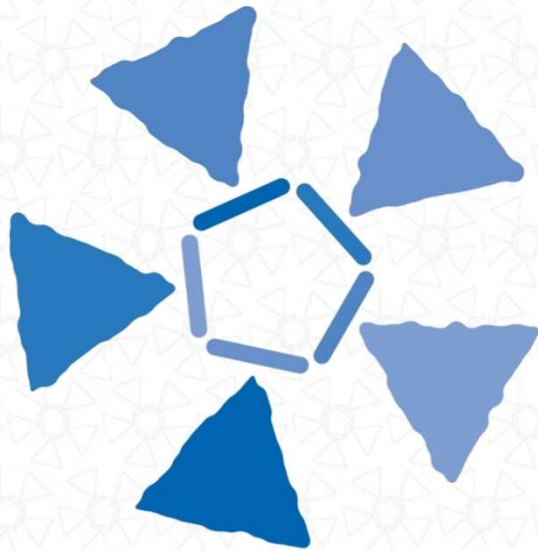


epic power



epic power



THE WAR OF CURRENTS IS NOT OVER AND HOW IT IMPACTS THE ELEVATOR

Dr. Pilar Molina-Gaudo



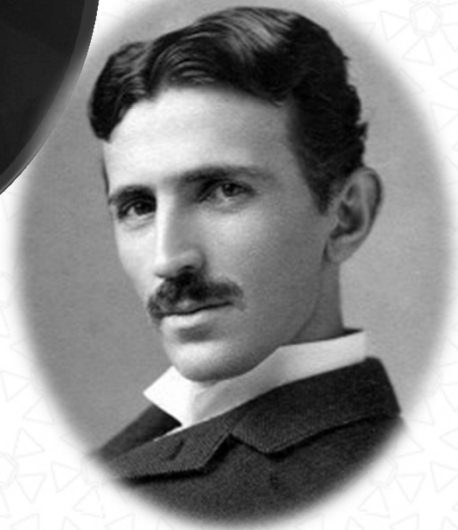
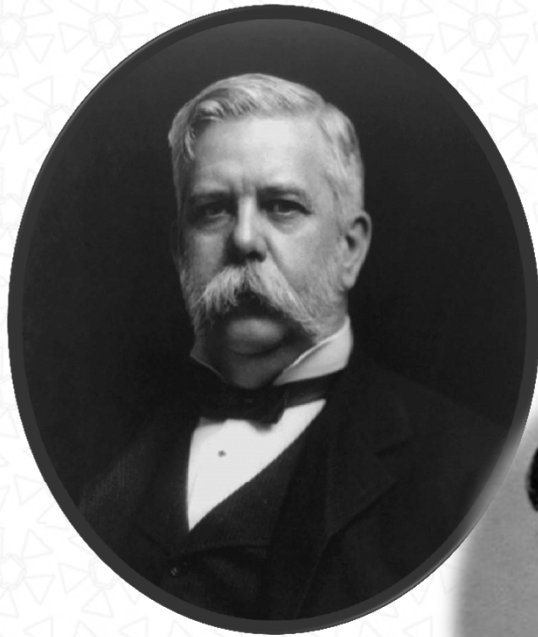
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IN THE PAST...

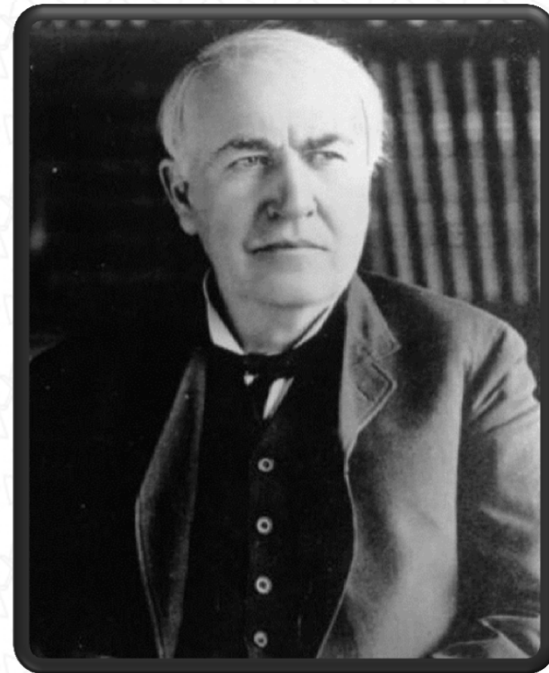


WHAT WAS THE WAR OF CURRENTS?

✦ Westinghouse (and Tesla)



✦ Thomas A. Edison





HOW TO DISTRIBUTE ENERGY

E07

DISTANCE BETWEEN GENERATION AND LOAD → LONG LINES →
LINE LOSSES → HIGH COST



AC

- Advantages
 - Transformation of voltage levels with transformers
 - AC motors → Simpler
 - Poly phase systems reduce losses
- Disadvantages
 - Suboptimal power transmission
 - Hazardous high voltage AC
 - Line inductances and capacitances



DC

- Advantages
 - Safer and simpler
 - No synchronization
 - No harmonic problems
 - DC motors
 - Maximizes power transmission
- Disadvantages
 - Difficult high-voltage generation
 - Difficult DC / DC transformation
 - DC circuit breakers

Folie 5

E07

La info de est transpa, está contrastada en algún sitio?

