**Energy system**

1. The Power Requirements for payloads:
   * + Identifying Components:

Payloads (e.g., cameras, spectrometers)

Communication systems (transmitter, receiver, antennas)

Sensors (e.g., temperature, pressure, magnetometers)

Onboard computer and subsystems (e.g., attitude control system, power management system)

* + - Power Consumption Estimation:
* the typical Orbit Average Power (OAP) for a 1U CubeSat in a sun synchronous orbit with maximum eclipse should be no more than 1.9W (the panels are 100mm x 83mm, so even with high efficiency cells the maximum power per panel is about 2.1W)
* Considering duty cycles in every way possible:
* Identifying Power-Hungry Components using communication systems or onboard ones
* Implement Duty Cycle Logic where we can calculate the CubeSat’s orbit to simply know when he needs to use some sensors and cameras and when not.
  + - Margin Factor:
* Accounting for unexpected power demands or component degradation.

1. The Power Source & Energy Storage:
   * + Solar Panels:

* Panel Area:
* **1U CubeSat:**

**Panel Area :** Around 100-200 cm²

**Power Output :** 1-2 Watts

* **3U CubeSat:**

**Panel Area :** Around 300-600 cm²

**Power Output :** 3-6 Watts

* **6U CubeSat:**

**Panel Area :** Around 600-1200 cm²

**Power Output :** 6-12 Watts

* Batteries :
* lithium-ion, nickel-hydrogen Batteries Are the best options considering efficiency and weight.

1. PMS :

* **Power Conversion:**
* Design efficient DC converters to regulate voltage levels for different components.
* **Power Distribution:**
* Implement a reliable Power Distribution Network to deliver power to all components.
* **Power Switching:**
* Design a Power Switching Mechanism to turn on and off components as needed to conserve power.

1. Test of PMS:

* **Thermal Vacuum Chamber:**
* Simulate the space environment to test the Power System's Performance under extreme temperatures and vacuum conditions.
* **Radiation Testing:**
* Expose the Power System to radiation to assess its tolerance and degradation.
* **Vibration Testing:**
* Subject the Power System to vibration tests to ensure its structural integrity.
* **EMC Testing:**
* Conduct Electromagnetic Compatibility testing to verify that the power system does not interfere with other components.