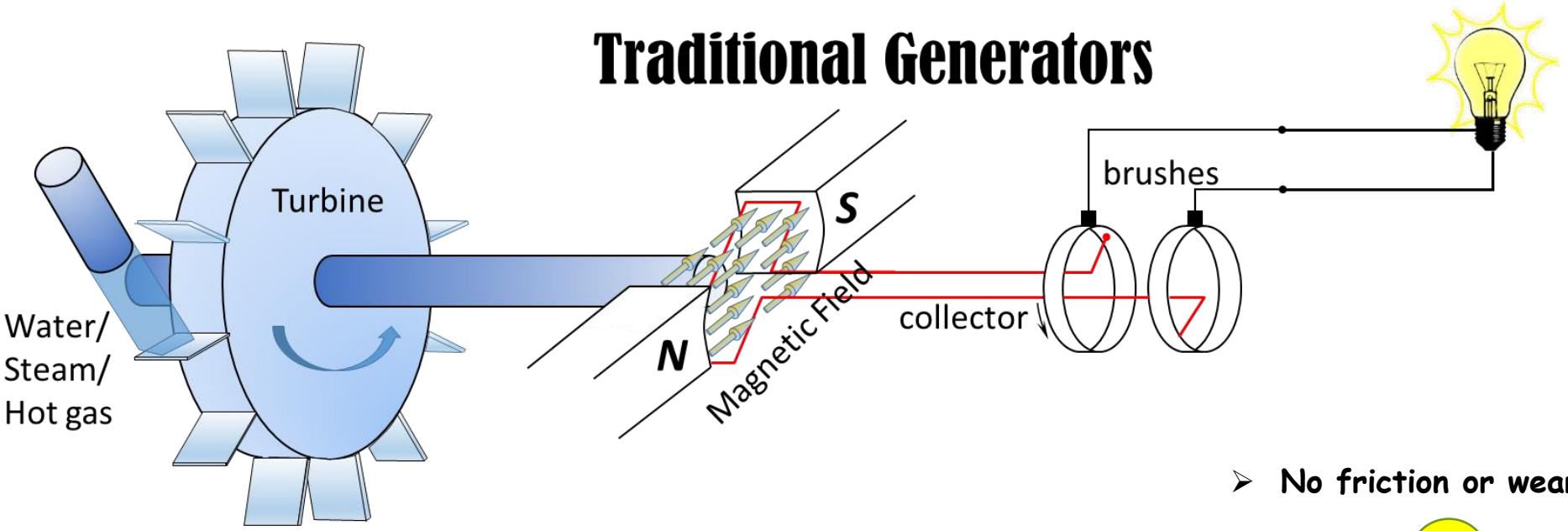
cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

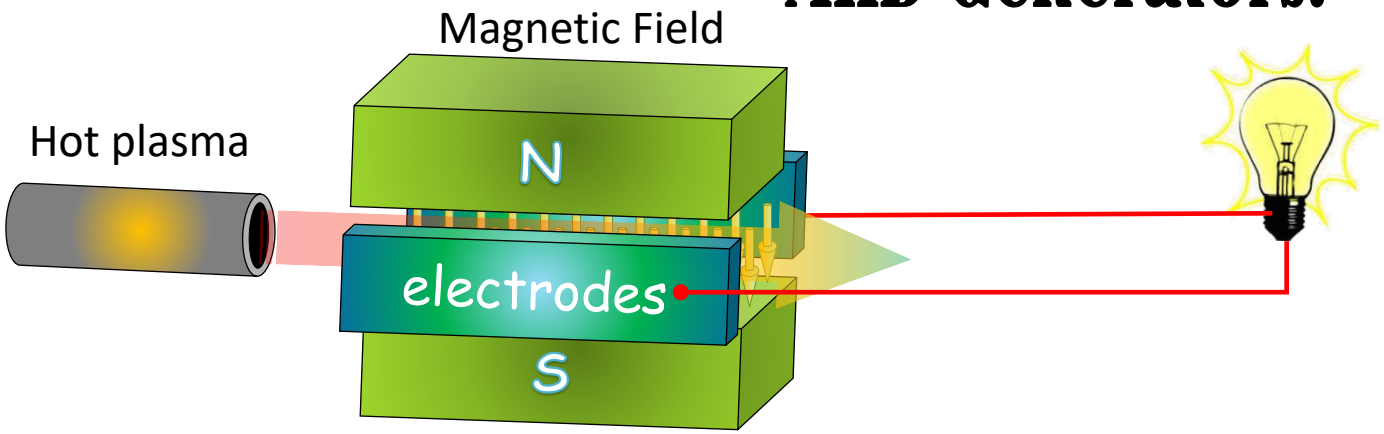
Static Energy Conversion for Renewable Harvesting

EuMHD

Traditional Generators

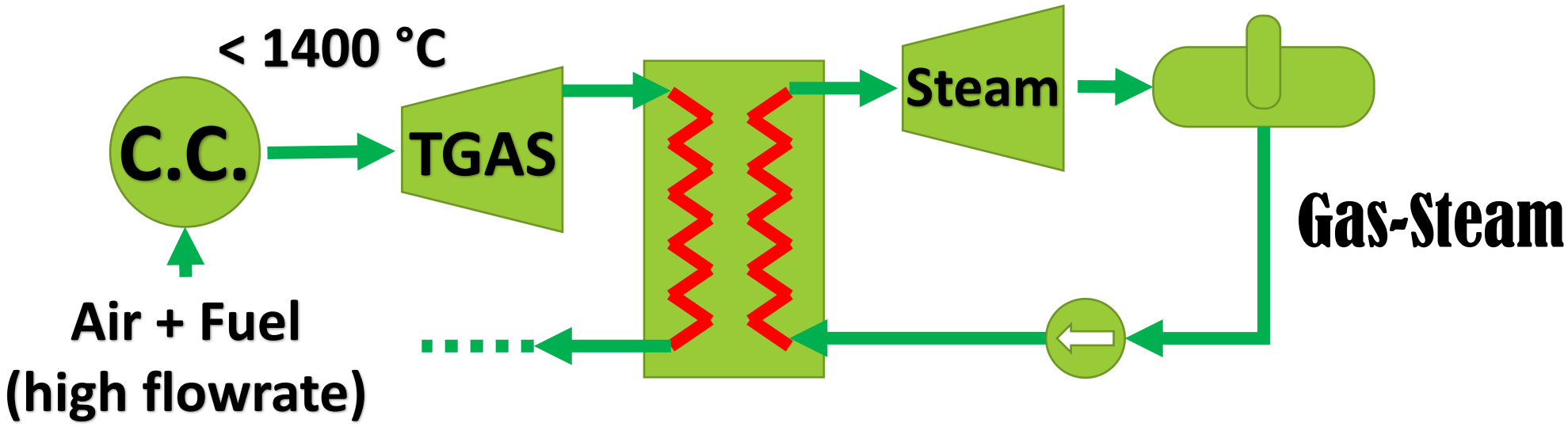


MHD Generators:

