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The 27th INTERNATIONAL  
ELECTRIC VEHICLE  
SYMPOSIUM & EXHIBITION

BARCELONA  
17th-20th November 2013

# INTELLIGENT +BOATING

DEMONSTRATION OF A SYSTEM FOR  
SUPERCHARGED PLUG IN HYBRID  
COMMUTER BOAT

ECHANDIA  
MARINE  
INTELLIGENT BOATING

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## THE COMPANY

- + Echandia Marine

## HYBRID PRINCIPLE

- + Series hybrid system
- + Echandia system principle

## DEMO PROJECT PLUG IN HYBRID BOAT

- + Background
- + Environmental benefits
- + Economy

## OUR MISSION ELECTRIC

"Echandia Marine's mission is to electrify boat traffic for business and pleasure. The focus of our business is public transport on water in cities and pleasure boats in the archipelago. Echandia is supplying both drivetrain and the energy to be used"



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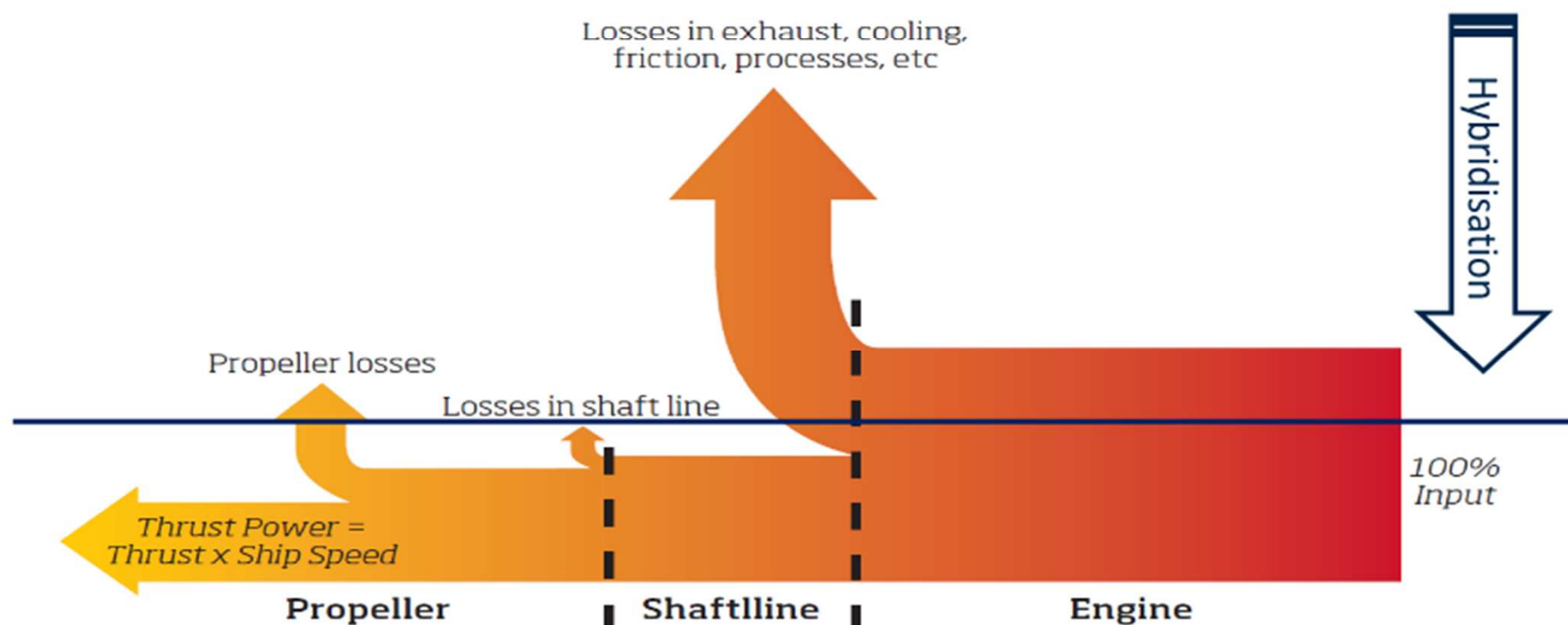
## SUSTAINABLE FUTURE

