Unit V

Worksheet – Forecast of EES Market Potential by 2030

Part A: Multiple Choice Questions (20 Questions)

Choose the correct answer.

1. EES stands for:
   - A) Electrical Energy Storage
   - B) Energy Efficiency System
   - C) Electrical Energy Supply
   - D) Energy Expansion Service

   Answer: A

2. Future growth of EES is mainly driven by:
   - A) Coal power plants
   - B) Renewable energy integration
   - C) Diesel generators
   - D) Nuclear reactors

   Answer: B

3. Sandia National Laboratory estimated EES market potential in:
   - A) Germany
   - B) Japan
   - C) USA
   - D) China

   Answer: C

4. According to SNL, which application has a large market but relatively low value?
   - A) Substation On-site
   - B) Time-of-use Energy
   - C) Frequency Regulation
   - D) UPS

   Answer: B

5. The Boston Consulting Group estimated total EES market potential of:
   - A) 150 GW

- B) 220 GW
- C) 330 GW
- D) 500 GW

Answer: C

6. The most promising EES market identified by BCG is:
   - A) UPS
   - B) Conventional Stabilization
   - C) Consumer Electronics
   - D) EV Charging

   Answer: B

7. CAES stands for:
   - A) Controlled Air Energy Storage
   - B) Compressed Air Energy Storage
   - C) Centralized Air Energy System
   - D) Cyclic Air Energy Storage

   Answer: B

8. Panasonic forecast rapid growth in:
   - A) Lead-acid batteries
   - B) Ni-Cd batteries
   - C) Li-ion batteries
   - D) Zinc batteries

   Answer: C

9. Germany's renewable energy target for 2030 is approximately:
   - A) 20%
   - B) 30%
   - C) 40%
   - D) 60–80%

   Answer: D

10. Present storage capacity in Germany is mainly:
    - A) Li-ion batteries
    - B) CAES
    - C) Pumped Hydro Storage
    - D) Hydrogen storage

    Answer: C

11. Germany's pumped hydro storage capacity is approximately:
    - A) 10 GWh
    - B) 20 GWh
    - C) 40 GWh
    - D) 100 GWh

    Answer: C

12. Weekly storage demand estimated for Germany in 2030 is:
    - A) 500 GWh
    - B) 1 TWh
    - C) 3.2 TWh
    - D) 10 TWh

    Answer: C

13. Hydrogen storage is mainly suitable for:
    - A) Minute-scale storage
    - B) Hourly storage
    - C) Daily storage
    - D) Long-term storage

    Answer: D

14. The storage capacity of Germany's natural gas grid is approximately:
    - A) 50 TWh
    - B) 100 TWh
    - C) 200 TWh
    - D) 500 TWh

    Answer: C

15. Siemens' study assumed electricity generation from renewables at:
    - A) 50%
    - B) 75%
    - C) 90%
    - D) 100%

    Answer: D

16. According to Siemens, one week's load storage in Europe corresponds to approximately:
    - A) 20 TWh
    - B) 40 TWh
    - C) 60 TWh
    - D) 100 TWh

Answer: C

17. IEA estimated global EES demand in 2050 could reach:
    - A) 50 GW
    - B) 100 GW
    - C) 189–305 GW
    - D) 500 GW

    Answer: C

18. V2G stands for:
    - A) Voltage to Grid
    - B) Vehicle to Grid
    - C) Variable to Grid
    - D) Vehicle to Generator

    Answer: B

19. Average battery capacity assumed per EV in Germany is:
    - A) 10 kWh
    - B) 15 kWh
    - C) 20 kWh
    - D) 50 kWh

    Answer: C

20. Smart Grid technology can effectively utilize:
    - A) Coal plants
    - B) Distributed batteries
    - C) Diesel generators
    - D) Nuclear reactors

    Answer: B

Part B: Fill in the Blanks (20 Questions)

1. EES stands for **_____ Energy Storage**.

   Answer: Electrical

2. Sandia National Laboratory is abbreviated as **_____**.

   Answer: SNL

3. Time-of-use energy refers to energy **_____**.

   Answer: shifting

4. The Boston Consulting Group is abbreviated as **_____**.

   Answer: BCG

5. BCG estimated a total EES market potential of **_____ GW**.

   Answer: 330

6. Conventional stabilization includes time shift and output **_____**.

   Answer: smoothing

7. Panasonic forecast strong growth of **_____-ion batteries**.

   Answer: Lithium (Li)

8. Germany aims to achieve around **_____–80%** renewable energy by 2030.

   Answer: 60

9. Germany's existing pumped hydro storage capacity is about **_____ GWh**.

   Answer: 40

10. Hourly storage demand in Germany by 2030 is estimated at **_____ GWh**.

Answer: 16

11. Daily storage demand in Germany by 2030 is estimated at **_____ GWh**.

Answer: 170

12. Weekly storage demand is estimated at **_____ TWh**.

Answer: 3.2

13. Monthly storage demand is estimated at **_____ TWh**.

Answer: 5

14. Hydrogen can be injected into natural gas grids up to **_____ %**.

Answer: 10

15. Electricity can be converted into hydrogen and stored in the **_____ grid**.

Answer: gas

16. Siemens assumed **_____ % renewable electricity generation**.

Answer: 100

17. The IEA stands for International Energy **_____**.

Answer: Agency

18. Vehicle-to-Grid technology is abbreviated as **_____**.

Answer: V2G

19. The average EV battery capacity considered in Germany is **_____ kWh**.

Answer: 20

20. Long-term energy storage technologies include hydrogen and **_____ gas**.

Answer: synthetic methane (SNG)
