Report on Joint Seminar
“Greener Voyage Fuelled by LNG”

Busan, Republic of Korea
November 18~20th, 2015

Transportation Working Group (TPT-WG)

Nov 2015
SUMMARY SHEET

Title: Greener Voyage Fuelled by LNG

Date: November 18–20th, 2015

Location: Rose/Lilac/Orchid Room, The Westin Chosun,
67, Dongbaek-ro, Haeundae-gu, Pusan, Republic of Korea.

Date: November 18–20th, 2015

Project Code: APEC TPT 05 2013A

Project Name: Cooperation Program of Clean Energy Shipping with LNG Fuelled Ships

Project Overseer: Ministry of Oceans and Fisheries (MOF), Republic of Korea

Co-sponsoring Economies: Japan, Canada

Organized by Korean Register and supported by Ministry of Oceans and Fisheries (MOF), Republic of Korea

27 participants from 10 member economies jointed the seminar. In addition, one session of the seminar (Nov 19th afternoon) was opened to the local marine society and around 100 people from various agencies, nautical institutes and commercial companies in Korea had the chance to listen to the presentations given by APEC member economies.

Summary

The seminar objective was to share and disseminate technological alternatives of LNG fueled ships, in the same time to discuss market requirements, needs and restriction of developing it. This seminar aims to promote co-operation among APEC economies in their efforts to enhance the region’s emission record and the protection of the marine environment.

The proceedings occupied 3 days, the first of which consisted of an opening ceremony. The second day was divided into 2 sessions. The morning session started from the presentation of KR on its research result of APEC TPT 05 2013A, followed by presentations from Hong Kong and Thailand of their views on LNG fuelled ships. The afternoon session was opened to the local marine society with 4 presentations from Korean, 2 from China, 1 from Canada and 1 from Singapore.

An interesting and much appreciated field trip of Busan city was made on the third day.

The seminar clearly met its objectives and the participants all completed their mission.

The list of participants is at ANNEX A and the seminar programme is at ANNEX B.
I. INTRODUCTION

The joint seminar belongs to “Cooperation Program of Clean Energy Shipping with LNG Fuelled Ships” which is funded by APEC Transportation Working Group with project Code TPT05 2013A.

The joint seminar was arranged by Korean Register, which is the contractor of APEC project. The seminar was hosted by the Korean Ministry of Oceans and Fisheries (MOF).

The venue for the Seminar was The Westin Chosun, Busan, Republic of Korea and ran for three days from Wednesday 18 to Friday 20 November 2015.

There were 25 participants from the public and private sector of the following 10 member economies: Canada, China, Hong Kong, Japan, Korea, Malaysia, Papua New Guinea, Singapore Thailand and Viet Nam. There were around 100 observers from various Korean institutes, universities and companies (afternoon session of Nov 19th only). The full list of participants and their contact details are at ANNEX A.

II. OBJECTIVE

The basic goal of this joint seminar is to share knowledge and promote usage of LNG fuelled ships in APEC region.

- To collect relevant information from APEC economies on market requirements, needs and restriction of developing LNG fueled ships.
- To review best practice, technological and regulation barriers on development of LNG fuelled ships.
- To discuss and distribute the research results among APEC economies, contributing to the sustainable development and help developing economies in APEC region to narrow up the technology gap with advanced economies.

III. ACTIVITIES AND PROCEEDINGS

The seminar program is at ANNEX B.

A comprehensive briefing document, containing the program, list of participants and the preprogrammed presentations had been prepared by the consultant, Ms Lindsay Hsu.

The meeting arrangements had been thoroughly thought through and were well suited to the seminar’s requirements. All presentations made during the seminar were contained in printing books and also placed on memory sticks. Both of the book and memory stick were provided to each delegate before their departure.
1. Welcome reception (Day 1)

The opening ceremony commenced punctually at 7pm on day one and was presided over by Dr. Jong-shin Kim (Executive Vice President, Korean Register).

In Dr. Jong-shin Kim’s opening message he extended a warm welcome to all the foreign guests and said it was a great honor for the Republic of Korea to have this opportunity to host this APEC joint seminar.

During this reception, the seminar program was briefed to the delegates, following which each delegate and the consultants were introduced. After the dinner, Dr. Parry Oei (Director and Chief Hydrographer, MPA, Singapore) as the representative of all foreign delegates expressed his thanks to Korean host’s hospitality.