Estanis Oyarbide; 05.10.2017



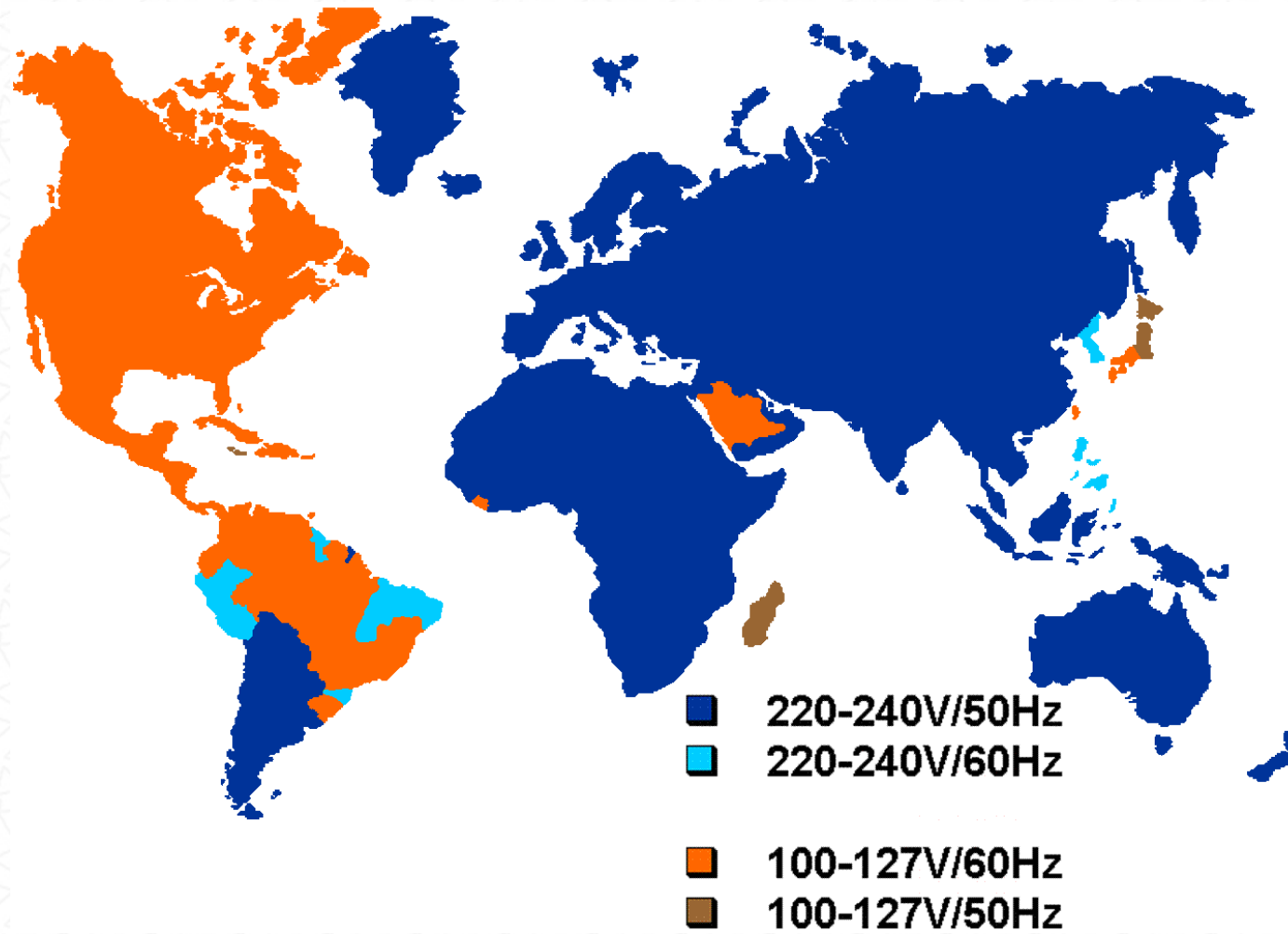
AND THE WINNER WAS...

✦ Chicago 1893 World Fair





ENERGY DISTRIBUTION IN THE WORLD TODAY



Source: <http://www.worldstandards.eu/>



AND HOW DOES THIS IMPACT THE ELEVATOR?

IEEE
SPECTRUM

San Francisco's Secret DC Grid

The last direct-current power lines are being dismantled just as DC distribution seems headed for a comeback



Photo: Peter Fairley



Photo: Richard Blaska

Source: IEEE Spectrum Magazine. Nov. 15, 2012



epic power

IN THE PRESENT...

Electricity

Edison's revenge

The humble USB cable is part of an electrical revolution. It will make power supplies greener and cheaper



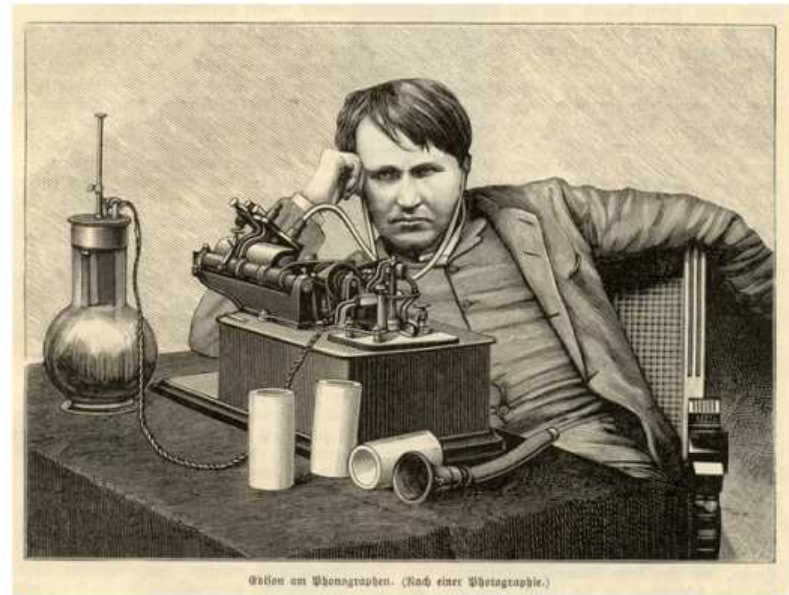
Source: The Economist. Oct. 19, 2013

Business Report

Edison's Revenge: The Rise of DC Power

In a world of more electronics and solar energy, there's less and less need for AC power.

