



# The Environment Effects of Ocean Energy Development & Its management countermeasures in China

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# Overview

## 1. Ocean Energy Development in China

## 2. Potential Environment problems of OED

Environment effects of OED

OED sea use characteristics

Marine environment and ecosystem status

Marine protection goals in China

## 3. OED management system in China

Licensing system

MFZ Planning EIA FASU

## 4. Problems and countermeasures

## 1.Ocean Energy Development in China

# 1.Ocean Energy Development in China

## Ocean energy development Plan and goals:

- **Strategy action plan for Energy development (2014-2020)** put forward “ actively develop ocean energy. Orderly launch ocean **energy resources investigation**, actively **promote high-efficiently and clean use** ocean energy, **develop pilot project** of ocean energy”.
- **National plan to address climate change in China (2014-2020)** put forward” **Improve the level of the development and utilization of ocean energy**. Built a number of tidal power, tidal current energy **pilot power station**, combined with the island demands, develop ocean energy and wind energy, solar power and other complementary **independent pilot power plant**”.
- **Wind power plan:**  
coastal province offshore wind plans : 43,650MW(2020)

# Ocean Energy Development in China

## OED development statues:

### **Offshore wind:**

- Offshore wind power has realized commercialization.
- >20 offshore wind power projects ---->1,500ha

### **Tidal range energy:**

- 2 tidal range power station
- Jiangxia tidal power station (1980s) ---3.9MW.

### **Wave energy:**

- wave energy device -----hundreds kW.

### **Tidal current energy:**

- 1 MW pilot project of tidal energy has been built in Zhejiang Province, at east sea of china.

## 2.Environment problems of OED

## Environment effects of OED

**Acoustic effects** : The noise of construction, operation and decommission activities can cause marine animal avoidance of or attraction to the devices, disturb animal communication, reproduction, orientation, prey and predator.

**Collision Risk for Animals:** Moving parts of ocean energy devices can lead collision with migratory birds, diving birds, marine animals, etc.

**Hydrodynamic effects:** Removal of tidal and wave energy could result in changes in tidal range, wave speed, potentially impacting beach making, and marine habitat.

**Chemical effects:** During deployment, routing servicing and decommissioning, the expected risks associated with marine vessel operation will be encountered. The spilling chemicals are highly toxic to fish or mammals.

**Electromagnetic effects:** During transmission of the produced electricity, the cables will emit low-frequency electromagnetic fields. But to date the effect not very clear.

(George w. Boehlert, 2010)

## Sea use character of OED

**A large sea area occupied.** For offshore wind farm, the average sea area is 0.94 ha/MW for structure , but the farm occupied 15ha/MW.

**Near shore distribution.** For offshore wind farm, the average distance from coast is 2km.

**Multi-sea-space occupied .** The floating and fixed structure can occupied sea surface, sea water column, and seabed. Especially for cables, to now, the average 500m-1.50km/MW cables have been used, large seabed would be occupied.

**Low compatibility** with other sea use styles, especially for navigation channel.



**What's the pressure would be taken to Chinese marine environment?**

## Marine environment protection goals

According to **Marine Eco-civilization Development Strategy plan** and **Marine Function Zoning** in China, the marine environment protection goals include:

### **Marine spatial use pattern:**

the percentage of **natural coastline length** >35%,

the percentage of **offshore reserved zone** >10%,

the minimum objective for retention in the **aquaculture area** >26,000km<sup>2</sup>.

### **Ecological environment system quality:**

**Marine protected area** >5% (of marine areas in administration), >11% of internal water,

The **rectification and rehabilitation area of polluted and destroyed coastline** > 2000km,

**rehabilitation area of wetland** >8,500ha.

## Potential environment problems

Marine environment protection in China mainly focus on aquaculture area, nature coastline, nearshore area, marine protected areas, landscape and famous scenery, vulnerable ecosystem, marine economic species.

The potential environment impacts which connected to these goals would be focused by management department.

### 3. Marine management system of OED in China

# Marine management system in China

## Law & Regulation basis:

- *Environmental Protection Law of the PRC,*
- *Marine Environmental Protection Law of PRC,*
- *Law of the PRC on the Administration of Sea Area,*
- *Island Protection Law of the PRC*
  
- *Administrative Regulation on the Prevention and Control of Pollution Damages to the Marine Environment by Coastal Engineering Construction Projects of the PRC*
  
- *The detailed rules for Development, Construction, and Management of Marine Wind Power,*
- *Enforcement Rules of Provisional Regulations on Development, Construction, and Management of Marine Wind Power*

## Management department:

Energy Department  
Ocean Department  
Transportation(Maritime)  
Department  
Electricity Department  
Development Department

