

TOWARDS CLEAN ENERGIES

MEXICAN CENTRE FOR INNOVATION IN OCEAN ENERGY (**CEMIE-OCEAN**)



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- ❑ Background
- ❑ CEMIE-Ocean
 - I. Integration of the Consortium
 - II. Strategic and Operative Plans
 - III. Research lines and Strategic actions
- ❑ Conclusions

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BACKGROUND

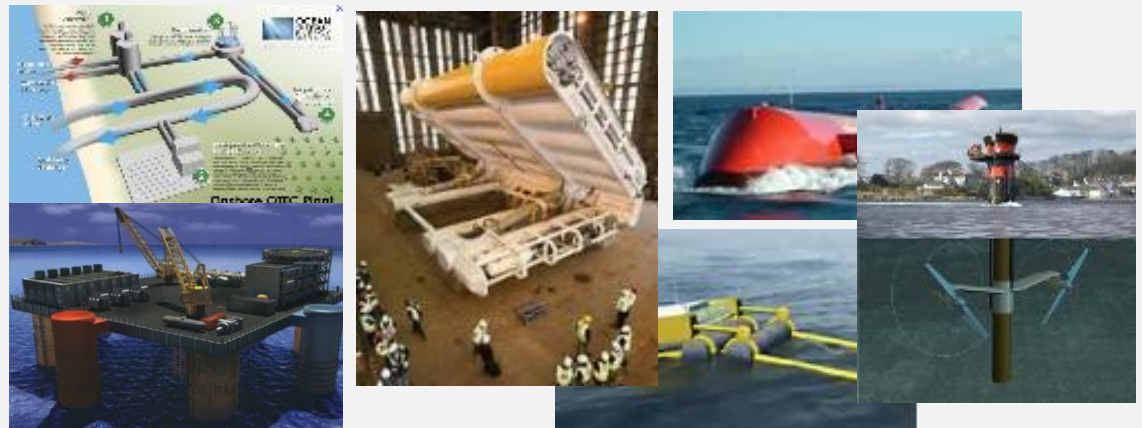
Approaching clean energies for the reduction of fossil fuel energy consumption is an incoming worldwide challenge.

Solutions?

- Hydraulic energy
- Geothermy
- Solar
- Wind
- Biomass



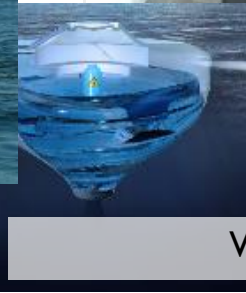
- Ocean????



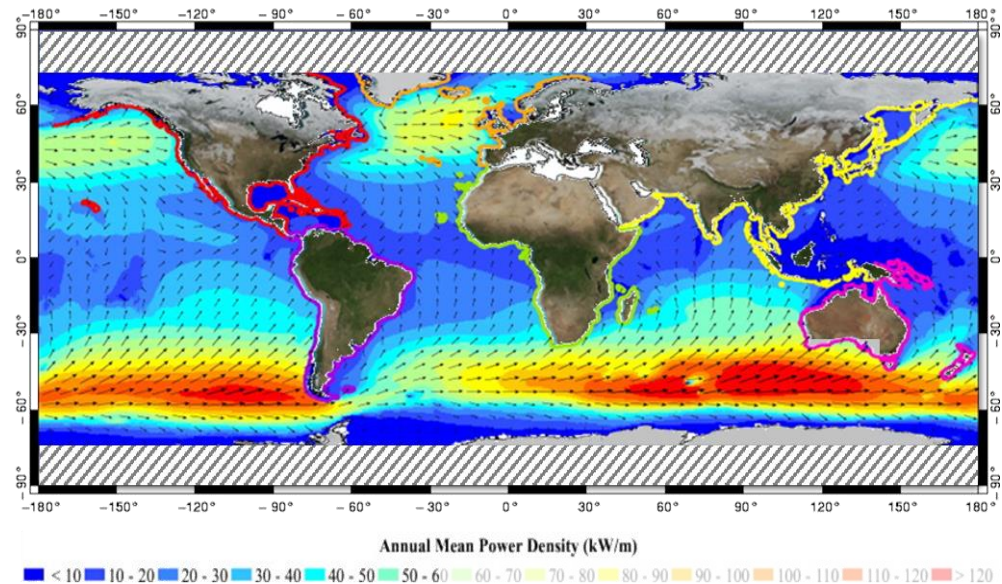
BACKGROUND

Wave Energy

Obtained from the waves, it is estimated that a global level potential of 2.11 ± 0.05 TW exists in the ocean. However, wave energy is found along the western continental coasts and with larger incidence in higher latitudes



