Report of

Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping for the Wider Caribbean Region

Kingston, Jamaica, 17-19 February 2014

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SUMMARY SHEET

Title of the workshop:	Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping for the Wider Caribbean Region.
Host:	The Maritime Authority of Jamaica (MAJ)
Venue:	The Courtleigh Hotel and Suites New Kingston, Jamaica 85 Knutsford Boulevard, Kingston 5, Jamaica West Indies
Date	17-19 February 2014
Type:	Regional
Organized by:	RAC/REMPEITC-Caribe
Supported by:	IMO – Marine Environment Division
No. of participants:	28
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Cost:	**-**
Source of funding:	IMO WBS XB / 01105 - 14 – 032210

EXECUTIVE SUMMARY

The main objective of the workshop was to raise awareness among the participating regional countries' stakeholders on MARPOL Annex VI in general and more specifically the recently adopted Chapter 4 of MARPOL Annex VI on Energy Efficiency Regulations for Ships.

The other objective of the workshop was for the participants to have a greater understanding and appreciation on the requirements and implications of implementation and enforcement of MARPOL Annex VI in order for them to be able to lead their Governments' efforts in strategic targeting for development of relevant legislation, tools and measurements for compliance, monitoring, and enforcement by both Port State and Flag State Controls.

The workshop covered the following main topics over three days:

- The International Regulatory Framework for Preventing Pollution from Ships
- MARPOL Annex VI – Prevention of air pollution from ships including Chapters 1 to 3.
- Overview of the GHG issue and the role of international shipping
- MARPOL Annex VI, Chapter 4 - Regulations for Ship Energy Efficiency
- Host country presentation on MARPOL Annex VI and GHG emissions
- Emissions Control Areas (ECA) for NOx, SOx and PM control
- Alternative fuels and SOx scrubbers
- On Shore power supply and green port initiatives
- Guidelines supporting Chapter 4 of MARPOL Annex VI on EEDI
- Guidelines supporting Chapter 4 of MARPOL Annex VI on SEEMP
- Further measures to enhance the energy efficiency of ships
- Energy efficient ship design and technical energy efficiency measures
- Energy efficient ship operation and operational energy efficiency measures
- Implementation and enforcement of MARPOL Annex VI
- MARPOL Annex VI – potential impact on marine GHG emissions and fuel consumption
- MARPOL Annex VI - future capacity building activities

As such, the workshop provided the participants with relevant information for a better understanding of IMO working practices, MARPOL Annex VI and ship Energy Efficiency including EEDI (Energy Efficiency Design Index), SEEMP (Ship Energy Efficiency Management Plan), EEOI (Energy Efficiency Operational Indicator) and wider aspects of GHG emissions. Also, the workshop provided information on the tasks needed for enforcement in relation to newly adopted regulations including Flag State aspects and Port State Control as well as the future likely impacts of these regulations. The issue of Technical Cooperation and IMO activities in this regard were also covered.

The training workshop was conducted very interactively. Participants consisted of both Governmental maritime and ministerial sectors from a large number of the Wider Caribbean small regional countries. They expressed significant interest on the subject and actively took part in the workshop deliberations. They demonstrated their willingness in understanding the details of regulations, importance of reducing all air emissions and implementation aspects of MARPOL Annex VI in particular on how to mitigate the impact of shipping on climate change.

The workshop was facilitated by the IMO expert consultants Dr Edmund Hughes (Senior Technical Officer, Marine Environment Division, IMO), Dr Zabi Bazari (Energy and Emissions Solutions, UK) and CDR Felton Gilmore (IMO Consultant in RAC/REMPEITC-Caribe). Time was also devoted to present the Jamaica's and the Wider Caribbean Region (WCR) efforts on GHG, MARPOL Annex VI and identifying relevant regional requirements in this area.

At the end of the workshop, evaluation forms were completed by participants and subsequently analysed and reported herein. Evaluation results show a very high level of satisfaction by participants with the way the workshop organised, executed, the venue and also the IMO facilitators / experts.

Overall, the workshop was completed successfully and according to plan.

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1 INTRODUCTION

1.1 IMO MEPC (Marine Environmental Protection Committee), at its 62nd meeting in July 2011, adopted the amendments to MARPOL Annex VI via addition of Chapter 4 on Energy Efficiency Regulations for Ships (Resolution MEPC.203(62)).

1.2 The above Regulations deals with Attained EEDI (Energy Efficiency Design Index), Required EEDI and SEEMP (Ship Energy Efficiency Management Plan). It specifies methods of calculations and surveys and verification of EEDI as well as development of SEEMP. The Regulations are supported by a number of guidelines that was subsequently adopted at the IMO MEPC 63rd to 65th meetings including guidelines on calculation of EEDI, guidelines for survey and verification of EEDI, guidelines for development of the SEEMP and a number of other guidelines.

1.3 IMO endeavours to support capacity building in developing countries on relevant regulations. Specifically within the MEPC and in relation to energy efficiency regulations, there have been calls by a number of countries to support the capacity building and technology transfer processes. This workshop was planned and executed within the above general framework. Further the IMO World Maritime Day theme for 2014 is “IMO Conventions: Effective Implementation” and such efforts are considered imperative to supporting effective implementation.

1.4 The Wider Caribbean Region (WCR), due to its strategic location, is an important hub for maritime transportation. The Panama Canal alone accommodates about 14,000 ships a year, and this number is expected to double in the next 10 to 15 years with the construction of new sets of locks. The region also includes many developing countries that rely on the exportations of raw materials (e.g. oil), the importation of manufactured products and the use of their coastal resources (e.g. fishing, tourism). In addition, the region accommodates a large number of cruise passenger ship and leisure craft. Furthermore, ecologically, the region is sensitive to climate change issues and thus there is a need to protect the Caribbean systems of adverse effects caused by maritime transportation and climate change.

1.5 In order to provide information on MARPOL Annex VI and to increase the ratification rate of the instrument by the WCR countries, RAC/REMPEITC-Caribe, with financial support from Transport Canada through IMO, convened this workshop with full support of Maritime Authority of Jamaica and the Marine Environment Division of the IMO.

2 AIMS & OBJECTIVES

Aim

2.1 The aim of this Regional Workshop was to increase awareness and familiarize the maritime stakeholders from a number of regional countries from WCR of the latest developments of MARPOL Annex VI in particular the new Chapter 4 of MARPOL Annex VI on “Regulations for Energy Efficiency of Ships” with a view to help those Contracting Parties to implement the energy efficiency requirements and for other Member States to prepare for future adoption and implementation of MARPOL Annex VI.

Objective

2.2 The objective of the workshop was to create for participants a greater understanding of:

- Overall IMO working practices and its initiatives for capacity building in developing countries.
- MARPOL Convention and specifically MARPOL Annex VI.
- Importance of control of GHG emissions and relevant International efforts and initiatives and IMO's actions.
- Newly adopted Energy Efficiency Regulations (Chapter 4 of MARPOL Annex VI).
- Related guidelines on calculation of EEDI, verification of EEDI and development of SEEMP and use of EEOI (Energy Efficiency Operational Indicator).
- Implementation and enforcement aspects of MARPOL Annex VI.
- Energy efficiency measures for ship design and operation.
- Emissions Control Areas (ECAs) and applicable rules.
- Possible impact of these regulations on future CO2 levels from international shipping.

Expected outcomes

2.3 For this workshop, the expected outcomes were as follows:

- Increased awareness on IMO working practices and MARPOL Annex VI regulations.
- Increased awareness of the forthcoming strengthening of the fuel oil standards in the North American and US Caribbean Sea Emission Control Areas.
- Greater understanding of the factors that impact a ship's energy efficiency and how it could be improved in practice.
- Become familiar with implementation and enforcement aspect as well as methodologies for establishing national strategies and policies on implementation of MARPOL Annex VI.
- Catalyse the increased regional cooperation on the subject and Annex VI implementation.

2.4 Time was also allocated to the host country (Jamaica) to present the status of maritime industry in the country and for other Member States in the WCR to present their plans for ratification / legislative developments of the MARPOL Annex VI.

