



## **Managing the Blue Economy: Future of Port and Shipping in the Asia-Pacific**

*PECC international project 2015-2016*

### **PROJECT OUTLINE**

Development of efficient ports and optimizing maritime routes are key elements to harnessing opportunities from and facilitating international trade, enhancing connectivity and boosting economic growth in the Asia-Pacific region and beyond.

This PECC international project aims to contribute to regional policy dialogues on drivers of growth, sustainability and connectivity for the economies on both sides of the Pacific that are seeking to benefit from maritime trade by improving efficient and environmentally sustainable port capacities while optimizing supply chain activities.

Through a series of three seminars over two years, representatives from both private and public sectors including port authorities, relevant research institutions and businesses that are stakeholders in maritime transport such as port and logistics operators, service providers, shipping and cruise companies, designers and builders of vessels, port construction companies, are invited to exchange views and propose solutions for improved regional cooperation in the Asia-Pacific.

The project is undertaken against the backdrop of a considerable shift in the shipping industry, which, after years of growth, is experiencing stagnant trade volumes, and in awareness of global environmental issues, accelerating efforts to enhance environmental-friendly productivity and beautification.

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### **SEMINAR 1: Meeting the Demand for Maritime Trade Papeete, French Polynesia | October 19-20, 2015**

The first seminar took place in Papeete at the invitation of the Government of French Polynesia (FP). It took place immediately after the inaugural South Pacific Cruise Forum organized by the South Pacific Cruise Alliance (SPCA). Under the overarching theme focusing on the prospects of maritime trade in the Asia-Pacific region, the following issues were addressed:

- What will the regional maritime trade look like in 2025 - what are the current trends and future projections?
- What are the main drivers of increased pressure on sea routes and ports?
- What changes in vessels – both cargo and passenger - are needed to meet the increased demand while satisfying safety and environmental criteria?
- Which ports will emerge as new hubs; where are the chokepoints; and what will happen to smaller ports?

Executive summary and presentations are available on PECC website: <http://bit.ly/1Vzvyv4>

**SEMINAR 2: Sustainability and Beautification of Ports  
Busan, Korea | April 4-6, 2016**

The second seminar took place in Busan, sixth largest container port in the world by volume (2015), in partnership with the Korea Maritime Institute (KMI). The executive summary follows below.

Program agenda and presentations are available on PECC website: <http://bit.ly/1SPuZqm>

**SEMINAR 3: New Technologies and Services for Ports of the Future  
Auckland, New Zealand | December 5-6, 2016**

The concluding seminar will be hosted by the New Zealand committee for PECC (NZPECC) in Auckland. Attention will be given to technological and policy innovations adopted by exemplary ports around the world to stay energy-efficient and economically competitive. If ratified, the recently signed Transpacific Partnership is also expected to influence the directions in which goods will flow and be handled in the future. Medium-sized ports such as Auckland face some specific challenges given the past upsizing of vessels by the world's largest shipping and cruise companies, adaptation to climate changes, and the impact of upgrades at Suez and Panama Canals. They need to make some important decisions on their future strategies and upfront investments today that will have long-term economic and social implications.

**SEMINAR 2: SUSTAINABILITY AND BEAUTIFICATION OF PORTS**

Busan, Korea | April 4-6, 2016

**EXECUTIVE SUMMARY**

With 90 percent of value of global trade carried by ships, economic growth is intricately linked to maritime transport activities and overall performance of the shipping and related industries. It is estimated that there are about 50,000 merchant vessels registered in 150 nations. Aside from the volume of goods traded through ports, the number of passengers traveling by ferries and cruise ships are on the rise. While the value of global trade has slowed down somewhat in recent years, there is continued upward trend in cargo and bulk shipping and explosive growth of the cruise industry.

Many of today's world mega cities such as Shanghai, Tokyo, New York, London, and Mumbai initially came to being and prospered as commercial hubs thanks to their ports and proximity to seas. The world's top five busiest seaports by containers in 2012 were: Shanghai, Singapore, Hong Kong, Shenzhen, and Busan. Nine of the top ten container ports were located in East Asia, the only exception being Dubai, which ranked ninth.

Expanding port facilities also have significant environmental impact on cities. While ports were initially located near town centers for convenience and efficiency, as traffic and infrastructure at ports increase, they increasingly become an inconvenience or potential hazard, perceived as

aesthetically unpleasant for city dwellers and hindrance to land transportation and recreational centers around the shorelines. As cities modernize and expand, considerations about how to upgrade ports and whether or not to relocate ports farther from the city centers become huge issues of debate and discussion.

