



The complete electrical power subsystem of a satellite platform

Ismael Sanchez

Director of Product Development

i.sanchez@dhvtechnology.com





WHO WE ARE

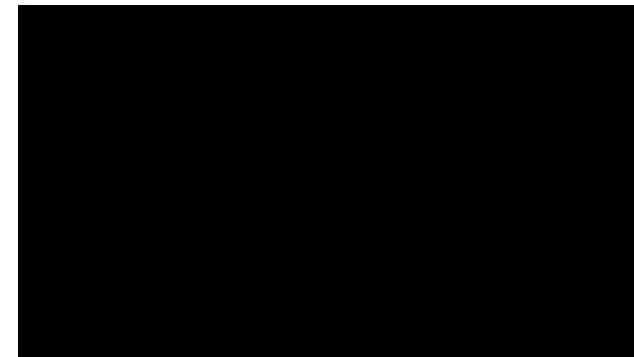


DHV Technology is a Spain-based international company that designs and manufactures solar panels and other power subsystems for space applications.

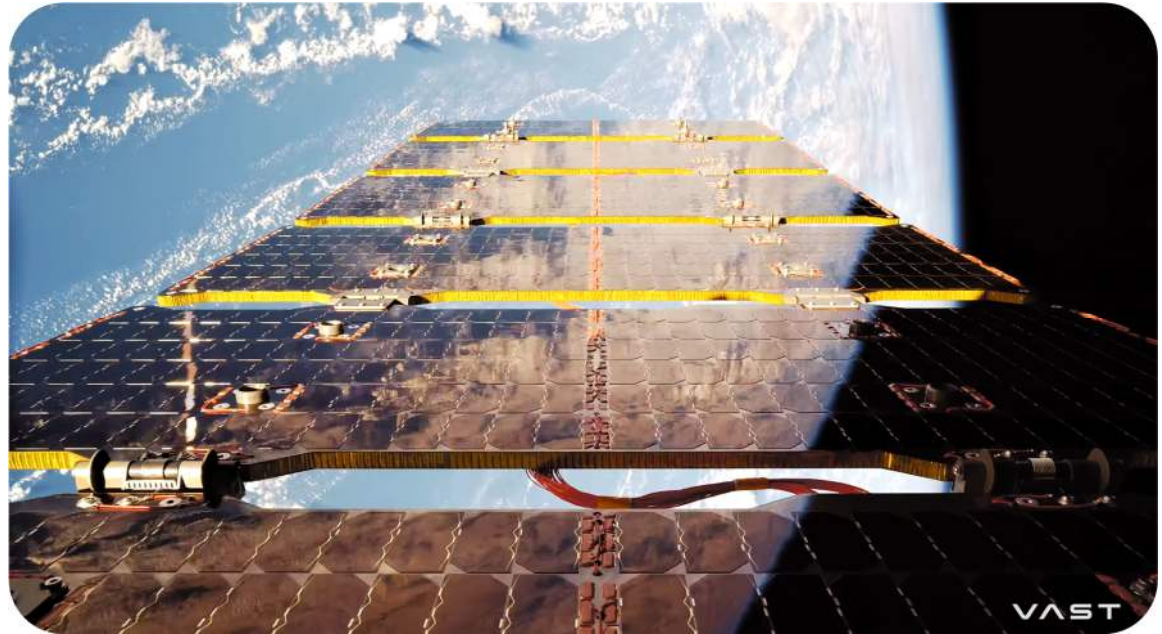
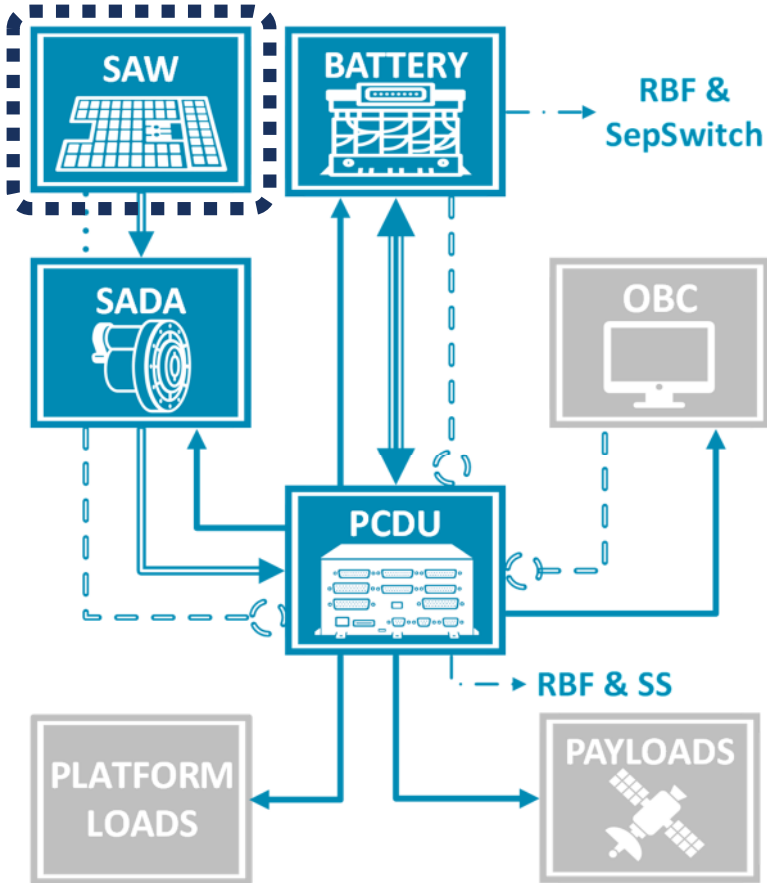
DHV Technology supplies solar panels and fully customized solutions for the main international companies in the space sector.

Our facilities, with a total of 3700 m²:

- + 1200 m² clean room
- + 1000 m² offices
- + 1500 m² warehouse and others
- + (expanding to new facilities in 2026 and 2027)

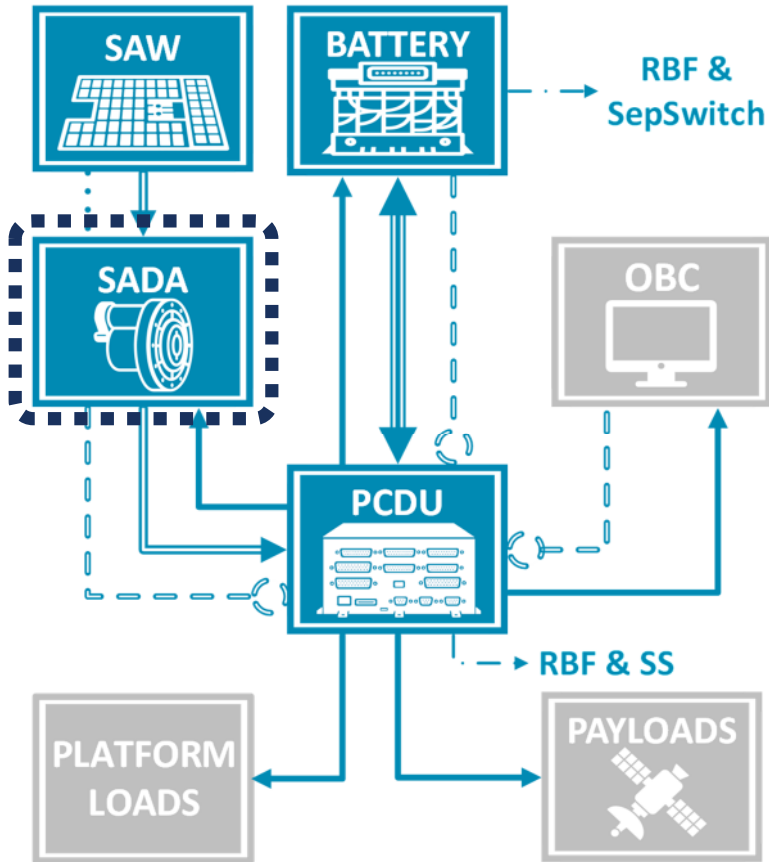


CONTEXT RELEVANT HERITAGE

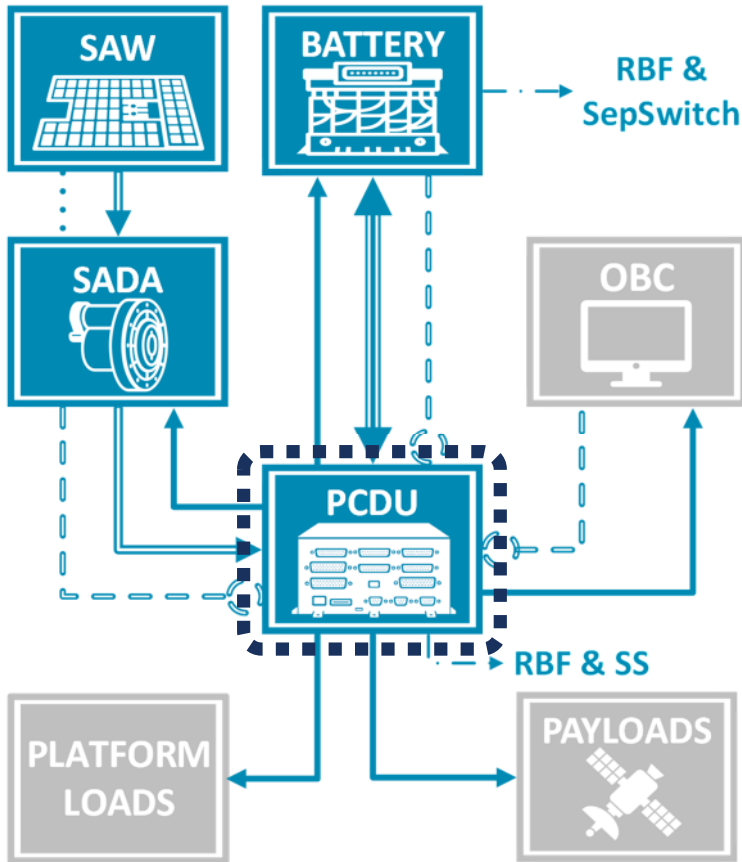


- + 500 SATELLITES FLYING WITH DHV SOLAR ARRAYS
- + 430 PROJECTS CARRIED OUT

CONTEXT RELEVANT HERITAGE



CONTEXT RELEVANT HERITAGE



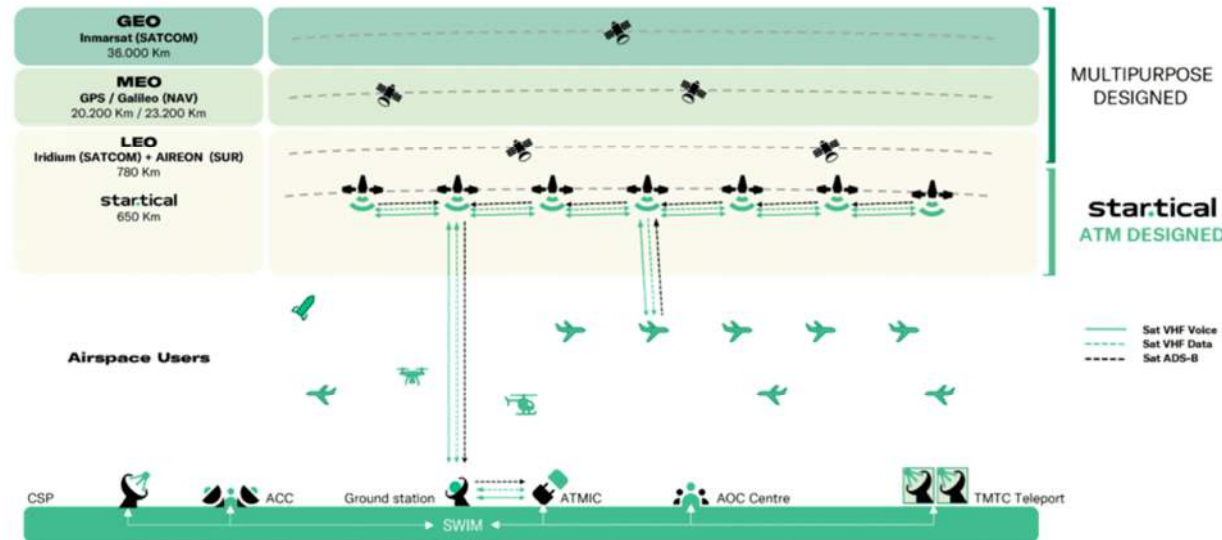
TARGET PLATFORM CHARACTERISTICS

Features:

- + Microsatellite class (100 – 200 kg)
- + LEO constellation 650 km
- + Modular and repeatable design
- + High performance and high reliability
- + Designed for serial production

Demonstrator:

- + **startical** constellation

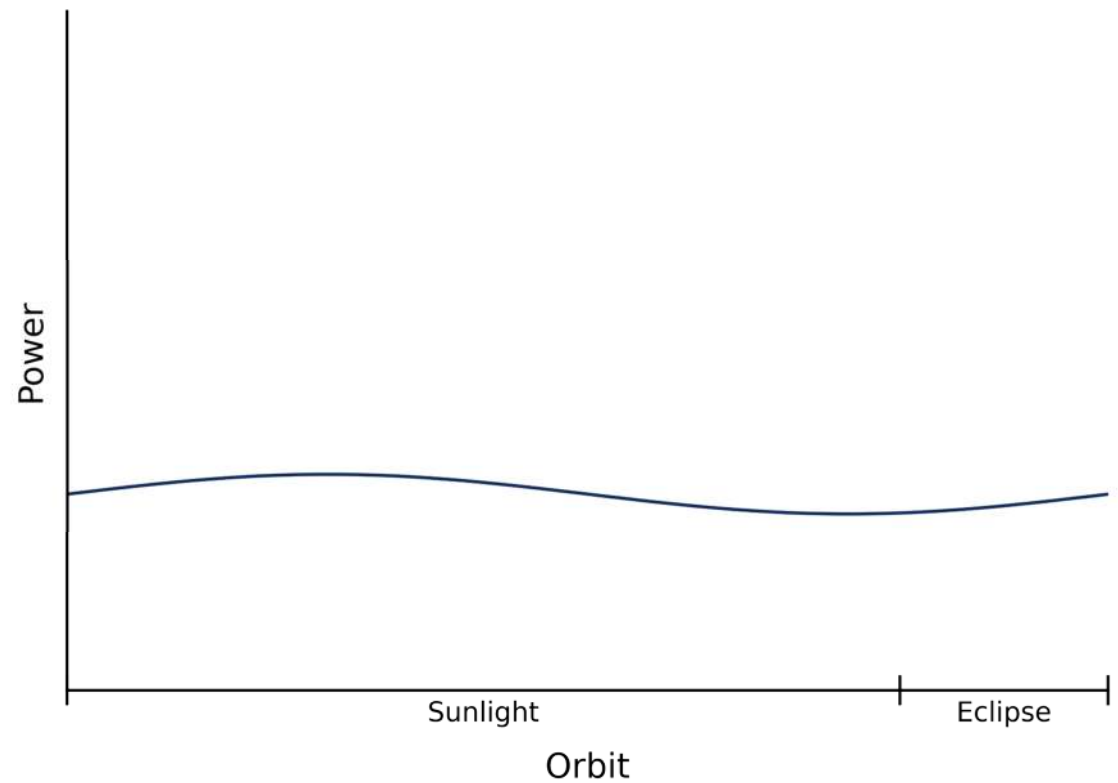


TARGET PLATFORM POWER PROFILE

— Power demand

Power demand profile:

- ➔ Constant power demand
- + Short-duration, high power events



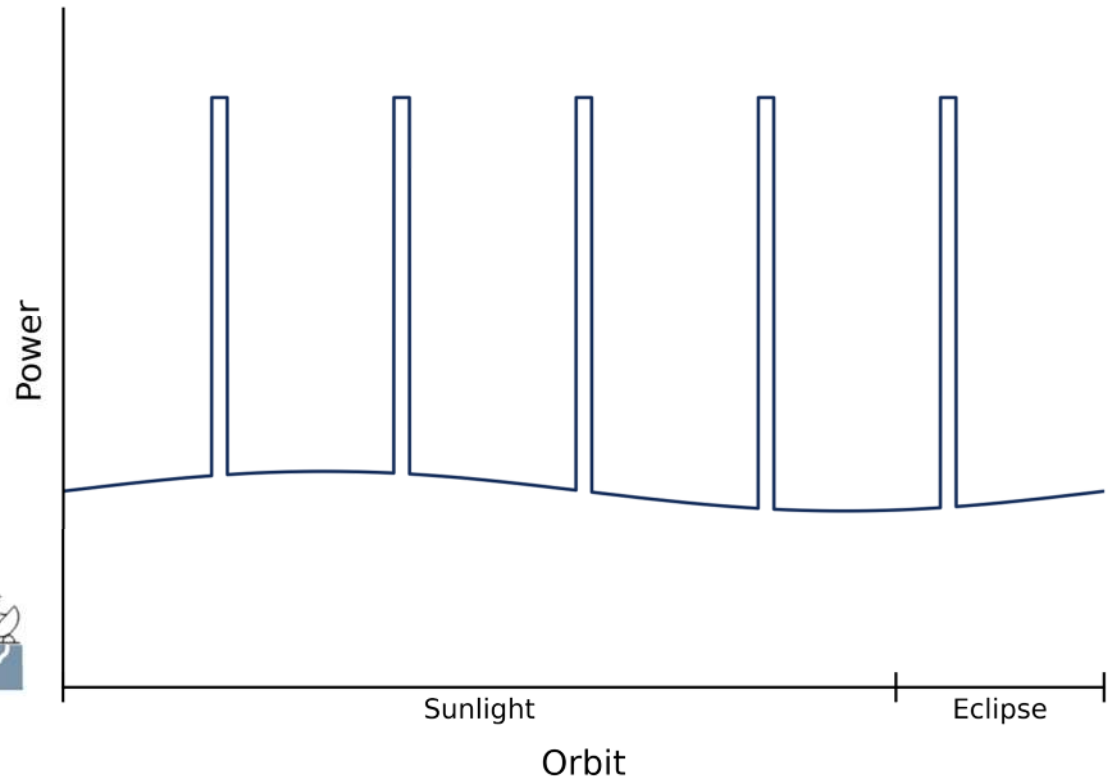
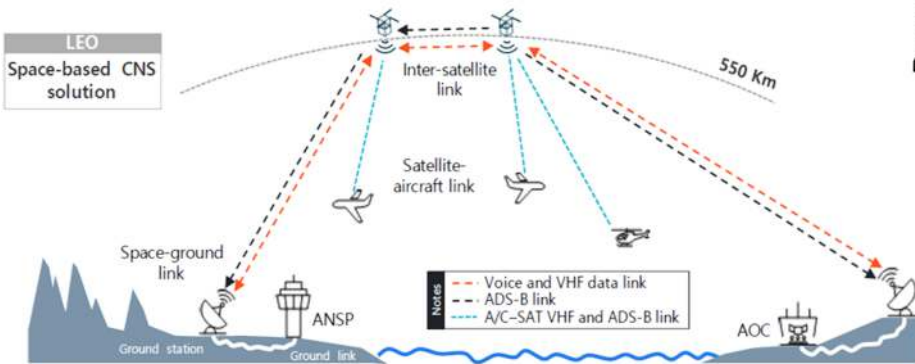
TARGET PLATFORM POWER PROFILE

— Power demand

Power demand profile:

- + Constant power demand
- Short-duration, high power events

startical



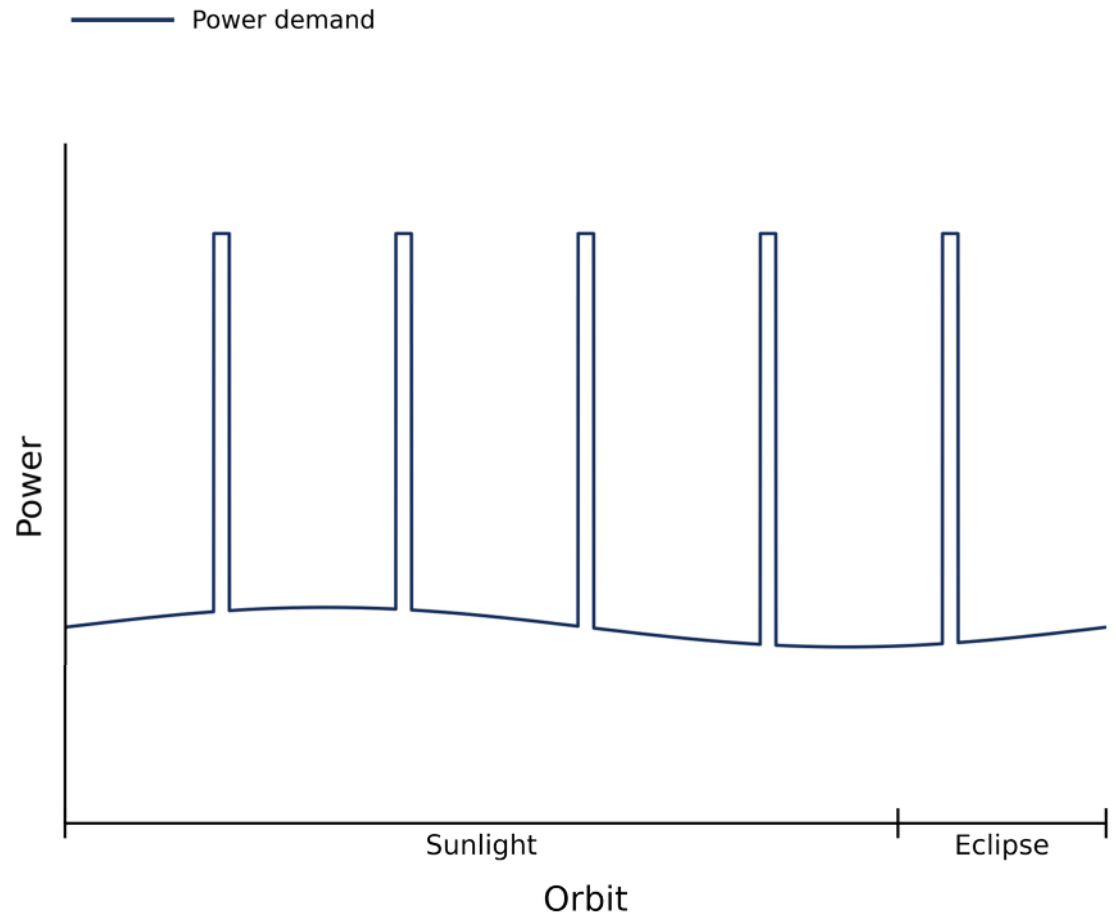
TARGET PLATFORM POWER PROFILE

Power demand profile:

- + Constant power demand
- + Short-duration, high power events

Typical Pulse Power Loads:

- + Synthetic Aperture Radar
- + High-power RF transmitters
- + LIDAR
- + Electric propulsion system

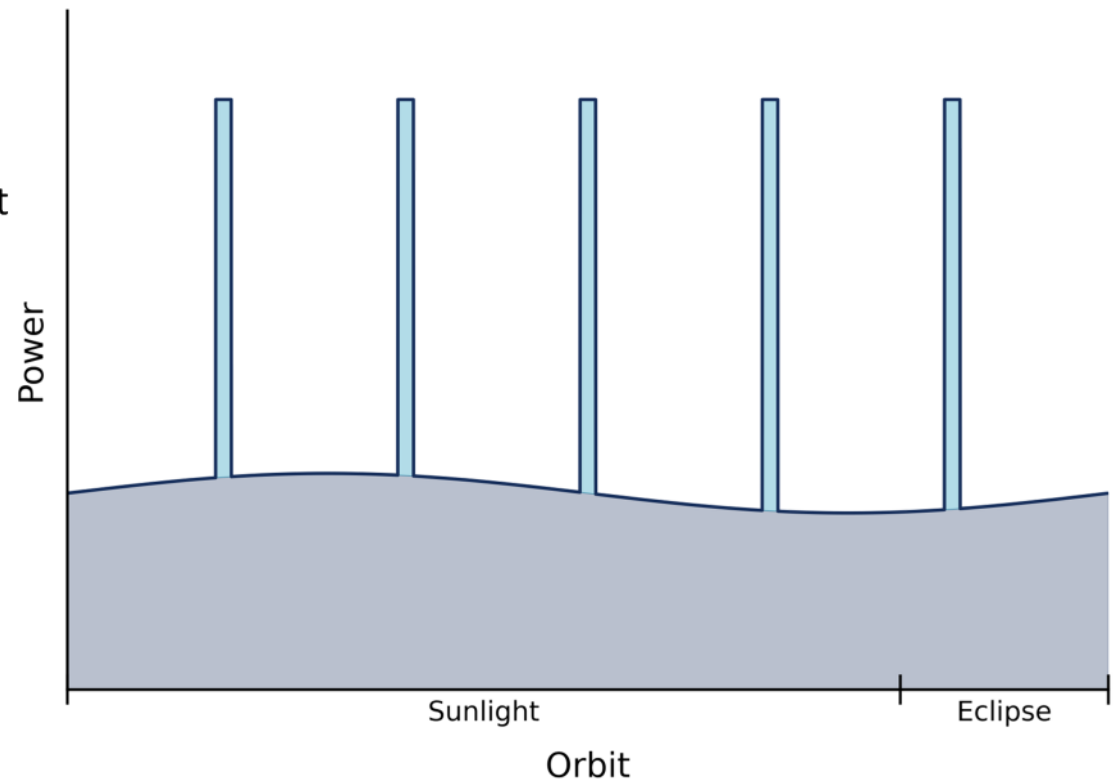
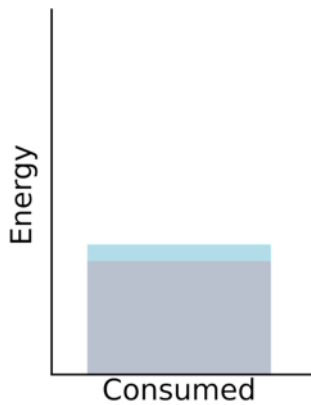


EPS SIZING CLASSIC APPROACH

— Power demand ■ Constant load energy ■ Pulse load energy

Power demand profile:

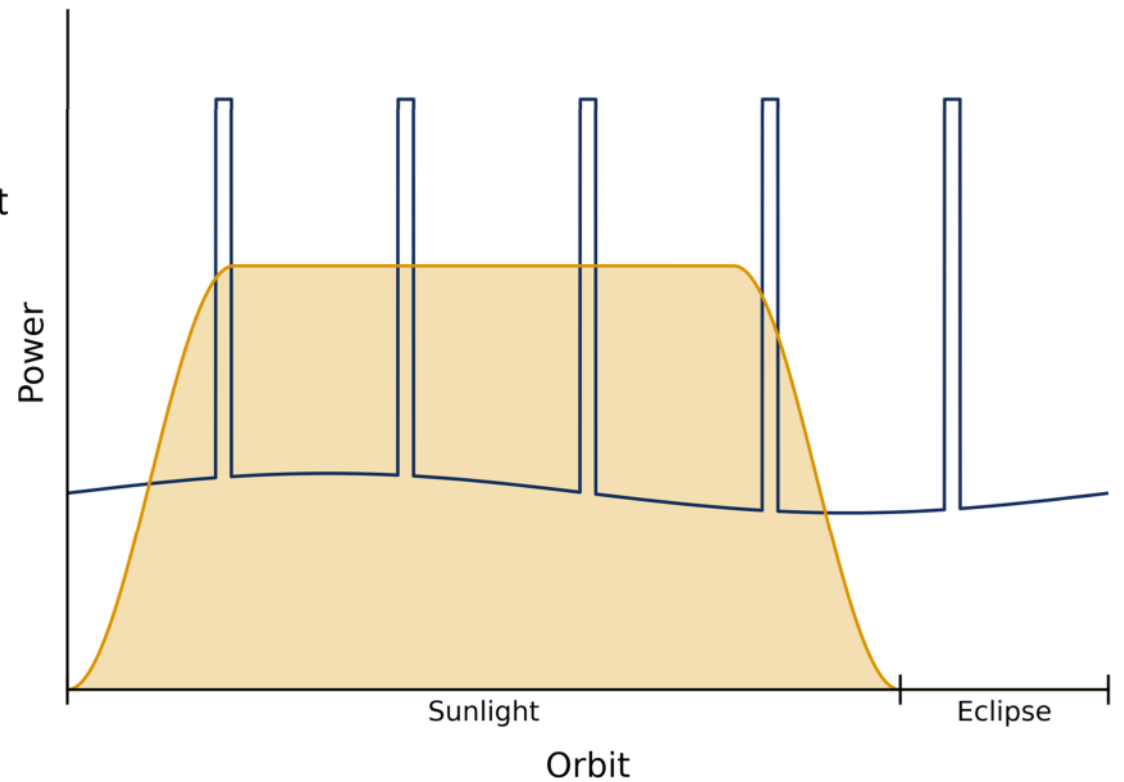
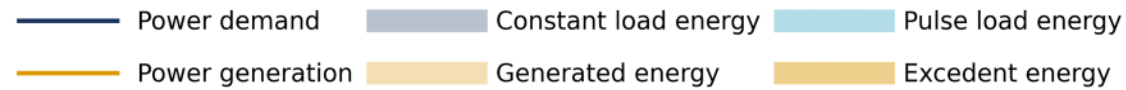
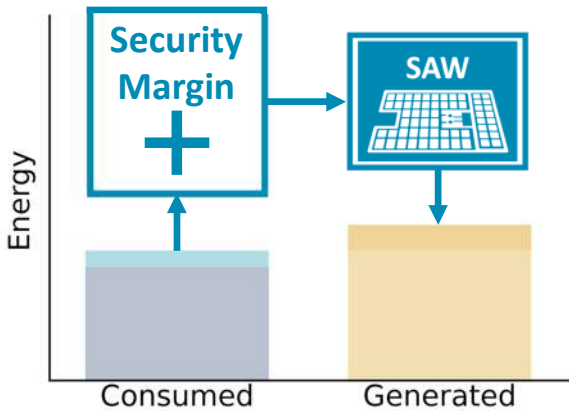
- + Constant power demand
- + Short-duration, high power events
- ➔ Low contribution to total energy budget
- + Strong impact on EPS sizing



EPS SIZING CLASSIC APPROACH

Power demand profile:

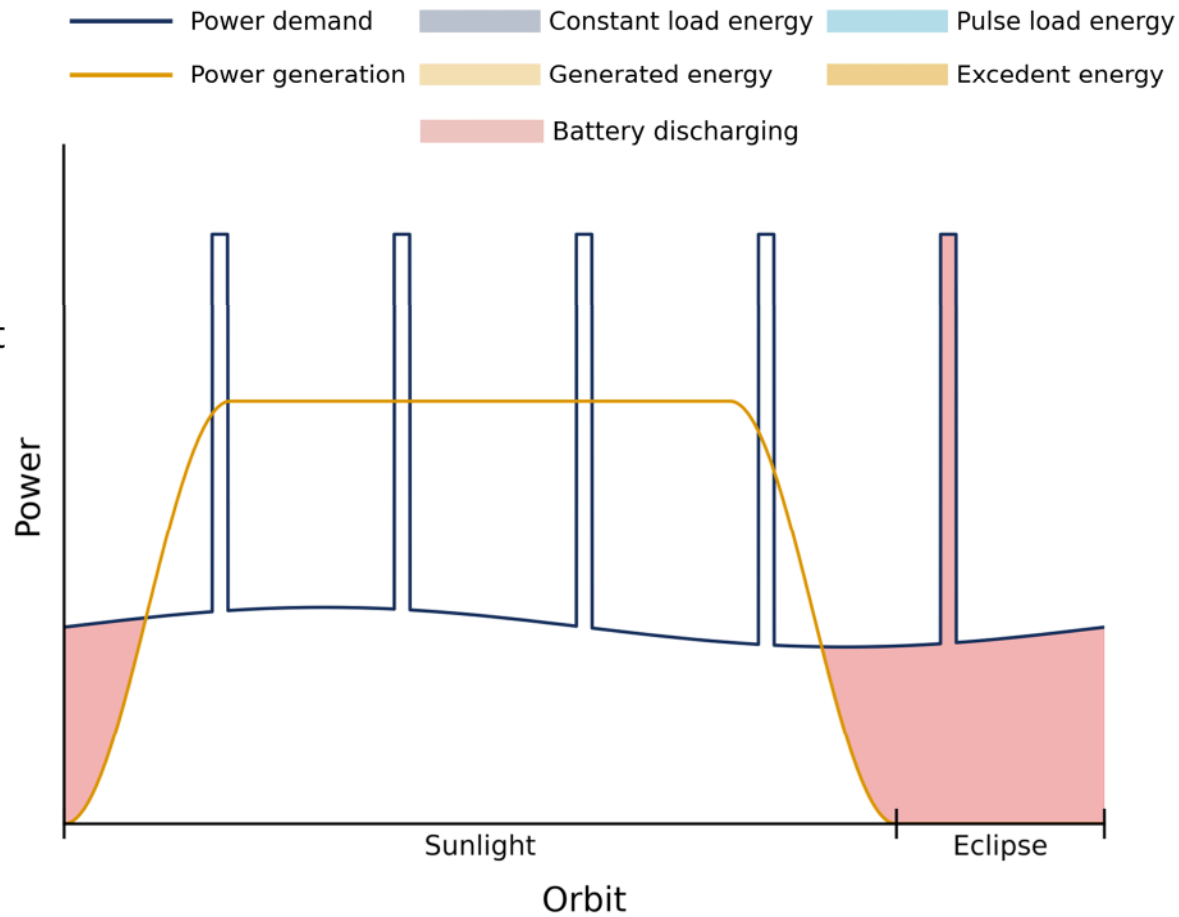
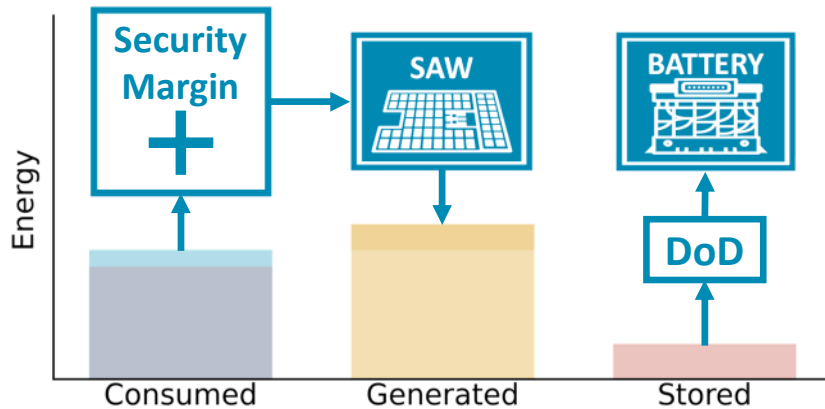
- + Constant power demand
- + Short-duration, high power events
- ➔ Low contribution to total energy budget
- + Strong impact on EPS sizing