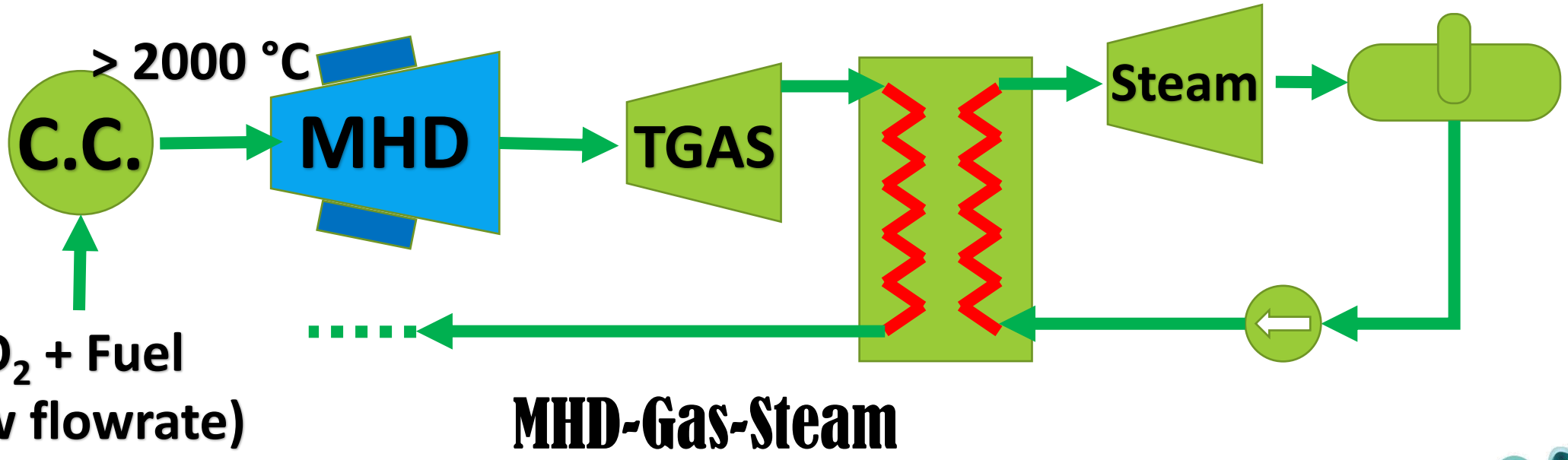


- No friction or wear → high reliability
  → durability
  → low costs for maintenance
  → low weight
- High Temperatures → high Carnot efficiency
  → low mass flow rate
  → small size devices