In an introductory statement, Charles E. Morrison, President of the East-West Center, noted that environmental damage can take place at different stages. During the construction stage, damage could occur through destruction of coastal habitats, land reclamation, dredging and construction of buildings and roads to connect to the port. During the operations stage, there are air and water pollutants, solid waste, noise pollution, and higher than normal emission level of greenhouse gases (GHG). Port areas and nearshore seas are also prone to accidents as many ships pass through. Storage of chemicals and energy resources at port facilities can be dangerous and if not handled with extreme caution, may lead to large-scale fires or explosions. In recent years, piracy has also become notably higher at or near ports rather than at high seas. Climate change-related natural events such as storm surges and tsunamis can have disastrous effects at ports.

Shipping alone accounts for about three percent of global carbon dioxide emissions. Pollution, particularly in the form of nitrogen oxide (NO<sub>x</sub>) and sulfur oxide (SO<sub>x</sub>) is monitored and/or regulated more closely than before. There are three principal UN mechanisms that serve to provide global standards and goals to curb GHG emissions and mitigate climate change risks in pertinence to the ports and shipping sector: First, the International Maritime Organization (IMO) which establish binding rules and regulations that its signatories need to adhere to, and secondly, the United Nations Framework Convention on Climate Change (UNFCCC) via the Paris Agreement on Climate Change, followed by the more comprehensive UN Sustainable Development Goals.

### **Port Outlook in China**

China is currently the second largest trading economy in the world after the United States, and the world's largest exporter. China has the biggest maritime demand, and is the world's highest importer of iron ore and coal. It will soon become the highest importer of oil in the world. Seven of the top ten ports are located in China. With the merge of Ningbo and Zhoushan ports, by 2015, it surpassed Busan to become the fifth busiest port with 19.45 million TEUs handled in the year. The amount of bulk and oil handled at Ningbo and Zhoushan were actually higher than that of Shanghai in 2015.

Dr. Dong Yang, Assistant Professor in Logistics and Maritime Studies at the Hong Kong Polytechnic University, said that prior to 1984, 38 major ports of China including 13 coastal and 25 ports along the Yangtze River were directly controlled by the Ministry of Communications. By 1987, 37 of the 38 ports were jointly controlled by the Ministry of Transport and local governments. The only exception was Qinhuangdao Port which served as the largest coal transport port. Following the entry of China into the WTO in 2001 and Port Reform carried out in 2004, all 37 ports under the dual-administration system were transferred to the corresponding local governments in a large-scale effort to decentralize the administration and investments in ports. With the introduction of

Port Law, foreign investments in some of the major ports of China have become significant. Likewise, Chinese investments in foreign ports also grew during this time, led by Hutchison, COSCO, China Merchant, and China Shipping.

### **The Importance of Intermodal Transport: Pak Bara, Thailand**

Discussions on the costs and benefits of cutting a canal that would measure well over 50km through the Kra Isthmus have been ongoing for several decades and feasibility studies have been conducted. There are significant social and security issues, concerns about literally splitting the country into two and impacts on the international tourism industry concentrated in adjacent areas of Thailand. A possible alternative that was proposed as part of the 11<sup>th</sup> National Economic and Social Development Plan (2012-2016) of Thailand is the Pak Bara Deep-sea Port Project. The main objective is to provide an alternative route for ships having to travel around the Malay Peninsula via the Malacca Strait, to connect the Andaman Sea with the Gulf of Thailand. An import component of this potential project is to develop a multimodal transportation system that can seamlessly transport cargo from the ports located along the eastern coastlines of Thailand to Pak Bara that could become a major port of the Andaman Sea. In particular, the government plans to connect Pak Bara with Songkhla Port on the other side with a railroad. At present, Pak Bara only has a small tourist information center at its port and the nearby Tammalang Port is serving to link with Penang Port of Malaysia. The owner of the upgraded Pak Bara Port would be the Marine Department of the Thai Ministry of Transport. The Government hopes to reenergize the region in the form of a “Southern Green Corridor” by facilitating the transport and export of agricultural products such as rubber and fruits as well as energy, notably gas and biodiesel.

Dr. Pairach Piboonrungrroj of Chiang Mai University explained that various concerns were voiced out by the local community members when the Maritime Department conducted survey to gather opinions, identify clearly the reasons of protest, and to look for ways to resolve these in order to eventually garner more support from the local residents. The results indicated that the local people do not wish to change their ways of life. They were also worried about potential rise in living costs. Women were more concerned about environmental and socio-cultural impact, while men were more concerned about the economic impact. The local residents pointed to a need for social responsibility programs, incentives to attract investors, and effective waste reduction as most important recommendations for port development. In conclusion, building trust between the local community and the Government by sharing comprehensive information about the possible impact from port development was the most important policy recommendation.

