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Opportunities and challenges of the development of MRE in China


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Outlines

- ▣ MRE in China
 - ▣ Opportunities
 - ▣ Challenges
 - ▣ Suggestions
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MRE in China

- β China has paid great importance to MRE.
- β With the support of Chinese central and local governments, China has carried out several MRE pilot projects since 1980s.
- β China has made some progress on the MRE resources assessment, technologies R&D, and demonstration, and related policies development, etc.

MRE in China - Policies

β Legislation

- The Law of Renewable Energy (adopted in 2005, revised and amended in Dec. 2009)

β Planning

- The 12th FY plan of renewable energy in China (to be released soon)
- The Special Plan of 12th FY(2011-2015) for MRE in China (under development)

β Relevant Documents

- National Marine Functional Zoning(2011-2020)
- National Plan of Islands Protection (2011-2020)

MRE in China - *Policies*

β Special Funding Program for MRE

- ▷ Since 2010, with the support of Ministry of Finance, SOA had established the special funding program for marine renewable energy.
- ▷ The total amount of 3 rounds of special fund is RMB 600 Millions.
- ▷ The Special funds focus on the areas as follows:
 - Pilot demonstration projects for hybrid MRE system in Isolated remote islands, pilot demonstration projects in remote sea area; MRE technologies industrialization; Technologies R&D; standard and public services system construction.

MRE in China - Policies

- β SOA takes the responsibility of MRE research, application and management in China. SOA has,
 - ▷ designated NOTC as the contracting party of IEA Ocean Energy System Implementation Agreements;
 - ▷ established ACMRE in 2011 for supervision of the Special funds;
 - ▷ carried out projects for MRE resources survey and assessment;
 - ▷ sponsored NOTC hosting the 1st annual MRE conference and training courses in April 2012, Beijing.



1st China Marine Renewable Energy Conference

- From 11th -12th April, 2012, the 1st Annual China Marine Renewable Energy Conference was held in Beijing, China.
- Host: NOTC and ACMRE, SOA,
- Sponsor: SOA and MOST.
- Theme: Challenges and Opportunities, the Future Perspective of the marine renewable energy in China.
- Topics: Policies, Technologies, Industrializations.
- Participants: 230 from central and local governments, developers, stakeholders.



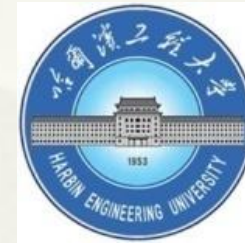
MRE in China - *Technologies*

- **Tidal range technologies**

- Jiangxia Tidal Power plant, established in 1980s, operates well with only several major technology modifications and never caused any significant environmental problem.
- Jiantiao (Zhejiang, 21MW) Tidal power pre-feasibility study has been completed, and had got the support of local government.
- Rushan estuarine (Shandong, 10MW), Bachimen (20MW) and Maluan Bay (Fujian, 10MW) tidal power pre-feasibility study are under progress.



MRE in China - *Technologies*



tidal current technologies

MRE in China - *Technologies*

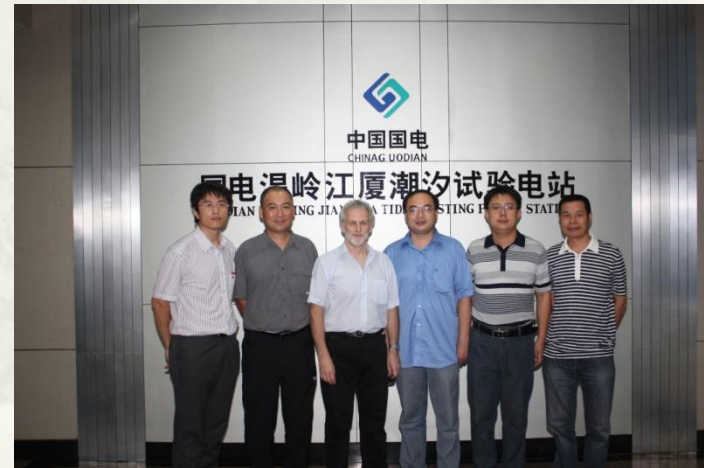


Wave technologies

MRE in China - *Demonstration*

Jiangxia Tidal Power Plant

- Installed capacities 3.9MW with 6 turbines
- Generating 7.3Million KWh/year;
- In operation more than 30 years.