by Peter Fairley April 24, 2012



Source: MIT Technology Review. April 24, 2012



USE OF ENERGY IN THE WORLD TODAY

✦ LEDs are DC powered

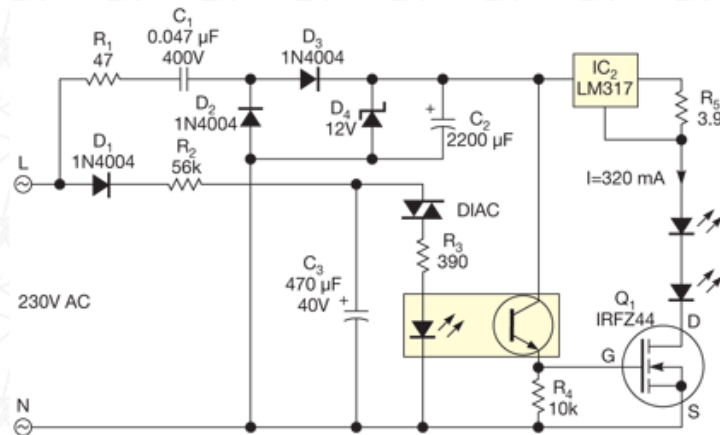


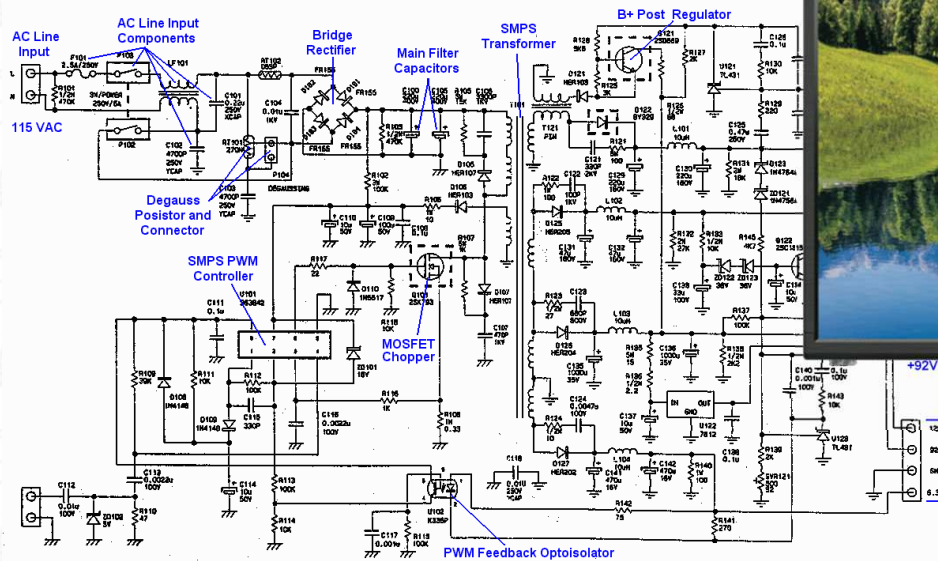
Figure 1 This circuit uses a simple DIAC relaxation oscillator, which activates a constant-current-switching circuit.





USE OF ENERGY IN THE WORLD TODAY

Monitors and TVs

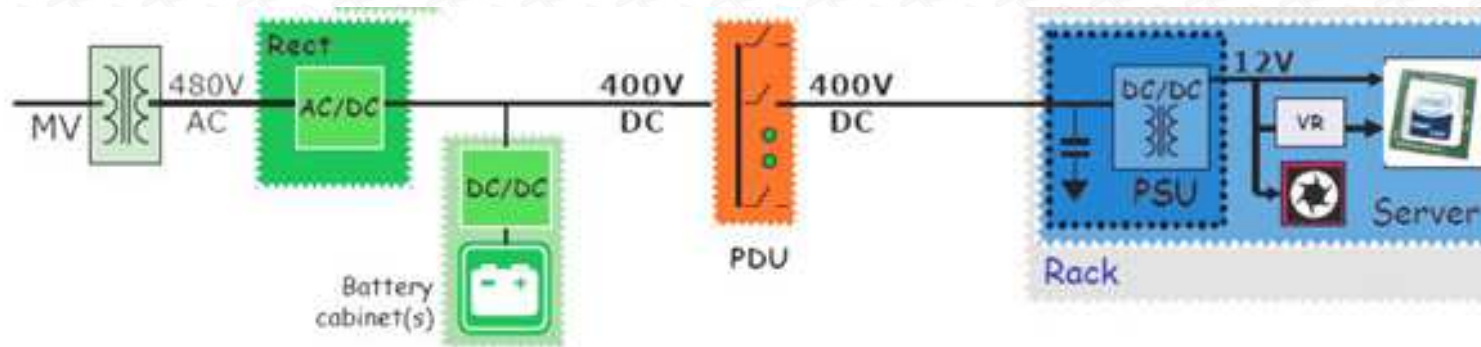


Typical Switchmode Power Supply for Small SVGA Color Monitor
<https://www.repairfaq.org/>



USE OF ENERGY

❖ Data centres



Source: T. Aldridge, A. Pratt, P. Kumar, D. Dupy, G. AlLee, Intel Labs, "Evaluating 400 V Direct-Current for Data Centers," A case study comparing 400 Vdc with 480-208 Vac power distribution for energy efficiency and other benefits.



USE OF ENERGY

Electric Vehicles



40A Level 3 DC fast charger



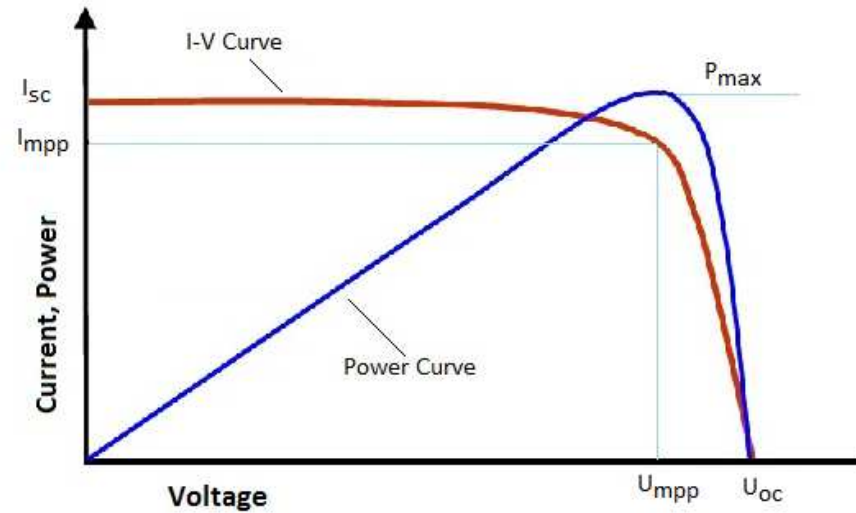
Specification:
input: 380-440V Three Phase
output: 450Vdc/750Vdc
output power: 20KW to 100KW