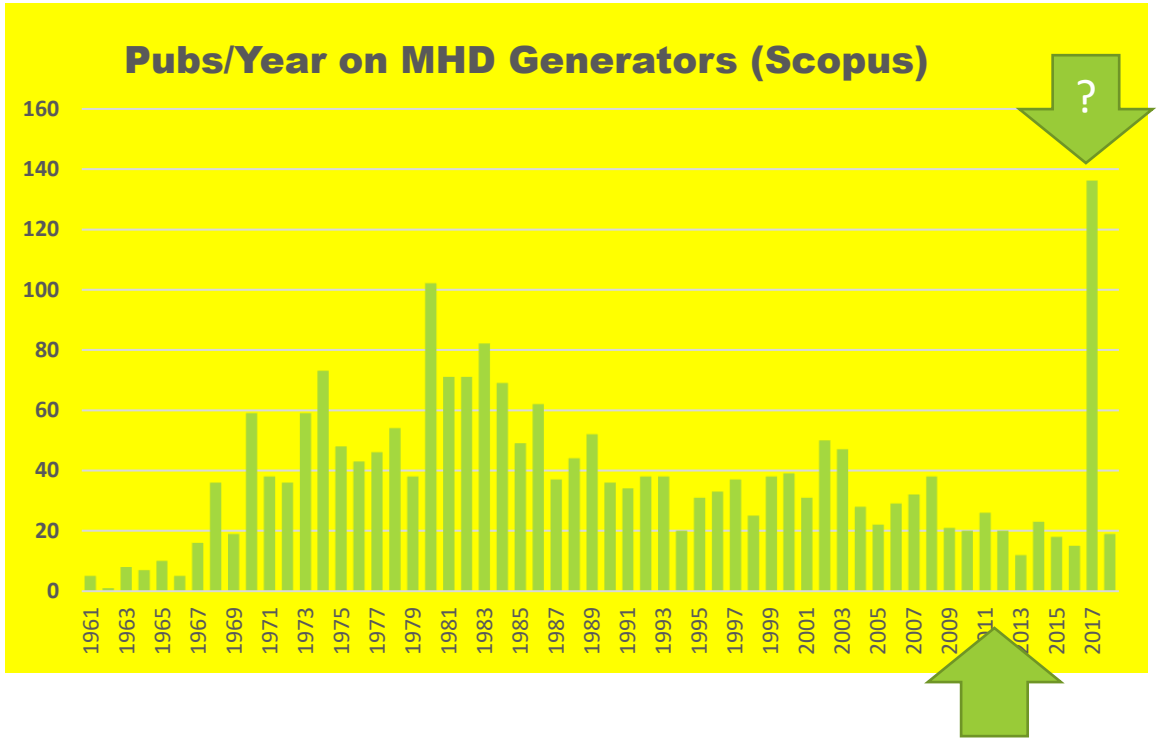
Combined Cycles



Gas-Steam



MHD-Gas-Steam

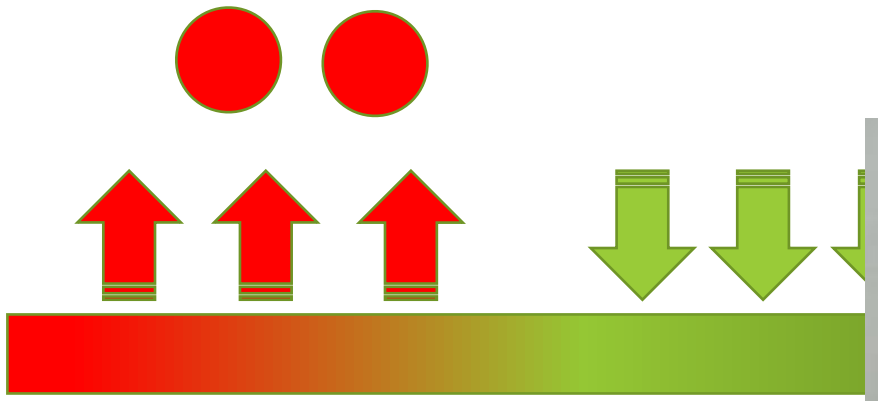


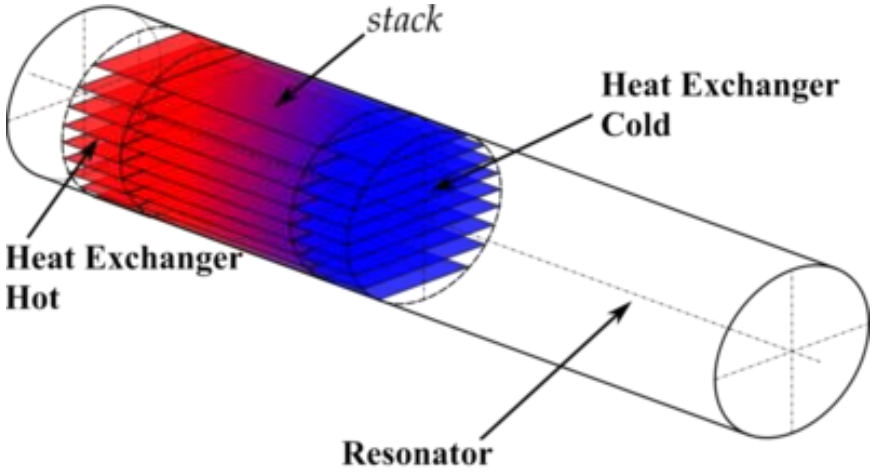
Alemany et Al, 2011

- Limited enthalpy drop
- Electrodes corrosion
- High external magnetic field →
- Seeding retrieval
- Competitor: Gas Turbine