Wave energy converters



Wave energy potential

BACKGROUND

Tides and Marine currents

Tidal energy is extracted by approaching the water level gradient caused by the tide changes and using natural/artificial barriers.

Another way of extraction is the usage of the kinetic bidirectional currents induced by tides or the unidirectional marine currents



La Rance, France



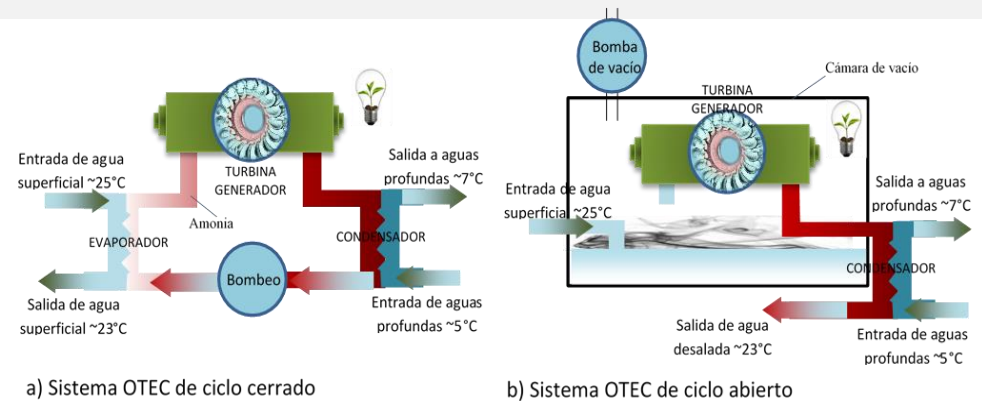
Sihwa, South Korea

BACKGROUND

Oceanic Thermal Energy

It is the energy caused by the difference of temperature between the surface and deep waters.

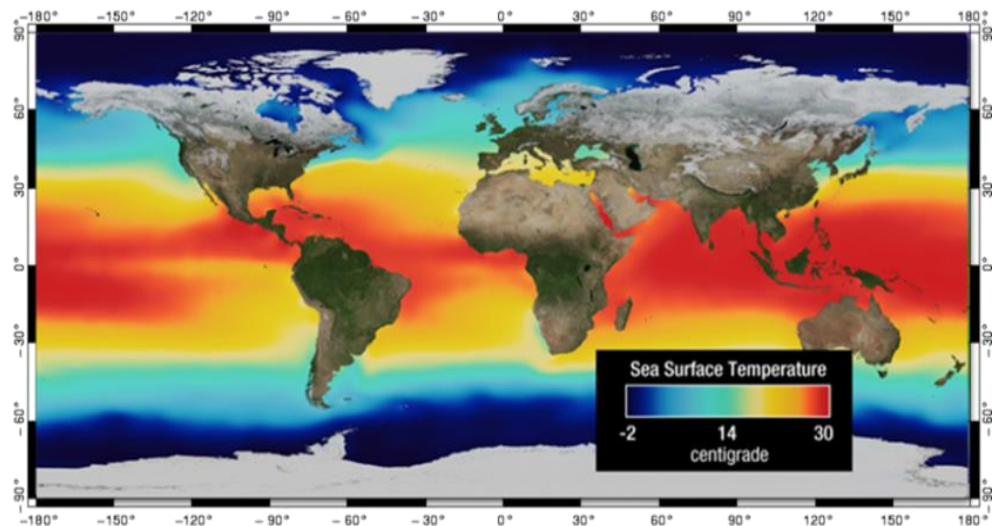
Compared to wave energy, the available thermal energy gradients is of 2 orders of magnitude higher, but its extraction is challenging and with high costs (up to now).