Workshop programme

2.5 The workshop programme is given in **Annex 1**. The workshop was conducted according to this programme.

3 VENUE, DATES, PARTICIPANTS AND FACILITATORS

3.1 The venue for this Regional Workshop was:

The Courtleigh Hotel and Suites
New Kingston, Jamaica
85 Knutsford Boulevard, Kingston 5,
Jamaica West Indies

3.2 The Workshop was held on 17-19 February 2014 at the above venue that included all amenities needed for the workshop.

Logistical arrangements

3.3 The workshop was organized by RAC/REMPEITC-Caribe and funded by Transport Canada through the IMO.

3.4 The Maritime Authority of Jamaica provided excellent support during the workshop. This support included providing the workshop venue, transportation to and from the airport, formal engagement during opening and closing ceremony, logistical support for the participants including assistance with visa, travelling and recommendation for hotel and venue.

3.5 The Workshop was conducted in English.

3.6 Participants were provided with the following materials:

- A participant thumb drive with digital resources and manuals including all the presentations, guidelines, major background documentation such as 2009 Second IMO GHG Study and other relevant materials.
- A hardcopy book on the MARPOL Annex VI regulations (English Edition 2013), copies in French and Spanish were provided on request.
- A video and pocket book on ship operational energy efficiency.

3.7 **CDR Felton Gilmore**, Sr. IMO Consultant, USCG Liaison RAC/REMPEITC-Caribe in Curacao, had the overall coordination of the project. He closely worked with facilitators, IMO regional representative as well as the local organisers to ensure that the workshop is planned and executed smoothly.

3.8 **Ms Carla Bikker,** RAC/REMPEITC-Caribe's office manager, provided logistics for the workshop via provision of excellent support for facilitators and participants before and during the workshop.

3.9 **Mr Bertrand Smith**, Director, Legal Affairs, Maritime Authority of Jamaica was in charge of the local organisation of the workshop in Kingston. He was supported by a number of staff from Maritime Authority of Jamaica. They collectively provided excellent support.

Participants

3.10 A large number of countries took part in this workshop that included the majority of the countries from the WCR. The full list of participants is given in **Annex 2**.

Facilitators and Presenters

3.11 The facilitators for this workshop were **Dr Edmund Hughes** (IMO, UK), **Dr Zabi Bazari** (Energy and Emissions Solutions, UK) and **CDR Felton Gilmore** (IMO Consultant in RAC-REMPEITC-Caribe). They all have significant level of expertise on the subject and also long-term working experience with the IMO instruments. A short resume of the facilitators follows.

3.12 **Dr. Edmund Hughes** is a Senior Technical Officer in the Marine Environment Division of the International Maritime Organization. Within the IMO Secretariat his responsibilities cover MARPOL Annex VI 'Regulations for the Prevention of Air Pollution from Ships' and regulations on energy efficiency for ships – Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP) – and consideration of further technical and operational measures to enhance the energy efficiency of ships.

Prior to joining IMO he worked for the United Kingdom's national maritime Administration, the Maritime and Coastguard Agency, in several roles related to both safety and environmental policy for international shipping. Dr. Hughes is a member of the Institute of Marine Engineering, Science and Technology (IMarEST), is a Chartered Engineer, and has a doctorate in environmental pollution control from Cranfield University in the United Kingdom.

3.13 **Dr Zabi Bazari** is the Director of Energy and Emissions Solutions (UK) Ltd where he provides services on ship's energy efficiency and emissions control. His experience spans over 40 years (about 23 years with Lloyd's Register, UK) and includes many aspects of energy-efficient and low carbon shipping. As a principal expert in this field, he has delivered a significant number of consultancy and training projects on marine engines, ship propulsion, ship performance monitoring, ship energy audits, GHG studies, benchmarking and ship energy management including EEDI, SEEMP and EEOI regulations. In the past, he has been a regular participant at the IMO GHG meetings on behalf of the IACS (International Association of Classification Societies) on energy efficiency. He has been engaged in EEDI verification while at LR including the development of LR procedures for EEDI verification. Dr Bazari has more than 30 written technical papers, a large number of conference presentations and regularly provides training and coaching to maritime industry internationally. Dr Bazari has frequently been engaged as an IMO consultant for delivery of similar workshops.

3.14 **Commander Felton Gilmore** is a U.S. Coast Guard Officer seconded to the UN International Maritime Organization and serves as the Senior Consultant to RAC/REMPEITC-Caribe. As the Sr. Consultant, it is his role to coordinate and facilitate developing countries of the Wider Caribbean Region in adopting and implementing the major conventions, protocols, and instruments of the International Maritime Organization. His technical expertise is utilized in capacity building, training, sharing of best practices, development of course training, delivery of IMO Model Courses, coordinating cooperation and mutual assistance throughout the member states and partners of the Caribbean.

4 ACTIVITIES AND PROCEEDINGS

Opening of the Workshop

4.1 The opening ceremony was initiated by **Rear Admiral Brady**, the Director General of the Maritime Authority of Jamaica, who briefly explained the purpose of the workshop. He highlighted the importance of control of air emissions and the disastrous consequences of global warming. He introduced and welcome the Chairman of the Board of Directors of the Maritime Authority of Jamaica, Dr Peter-John Gordon, the IMO Representative Dr Edmund Hughes and the IMO Consultants CDR Felton Gilmore and Dr Zabi Bazari. He invited Dr Edmund Hughes to deliver his opening remarks.

4.2 **Dr Hughes**, on behalf of the IMO, thanked the Government of Jamaica for hosting this workshop. In particular he expressed thanks to Rear Admiral Brady, Director General of the Maritime Authority of Jamaica who has always been supportive of the IMO and also Mr Bertrand Smith and all the staff of the Maritime Authority of Jamaica who have assisted in making this workshop happen. He also thanked CDR Gilmore of the Regional Marine Pollution Emergency Information and Training Center for the Wider Caribbean and US Coastguard in identifying a need for, and organising this regional workshop. The full text of Dr Hughes opening remarks is given in **Annex 3**. Additionally, Dr Hughes also acknowledged that the funding for this workshop has been provided by the Government of Canada.

4.3 **Dr Peter-John Gordon** delivered his keynote speech by thanking the IMO, RAC-REMPEITC and Jamaican representatives for organising the workshop and extended his welcome to all the participants. He also expressed the best wishes from the Jamaican Minister

of Transport, Works and Housing, who has the portfolio responsibility for marine transportation matters. He wished that the participants will be provided with information on the recent amendments to Annex VI of the MARPOL Convention and more importantly the current initiatives of the IMO to reduce the level of CO2 emissions from international shipping. He stressed the importance of the WCR countries maritime sector in terms of having significant ship registration capability, contributing significantly to the marine tourism sector and representing one of the world's great shipping routes as tonnage heading to or from the Panama Canal inevitably passes through the Caribbean Sea. Finally he noted the good scope and full agenda for the coming three days and wished the participants a successful workshop. The text of his opening remarks is included in **Annex 4**.

4.4 Following this, a group picture of those present was taken. This plus additional photos are shown in **Annex 5**.

Workshop Technical Proceedings

Participants Introduction

4.5 Dr Bazari invited the participants to introduce themselves. IMO consultants also explained their areas of expertise and affiliations. Dr Bazari then introduced the work plan for the three days of workshop and invited all the participants to actively take part in proceedings and discussions.

Day 1 presentations and discussions

4.6 The first presentation (given by Dr Hughes), entitled "**The International Regulatory Framework for Preventing Pollution from Ships**". This presentation was given in two parts. Part I provided a general introduction to the IMO working practices, organisation, regulatory framework and achievements. This included a description of IMO's various committees and departments that deals with various regulatory aspects. As second part of this presentation, he provided an overview of MARPOL convention and its requirements and roles of Flag and Port State Controls in implementing the MARPOL. He then moved to provide an overview of MARPOL Annexes I to V.

4.7 The second presentation (given by Dr Bazari) entitled "**MARPOL Annex VI – Chapters 1 and 2**" within which he dealt with the requirements of MARPOL Annex VI. He presented an overview of all the Regulations under various chapters of MARPOL Annex VI. He then moved into more detailed description of MARPOL Annex VI Regulations 1 to 11 that included Chapters 1 and 2. Detailed discussion followed regarding various aspects of these regulations including for example "major conversion" for engine certification, methods of ship definition / classification, the differences between IAPP and EIAPP certificates, port state control of non-party vessels, survey and compliance of domestic shipping and so on. This part of the session preceded by an exercise on related acronyms where the participants successfully identified the extended version of the MARPOL Annex VI related acronyms.