EPS SIZING CLASSIC APPROACH

Power demand profile:

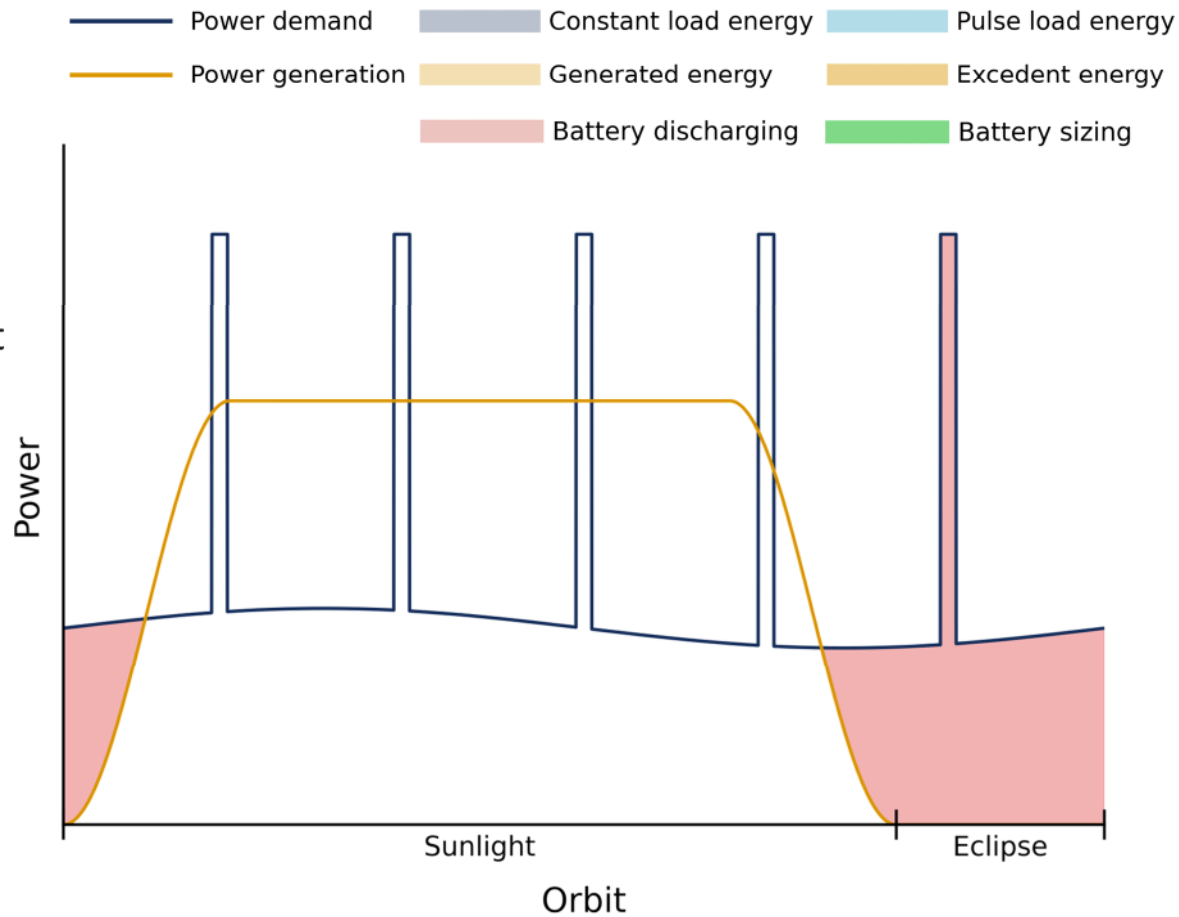
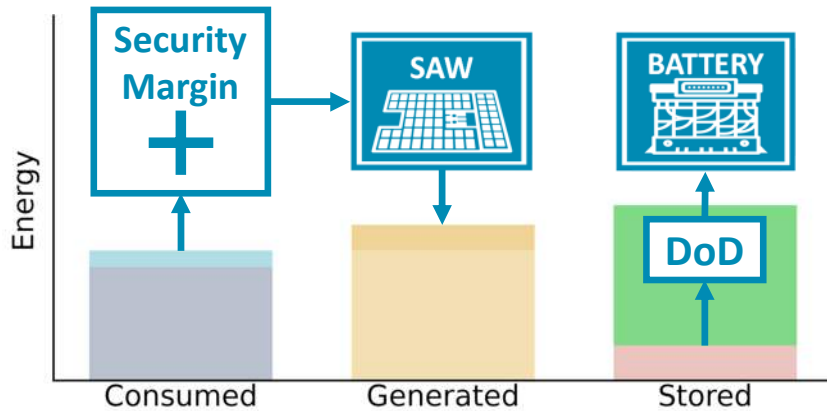
- + Constant power demand
- + Short-duration, high power events
- ➔ Low contribution to total energy budget
- + Strong impact on EPS sizing



EPS SIZING CLASSIC APPROACH

Power demand profile:

- + Constant power demand
- + Short-duration, high power events
- ➔ Low contribution to total energy budget
- + Strong impact on EPS sizing

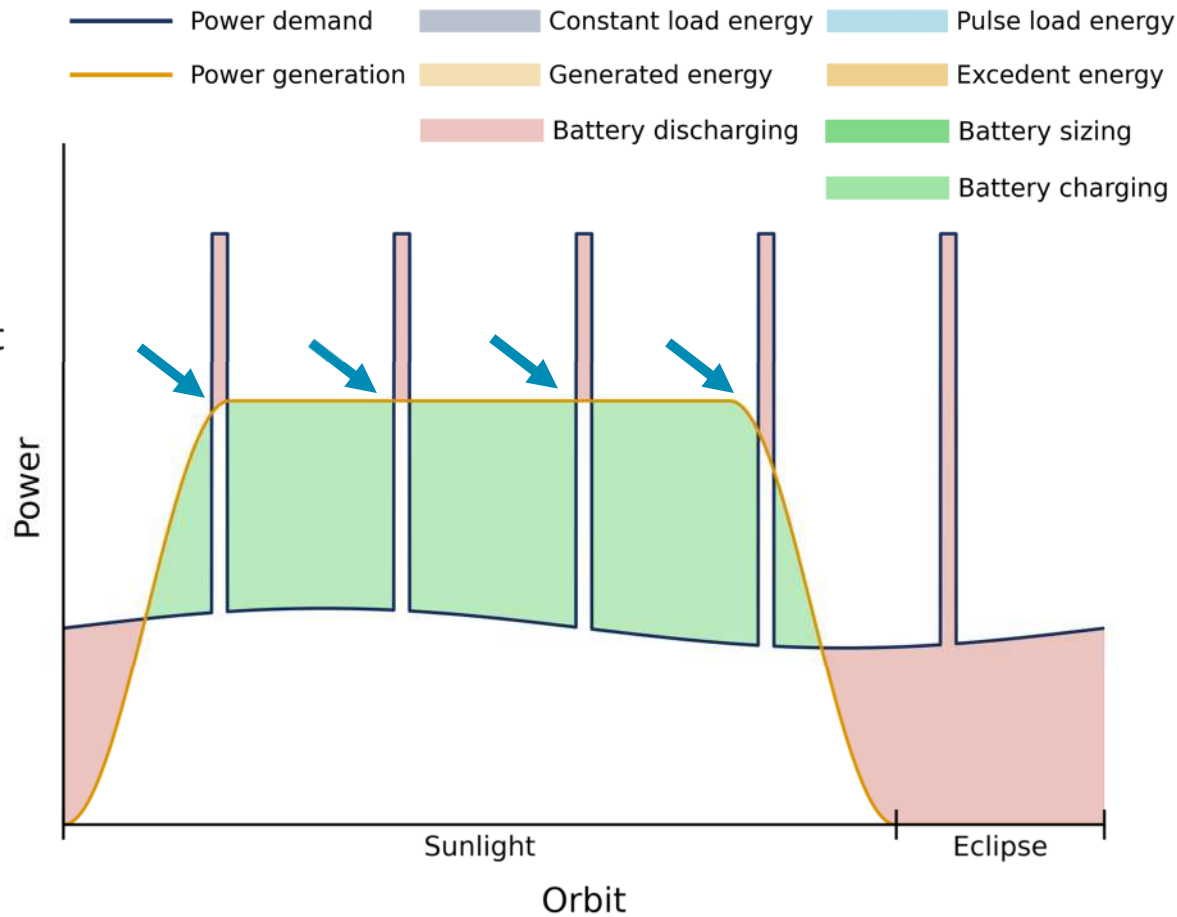
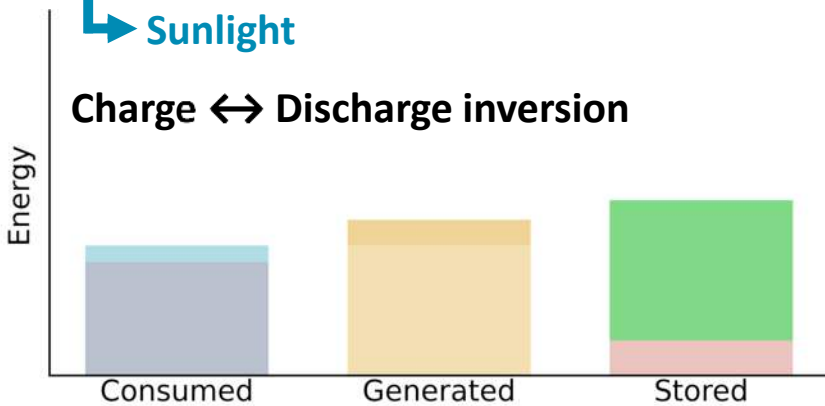


EPS SIZING PEAK POWER DRIVES SIZING

Power demand profile:

- + Constant power demand
- + Short-duration, high power events
- + Low contribution to total energy budget

Strong impact on EPS sizing
Sunlight

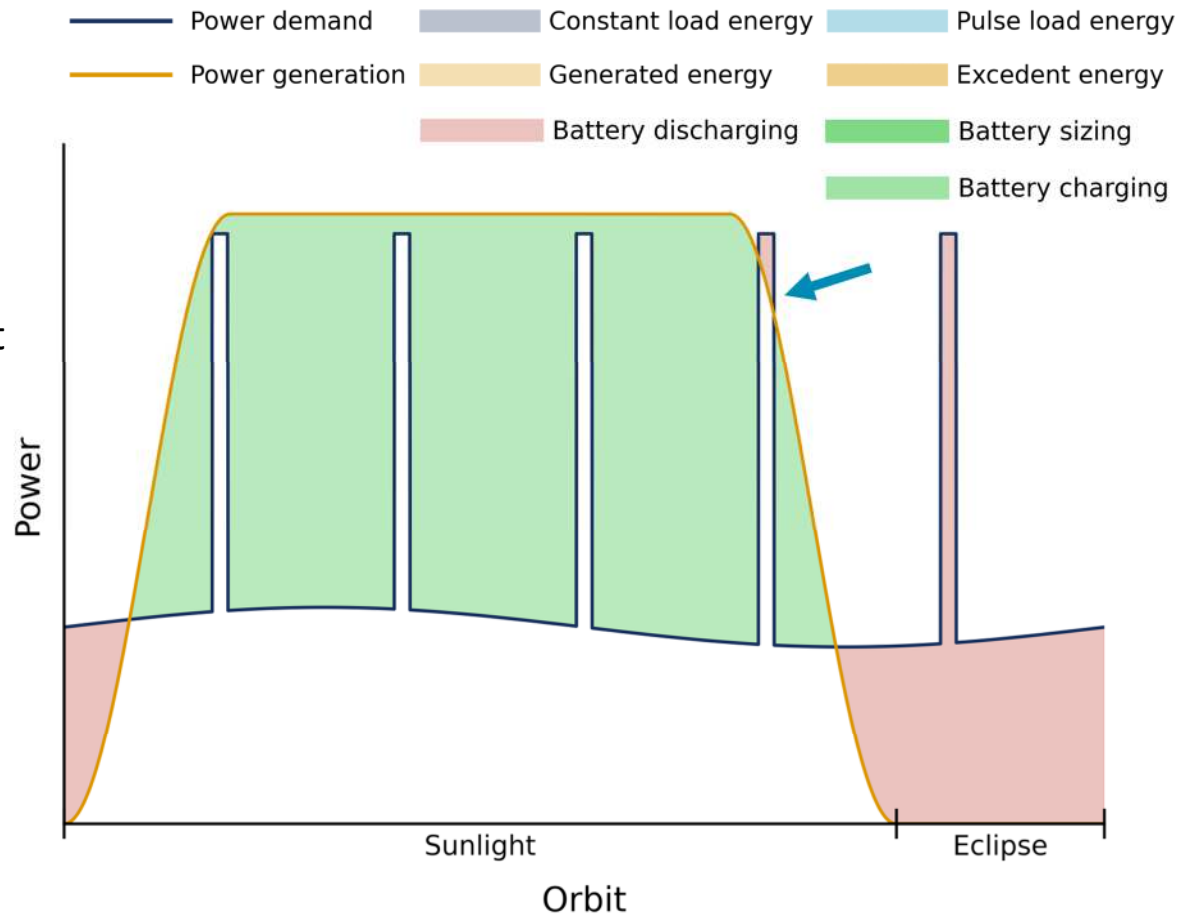
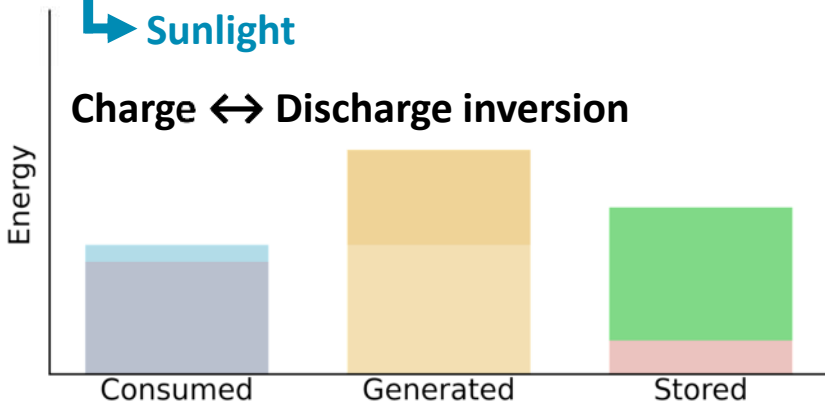


EPS SIZING PEAK POWER DRIVES SIZING

Power demand profile:

- + Constant power demand
- + Short-duration, high power events
- + Low contribution to total energy budget