- + Low cost of operation and TCO
- + Environmentally friendly (No CO<sub>2</sub> , NO<sub>x</sub> or PM)
- + Better comfort (Low noise and vibrations)
- + Better manoeuvrability

## GREEN CITY FERRIES CONCEPT

- + Bareboat contract through Green City Ferries
- + Enables shared risk and investments

# LOSSES COST



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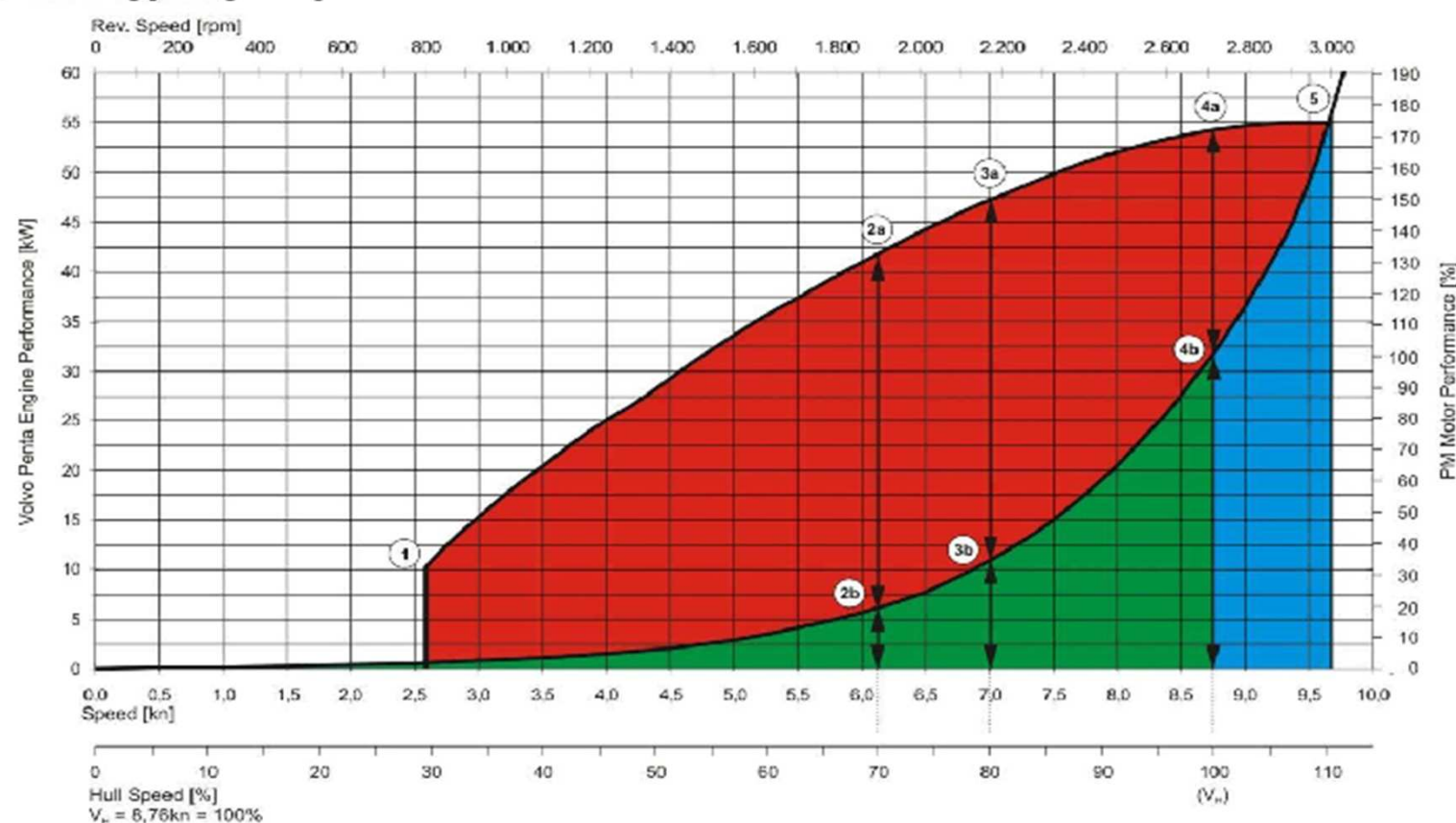


