FAIR WINDS CHARTER: HOW CIVIC EXCHANGE INFLUENCED POLICYMAKING TO REDUCE SHIP EMISSIONS IN HONG KONG 2006-2015

Simon Ng
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ABOUT CIVIC EXCHANGE

Civic Exchange is an independent Hong Kong public-policy think tank established in 2000. We use in-depth research and dialogue to inform policy and engage stakeholders on addressing environmental and development challenges in Hong Kong. Civic Exchange has been ranked among the top 50 environmental think tanks in the world by the Lauder Institute at the University of Pennsylvania since 2011. For more information, visit www.civic-exchange.org

ABOUT ADM CAPITAL FOUNDATION (ADMCF)

ADMCF is an impact driven foundation focused on making change in Asia. Through research, we identify environmental challenges then work towards solutions across five key areas: marine ecology, water security, air quality, wildlife trade and forestry conservation finance. We see all our programmes as inter-related and work towards “un-siloing” how we approach environmental challenges, from the mountains to the oceans. We believe it is impossible to think only of air or water pollution, about protecting our forests, our oceans and their biodiversity, without considering also the development challenges we face in Asia.

ABOUT THE AUTHOR

Simon Ng, a Civic Exchange Fellow and former Chief Research Officer, has more than 20 years of experience in academic and policy research, project management and stakeholder engagement on mainly air quality, urban transportation, walkability and sustainability issues. Trained as a geographer, he has conducted groundbreaking research on ship emissions inventory in Hong Kong and the Pearl River Delta and collaborated with the shipping industry that led to the creation of the Fair Winds Charter.

Mr Ng has also been serving as an expert member of the United Nations Centre for Regional Development Regional Environmentally Sustainable Transport Forum in Asia since 2006. He and Robert Gottlieb co-wrote the book Global Cities: Urban Environments in Los Angeles, Hong Kong, and China (The MIT Press, 2017).
Civic Exchange’s work on ship emissions in Hong Kong is a perfect example of how a public-policy think tank could influence policymaking. We identified a neglected but important problem, commissioned and completed research to inform public dialogue, engaged stakeholders and facilitated a shipping industry-led voluntary initiative to cut emissions (the signing of the Fair Winds Charter). All these efforts resulted in a policy change with the government establishing mandatory emission requirements for the industry and provided an evidence-based solution for the original problem. As a result, emissions were reduced, air quality improved and people’s health was enhanced.

Several factors contributed to the success of the Fair Winds Charter (FWC):

First, Civic Exchange stressed the importance of evidence-based policymaking. Initially, the shipping industry believed it only played a small part in Hong Kong’s air pollution problem. But once scientific research revealed that the industry was actually among the top emitters and that container vessels at berth released the largest amount of emissions into their surrounding environment, the industry was ready to clean up its act. Shipping companies voluntarily agreed to switch to a more environmentally friendly fuel at berth as the best short-term solution. We would like to acknowledge the contributions by our past researchers and other external research collaborators such as the Hong Kong University of Science and Technology and the University of Hong Kong.

Second, building a partnership with the shipping industry and the government was of critical importance. Over the course of the journey, there were different expectations, tensions and arguments, but all parties shared a common vision and goals. In the end, the collective will to reduce ship emissions overcame corporate or individual interests. Many agreed that the tripartite partnership between Civic Exchange, the shipping industry and the government was a critical factor leading to the eventual success.

Throughout the process, all parties involved demonstrated strong leadership to overcome every obstacle when the going got tough. In particular, we would like to thank Mr Arthur Bowring of the Hong Kong Shipowners Association, Mr Tim Smith of Maersk Line, Mr Peter Ng and Mr Roberto Giannetta of the Hong Kong Liner Shipping Association, among others, for stepping forward and pushing for the FWC initiative when discussions with the shipping industry were in limbo back in 2010; Ms Christine Loh for conceptualising and spearheading the project first at Civic Exchange and then as Under Secretary for the Environment; Mr Edward Yau, former Secretary for the Environment, and Mr Roger Tupper, former Director of Marine, for supporting the ship-emission reduction initiative and getting the support of their respective departments behind us; Mr Tony Lee and Mr Billy Cheung as well as their supervisors in the Environmental Protection Department for providing the extra nudge at critical moments that proved to make the difference; Mr Simon Ng, Professor Alexis Lau, Professor Jimmy Fung, the late Professor Anthony Hedley, and Dr Lai Hak Kan for their vision and leadership in conducting pioneering research; and Mr Mike Kilburn and Ms Veronica Booth for taking charge of stakeholder-engagement activities for the FWC. We are also grateful to Ms Yenni Kwok for supporting preliminary research and interviews for this report; Ms Helen Luk for editing it and organising a seminar, together with Ms Michele Weldon and Mr Cosmo Lo, to share this success story with key stakeholders; Mr John So for proofreading and Ms Amy Woo (DESIGNORM) for designing the layout of the report.
Last but not least, Civic Exchange was fortunate to have patient funders who understood that policy change would never happen overnight. We are greatly indebted to the Rockefellers Brothers Fund, the Millipede Foundation, Olympus Capital Asia, WYNG Foundation and the Environment and Conservation Fund for their long-standing support to our work on ship emissions. In particular, funding support from ADM Capital Foundation enabled us to bring the success story of the Fair Winds Charter in the form of this paper to the wider audience.

We hope that this paper will serve as a useful case study for public-policy students and researchers, and help convince other funders that while a collaborative, “science-to-policy” approach might not yield quick outcomes, it often produces bigger and long-lasting impact and is therefore worthy of investment and support.