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**Licensing**  
**MFZ**  
**Planning**  
**EIA**  
**FASU**

MFZ: Marine Function Zoning  
EIA: Environment Impact Assessment  
FASU: Feasibility Assessment of Sea Use

# Licensing

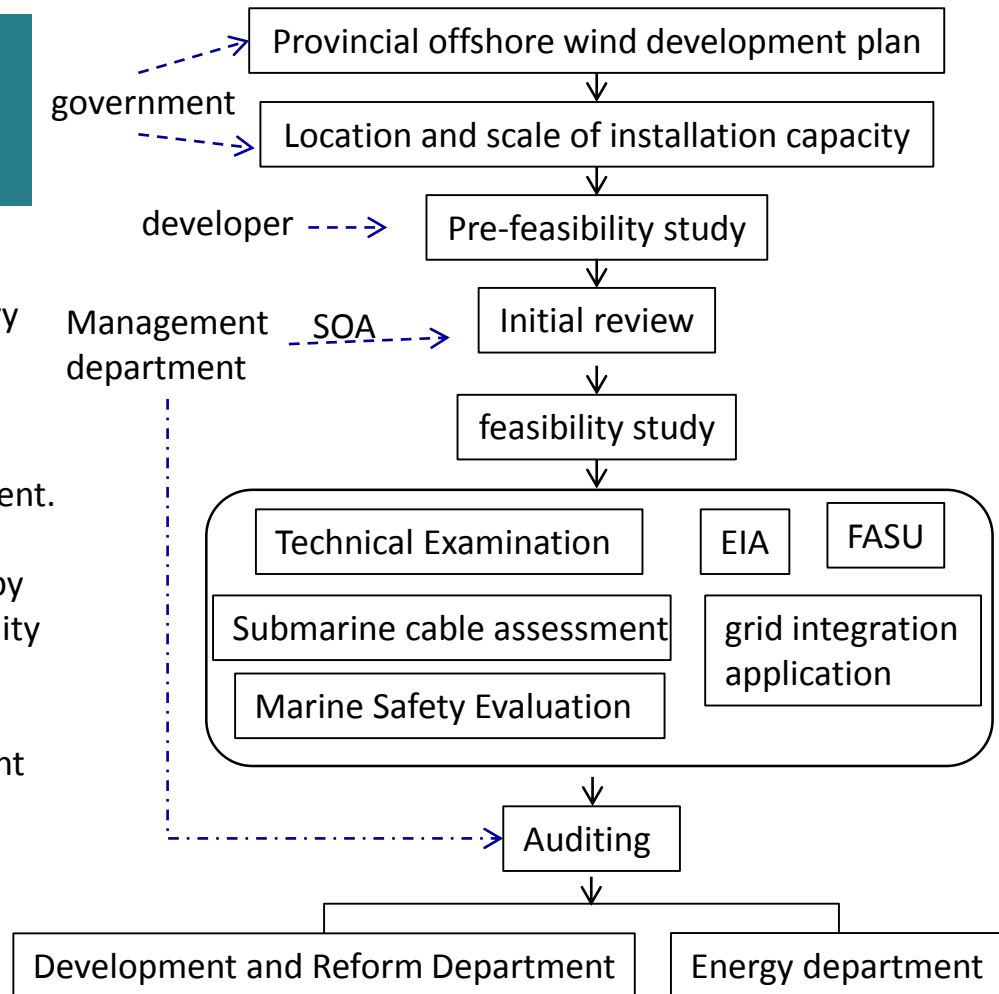
## Project approval process — Case of wind power

Offshore wind development plan usually made by every coastal province.

Developers usually find the project can be developed from provincial Energy Department and local government.

After that, developer needs to get several consenting by different administration departments including feasibility study, EIA, FASU, etc.

All the permitting procedure obtained from government usually take at least 2 years.