a) Sistema OTEC de ciclo cerrado

b) Sistema OTEC de ciclo abierto

OTEC (Oceanic Thermal Energy Converters)

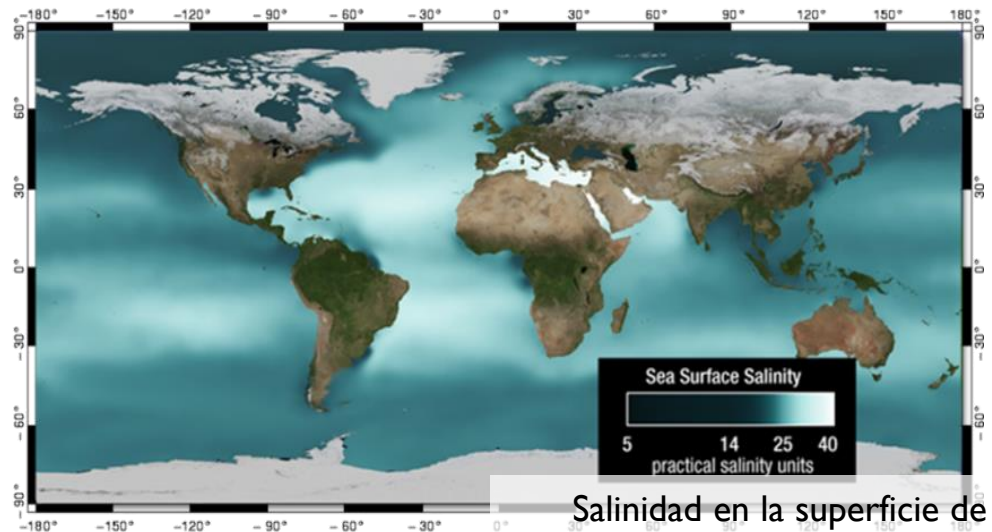
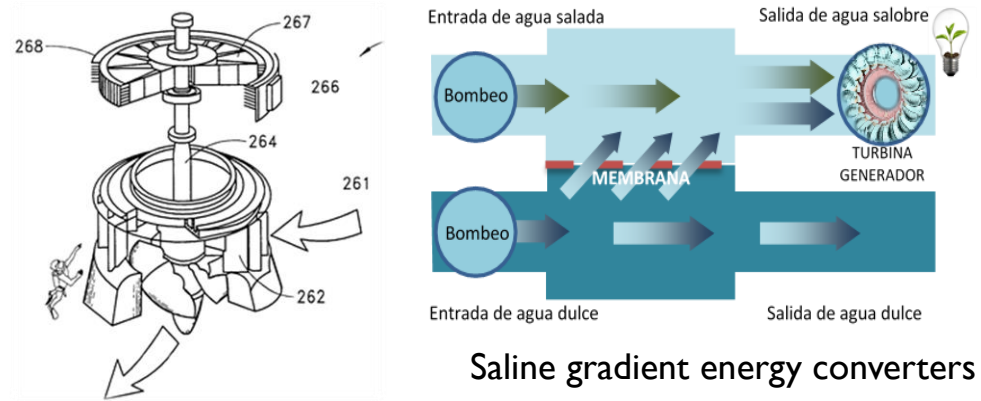


Surface temperature of the oceans

BACKGROUND

Energy from Saline Gradients

It is the energy caused by the difference of saline concentrations. It can be mainly found within the Atlantic Ocean waters in the Tropics and the Equator as well as in the Caribbean, the Mediterranean Sea and the Arabic Peninsula.