Winnie Cheung
Civic Exchange CEO
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ABBREVIATIONS

CMH China Merchants Holdings
DECA Domestic emission control areas
ECA Emission control areas
EPD Environmental Protection Department
FWC Fair Winds Charter
HFO Heavy fuel oil
HKGCC Hong Kong General Chamber of Commerce
HKLSA Hong Kong Liner Shipping Association
HKSOA Hong Kong Shipowners Association
HKUST Hong Kong University of Science and Technology
HSEC Human Settlements and Environment Commission
IENV Institute for the Environment
IMO International Maritime Organization
Intertanko International Association of Independent Tanker Owners
MARPOL Annex VI Annex VI of the International Convention for the Prevention of Pollution from Ships
MD Marine Department
$\text{NO}_x$ nitrogen oxide
OGVs ocean-going vessels
PM particulate matter
PRD Pearl River Delta
$\text{SO}_2$ sulphur dioxide
TEU 20-foot equivalent unit
YICT Yantian International Container Terminals
On 1 July 2015, a landmark legislation came into effect that mandates all ocean-going vessels (OGVs) calling at Hong Kong to use marine fuel with sulphur content not exceeding 0.5 per cent while at berth\(^1\), replacing heavy fuel oil (HFO), also known as bunker fuel. By the Environmental Protection Department (EPD)'s estimates, this switch will enable Hong Kong to reduce its total sulphur dioxide (SO\(_2\)) and particulate matter (PM) emissions by 12 per cent and 6 per cent, respectively. The reductions are even greater at the main berthing locations – the container terminals in Kwai Chung and Tsing Yi – reaching over 70 per cent. This has been arguably the most significant and effective policy intervention to reduce air pollution from local sources since 1990, cementing Hong Kong’s position as one of the leading cities in ship-emission control and a pioneer in Asia.

The legislation was the culmination of 10 years of collaborative efforts involving the Government of the Hong Kong Special Administrative Region (the government), the shipping industry, academia, and civil society. Civic Exchange played multiple roles throughout the process: it was an advocate and a leader in ship-emission scientific research, an intermediary in sharing international best practices on emission control, and a strategist who engaged with different stakeholders to build partnerships and facilitated the dialogue between the shipping industry and the government. All parties contributed to the government’s policy and strategy on ship-emission control.

The purpose of this paper is to document the “science-to-policy” journey, highlight several breakthroughs, and review the key factors that steered the process and resulted in far-reaching implications. By sharing the lessons learned, this paper aims to serve as a case study for research institutions, universities, government departments, non-government organisations, and the business sector to inspire new initiatives and foster new partnerships that would inform and improve public policymaking in Hong Kong.
Spotting the Issue

Inspiration from Abroad

Located thousands of miles away from Hong Kong at the other end of the Pacific Ocean, Los Angeles and Long Beach were the two busiest container ports in the United States. In 2005, Long Beach adopted the Green Port Policy. A year later, both ports adopted the San Pedro Bay Ports Clean Air Action Plan to reduce marine emissions. The action plan was deemed the most comprehensive and sweeping strategy ever developed by any US port. It addressed every type of port-related emission sources, including ocean-going ships, harbour crafts, trains, cargo-handling equipment, and included detailed strategies to reduce $\text{SO}_2$, nitrogen oxide (NO$_x$) and PM emissions. The plan also tracked the progress with annual emission inventories, which were made available in the public domain.

Upon learning about the Green Port Policy and the action plan, Civic Exchange believed that Hong Kong had much to learn from these two pioneering US ports. Despite being two competing ports, Los Angeles and Long Beach (with a combined container throughput of 14.2 million 20-foot equivalent unit, or TEU, in 2005) managed to align their vision and devise joint efforts to fight air pollution. Hong Kong had an almost 60 per cent higher container throughput at 22.4 million TEU in the same year but was lagging far behind in its understanding of ship and port emissions as well as measures to control them. A long-term strategy to tackle the problem was sorely needed.

Civic Exchange then began preliminary research on the topic and found that apart from California, several European countries such as Germany, the Netherlands and Norway had also made similar progress on reducing shipping emissions. These countries adopted a combination of scientific research, community movements and litigation against the port and environmental protection authorities amid growing public concerns about the adverse effects of marine emissions. The authorities often applied a carrot-and-stick approach: imposing emissions regulations on the one hand while offering incentives to port and ship operators to clean up on the other.

Meanwhile, the International Maritime Organization (IMO) was spearheading the global regulatory effort. In 1997, it adopted Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL Annex VI) to progressively reduce global emissions of $\text{SO}_2$, NO$_x$ and PM, and to introduce the concept of emission control areas (ECAs) to its member states. MARPOL Annex VI stipulated that the sulphur content in
the marine fuel could not exceed 4.5 per cent and it also set the limit on NO\textsubscript{x} emissions. MARPOL Annex VI was revised subsequently: in 2012, the global cap on sulphur content in marine fuel for ships operating outside ECAs was lowered from 4.5 per cent to 3.5 per cent; the cap would be further tightened to 0.5 per cent starting from 1 January 2020.

Tighter requirements were enforced inside ECAs: fuel sulphur content for ships was initially set at 1 per cent but was tightened to 0.1 per cent, effective from 1 January 2015. To date, there are four ECAs in force. The Baltic Sea became the world’s first ECA in 2006, followed by the North Sea in 2007. The North American ECA, which came into force in 2012, comprises most ports along the US and Canadian coasts, while the US Caribbean ECA – set up in 2014 – covers Puerto Rico and US Virgin Islands among others.

**Ship Emissions in Hong Kong**

Back in 2005, the Hong Kong EPD mainly focused its efforts on the power and road transport sectors as primary targets for emission control. This was because the air pollutant emission inventory compiled annually by the EPD showed that power plants were the biggest emission source of SO\textsubscript{2}, NO\textsubscript{x} and PM\textsubscript{10}, and emissions of NO\textsubscript{x} and PM\textsubscript{10} from road transport were also significant (see Figure 1). In comparison, emissions from the shipping industry were relatively small (5 per cent SO\textsubscript{2} and 8 per cent PM), except for NO\textsubscript{x} (16 per cent).