Strong impact on EPS sizing
Sunlight



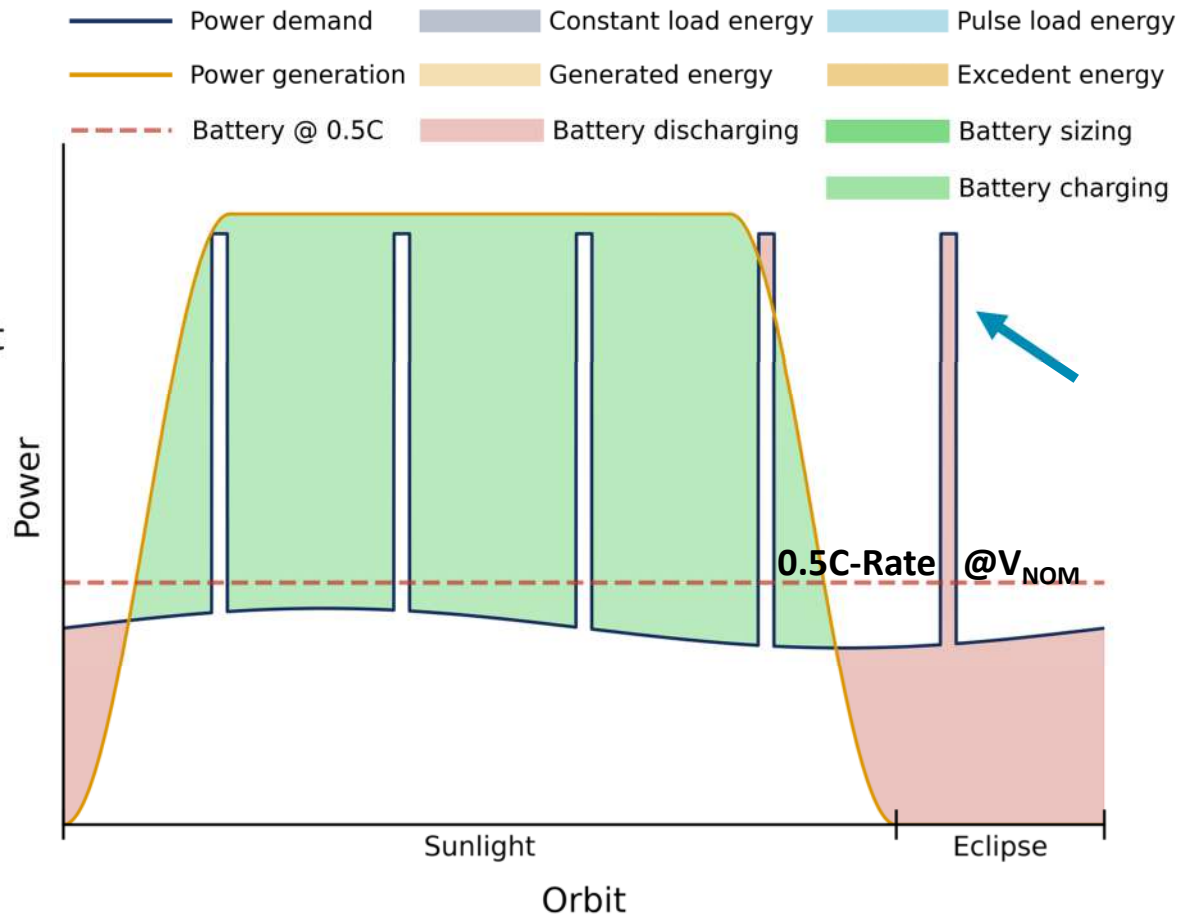
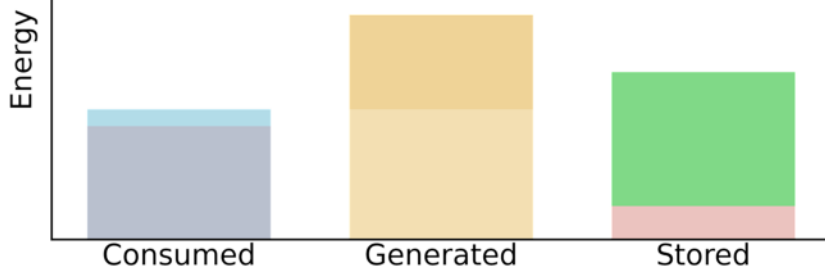
EPS SIZING PEAK POWER DRIVES SIZING

Power demand profile:

- + Constant power demand
- + Short-duration, high power events
- + Low contribution to total energy budget

Strong impact on EPS sizing
Eclipse

High discharge current

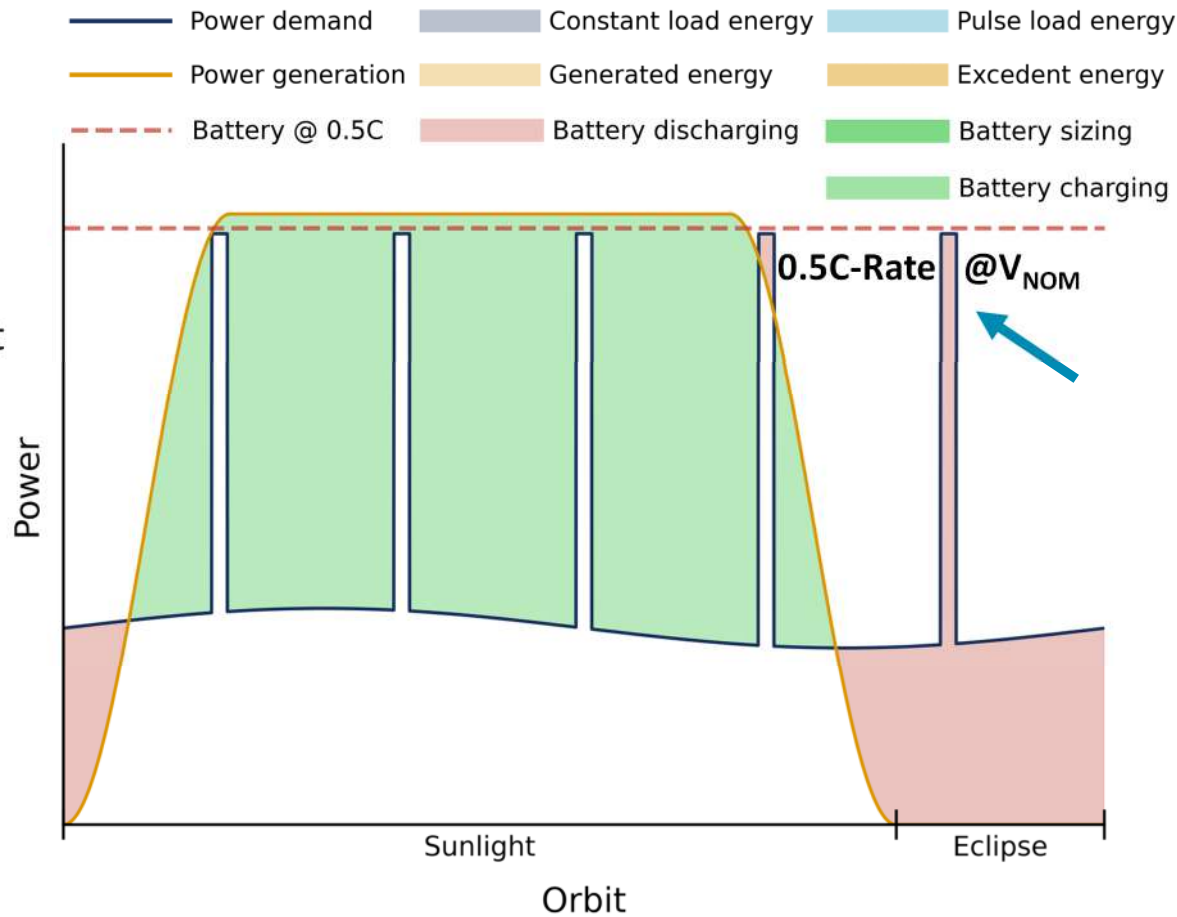
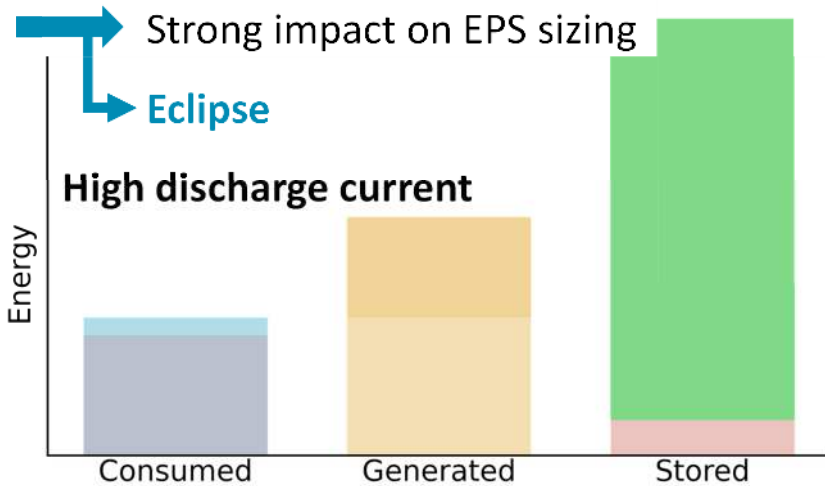


EPS SIZING PEAK POWER DRIVES SIZING

Power demand profile:

- + Constant power demand
- + Short-duration, high power events
- + Low contribution to total energy budget

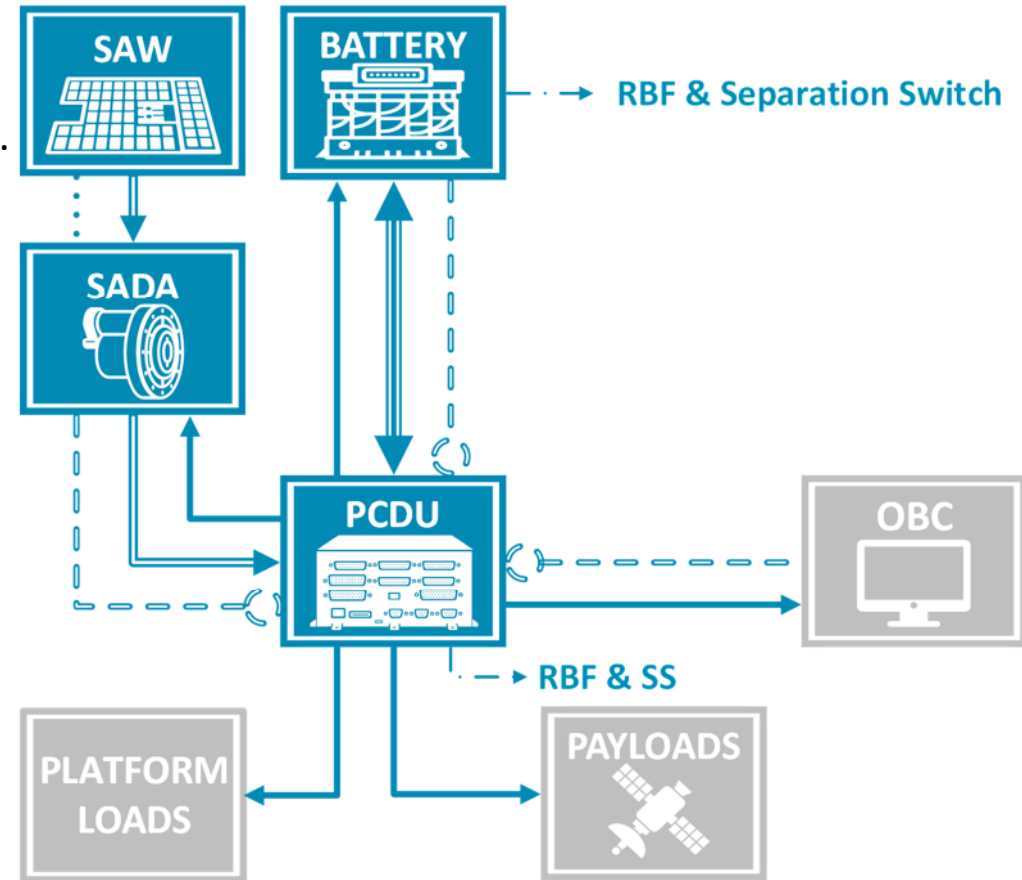
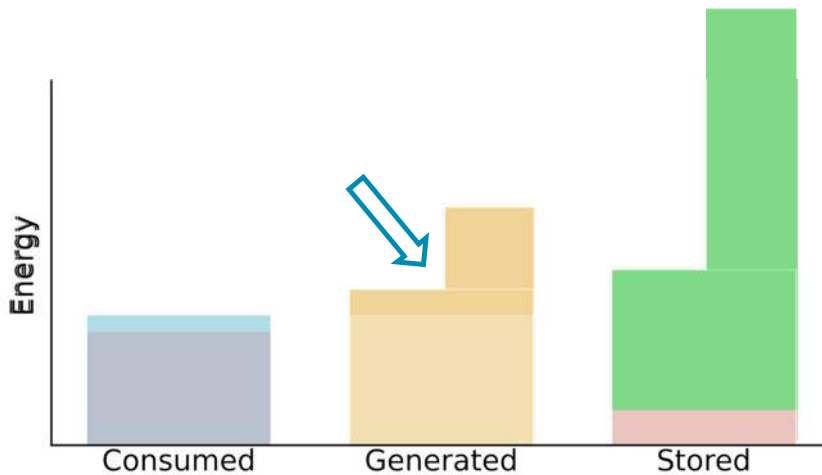
Strong impact on EPS sizing
Eclipse



EPS ARCHITECTURE IMPACT

Whole architecture oversized:

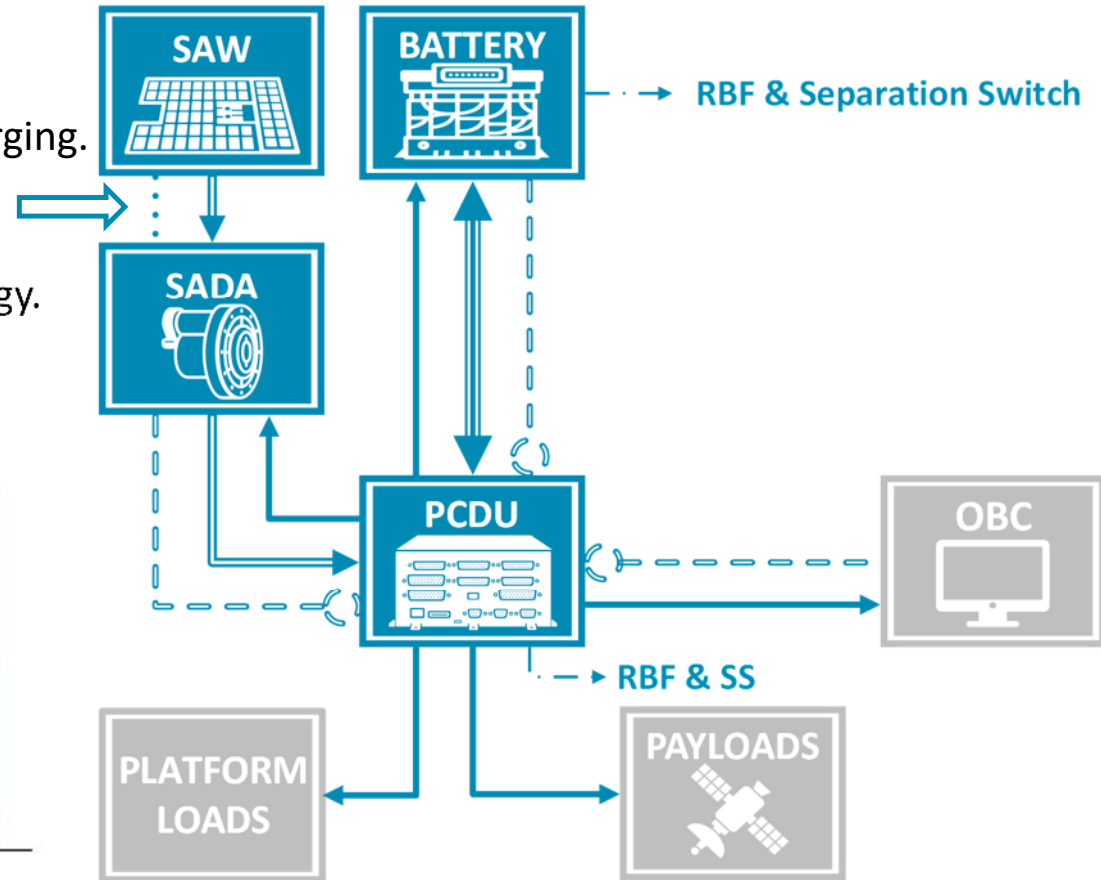
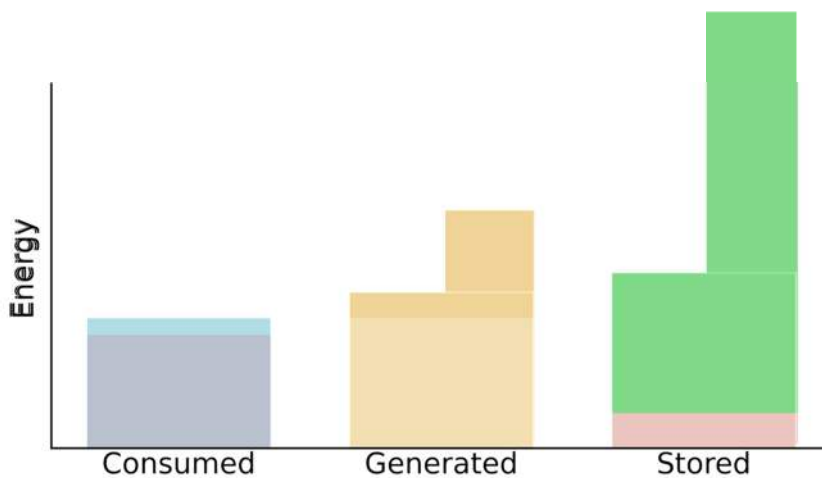
- ➔ **SAW:** Higher generation to keep battery charging.
- + **SADA:** Upsized for higher SAW current.
- + **BATTERY:** Sized by peak current, not by energy.
- + **PCDU:** Power path sized for peak power.



