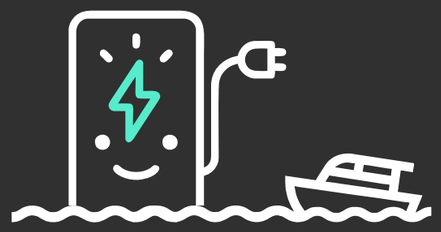
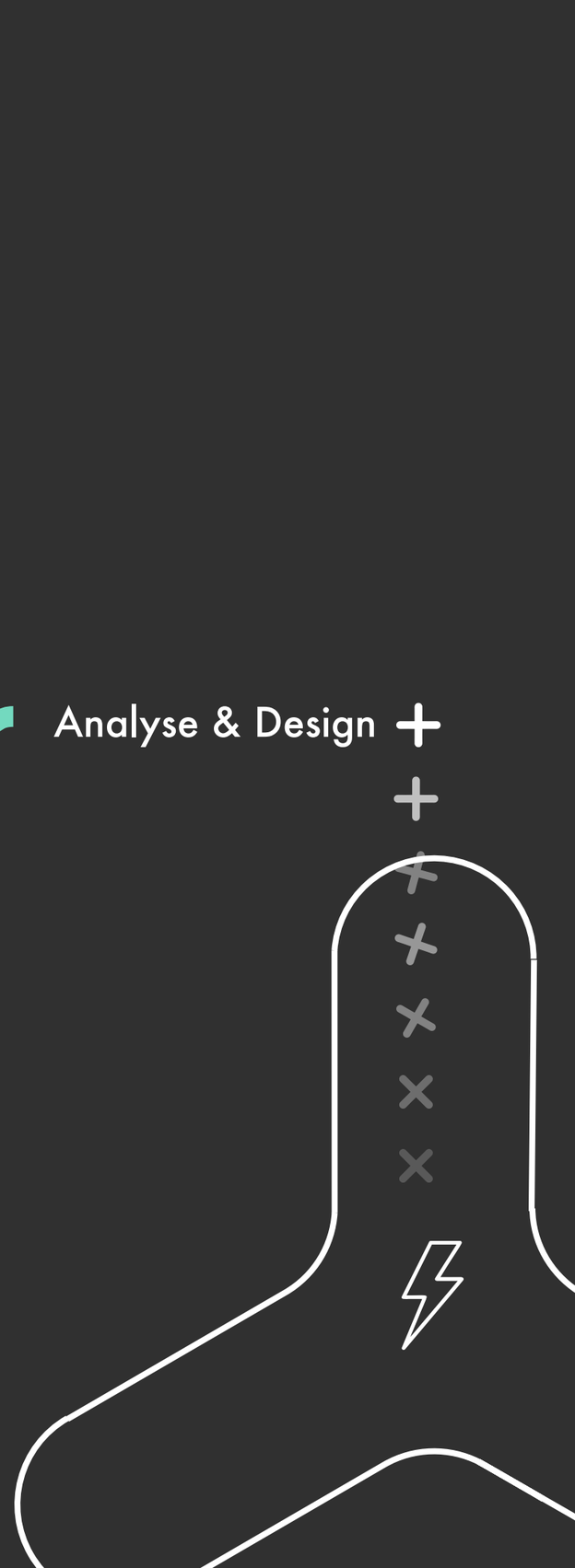


E-HARBOUR

POWER STATION SYSTEM
ON THE WATER

Analyse & Design



Yigang Shen

Analyse

Design strategy analyse

Product oppotunity gap

SET Analyse (social -economic-technological)

Value Opportunity

SWAT

Technological analyse

Technological Extrapolate

--Battery,
--Charging methodes,

Existing Tech-Problem and Solution

Independent power offer

Sum-up to Design

Design 1

Context analyse

Idea 1

Idea 2

Idea 3

Definition of Design - Innovative Oppotunity(POG)

E-Power Station on the water
can:

- Provides small maritime vessels (for example : E-boat) off-shore power supply
  to expand range and improve endurance.
- providing emergency services and communications
- Use clean energy to benefit the environment
- navigation light

-

SET Analyse (social -economic-technological)

Social

-rise up the comsuption of E-Mobiliity
-rise up the using of E-boat
-build up more consciousness about E-Mobiliity:
-increasing the outdoor activities on the water and live by the water
-environment will be better:
air will be clean
Co2 will be reduced
....