### **Luring Larger Vessels at What Cost?**

In the case of French Polynesia, Papeete Port serves as the main point of entry for vessels and the cargo they carry. In consideration of bigger vessels appearing on water and to accommodate more TEUs, Papeete Port has two options: either make on-site adjustments at existing facilities or expand by developing new quays on a site east of the existing port. Mr. Boris Peytermann, the

CEO of Papeete Port Authority said the first option will see deepening of the entry bay and international quay requiring about 35,000 cubic meters of dredging. It is estimated to cost about 80 million Euros over three years. The second option would consist of building new quays of 900m length as well as a new terminal and a second bridge. It is estimated to cost about 210 million Euros and take about two and half years for pre-construction studies and five years for the actual site works.

The main environmental impact concerns for both options are as follows:

- Noise, accidental pollution and operating constraints during the proposed works
- Destruction of coral areas
- Changes in urban landscape
- Perturbation to maritime wildlife
- Hydrodynamic perturbation and water turbidity

In terms of hydrodynamic perturbation, the option of on-site development would cause swells on the shore that could lead to erosion while the second option would have impact on water renewal in the area. Water renewal in the bay area occurs every five to ten days without which, maritime life will not be able to sustain itself.

In order to assess the hydrodynamic perturbation impact at the existing entry bay, 2D modeling (TELEMAC) was used to measure waves and currents. For extension to the east, data acquisition using 3D modeling is still in progress.

### **Modeling: Napier Port, New Zealand**

Napier Port is located at Hawke's Bay and is the fourth largest container terminal in New Zealand after Auckland, Tauranga, and Lyttleton. It services the central North Island, and handles about 260,000 TEUs per annum, the peak season being March to July. Napier is a "surge port" i.e. it suffers from long-period infragravity (IG) waves, with periods of 50-120 seconds. These waves, created by normal swell waves crossing shallow water or shorelines, cause vessels to surge at the berth, causing high mooring loads and potentially mooring failures.

According to Mr. Michel De Vos, Infrastructure Services Manager of the Napier Port, major ports in NZ are gearing up for larger vessels. Napier Port must prepare for these vessels with increased lengths, beams, drafts, or risk reduced number of calls in the future.

For now, the Port continues to see growth in both containerized and bulk cargo. The key strategic question for Napier Port today is whether or not to move the container terminal. There are social and environmental concerns associated with relocation including noise and visual impacts. Particular to the area, they would need to minimize short and long-term impact on environmentally sensitive areas such as Pania Reef and minimize impact on recreational fisheries, coral reefs, beaches and surf breaks. Sediments from dredging would also have impact on the

natural processes of the marine ecosystem. For the project to be a sustainable development, it needs to make economic sense in the long run and support local jobs and industries while staying competitive in its service delivery. Sustainable design means doing away with a breakwater thereby reducing not just upfront costs from material usage and labor, but causing less disruption for the waves and less damage on the seabed. In order to provide real-time mooring analysis to calculate the impact of various breakwater options, Dynamic Mooring Analysis (DMA) was used. With accurate representation of IG waves and inclusion of fender dynamics in its analysis, alternative mooring devices were assessed as well as the likely operational performance of the proposed berth. A Boussinesq model was developed using Mike21 with a very large domain to best model the generation of IG waves and their behavior in the bay area.

The key findings from this exercise indicated mooring limits generally driven by wind and IG waves. The IG waves are not dependent on a breakwater extension, and hence this structure would have limited effect in enhancing mooring effectiveness. Further work was to continue with the development of Mike21 hydrodynamic model with increased resolution of boundaries and multiple wave recording is being undertaken to refine and calibrate the hydrodynamic model.

### **When a Port Shuts Down**

Dr. Min-kyu Lee from the Korea Maritime Institute (KMI) made a presentation on the implications of a possible port shut-down due to X-events such as natural disasters or port labor strikes over short or long-term periods. X-events are defined as extreme events that are induced by natural and/or human triggers with low probability but high impacts. Given that ports are important parts of any economy's infrastructure and point of entry of goods and people, X-events can have catastrophic effects on not just the port facilities but cause further indirect damage if not contained well at the onset.