2. Working Group Meeting (Day 2 Morning Session)

Working group meeting was held with the main purpose of reporting KR’s research result to all the delegation and to collect opinions on development of LNG fuelled ships from different economies and different entities (policy makers, administrative authorities, shipbuilding yards, shipping companies, energy companies, port, classification, academia researcher, non-government organizations, environmental groups and etc) in APEC region.

The working group meeting commenced at 10am on day two and was started by Dr. Jong-shin Kim’s opening remarks. In his opening remarks, Dr. Kim introduced current status of LNG fuelled ships and LNG bunkering technology development in Korea and also addressed issues surrounding marine environment.
2.1 Greener Voyage Fuelled by LNG

The presentation was made by Mr. Jin-yil Chai (General Manager of Strategic Planning Team, Korean Register).

In the presentation, the background of using LNG as a marine fuel was dressed first, emission regulation was reviewed and effects were examined. He compared environmental performance, economic viability of alternative solutions including MGO, LSMGO, after-treatment devices and LNG as a fuel.

Mr. Chai also introduced current worldwide development status of LNG fuelled ships with LNG ready ships included. He also briefly presented about pilot project of “Econuri” in Korea. Technology readiness was reviewed from propulsion systems, duel fuel engine, LNG storage tank size, bunkering time, bunkering types. In terms of economic benefit, he analyzed LNG price and LNG sourcing price structure.

In the end of his presentation, he introduced LNG fuelled ships related activities in Korea Register and talked about the obstacles and limits that his organization faces.

2.2 Green Voyage – LNG Fuel

The presentation was made by Mr. George Gong (Senior Manager of Haicheung, Hong Kong).

In Mr. Gong’s presentation, he briefly reviewed the physical characteristics of LNG and compared the traditional heavy oil with it. He listed up the factors need to be considered when ships converting fuel from heavy oil into LNG. He also introduced LNG fuelled ship related projects that his organization involved with. He mentioned about his personal experience in introducing the 1st production line of Insulation box for LNG to Hongdong-Zhonghua Shipbuilding in China. He also summarized about the technology readiness of key equipment and components such as resin machine, liquid pump, electric generator, steering engine for LNG fuelled ships.

2.3 LNG Growth and Opportunities in Thailand

The presentation was made by Mr. Veerachai Gosasang (Marine Superintendent, Port Authority of Thailand).

In Mr. Gosasang’s presentation, he firstly introduced the global LNG market followed by the LNG market in Thailand. He talked about the fast growing LNG shipping volume and introduced related organizations such as service provider (PTT group), shipbuilders (UNITHAI, ITALTHAI, ASIMAR), port (Map Ta Phut) and also mentioned these organizations will be the pioneers in Thailand regarding LNG fuelled ships. In the end of his presentation, he expressed his thanks to APEC and to the seminar organizer for knowledge sharing.
3. Working Lunch (Day 2)

After the morning session and working lunch, all the participants had an opportunity to visit Nurimaru APEC House, the place that APEC leaders’ meeting was held on November 19, 2005. A group photograph was taken at the same place of 2005 APEC leaders’s commemorative group photo.
4. Open Seminar (Day 2 Afternoon Session)

The afternoon session contains 8 presentations from 4 APEC member economies and was opened to the local marine society. Around 100 people from various agencies, nautical institutes and commercial companies in Korea had the chance to listen to the presentations given by APEC member economies.

4.1 Keynote Speech

Keynote speech was given by Mr. Chang-Kyun Kim, Director of Maritime Industry and Technology Division, Ministry of Oceans and Fisheries (Korea). The text of the address is at ANNEX D.

4.2 The Economic Effect of LNG Fuelled Ships

The presentation was made by Dr. Ho-Choon Lee (Senior Researcher of Korea Maritime Institution).

Dr. Lee analyzed recent trend of LNG fuelled ships with a focus in Korea, followed by a review on domestic regulation framework of LNG fuelled ships. He shared his research findings of a recent survey among ship owners. Dr. Lee analyzed the economic effect of six different types of ships adopting LNG fuel technology in the case of Korea and comes to a conclusion that LNG as a marine fuel maybe economically competitive for Ro-Ro ship, tug
boat and car ferries. He also mentioned the importance of international cooperation in developing LNG fuelled ships with a case study of Korea-China International car ferry.