4.8 The third presentation of the day (given by Dr Bazari) entitled "**MARPOL Annex VI – Chapter 3**" within which he dealt with the regulatory requirements of MARPOL Annex VI with regard to various air emissions. He covered and explained in detail Regulations 12 to 18 and covered all aspects of ODS (Ozone Depleting Substances), NOx, SOx, VOC (Volatile Organic Compounds), incineration, reception facilities and fuel quality and availability. For each case, the type of emissions, how they are produced / generated, their impacts and method of control were described. Significant level of discussion on regulatory requirements, Port State Control aspects, NOx certification process, issues relating to availability of fuels, reception facilitates and obligations of the member Parties, link between reception facility for Annex VI and Annex V, etc. were raised and discussed.

4.9 The next presentation of the day by Dr Hughes related to an "**Overview of the global GHG emissions and the role of international shipping**". First, he highlighted the changes in atmospheric CO2 emissions, the recent climate activities such as flooding that may have link with GHG emissions and the significant impact that GHG emissions may have on various countries in particular the small island states. He then discussed various International efforts and initiatives on GHG emissions control including UNFCCC, Kyoto Protocol, IMO obligations within Kyoto Protocol and recent developments in this area. He then continued and explained the related historical activities of IMO since 1997 to date that has led to EEDI and SEEMP regulations. He also touched on past discussions on MBM work within IMO and various schemes that have been proposed by various countries. A significant level of discussion on the level of GHG emissions from international shipping, Kyoto Protocol and its status, current activities on quantification of emissions, likely development in MRV (Monitoring, Reporting and Verification) were made and debated.

4.10 The last presentation of Day 1 entitled "**IMO MARPOL Annex VI Chapter 4 Regulations on Energy Efficiency for Ships**" was given by Dr Bazari. He first explained in detail the amendments made to already existing Regulations 1 to 11 of Annex VI, in order to accommodate the Energy Efficiency Regulations.. This created some discussion on International Energy Efficiency (IEE) Certificate, definition of "major conversions", waiver clause and roles of Port State Controls. Due to end of time for Day 1, the remainder of this presentation was left for Day 2.

4.11 Throughput the break periods, CDR Gilmore showed relevant video clips on various aspects of air emissions and maritime activities.

Day 2 presentations and discussions

4.12 Day 2 started with a group exercise conducted by Dr Bazari on the question of "What do you remember from yesterday – Share one item with the group". The group gave a significant number of items of what they have learned in relation to MARPOL Annex VI regulations and wider aspects of GHG and polluting emissions during Day 1. The exercise proved to be successful in consolidating the in-class learning process and prepared the group into a participatory mood for the Day 2 deliberation.

4.13 Dr Bazari then continued with the presentation on "**IMO MARPOL Annex VI Chapter 4 Regulations on Energy Efficiency for Ships**", that was left from Day 1. He talked about regulations 19 to 23 and provided information on application domain of Attained EEDI, Required EEDI and SEEMP. He then explained how the Required EEDI is calculated using numeric data using reference line and reduction factor and why the Required EEDI has not been mandated for a number of ship types as well has the small size ships. He showed the progress at IMO on inclusion of other ship types and the MEPC 66 plan as well as future review dates (At start of phase 1 and mid-point between phase 2 and 3). On attained EEDI, he mentioned that calculation formula, calculation guidelines and survey and verification guidelines will be covered later. The Regulations 22 on SEEMP and 23 on Technology Transfer were presented and the concept of EEDI Technical File, the relevant Ship Records of Construction and the IEE Certificate and its validity period were extensively discussed.

4.14 The status of the Caribbean region with regard to MARPOL Annex VI was given by CDR Gilmore. His presentation included the information supplied by various countries of the region. Dr Hughes, as IMO representative, gave his appreciation of progress made in the region and encouraged the group to move forward in this direction. CDR Gilmore stressed the need for more regional cooperation and collective solution-seeking with respect to relevant issues e.g. provision of bunkering for ships entering the Emission Control Areas.

4.15 Dr Hughes then made his presentation entitled "**Emissions Control Areas (ECA) for NOx, SOx and PM control**". He gave an overview of the ECAs, their designation method, existing regulatory limits and differentiation of ECA-SOx and ECA-NOx. He mentioned that currently there is no application for a new ECA region. He also gave an overview of the current NOx Tier III debate on date of entry in force and the fact that this will be further debated at MEPC 66. There were questions on fuel availability issue including the review required under Regulation 14 of MARPOL Annex VI and relevant enforcement aspects within ECA that was clarified by Dr Hughes.

4.16 CDR Gilmore provided information on studies done with regard to ECA-Mx (ECA for Mexican coastal area). He explained the scope of the study and aspects that have considered, for example, the benefits in terms of emissions reduction. There is not yet a concrete understanding on the creation of ECA-Mx; however current emphasis is to further develop information and assess impact on public health and find alternatives. Dr Hughes noted that to designate an ECA, an IMO Member State or States (depending on the area to be designated) had to be a Contracting Party to MARPOL Annex VI.

4.17 Dr Bazari gave the next presentation of Day 2 on "**Alternative fuels, LNG, SOx scrubbers and NOx SCR**". He initially focussed on the impact of ECA on fuel cost for ships as the main driver for shipping seeking alternative methods for reducing SOx, NOx and CO2. He then differentiated between technical feasibility, fuel / technology availability and economic viability of alternative solutions and clarified that any solution that can provide a winning situation in all three areas will likely be the winner. He then moved to identifying the options that are available to shipping including:

- Use of more expensive fuels
- Use of SOx scrubbers and NOx SCR
- Use of LNG as marine fuel.

The discussion then concentrated on each of the above areas and pros and cons of every solution were clarified. He concluded the presentation via saying that there is no single wining solution and it is likely that based on ship types and time of operation in ECAs, different solutions will be adopted. He also concluded that as a result, the shape of ship technologies and operation will change in the future.

4.18 The next presentation of the day was on "**Onshore Power Supply**" that was delivered by Dr Bazari. He started this session with an exercise for participants to calculate the exhaust emissions from a typical cruise ship while staying in a typical port. The objective was to demonstrate that while a ship is in port, it would emit significant amount of emissions to the port. He then continued to explain various aspects of onshore power supply including the business case (mainly reduction of port-related pollutants), technology requirements, typical investments, standardisation aspects, regulatory proposals and benefits. The discussion then moved to Green Port Initiatives and under that a list of items that ports could do to contribute to reducing the impact of air emission on the local environment. The session concluded with significant level of discussion as interest on onshore power as well as Green Port Initiative that seems to be high on minds of participants because of importance of cruise industry in the region.

4.19 The next presentation of the day was on "**Guidelines supporting Chapter 4 of Annex VI on EEDI**". This presentation was given by Dr Bazari. He covered various guidelines including Guidelines on calculation of Attained EEDI (Resolution MEPC.212(63)), Guidelines for verification of EEDI (Resolution MEPC.234(65)), Guidelines for minimum power, guidelines for innovative energy efficiency technologies and finally Industry Guidelines. He spent some time to describe the EEDI formula and its various parameters. He then presented a set of slides that described in more detail various aspects of EEDI calculation. He emphasised that the objective

is not for the participants to become an expert in this type of calculations but to be able to appreciate it. He then moved to verification guideline and explained in detail the pre-verification and final verification of EEDI and what needs to be checked by the verifier. He mentioned that due to complexity of formula and specific factors used, the verification will most likely be delegated to ROs by Flag States. He briefly touched on other relevant guidelines.

4.20 The last presentation of Day 2 was on "**Guidelines supporting Chapter 4 of Annex VI on SEEMP**". This presentation was given by Dr Bazari. He covered two guidelines in detail:

- Resolution MEPC.213(63) on SEEMP
- Circular Circ.1/MEPC.684 on EEOI

He initiated to describe in detail the main features of an IMO SEEMP that included planning-doing-monitoring and assessment continuous improvement cycle. He then moved to issues such as:

- Goal-setting,
- Implementation system
- Training aspects,
- Record keeping and monitoring aspects and the need for use of EEOI or a similar indicator for this purpose
- Self-assessment and reviews.

For each of the above, he described the relevant section of the Guidelines. Finally, the SEEMP template was presented and enforcement aspects discussed.

He then moved to explain the guidelines on EEOI calculation, giving the EEOI formula, defining the main parameters, clarifying from where the data need to be gathered and the fact that EEOI calculation and SEEMP monitoring is best to be carried out by the heard office in order to reduce the burden on ship staff.