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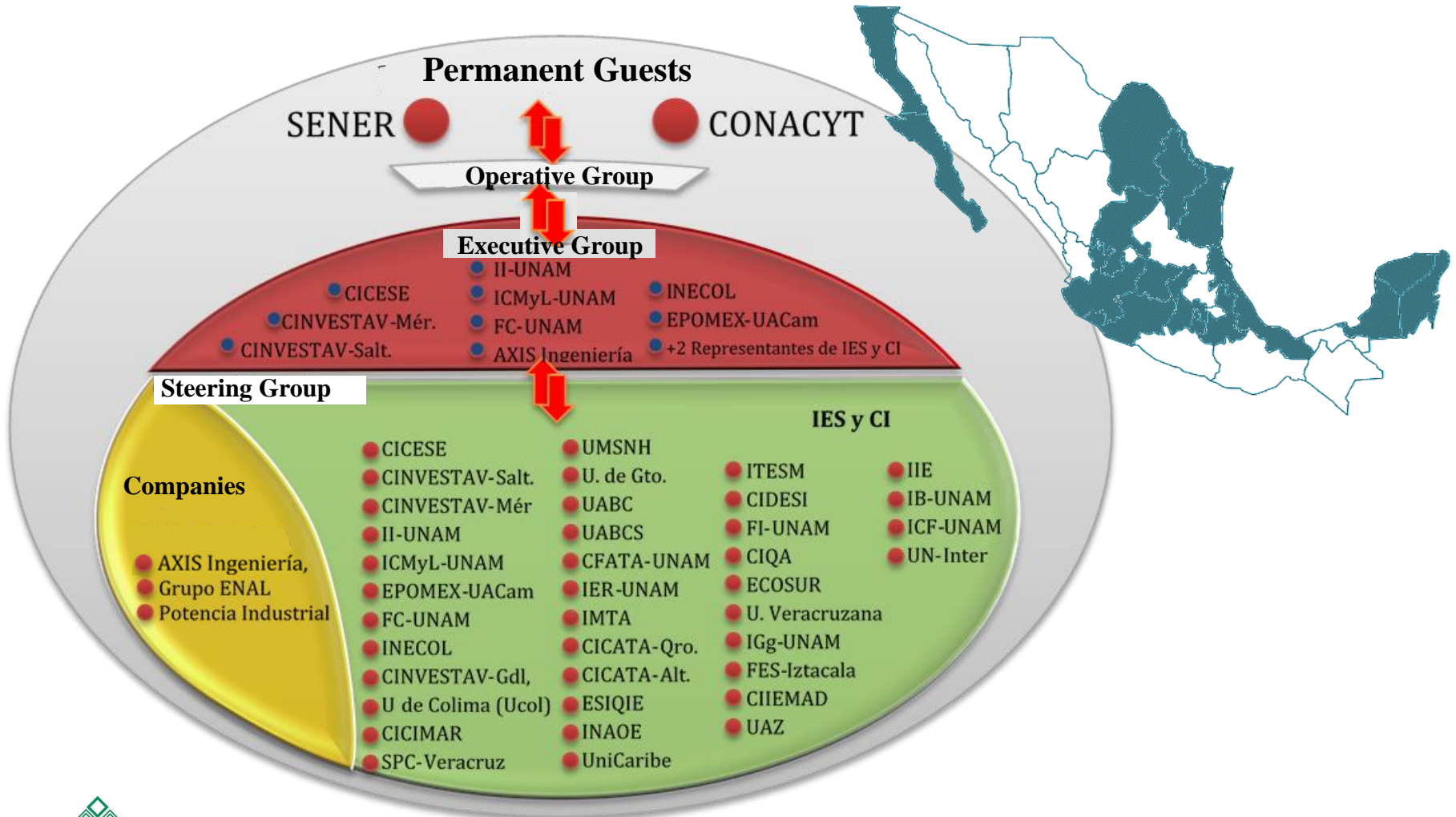
CEMIE-Ocean: Integration of the Consortium

The energy generation from conventional fossil fuel sources and their exploitation have endangered world ecosystems with effects such as global warming.