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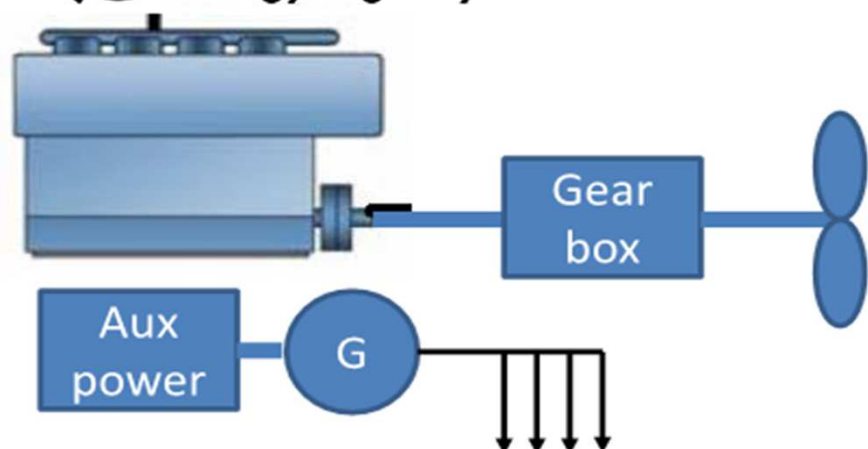


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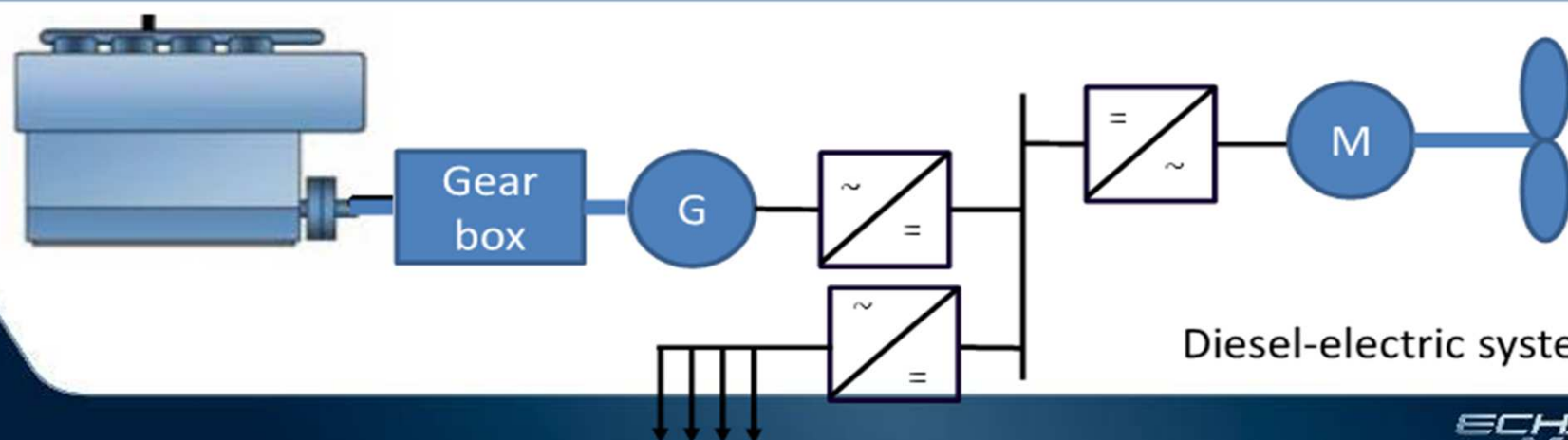