Day 3 presentations and discussions

4.21 Day 3 started with a group exercise conducted by Dr Bazari on the question of "What do you remember from yesterday – Share one item with the group". The group gave a significant number of items of what they have learned in Day 2 but their emphasis was on:

- Emissions Control Areas and their impact on the Caribbean regions.
- The usefulness of exercise that was given on port emissions calculations.
- LNG as marine fuel
- Scrubber and relevant issues
- EGCS (Exhaust Gas Cleaning System) for NOx control and relevant issues
- EEDI calculations and its complexity.

Similar to Day 2 exercise, this proved to be successful in consolidating the in-class learning process and prepare the group into a participatory mood for the Day 3 deliberation.

4.22 Dr Hughes then made a presentation on "**Further measures to enhance the energy efficiency of ships**". He addressed commercial aspects of shipping, methods of energy saving, typical energy efficiency measures, MAC (Marginal Abatement Cost) curve. He then gave an overview of future IMO plans and introduced some of the recently submitted documentation to IMO that relates to these new topics such as data collection, monitoring of fuel consumption, etc. He then discussed the ideas on monitoring and reporting, data collection, etc. Related

issues such as ownership of data, commercial sensitivity of fuel consumption data, methods of measurement were discussed.

4.23 Following this presentation, Dr Bazari gave the participant an exercise on how to reduce EEDI? He asked the participants to use the EEDI formula and come up with new ideas. He explained the reasons why we should use and become more familiar with EEDI formula as well as the techniques for EEDI reduction. The group picked up a number of measures for EEDI reductions including the following:

- Hull optimisation
- Waste heat recovery
- Engine optimisation
- Use of alternative fuels
- Increase in ship capacity

The group did not pick up reduction in design speed as one solution. Dr Bazari then used the formula to show how each of the above impacts EEDI.

4.24 The next presentation was made by Dr Bazari on the topic of "**Energy efficient ship design and technical energy efficiency measures**". In this presentation, he introduced a variety of technologies that could be used to reduce a ship's EEDI. As part of this presentation, he covered extensively ship hydrodynamics and possible changes to ship design as well as propellers that may be used to improve energy efficiency. He then moved to ship engines and auxiliary machinery and provided a list of technologies such as engine de-rating, waste heat recovery, variable speed drives and so on that may be adopted for improving machinery energy efficiency.

4.25 Following this presentation, Dr Bazari asked the participants to do a new exercise, this time on how to reduce ship's operational fuel consumption and thereby EEOI and ship costs. The group responded very well via identifying the following operational energy efficiency measures including

- Ship speed reduction/slow steaming
- Hull and propeller cleaning
- Passage/voyage planning and execution
- Improve fleet management
- Ship design upgrades
- Main engine improvements
- Manning and training
- Waste heat recovery.

The group showed significant interest and also some awareness on the subject.

4.26 Following the above exercise, Dr Bazari made a presentation on the subject of "Energy efficient ship operation and operational energy efficiency measures". In his presentation, he emphasised the importance of SEEMP and EEOI in the context of ship energy management. He covered a wide range of topics on ship energy management and how to practically the operational energy efficiency management can be carried out via adopting staged and systematic processes and approaches, use of performance monitoring and benchmarking and so on. He described in detail just-in-time operation and virtual arrival, weather routing, hull and propeller condition improvement and engine condition monitoring. He explained practical energy saving examples from his own ship-board energy audit experiences.

4.27 The next presentation was made by Dr Hughes on the topic of "**Implementation and enforcement of MARPOL Annex VI**". He first introduced why it is a good idea for a country to join MARPOL Annex VI via explaining the importance of air pollution controls and also privileges that membership brings about. He then moved to details of PSC including MARPOL provisions for survey and inspection, clear grounds for detailed inspect and on to Flag aspects and Port State Control aspects of MARPOL requirements. He showed a typical EEDI Statement of Compliance and accompanying Technical File and Records of Construction. A number of Guidelines were introduced at the end of the session to help with PSC various issues.

4.28 The next presentation of the day was given by Dr Bazari entitled "**Amendments of MARPOL Annex VI – Potential impacts on reduced GHG emissions and fuel consumption**". In this presentation, he introduced the report of a study that has been commissioned by the IMO in order to quantify the impact of EEDI and SEEMP regulations on future level of marine CO2 emissions. He described methodology used, scenarios modelled and assumptions made. He then presented the results of this study in terms of growth of CO2 emissions by 2050, and the reduction levels due to EEDI and SEEMP. He concluded that the impact will be significant but not sufficient enough to change the rising CO2 trend of international shipping to a reduction trend. He mentioned this as the main reason that there will be future pressure on IMO to do more work in this area as the continuously rising trends will not be acceptable to international community.

4.29 The last presentation of the day was given by Dr Hughes entitled "**Future Capacity Building Activities**". In this presentation, he initially explained the IMO's Technical Cooperation (TC) and Integrated Technical Cooperation Programmes (ITCP) in terms of their objectives, method of working and achievements. He also explained the historical background on MDGs (Millennium Development Goals) and the maritime sustainable development goals. He explained that international cooperation forms the main cornerstone of fighting GHG emissions and global warming. He discussed that the main beneficiary of technical cooperation is going to be the marine stakeholders in the developing countries. He then moved to the following topics:

- III Code
- IMO Audit Scheme
- Examples of ITCP activities such as model maritime legislation, development of maritime training academies, etc.
- The details of the regional maritime advisor for Caribbean as well as points of contact at IMO.

He then moved to MARPOL Annex VI Regulation 23 and explained the scope of this regulation. Additionally, he referred to the important Resolution 229 (65) on technology transfer and presented its full text; that mandates the establishment of ADHWG in this area. He then opened a group discussion on the subject. A significant level of discussion followed and a number of relevant projects and initiatives were further discussed. Dr Hughes also provided information on already existing training courses such as for ship design and ship operation.

Final discussion

4.30 Before the close of the workshop, Dr Hughes summarised the workshop proceedings and invited the participants to express their views on the subject and the areas of their interest. This part of discussion mainly was on importance of GHG and the fact that work on this subject has just begun and will continue for some time in the future.

As part of brainstorming in this session, the following were expressed as ideas for future consideration:

- National ratification and full implementation was required before Member States could consider and develop a regional strategy to control air pollution and address GHG emissions from international shipping
- Need for further capacity building and technical specialist workshops, including a focus on port State developments such as provision of waste reception facilities.
- Political will places the issue low on agenda. May be workshops for policy makers will be needed.
- Ship register: How do you create a uniform maritime strategy when oversight is divided amongst various ministries?
- There is a need for a national / flag state policy to consider legislation to enact the provisions of MARPOL Annex VI
- Green port initiative needed to emphasise importance to shipping industry and tie in with national policies on air pollution and GHG emissions mitigation
- Post workshop dissemination of information across all government and commercial sectors to be undertaken by each participant.
- Maritime energy efficiency policies
- Developing capacity on MARPOL Annex VI.

Evaluation Forms

4.31 The "workshop evaluation forms" were circulated to attendees early on Day 3 and collected at the end of the workshop. The feedback from attendees were analysed; a summary of which is given in **Annex 6** of this report. The feedback was quite positive and shows that the workshop has fully achieved its objectives.

5 CLOSING CEREMONY AND EXPRESSION OF APPRECIATION

5.1 The closing ceremony started by **CDR Felton Gilmore** who thanked Bertrand Smith and his colleagues for supporting to organise the meeting. He then asked Dr Hughes to say few closing remarks.

5.2 **Dr Edmund Hughes**, on behalf of the IMO, thanked everybody for taking part actively in the three day event. He expressed thanks once again to RAC-REMPEITC-Caribe and Maritime Authority of Jamaica for running such a well-organised workshop. He also thanked the Government of Canada for sponsoring the workshop. He wished all the participants a safe journey back to their bases.

5.2 **Mr Bertrand Smith** Director, Legal Affairs of Maritime Authority of Jamaica and on behalf of Read Admiral Brady, delivered the closing speech. In his well-rounded speech he thanked both facilitators and participants for the three days of deliberations. He then emphasised the follow-on important task of sharing the findings of this workshop with other colleagues and other stakeholders by participants in their own country. He also referred to the technical assistance provisions of the MARPOL Convention and MEPC Resolution 229(65) which provides an opportunity to get the help needed to implement our obligations.