Nevertheless, Civic Exchange was insistent that due attention should be given to the shipping industry for several reasons. First, Hong Kong has always been one of the largest seaports in the world, with its container throughput ranking globally at number one in 2004 and number two in 2005. It was reasonable to assume that because of the sheer volume of fuel consumed by vessels, the shipping industry would be a significant source of emissions leading to air pollution. Second, with growing seaborne trade and a rising number of vessels calling at Hong Kong’s port, ship-induced air pollution would likely worsen, especially in the absence of ship-emission control regulations from the government. Figure 2 illustrates that the emission of SO\textsubscript{2} from ships increased by 90 per cent between 1990 and 2005, but
total SO₂ emissions in fact dropped 60 per cent in the same period largely due to emission control over other sources. The same diverging trends were also found for both NOₓ and PM₁₀ emissions. If government policy remained unchanged, it would only be a matter of time when ships would outgrow power plants and road vehicles as the biggest emitter of air pollutants in Hong Kong.

**FIGURE 2** Total and Ship Sulphur Dioxide Emissions, 1990-2007  
Source: Hong Kong EPD

**Growing Concerns over Ship Emissions and Mortality**

Air pollution is widely acknowledged to have an adverse effect on human health, leading to illnesses and even premature death. Prof James Corbett and his team’s 2007 research on the global assessment of ships emissions estimated that about 64,000 annual cardiopulmonary and lung cancer mortality was attributable to shipping-related PM emissions.³ The hardest-hit regions were found in Europe (about 27,000 deaths), East Asia (about 20,000 deaths) and South Asia (about 10,000 deaths) (see Figure 3).
Other ship-induced air pollutants, such as $\text{SO}_2$ and $\text{NO}_x$, also pose health risks to people. To minimise fuel costs, ocean-going vessels are generally run on HFO, which is high in sulphur and trace metals. Before 2012, the allowable sulphur content of HFO for ships was capped at 4.5 per cent by the IMO, which was almost 1,000 higher than the ultra-low-sulphur diesel fuel used by automobiles (with 0.005 per cent sulphur). After combustion, large amounts of air pollutants would be released as exhaust gas, harming people’s health.

It was a major concern in Hong Kong, as the main container terminal facilities in Kwai Chung and Tsing Yi Island are located close to residential areas (Figure 4). People living and working in these communities are likely to have constant exposure to much higher concentrations of air pollutants, leading to adverse health consequences. Studies found that communities located near port facilities, railyards, freeways and polluting diesel trucks in Southern California, such as the Los Angeles and Long Beach ports, were among those with the highest cancer risk from air pollution in the United States.5

A research paper written jointly by the Institute for the Environment (IENV) of the Hong Kong University of Science and Technology (HKUST) and Civic Exchange in 2005 identified a high level of $\text{SO}_2$ near Kwai Chung and other nearby air-quality monitoring stations from 2000 to 2002.6 Analysis of speciated PM$_{10}$ data showed that it was associated with the combustion of HFO in the adjacent container terminals. The findings backed up Civic Exchange’s suspicion that ships were a major source of emission in Hong Kong and the related health implication on the estimated 3.8 million people living in the nearby urban airshed would be substantial.7

**FIGURE 4** Kwai Chung Container Terminals and its Adjacent Residential Area
LEARNING THE SCIENCE

When it became obvious that ship emissions were an emerging issue with significant environmental and health impacts in Hong Kong, Civic Exchange began researching into the extent of such emissions. Although the EPD compiled and published the Hong Kong air pollutant emission inventory yearly, the information was rather limited and presented in aggregate format. For example, it only showed the total amount of air pollution produced by the shipping industry each year by major pollutant, and the contribution of the shipping industry relative to other local emission sources. There was, however, no information about the assumptions used for emission estimation, which would affect the accuracy of the calculation, and the amount of air pollution attributable to different vessel types as well as the spatial distribution of ship emissions, which would determine the focus of control strategy. It was evident that Hong Kong badly needed a detailed emission inventory to provide answers to these queries in order to establish effective control solutions.

Hong Kong’s Baseline Emissions

The first opportunity to conduct a baseline study on shipping emissions emerged in 2008 when the EPD commissioned research into the marine vessels emission inventory, a year after Civic Exchange engaged the former Secretary for the Environment, Mr Edward Yau, on the issue. This marked the beginning of a partnership between Civic Exchange and the EPD, with Civic Exchange undertaking research and engaging the shipping industry and other stakeholders, and the EPD participating in those engagement activities and pulling together internal resources to closely examine the issue. IENV of HKUST led the research and released in 2012 detailed findings of ship emissions in Hong Kong and recommendations that informed policymakers on the best strategy for tackling the problem. The study revolutionised the methodology of ship-emissions estimation in Hong Kong by introducing the activity-based approach to complement the conventional fuel-based approach. It provided new information about the practices and preferences of the shipping industry through a large-scale survey as well as reviewed and revised the assumptions used in past emission estimations to reduce uncertainties associated with the estimation. The study also calculated emissions from each ocean-going vessel operating in Hong Kong in 2007 (the base year) and tracked ship movements with the help of the automatic identification system (AIS) installed on these vessels, hence offering a high-resolution spatial dimension of ship emissions in Hong Kong for the first time in history.
Key findings of the study included:

- OGVs accounted for 79 per cent of SO$_2$, 44 per cent of NO$_x$ and 68 per cent of PM$_{10}$ for the whole shipping sector.
- Among OGVs, about 80 per cent of SO$_2$, NO$_x$ and PM$_{10}$ emissions were attributable to container vessels, followed by cruise ships with roughly 9 per cent.
- Of all the emissions from OGVs, about 42 per cent of SO$_2$, 30 per cent of NO$_x$ and 33 per cent of PM$_{10}$ were emitted when the vessels were at berth due to the burning of bunker fuel when the auxiliary engines and boilers were in operation.
- Emission hot spots were found at the container terminals in Kwai Chung, cruise terminals in Tsim Sha Tsui and some other berthing and mooring locations in and around the harbour (Figure 5). Major fairways such as East Lamma Channel, Ma Wan Channel and Urmston Road were also identified as high-emission corridors.