# HYBRID PRINCIPLE

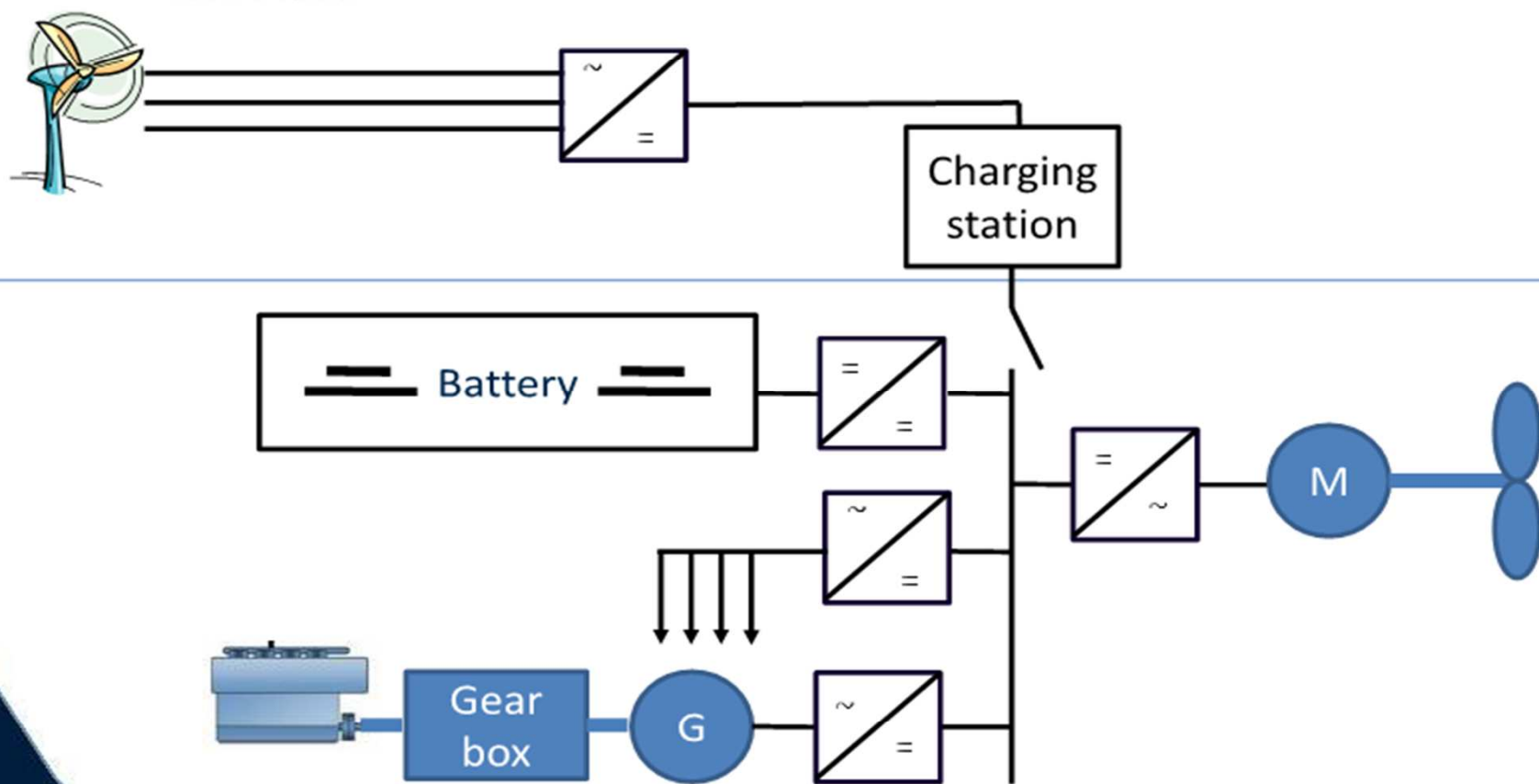


Conventional system

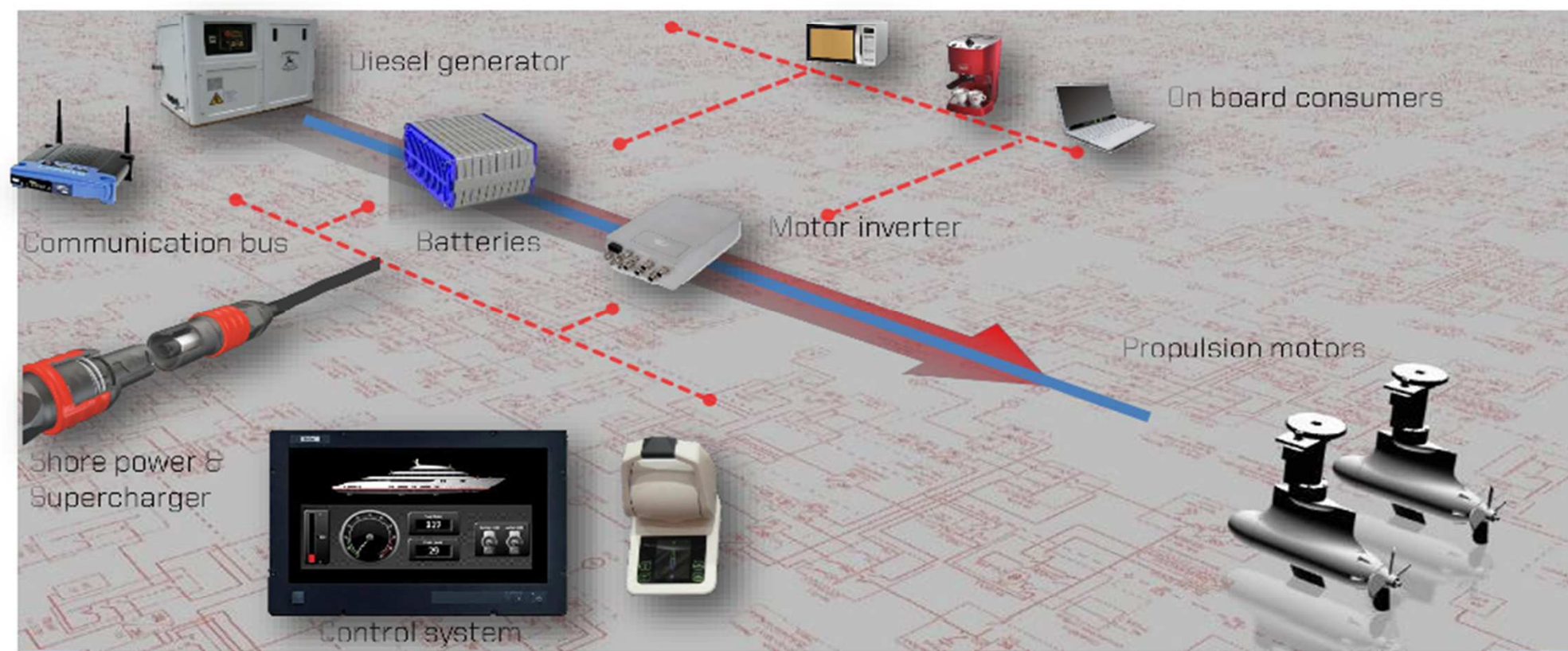


Diesel-electric system