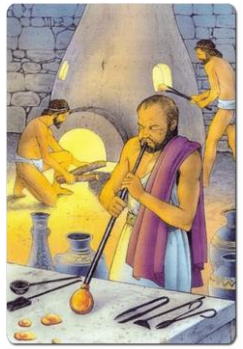
Superconducting coils

ThermoAcoustics





ThermoAcoustics



50 bc

Phoenician glass blowers

1800

1850
Sondhass tube

1859
Rijke tube

1877
Lord Rayleigh

1900

1949
Taconis waves

1962
Heat Exchangers
Sondhass tube

1966
First stack (Feldman)

1969
Rott's Eq.ns

1985
Wheatley, Hoffer, Swift

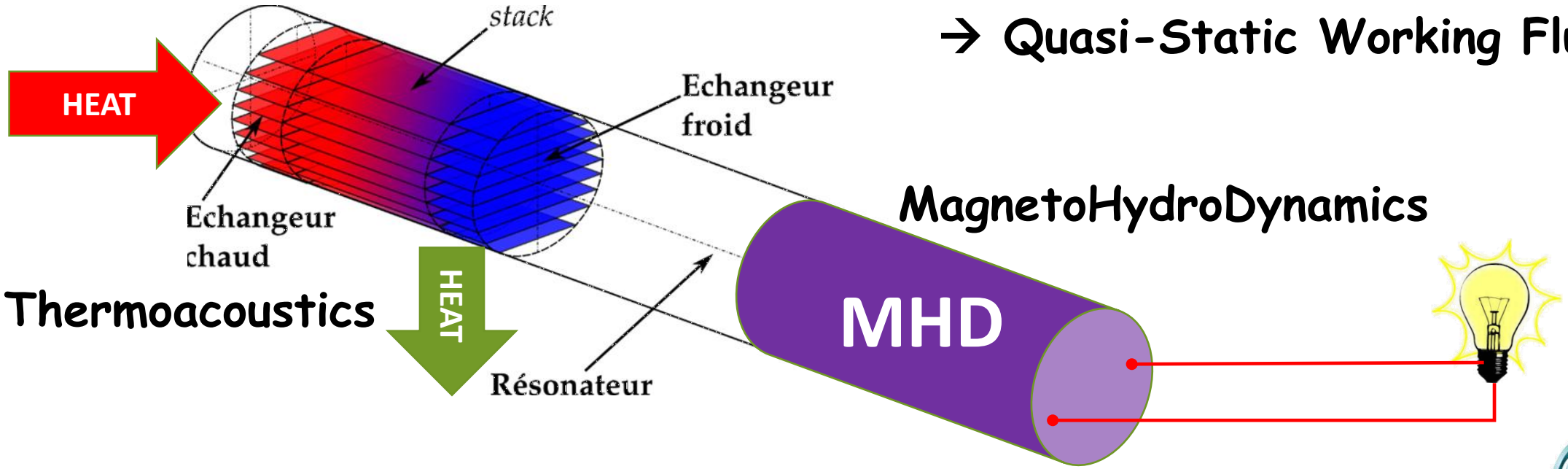
2000

2003
Swift's Textbook

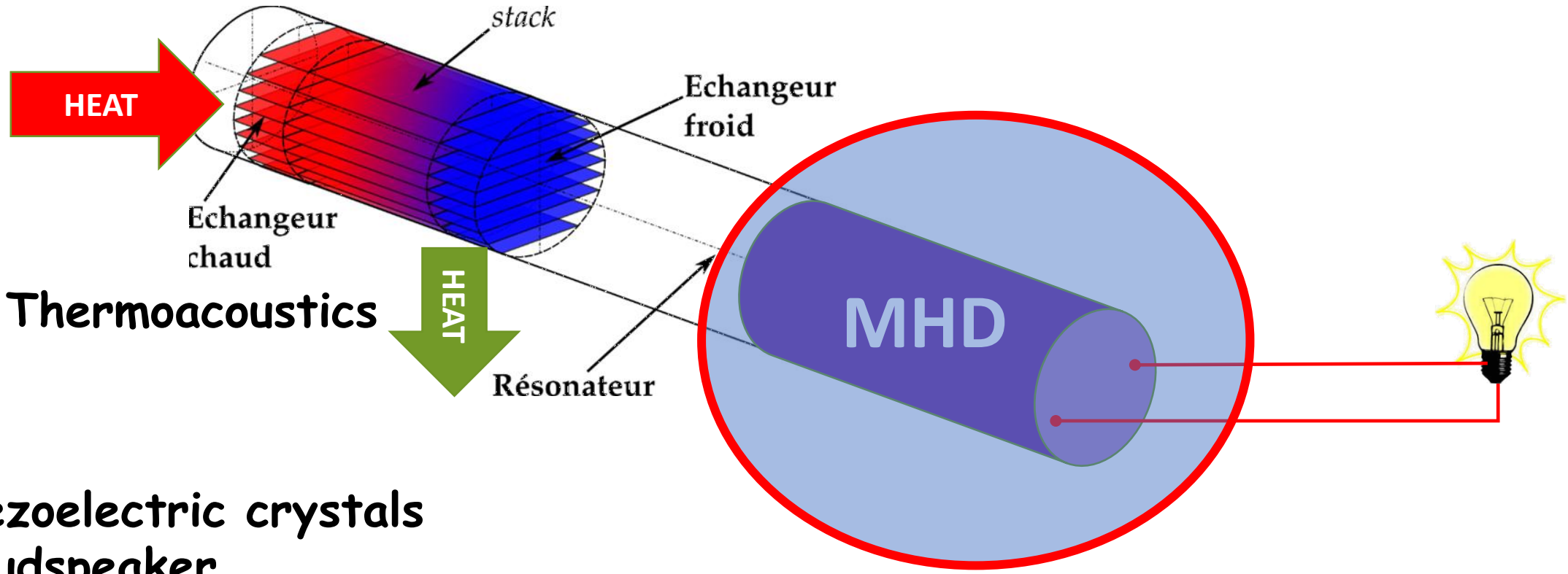
Strategy

- Limited enthalpy drop → Independency on the Temperature
- Electrodes corrosion → Electromagnetic Induction
- Superconducting coils → High conductivity/Excitation with electric field
- Seeding retrieval → Liquid Metal/Ionized gas

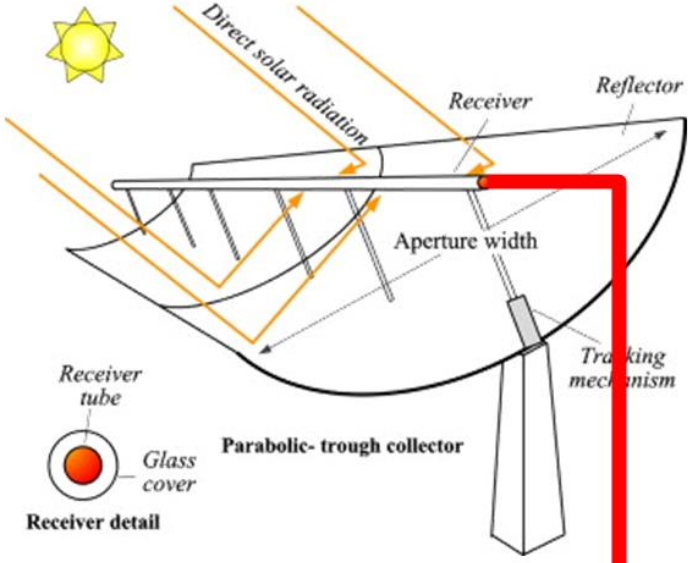
→ Quasi-Static Working Fluid



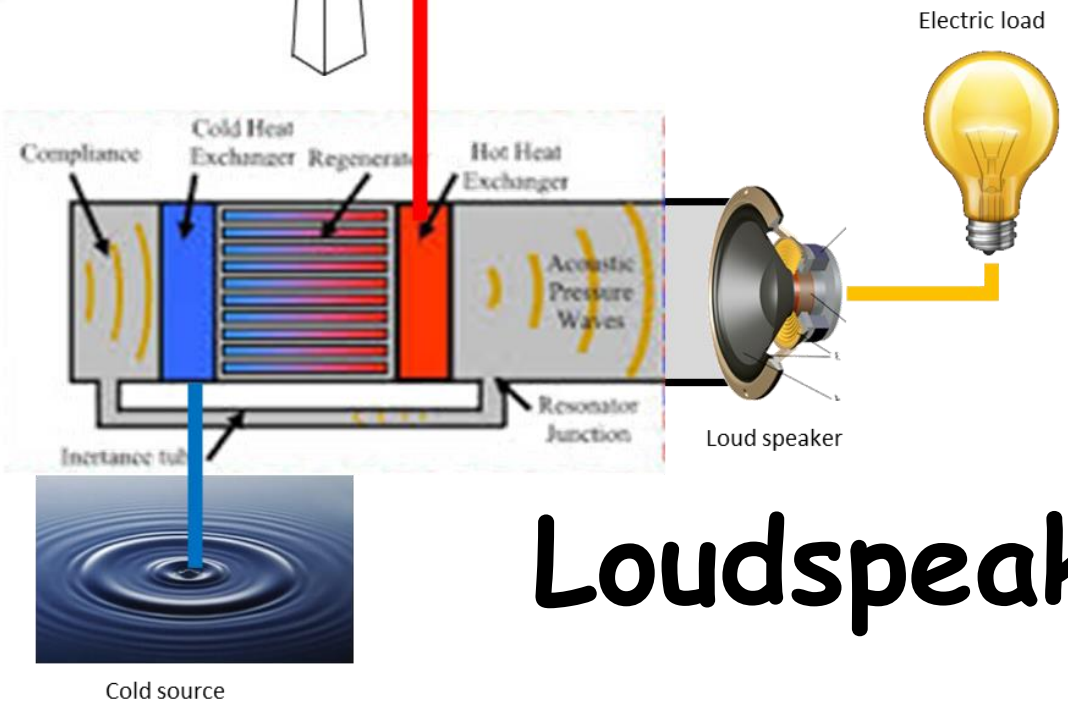
Electromechanical Conversion



- Piezoelectric crystals
- Loudspeaker
- Alternated piston + Electromechanic converter
- …
- MHD