The most important conclusion was that Hong Kong’s short-term ship-emission control strategy should focus on OGVs, especially container vessels, as they contributed the most to air pollution. Therefore, cutting emissions from these vessels while at berth would be the best short-term solution.
Ship Emissions in the Pearl River Delta

In order to fully tackle the problem of ship emissions and maximise benefits for society, Civic Exchange recognised the need to take a regional approach by coordinating control and management throughout the Pearl River Delta (PRD).

Similar to the twin ports of Los Angeles and Long Beach, the ports of Shenzhen (including Yantian, Shekou and other smaller ports) and Guangzhou are adjacent to Hong Kong. Collectively, Hong Kong, Shenzhen and Guangzhou handled a container throughput of 59 million TEU in 2008, equivalent to 12 per cent of the world’s container trade (Figure 6). Because of the intensity of shipping activities in such a small region, the impact of ship emissions in the PRD was understood to be significant. As a result, finding the right emission-reduction solution for the whole region was also expected to bring substantial public health benefits.

In 2010, Civic Exchange received a major grant from the Rockefeller Brothers Fund to carry out a study on the health impacts of marine emissions in the PRD. The study aimed to compile an emission inventory for OGVs in the PRD to determine the contribution of ship emissions in air-pollutant concentrations through the application of air-dispersion modelling. It also covered a health-impact assessment from shipping emissions on people living in the PRD and an evaluation of potential benefits of several ship-emissions control measures, including fuel switching, vessel speed reduction and the setting up of a PRD ECA. The three-part study was completed in September 2012 including:
• An inventory of OGV emissions in the PRD and their effect on air quality, prepared by the Atmospheric Research Center of the Fok Ying Tung Graduate School of HKUST.9
• A health impact assessment report on ship emissions and various control scenarios, completed by the School of Public Health of the University of Hong Kong.10
• A policy recommendation paper prepared by Civic Exchange based on the scientific research carried out by the two university partners.11

The study found that the annual number of deaths attributable to SO$_2$ emissions from marine vessels in Hong Kong and the PRD was 519, of which 385 (or 74 per cent) took place in Hong Kong, 93 (18 per cent) in inner PRD and 42 (8 per cent) in outer PRD (Figure 7). These findings showed a close connection between ship emissions and public health. The study also identified that Hong Kong was the most affected area by ship emissions in the entire PRD region as the majority of vessels going to Shekou and Yantian sailed through Hong Kong waters. So even though Hong Kong’s port only handled less than half of the PRD’s container throughput, Hong Kong residents bore the brunt of the pollution. As a result, any effective control measures would benefit Hong Kong the most.

After comparing the benefits of four different control measures, the study highlighted that a PRD ECA would be the most effective way to reduce the adverse impact of ship emissions on public health. The mandatory requirement of the use of 0.1 per cent sulphur fuel in an ECA would reduce 91 per cent of the excessive deaths, as PM and SO$_2$ emissions would drop by 85 per cent and 95 per cent, respectively, across the PRD (Figure 7).12 The other three measures were imposing a 12-knot speed limit for OGVs while in Hong Kong waters, requiring OGVs to use 0.5 per cent sulphur fuel while at berth in Hong Kong, and asking OGVs to switch to 0.1 per cent sulphur fuel while operating in Hong Kong waters. These should be considered as short-to-medium-term measures as they would reduce excessive deaths by 41 to 62 per cent.

<table>
<thead>
<tr>
<th>Control Measure</th>
<th>Description</th>
<th>HONG KONG</th>
<th>INNER PRD</th>
<th>OUTER PRD</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Measure 1</td>
<td>At-berth fuel switch (0.5% sulphur limit) in Hong Kong waters - OGVs</td>
<td>197 (49%)</td>
<td>64 (31%)</td>
<td>28 (33%)</td>
<td>288 (44%)</td>
</tr>
<tr>
<td>Control Measure 2</td>
<td>0.1% sulphur limit in Hong Kong waters - OGVs</td>
<td>114 (70%)</td>
<td>57 (39%)</td>
<td>25 (40%)</td>
<td>195 (62%)</td>
</tr>
<tr>
<td>Control Measure 3</td>
<td>ECA up to 100 nautical miles from Hong Kong (0.1% sulphur limit) - All ships</td>
<td>33 (91%)</td>
<td>11 (88%)</td>
<td>3 (93%)</td>
<td>46 (91%)</td>
</tr>
<tr>
<td>Control Measure 4</td>
<td>Vessel speed reduction (12 knot) in Hong Kong waters - OGVs</td>
<td>229 (41%)</td>
<td>57 (39%)</td>
<td>21 (50%)</td>
<td>306 (41%)</td>
</tr>
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</table>
It was a pioneering study as it included both a regional perspective and a public health angle to the policy discussion, supported by the first high-resolution emission inventory of OGVs in the PRD. It took an integrated, “science-to-policy” approach that started with an emission inventory, followed by air-quality modelling and health-impact assessment, before concluding with policy recommendations. The study showcased how scientific evidence could inform policy formulation with public health protection as an overarching goal.