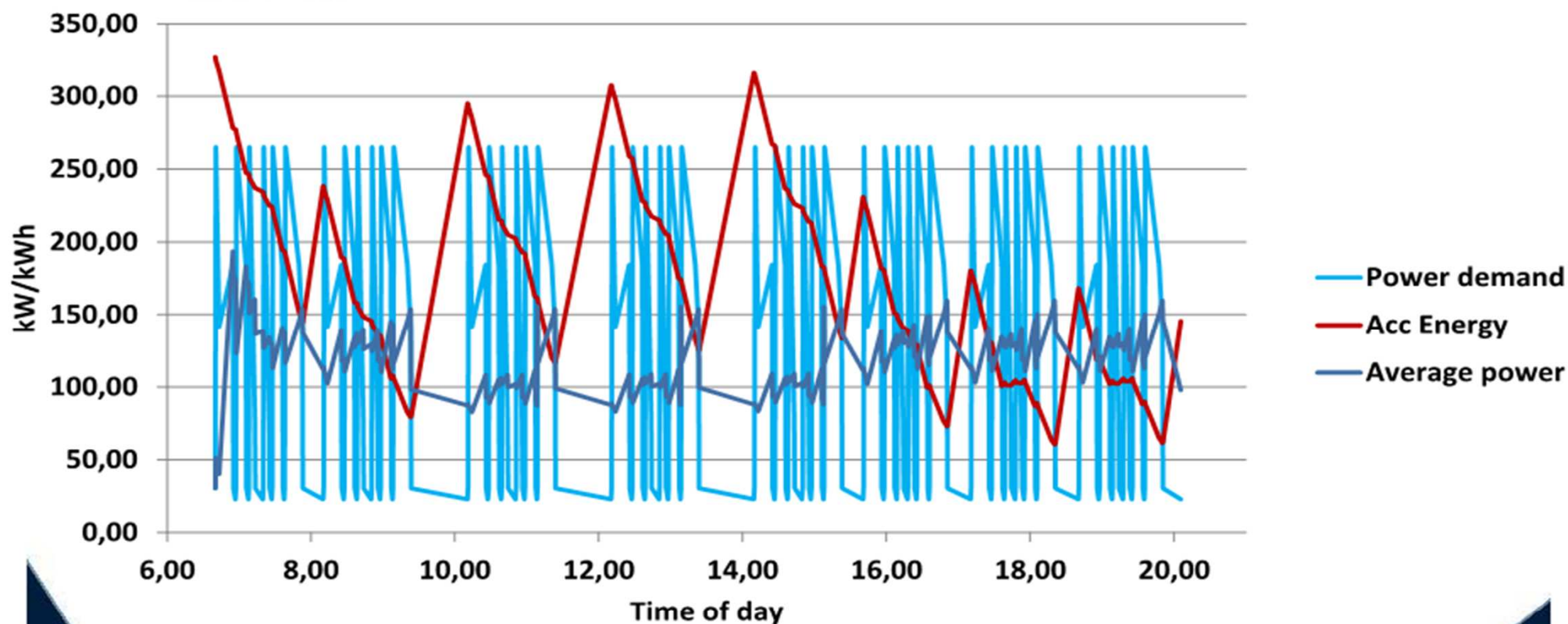
# ECHANDIA PRINCIPLE







# OPTIMAL SIZING



PRE STUDY, Energy Agency 30 k€ (45%)

- + Conducted 2011 - 2012
- + Passenger flow analysis
- + Dimensioning requirements
- + Environmental benefit analysis

DEMO PROJECT, Energy Agency 1 M€ (45%)