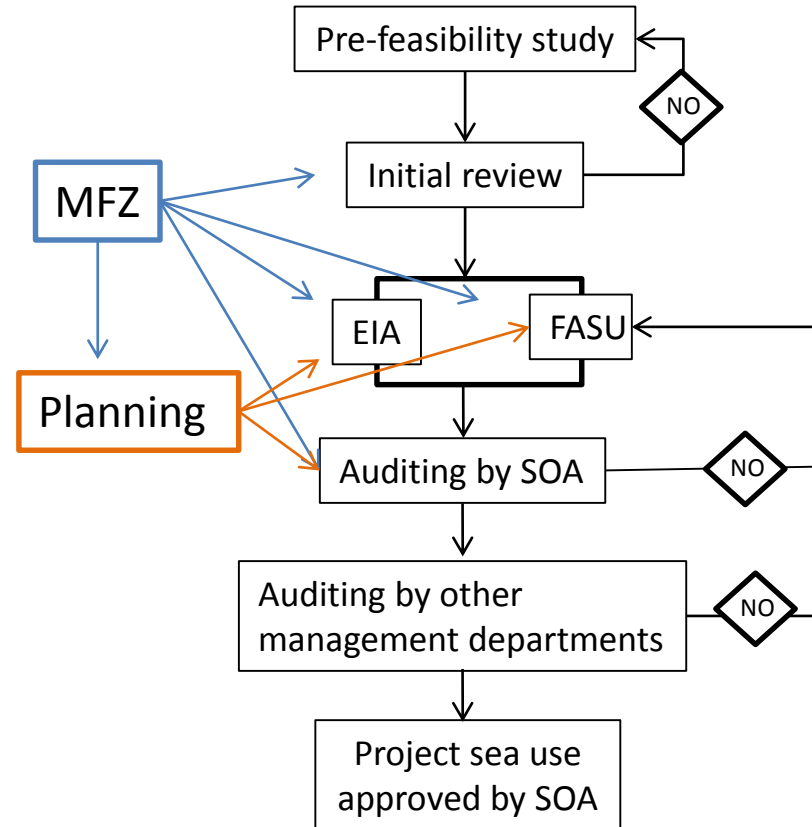


# Licensing

## SOA:

In the process of project approval, SOA mainly responsible for the management of sea use right & ownership, cables development and marine environment protection.

MFZ, Planning, EIA, FASU are the main approaches to protect marine environment.



## Marine Function Zoning (MFZ)

- Marine Function Zoning is Marine Spatial Planning in China. It is the basic proof and approach for marine management.
- *National Marine Functional Zoning (2011-2020)* in China set “renewable resource zone” for ocean energy. Besides, some area have the strong compatibility for offshore wind, such as agriculture & fishery area, reserve area.
- In accordance with Provincial Marine Functional Zoning Plan in 2012, there are 65 zones 6,687,982 ha area in total been set for ocean energy, include 22 offshore wind zones which occupied 35% in total area of OED.
- For the difficult site selection and low profit of OED, National MFZ guarantees the development space.





# Planning system

## Industry planning system

**Industrial planning of OED** sets key development goals of ocean energy, including key technologies, equipment level, demonstrative project construction, and industrial service system construction. Wind power planed separately.

According to *Sea Area Use Management Law of the PRC*, agricultural and fishery planning, salt industries planning, transportation planning, tourism planning relevant to sea use must meet the MFZ.

# Environment Impact Assessment (EIA)

OED EIA:

**Construction and decommission period:** organism losses, density of suspended solids and temporary noise.

**Operation period:** long term disturbance to hydrodynamic environment, such as water quality, sediment transportation, distribution of nutrient substances, changes of marine organisms' behaviors, and permanent obstruction for marine organisms by space occupation.

Through EIA, we can understand whether these impacts meet quality demands of environmental criteria and functional zones, and whether vulnerable marine areas are disturbed. And countermeasure of reducing impact can be put forward.

## Feasibility Assessment of Sea Use (FASU)

FASU has been put forward in 2002 by law for applying for sea use.

OED FASU:

FASU of OED should not only focus on economic-society benefit and environment effects, but also lead the rationality of location which can avoid sea use collision by assessment suggestion.

OED devices, basic structure and submarine cables occupied large sea space. The low compatibility is the key factors in sea use conflict assessment. The ownership of facility and the way of sea using can relieve conflicts with stakeholders. For example, the offshore wind projects located in places avoiding navigation channel can prevent from collision accident.

## 4. Problems & countermeasures

## Problems & countermeasures

<b>Licensing:</b> Multi-departments approval, complicated process, long procedure.	→	Establish coordination mechanisms, simplified approval procedure.
<b>MFZ:</b> No certain offshore wind zone increases the difficulty of EIA and FASU; Nearshore layout of marine renewable zone increases sea use conflict risk.	→	Set offshore wind zone Strengthen resources evaluation to guide marine renewable energy zone far away from shore.
<b>Planning:</b> Lack resources assessment far from shore, planning is not reasonable for reducing sea use conflict and nearshore marine protecting.	→	Strengthen resources evaluation, rational Planning for OED and offshore wind.
<b>EIA:</b> Data gaps of long-term observation during ocean energy operation cause EIA depends on expert's experience.	→	Strengthen the basic scientific research on environment impact of OED; Built a long-term environment monitoring mechanism for OED.
<b>FASU:</b> lacking of the uniform standard and criterion cause analysts assess sea use compatibility depends on experience.	→	Study the FASU guidelines, standards and criterion for ocean energy.



**Thank you!**

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