A PRD Emission Control Area

While a PRD ECA was identified as the most effective measure to control ship emissions and protect public health, Civic Exchange understood from the outset that it was going to be a long process involving different players, including Hong Kong and mainland Chinese government agencies as well as ship operators, ship owners and fuel suppliers.

To better inform the stakeholders and facilitate the process leading to the establishment of the PRD ECA, Civic Exchange published in November 2013 another paper entitled Working Towards a Quality Living Region: A Pearl River Delta Emission Control Area. It outlined the reasons and justifications for implementing the ECA, examined the experiences of other jurisdictions, and highlighted issues – from technical to financial and operational – that policymakers and stakeholders should consider when trying to set one up for the PRD.

One of the key messages highlighted in the paper was that the HKSAR Government and its Guangdong counterpart did not have the authority to apply to the IMO for the designation of an ECA in the PRD. Only the Chinese Central Government, as a full Member State of the IMO, could make an application. In other words, any discussion, decision and proposal submission related to the PRD ECA had to involve the relevant authorities in Beijing, Guangdong, Shenzhen, Macau and Hong Kong. This complex, multi-year process would require a lot of additional inputs, such as research into the setting of the ECA boundary, health impact assessment of ship emissions in the PRD, NOX emissions reduction technologies and their applicability in the PRD, availability of ECA-compliant fuel, and economic impact assessment of a PRD ECA on modal and port competition.

Looking back, the major scientific research studies commissioned by the EPD and Civic Exchange were a key phase in the entire process. The findings informed policy discussions on ship emissions and control in Hong Kong and facilitated stakeholders’ engagement. They explained why Hong Kong’s effort on ship emissions control would not only benefit itself but also add value at the regional, national and international levels. The partnership among Civic Exchange, IENV of HKUST and the HKU School of Public Health illustrated the importance of interdisciplinary research collaboration in scientific pursuit as well as policymaking.
Preliminary research by Civic Exchange and its collaborators showed that a strong will to address the issue of ship emissions through different means including rules and regulations significantly contributed to North America and Europe’s success. Realising that the shipping industry and the HKSAR Government held the key to instigate change, Civic Exchange began fostering that partnership.

Engaging the Shipping Sector

Traditionally, the shipping industry was perceived as one of the least receptive to change. Yet, a few visionary industry insiders were ready to step up and take the lead in addressing ship emissions.

One of them was Mr Arthur Bowring, Managing Director of the Hong Kong Shipowners’ Association (HKSOA) from 1997 to 2016. In 2005, he attended a forum on air pollution and was asked by Civic Exchange, one of the organisers, about the shipping industry’s effort in addressing air pollutants from marine sources. Recognising that the industry had done little to tackle ship emissions beyond complying with the fuel sulphur limit imposed by the IMO, he soon began consulting members of the HKSOA to garner their support for proactively addressing the issue.

He reached out to other industry associations such as the Hong Kong Liner Shipping Association (HKLSA), International Association of Independent Tanker Owners (Intertanko), the Hong Kong General Chamber of Commerce (HKGCC) Environment Committee and the Marine Department (MD) to broaden the discussion. He also engaged like-minded industry insiders who later became major supporters for a proactive solution in the subsequent years. Together, they sowed the seeds for change to ensure the sustainable and green development of the industry.
Building Trust and Sharing Knowledge

Support from the HKSOA and HKLSA opened the door for more meetings between Civic Exchange and the shipping industry. In 2008, a series of workshops were organised to bring different stakeholders to the table, including ship, port and local craft operators, the trucking sector, fuel suppliers and academics. Government officials also attended the workshops as observers. Civic Exchange shared its vision and invited the stakeholders to explain their concerns and opportunities for emissions control. It was hoped that this regular platform could be used to share new research findings and international best practices on ship emissions control and regulation, as well as foster an open and transparent dialogue to help stakeholders build consensus and devise joint actions. More meetings and workshops were organised between 2009 and 2010.

Gradually, Civic Exchange established a strong relationship with the shipping industry based on trust and mutual respect. Civic Exchange conducted evidence-based research and readily shared the latest information with the industry. In return, the industry was willing to explore feasible solutions that comply with international requirements to reduce ship emissions and create a level-playing field for all players.

Keeping the Government in the Know

At the same time, Civic Exchange was working on building relationships with key government stakeholders, including the EPD and the MD. The EPD was responsible for air pollution control in Hong Kong, while the MD was able to provide professional advice on international regulations and practices on ship emissions control, the feasibility of the application of different emission-reduction options (either tailpipe devices or clean fuel) in Hong Kong, and the required precautionary provisions without compromising navigational and operational safety. Support from the MD would also help get the buy-in from the shipping industry.

Engaging the two departments initially proved to be a tricky task as ship emissions was not a primary area of concern for the EPD before 2008 and the MD only focused on maritime safety. However, Civic Exchange managed to convince the then Secretary for the Environment, Mr Edward Yau, and Director of Marine, Mr Roger Tupper, to pledge their support and encourage their officers to join our meetings and engagement activities on ship-emission reduction. With blessings from the senior management, both the EPD and the MD took part in our activities and were kept informed of the ongoing dialogue between Civic Exchange and the shipping industry.

Pushing for Action

In 2008, amendments to MARPOL Annex VI were adopted, tightening the global fuel sulphur limit to 3.5 per cent in January 2012. But the shipping industry wanted to explore short-term options that could be adopted in Hong Kong because the next drastic cut of the sulphur cap to 0.5 per cent was only scheduled to take effect in 2020. The industry,
however, found it difficult to get the government on board and give clear policy direction. The situation took a positive turn after the HKSOA’s Mr Bowring gave a presentation on possible ship-emission control options at an American Chamber of Commerce breakfast meeting in November 2009. The presentation caught the attention of two representatives from the EPD and the MD, who visited him the next day for more discussions.

