The Blueprint of Hope"

**Task:** Design a **Digital Infographic** or a **Hand-Drawn Poster** for the school hallway.

- **Topic:** "India's Roadmap to 2047: From Energy Deficit to Energy Surplus."
- **Requirements:** Must include symbols for Wind, Solar, and Nuclear energy, and a slogan that connects "Energy" with "Global Peace."

**Self-Checklist for Submission:**

- Is the data in the Math section calculated accurately?
- Does the Social Science section cite specific recent news events?
- Is the English letter written in a formal, diplomatic tone?
- Is the Art project colorful and informative?

*"Energy saved is energy generated. Peace maintained is progress sustained."*