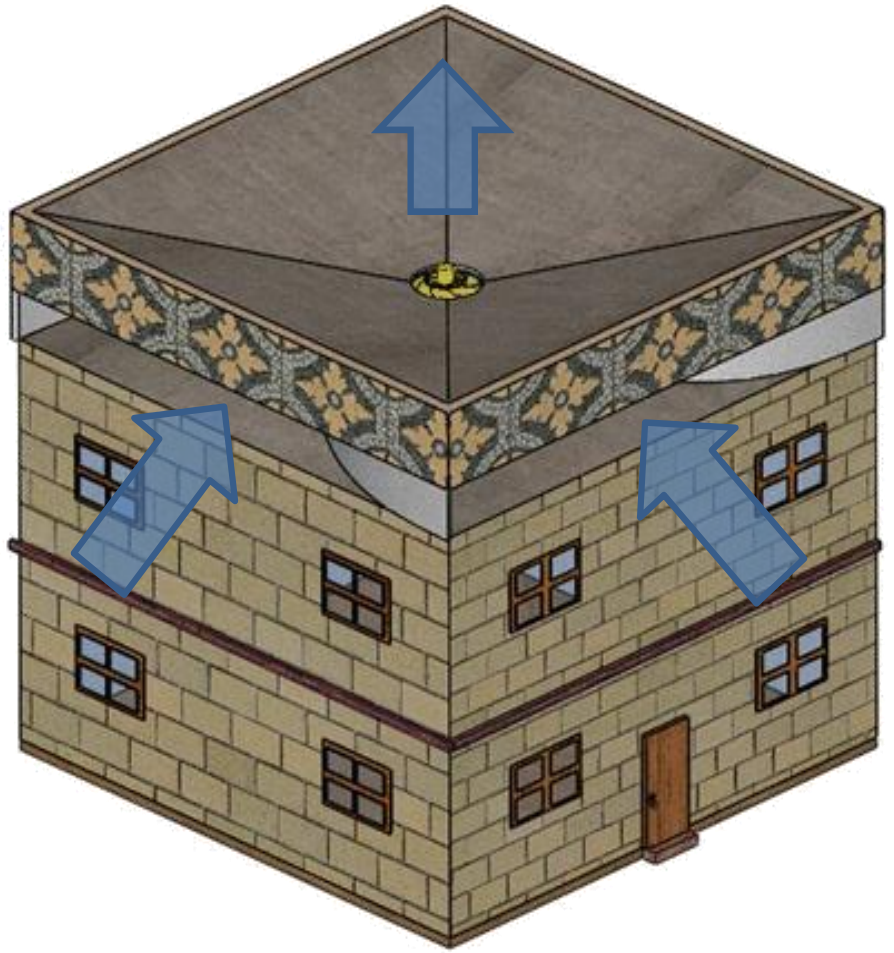
Solar Energy



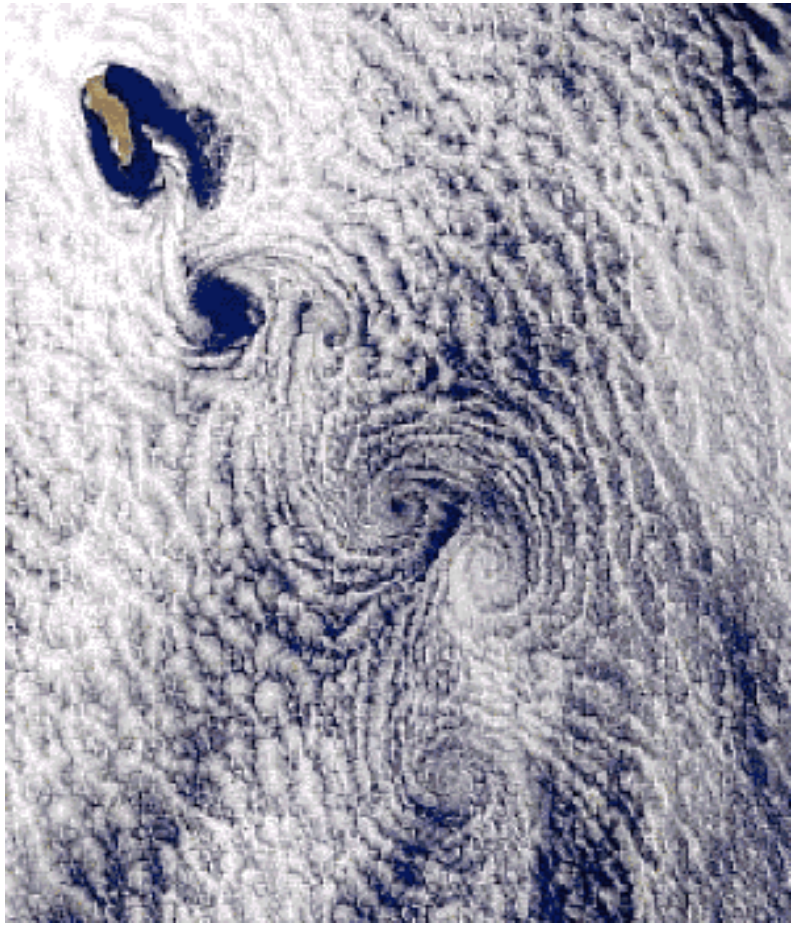
Loudspeaker

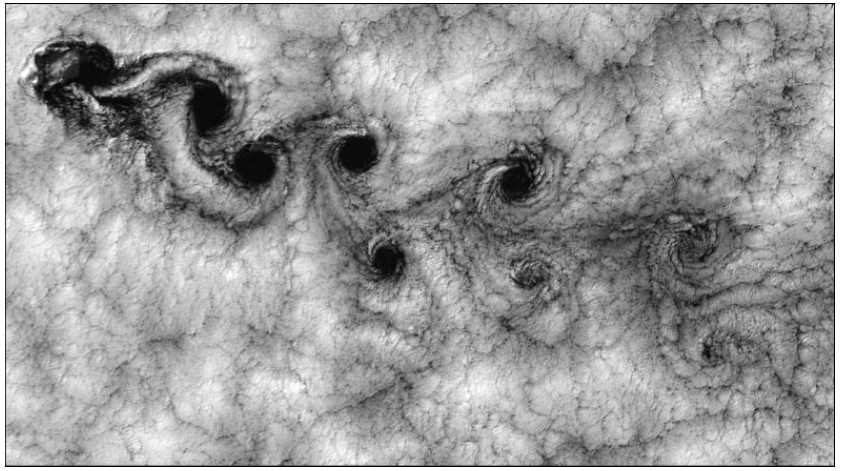
Resonators

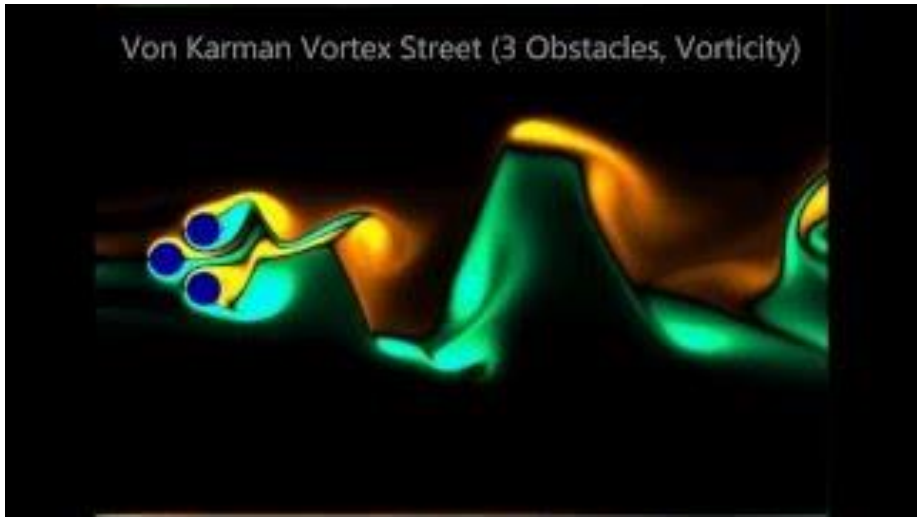
Wind Power



Sea Power







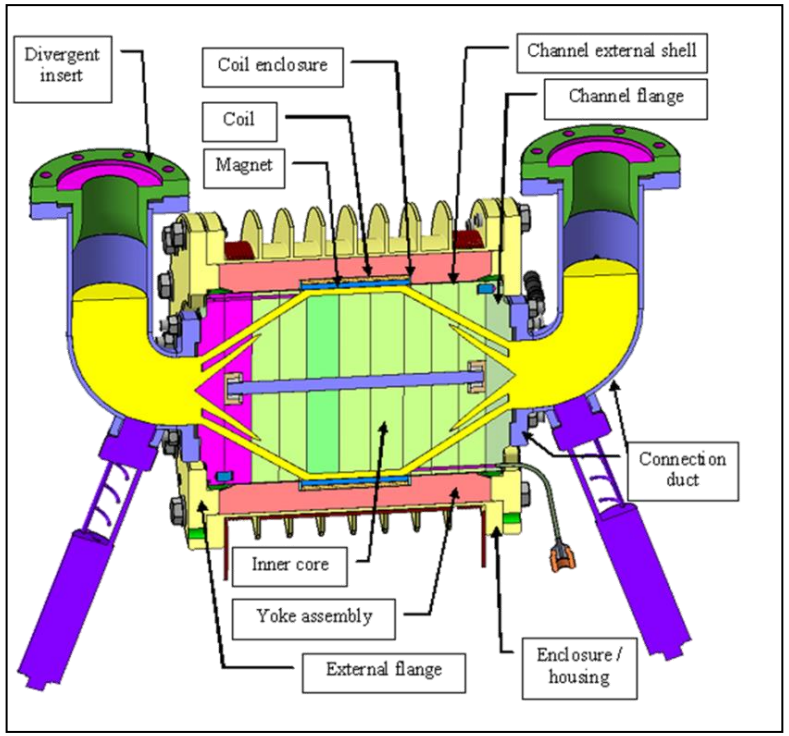
Von Karman streets

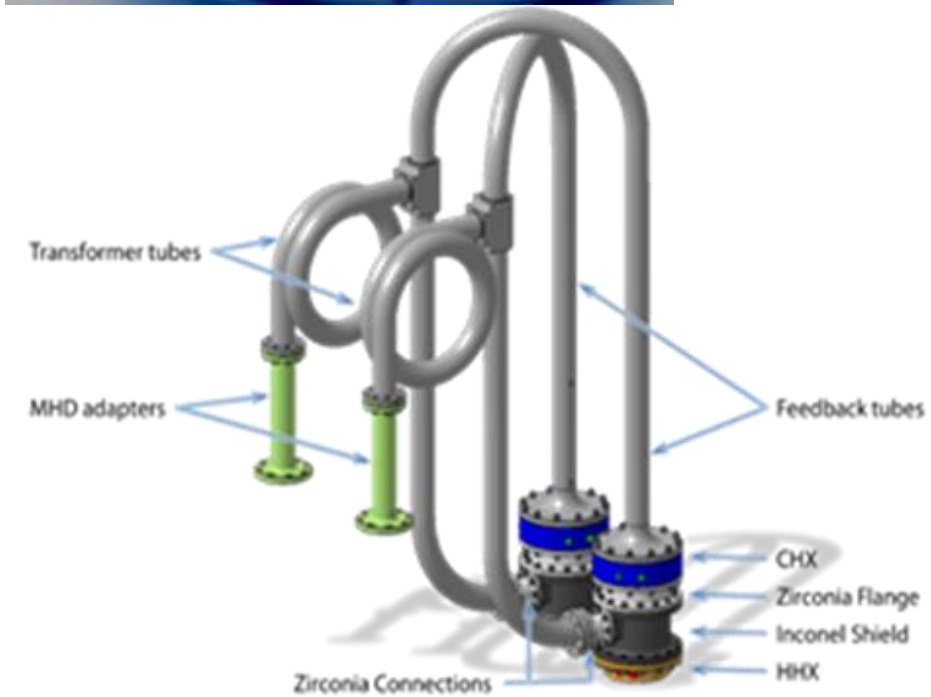