During a June 2010 workshop hosted by Civic Exchange, Mr Bowring and Mr Tim Smith of Maersk Line raised the possibility for the Hong Kong shipping industry to adopt a voluntary emission-reduction initiative as a way forward. In the same workshop, preliminary findings of the EPD-commissioned study were shared and several major shipping lines such as Maersk, OOCL, APL and MOL verbally agreed to draft a voluntary agreement requiring their ships to switch from polluting marine bunker fuel to low-sulphur distillate fuel while at berth in Hong Kong. Other smaller carriers also agreed to communicate with their head offices before making a decision.

To use low-sulphur distillate fuel, the carriers faced several challenges: (a) they would have to pay more for cleaner fuel; (b) certain ships or engines might not be equipped to switch to cleaner fuel, thus potentially causing engine issues; (c) Hong Kong might lose its competitive edge to nearby Shenzhen and other southern Chinese ports due to higher standards and extra costs; (d) the availability of 0.5 per cent or 0.1 per cent sulphur fuel in Hong Kong was not certain; and (e) extra workload on ships’ command or engineers to fill in reporting documentation due to the fuel-switch requirement.15

Despite these challenges, the overall shipping industry was in favour of regulation to create a level-playing field so that the “good guys” would not be penalised financially for cleaning up while the “bad guys” could pay cheaper fuel and gain a competitive edge over their rivals. Regulation would also help enhance the environmental performance of the shipping industry, which was keen to push for fuel requirements and standards to align with international practices. They were against having one set of rules in Europe and North America, and another set of requirements in Hong Kong, citing the difficulty of adding fuel compartments to store several types of compliant fuel and the challenge for crew members to comply with different rules in different jurisdictions.

Although the shipping lines were willing to make a move, they were uncertain about the availability of 0.1 per cent low-sulphur fuel for their vessels and therefore unanimously opted for 0.5 per cent sulphur fuel. Although Civic Exchange would have preferred the 0.1 per cent option, it realised that the higher cost and lack of availability might become too much of a hurdle for shipping lines. Thus, it agreed to getting a greater number of carriers to make a switch to 0.5 per cent sulphur fuel as a first step.

The Fair Winds Charter

After several months of deliberation and discussion within the HKLSA, leading members of the association had in principle agreed to support the voluntary fuel-switching initiative in 2010. Civic Exchange supported the discussion and reviewed the early draft of the FWC. Details were finalised and the HKLSA announced the FWC launch on 29 October 2010. A
total of 17 companies – 14 shipping lines, two cruise lines and one autoliner – signed the charter (Figure 8), which was the world’s first voluntary at-berth fuel-switching scheme led by the industry. Under the FWC, which was effective from 1 January 2011 to 31 December 2012, signatories agreed to use marine fuel with 0.5 per cent sulphur content or lower while berthing at the Hong Kong port as much as possible.

A visionary statement by the shipping industry, the FWC sent a clear message and goodwill gesture to the government by accepting responsibility for ship emissions and actively becoming part of the solution. To stay ahead of the curve, the shipping industry also asked for regulation in Hong Kong and uniform standards in the PRD in the longer term.

The public attention the shipping companies received because of the FWC meant that it would be extremely difficult for them to reverse their commitment to clean up. With the FWC, the partnership between Civic Exchange and the shipping industry reached a new height. It also opened the door for a deepened partnership with the government.

**FIGURE 8** The Fair Winds Charter

- In 2010, 17 companies signed the FWC (in alphabetical order): Alianca Lines, APL, CMA CGM, COSCO, Evergreen, HMM, Hamburg Sud, Hanjin, Hapag-Lloyd, Maersk, MOL, NYK, OOCL, Yang Ming, Höegh Autoliners, Crystal Cruises and Prestige Cruise. In 2012, an additional company, CNCo, signed the charter, making it 18 signatories.
- In 2013, 17 companies signed the renewed charter, including Alianca, APL, CNCo, CMA CGM, COSCO, Hamburg Sud, Hanjin, Hapag-Lloyd, HMM, Maersk, MOL, NYK, OOCL, Pacific Basin, Wah Kwong, Wan Hai and Yang Ming. The initiative was supported by HKSOA, HKLSA, Civic Exchange and Wallem. The 2013 version of the FWC was further extended to the end of 2014.
WHY IS IT CALLED THE FAIR WINDS CHARTER?

At the beginning, Civic Exchange put all the projects and events related to ship emissions under the “Green Harbours” banner. Yet, when the shipping industry agreed to a voluntary emission-reduction initiative in the summer of 2010, the involved parties felt they needed a different name that would be easy to remember but also convey the vision and rationale behind the industry-led initiative.

Civic Exchange’s Ms Veronica Booth came up with “Fair Winds Charter”, originating from “fair winds and following seas”, a nautical blessing for safe and lucky voyages. The word “fair” also invokes justice and equity, suggesting that everyone is entitled to the right to breathe clean air.

Mr Simon Ng then translated the English title into “乘風約章”, which had the additional meaning of “riding the winds”. This is benefiting of the fact that Hong Kong and its shipping industry were riding the trend of ship emissions control that began in the United States and Europe while helping it take root in Asia.

Changing Role of Civic Exchange

The FWC was an important milestone for Civic Exchange, who put the shipping industry in the spotlight, prompting industry leaders to take responsibility and work together to reduce emissions created by their ships.

After the launch of the FWC, Civic Exchange shifted gears in its engagement work by playing a more strategic role. It invited other carriers to join the FWC to maintain the momentum within the shipping industry, secured support from both the industry and the government to press for regulatory changes, and shared Hong Kong’s success story with other countries to inspire change and multiply impact, especially in the PRD and other Chinese ports.