LOCAL GENERATION OF ENERGY

Solar panel





ENERGY STORAGE

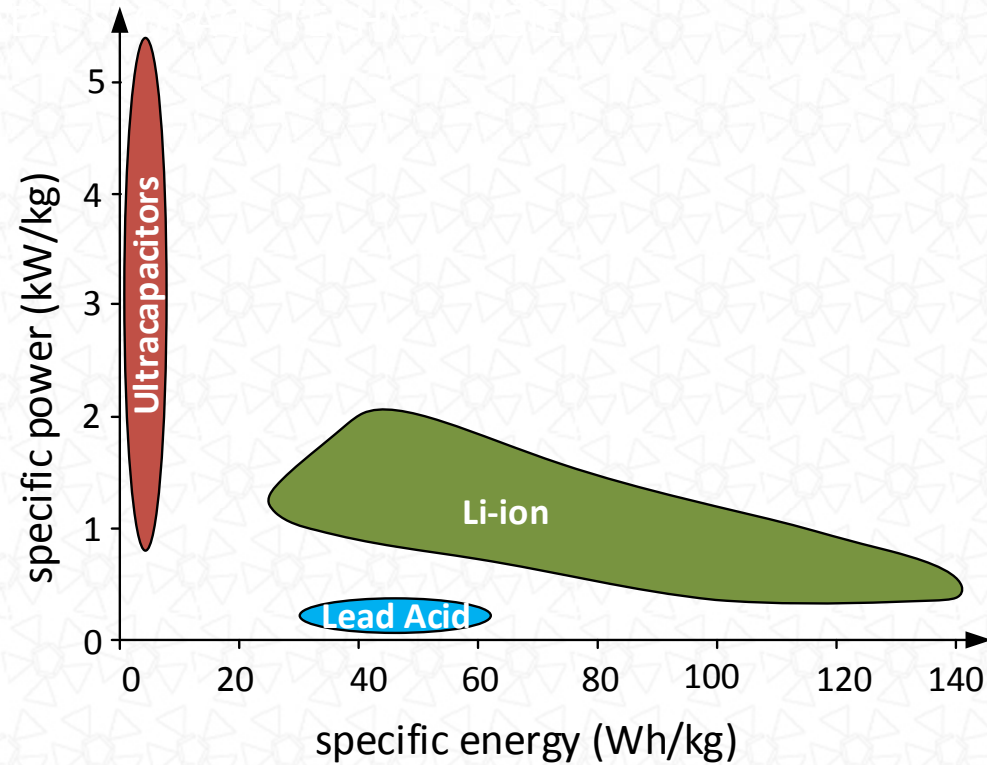


Source: Tesla.com





AVAILABLE STORAGE TECHNOLOGIES

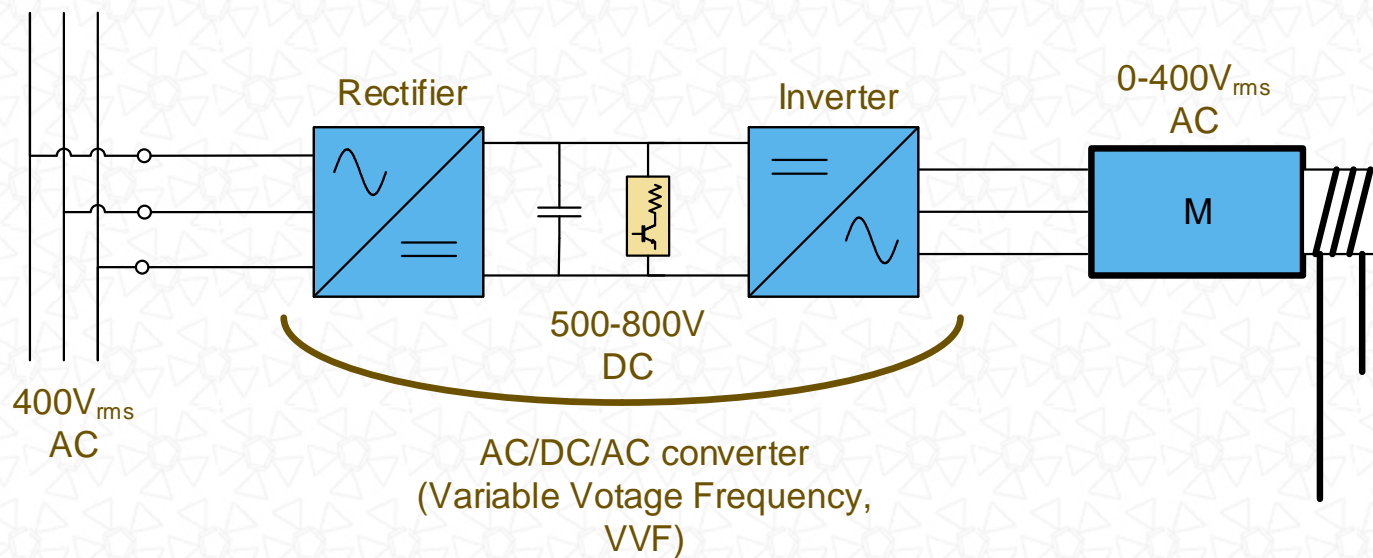


Feature	Lead Acid	LiOn	Ultracapacitor
Number of cycles	300-2000	>5000	>1000000
Specific power (W/kg)	30-180	300-2000	5000
Specific energy (Wh/kg)	30-60	30-140	5
BMS/VMS	no	yes (BMS)	yes (VMS)
Cost (€/kWh)	170	1200	17000



AND THE ELEVATOR?

❖ Motor + inverter (VVVF drive)