Economic

-conduce to the development of E-mobility industry
– increase the construction of renewable energy
-reduce the cost of E-mobility on the water
-consumer will beable to afford more

More small maritime vessels need more power station for more eco-friendly

Technological

- promote the renewable energy-development
-improve energy management technology on the water

Value Opportunity

E-Power Station on the water
hat:

-a strong Independences, confidence and strength

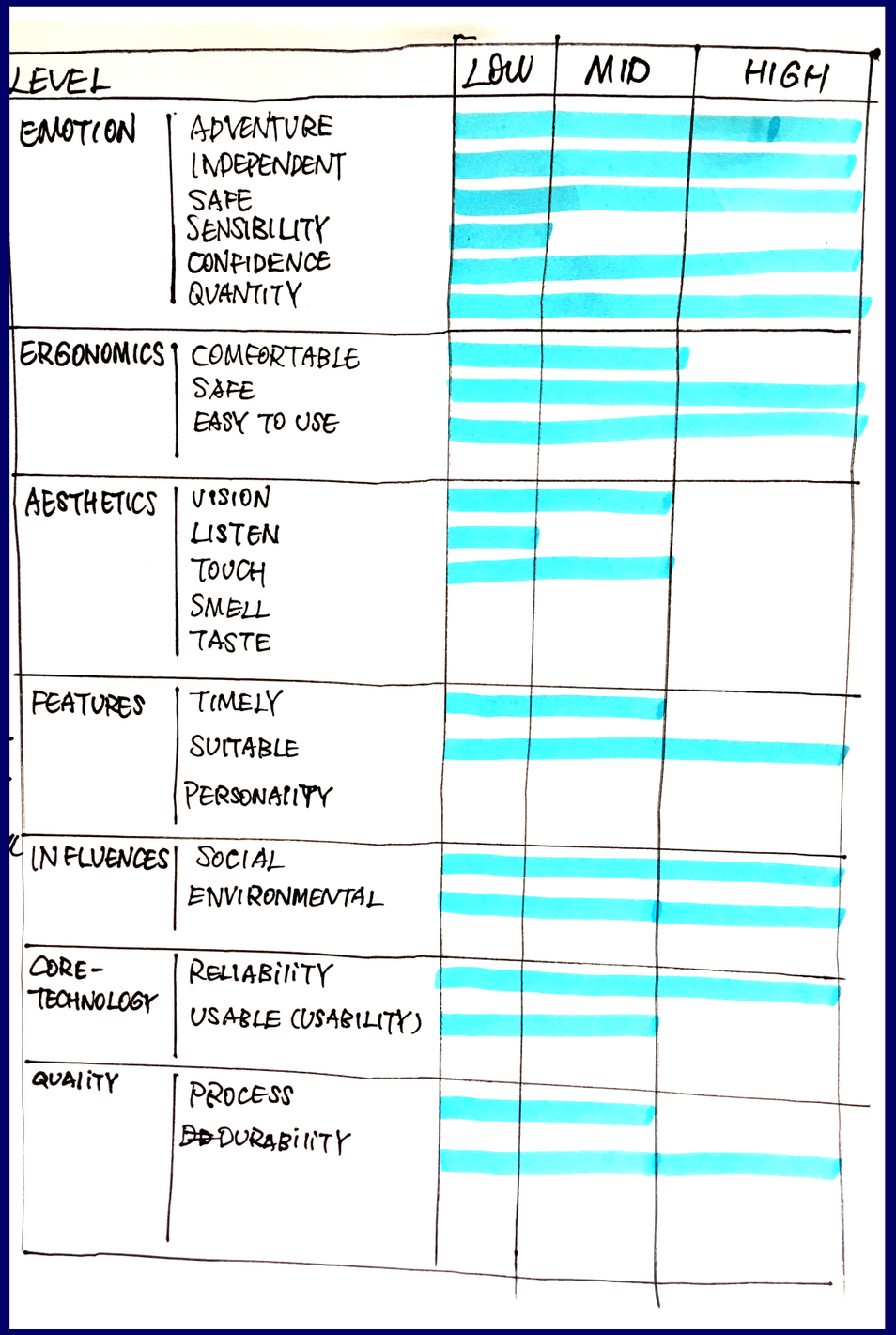
-Visual, tactile Aesthetics

-comfort, easy to use in Ergonomics

-strong timeliness, adaptability and universality

-The ability to connect to eletricity-net and
the EV-Battery

-Powerful technology and quality value opportunitiesh



Value position in iNPD

Creating Breakthrough Product

The networked dockside superchargers will be designed to support the use of high-performance electric boats.