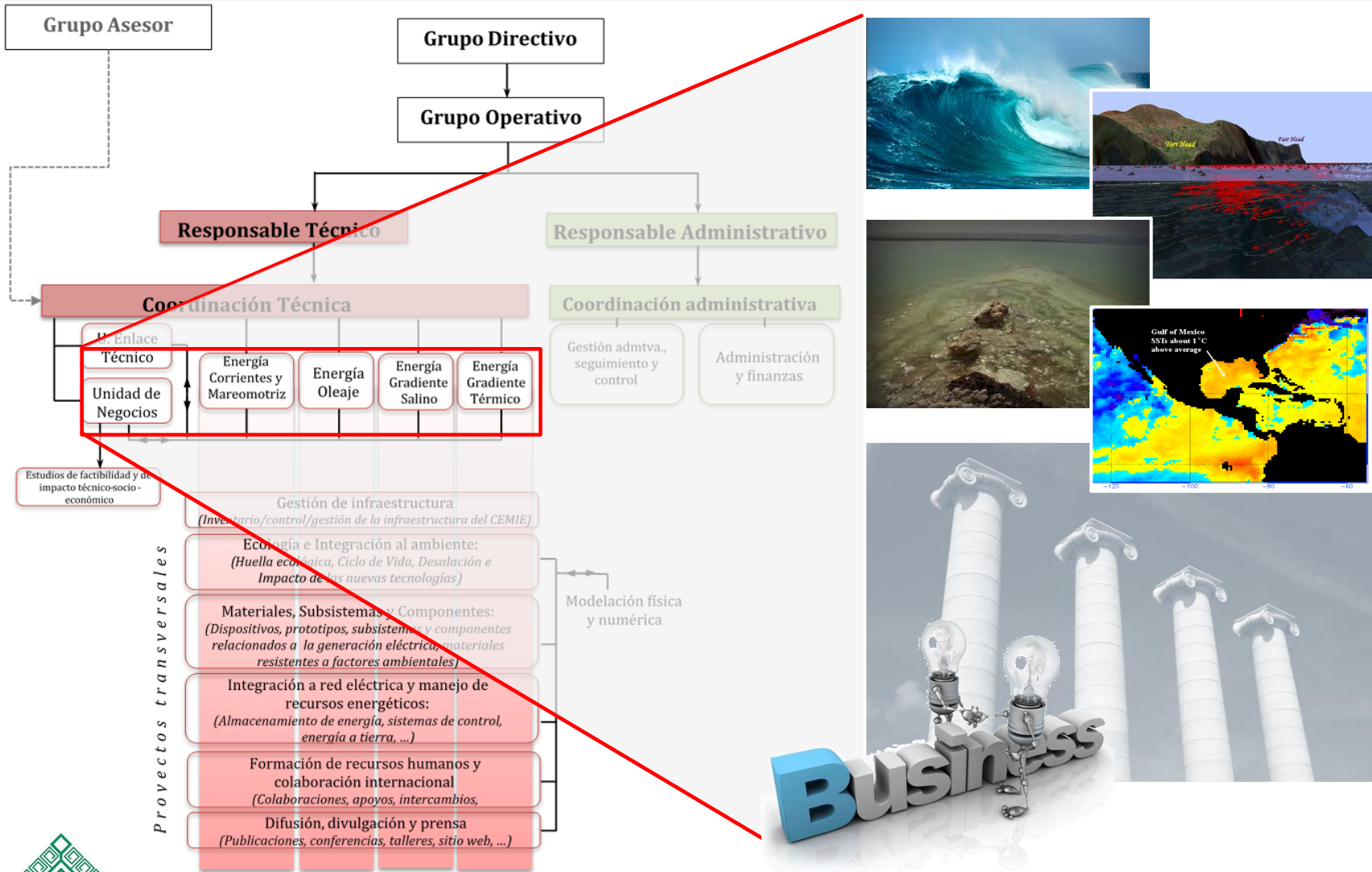
- In **2013**, the Mexican Government promote the **strategy for the creation of the Mexican Centers for Innovation in Energy** in order to become the most important Centers in Latin America for the approaching of ocean renewable energies and technology development.
- In **2017**, the **Centre for Ocean Energy starts its operations** through the joint collaboration of **41 Mexican Research Institutions, Universities and Industry**, also including foreign partners from **Germany, UK, Belgium, Spain and USA**.