4.3 Use of LNG as a Marine Fuel in Canada

The presentation was made by Mr. Andrew Kendrick (Vice President of Vard Marine, Canada).

Mr. Kendrick briefly introduced his organization and activities related with LNG fuelled ships in Canada. He talked about emerging shale gas and its impact on energy supply in North America.

Mr. Kendrick introduced the Canadian LNG Supply Chain Project led by Canadian government, which is performed with the aim to identify all barriers to the use of LNG, and to develop approaches to overcome these. Phase 1 key results of this project are as follows.

LNG produces dramatic reduction in pollutants in all circumstances.

- LNG can produce significant reduction (up to 20%) in total greenhouse gases, but much depends on liquefaction process
- Environmental consequences of fuel spills are greatly reduced compared with heavy fuel or diesel.
- Payback periods are highly dependent on percentage of time operating in ECA, total fuel burn and building type (new build or conversion)
- There is currently limited liquefaction capacity and significant investments are required in the 2020-2025 timeframe.
- Bunkering operations require particular attention, and regulation remains a challenge for international shipping
- Waterway safety management cannot rely on gas carrier approaches, and best practices need to be codified

4.4 The Future of LNG Bunkering in Singapore

The presentation was made by Dr. Parry Oei (Director and Chief Hydrographer of Maritime and Port Authority, Singapore)

Dr. Parry Oei began his presentation with an examination of factors behind LNG as a key marine fuel of the future. He said the environmental regulation together with abundant global gas reserves will be the main driving source of LNG fuelled ships. He briefly introduced the preparations being done by major global ports. And roadmap of Singapore port of LNG bunkering was discussed in detail.

Dr. Parry Oei suggested key stakeholders in APEC working together on LNG bunkering with LNG fuel promotion, infrastructure development and bunkering standard harmonization.
the end of the presentation, he introduced an upcoming event “Singapore International Bunkering Conference 2016” and invited everyone to join that.

4. 5 Development of Floating LNG Bunkering Terminal

The presentation was made by Dr. Hong Gun Sung (General Manager of Korea Research Institute of Ships and Ocean Engineering)

Dr. Sung introduce the R&D project for offshore floating LNG bunkering terminal funded by Korean government. He said Korea has been endeavoring to catch up with state-of-art technologies and infrastructure of LNG bunkering. Since practical technologies of LNG fueled ships and LNG bunkering shuttle have been completely developed and tested already, it is time to try to open a new era of LNG for cleaner earth and its ocean environment.

In his presentation he mentioned International collaboration in the field of LNG bunkering will bring not only cleaner environments but also great economic benefits. He emphasized that standardization issues need to be discussed and collaboration between countries interested in LNG bunkering are highly required for risk management.

4. 6 LNG as Marine Fuel and Bunkering in China

The presentation was made by Mr. Sujian Sheng (Deputy GM of shipping company, CNOOC Group, China)

Mr. Sheng started his presentation with an introduction of Chinese government’s actions on promoting LNG as a marine fuel. He talked about the upcoming ECAs (Pearl River Delta, Yangtze River Delta and The Bohai Rim) and the energy restructuring plan in China. It is followed by a review on players with different functions, such as regulatory framework development, safety management, ship design, gas handling gas engine.

He introduced the current development status of LNG fuelled ships and LNG bunkering in China. At the end of his presentation he showed several pilot projects and demonstration projects through video.

4. 7 LNG Strategy and Policy of LNG Fuelled Ships in China

The presentation was made by Dr. Yongbo Ji, Deputy Director of China Waterborne Transport Research Institute (China)

Dr. Ji said government Interests together with enterprise profitability are the driving force of China’s fast development of LNG fuelled ships. Chinese government’s development strategy are based on 3 principles of 1) Safety first, pilot leading; 2) Market oriented and synergistic pushing; 3) Innovation-driven and technology support.
Great economy incentives are provided to organizations adopting LNG as a marine fuel, such as:

- Subsidies of LNG-fuelled new-building ships
- Special fund for energy conservation and emission reduction
- Renovation subsidies of LNG-fuelled ship in some areas
- Priority through locks and tax relief in some area

4.8 Small Scale LNG Supply Business Model Using ISO LNG Container

The presentation was made by Dr. Youngsam Oh (General Manager of Korea Gas Corporation)

Dr. Oh explained traditional LNG supply chain and its shortage and suggested small scale LNG as an alternative solution to overcome these. He introduced an R&D project named as “Energy Independent Island Project” in Korea.