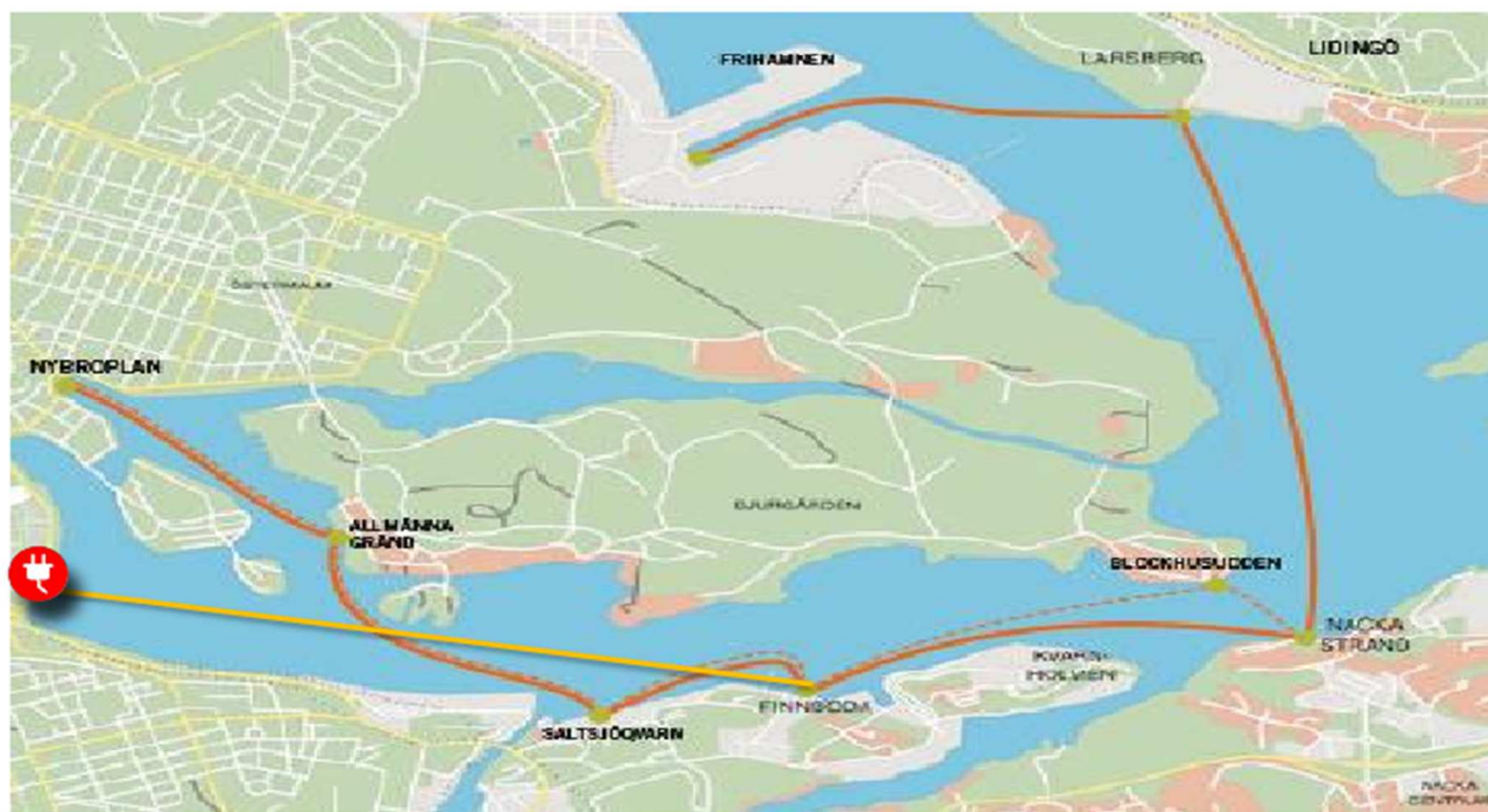
- + Project time frame July 2012 - June 2016 (start Q3 2014)
- + Verify lower energy usage and emissions
- + Verify lower M&O costs vs conventional system



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# DEMO CASE



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# DEMO BOAT



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## CALCULATED BENEFITS

- + Lower energy consumption 700 MWh/y (60%)
- + Lower CO<sub>2</sub> emissions 280 tons/y (85%)
- + Lower NO<sub>x</sub> emissions 3 tons/y (95%)
- + Lower PM emissions 140 kg (95%)

## HEALTH EFFECTS

- + Less victims from heart attacks (PM effect)
- + Lower health care costs

# FINANCIAL? BENEFIT

	CONVENTIONAL	ELECTRIC
INVESTMENT	1 600 k€	1 900 k€
CAPEX (7%)	110 k€/y	130 k€/y
BATTERY LEASE	0 k€/y	70 k€/y
MAINTENANCE	40 k€/y	10 k€/y
ENERGY 3000 H (0,9 €/L 0,16 €/KWH)	160 k€/y	90 k€/y
ENERGY- & CO <sub>2</sub> -TAX	0 k€/y	20 k€/y
SUMMA	310 k€/y	320 k€/y

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## BENEFITS FOR COMMUTERS

- + Lower environmental footprint
- + Higher comfort on board (no noise)
- + Deliver upon environmental targets (75% RES)

## BENEFITS FOR CITY

- + Cleaner air and less noise - Lower health care costs
- + Positive image
- + Future realistic demand for Public bidding process



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