new brand
creative Product
new Tech-field

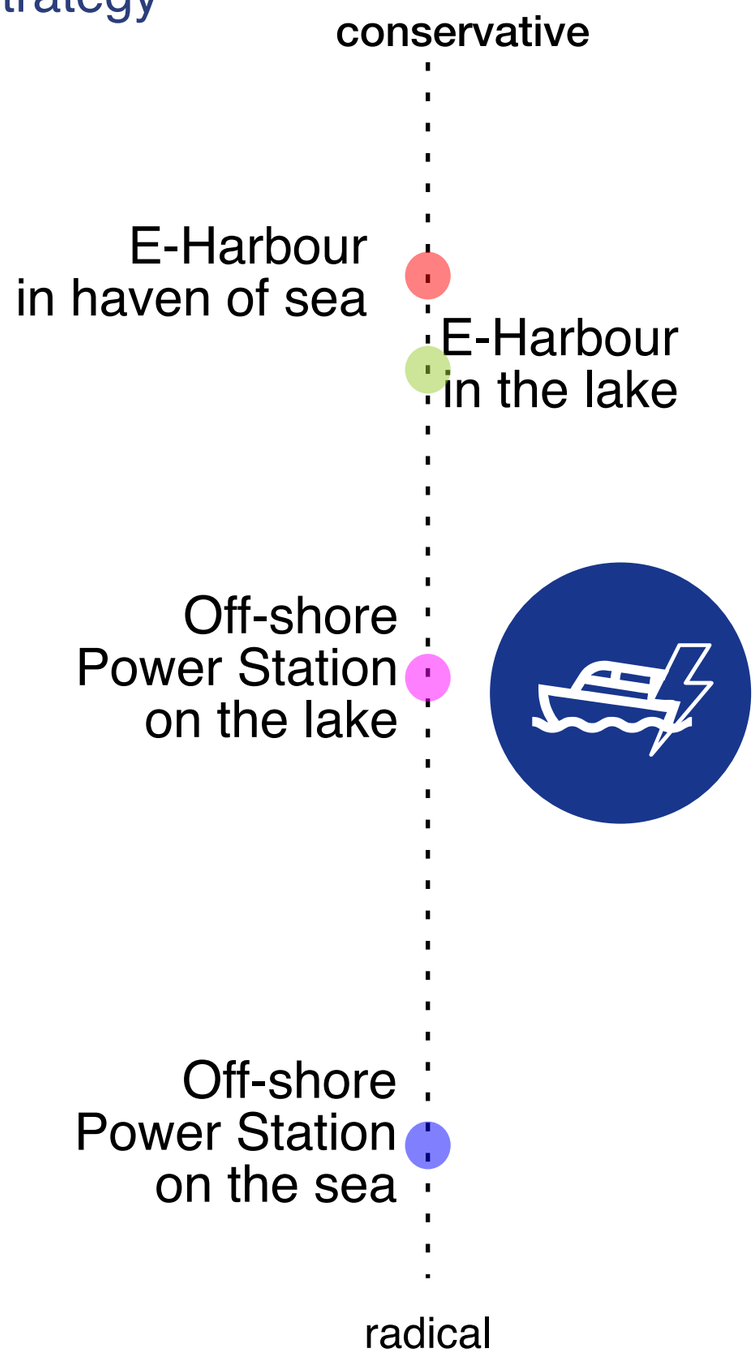
inshore E- harbour

same core-system
with different module

Offshore water Power Station

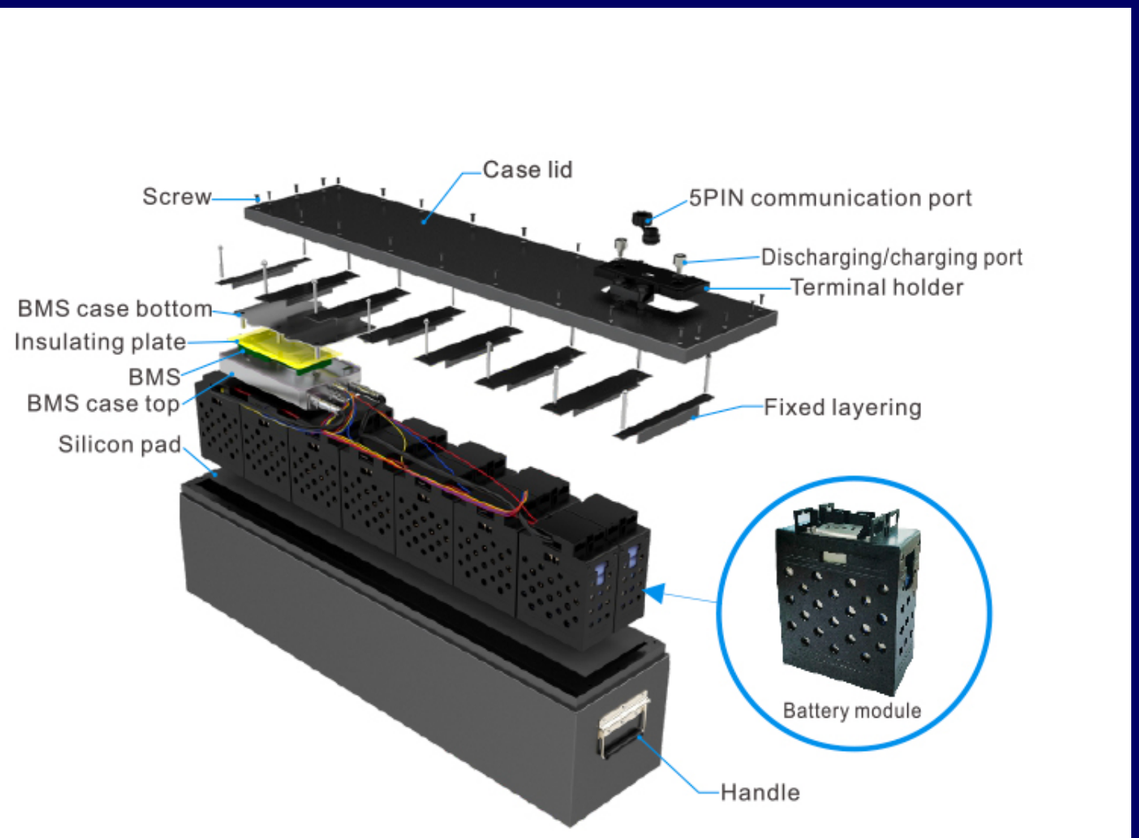
offer the essential power for E-maritime vessels