In his presentation he reviewed key technologies of LNG logistic to Islands using small scale LNG applications and conclude that this business model may benefit island economies.

4.9 Establishing LNG Bunkering Base in Busan

The presentation was made by Dr. Soo-Yul Han (Vice President of Polaris Shipping, Korea)

Dr. Han briefly introduced his organization Polaris Shipping and mentioned their biggest customer Vale has ordered them to build new ships with most green technology. He compared different alternatives to meet emission regulation and concluded that LNG as a marine fuel maybe the solution which best meet the market needs.

Dr. Han introduced the “BLNG project” plan of his company. BLNG aims to establish LNG bunkering facilities in Busan New Port, Korea. He said Busan as a strategic port by 4 leading container alliances, the starting point of pacific service routes with its sufficient bunkering demand from mega container ships will be the best place of LNG bunkering in Korea. He talked about project site, plant configuration LNG bunkering demand and LNG bunkering price in detail.

5. Field Trip (Day 3)

The third day of the seminar was devoted to a field trip. During the trip, participants had a chance to learn the development status of marine industry in Korea and the history of Busan city as a global main container port.
IV. ASSESSMENT

At the end of the Seminar, all participants indicated their appreciation for the Seminar and, overall, were satisfied with the preparations for and the conduct of it. The participants especially thanked APEC and the hoster, Korea, for the hospitality, the preparations made for and the subsequent running of the seminar. The quality and suitability of participants was appropriate.

V. ACHIEVEMENTS AND CONCLUSIONS

The seminar achieved the goals and objectives as set out in paragraph 2 of this report and as outlined in the opening session remarks. The presenters were very pleased with the open and frank approach by all participants. The participants shared experiences and knowledge with their fellow participants in making presentations (six member economies) and via networking during breaks, meals and trips.
### ANNEX A: List of Participants

