



**Asia-Pacific
Economic Cooperation**

2014/AOMM/007
Agenda Item: 4.3

Marine Technology and Innovation

Purpose: Information
Submitted by: Korea



4th APEC Ocean-Related Ministerial Meeting
Xiamen, China
28 August 2014

AOMM4
(Aug. 28, 2014)



Marine Technology & Innovation

- A Key to Open a New Era of the Ocean -



Moon Haenam

Deputy Minister of Oceans and Fisheries

Republic of Korea



Contents

- I. The Ocean : Blue Frontier in the 21c
- II. MT: Blue Chip Solutions to Global Challenges
- III. Korea's Innovation through MT
- IV. Suggestions for MT & Innovation





1 Meaning and Value of the Ocean

✓ Meaning : More concrete and Expanded as time goes by



✓ the Ocean in the 21c : A place to dream our future

- Growing interests in the ONLY unexplored place : Solutions to global challenges
Ex. food, resources & energy crisis, climate change, increasing natural disasters...



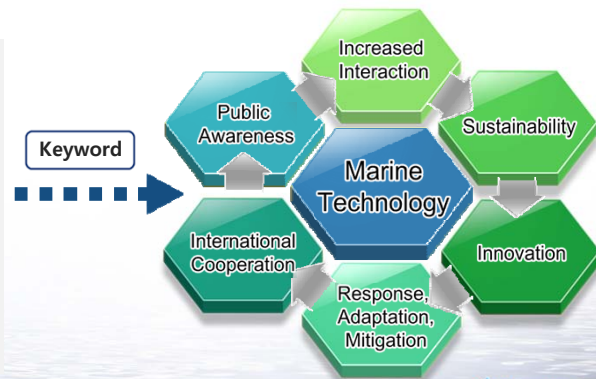
"The ocean covers more than 70% of the planet's surface, is crucial to sustaining life, provides food and income to billions of people who depend on marine ecosystems for their livelihood and connects people, markets and communities as the silk-road for over 90% of the world's trade"

2 Global Marine Policy

✓ Ocean : Solutions to global challenges & Source of economic growth

- Formulate & implement integrated policy and strategy specialized in the ocean
- Focus policy capacity in developing MT and creating new industry

< CHINA >	< U.S.A. >	< JAPAN >
Marine S&T in China: A Roadmap to 2050 (2009)	An Ocean Blue Print for the 21 st century(2004)	The 21 st Century Ocean Policy (2002)
Outline of the Plan for National Marine Economic Development(2010)	The Interagency Ocean Policy(2010)	Basic Act on Ocean Policy (2007)
Marine S&T Development Strategy toward 2050 (2011)	Climate Change Program (2010)	Basic Plan on Ocean Policy (2008, 2013)



2

MINISTRY OF OCEANS AND FISHERIES

II. MT : Blue Chip Solutions to Global Challenges

1 Climate Change Response & Marine Environmental Protection

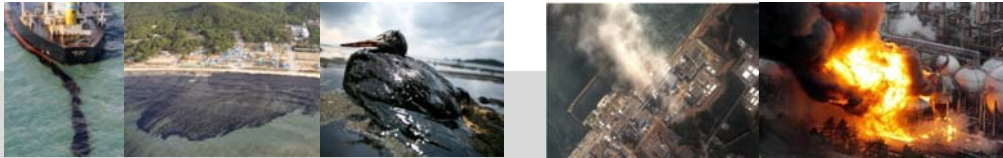
✓ Global warming : rising sea level & natural disasters ⇒ threat to humanity

- Temperature (+) 2.6~4.8°C, Sea level (+) 45~82cm by 2100[IPCC]
- More natural disasters, Extinction of species, Flood in low-lying areas



✓ Human impact on the Ocean ⇒ Marine Environment & Ecosystem Degradation

- Large-scale marine pollution*, marine waste & ocean acidification
- ※ Oil spill of *Hebei Spirit* (2007, Korea), Fukushima nuclear power plant meltdown (2011, Japan)

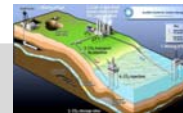


3

1 Climate Change Response & Marine Environmental Protection

✓ Develop technology to respond CC & natural disasters

- Underwater carbon capture and storage(CCS) & Green ship
- Marine forecasting & prediction system, Global marine climate observation, Coastal disaster management and Coastal erosion responses