In July,2011, Dr.John Huckerby visited Jiangxia tidal plant.

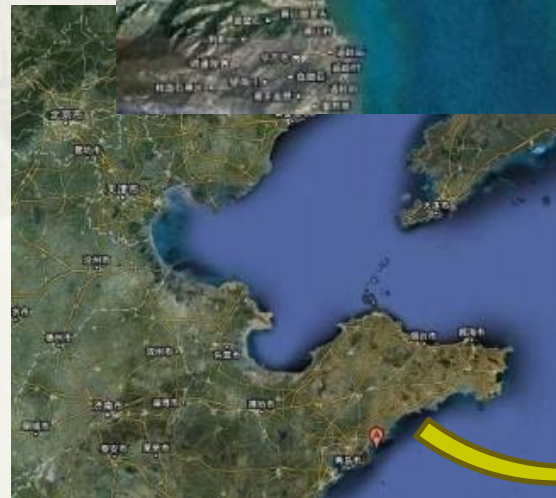
MRE in China - *Demonstration*

Isolated hybrid MRE power system in Daguan island

- Installed Capacities
105KW with 30KW wave, 60KW wind and 15KW solar power. In operation since June 2011



30KW Wave Power



MRE in China - *Demonstration*

Ongoing Projects



DATANG: 4X300KW tidal current energy system, grid-connected, Longxudao Island, Shandong



CNOOC: 500KW hybrid tidal current energy system, isolated, Zhaitang Island Shandong



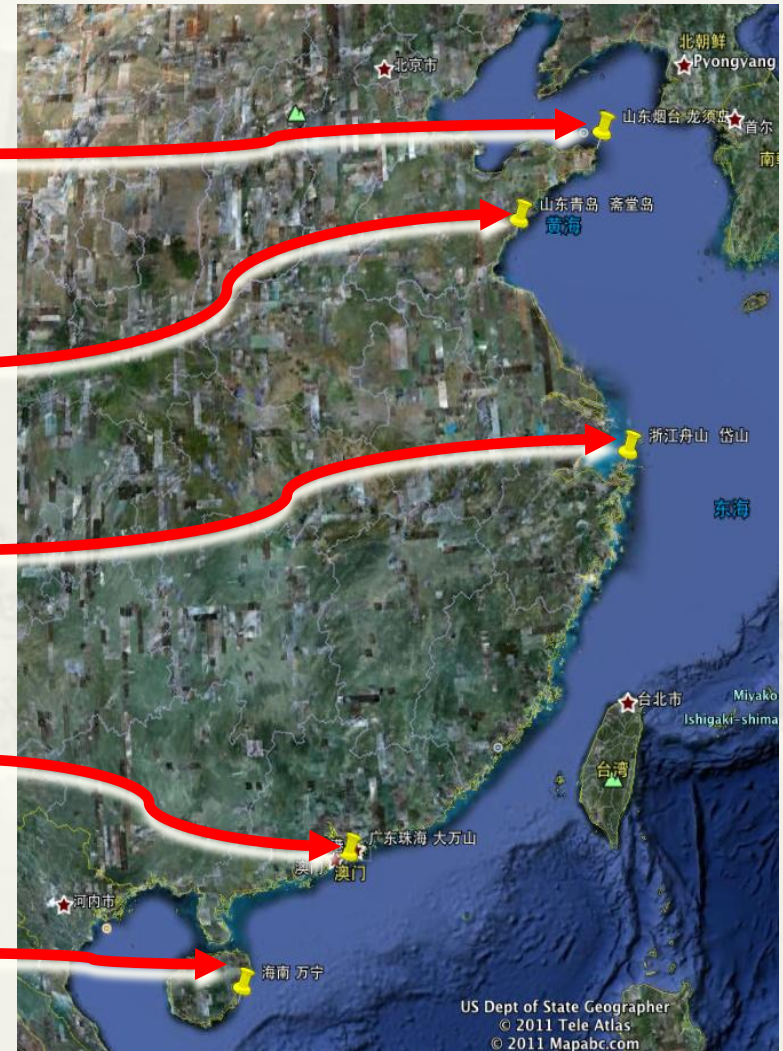
CECEP: 1MW tidal current energy system, grid-connected, Daishan Island, Zhejiang,