<table>
<thead>
<tr>
<th>No</th>
<th>Economy</th>
<th>Name</th>
<th>Position</th>
<th>Organization</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CANADA</td>
<td>Andrew Kendrick</td>
<td>Vice President Operations</td>
<td>Vard Marine Inc.</td>
<td><a href="mailto:Andrew.Kendrick@vard.com">Andrew.Kendrick@vard.com</a></td>
</tr>
<tr>
<td>2</td>
<td>CHINA</td>
<td>Shujian Sheng</td>
<td>Deputy GM</td>
<td>CNOOC Group</td>
<td><a href="mailto:shengsj@cnooc.com.cn">shengsj@cnooc.com.cn</a></td>
</tr>
<tr>
<td>3</td>
<td>CHINA</td>
<td>Yongbo Ji</td>
<td>Deputy Director</td>
<td>China Waterborne Transport Research Institute</td>
<td><a href="mailto:jyb@wti.ac.cn">jyb@wti.ac.cn</a></td>
</tr>
<tr>
<td>4</td>
<td>CHINA</td>
<td>Dong Yang</td>
<td>Senior Researcher</td>
<td>China Waterborne Transport Research Institute</td>
<td><a href="mailto:yangdong@wti.ac.cn">yangdong@wti.ac.cn</a></td>
</tr>
<tr>
<td>5</td>
<td>HONG KONG</td>
<td>George Gong</td>
<td>Senior Manager</td>
<td>Haicheung</td>
<td><a href="mailto:george_gong@haicheungchina.com">george_gong@haicheungchina.com</a></td>
</tr>
<tr>
<td>6</td>
<td>JAPAN</td>
<td>Mitsuru Kawamata</td>
<td>Consul, Consulate</td>
<td>General of Japan in Busan</td>
<td><a href="mailto:Mitsuru.Kawamata@pz.mofa.go.jp">Mitsuru.Kawamata@pz.mofa.go.jp</a></td>
</tr>
<tr>
<td>7</td>
<td>JAPAN</td>
<td>Chang-Kyun Kim</td>
<td>Director (Maritime Industry and Technology Division)</td>
<td>Ministry of Oceans and Fisheries</td>
<td><a href="mailto:lioksj@korea.kr">lioksj@korea.kr</a></td>
</tr>
<tr>
<td>8</td>
<td>JAPAN</td>
<td>Gyeong-su Jeong</td>
<td>on behalf of Project Overseer</td>
<td>Ministry of Oceans and Fisheries</td>
<td><a href="mailto:kguks@korea.kr">kguks@korea.kr</a></td>
</tr>
<tr>
<td>9</td>
<td>KOREA</td>
<td>Soo-Yul Han</td>
<td>Vice President</td>
<td>Polaris Shipping</td>
<td><a href="mailto:rusacsy@gmail.com">rusacsy@gmail.com</a></td>
</tr>
<tr>
<td>10</td>
<td>KOREA</td>
<td>Hong Gun Sung</td>
<td>General Manager</td>
<td>Korea Research Institute of Ships and Ocean Engineering</td>
<td><a href="mailto:hgsung@kriso.re.kr">hgsung@kriso.re.kr</a></td>
</tr>
<tr>
<td>11</td>
<td>KOREA</td>
<td>Youngsam Oh</td>
<td>General Manager</td>
<td>Korea Gas Corporation</td>
<td><a href="mailto:ysoh@kogas.or.kr">ysoh@kogas.or.kr</a></td>
</tr>
<tr>
<td>12</td>
<td>KOREA</td>
<td>Ho-choon Lee</td>
<td>Senior Researcher</td>
<td>Korea Maritime Institution</td>
<td><a href="mailto:leehochoon@kmi.re.kr">leehochoon@kmi.re.kr</a></td>
</tr>
<tr>
<td>13</td>
<td>KOREA</td>
<td>SooYeob, Kim</td>
<td>Research Fellow</td>
<td>Korea Maritime Institution</td>
<td><a href="mailto:dahn@kmi.re.kr">dahn@kmi.re.kr</a></td>
</tr>
<tr>
<td>14</td>
<td>KOREA</td>
<td>Jong-shin Kim</td>
<td>Executive Vice President</td>
<td>Korean Register</td>
<td><a href="mailto:jskim@krs.co.kr">jskim@krs.co.kr</a></td>
</tr>
<tr>
<td>15</td>
<td>KOREA</td>
<td>Jin-yil Chai</td>
<td>General Manager</td>
<td>Korean Register</td>
<td><a href="mailto:jychai@krs.co.kr">jychai@krs.co.kr</a></td>
</tr>
<tr>
<td>16</td>
<td>KOREA</td>
<td>Lindsay Hsu</td>
<td>Supervisor</td>
<td>Korean Register</td>
<td><a href="mailto:lindsay@krs.co.kr">lindsay@krs.co.kr</a></td>
</tr>
<tr>
<td>No</td>
<td>Economy</td>
<td>Name</td>
<td>Position</td>
<td>Organization</td>
<td>Email</td>
</tr>
<tr>
<td>----</td>
<td>---------------</td>
<td>-----------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>MALAYSIA</td>
<td>Hazman Bin Hussin</td>
<td>Director</td>
<td>Marine Department Malaysia</td>
<td><a href="mailto:hazman@marine.gov.my">hazman@marine.gov.my</a></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>Kamal Ariffin Bin Idris</td>
<td>Senior Manager</td>
<td>Port Klang Authority</td>
<td><a href="mailto:kamal_idris@pka.gov.my">kamal_idris@pka.gov.my</a></td>
</tr>
<tr>
<td>19</td>
<td>PAPUA NEW GUINEA</td>
<td>Gabi Haoda</td>
<td>First Assistant Secretary (Maritime Security Division)</td>
<td>PNG Department of Transportaiton</td>
<td><a href="mailto:ghaoda@transport.gov.pg">ghaoda@transport.gov.pg</a></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Pawa Limu</td>
<td>Manager (International compliance and Conventions)</td>
<td>PNG National Maritime Safety Authority</td>
<td><a href="mailto:plimu@nmsa.gov.pg">plimu@nmsa.gov.pg</a></td>
</tr>
<tr>
<td>21</td>
<td>SINGAPORE</td>
<td>Parry Oei</td>
<td>Director and Chief Hydrographer</td>
<td>Maritime and Port Authority</td>
<td><a href="mailto:parry_oei@mpa.gov.sg">parry_oei@mpa.gov.sg</a></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>James Seow</td>
<td>Deputy Manager(Marine Fuel Development and Promotion)</td>
<td>Maritime and Port Authority of Singapore</td>
<td><a href="mailto:James_SEOW@mpa.gov.sg">James_SEOW@mpa.gov.sg</a></td>
</tr>
<tr>
<td>23</td>
<td>THAILAND</td>
<td>Veerachai Gosasang</td>
<td>Marine Superintendent</td>
<td>Bangkok Port, Port Authority of Thailand</td>
<td><a href="mailto:Veerag1968@hotmail.com">Veerag1968@hotmail.com</a></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>Phuwiphop Tongthashang</td>
<td>General Administrative Officer &amp; Chief Officer</td>
<td>Laem Chabang Port,Port Authority of Thailand</td>
<td><a href="mailto:phuwiphop@hotmail.com">phuwiphop@hotmail.com</a></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Wipaporn Bunchawut</td>
<td>Technical Officer 12 (Environment)</td>
<td>Policy and Planning Department</td>
<td><a href="mailto:wiset.ilada@gmail.com">wiset.ilada@gmail.com</a></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>Wisetsak Wisetsanyakorn</td>
<td>Chief Engineer 12</td>
<td>Dredging Division, Marine Department</td>
<td><a href="mailto:wbnum.009@gmail.com">wbnum.009@gmail.com</a></td>
</tr>
<tr>
<td>27</td>
<td>VIET NAM</td>
<td>Hoang Le Huy</td>
<td>Senior Researcher</td>
<td>Vietnam Register</td>
<td><a href="mailto:huyhl@vr.org.vn">huyhl@vr.org.vn</a></td>
</tr>
</tbody>
</table>
# ANNEX B: Seminar Program