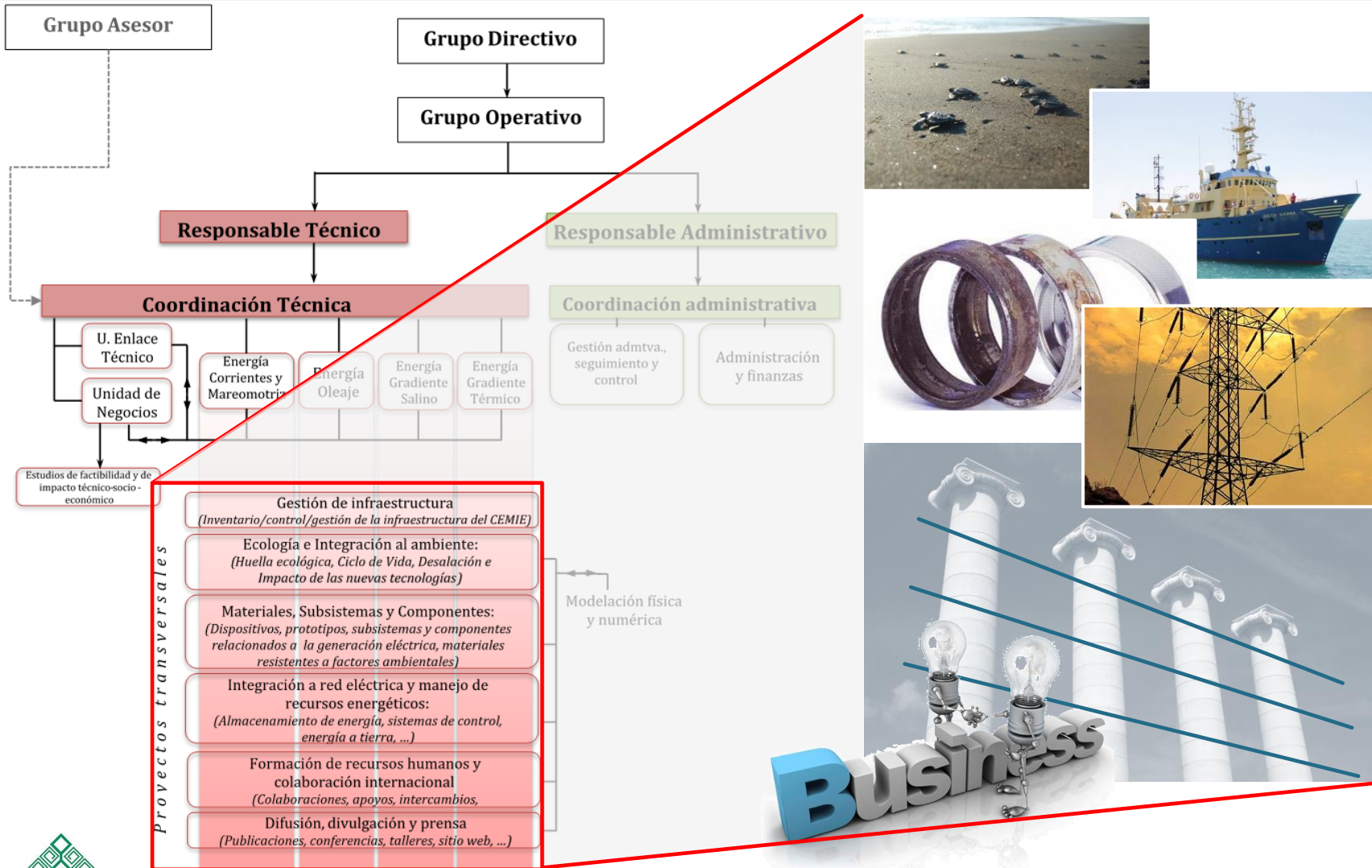
CEMIE-Ocean: Integration of the Consortium



CEMIE-Ocean: Integration of the Consortium



CEMIE-Ocean: Integration of the Consortium



CEMIE-Ocean: Strategic & Operative Plans

Objectives

- ❑ Enlargement/enhancement of the national capabilities for research and technology development within a collaborative framework.
- ❑ Integration and specialization of human resources on the fields related to the exploitation of ocean energy.
- ❑ Linkage between academia and the industry for joint projects.
- ❑ Development of a portfolio of projects.