GIEC: 500KW hybrid wave energy system, isolated, Danwanshan Island, Guangdong



HUANENG: wave energy system, grid-connected, Wannin, Hainan



MRE in China - *Demonstration*

Wave and tidal test sites pilot projects initiated

- The site selection has been completed. The pilot test sites location is closed to Chengshantou sea area, Shandong province, 3 km off the coastline.
- The first facility building project will be launched in July, 2012.



Opportunities

β **China government paid more attention to MRE**

- ▷ Chinese government committed that the carbon emission per unit of GDP in 2020 relative to 2005 levels would decrease by 40-45%;
- ▷ Setup the target of development of RE;
- ▷ More investment in MRE in recent years;
- ▷ Government incentives for MRE.

Opportunities (Cont.)

- β **More and more sectors engaged in MRE**
 - More than 70 institutes, universities, corporations are engaged in the development and utilization of MRE;
 - Emerging of preliminary industry chains of MRE including technology development, equipment manufacturing, marine engineering, maintenance and so on.

Opportunities (Cont.)

β **Experiences and technical basis**

- 30 years experience of R&D on MRE;
- Tidal range technology is mature, with the ability to build large-scale tidal range power station;
- A number of different principles of tidal current devices, which are in proof-of-concept of prototype stages;
- Some technologies for both capturing and converting wave energy into electricity, such as the 100kW oscillating column generator and the 30kW pendulum pilot plant.

Opportunities (Cont.)

β **Demands to improve environment and boost the marine economics**

- ▷ improve the environment livable for islands with cleaner power supply, and promote islands development, utilization and protection in China;
- ▷ form a strategic emerging industries, boost marine economics and create more jobs;
- ▷ promote the poverty eradication and build the harmonious society.

Challenges

- β **Key technologies need to be developed**
 - β As a developing country, over the years, the R&D of funding on MRE is not enough;
 - β the characteristics of high cost, high risk and harsh environment of MRE;
 - β lack of capacity of R&D and test facilities for MRE.



Challenges (Cont.)

β Possible negative impact on the marine environment.

- The identification of environmental impacts for MRE device is complicated, requiring individualized assessments.



Challenges (Cont.)

β **Conflict of sea area uses**

- Public awareness for MRE is weak, due to lack of information for public education;
- With the rapid development of marine industries, the conflict between the MRE and other utilization for ocean space, such as fishery, transportation, shipbuilding, tourism, and so on, becomes more and more obvious.

Challenges (Cont.)

β **Gaps with developed countries**

- ▷ Developed countries have reached the pre-commercial stage on tidal and wave technologies. China is just at the early stage for MRE;
- ▷ The gaps between developing countries and developed countries are getting bigger;
- ▷ Cooperation and collaboration between developed countries and developing countries are needed;
- ▷ Less global and regional coordination mechanism and programs for MRE;
- ▷ IEA OES IA is lead international organization for MRE, but only 19 member states.

Suggestions

β **To enhance collaboration**

- ▷ Developing countries need to learn advanced experience of developed countries, such as policies exchange, technical cooperation, technologies transfer, reducing the gaps between developing and developed countries;

β **To establish global coordination frameworks**

- ▷ Under the framework of UN, it is suggested to build intergovernmental mechanism for strengthening the communication, exchange, cooperation on the development of MRE.