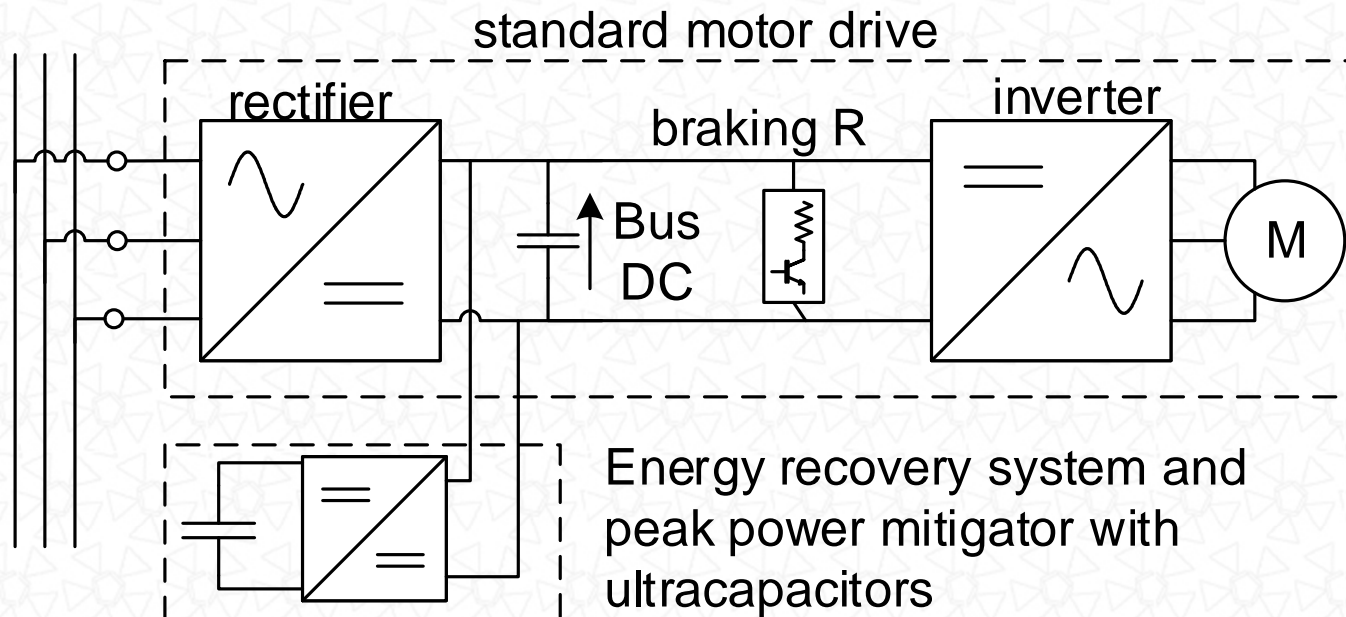


- ❖ Based on well-known industrial drivers
- ❖ 500 to 800V at its DC bus



OPPORTUNITIES OF ENERGY STORAGE 1

❖ Energy recovery system with ultracapacitors





ERS 2G

plug & save

**ENERGY RECOVERY
SYSTEM FOR LIFTS**

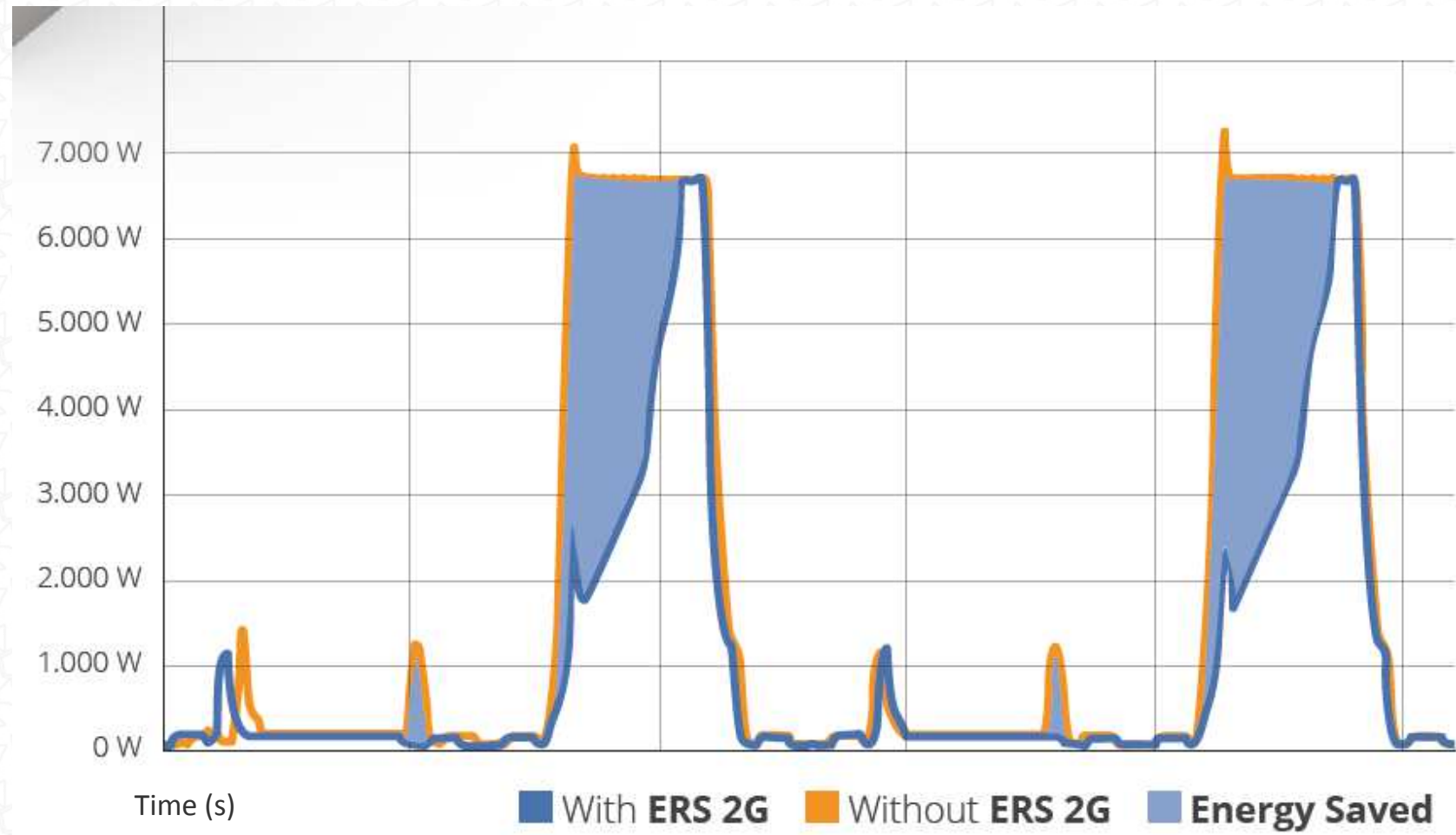


with a simple two-wire connection to any drive.

by  epic power

- ❖ Two wire connection to drive
 - New or existing
- ❖ One size fits all
 - Parallelization
- ❖ No maintenance
- ❖ <2W standby