Six external shocks were identified as the most potentially disruptive in the case of the Korean economy: 1) Internet collapse; 2) nuclear accidents in Northeast Asia; 3) abrupt energy price volatility; 4) food crisis in Korea; 5) pandemic in Korea; and 6) retirement age of 75. Scenarios for mega disasters would stem from: global warming by climate change; a new contagious disease; terrorism; cyber terror; and accidents. Some examples would be SARS, swine influenza, or more recently the Zika virus, Tohoku earthquake and tsunamis, and socio-political or economic events such as the fall of Berlin Wall and the global financial crisis. What are virtually impossible to forecast and specifically prepare for are terrorist attacks such as the 9/11. However, some contingency plans are possible with x-events of less improbability.

With the above x-factors in mind, port shutdown scenarios were laid out to examine the possible spill-over effects. Policy instruments for building resilience and recovery to the port shutdowns were identified as:

- Preparing measures on prevention, reduction, and recovery from the shutdown;
- Formulating strategies to deal with many situations induced by the shutdown;

- Examining economic and social impacts; and
- Suggesting an effective application method with manuals on port risk management.

A port shutdown scenario mapping exercise pointed to paralysis of port operations which would lead to spillover effects in other sectors such as transport/ logistics, safety, economy, employment, food, and health. Furthermore, a port shutdown, over a longer term, would create a causal loop and start a vicious cycle consisting of interruptions in the international supply chain system, overload in land transport, crisis in energy supply and transport, collapse in labor market, economic crisis and social tension.

Policy implications for ports would be:

- Designate substitute berths of port for strategically important items such as energy and food during crises;
- Formulate welfare policies for port labor and ensure satisfactory working conditions at ports;
- Establish governance structures for responding to risks at emergency situations including early warnings, monitoring and communication systems; and
- Build parallel inspection and safety systems in each berth to minimize disruption in the possible event of contagious diseases.

### **Air Pollutants from Ships**

While the Kyoto Protocol of 1997 was the first most stringent protocol to control the Greenhouse Gas (GHG) emissions, in comparison to its 34 economies, the more recent Paris Agreement includes the United States and China with much wider coverage. The authority of controlling gas emissions from maritime transport was largely delegated to the IMO. In particular, NO<sub>x</sub>, SO<sub>x</sub>, and particulate matter (PM) emissions reduction efforts needed cooperation at national, regional, and global levels. Under the IMO, these aspects of international shipping are measured through technical methods (e.g. EEDI – Energy Efficiency Design Index, which is relevant to the manufacture of new vessels that consume much less energy), an operational measure, and market-based measures such as the carbon tax and emission trading schemes. The so-called Emission Control Areas (ECAs) define protected areas in order to control emissions of these hazardous gases. For example, in 2005, MARPOL Annex VI entered into force to reduce SO<sub>x</sub> emissions from ships that can lead to acidification of the atmosphere and incur acid rain. Starting with the Baltic Sea and progressively with North Sea and English Channel coming into force in 2007 and the coasts of the United States by 2012, measures to date have shown that there are 35 times less sulfur emitted in these areas committed to the legislation. However, no ECA has yet been designated in Asia.

Professor Young-Tae Chang of Inha University, Korea, referred to a study carried out by the Incheon Port Authority in 2012. Data was gathered at the Port of Incheon by the Authority on about 14,000 vessels that passed through during January to October 2012 to measure the gas

emissions by looking at the fuel consumption by main engine, as well as the ratio between operating speed and design speed. For example, slow-steaming, now adopted in most newly manufactured mega vessels, can save over 87%. To assess the GHG emission levels, European Environmental Agency standards were applied and it was found that sulfur could be reduced by as much as 93%.

## **Dismantling Well**

An important part of sustainable management of ports has to do with safe and efficient handling of waste materials at ports and dismantling old infrastructure that have come to end of their lives. Unlike normal refuse management, there are greater safety concerns and potential hazards with the dismantling of offshore platforms, ships, rigs, and other vehicles of transport that require a combination of very advanced technical skills and careful planning. If not handled well, there could be contamination risks (e.g. nuclear, asbestos, oil...), spills or other forms of accidents at ports or on water. Handled well, these parts could also be turned into recyclable resources for other future usage, as recommended through the concept of 'circular economy.'

It is estimated that there are about 2,000 offshore platforms to be dismantled in the North Sea, Gulf of Mexico and Southeast Asian seas. The cost of dismantling an offshore platform could range in the tens of millions of dollars per unit. Beyond the objective of environmental protection, one of the ways of reducing the cost of dismantling is by recycling up to 98% of the materials used in the platforms, according to Mr. Nicolas Renard, Special Adviser to the CEO of Veolia.