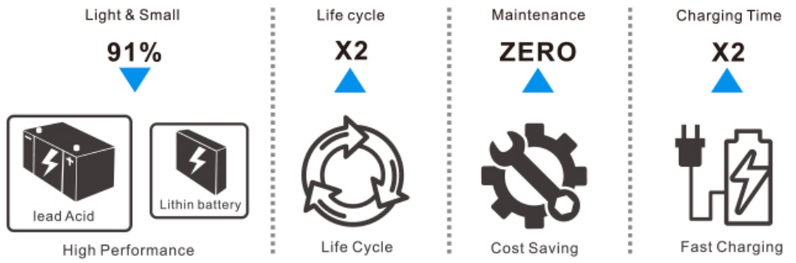
Development strategy



Target object- Batteries group in for small maritime vessels (E-boat)

Intelligent BMS controlMax Charge Current: 60 A
Max Discharge Current:200ANominal Capacity: 251Ah
Application: Solar SOLUTIONS

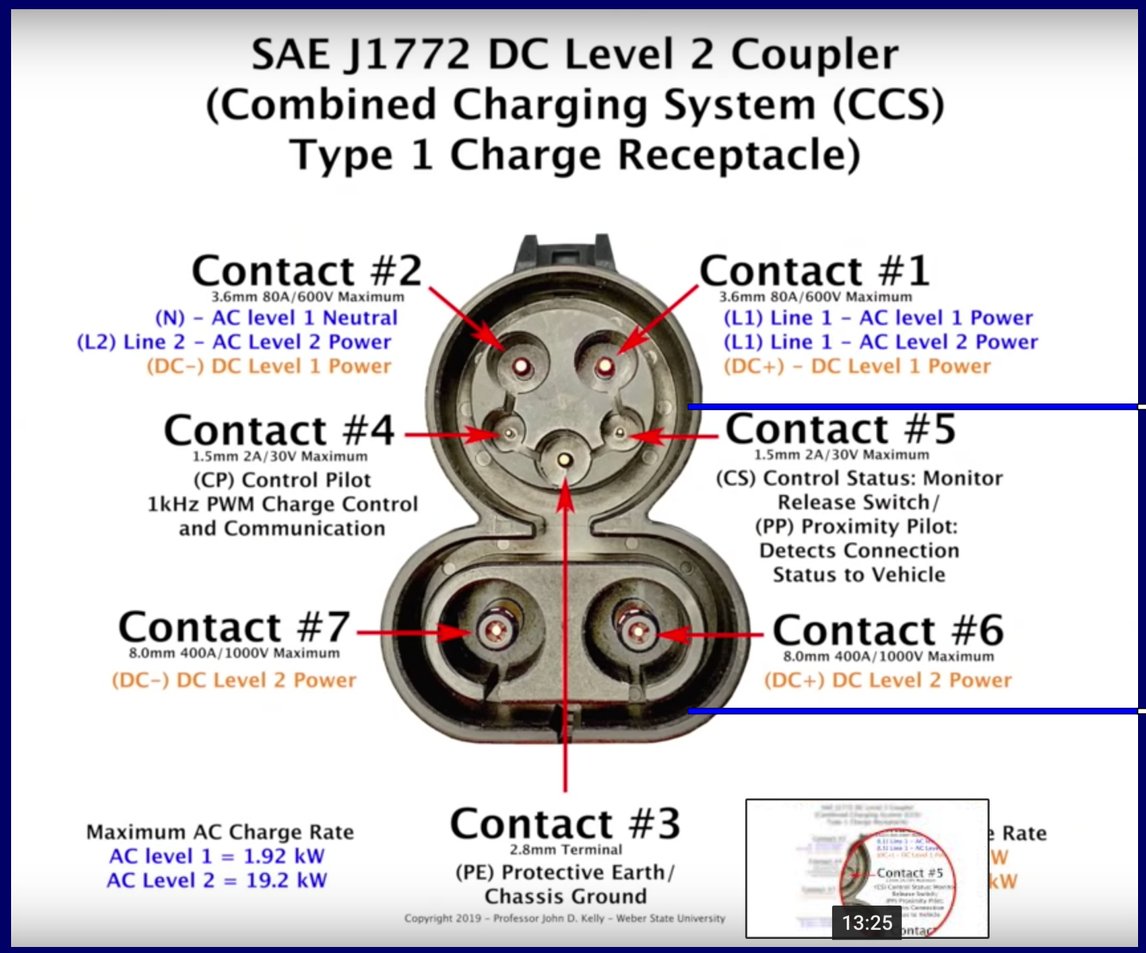




Weight : 200kg(lead Acid 48 V 100Ah) vs 23kg(LIB 48V 60Ah)
Life cycle : 2 yr warranty(Lead Acid) vs 4 yr warranty(LIB)
Maintenance:voltage check,cleaning and distilled water replacement
Chrging time(using 20A Delta-Q charger): 6hr(lead Acid 100Ah),3hr(LIB 48V 60AH)

https://turnlife.cn/product-item/e-boat-battery/

Charging Methods & Standard



CCS form charging Methode supports AC and DC charging.
With a maximum power output of 150 kWh, they allow DC compatible powerboats to half recharge in under an hour.