He mentioned that there are a number of other issues which will affect Caribbean as a region such as whether we should start a conversation on establishing an Emission Control Area. WCR also need to know the implications and opportunities of the North American ECA. He expressed that Jamaica has indicated its desire to be a leading player in Annex VI-related

regional activities and will share its acquired knowledge with the rest of the Region. The full text of his speech is given in **Annex 7.**

5.3 Finally the certificates were handed over to participants. **Ms Carla Bikker** read the name of each individual. The Certificates was handed over to each participant by Dr Hughes, Mr Smith on behalf of Rear Admiral Brady and Dr Bazari. Relevant photographs were taken.

5.4 The workshop was formally closed at 17:00 hours on 19th February 2014. As a result of the three-day deliberations, all agenda items were completed successfully.

6 CONCLUSIONS

6.1 The IMO / RAC-REMPEITC-Caribe workshop entitled “Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping for the Wider Caribbean Region” was organised and successfully delivered in Kingston, Jamaica on 17-19 February 2014.

6.2 A total number of 28 people from 16 regional countries took part. The workshop was preceded with an opening ceremony and finished with a closing ceremony and hand-over of certificates to attendees.

6.3 The workshop covered at its core the MARPOL Annex VI generally and its new Chapter 4 regulation on Energy Efficiency specifically. As part of the workshop deliberations, all MARPOL Annex VI regulations were described, new Regulations 19 to 23 on Energy Efficiency were fully covered together with all the relevant supporting guidelines on EEDI, SEEMP and EEOI. Also, methods for mitigation of GHG shipping from international shipping, both technical measures and operational measures, were covered. Additionally, issues related to Flag state certification and port state control, IMO working practices, IMO Technical Cooperation Programme, Capacity building initiatives and so n were discussed extensively

6.4 Interactions with participants were encouraged via question & answer sessions and exercises to encourage deeper learning by the attendees.

6.5 The workshop was evaluated using feedback forms and questionnaire. The great majority of the participants expressed their satisfaction with the deliberations including content, venue and performance of the facilitators. Based on feedback received, it is concluded that the workshop was successfully completed and that all its objectives were met.

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Annexes to Report

Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping for the Wider Caribbean Region Kingston, Jamaica, 17-19 February 2014

Annex 1 - Workshop Programme

Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping for the Wider Caribbean Region Kingston, Jamaica, 17-19 February 2014

Day One		**Speaker**
08:30-09:00	**Arrival and registration of participants**	
09:00-09:45	**Official opening** • Welcome by host • Opening remarks by IMO and UNEP/RAC-REMPEITC-Caribe • Photo session	Host, IMO rep. (EH) UNEP/RAC-REMPEITC-Caribe (FG)
09:45-10:00	**Roundtable introduction and workshop programme** • Introduction to programme, facilitators and participants	ZB
10:00-11:00	**The International Regulatory Framework for Preventing Pollution from Ships** • Introduction to the IMO, structure, decision making process • Overview of the MARPOL Convention and introduction of Annexes I to V • Other environmental instruments – BWMC, AFS, etc. • Roles and responsibilities of Administrations • IMO's Integrated Technical Co-operation Programme	EH
11:00-11:30	***Refreshments***	
11:30-12:30	**MARPOL Annex VI – Prevention of air pollution from ships** • Why regulate air pollution from ships • Current status of MARPOL Annex VI and its application • Key technical provisions of MARPOL Annex VI and the NOx Technical Code 2008. • Review of Chapters 1 and 2 of MARPOL Annex VI including Equivalents, Notifications, Survey and Certification	ZB
12:30-13:30	***Lunch***	
13:30-14:30	**Overview of MARPOL Annex VI, Chapter 3** • Regulation of ODS, NOx, SOx, VOC, Incineration, Fuel Oil (Quality and Availability). • Current status, application, survey and certification	ZB
14:30-15:00	**Overview of the GHG issue and the role of international shipping** • Work by IMO to address GHG emissions • Role of international shipping • IMO consideration of the issue & Resolution A.963(23) • 2nd IMO GHG study – key findings and conclusions • Link with UNFCCC	EH
15:00-15:30	***Refreshments***	
15:30-17:00	**MARPOL Annex VI, Chapter 4 - Regulations for Ship Energy Efficiency** • Resolution MEPC.203(62) on the new Chapter 4 in MARPOL Annex VI on energy efficiency measures adopted at MEPC 62 and consideration of the specific provisions • Energy Efficiency Design Index (EEDI) • Ship Energy Efficiency Management Plan (SEEMP) • Survey and certification requirements • Discussion on implementation and progress so far	ZB
17:00	**End of day one**	

Day Two		Speaker(s)
09:00-10:00	**Host country presentation on MARPOL Annex VI and GHG emissions** • The host country's perspective on the IMO's work on MARPOL Annex VI and GHG emissions from international shipping. • Further discussion by participants from the region.	tbc
10:00-11:00	**Emissions Control Areas (ECA) for NOx, SOx and PM control** • How ECAs are decided • Existing ECAs and likely future ECAs • Requirements for operation in ECAs • Enforcement aspects of ECA	EH
11:00-11:30	***Refreshments***	
11:30-12:30	**Alternative fuels and SOx scrubbers** • The likely changes to marine fuels in the future • Scrubbers technology and status • Scrubber rules and compliance methods • LNG as marine fuel – Technical aspects and status • IMO LNG studies – WCR, North American ECA, Pilot study in Trinidad & Tobago	ZB EH/FG
12:30-13:30	***Lunch***	
13:30-14:00	**On Shore power supply and green port initiatives** • On shore power supply techniques and benefits • Regulatory aspects of on shore power supply • Green port initiatives	ZB
14:00-15:00	**Guidelines supporting Chapter 4 of MARPOL Annex VI on EEDI** • Calculation of Attained EEDI • Calculation of Required EEDI • Guidelines on survey and verification procedures • Other issues: minimum power, survey and verification of energy saving technologies.	ZB
15:00-15:30	***Refreshments***	
15:30-16:30	**Guidelines supporting Chapter 4 of MARPOL Annex VI on SEEMP** • SEEMP framework • Development of a SEEMP and its implementation • Survey and certification requirements • Energy Efficiency Operational Indicator (EEOI)	ZB
16:30-17:00	**Further measures to enhance the energy efficiency of ships** • Overview of proposals for data collection and monitoring of fuel consumption of ships • Future considerations of energy efficiency improvements	EH
17:00	**End of day two**	

Day Three		Speaker(s)
09:00-10:00	**Energy efficient ship design and technical energy efficiency measures** • Introduction to ship deign and ship resistances • Identification of key technical measures for improving energy efficiency and their impact on EEDI • Likely impact of EEDI on future ship designs.	ZB
10:00-11:00	**Energy efficient ship operation and operational energy efficiency measures** • Introduction to ship operation for energy efficiency • Identification of key operational measures for improving energy efficiency and input to SEEMP • Example SEEMP for an oil tanker.	ZB
11:00-11:30	***Refreshments***	
11:30-12:30	**Implementation and enforcement of MARPOL Annex VI** • MARPOL Annex VI – How to do it. • Flag Administration considerations • Port State Control under MARPOL Annex VI • Impact on industry stakeholders and national considerations • Reference to and use of relevant IMO guidelines	EH
12:30-13:30	***Lunch***	
13:30-14:00	**MARPOL Annex VI – potential impact on reduced GHG emissions and fuel consumption** • Estimated effect of amendments to MARPOL Annex VI • Estimated reductions in GHG emissions and fuel savings.	ZB
14:00-15:00	**MARPOL Annex VI - future capacity building activities** • Identification of Member State needs associated with the provision of support with a view to ratification by non-Parties and implementation by Parties • MARPOL Annex VI Regulation 23 • Resolution MEPC.229 (65) Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships • IMO-GEF project	EH/FG
15:00-16:00	***Refreshments***	
16:00-16:30	**Feedback and group discussion and deliberations** • Feedback forms to be collected • Review and deliberations on MARPOL Annex VI • Group discussion	EH+ZB+FG
16:30-17:00	**Presentation of certificates and closing remarks**	IMO/Host
17:00	**Close of workshop**	

Annex 2 – List of Participants and Facilitators

PARTICIPANTS LIST
Regional Workshop on MARPOL AnnexVI - Air Pollution and Greenhouse Gas (GHG) Emmissions from International Shipping for the Wider Caribbean
Kingston, Jamaica
17 - 19 February 2014