Initial Stage (4 years)

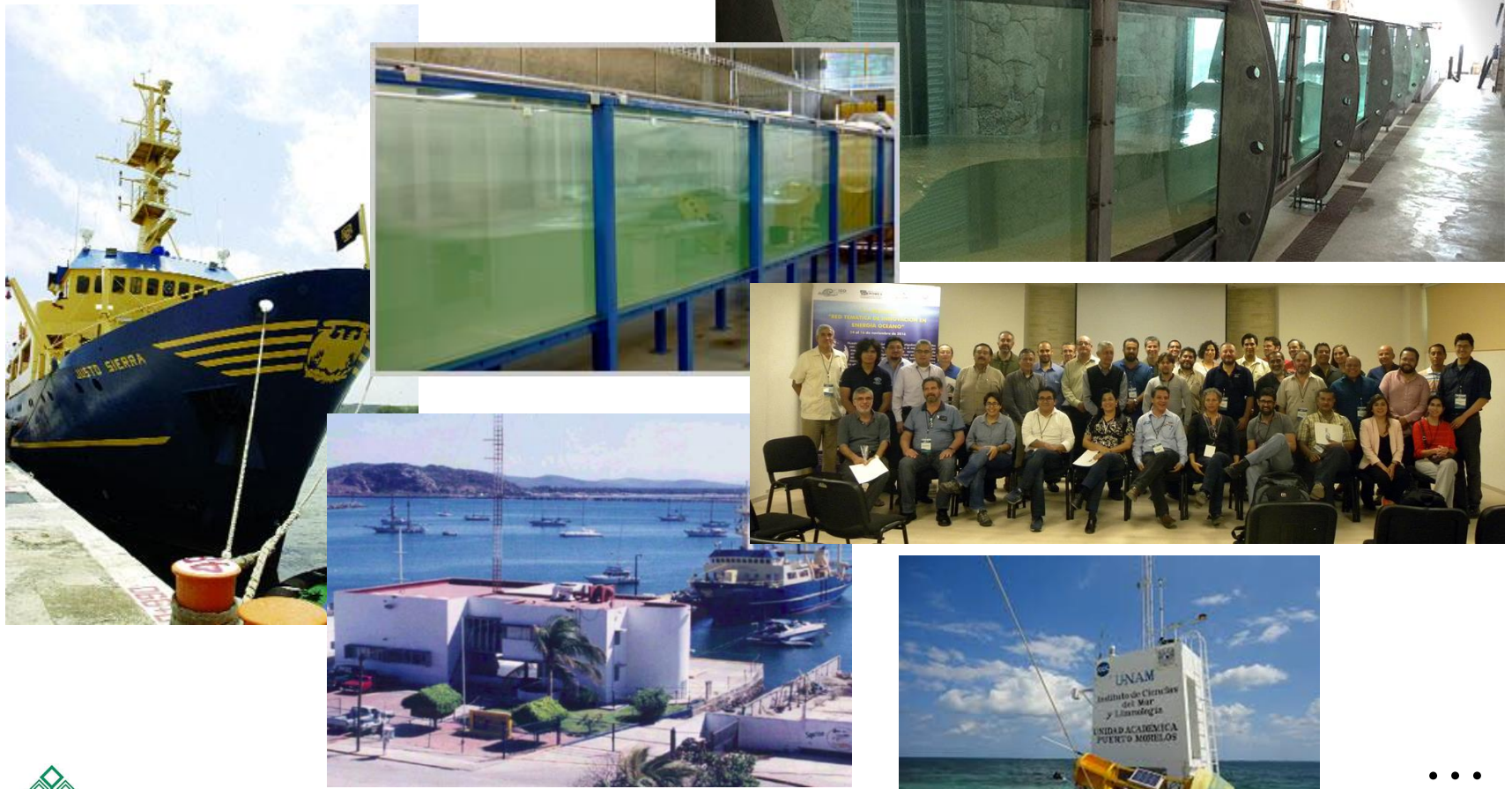
Initial Funding
SENER-CONACYT

Long term (>4 years)