✓ Develop technology to conserve marine environment and ecosystem

- Marine debris & waste, Ocean acidification management, Marine radioactive substances monitoring model, Rapid responses to oil & HNS spill and environmental restoration
- Marine ecosystem monitoring, Ballast water treatment, Coastal wetland & marine ecosystem conservation and restoration

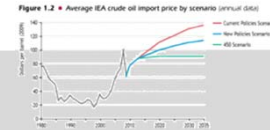


4

2 Solutions to Resource & Energy Crisis

✓ F.F. Depletion & energy demand increase ⇒ soaring prices & supply crisis

- Oil prices : \$100 (2014) → \$120/b (2035) [IEA]
- Kyoto Protocol : growing interests in sustainable clean energy



✓ Imbalanced supply & depletion of land-based minerals ⇒ mineral development rush

- Major minerals to be depleted by 2050 [NIMS]
Ex. copper, lead, zinc, gold, silver...
- Global economic growth ⇒ mineral demand & price ↑
Ex. Cooper : \$8,500~9,100/t (2025) Nickel : \$20,000~23,000/t (2025)

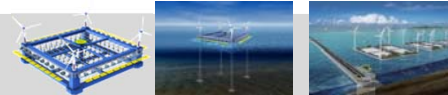


5

2 Solutions to Resource & Energy Crisis

✓ Development of various sources of clean marine energy

- Offshore wind, tide & tidal current, wave, OTEC, marine bio-hydrogen & diesel
- Technology to integrate marine energies
Ex. wind + tide, wind + current...



✓ Development of marine minerals to secure the supply of metal resources

- Technology to use deep-sea minerals
Ex. Polymetallic nodule, hydrothermal deposit, co-rich crust...
- Mining and smelting technology to explore and commercially use mining lots



6

3 Food Security Enhancement

✓ Population & global warming ⇒ Imbalance supply of food ⇒ Food crisis

- 7.2 billion (2014) → 9.2 billion (2050) [UN]
- Drought & flood, less ground & underground water
⇒ Food production ↓ (2030~) [IPCC]
- World hungry population : 850 m (2006) → 870 m (2012) [FAO]



✓ Seafood supply & demand imbalance ⇒ Fishflation

- Per capita seafood consumption: 18.6kg (2010) → 22.4kg (2020)
- Excess demand : 11 m ton (2015) → 92 m ton (2030) [FAO]
- Fish prices (2020): capture 23% ↑, aquaculture 50% ↑



7

3 Food Security Enhancement

✓ Green aquaculture tech. for mass-production of high-quality seafood

- Development of advanced aquaculture tech.
Ex. Biofloc, re-circulating aquaculture & building-style aquaculture...
- Quality improvement of fish seed based on BT
※ (KOREA) 'Golden Seed Project' to be implemented
(CHINA) 'Marine Biotechnology 819 Program' → Breeding project(carp, shrimp, abalone, sea cucumber...)
- Tech. to respond to climate change and natural disaster
Ex. IT-based automatic controlling system to monitor aquaculture environment

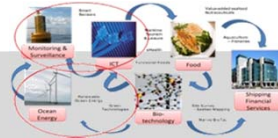


8

4 Future Growth Engines

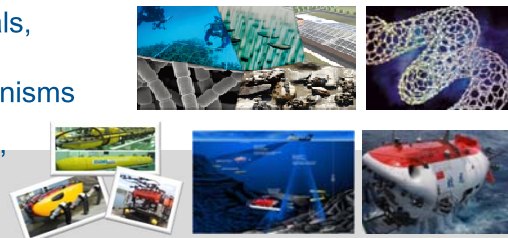
✓ Innovative development & Enhanced convergence of ST

- State-of-the-art ST
 ⇒ Improved access to and utilization of the ocean
- MT + IT • BT • ET • NT ⇒ New industries and markets



✓ Technology development for new, value-added marine industries

- Marine-Bio : New medicine & medical materials, New materials (high-performance fiber & plastic), Genetics decoding technology of marine organisms
- Cutting-edge marine equipment : AUV & ROV, Underwater wireless technology, Deep-sea manned submarines & ice-breakers



9

MINISTRY OF OCEANS AND FISHERIES

III. Korea's Innovation through MT



1 Korean government's Marine Philosophy

✓ Channel policy capabilities into creating new value from the ocean

- Re-establishment of MOF(2013): foundation to become a Marine Powerhouse
 - ※ MOF pursues to "realize dream and happiness of the public through the ocean."
- Ocean : a tool to realize Creative Economy*
 - ▶ Advanced MT ⇒ creative new marine industry, job creation
 - * Park Gunhye Administration's National Vision : Imagination & Creativity + ST, ICT ⇒ Creation of new industry, market, quality jobs



"The ocean is a great blessing endowed to us."
 "The ocean is a repository of creative economy."
 "Now we are ushering in a new era of the ocean in which the ocean gains more importance and value."