Number	Country	Name	Title and Organization	Email and Phone
1	Aruba	Carlyle de Coteau	Director Directorate of Shipping Aruba	c.decoteau@dsa.aw 00-297-583-5192
2	Antigua and Barbuda	Winston Chin	Marine Surveyor / Examiner Antigua & Barbuda Department of Marine Services	wchin@abregistry.ag 001-268-462-1273
3	Bahamas	Brent Williamson	Adviser Ministry of Transport and Aviation	brentwillbah@gmail.com 001-242-322-4546
4	Belize	Michael Jenkins	Chief Safety & Security Manager BPA Belize Port Authorithy	bzportauth@blt.net 00-501-223-0752
5	Belize	Annette Garel	Senior Deputy Registrar International Merchant Marine Registry of Belize	annettegarel@immarbe.com 00-501-223-5026
6	Haiti	Myriam Desrosiers	Director Maritime Affairs Ministry of Maritime Affairs	myraymi @ Yahoo.fr 00-509-3777-4131
7	Haiti	Evens Torchon	Assistant Head Data Management and Transfer Ministry of Maritime Affairs	torchonevens@yahoo.fr 00-509-3777-4131
8	Cuba	Dael Cantero Sarria	Head of Marine Environment Polution Department Marine Safety and Survey Directorate	dsim@mitrans.co.cu 0053-7-881-6607
9	Dominica	Albert Peter	Assistant Maritime Administrator Dominica maritime Administration	maritime@cwdom.dm kchampion70@hotmail.com 001-767-266-3071/ 001767-245-2259
10	Grenada	Ian Evans	Port Manager / Deputy Director Grenada Ports Authorithy	grenport@spiceisle.com 001-473-440-7678
11	Guyana	Geoffrey Babb	Marine Pilot Inspector of Shipping Maritime Administration Department	marad@maritimegy.com 00592-623-9222
12	Saint Kitts	Wayne Edmeade	Flag and Port State Control Inspector Ministry of Tourism & International Transport	waynejrsm@hotmail.com 001-869-467-1385
13	Saint Lucia	Donnalyn Charles	Senior Officer Ministry of Sustainable Development	donnalyncharles@gmail.com 001-758-451-8746
14	Saint Vincent	Jillianjoy Davis	Registrar of Ships and Seafares Maritime Administration	svgmarad@gmail.com 001-784-456-1378
Number	**Country**	**Name**	**Title and Organization**	**Email and Phone**
15	Suriname	Donovan Bogor	Field officer (NIMOS) Office of Environmental Monitoring Enfircement	dbogor@nimos.org 00597-490044
16	Trinidad & Tobago	Richmond Basant	Maritime Research / Environmental Officer Ministry of Transport Maritine Services Division	msddir@tstt.net.tt 001-868-625-3218

PARTICIPANTS LIST

Regional Workshop on MARPOL AnnexVI - Air Pollution and Greenhouse Gas (GHG) Emmissions from International Shipping for the Wider Caribbean

Kingston, Jamaica

17 - 19 February 2014

Number	Country	Name	Title and Organization	Email and Phone
17	Turks and Caicos	Henry Wilson	Deputy Director Department of Environment and Maritime Affairs	hw@gov.tc /hwilson_53@hotmail.com 001-694-941-5122
18	Panama	Maria Sierra	Technical Assistant Panama Maritime Authority	msierra@segumar.com 001-212-869-6440
19	Jamaica	Bertrand Smith	Director Legal Affairs Maritime Authority of Jamaica	bsmith@jamaicaships.com 001-876-967-1060
20	Jamaica	Leighton Miller	Marine Inspector Maritime Authority of Jamaica	lmiller@jamaicaships.com 001-876-967-1060
21	Jamaica	Hamada Fouda	Marine Surveyor Maritime Authority of Jamaica	hfouda@jamaicaships.com 001-876-967-1060
Number	**Country**	**Name**	**Title and Organization**	**Email and Phone**
22	Jamaica	Henry Tomlinson	Marine Inspector Maritime Authority of Jamaica	htomlinson@jamaicaships.com 001-876-967-1060
23	Jamaica	Royland Brooks	Marine Surveyor Maritime Authority of Jamaica	rbrooks@jamaicaships.com 001-876-967-1060
24	Jamaica	Steven Spence	Marine Surveyor Maritime Authority of Jamaica	sspence@jamaicaships.com 001-876-967-1060
25	Jamaica	Austin Lobban	Marine Inspector Maritime Authority of Jamaica	alobban@jamaicaships.com 001-876-967-1060
26	Jamaica	Kenre Valentine	Marine Inspector Maritime Authority of Jamaica	kvalentine@jamaicaships.com 001-876-967-1060
27	Jamaica	Jody Ann Marston	Environmental Officer National Environment and Planning Agency NEPA	jodi-annmarston@nepa.gov.jm 001-876-927-1552
28	Jamaica	Oswald Chinkoo	Manager of Pollution Monitoring and Assesment Br National Environment and Planning Agency NEPA	ohinkoo@nepa.gov.jm 001-876-927-1552
29	UK London	Dr. Edmund Hughes	Marine Environment Division International Maritime Organization	E-Mail: ehughes@imo.org Tel: +44 (0) 207 587 3120
30	UK London	Dr. Zabi Bazari	Energy and Emissions Solutions Ltd (EnEmSol)	zabi.bazari@enemsol.com 44 (0) 78 37 27 12 42
31	Curacao RAC/REMPEITC	Felton Gilmore	Senior IMO Consultant RAC/REMPEITC-Caribe	fgilmore@cep.unep.org 005-999-868-3409
32	Curacao RAC/REMPEITC	Carla Bikker	Office Manager/ IMO Assosiate RAC/REMPEITC-Caribe	carla@cep.unep.org 005-999-868-3409

Annex 3 – Opening Statement by the IMO Representative Dr Edmund Hughes

Good morning ladies and gentlemen,

It gives me enormous pleasure to be here today to provide some opening remarks to this regional workshop on "MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping for the Wider Caribbean Region".

Twenty years ago I had the great fortune to work in Jamaica, and with that experience, and later as a delegate from the UK attending IMO, I learnt that people from different backgrounds and cultures to my own can have alternative view points and priorities which, importantly, need to be listened too and respected.

I now find myself to be fortunate to be back on this beautiful island representing the International Maritime Organization, where on a day-to-day basis I am responsible for MARPOL Annex VI and the work by IMO to address greenhouse gas emissions from international shipping.

Before saying something about this workshop and why I am delighted we are able to hold this workshop now, I need to say a few "thank-you's".

Firstly I wish to thank the Government of Jamaica for hosting this workshop. In particular I would like to thank, Rear Admiral Brady, Director General of the Maritime Authority of Jamaica - who is a truly supportive and good friend of the IMO – also I thank Bertrand Smith and all the staff of the Maritime Authority of Jamaica who have assisted in the making this workshop happen.

I am indebted to Commander Gilmore of the Regional Marine Pollution Emergency Information and Training Center for the Wider Caribbean and US Coastguard for his leadership, in identifying a need for, and delivery of this regional workshop.

Also I would like to take this opportunity to publicly thank him for his support and input to several other important regional activities that IMO has been undertaking in relation to MARPOL Annex VI, some of which you will hear about over the next 3 days.

I would also like to thank all you delegates for taking the time to attend and I would urge you to fully contribute to making this workshop a success through being prepared to share your views and experiences.

Finally, and not least, I would like to thank, on your behalf, Carla Bikker, also of RAC-REMPEITC, who has so ably co-ordinated the preparations for this workshop. These workshops take a lot of administration and I can say I have been impressed at the professional and smooth way this workshop has been brought together.

Ladies and gentlemen, the focus of this workshop is MARPOL Annex VI. The control of emissions of air pollutants from ships and the increasing need for international shipping to address greenhouse gases are, to be frank, a hot item at IMO!

Indeed Senator John Kerry, US Secretary of State, has only recently been stressing the importance of the global community working together to address climate change. International shipping as a lynchpin for global trade has a role to play as part of a global response.

The forthcoming Marine Environment Protection Committee – the IMO technical body responsible for considering and developing international regulations to protect the marine environment – will consider at its next meeting at the end of March whether to establish 3 working groups related to air pollution, further energy
efficiency measures and technical cooperation to build capacity to effectively implement the energy efficiency regulations. So you can see this issue is one at the heart of current IMO work.