With overcapacity in the shipping industry, aging fleets are quickly reaching the end of their lives. Preliminary decontamination - in particular for military ships - is an important step of removing, neutralizing, or destroying harmful substances such as asbestos, noxious chemicals, radioactive materials, or poisonous gas, thereby rendering the obsolete ship safe enough for unprotected personnel to handle eventually.

Of concern are under-regulated dismantling practices found in some developing economies, where low costs of discarding old vessels are common, at the expense of the health and safety of workers and neighboring residents, and at the detriment of the sea or shore environments. Technical standards and financial incentives are required to promote clean dismantling, which would help to ensure occupational health, prevent risks and better protect the environment.

## **Which Rules?**

GHG emissions from shipping make up a relatively small proportion of global GHG emissions today and shipping remains the most energy-efficient mode of transport. However, the concern is that the sector's emissions are fast growing particularly in the developing economies. Among sea vessels, CO2 emissions are highest in container and bulk carriers, mostly coming from main engines. Fortunately, an IMO study in 2014 has found that CO2 emission level of total shipping has dropped from 3.5 percent

of global GHG emissions in 2007 to 2.6 percent in 2012. Considering that the world emits 40 billion tons of CO<sub>2</sub> annually, emission from the shipping sector is responsible for about one billion tons. Unfortunately, the same study indicates that despite fleet average efficiency improvements of about 40 percent, CO<sub>2</sub> emissions in shipping are projected to increase by 50 to 250 percent by 2050 depending on different scenarios.

The IMO uses Energy Efficiency Design Index (EEDI) in the design of vessels and Energy Efficiency Operational Indicator (EEOI) at the operational stage. At operation, various technologies and strategies are applied to increase efficiency and reduce GHG emissions from ships such as propeller polishing, autopilot, water flow optimization, weather routing, propeller upgrade, hull cleaning, air lubrication, etc. There are economic reasons as much as there are environmental reasons.

On a regional level, the EU adopted a mandatory MRV (monitoring report and verification) regulation on 29 April 2015 which creates an EU-wide legal framework for the monitoring, reporting and verification of CO<sub>2</sub> emissions from maritime transport. This regulation requires operators of large ships that are over 5,000 gross tonnage calling at EU ports to monitor and annually report the verified amount of CO<sub>2</sub> emitted on journeys to, from, between, and at EU ports. Starting 1 January 2018, large ships will thus need to carry a document of compliance issued by an accredited MRV verifier and this rule would apply to all ships irrespective of where they were registered.

There are also national targets set by respective governments. Korea, for example, has announced in 2008, 'Low Carbon, Green Growth' and established the national target of 30 percent reduction in GHG emissions by 2020, according to Dr. Han-seon Park, Research Fellow at the Korea Maritime Institute.

The main challenge is to reconcile the differences in standards and methodologies employed to measure and collect data among the diverse frameworks and targets that have been set by different authorities. For example, post-Paris Agreement, the International Chamber of Shipping has proposed an "Intended IMO Determined Contribution" concept for CO<sub>2</sub> reduction in the international shipping sector borrowed from the INDC (Intended Nationally Determined Contributions) language of the Paris Agreement which adopts a bottom-up, non-binding approach to emissions reduction.

### **Mitigation of On-shore and Near-shore Pollution**

Established in 1955 and headquartered in Tokyo, the International Association of Ports and Harbors (IAPH) is a network of over 180 ports in more than 90 countries, covering about 70 percent of world container activities. As an NGO with "consultative status" conferred by the United Nations, IAPH promotes sustainability at ports through various climate change programs, mostly of mitigation nature. Mitigation measures have largely focused on monitoring and controlling the local gas emissions such as SO<sub>x</sub>, NO<sub>x</sub>, and particulates as well as the CO<sub>2</sub> greenhouse gas emissions at ports and ships. Adaptation measures largely depend on specific geographical and economic conditions of ports, and thus the solutions must also vary for different ports which makes it difficult to produce general guidelines or manuals.

In 2008, IAPH introduced the WPCI (World Ports Climate Initiative), serving as an interesting case study. Under the WPCI, IAPH issued web-based manuals or guidelines, by which port authorities can formulate plans to alleviate air pollution caused by port activities. These include: *Carbon Foot-printing*

*for Ports, Port Clean Air Programs, and On-Shore Power Supply.* The Secretary General of IAPH, Mr. Susumu Naruse, said a relatively new issue is related to the LNG bunkering at ports since many more LNG-fueled vessels are expected to enter the market very soon. At the moment, about 30 sea vessels in North Europe are already fueled by LNG. Work was in progress for safety check lists regarding LNG bunkering.