AC: for main power to drive the moto

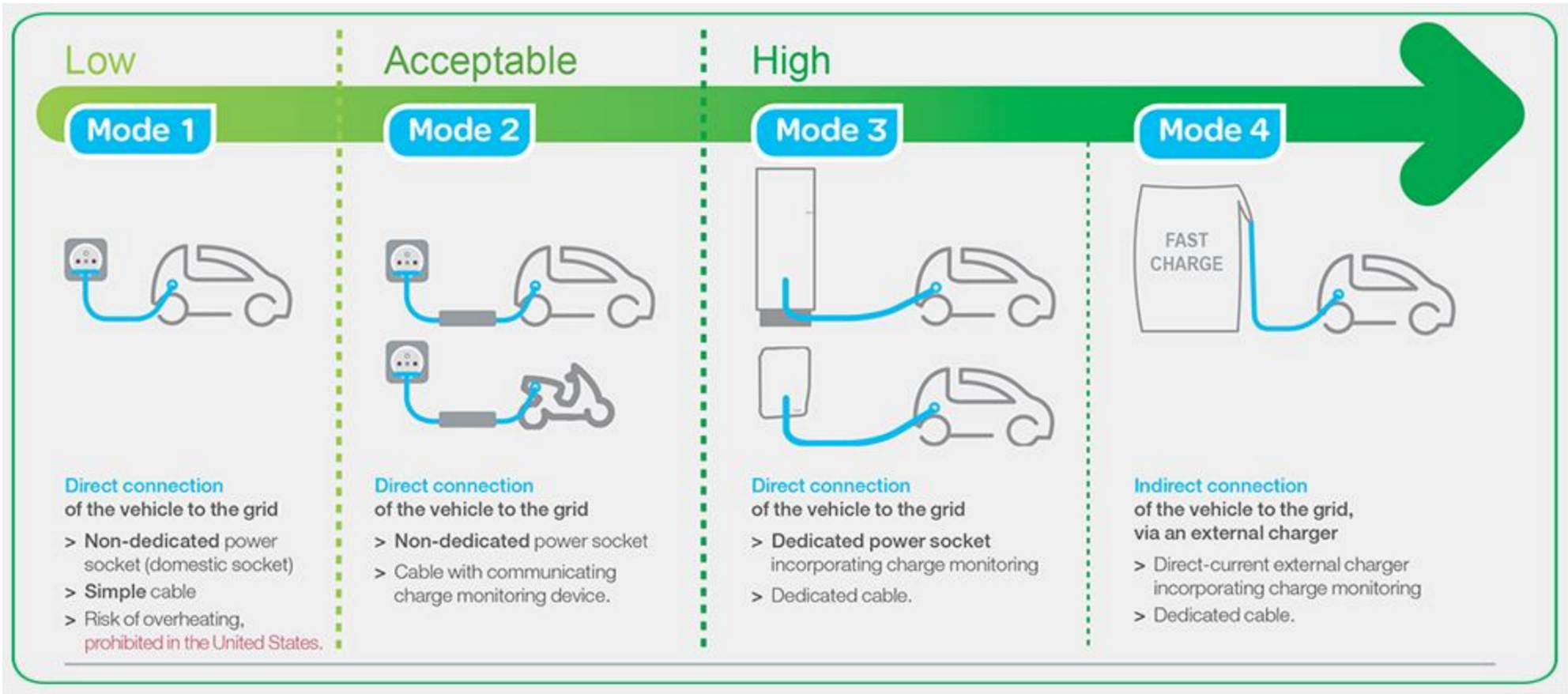
DC: for support some electronitic part for regular working