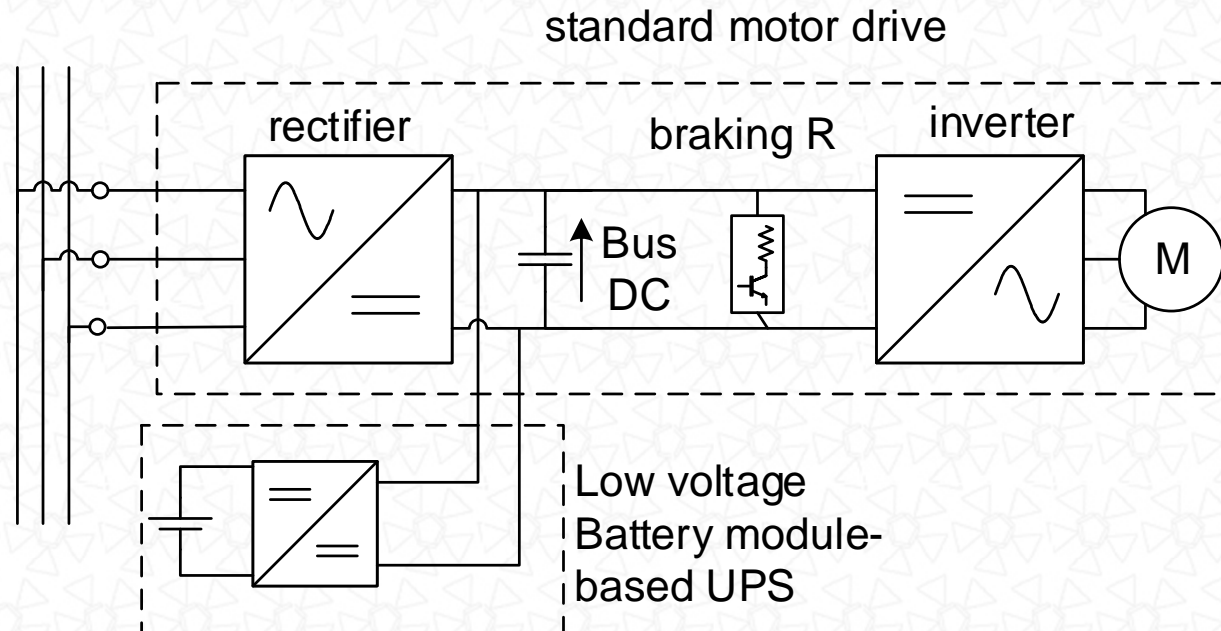
Power





OPPORTUNITIES OF ENERGY STORAGE 2

❖ Low-voltage battery high-performance UPS





E3

EVACUATION
EQUIPMENT



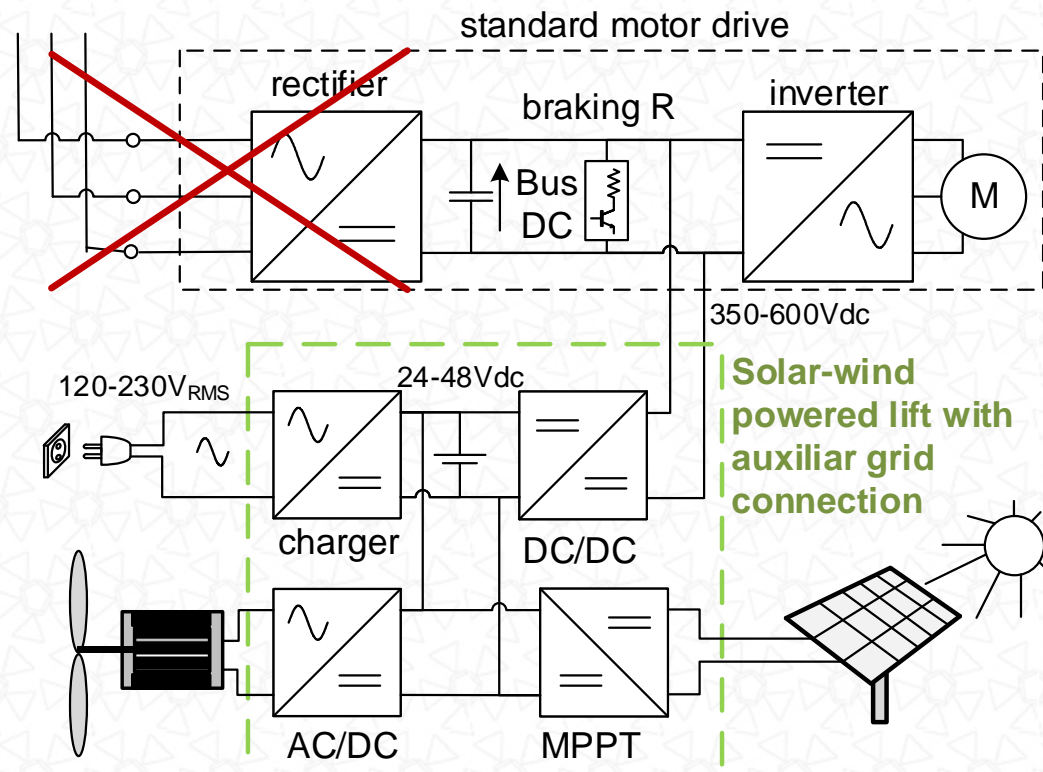
by  epic power

- ❖ 48V batteries
 - Low cost
 - Low size
- ❖ No additional control
 - Simple connection
- ❖ Power scalable
 - From 3k5 to ...
- ❖ Energy scalable
 - Full evacuation of buildings



OPPORTUNITIES OF ENERGY STORAGE 3

❁ Intelligent power supply (all-in-one energy hub)





P2S

plug & single-phase

**POWER SUPPLY
FOR ELEVATORS**

ADVANTAGES

» Reduces peak power consumption



ENERGY one.



by epic power



- ❖ 48V batteries
 - Low cost
- ❖ Low power charger 500W
 - Peak reduction
- ❖ No UPS required
- ❖ Regenerated energy
- ❖ Solar



IN THE FUTURE...



NET-ZERO (NEAR-ZERO) ENERGY BUILDINGS

✿ Beyond BREAM / LEEDs





epic power

IN CONCLUSION



BRING YOU ELEVATOR CLOSER TO A (POSSIBLE) DC FUTURE

✦ DC powering of systems

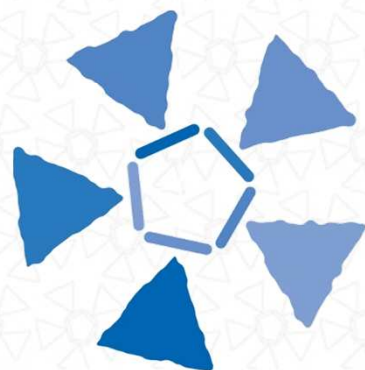
- No AC/DC
- Energy storage
- Solar energy