EPS ARCHITECTURE IMPACT

Whole architecture oversized:

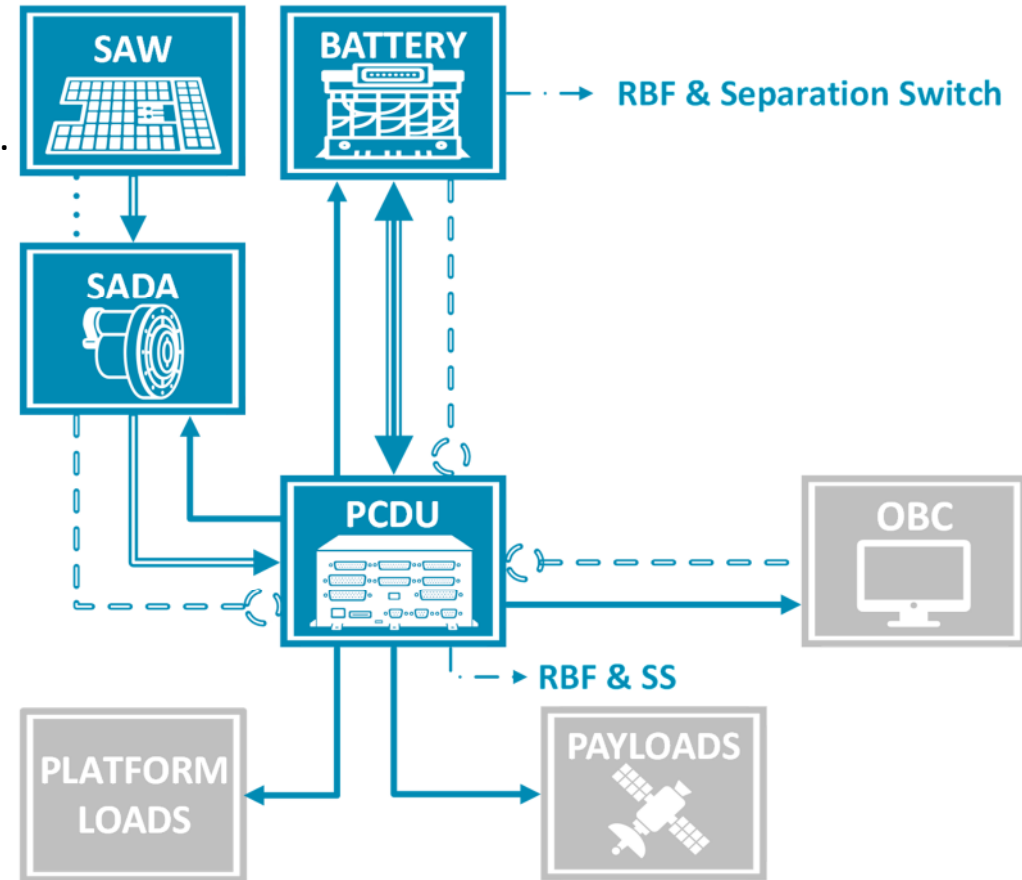
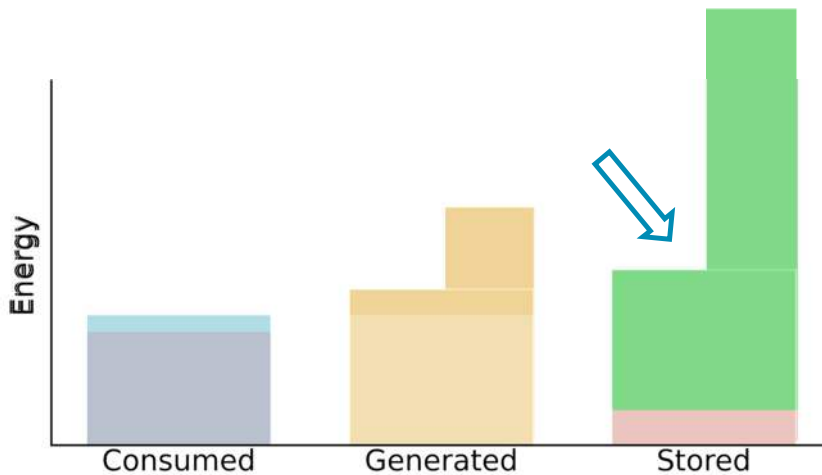
- + **SAW**: Higher generation to keep battery charging.
- ➔ **SADA**: Upsized for higher SAW current.
- + **BATTERY**: Sized by peak current, not by energy.
- + **PCDU**: Power path sized for peak power.



EPS ARCHITECTURE IMPACT

Whole architecture oversized:

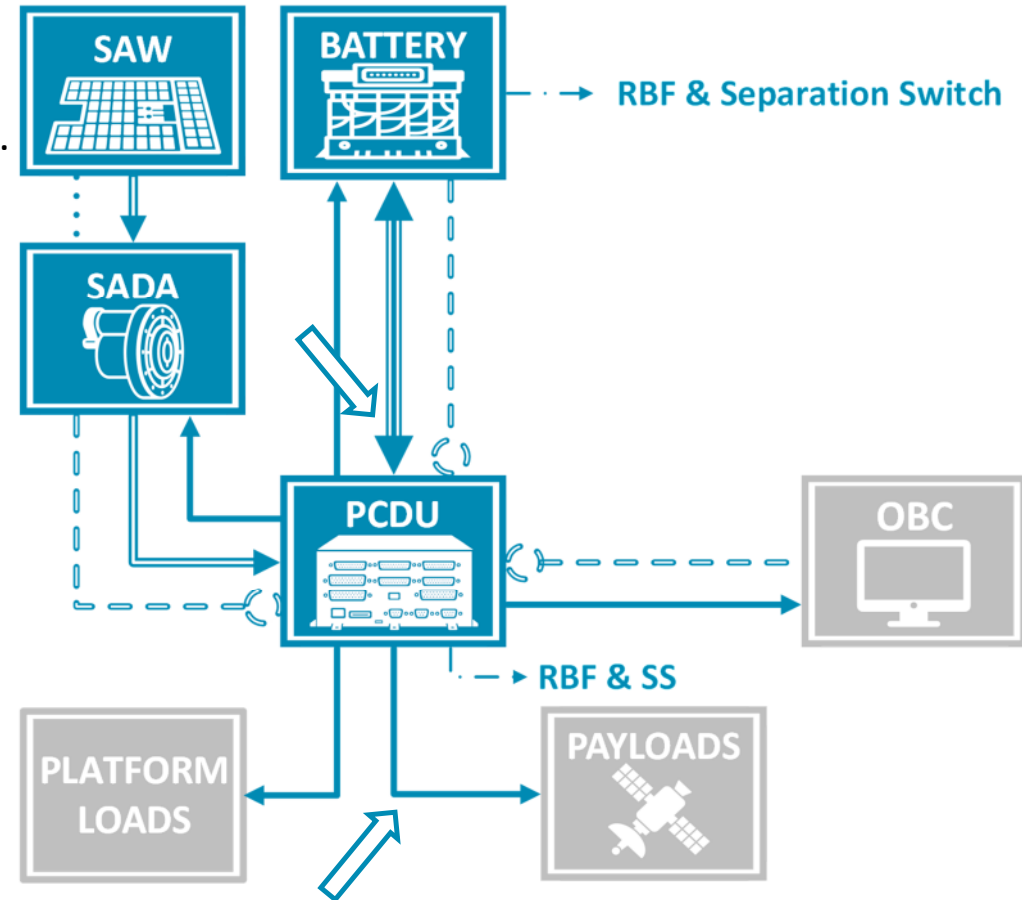
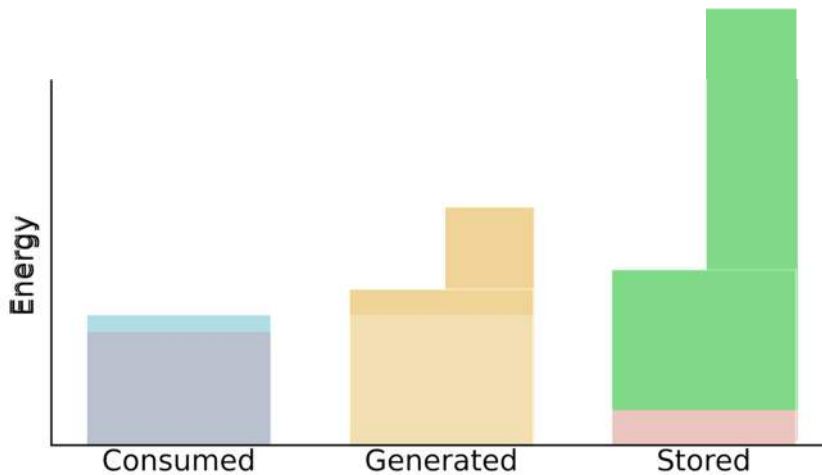
- + **SAW**: Higher generation to keep battery charging.
- + **SADA**: Upsized for higher SAW current.
- ➔ **BATTERY**: Sized by peak current, not by energy.
- + **PCDU**: Power path sized for peak power.



EPS ARCHITECTURE IMPACT

Whole architecture oversized:

- + **SAW**: Higher generation to keep battery charging.
- + **SADA**: Upsized for higher SAW current.
- + **BATTERY**: Sized by peak current, not by energy.
- ➔ **PCDU**: Power path sized for peak power.

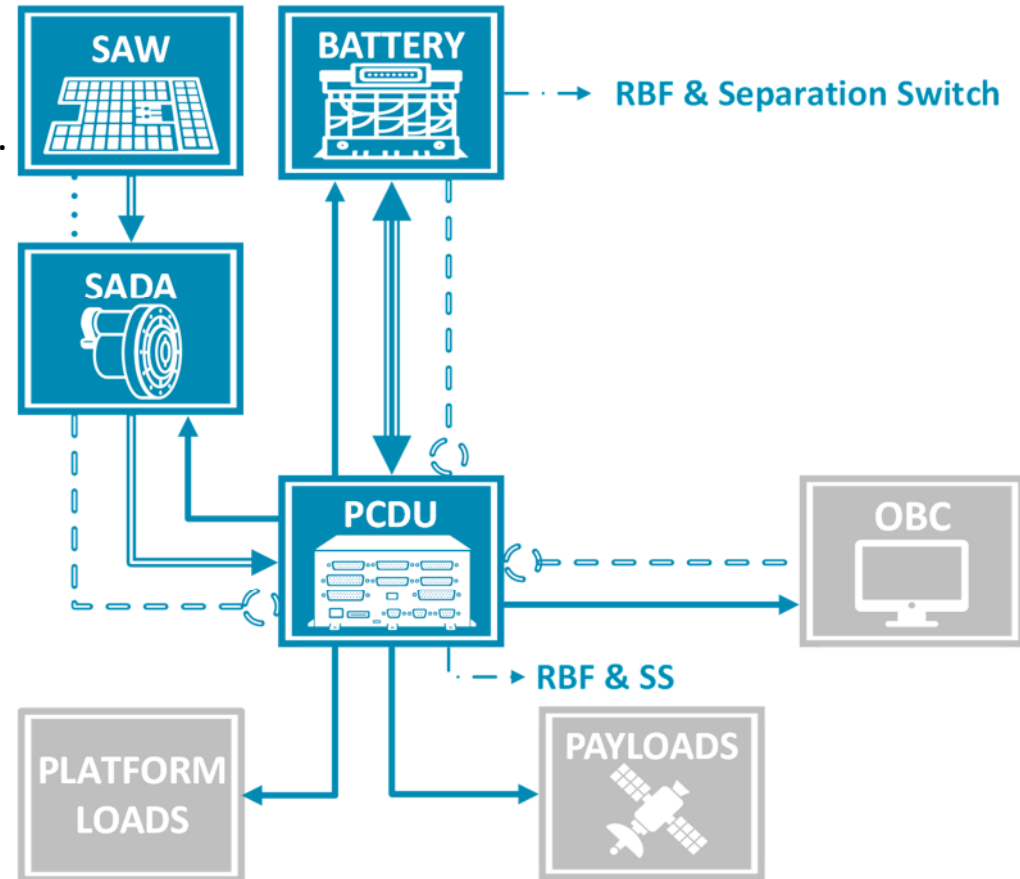


EPS ARCHITECTURE IMPACT

Whole architecture oversized:

- + **SAW**: Higher generation to keep battery charging.
- + **SADA**: Upsized for higher SAW current.
- + **BATTERY**: Sized by peak current, not by energy.
- + **PCDU**: Power path sized for peak power.

High peak power demands could drive to a platform resizing

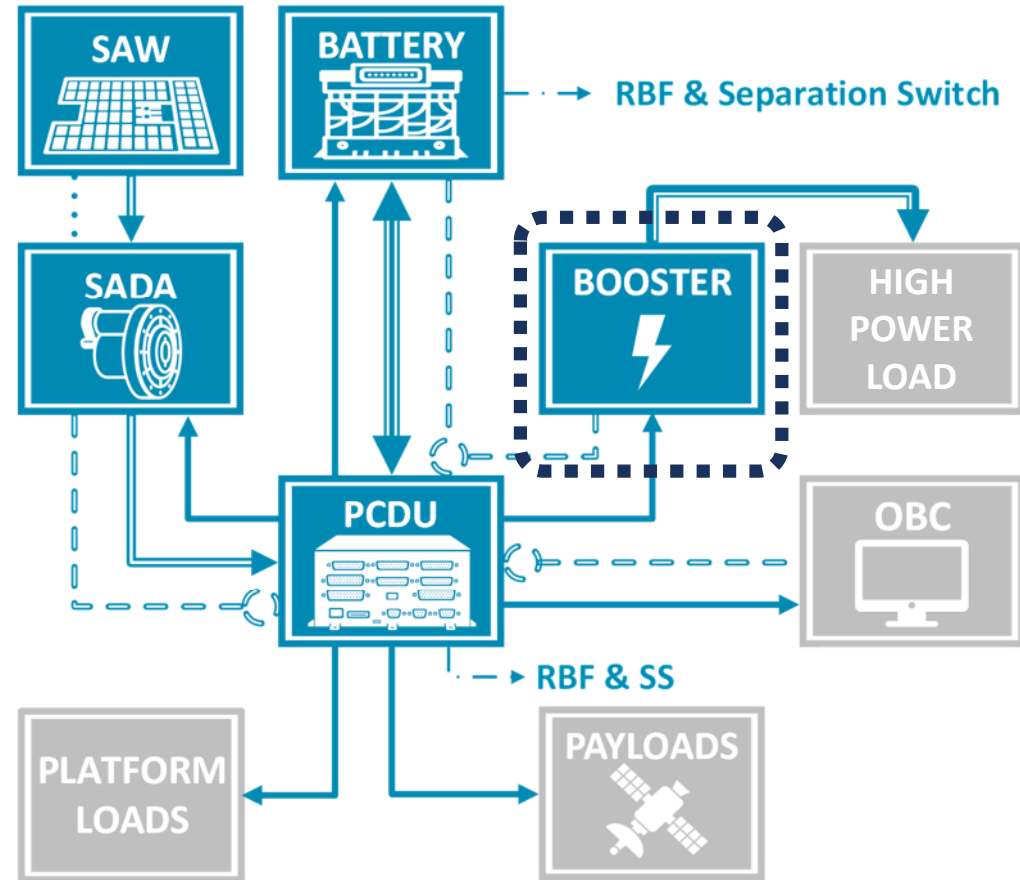
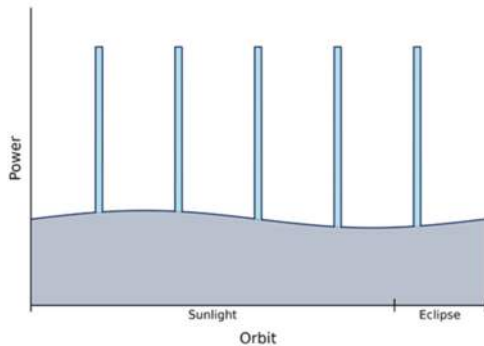


EPS ARCHITECTURE POWER BOOSTER

Decoupling peak from the EPS:

➔ Power booster as secondary energy buffer.