Civic Exchange maintained a close partnership with the shipping industry following the signing of the FWC. Regular meetings were called to discuss strategies that would pressure the Hong Kong government to regulate as soon as possible and to consider providing a financial incentive to those who switched fuel. In addition, the HKSOA and HKLSA were trying to engage the Guangdong authorities in the hope of standardising requirements in the PRD for ship-emission control. It was an uphill battle as the issue was still under the radar of Chinese authorities back in 2013. Yet, Civic Exchange and its collaborators continued to share the successful example of the FWC and other ship-emission research conducted in Hong Kong with mainland authorities on various occasions. The subject gradually received more and more traction in China, especially in Shanghai and Shenzhen.

Meanwhile, Civic Exchange’s working relationship with the government strengthened when its co-founder Ms Christine Loh, a key figure in its ship-emission work, joined the government as Under Secretary for the Environment in September 2012. Building on the groundwork laid down by Civic Exchange, the shipping industry and other stakeholders, she pushed the Environment Bureau and the EPD to “finish off the job”, that is, to establish regulation and other control measures to reduce ship emissions.
Mr Tupper, former Director of Marine, said the scientific findings from the EPD-commissioned study provided the evidence for the government to act, and the FWC also showed the industry’s willingness to be regulated and commitment to reducing ship emissions. “After the EPD’s scientific study, it became our responsibility to legislate it,” he said.

In late September 2012, the government launched the Port Facilities and Light Dues Incentive Scheme. Under the three-year scheme, OGVs switching to low-sulphur marine fuel – 0.5 per cent or lower – would enjoy a 50 per cent reduction in port facilities and light dues. In the 2013 Policy Address, former Chief Executive Leung Chun-ying made a commitment to regulating at-berth fuel switching in Hong Kong and exploring collaboration with the Guangdong provincial government on ship-emission control in the PRD. It was followed by the publication of A Clean Air Plan for Hong Kong (Clean Air Plan) in March 2013, with a specific chapter dedicated to the problem of ship emissions, its impact on public health, and the government’s vision on how the issue should be addressed. Consultation with the shipping industry began soon after on the draft legislation. The Air Pollution Control (Ocean Going Vessels) (Fuel at Berth) Regulation was gazetted in March, approved in April and became effective on 1 July 2015.

While the shipping industry was locked in formal consultation with the government in 2013 and 2014 on the framework and details of the new regulation, Civic Exchange once again shifted focus and became the leading voice outside the government to promote the concept of a PRD ECA. This was backed up by the research published by Civic Exchange in 2012 and 2013, showing that a PRD ECA would be the best solution to address ship emissions and reduce the impact on public health at the regional level. It also aligned with the Hong Kong government’s long-term vision in ship-emission control, as described in the Clean Air Plan.

The FWC was a defining moment for the collaborative efforts between the shipping industry, the government and Civic Exchange. Not only did it help reduce ship emissions in Hong Kong in the short-to-medium term, but it also firmed up the dialogue on control regulation in the city and provided opportunities for broader collaboration with local, regional and even national governments to tackle the problem.
The success of the FWC and the Air Pollution Control (Ocean Going Vessels) (Fuel at Berth) Regulation led to an improvement in ship-emission control and air quality in Hong Kong. To multiply the benefits for the wider region, Civic Exchange began engaging Shenzhen and other PRD authorities to adopt similar emission-reduction measures.

**Air-Quality Improvement**

Government figures revealed that more than 3,600 OGVs switched fuel in 2011 under the FWC, representing about 11 per cent of the total number of OGVs arriving in Hong Kong. This led to a reduction of 890 tonnes of SO₂ and 90 tonnes of PM₁₀, equivalent to a 4.9 per cent SO₂ reduction and 3.6 per cent PM₁₀ reduction from the shipping industry. Given that the FWC was only a voluntary scheme, these were encouraging results. The participation rate in the FWC was estimated to have remained at a similar level in the years leading up to the introduction of the new regulation in 2015.

The regulation clearly helped improve the air quality in Kwai Chung, an emission hot spot identified by the EPD-commissioned study due to its proximity to the container terminals. Before 2016, SO₂ concentration in Kwai Chung (blue line in Figure 9) was way higher than Central/Western (yellow) and Causeway Bay (orange, roadside), showing a strong connection with the burning of high-sulphur fuel oil in the container terminals. Between 2011 and 2014 when the FWC was in force, there was a slight reduction in SO₂ concentration in Kwai Chung. The concentration level dropped significantly – down to levels found at Central/Western and Causeway Bay stations – after 2015 when the new regulation was introduced. While other factors such as wind-condition variation might have affected the air quality recorded at the monitoring stations, the trend clearly showed a major change in SO₂ concentration as a result of the regulation.
Informing Shenzhen

Encouraged by the results in Hong Kong, Civic Exchange began strategising a regional approach to ship-emission reduction as its research indicated that bigger benefits would be realised if the PRD, with over 36 million inhabitants, and also major port cities in the Yangtze River Delta could adopt similar measures as Hong Kong. The shipping industry also supported this as it was looking for a uniform ship-emission standard and fuel requirement for the PRD under the FWC to avoid complications and reduce operational costs.

From 2011 onwards, several meetings were lined up between Civic Exchange and Guangzhou and Shenzhen government agencies, with the help of intermediaries such as the US Consulate General in Guangzhou, Yantian International Container Terminals (YICT) and China Merchants Holdings (CMH). As regular participants of Civic Exchange’s engagement events since 2008, YICT and CMH were keen to share Hong Kong’s pioneer work with their government contacts in Guangdong. As a result, they facilitated meetings between Civic Exchange and mainland Chinese agencies including the Guangdong Maritime Safety Administration, the Human Settlements and Environment Commission (HSEC) of Shenzhen Municipality, and the Transport Commission of Shenzhen Municipality.