Own sustainability
CEMIE-Ocean

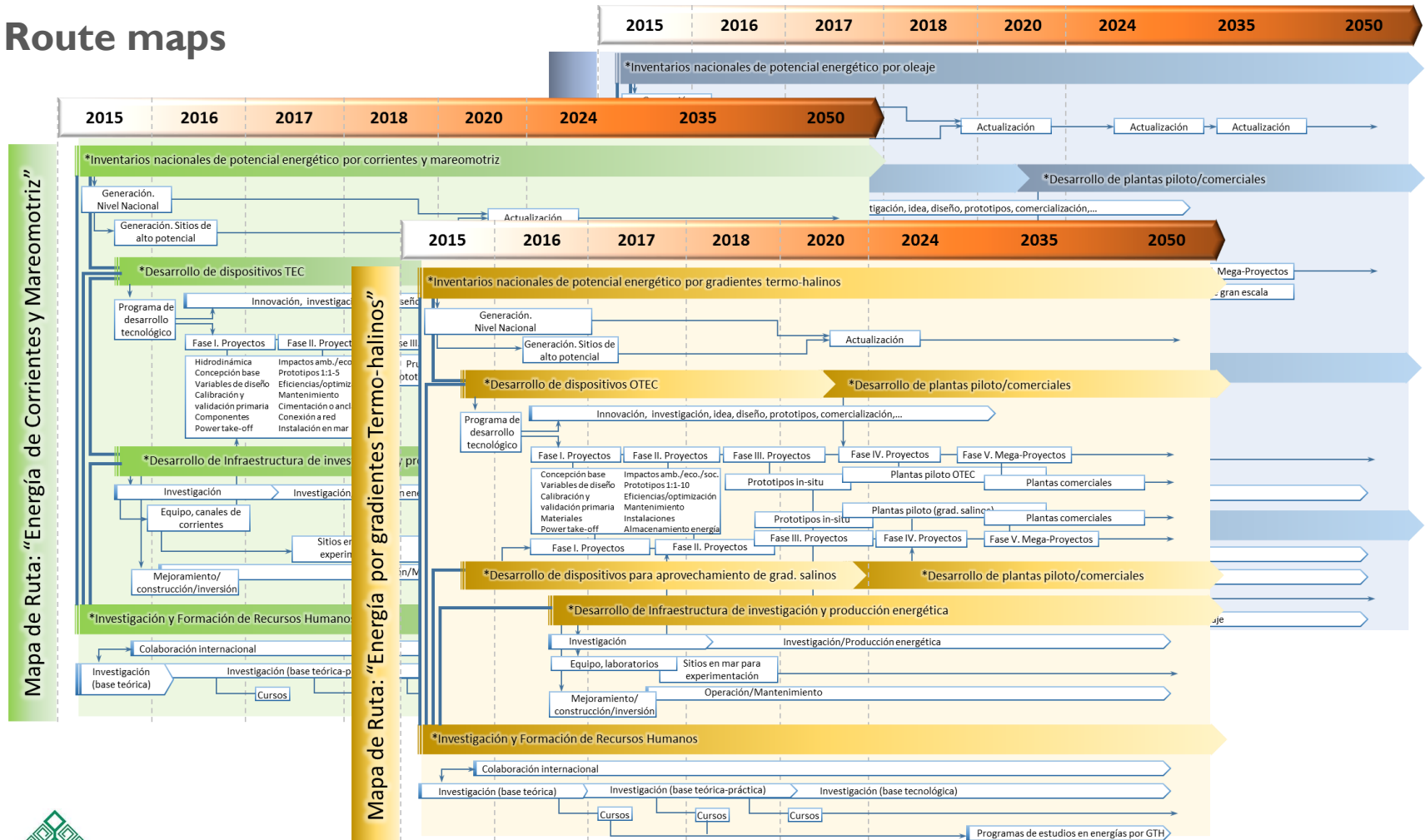
CEMIE-Ocean: Strategic & Operative Plans

Through the joint collaboration...



CEMIE-Ocean: Research lines & Strategic actions

Route maps



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Conclusions

- Enlargement/enhancement of the national capabilities for research and technology development within marine energy (waves, ...) is becoming a technological reality.
- Technologies in phase of demonstration after surpassing the one of development.
- Similar travel conviction (faster) than other energies.
- Need for support to I+D+I and specific regulatory framework.
- Mexico has a great opportunity to exploit.
- Universities must support development in national enterprises.

Thanks for your attention

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