✦ DC powering of elevators

- High-performance UPS systems
- Peak power mitigation
- Energy recovery systems



Thank you for your attention



epic power



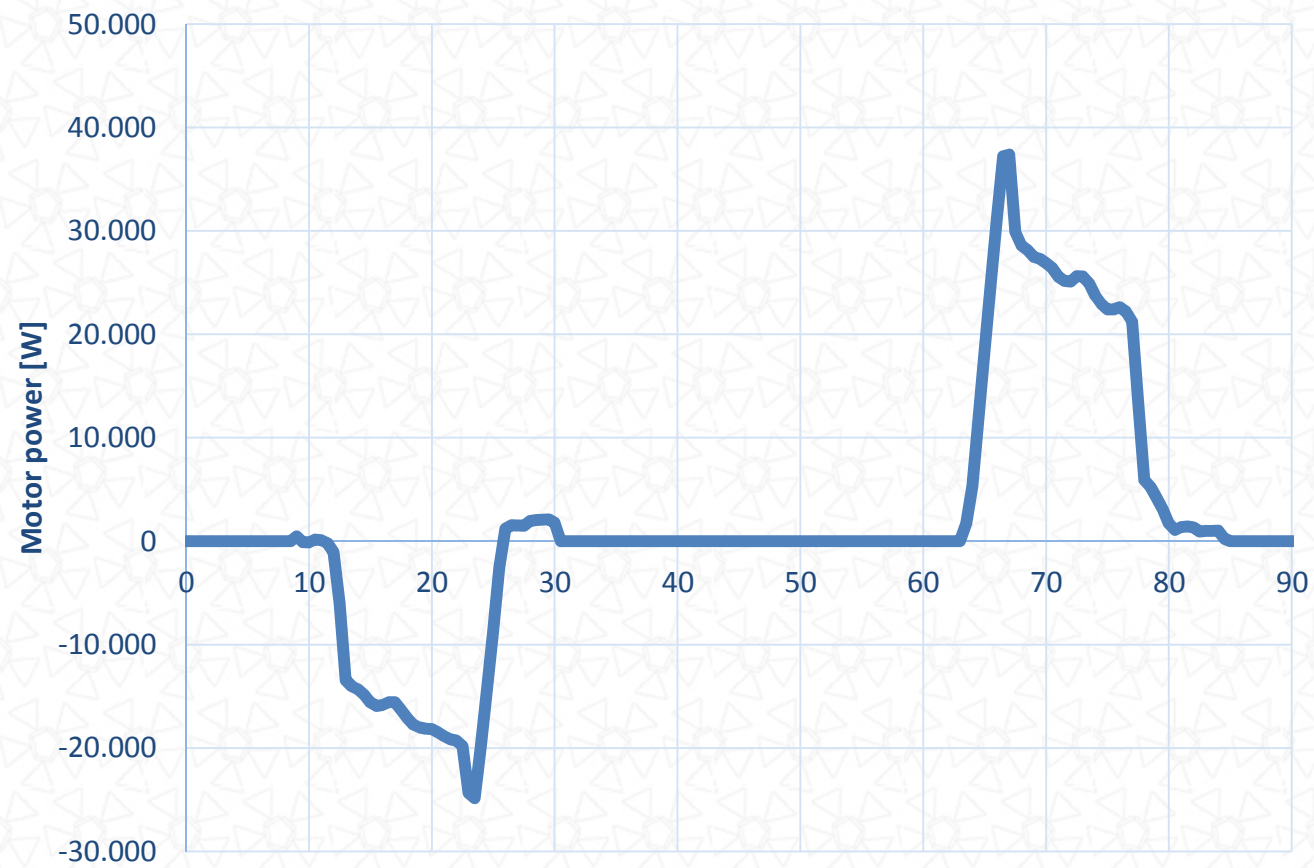
www.epicpower.es

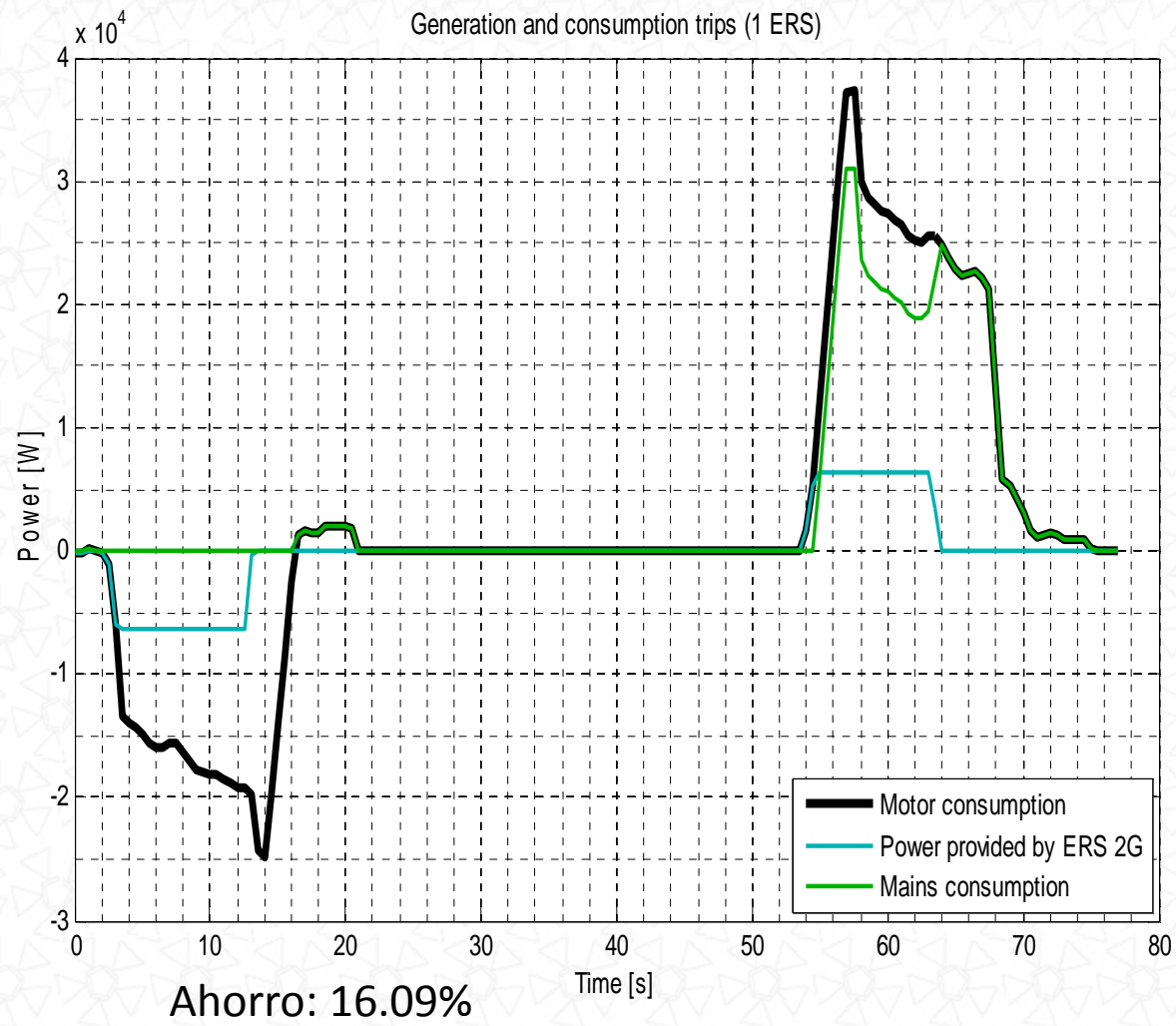
Pavillion, 103

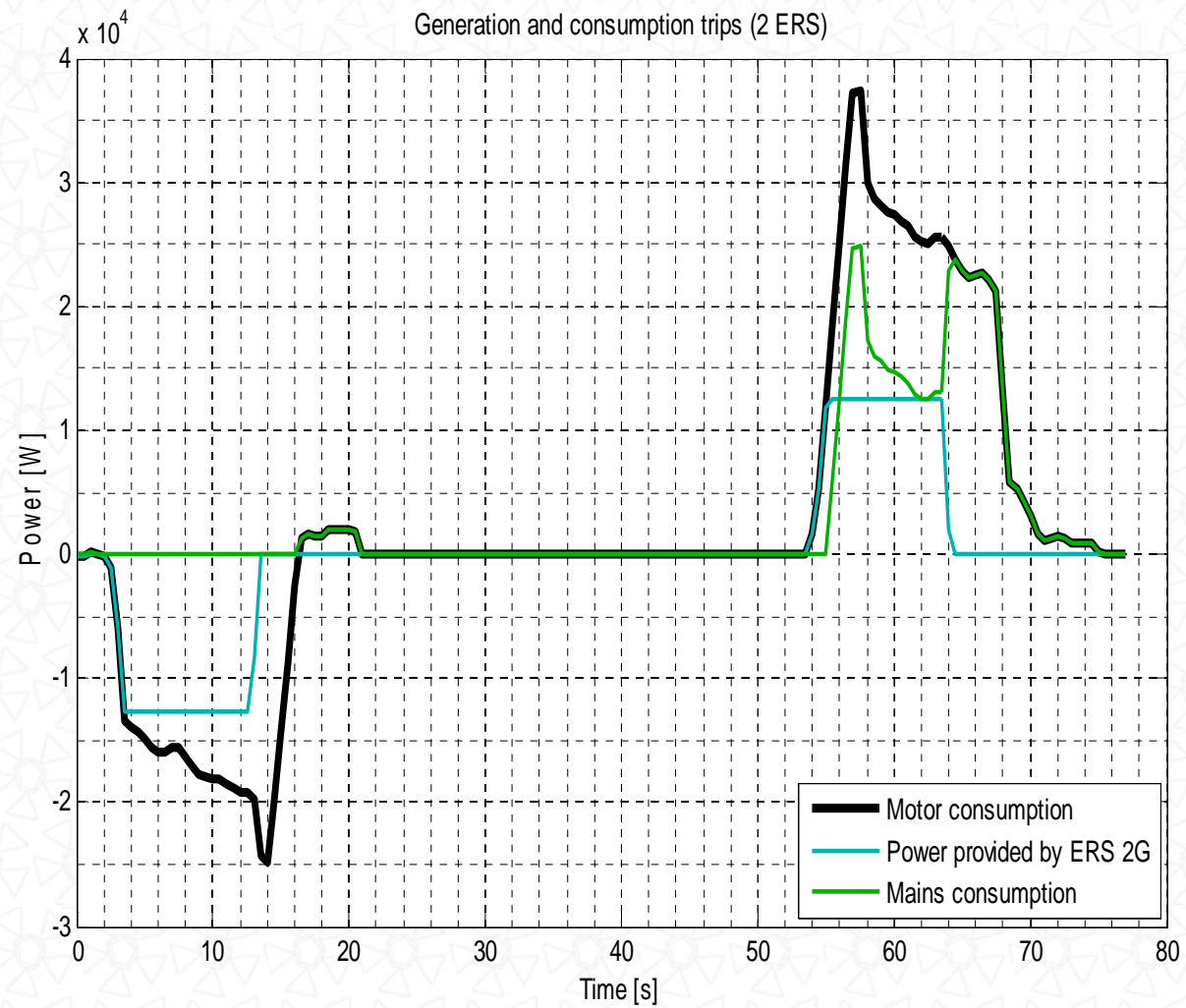


CASE STUDY N