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1, Nov 18th (Wednesday)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18:30~19:00</td>
<td>Registration</td>
<td></td>
</tr>
<tr>
<td>19:00~21:00</td>
<td>◆ Welcome Reception</td>
<td></td>
</tr>
<tr>
<td><strong>Day 2, Nov 19th (Thursday)</strong></td>
<td>◆ Working Group Meeting</td>
<td></td>
</tr>
<tr>
<td>10:00~10:10</td>
<td>- Opening Remarks</td>
<td>Jong Shin Kim, Executive Vice President of KR</td>
</tr>
<tr>
<td>10:10~10:30</td>
<td>- Presentation of the Research Result</td>
<td>J.Y Chai, GM of Strategic Planning Team, KR</td>
</tr>
<tr>
<td>10:30~10:50</td>
<td>- Green technology, LNG fuel</td>
<td>George Gong, Senior Manager of Haicheung (Hong Kong)</td>
</tr>
<tr>
<td>10:50~11:10</td>
<td>- LNG growth and opportunities in Thailand</td>
<td>Veerachai Gosasang, Marine Superintendent of Bangkok Port, Port Authority of Thailand</td>
</tr>
<tr>
<td>11:10~11:30</td>
<td>- Free Discussion</td>
<td></td>
</tr>
<tr>
<td>11:30~14:00</td>
<td>Working Lunch + Commemorative Photographing</td>
<td></td>
</tr>
<tr>
<td>14:00~14:10</td>
<td>◆ Open Seminar</td>
<td></td>
</tr>
<tr>
<td>14:00~14:10</td>
<td>- Keynote speech</td>
<td>Chang-Kyun Kim, Director of Maritime Industry and Technology Division, Ministry of Oceans and Fisheries (Korea)</td>
</tr>
<tr>
<td>14:10~14:30</td>
<td>- The economic effect of LNG fuelled ships</td>
<td>Ho-Choon Lee, Senior Researcher of Korea Maritime Institution (Korea)</td>
</tr>
<tr>
<td>14:30~14:50</td>
<td>- Use of LNG as a marine fuel in Canada</td>
<td>Andrew Kendrick, Vice President of Vard Marine Inc. (Canada)</td>
</tr>
<tr>
<td>14:50~15:10</td>
<td>- The future of LNG bunkering in Singapore</td>
<td>Parry Oei, Director (Port Services Division) and Chief Hydrographer, Maritime and Port Authority(Singapore)</td>
</tr>
<tr>
<td>15:10~15:30</td>
<td>- Development of floating LNG bunkering terminal</td>
<td>Hong Gun Sung, GM of Korea Research Institute of Ships and Ocean Engineering (Korea)</td>
</tr>
<tr>
<td>15:30~15:40</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>15:40~16:00</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>16:00~16:20</td>
<td>- LNG as marine fuel and bunkering in China</td>
<td>Sujian Sheng, Deputy GM of shipping company, CNOOC Group (China)</td>
</tr>
<tr>
<td>16:20~16:40</td>
<td>- LNG strategy and policy of LNG fuelled ships in China</td>
<td>Yongbo Ji, Deputy Director of China Waterborne Transport Research Institute (China)</td>
</tr>
<tr>
<td>16:40~17:00</td>
<td>- Small scale LNG supply business model using ISO LNG Container</td>
<td>Youngsam Oh, GM of Korea Gas Corporation (Korea)</td>
</tr>
<tr>
<td>17:00~17:20</td>
<td>- Establishing LNG bunkering base in Busan</td>
<td>Soo-Yul Han, Vice President of Polaris Shipping (Korea)</td>
</tr>
<tr>
<td>17:20~17:30</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td><strong>Day 3, Nov 20th (Friday)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:30~14:00</td>
<td>Field Trip</td>
<td></td>
</tr>
</tbody>
</table>
ANNEX C: Keynote Speech