Subsequently, the HSEC of Shenzhen Municipality was clearly impressed with Hong Kong’s FWC model following Civic Exchange’s visit to their office in 2011. It was understood that the HSEC began closely following ship-emission control developments in Hong Kong and made enquiries to the Hong Kong EPD about the FWC and the government’s incentive scheme. In 2014, the Shenzhen Municipal Government launched their own scheme mirroring Hong Kong’s to encourage voluntary at-berth fuel switching in Shenzhen ports. Shenzhen also offered subsidies for on-shore power construction and use, which was not included in Hong Kong. Shenzhen’s proactive approach was welcomed by the HKSAR Government and Civic Exchange, as it was a testimony to Hong Kong’s pioneering work and would put pressure on Guangzhou and other PRD ports to join the clean-up action.
Making Wider Impact in China

Beyond Guangdong, Civic Exchange communicated with other mainland officials through the regular meetings and forums hosted or co-hosted by the US Environmental Protection Agency between the United States and China on environmental issues and clean-port initiatives. Civic Exchange used the speaking opportunities to share the Hong Kong experience with mainland port cities and policymakers. After 2013, it shifted its key message towards discussion about the ECA concept and the planning of a PRD ECA. As more and more players entered the conversation, including government representatives from Hong Kong, Guangdong and Beijing, Civic Exchange play the role of a neutral facilitator, convener and content provider, focusing on areas where expertise and experience could be offered.

Back in Hong Kong, Civic Exchange continued to organise workshops and public events to facilitate discussion with the shipping industry and other key stakeholders involved with the setting up of a PRD ECA. Experts from the United States and Europe were also invited to share their ECA experience. They talked about emission standards under an ECA, the availability of compliant fuel and technologies, and enforcement issues. Mainland speakers were also invited to share the latest progress in China.

In December 2015, the Ministry of Transport of the Chinese Central Government announced the implementation plan for domestic emission control areas (DECAs). Three DECAs will be established in the PRD, the YRD, and Bohai Rim area to regulate ship emissions, with the fuel-quality requirement to be tightened in phases. By January 2019, all ships entering the three DECAs will be required to use fuel oil with sulphur content not exceeding 0.5 per cent. This is a significant development in China, and one that would bring enormous emission reduction and health benefits to society. It is fair to say that Hong Kong’s pioneering work on ship emissions offered an excellent model for China to consider as the country develops its control and regulatory strategies.
ENDNOTES


2. Overseas best practices were reviewed and discussed in Gall, C., and Van Rulfhghem, M., (2006) Marine Emission Reduction Options for Hong Kong and Pearl River Delta Region, Hong Kong: Civic Exchange, March 2006.

3. Ibid.


12. Ibid., p.20.


15. Interview with Mr Peter Ng on 10 September 2017.


18. According to the EPD’s air pollutant emission inventory, 17,390 tonnes of SO₂ and 2,390 tonnes of PM₁₀ were emitted from the shipping source in 2011.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Details</th>
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<tbody>
<tr>
<td>2006</td>
<td>MARCH RESEARCH: Civic Exchange published Marine Emission Reduction Options for Hong Kong and the Pearl River Delta Region</td>
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<td>2008</td>
<td>JANUARY – DECEMBER RESEARCH: EPD commissioned a study on Marine Vessels Emission Inventory</td>
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<td></td>
<td>FEBRUARY – MARCH ENGAGEMENT: Green Harbours project</td>
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<td>2009</td>
<td>SEPTEMBER (to June 2010) ENGAGEMENT: Green Harbours II project</td>
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<tr>
<td>2010</td>
<td>JUNE – SEPTEMBER ACTION: Discussions with the HKLSA and HKSOA about a voluntary at-berth fuel-switching initiative</td>
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<td></td>
<td>OCTOBER ACTION: Announcement of the Fair Winds Charter</td>
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<td>2011</td>
<td>JANUARY (to December 2012) ACTION: The FWC took effect</td>
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<td></td>
<td>NOVEMBER ENGAGEMENT: Civic Exchange organised a conference called The Air We Breathe 3: A Pan-PRD Dialogue on Marine Emissions</td>
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<td>2012</td>
<td>FEBRUARY RESEARCH: EPD-commissioned study completed</td>
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<td></td>
<td>SEPTEMBER RESEARCH: Civic Exchange published a report titled A Price Worth Paying: The Case for Controlling Marine Emissions in the Pearl River Delta</td>
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<td>ACTION: Government announced the Port Facilities and Light Dues Incentive Scheme for OGVs using Cleaner Fuel</td>
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<td>2013</td>
<td>JANUARY ACTION: Announcement of the extension of the FWC until end of 2013</td>
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<td>ACTION: Government announced in the Policy Address 2013 that a new proposed legislation to enforce the requirement of fuel switch at berth will be submitted, after consultation with the maritime sector</td>
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<td>MARCH ACTION: Government published A Clean Air Plan for Hong Kong, which further elaborates its intention and plans to control ship emissions</td>
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<td>2014</td>
<td>JANUARY ACTION: Announcement of the extension of the FWC until end of 2014</td>
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<tr>
<td>2015</td>
<td>JUNE ENGAGEMENT: Civic Exchange organised a conference called Shipping Dialogue 2: Working towards a Ship-Emission Control Area in Hong Kong and the Pearl River Delta</td>
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<td></td>
<td>JULY ACTION: The Air Pollution Control (Ocean Going Vessels) (Fuel at Berth) Regulation became effective; the Port Facilities and Light Dues Incentive Scheme was extended to 31 March 2018</td>
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