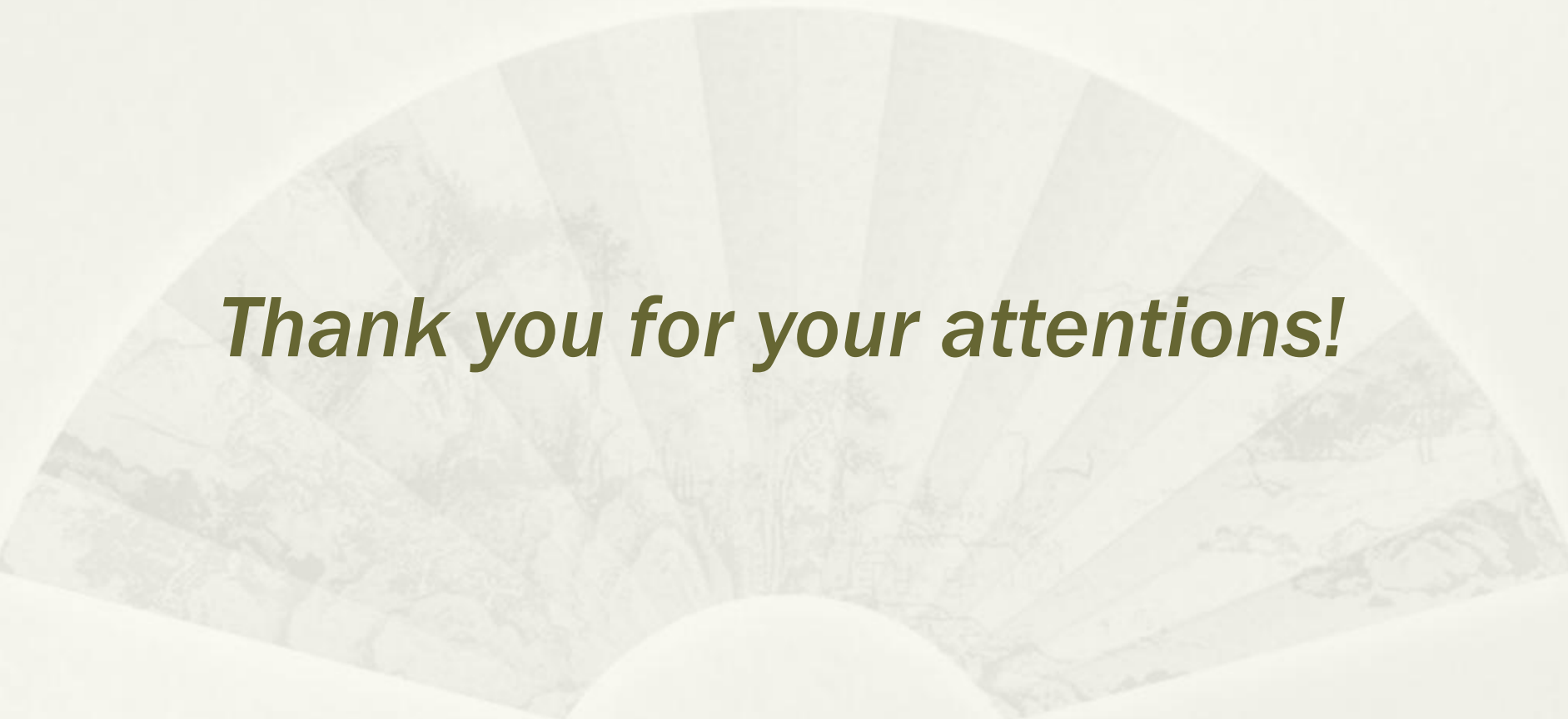
Suggestions (Cont.)

β **To strengthen the role of regional organizations**

- ▷ Regional organization, such as PICES, WESTPAC/IOC, play important roles to promote the cross-border cooperation

β **To enhance the role of IEA OES IA**

- ▷ Encourage more countries to participate the IEA OES IA;
- ▷ IEA OES IA needs to launch more pilot projects to strengthen the collaboration between developing and developed countries, especially on application of the mature MRE technologies.



Thank you for your attentions!