Further, and specifically for this region, is the reduction on 1 January 2015 to 0.10% limit for sulphur content in fuel oil for ships operating in the North American Emission Control Area and the US Caribbean Sea. The proximity of the other Wider Caribbean Region States to these emission control areas may lead to some significant changes to maritime activity in the region and could have implications for ships trading from ports outside the ECA to ports into the ECA.

Finally, I wish to congratulate Jamaica – along with Bahamas and Panama - for its re-election to the IMO Council. In doing so, if I may, I wish to finish by quoting Rear Admiral Brady : "Re-election to the IMO Council is critical for Jamaica at this time, as the country has evolved as a credible maritime State with port, flag and coastal State standards at the international level and as it establishes itself as a global Shipping and Logistics Hub".

These regional workshops are an opportunity for progressive maritime Administrations to benchmark themselves and assess their credibility, for international shipping is under increasing scrutiny and so it is imperative that flag States demonstrate a clear willingness to fully implement international maritime regulations.

As I said I am delighted to be here and look forward to discussing this further with you over the next three days.

Thank-you.

Annex 4 – Opening Keynote Speech by:

DR PETER-JOHN GORDON, CHAIRMAN, MARITIME AUTHORITY OF JAMAICA

REGIONAL WORKSHOP ON MARPOL ANNEX VI – AIR POLLUTION AND GREENHOUSE GAS (GHG) EMISSIONS FROM INTERNATIONAL SHIPPING FOR THE WIDER CARIBBEAN REGION THE COURTLEIGH HOTEL, KINGSTON JAMAICA, 17 FEBRUARY 2014

Salutations

Ladies and gentlemen, from around the Wider Caribbean Region, the IMO representative Mr Edmund Hughes; IMO consultants from RAC-REMPEITC Commander Felton Gilmore from RAC-REMPEITC and Mr. Zabi Bazari and the Jamaican representatives from the maritime sector and other related Government sector, let me extend a warm Jamaican welcome to Kingston to this very timely seminar.

In extending the welcome, I also bring you best wishes from the Minister of Transport Works and Housing, which of course has the portfolio responsibility for marine transportation matters and therefore marine environment protection as governed by the International Convention for the Prevention of Pollution from Ships, 1978 as amended commonly known as the MARPOL Convention.

This workshop is being held under auspices of the IMO, UNEP and the RAC-REMPEITC and is the first of its kind in the Region. Not only is the workshop important but it is also very timely the as United States Caribbean Sea Emission Control Area came into effect, under MARPOL Annex VI, on 1 January 2014, bringing in stricter controls on emissions of sulphur oxide (SOx), nitrogen oxide (NOx) and particulate matter for ships trading in certain waters adjacent to the coasts of Puerto Rico and the United States Virgin Islands.

This development will also affect other States in the region as ships trading with our ports or transiting our large Exclusive Economic Zones take measures to comply with the new US requirements.

Participants at this workshop with be provided with information on the recent amendments to Annex VI of the MARPOL Convention which regulates the prevention of pollution from ships and the obligations of State Parties to implement and enforce the highly technical obligations.

Importantly the current initiatives of the IMO to reduce the amount of CO2 emissions from international shipping will be discussed which is critical to many countries in the Caribbean region for a number of reasons.

The countries of the Caribbean region are dependent to a very large extent on shipping, which not only provides the backbone of trade links, both within the region and with the wider international community, but is also itself an engine for economic growth.

Currently the registries of the Caribbean countries were together responsible for approximately 5,000 merchant ships representing 5 per cent of the world fleet in terms of number and nearly 7 per cent in terms of tonnage.

Shipping also contributes significantly to the tourism sector with more than 45 per cent of world cruise shipping taking place in the Caribbean.

The region also accommodates one of the world's great shipping routes as tonnage heading to or from the Panama Canal inevitably passes through the Caribbean Sea.

A sustainable maritime transportation system which addresses marine environment protection and resource conservation is therefore critical to the well-being of the region and the implementation of the MARPOL Convention and particular Annex VI which addresses the reduction of CO2 emissions will not only be beneficial to the region but it will also bring obligations for us as flag States, port States and coastal States.

As you may all be aware the theme selected by the IMO for World Maritime Day 2014 is "IMO Conventions: Effective Implementation" . The matter of the implementation is extremely relevant not only in relation to IMO treaties which have yet not come into force such as the Ballast Water Management Convention, 2004 but also in respect of the well-known challenges that Small Island Developing States (SIDs) in the Caribbean face in the implementation of existing Conventions such as the MARPOL Convention which are constantly revised to meet the new technologies and requirements of global shipping.

Jamaica through the Maritime Authority has taken significant steps to implement its obligations under all of the major IMO Conventions and has been championing the policy and legislative imperatives to ensure that the country's obligations are being properly discharged.

Jamaica has been involved, and continues to play a lead role in the region in the area of the marine environment protection as a Lead Partner Country in the IMO supported Glo-Ballast Partnership Project and has been recently appointed as one of the ten Lead Pilot Country in the world under the recently launched GEF IMO UNDP project "Transforming the Global Maritime Transport Industry towards a Low Carbon Future through Improved Energy Efficiency" which will be looking at the removal of capacity barriers to the implementation of Energy Efficiency Measures on international shipping.

The implementation of MARPOL Annex VI will be bring its unique challenges and it is hoped that by the end of the workshop you will be in a much better position to advise our government's on the policy and legal framework which we must put in place in give full and proper effect to the Convention.

I note that you have a full agenda over the next three days and it is just left for me to wish you a successful workshop.

Annex 5 – Pictures of event

Group picture

Rear Admiral Peter Brady, General Manager of Maritime Authority of Jamaica, addressing the workshop

Dr Peter-John Gordon, Chairman of Board of Directors of Maritime Authority of Jamaica giving keynote speech to the workshop

Dr Edmund Hughes (left), Mr Bertrand Smith (centre) and Dr Zabi Bazari (right) handing out the workshop certificate to Ms Jillianjoy Davis (Centre)

Annex 6 – Summary of Evaluation Questionnaire

Total number of participants: 28 Total number of completed questionnaires: 26

Q1: Was the invitation received in good time?

YES: 25
NO: 0
No answer: 1

Q2 - Did you receive the information listed below about the event before your participation?

- **on its objective and scope**

YES: 25
NO: 1
No answer: 0

- **subject areas and programme**

YES: 21
NO: 2
No answer: 3

Q3 - Were the instructions on the following clear and easy to understand?

- **profile required of participant**

YES: 26
NO: 0
No answer: 0

- **completion and submission of the nomination form**

YES: 25
NO: 0
No answer: 1

Q4 - Did you receive logistical information on?

- **Venue**

YES: 24
NO: 1
No answer: 1

- **travel arrangements**

YES: 17
NO: 0
N/A: 7
No answer: 2

- **DSA payments**

YES: 17
NO: 0
N/A: 7
No answer: 2

- **Accommodation**

YES: 19
NO: 0
N/A: 6
No answer: 1

Q5 - If you were given any pre-event assignment, was it useful?

YES: 24
NO: 0
N/A: 2
No answer: 0

Q6 - To cover the topics fully, was the event (please check the appropriate box)?