In addition to guidelines and manuals, the IAPH manages Environmental Ship Index (ESI) whereby ports offer incentives to environment-friendly ships that call at their ports. Currently, more than 3,000 ships and 25 incentive-providers, which are mainly port authorities, participate in the program and they have been increasing in number year after year.

### **Why the Asia-Pacific Cooperation Is Important**

There has been a major shift in shipping towards the Asia-Pacific region in the last three decades. Cargo volumes have continued to climb over the years and now we are seeing over-capacity of ships and over-expansion in some of these ports. Need for cooperation in sea transport and ports management seem natural but in reality sovereignty limits binding regulations and the cooperation efforts have centered more in respect to facilitating trade and reducing costs, increasing security and predictability for merchants and customers. Application of sustainability in an environmental sense is a relatively new objective and still remains more of a choice than a requirement in many places.

The IMO conventions such as the International Convention for the Prevention of Pollution from Ships (MARPOL) covers 138 countries and 98 percent of global shipping. The Ballast Water Management Convention was more recently adopted in 2004 and currently has 49 signatories that covers 35 percent of the world's merchant fleet in gross tonnage. It is likely to come into force by 2017. Bio-invasions have occurred at alarming rate in the past 25 years as unwanted species of marine plants and animals entered through ships arriving at ports. Ecological economic costs can be tremendous in certain cases as they are often very difficult to control and can quickly lead to food web disruptions in the area.

Participation is critical in regional and global initiatives to control and mitigate various environmental challenges. IAPH's WPCI is mostly led by European participation. Despite the Asia-Pacific region hosting most of the largest ports of the world, only 22 are APEC economies out of a total of 55 ports. Apart from Hong Kong, no other Chinese port is present. Of the 42 ports participating in ESI to measure air pollution and reward incentives to standard-compliant ships, only eight are from the Asia-Pacific region with none from China, and the initiative remains predominantly a European effort. In 2014, Busan became the first port in Northeast Asia to offer an ESI incentive in the form of 15 percent discount on port fees. For 'Onshore Power Supply,' there are 12 European ports and eight North American ports, none from elsewhere. However, it was also noted that in the case of Korea, while the will is there, technical difficulty remains with the standardization aspect. In the case of China, Dr. Dong Yang pointed out that domestic green port evaluation system was launched by the Ministry of Transport.

While ports naturally compete, international cooperation – not just domestic - among ports is valuable and necessary. There are mutual benefits to sharing experiences, training, technologies and services. Sustainable development of ports and expansion of port service industries are two priorities that would also be important for the 'One Belt, One Road' strategy of the Chinese government.

## **Green Ports for the Asia-Pacific**

With Asia-Europe and Asia-North America routes accounting for most of the maritime traffic in the world, it is imperative that Asian ports and shipping companies participate more vigorously in the international cooperation efforts.

One regional initiative that focuses more specifically on the Asia-Pacific is the APEC Port Services Network (APSN). In line with APEC's overall mission, APSN promotes trade and investment liberalization and facilitation, aims to contribute to strengthening economic cooperation, capacity-building, information and personnel exchange among port and port-related industries and services. It is non-profit, self-funded, and reports to the Trade and Transport Working Groups of APEC.

The APSN has established a Green Port Award System (GPAS) to improve environmental awareness and achieving a balance between economic development and environmental protection among ports in the APEC region. One other objective is to improve the interoperability of different green port systems and standards in the region. Signing up for GPAS is voluntary and serves to motivate participating ports to improve their green performance through self-evaluation and expert evaluation, to attain "APSN Green Port Certification." The main indicators for performance are: a) commitment and willingness; b) action and implementation; c) efficiency and effectiveness. Pilot projects are underway at ports of Hong Kong, Shanghai, Bangkok, as well as in the Philippines and Malaysia. All ports scored high in 'commitment and willingness' but there is still large room for improvement in the 'efficiency and effectiveness' category.

## **Is LNG the Answer?**

One of the ways in which shippers aim to reduce fuel costs while reducing carbon footprints is through the usage of LNG. Hailed an "environment-friendly fuel," LNG is expected to reduce SOx by 99 percent, NOx by 85 percent, and CO2 by 23 percent as compared to conventional means of powering ships.