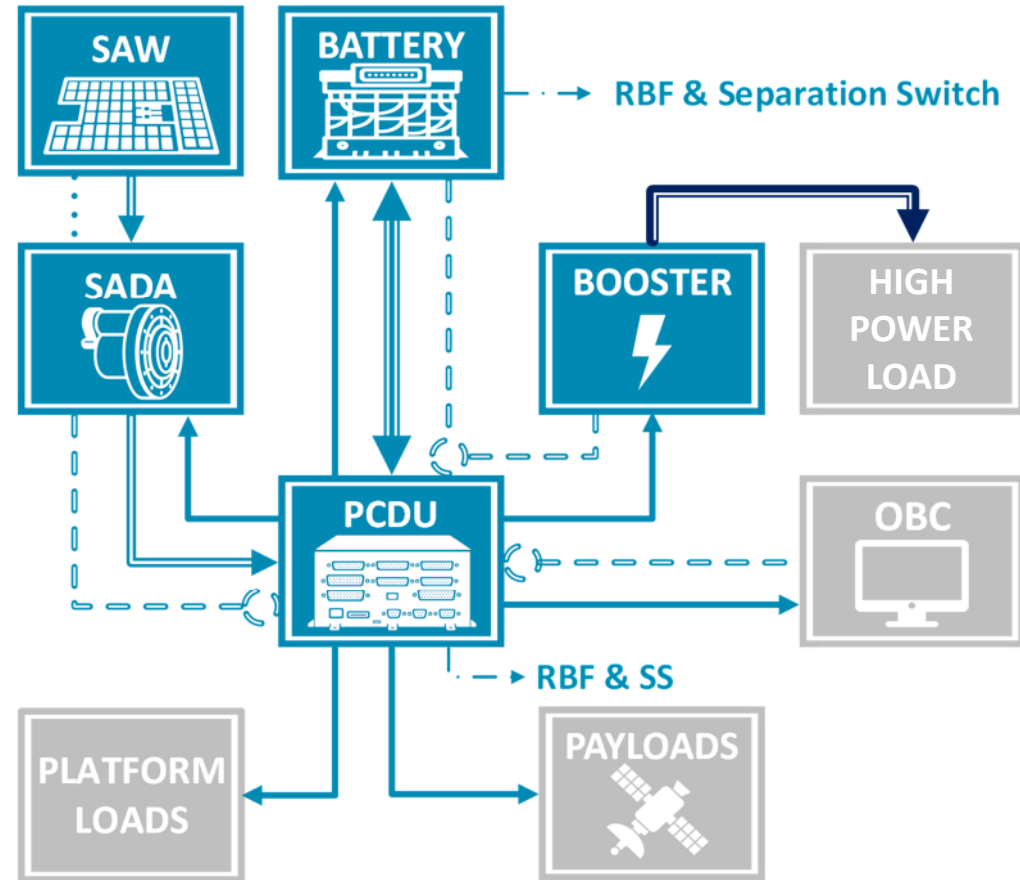
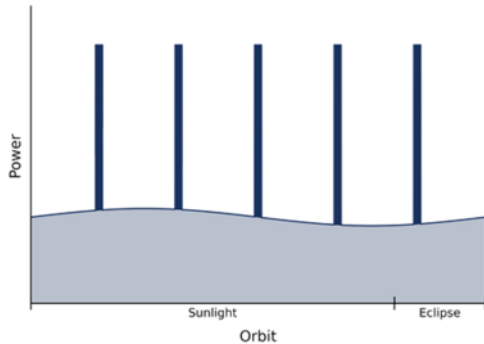
- + Pulse ON: Buffer feeds the peak.
- + Pulse OFF: Bus recharges slowly
- + EPS sees a smooth, limited load
- + Battery protected from peak current
- + Classic EPS sizing preserved



EPS ARCHITECTURE POWER BOOSTER

Decoupling peak from the EPS:

- ➔ Power booster as secondary energy buffer.
- ➔ Pulse ON: Buffer feeds the peak.
- + Pulse OFF: Bus recharges slowly
- + EPS sees a smooth, limited load
- + Battery protected from peak current
- + Classic EPS sizing preserved

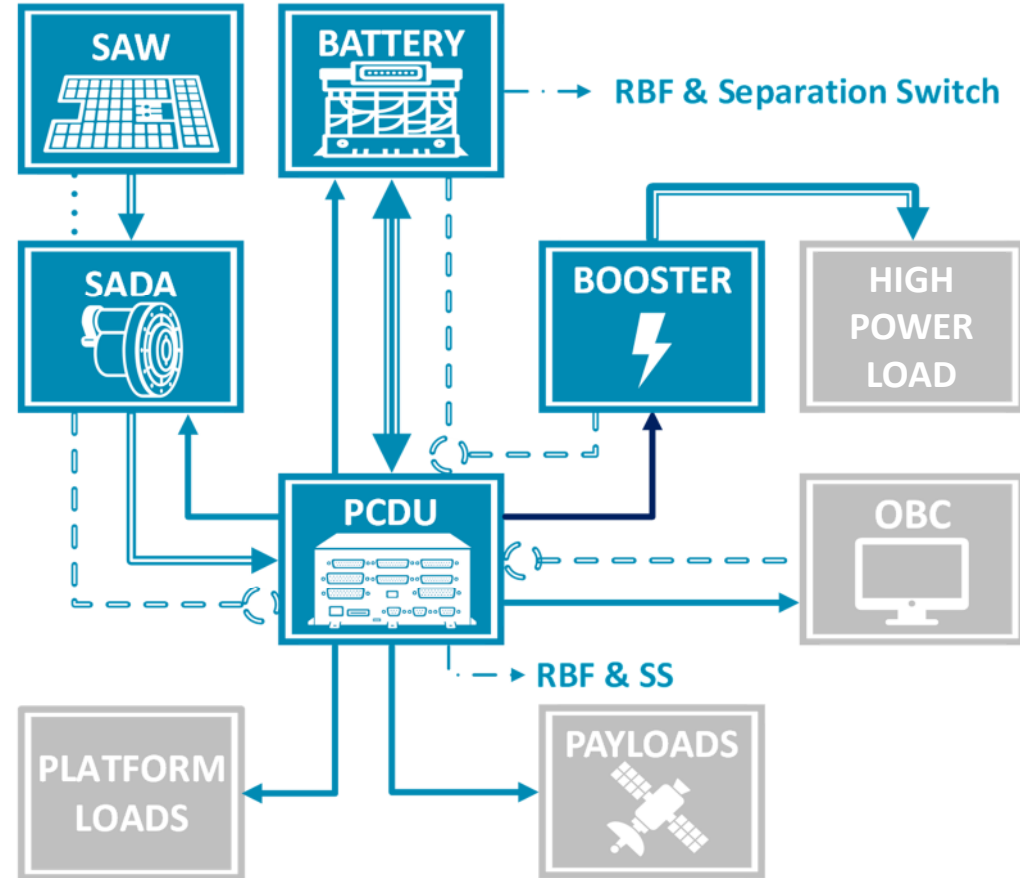
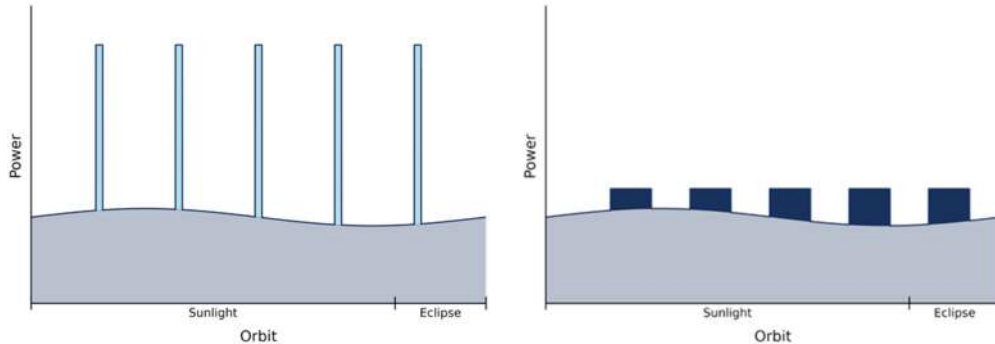


EPS ARCHITECTURE POWER BOOSTER

Decoupling peak from the EPS:

Power booster as secondary energy buffer.

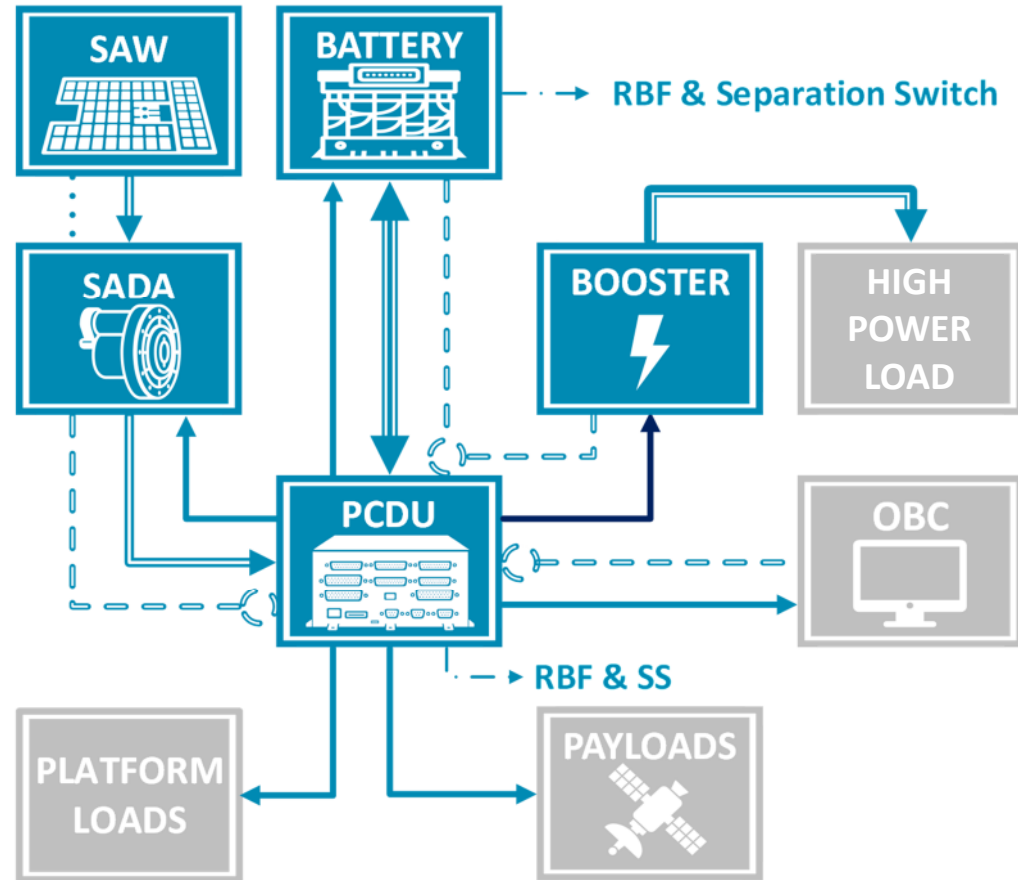
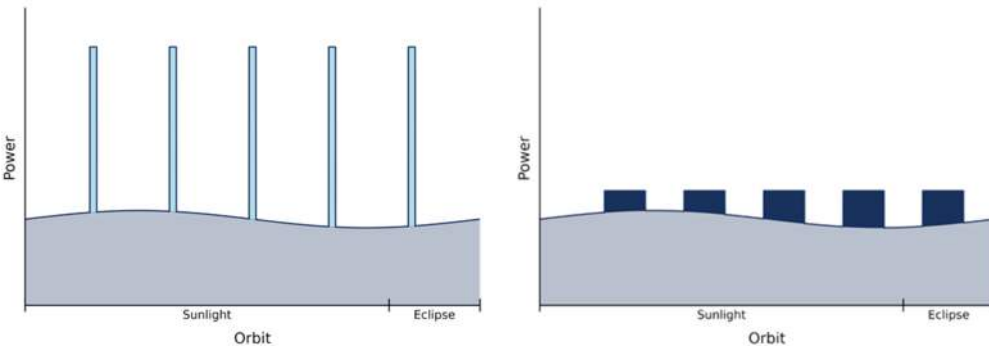
- + Pulse ON: Buffer feeds the peak.
- + Pulse OFF: Bus recharges slowly
- + EPS sees a smooth, limited load
- + Battery protected from peak current
- + Classic EPS sizing preserved



EPS ARCHITECTURE POWER BOOSTER

Decoupling peak from the EPS:

- + Power booster as secondary energy buffer.
- + Pulse ON: Buffer feeds the peak.
- + Pulse OFF: Bus recharges slowly
- ➔ EPS sees a smooth, limited load
- + Battery protected from peak current
- + Classic EPS sizing preserved



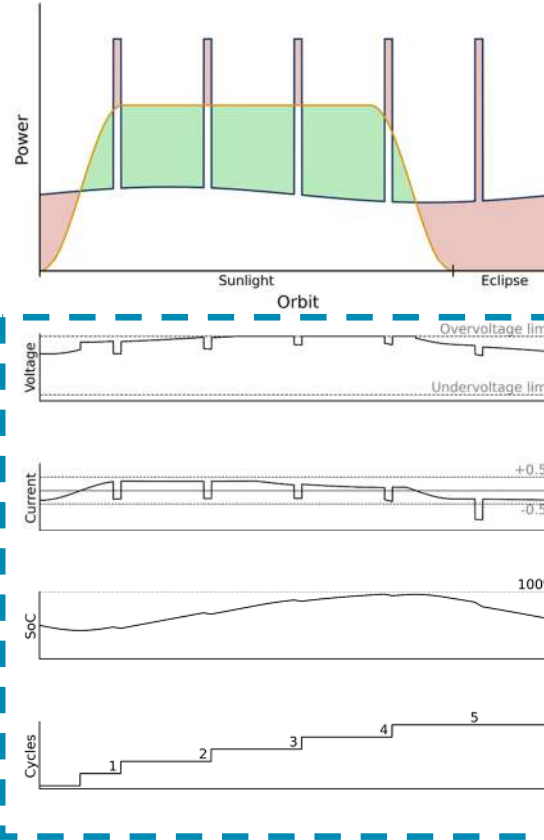
EPS ARCHITECTURE POWER BOOSTER

Decoupling peak from the EPS:

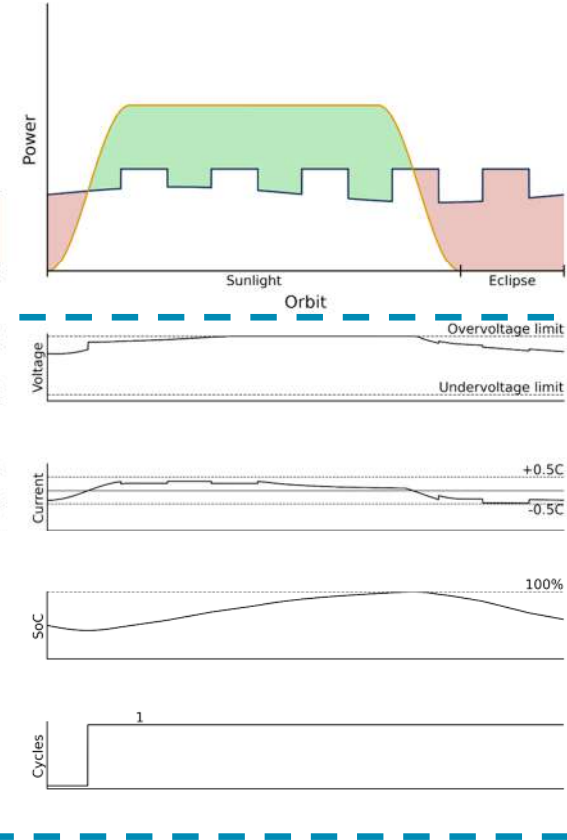
- + Power booster as secondary energy buffer.
 - + Pulse ON: Buffer feeds the peak.
 - + Pulse OFF: Bus recharges slowly
- EPS sees a smooth, limited load
- Battery protected from peak current
- + Classic EPS sizing preserved



Without Power Booster



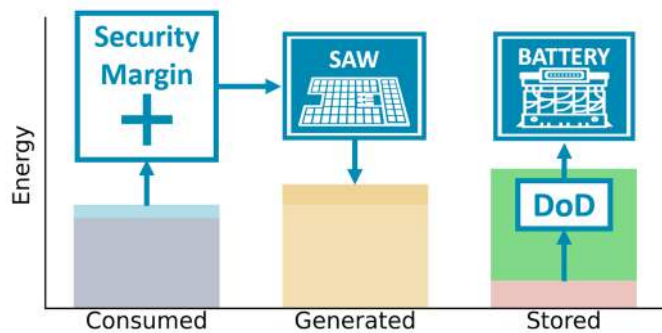
With Power Booster



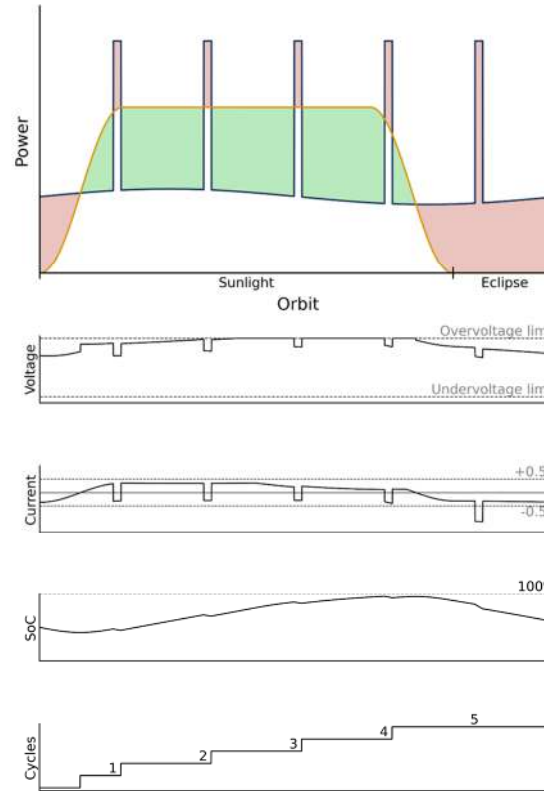
EPS ARCHITECTURE POWER BOOSTER

Decoupling peak from the EPS:

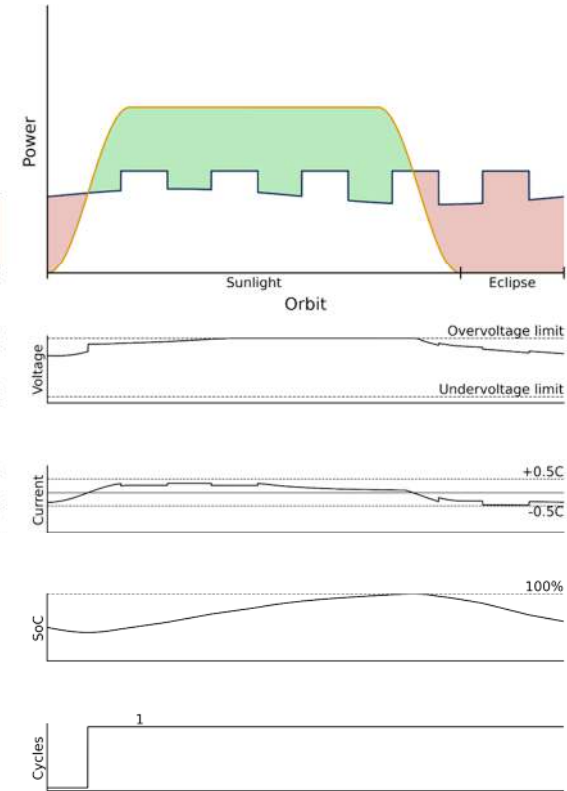
- + Power booster as secondary energy buffer.
 - + Pulse ON: Buffer feeds the peak.
 - + Pulse OFF: Bus recharges slowly
- EPS sees a smooth, limited load
- + Battery protected from peak current
- Classic EPS sizing preserved



Without Power Booster



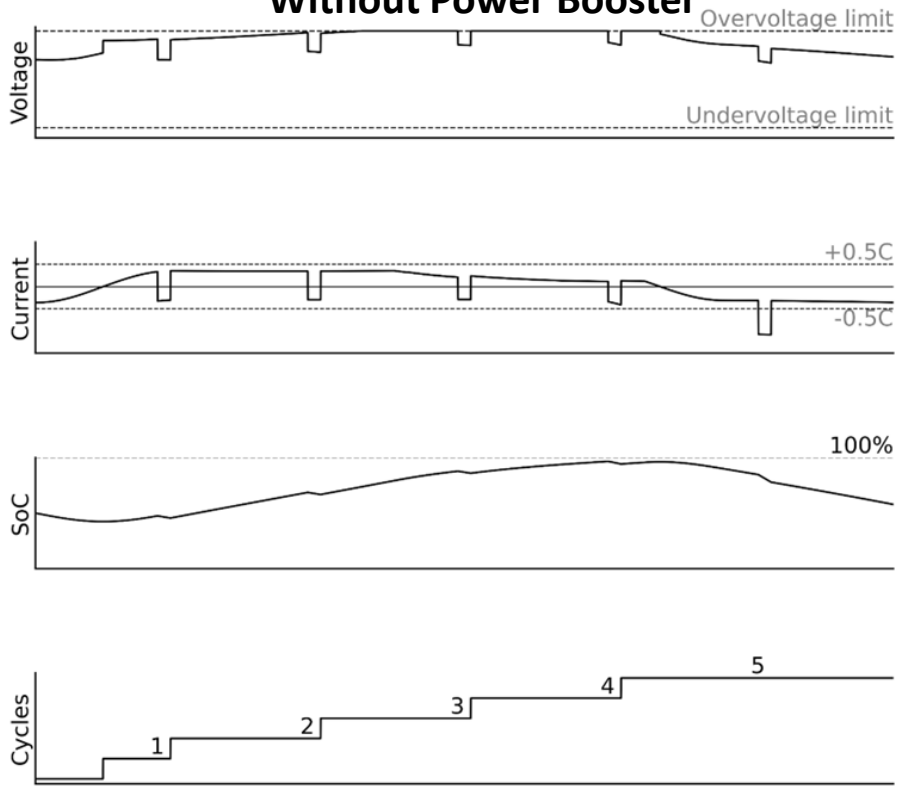
With Power Booster



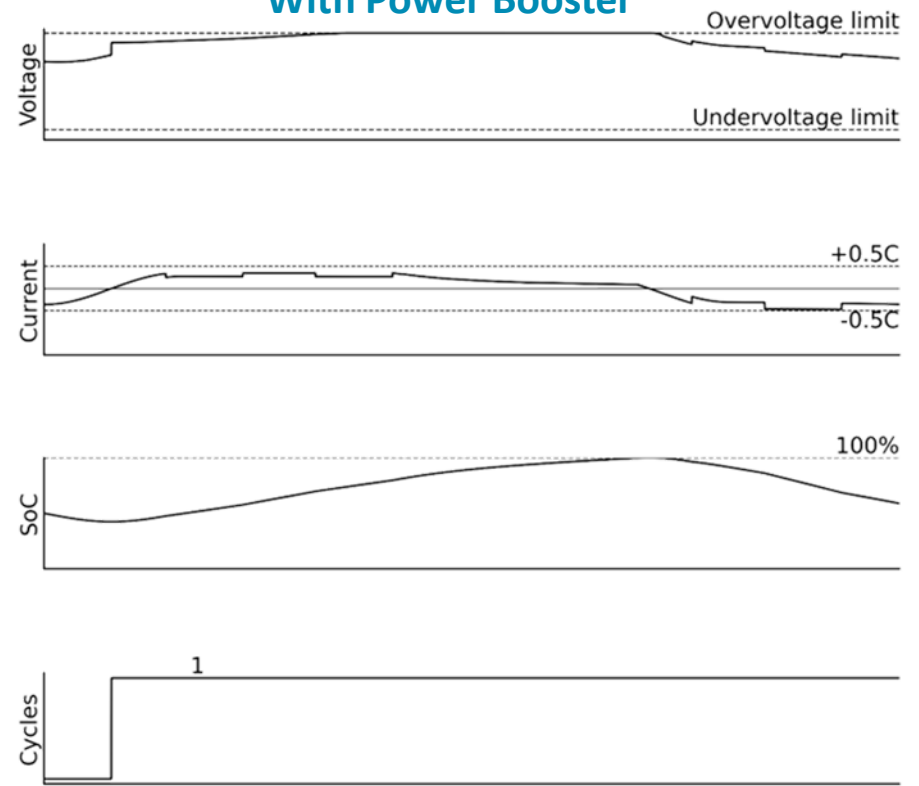


EPS ARCHITECTURE POWER BOOSTER

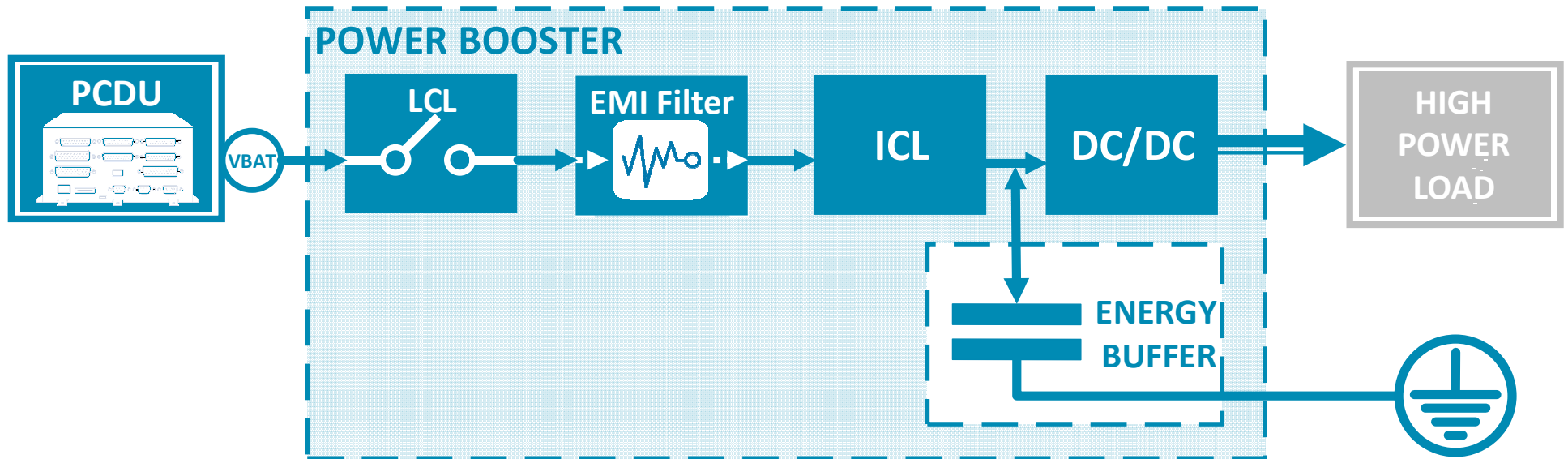
Without Power Booster



With Power Booster



POWER BOOSTER CONCEPT



Development in collaboration with: **SPES**  **UNIVERSITAS**  Miguel Hernández

Space Power & Electronic Systems

Severo Ochoa 13 – 29590 Malaga (SPAIN)

POWER BOOSTER CONCEPT

ENERGY BUFFER

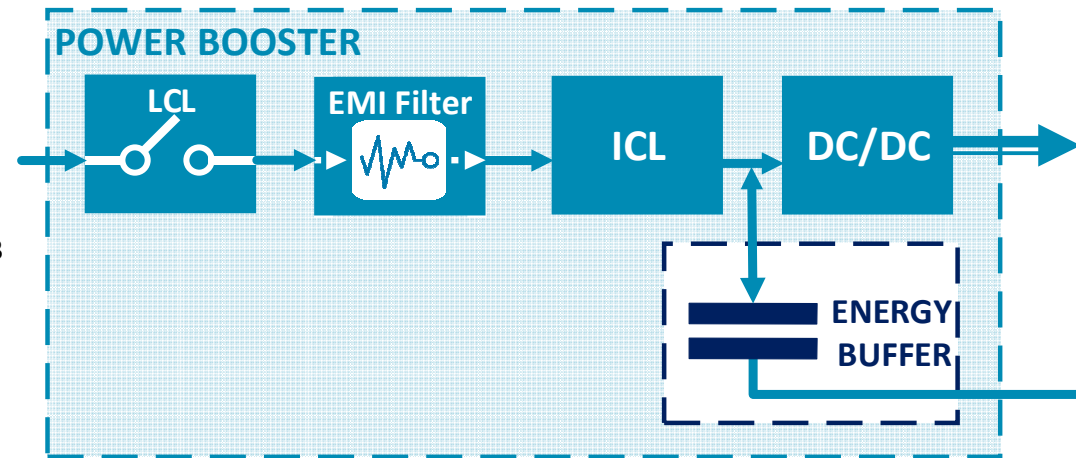
- ➔ Why supercapacitors?
- ➔ Designed for high power density.
 - + Lifetime measured in 10^6 - 10^7 cycles, not 10^3

ICL – Inrush Current Limiter

- + Not disturbance to primary EPS
- + Enables constant input power

DC/DC Converter

- + Enables optimal capacitor operating window
- + Regulates output voltage to payload



POWER BOOSTER CONCEPT

ENERGY BUFFER

Why supercapacitors?

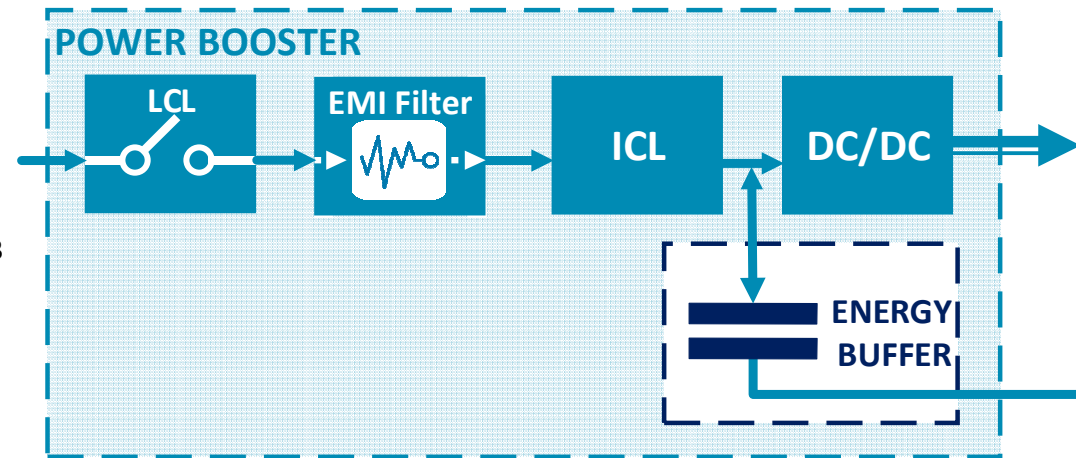
- + Designed for high power density.
- + Lifetime measured in 10^6 - 10^7 cycles, not 10^3

ICL – Inrush Current Limiter

- + Not disturbance to primary EPS
- + Enables constant input power

DC/DC Converter

- + Enables optimal capacitor operating window
- + Regulates output voltage to payload



POWER BOOSTER CONCEPT

ENERGY BUFFER

- + Why supercapacitors?
- + Designed for high power density.
- + Lifetime measured in 10^6 - 10^7 cycles, not 10^3

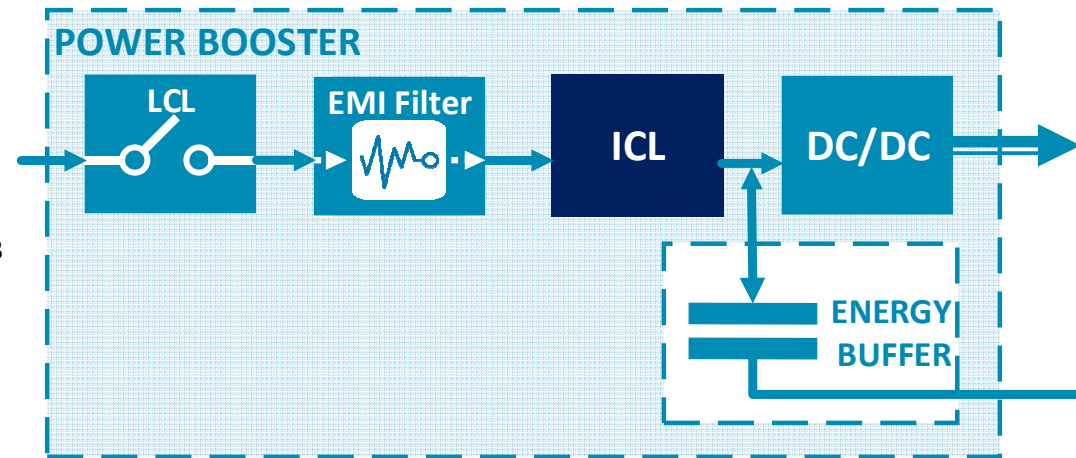
ICL – Inrush Current Limiter

➔ Not disturbance to primary EPS

- + Enables constant input power

DC/DC Converter

- + Enables optimal capacitor operating window
- + Regulates output voltage to payload



POWER BOOSTER CONCEPT

ENERGY BUFFER

- + Why supercapacitors?
- + Designed for high power density.
- + Lifetime measured in 10^6 - 10^7 cycles, not 10^3

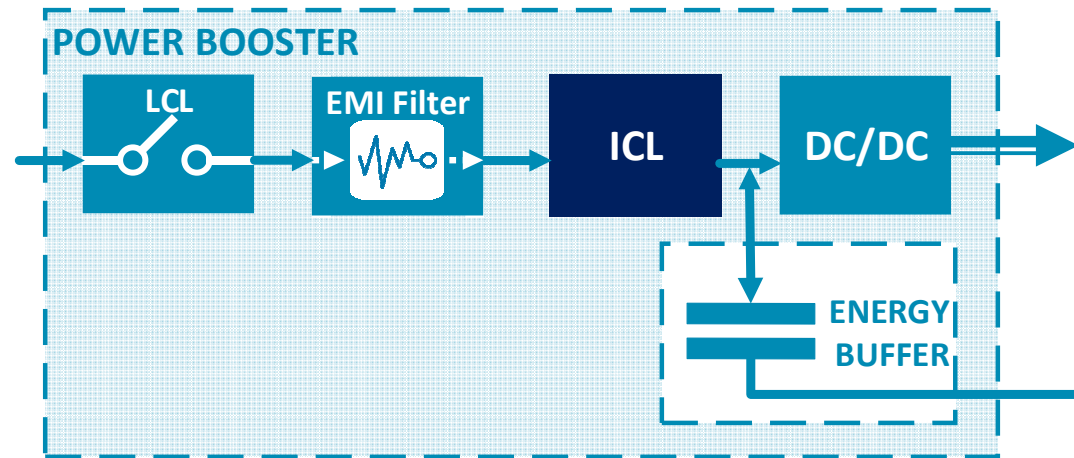
ICL – Inrush Current Limiter

- + Not disturbance to primary EPS

➔ Enables constant input power

DC/DC Converter

- + Enables optimal capacitor operating window
- + Regulates output voltage to payload