Distinguished guests from home and abroad, I am Chang-Kyun Kim, Director of Maritime Industry and Technology Division in the Ministry of Oceans and Fisheries.

I congratulate you on the opening of the APEC joint seminar. I would like to deliver my heartfelt welcome to the experts from various fields who are with us in Busan. My sincere gratitude also goes to the member economies of APEC for their wonderful support and all the participants who are here today.

We have international guests who flew afar from various member economies and my special thank goes to the speakers of toady: Vice president Andrew Kendrick from Vard Marine, Canada; Dr. Parry Oei from MPA, Singapore; Deputy General Manager David Sheng from CNOOC’s LNG Shipping Company, Dr. Yongbo Ji from Waterborne Transport Research Institute under Ministry of Transport, China. My thank also goes to all the participants from abroad and all the audience here.

To prevent environmental pollution, all the industry sectors are making arduous efforts. In line with that development, the maritime sector, led by IMO, has been strengthening regulation against vessel emissions such as NOx, SOx, and CO2 and has mandated operation of eco-friendly vessels. As such, we are witnessing radical changes in the marine sector.

In response to these changes, many economies, including Korea, are developing technical alternatives, examining economic effects and reframing industry policy. Hence, there is increasing interest in and expectation on LNG fuelled ships and LNG bunkering across the world.

According to the “Third IMO GHG Study 2014”, SOx and NOx generated from vessels account for 13% and 15% respectively out of the total global emission volume.

Against this backdrop, LNG fuel can be the most attractive choice to address the environmental pollution. It is clean, abundant, fully commercialized already, and can be the optimal choice to fulfill the future emission requirement.

According to a source from Clarksons, around 200 LNG fuelled ships are in operation across the world as of March 2015, and additional 200 vessels are scheduled to be built.

In the past, LNG fuelled ships and LNG bunkering were initiated by Norway and other Northern European countries which are rich in natural gas reserves. However, economies in APEC region such as the US, Canada, China, and Korea are currently taking actions in these areas.

In the case of Korea, the first ever eco-friendly LNG fuelled ship in Asia ecoNURI was launched in 2013 in Incheon Port. Recently, the first-ever LNG-propelled container ship (M/V) “Isla Bella” was created with technical prowess of DSME and was put into the route after the successful sea trial.

This means LNG fuelled ships and LNG bunkering carries a lot of significance not only to Korea but also to APEC economies since they can enhance overall conditions in the port cities, boost the shipping service industry, and nurture the future growth engine that can create high added value.

We are gathered here under the subject of economic effect of LNG fuelled ships and LNG bunkering and APEC member economies’ technological alternatives and development strategy. We will look into the research outcome and the case studies from many countries and eventually will be able to make meaningful contribution in terms of technological exchange, economic cooperation, and policy coordination.

Once again, my appreciation goes to you all who visited Busan to join us today and let’s enjoy the seminar. Thank you.
APEC Project: TPT 05 2013A

Produced by
Korean Register
36, Myeongji ocean city 9-ro, Gangseo-gu, Busan, Korea (Zip Code 618-814)
Tel: (82) 70 8799 7114
Fax: (82) 70 8799 8999
Email: krbell@krs.co.kr
Website: www.krs.co.kr

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

© 2015 APEC Secretariat

APEC#215-TR-04.2