At present, 73 LNG-fueled ships are in operation while 80 new orders have been placed. Despite new compliance regulations that come in effect from the beginning of 2016, Mr. Stephano Heo of Daewoo Shipbuilding and Marine Engineering said that this year, they expected to see many fewer than last year's high number of orders. Some other notable trends affecting decisions regarding LNG usage are:

- With the global oil price plunge, LNG price has also dropped;
- Mostly passenger ferries were fueled by LNG; now more tankers and container ships;
- LNG is coming from new sources; for example, the shale gas boom in North America and Australia's mega gas project.

Singapore is now aiming to become an LNG hub in the region, and a LNG-bunkering jetty is currently under construction. Starting 2017, the new facilities will become operational and ready

for 'milk runs' to remote, isolated islands of Southeast Asia. Busan Port, which handled 19.4 million TEU containers in 2015 to be ranked the sixth container port in the world, is planning for LNG bunkering and expects to complete construction of LNG facilities by the end of 2020.

At present, with crude oil selling at US\$38 per barrel, there is not much saving to be made from switching to LNG but if the oil price goes back up to US\$80 per barrel or above, there will be significant savings, according to Mr. Heo.

## **Conclusion**

Efficient management and profitable operation of ports form a key component of the growth agenda for economies of the Asia-Pacific region. Efficiency at ports also require connectivity to well-established intermodal transport systems. Many of the region's economies are much in need of an integrated transport system and it is necessary to look at linkages between ports and inland transport systems. In addition to at-the-port logistic services such as cargo handling and storage, there are other facilities associated with port operations such as improving supply chain management at ports, customs facilitation, and hinterland transport.

Construction of any type of port is a major investment with long-term implications and requires continuous monitoring of costs versus benefits amidst fierce competition – international and domestic – particularly as the vessels become significantly larger. Public-private partnership financing and other types of infrastructure financing mechanisms need to be more thoroughly explored.

Various socio-cultural concerns need to be addressed including safety-environment standards by working with local communities and local governments when upgrading the existing or developing new ports. Port governance differs greatly from economy to economy, yet international cooperation is much needed and would mutually benefit in terms of regulatory harmonization and customs facilitation, environmental standards, technologies, services, personnel training, as well as standards for dismantling old vessels or rigs. As much as sea routes are shared, information-sharing and collaborated maritime surveillance are important areas needing international cooperation. With Paris Agreement recently having been attained as a result of COP21, international cooperation at sea and at ports for climate change mitigation and adaptation also become more even pertinent and urgent.

As mentioned by the Secretary General of IAPH, Mr. Susumu Naruse, world seaborne trade has increased steadily to 9.8 billion tons in 2014. To cater to the growing volume and dependency on sea transport, vessel sizes have continued to increase dramatically over the last decade and as a consequence, there has been a cascade effect on the deployment of mega and large-sized vessels. With large vessels now operating at major sea routes, structural adjustments are demanded of ports, especially among the larger ones which must compete fiercely to become or remain regional hubs. However, as pointed out by Prof. Young-Tae Chang, increasing vessel size is no longer very economical post-2007; ships are already consuming minimum fuel with slow-steaming technology. Port upgrades have huge upfront cost implications. Most ports around the world are

not investing at the moment – only about a dozen are actually upgrading to accommodate these mega vessels.

In respect to green initiatives and standards at ports, while they are important and have long-term benefits that go far beyond ports, if environmental criteria and rules become too stringent, ships would rather divert to more non-compliant and cheaper ports. Hence, shared commitment and action followed by sustainable business practices are essential, in order to prevent compromise of port standards for competitive reasons. While recognizing that boosting profitability in shipping and port industries is crucial for any national economic growth agenda, environmental compliance enforcement through balanced and reasonable regulations, not just incentives, should be strengthened in order to effectively mitigate climate change challenges. Without them, short-term gains would continue to win over the longer-term sustainability agenda.

*Summarized by Jessica Yom  
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한국해양수산개발원  
KOREA MARITIME INSTITUTE

PECC International Project 2015-2016

Managing the Blue Economy: Future of Port and Shipping in the Asia-Pacific

## SEMINAR 2: SUSTAINABILITY AND BEAUTIFICATION OF PORTS

BUSAN, KOREA | APRIL 4-6, 2016

(VENUE: KOREA MARITIME INSTITUTE, BUSAN)