POWER BOOSTER CONCEPT

ENERGY BUFFER

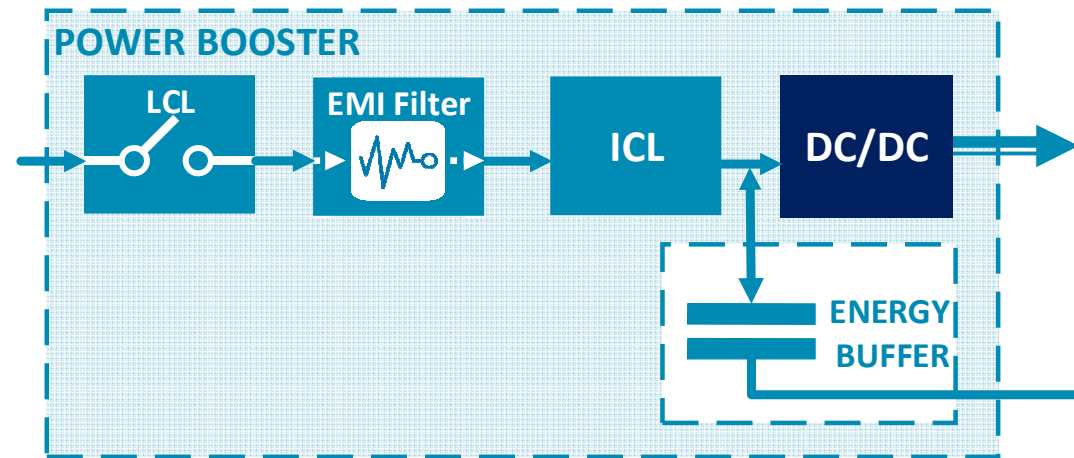
- + Why supercapacitors?
- + Designed for high power density.
- + Lifetime measured in 10^6 - 10^7 cycles, not 10^3

ICL – Inrush Current Limiter

- + Not disturbance to primary EPS
- + Enables constant input power

DC/DC Converter

- ➔ Enables optimal capacitor operating window
- + Regulates output voltage to payload



POWER BOOSTER CONCEPT

ENERGY BUFFER

- + Why supercapacitors?
- + Designed for high power density.
- + Lifetime measured in 10^6 - 10^7 cycles, not 10^3

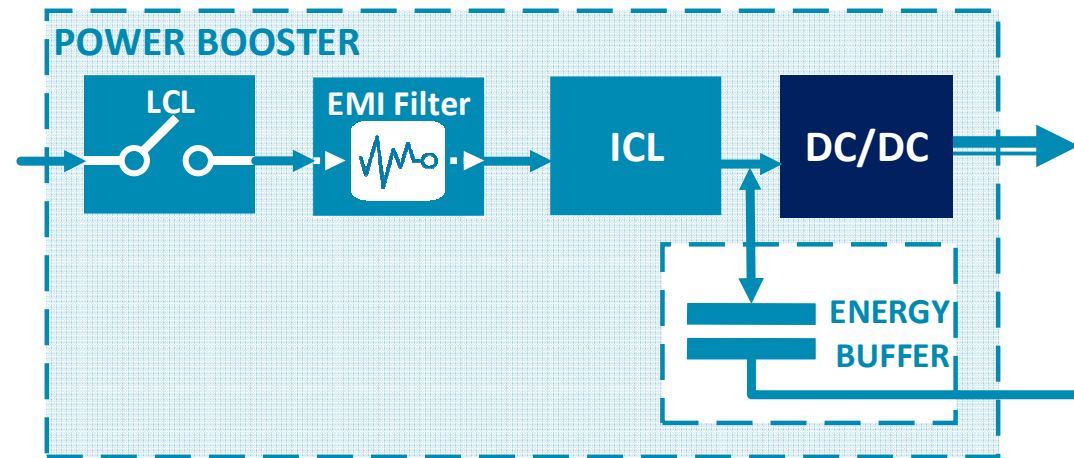
ICL – Inrush Current Limiter

- + Not disturbance to primary EPS
- + Enables constant input power

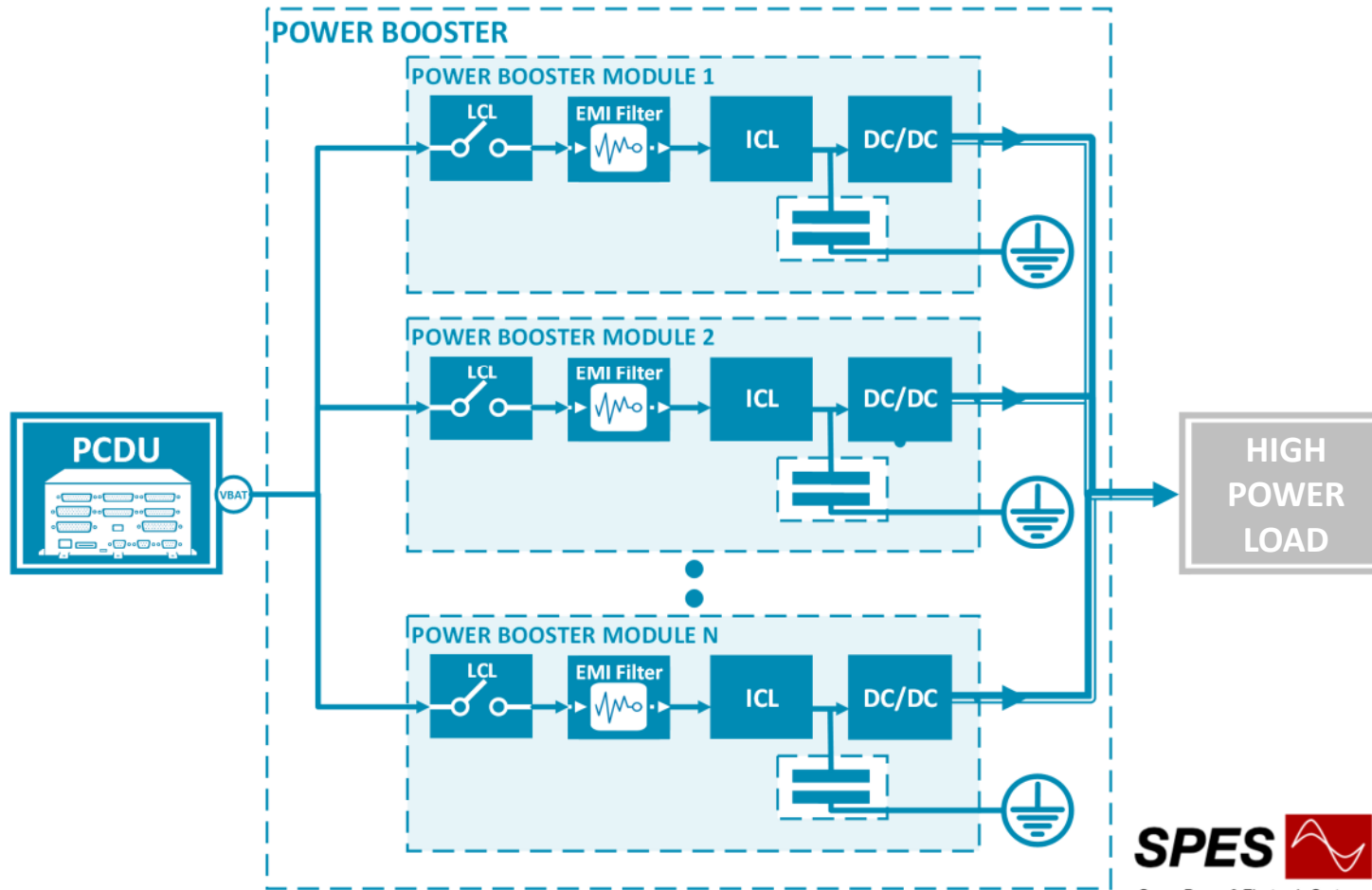
DC/DC Converter

- + Enables optimal capacitor operating window

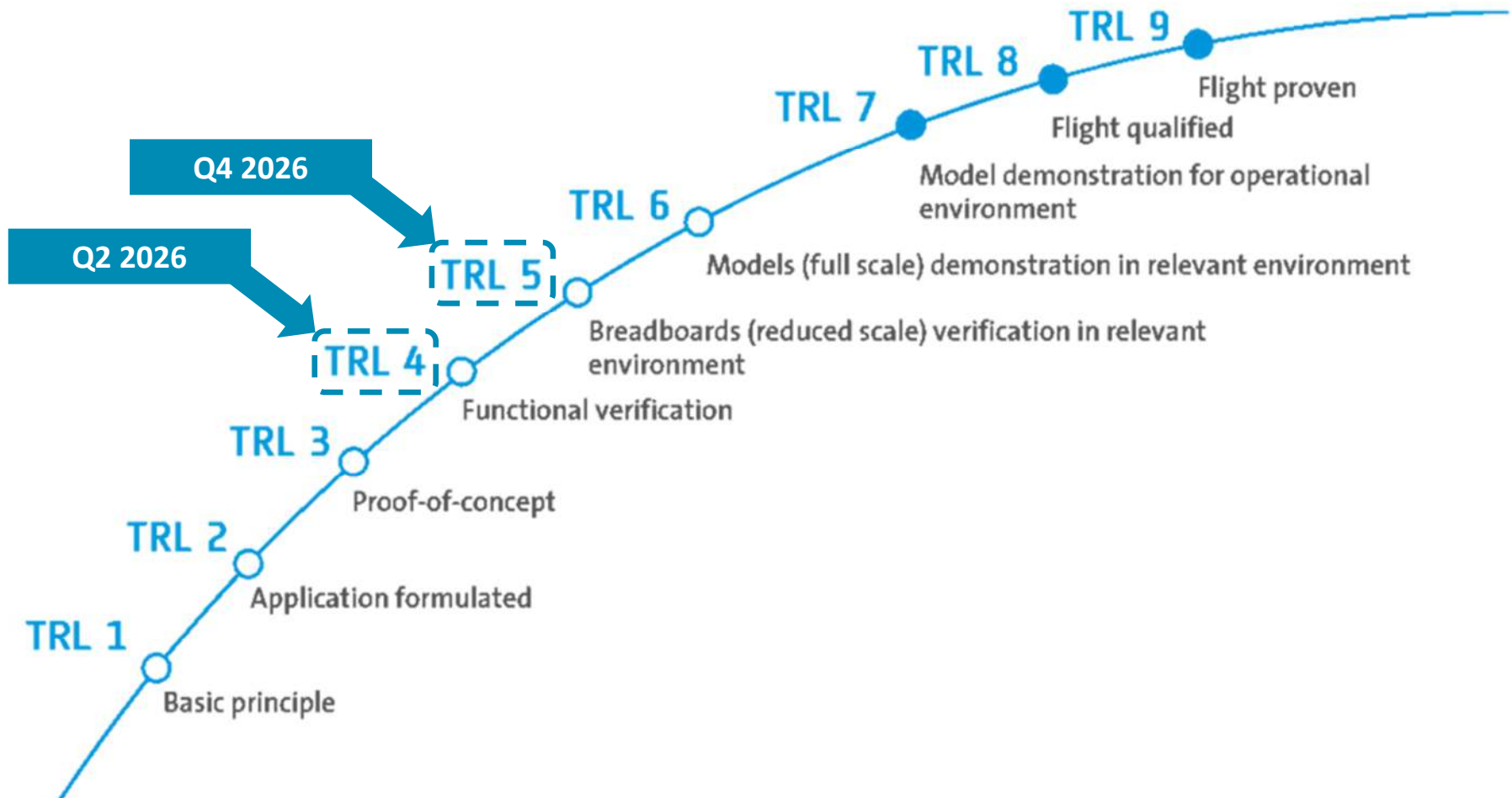
➔ Regulates output voltage to payload



POWER BOOSTER SUBSYSTEM ARCHITECTURE



POWER BOOSTER SUBSYSTEM ARCHITECTURE



SADA-M PRODUCT SPECIFICATIONS

ENVIRONMENTAL PROPERTIES	
Mission Specifications	LEO Orbit up to 5 years
Radiation Conditions	TID (Total Ionizing Dosis) = 20 KRad SEL (Single-Event Latch-Up) LET Threshold SEL ≥ 35 MeV-cm ² /mg
Temperature Ranges	Operational: (-30,+75) °C Non-Operational: (-50,+85) °C
GENERAL FEATURES	
Mass	< 2000g
Envelope	∅ 155 x 180 mm
Motion Range	± 177 deg (Twist Capsule)
Maximum Rotation Speed	1 deg/s
Position Accuracy; Backlash	± 1 deg
Holding torque	1 Nm (Unpowered), 15 Nm (Powered)
Solar array inertia load capability	1 Kg·m ²
ETU Harness	52 x AWG22
Maximum Power Consumption	< 10W



BATTERY PRODUCT SPECIFICATIONS

GENERAL FEATURES

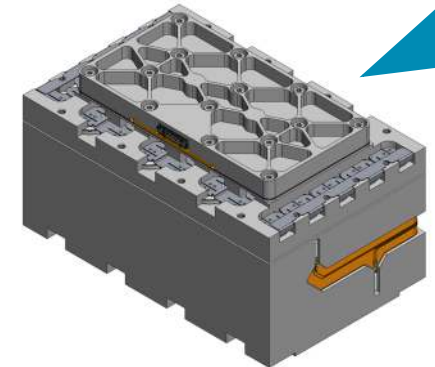
Chemistry	Lithium-ion
Architecture	40P8S (2x20P8S, each with 4x5P8S packs)
BOL capacity (MIN ↔ MAX)	130-134 Ah (3744-3859.2 Wh)
Nominal voltage (Charged ↔ Discharged)	28.8 V (33.6 V ↔ 24.0 V)
Maximum discharge rate (non-continuous)	260 A
Mass, 5P8S Pack	3.5 kg
Envelope (L x W x H), 5P8S Pack	170 mm x 110 mm x 95 mm

OTHER FEATURES

Discharge temperature range: -20°C to +60°C Charge temperature range: 0°C to +45°C
Thermal management performed by heaters (24W - PI control) and 8 temperature sensing points on cells, on each 5P8S module.
Telemetry: Voltage, current and temperature.
Battery cells protection: CID and PTC
Redundant BMS, 1 for each 20P8S Battery Module



Design derived from products with heritage



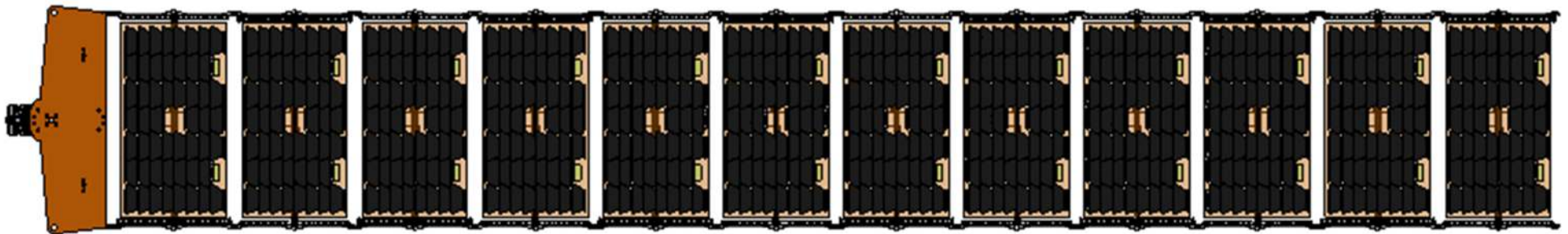
SOLAR ARRAY SEMI-FLEXIBLE WING

SEMI-FLEXIBLE CONCEPT

- + Solar Cells Laid over Flexible Substrate
- + Substrate tensioned by CFRP frame
- + Light and Compact: ~ 100 W/kg ~ 15 kW/m³ (3J solar cells at 28°C BOL),
 - + +100% in W/kg , & +50% in kW/m³ with respect to rigid wings

CELL TECHNOLOGIES

- + Compatible with 3J, 4J & Silicon Solar Cells (Hybrid capable)



FINAL REMARKS

- + Including a power booster to avoid primary EPS oversizing.
- + Decouple power peak consumption from the main bus
- + Adapt the battery modules and SADA to this specific platform
- + Development of a new solar array wing based on flex substrates and Si cells
- + Management of 4 kW peak power with an EPS sized for 1.5 kW continuous operation
- + Industrialization for manufacturing at constellation level



DHV Technology

www.dhvtechnology.com



CONTACT

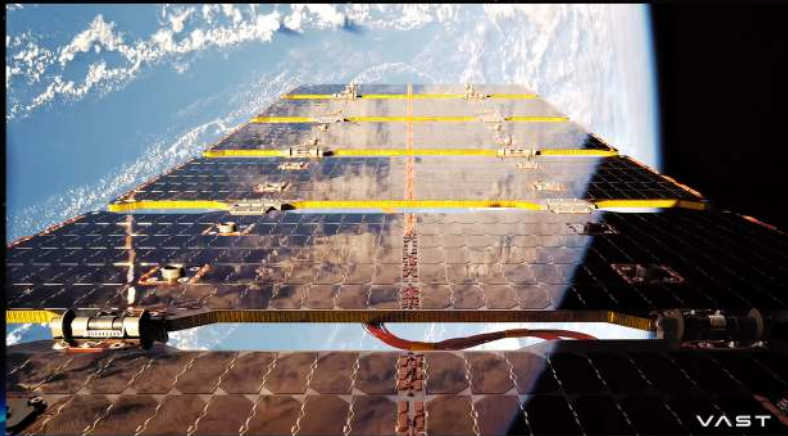
Ismael Sánchez
(Head of Product Development)
i.sanchez@dhvtechnology.com



ADDRESS

C/ Severo Ochoa 13
Tech Park of Andalusia
29590 Malaga (SPAIN)

Thank you!



DHV Technology

Space Power Workshop 2026

Tech Park of Andalusia
Severo Ochoa 13 – 29590 Malaga (SPAIN)