	Too long	Just right	Too short	No answer
The event was	2	11	11	2

Q7 – How do you rate the event with regard to the following? (tick one box in each case)

	Excellent	Good	Satisfactory	Poor	No Answer
Venue	12	9	2	0	1
Facilities	8	12	4	0	2
Equipment	8	14	2	0	2

Q8 - How do you rate the following aspects of the materials? (tick one box in each case)

	Excellent	Good	Satisfactory	Poor	No Answer
Presentation	14	12	0	0	0
Clarity	5	18	2	0	1
Technical content	8	14	4	0	0
Comprehensiveness	7	13	6	0	0
Quantity	5	18	3	0	0

Q9 - How would you rate the following aspects of the presentations? (tick one box in each case)

	Excellent	Good	Satisfactory	Poor	No Answer
Design and structure	9	14	3	0	0
Clarity	7	15	4	0	0
Technical contents	11	11	4	0	0
Comprehensiveness	8	12	5	0	0

Q10 - How do you rate the following aspects of the materials? (tick one box in each case)

	Excellent	Good	Satisfactory	Poor	N/A	No Answer
Course materials	16	10	0	0	0	0
IMO reference materials	17	9	0	0	0	0
Other resource materials	11	12	2	0	0	1
Group and practical activities	7	6	3	2	7	1
Field trips	3	2	0	2	19	1

Q11 - Please rate each lecturer with regard to the following (check one box in each case)

Dr Edmund Hughes

	Excellent	Good	Satisfactory	Poor	No Answer
content of lecture	16	10	0	0	0
delivery of presentation	15	9	2	0	0
ability to transfer knowledge	14	11	1	0	0
Effectiveness in answering questions	17	6	3	0	0
Effectiveness in suggesting solutions to issues	18	5	3	0	0

Dr Zabi Bazari

	Excellent	Good	Satisfactory	Poor	No Answer
content of lecture	16	10	0	0	0
delivery of presentation	14	9	3	0	0
ability to transfer knowledge	13	10	3	0	0
Effectiveness in answering questions	15	10	1	0	0
Effectiveness in suggesting solutions to issues	13	10	3	0	0

CDR Felton Gilmore

	Excellent	Good	Satisfactory	Poor	No Answer
content of lecture	13	6	0	0	7
delivery of presentation	12	7	0	0	7
ability to transfer knowledge	12	5	2	0	7
Effectiveness in answering questions	13	4	2	0	7
Effectiveness in suggesting solutions to issues	12	4	3	0	7

Q12 - What topics were of most interest and relevance to you?

- Energy Efficient Ship Design and Technical Energy Efficiency Measures
- Implementation and enforcement of MARPOL Annex VI
- Promotion of energy efficiency and sustainable le development
- ECA and emissions control areas
- EEDI and SEEMP
- Ship operational measures
- EIAPP and IEEC
- Efficiency, future fuels and technologies presentation
- LNG, EEDI, Attained EEDI, Green Port initiatives, scrubbers, ECAs
- Those on emissions CO2, NOx, ODS, SOx
- All aspects of Annexes MARPOL itself plus material on Port State Control.
- ECAs and EIAPP
- MARPOL Annex VI regulations
- EEDI calculations
- All topics provided with a range of knowledge.
- Energy efficiency regulations for ships
- Further measures to enhance energy efficiency
- How to calculate EEDI of a ship and what need to be done for ships to be compliant.
- Regulatory framework

Q13: Are there any topics which should be added?

YES: 4
NO: 14
No answer: 8

Proposed new areas:

1	Impact of the implementation of Annex VI within the region.
2	The framework of other air pollutions (environmental) instruments (conventions, rules, protocols) that may overlap with Annex VI.
3	Needs additional sessions or lectures on the topic of EEDI and EEOI calculations.

Q14: Do you consider that the objective of the event was met?

YES: 26
NO: 0
No answer: 0

Q15: Are you likely to use the information you gained on the course when you return to your work?

YES: 26
NO: 0
No answer: 0

Q16: Will you have the opportunity to transfer the knowledge gained to your colleagues at work?

YES: 26

NO: 0
No answer: 0

Comments given

1	The course was timely with many initiatives locally. It is intended to share via a submission of a report conducting a national workshop on MARPOL Annex VI and its implementation nationally and regionally.
2	A good workshop. Lots of technical information. Lecturers engaged lots of practical examples + exercises to break the monotony and involve participants in all activities.
3	In my view a very well organised workshop with the pre-assignment worksheets received in advance. The time allotted for delivery needed an extra two hours which would have enabled the presenters more time to deliver their slides at reasonable pace. The calculation data and formula should have a simpler explanation for participants who are not at the level that which they were presented.
4	Great workshop however, more local stakeholder should be invited. Add a checklist for the use of FSI and PSI to use when the needs arises to inspect a vessel on Annex VI.
5	Possible not to go so much into theory. However, more time should be on aspect of the implementation of Annex VI that would impinge specific areas as specific to the region if supply of low sulphur fuel, effect on the efficiency of port operation.
6	Some areas were rushed in the interest of time. Some of the presentations too technical. Number of presentations too many. There should have been more discussion; however length of presentations prohibited this. Very informative, useful information
7	The workshop was extremely informative in imparting knowledge and clarity to IMO Member States in the WCR to staff members to take back to their respective administrations. The The lecturers did a great job and the discussion was satisfactory. Please continue to have these workshops on the regional basis in preparation for adoption and implementation of environmental instruments and the eventual auditing of the member states under IMSAS(IMO Member State Audit Scheme)
8	Presentation given on external drive should be in PPT to allow easier read. Documents related to workshop could have been sent earlier to allow for reading and digestion of material.
9	During the three days of lectures, I acquired a vast amount of knowledge on MARPOL Annex VI which I will certainly filter down to co-workers, with the view of improving awareness among the organisations in regards to air pollutions from ships. The workshop was very useful.
10	Acknowledges and appreciate well-rounded knowledge of both lecturers and ability to create learning environment. Remind also the participants of their participation - A few participants preoccupied with personal chatting and shopping online, etc. (distracting).
11	This seminar provided a wealth of knowledge and a clear understanding of MARPOL Annex VI together with the advantages of implementing the provisions of it.
12	Very important workshop but I fear that there will be major difficulties experiences in implementing the measures of this Annex if policy makers do not understand the importance and possible economic impact of small island states in this region.
13	Excellent workshop. Very informative, interactive though it was a lot of information to digest in 3 days. Perhaps information could have been given to participants earlier for review.
14	All aspects of the workshop was very useful and interesting.
15	The entire course was well presented and lecturers conveyed information in an easy and understandable way. Note - When flight arrangements are made, it should be taken into account that custom and immigration in airport could take a long time and in my case I missed my flight.

Annex 7 – Closing Remarks by:

Mr. Bertrand Smith, Director, Legal Affairs, Maritime Authority of Jamaica

Good afternoon ladies and gentlemen

Regrettably Rear Admiral Peter Brady could not make this final session and so he has asked me to provide some closing words.

On behalf of the Chairman of the Board of Directors of the Maritime Authority of Jamaica, Dr Peter- John Gordon and Director-General Rear Admiral Peter Brady, I would like to express our thanks and appreciation firstly to Dr Edmund Hughes, Dr. Zabi Bazari and Cdr. Felton Gilmore for delivering this successful workshop on MARPOL Annex VI.

I can also speak as a participant and I am sure you can join me in saying that the presenters were not only eloquent but complemented the theory of the text of Annex VI, associated resolutions and guidelines with their first-hand experience of developments at IMO and in the shipping industry . For this we are extremely grateful.

Apart from the "simple" formulae,(and we should have a unified interpretation of the term "simple"), we are in a much better position to understand the role of IMO in addressing climate change and the benefits of MARPOL Annex VI as Flag States, Coastal States and Port States.

It is left for us to share the new found knowledge with our colleagues in our respective agencies and other stakeholders. It is important that we have an interagency framework to ensure we have a co-ordinated and sustained approach to implementation.

I would also like to thank RAC-REMPEITC-Caribe and, in particular, Mrs Carla Bikker for facilitating the logistics which enabled us to attend and participate in this workshop.

The ball is now in our courts as States and as a region. As countries we need to establish the relevant policy and legal framework to give full and proper effect to Annex VI.

We also note the technical assistance provisions of the MARPOL Convention and MEPC Resolution 229(65) which provide an opportunity to get the help we need to implement our obligations.

We cannot, however, seek help unless we fully understand what the issues are and are committed to implement the Annex.

We all know the cost of attending meetings at the IMO which can be prohibitive but there is no excuse for not following the debate by downloading from IMODOCS and examining the reports and relevant papers.

The ball also in our court as a region and we have noted where there is a provision in the Annex which has been negotiated in favour of SIDS including the option for a regional framework for adequate Waste Reception Facilities.

There are a number of other issues which will affect us as a region such as whether we should start a conversation on establishing an Emission Control Area. We also need to know the implications and opportunities of the North American ECA.

It is important that we engage the Caribbean MOU, CARICOM, RAC-REMPEITC and the respective IMO Member State Administrations and develop a regional strategy that will not only

enable us to meet our treaty obligations but will also be realistic have regard to our resource constraints.

To this effect, Jamaica has indicated its desire to be a Lead Pilot Country for the GEF-IMO-UNDP project on transforming the global maritime transport industry towards a low carbon future through improved energy efficiency and will be available to share our knowledge with the rest of the Region.

Again, thanks to the participants whose input made the last three days a very fruitful exercise and we look forward to continuing the conversation after this workshop.

I trust that you will see more of Kingston tonight and have a safe flight home.