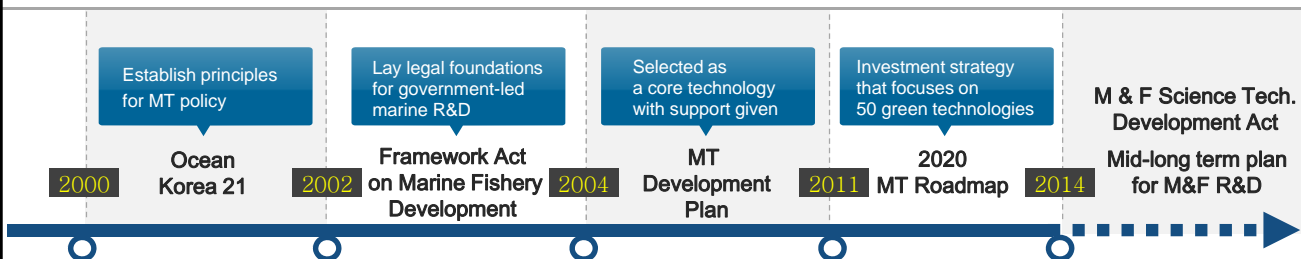


2 Korea's MT policy

✓ Policy Direction of MT

- Systematic cultivation of MT & Creation of development foundation at a government-level
 - ▶ Create new economic values through new industry
 - ▶ Explore solutions to global challenges & Contribute to the improved quality of life

< History of MT Policy >



2 Korea's MT policy

✓ Major policies on MT

- Vision 2030 for Marine & Fishery Sector
- Mid-long term plan for Marine & Fishery R&D → 70 core techs selected

< Mid-long term plan for Marine and Fishery R&D >



12

3 Status of Korea's Marine R&D

✓ R&D Investment

- Budget for Marine R&D : \$ 200 million (2008) → \$ 510 million (2013) (20% increase/y)
 ※ (same period) Total R&D budget : 10% increase/y (Budget for 2013 : \$ 17 billion)
- Long-term investment projects : Ocean survey & observation infrastructure construction, Marine mineral & energy development
 Ex. marine science station, communication, oceans & meteorological satellite, ice-breakers and the 2nd scientific station in the Antarctica

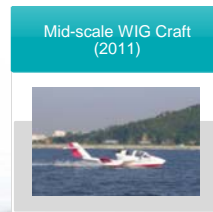


13

3 Status of Korea's Marine R&D

✓ Major Achievements of Marine R&D

- With continuous R&D investment, Korea has secured global top 7 leading technologies
 - ※ Ballast water filtration, Underwater wireless communication system, Seawater lithium extraction tech.
Marine bio-hydrogen, Mussel bio-adhesives & composite nano-fibers, Mid-scale WIG craft and DNA decoding of Minke whale
- Korea has made remarkable technological progress in the areas of ocean observation & prediction, marine resources and polar oceans



14

MINISTRY OF OCEANS AND FISHERIES



IV. Suggestions for MT Cooperation



Suggestions for MT Cooperation

✓ Marine Issues

- Future survival & prosperity
- Trans-boundary

✓ Marine Technology

- Lots of time & cost
- National & regional Differences



A single economy's efforts are not enough.



➔ **Concerted Efforts & COOPERATION are necessary!**

15

Suggestions for MT Cooperation

✓ AOMM

- Critical platform of discussion to find solutions to global challenges through ocean
 - ※ Seoul Ocean Declaration(2002), Bali Action Plan(2005), Paracas Declaration (2010)
- High time for concrete actions to solve marine issues
 - ▶ Xiamen Declaration : Catalyst to enhance cooperation & joint research in MT



**Korea pledges full cooperation for MT development
for co-development of Asia-Pacific.**

➔ **Propose a regular high-level meeting on Marine Technology!**

16