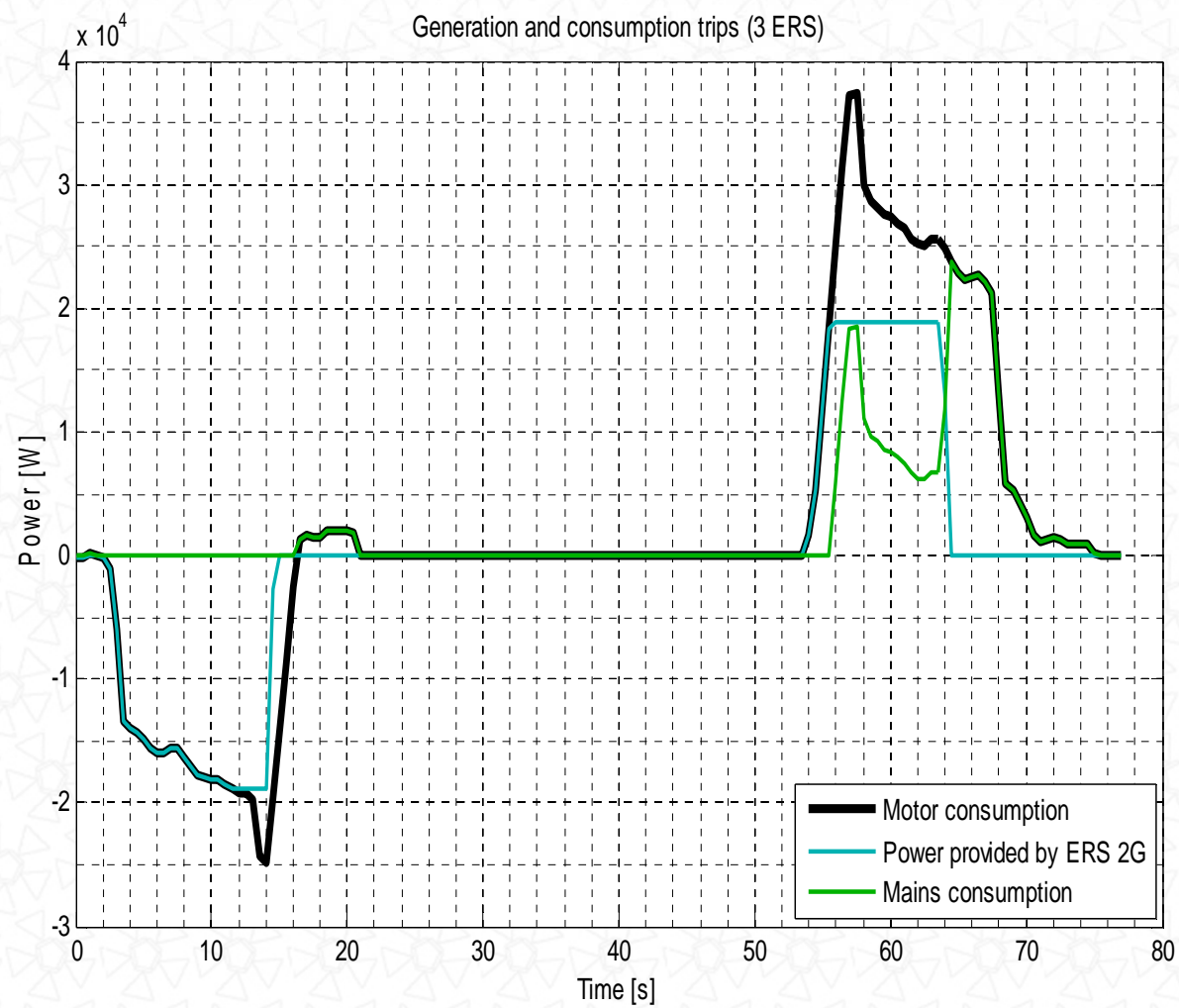
Motor Power







Savings: 32.17%



Ahorro: 48.26%

CASE STUDY 3 – COMPARISON WITH REGEN DRIVE

Case Study 3
Test tower
ERS P3k

- ✦ Test tower in Madrid
- ✦ No standby considered
- ✦ Only motor is measured

	[Wh]
10 trips	136
10 trips with REGEN drive	92
10 trips with ERS	83