Two-phases MHD generator

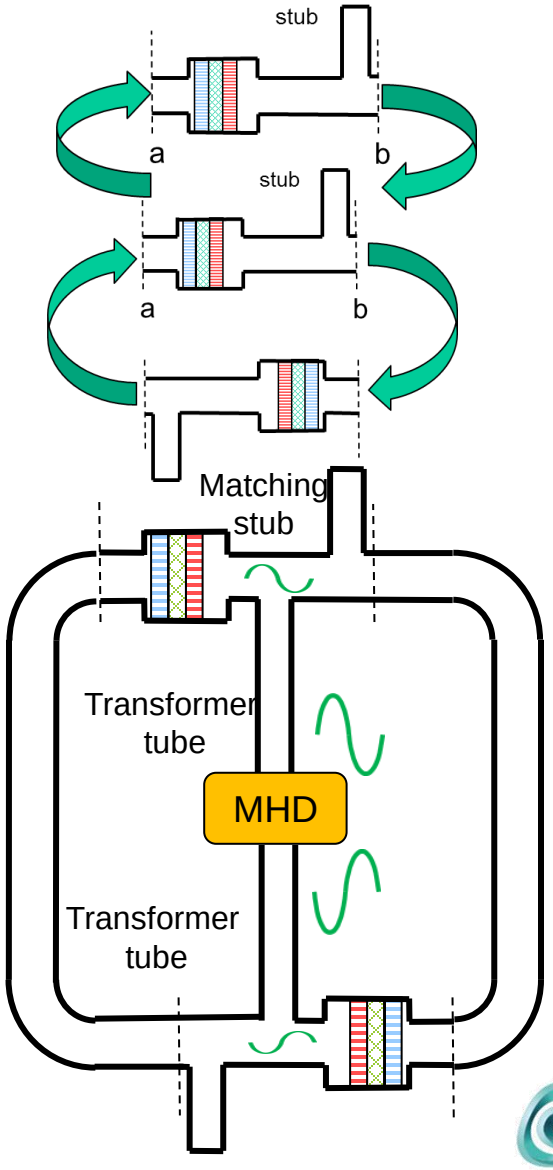
SEVENTH FRAMEWORK PROGRAMME

Theme 9: SPACE

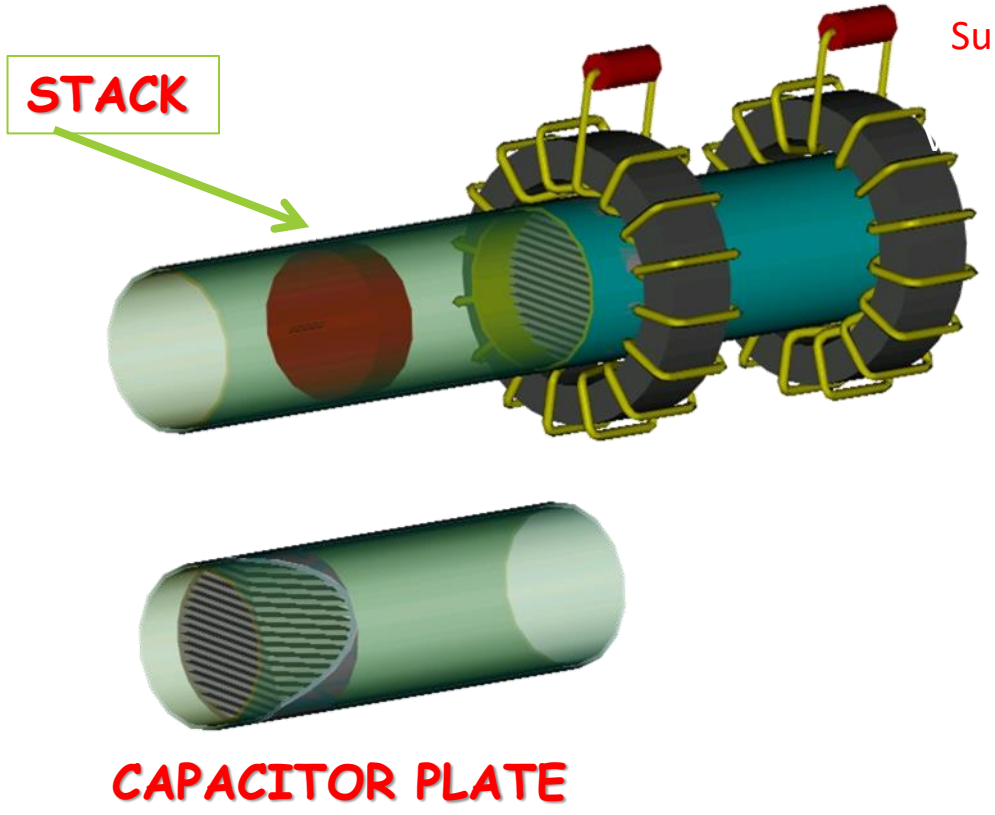
SpaceTRIPS

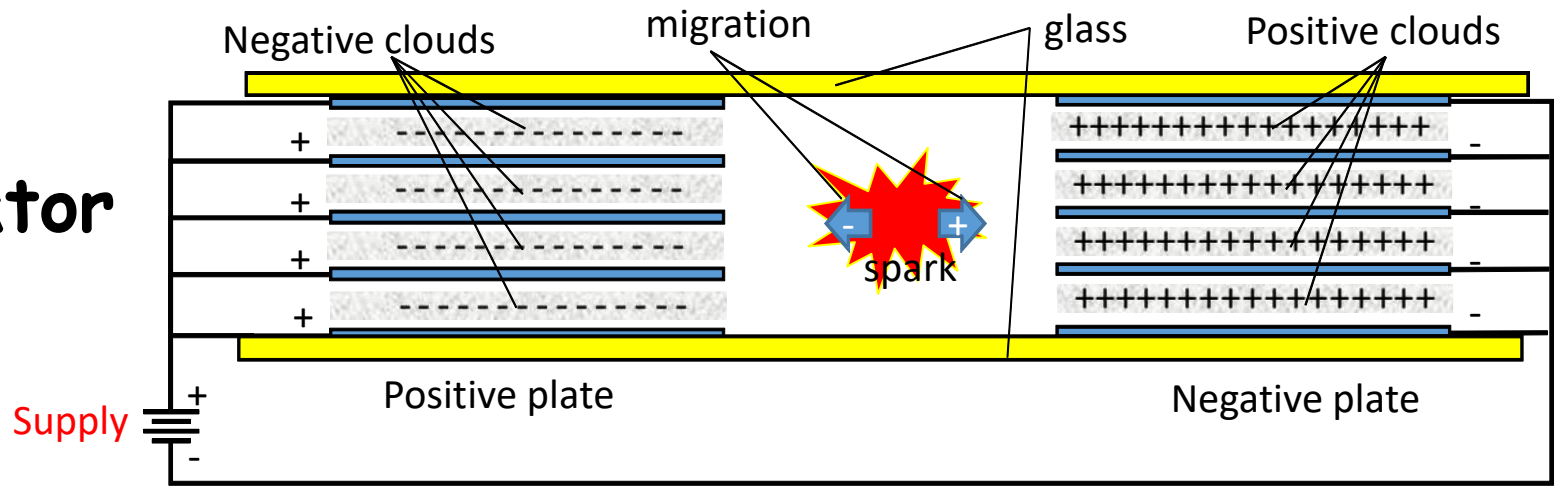


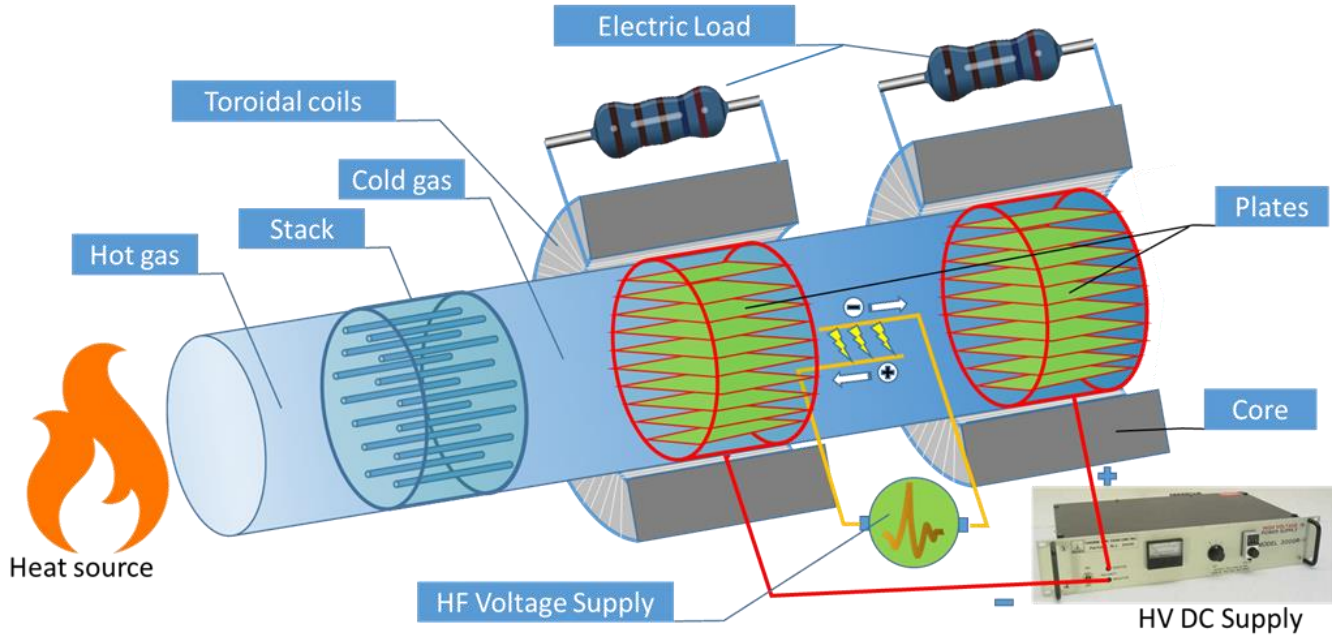




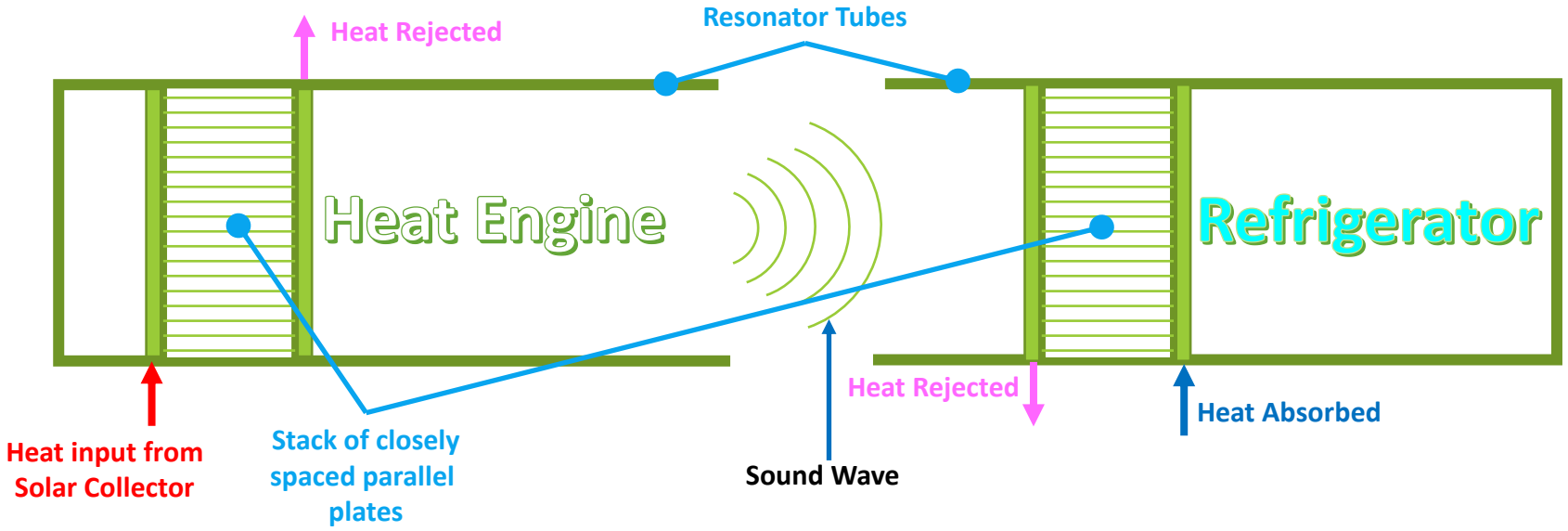
Single phase MHD generator







Cooling


Heat Rejected
Resonator Tubes
Heat Engine
Refrigerator
Heat input from Solar Collector
Stack of closely spaced parallel plates
Sound Wave
Heat Rejected
Heat Absorbed

Storage

Ultracapacitors

Batteries

Electrolyzers

Hydrogen fuel cells

Advantages of Static Conversion

- High power/weight ratio
- High power/volume ratio
- No solid moving parts
- No fluid transport
- Scalability
- Very high temperatures
- Low cost of components

Project-related Areas

- Static conversion of Renewables into mechanical energy
- Static conversion of mechanical energy into electricity
- Static cooling
- Energy Storage
- Materials

cost
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THANK YOU

EuMHD