AC Power is converted to DC Power by OBCM

https://www.youtube.com/watch?v=jZBsOud4O9Q

Charging Methods & Standard

Charging modes for electric vehicles



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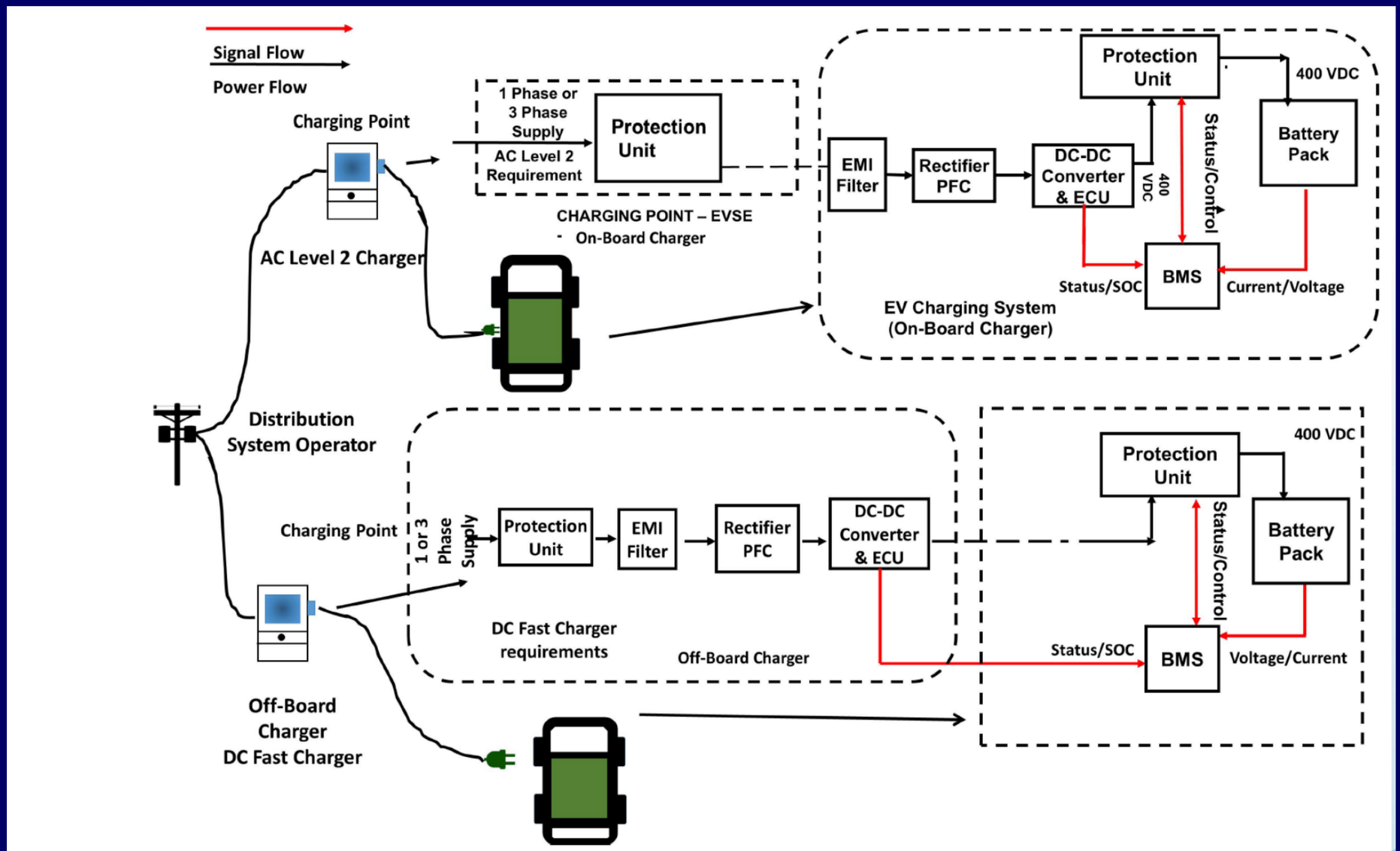
Charging Methods & Standard

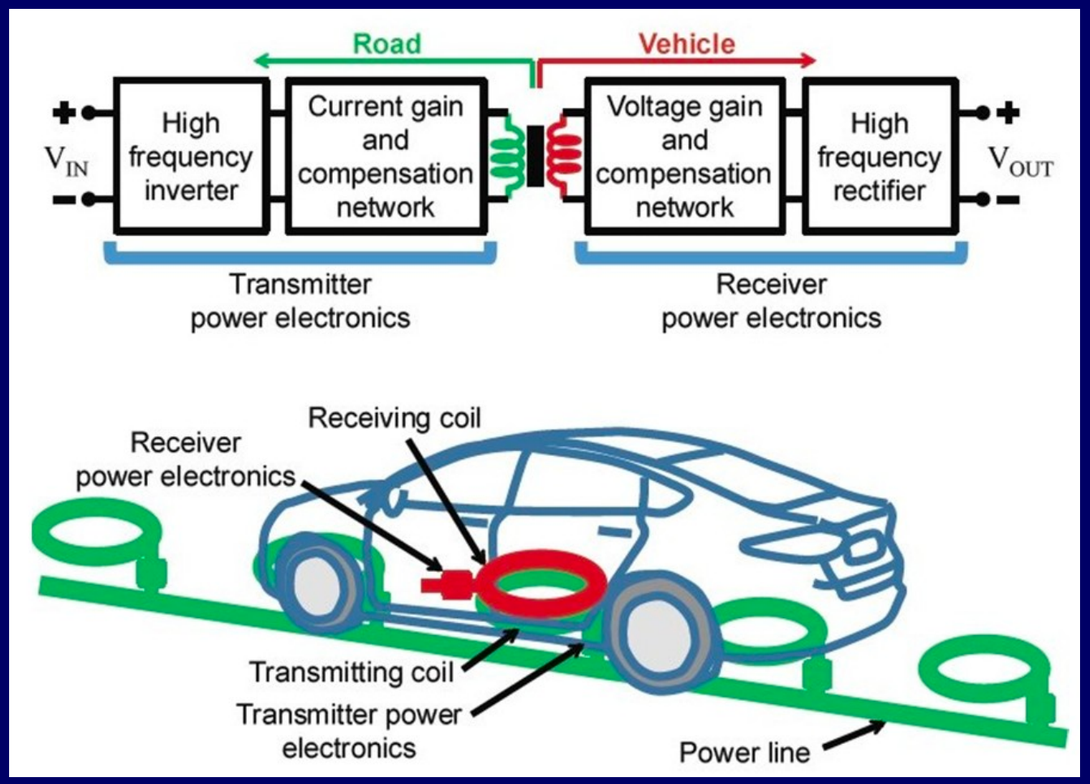
but on the water???