### DAY ONE: Monday, April 4th

- 09.00-09.10 Welcome remarks  
*Dr. Sung-Gwi Kim, President, Korea Maritime Institute (KMI)*  
*Dr. Charles E. Morrison, President of East-West Center, USA / former Chair of PECC*
- 09.10-09.20 Introduction of PECC international project 2015/2016 – “Managing the Blue Economy”  
*Prof. Jean Luc Le Bideau, Vice-chair, FPTPEC*
- SESSION 1: Ports of the Future**  
*Session chair: Prof. Jean Luc Le Bideau, Vice-chair, FPTPEC*
- 09.20-09.45 Environmental and safety concerns: Ports and shipping  
*(Dr. Charles E. Morrison, East-West Center, USA)*
- 09.45-10.10 Port governance, commercialization and investment in China  
*(Dr. Dong Yang, Assistant Professor, Logistics and Maritime Studies, Hong Kong Polytechnic University/ Senior Consultant of APSN)*
- 10.10-10.30 COFFEE BREAK
- 10.30-10.55 Measuring perceived impacts of developing new deep sea port: Pakbara Port in Thailand  
*(Dr. Pairach Piboonrungrroj, Director of Supply Chain Economics Research Centre, Faculty of Economics, Chiang Mai University, Thailand)*
- 10.55-11.20 OPEN DISCUSSIONS
- 12.00-13.30 LUNCH (Venue: Mokjangwon, 3<sup>rd</sup> Floor)

**SESSION 2: Management of Environmental and Economic Risks**

*Session chair: Dr. Charles E. Morrison, USAPC/ East-West Center, USA*

- 13.30-13.55 Dredging and building new port facilities with respect to environmental concerns: Papeete Port  
*(Mr. Boris Peytermann, CEO, Papeete Port Authority, French Polynesia)*
- 13.55-14.20 Use of modeling tools for sustainable port development  
*(Mr. Michel de Vos, Infrastructure Services Manager, Port of Napier, New Zealand)*
- 14.20-14.45 The spill-over effects of a port shutdown from the perspective of X-events  
*(Dr. Min-Kyu Lee, Associate Research Fellow, Port Research Division, Korea Maritime Institute)*
- 14.45-15.10 OPEN DISCUSSIONS
- 15.10-15.30 COFFEE BREAK

**SESSION 3: Mitigation of Pollution at Ports**

*Session chair: Dr. Charles E. Morrison, USAPC/ East-West Center, USA*

- 15.30-15.55 Impact of air pollutants from ships on coastal population  
*(Dr. Young-Tae Chang, Professor, Asia Pacific School of Logistics, Inha University, Incheon, Korea)*
- 15.55-16.20 Clean technologies for dismantling old vessels, oil rigs, and other offshore infrastructures  
*(Mr. Nicolas Renard, Adviser for the Chairman and CEO, Veolia, France)*
- 16.20-16.45 Mitigation of on-shore and near-shore pollution at ports and from vessels  
*(Mr. Susumu Naruse, Secretary General, International Association of Ports and Harbors (IAPH))*
- 16.45-17.10 OPEN DISCUSSIONS
- 19.00 Welcome Dinner hosted by KMI  
*(Venue: Westin Chosun Hotel, Haeundae - 2<sup>nd</sup> Floor, Violet Room)*

**DAY TWO: Tuesday, April 5th**

**SESSION 4: Regional Cooperation for Stewardship of Ports and Shipping**

*Session chair: Mr. Brian Lynch, NZPECC*

- 09.30-09.55 Asia-Pacific regional cooperation on port and shipping issues  
*(Dr. Charles E. Morrison, President, East-West Center, USA)*
- 09.55-10.20 Implications of GHG reduction targets and a mandatory IMO CO2 data collection system for international shipping  
*(Dr. Han-Seon Park, Korea Maritime Institute)*
- 10.20-10.40 COFFEE BREAK
- 10.40-11.05 Green Port Award System Initiative - APEC Port Services Network  
*(Dr. Dong Yang, Assistant Professor, Hong Kong Polytechnic University/  
Senior Consultant of APSN)*
- 11.05-11.30 LNG fuel market in shipping industry  
*(Mr. Youn Heo, General Manager, Technology Strategy Division, Daewoo Shipbuilding and Marine Engineering, Korea)*
- 11.30-11.55 OPEN DISCUSSIONS

**CONCLUDING SESSION**

- 11.55-12.15 Summary of recommendations by session chairs  
*Open discussion*
- 12.15-12.30 Closing remarks  
*Prof. Jean Luc Le Bideau/ Mr. Brian Lynch*
- 12.30-13.30 LUNCH  
*(Venue: Mokjangwon, 3<sup>rd</sup> Floor)*

*END OF SEMINAR*

- 19.00 Closing Dinner hosted by FPTPEC

**DAY THREE (OPTIONAL): Wednesday, April 6th**

- 09.30-19.00 Site visits to Busan port facilities and Daewoo shipyard