A. Ahmad, M. S. Alam and R. Chabaan, "A Comprehensive Review of Wireless Charging Technologies for Electric Vehicles," in *IEEE Transactions on Transportation Electrification*, vol. 4, no. 1, pp. 38-63, March 2018.

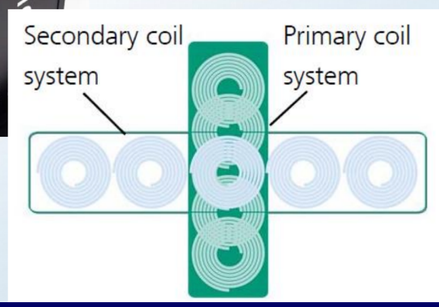
http://site.uit.no/ladeteknologi/files/2019/02/Arctic-Frontiers-2019-Bjarte-Hoff-169.pdf

Charging Methods & Standard



Wireless charging for electric vehicles

- Multiple coils increases tolerance in positioning



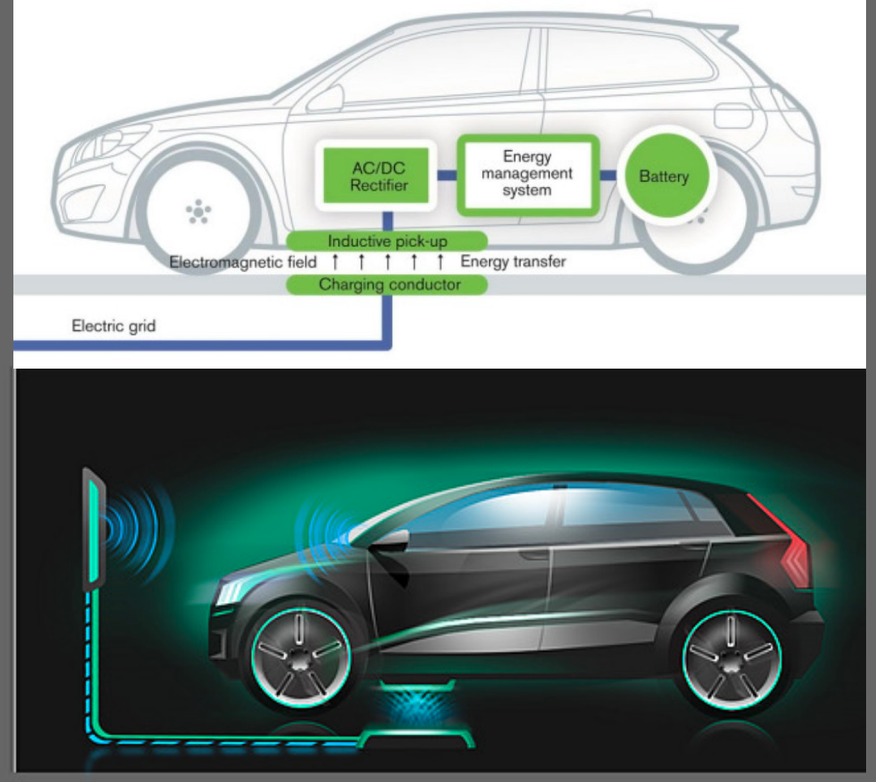
- 3,6 kW
- 97 % efficiency

Wireless charging for electric vehicles

on the Road with Wireless charging

↓

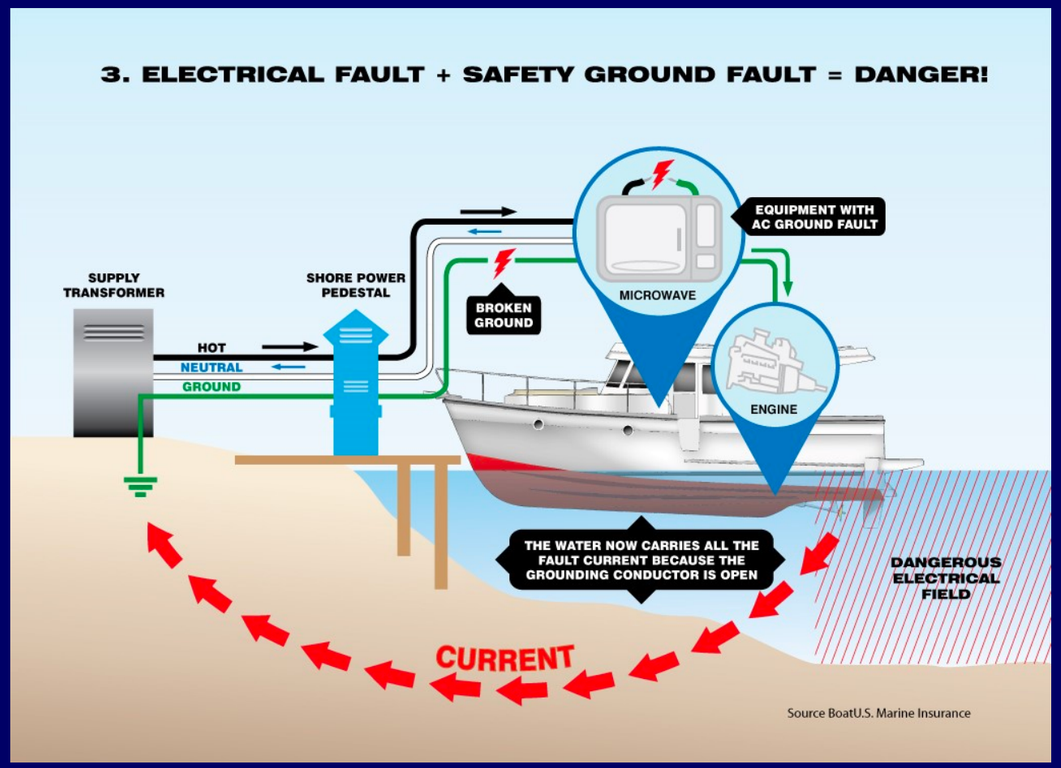
???? on the docking system????

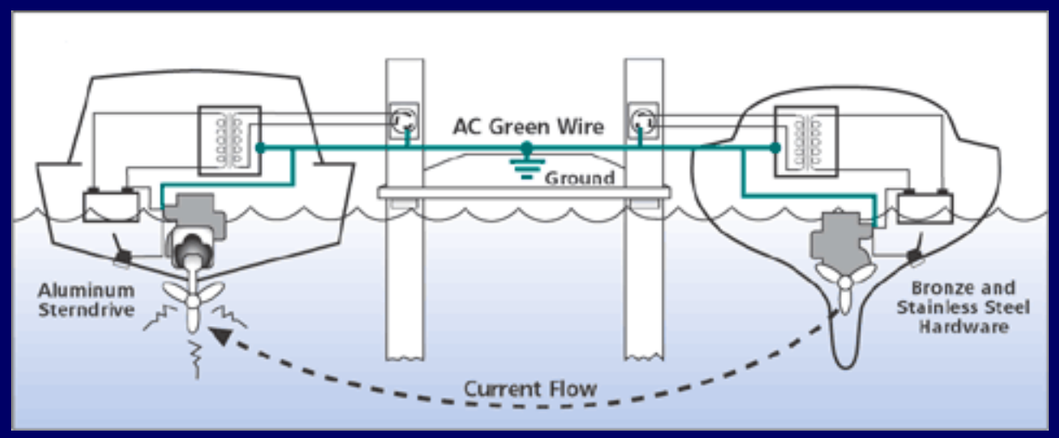


https://www.powerelectronics.com/automotive/wireless-charging-electric-vehicles
Source: Fraunhofer Institute for Integrated Systems and Device Technology/

https://www.motorbeam.com/volvo-develops-wireless-charging-technology-for-electric-vehicles

Tech–problems and existing Solution





–Electrolysis phenomenoe(Corrosion)
-Dangerous current to watercraft-damage

The E-boat is parked next to another one which clearly cannot operate under its own power, is slowly leaking current into the water, and ion by ion, dissolving all the other boats around it.

Bond or ground your boat, or not. Meaning, take all the pieces of metal on your boat and connect them with pieces of wire to neutralize the current flowing between them.

-Electric Shock Drowning to people

GFCI's are installed on all shore power pedestals and on all marina wiring circuits

https://docklife.blog/2018/02/26/electrolysis-when-will-i-ever-need-to-know-this/
https://www.theepochtimes.com/u-s-coast-guard-warns-of-fire-risk-from-charging-batteries-on-boats_3090829.html

Add up
the part of independent energy production
for self-sufficient

For inshore power station in haven/ lake

This particular platform is designed to generate
about 2 kilowatts of power,
and it actually has storage, energy storage, for
about 12 kilowatt hours of power.
It stores enough energy that it could dock four
boats
for a week without sunshine.

For
Inshore Power Station
on ocean

For
offshore Power Station
on ocean

https://www.blue-isles.com/single-post/2017/08/07/Local-Company-Introduces-Solar-Powered-Boat-Charging-Stations---ABC-6-News
https://www.marineinsight.com/tech/worlds-largest-tidal-plant-opening-in-france-in-2012/

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Context for Design 1

E–Power Station On the Water in Zugsee

https://www.peterraimann.ch/zug/kanton/zugersee/

Zugsee-- the situation of distribution