Report of

Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping

Apia, Samoa, 19-21 November 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
Host:	The Secretariat of the Pacific Regional Environment Programme (SPREP), Apia, Samoa
Venue:	SPREP Training and Education Centre, PO Box 240, Apia, Samoa
Date	19-21 November 2014
Type:	Regional
Organized by:	SPREP, Apia, Samoa
Supported by:	IMO – Marine Environment Division
No. of participants:	23 (excluding facilitators and SPREP staff)
Point of contact:	Mr. Scott Willson Marine Pollution Advisor SPREP, PO Box 240, Apia, Samoa. P: +685 21929 Ext 301 E: scottw@sprep.org
Cost:	-
Source of funding:	Government of Canada through Transport Canada, with in-kind support by Australian Maritime Safety Authority (AMSA)

EXECUTIVE SUMMARY

The main objective of the workshop was to raise awareness among the participating Pacific regional small island countries' (Cook Islands, Fiji, Federated States of Micronesia, Kiribati, Marshall Islands, Niue, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu) 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 the development of relevant legislation and tools for more effective implementation, compliance and enforcement; both as a Flag Administration and as a port State.

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,
- Overview of regional aspects on MARPOL Annex VI ratification and relevant barriers,
- 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 and EEOI,
- Further measures to enhance the energy efficiency of ships,
- Energy efficient ship design and ship operation and relevant energy efficiency measures,
- Enforcement and Port State Control aspects of MARPOL Annex VI,
- Potential impact of Chapter 4 of MARPOL Annex VI on marine GHG emissions and fuel consumption, and
- MARPOL Annex VI - Future capacity building activities, technology transfer and relevant IMO activities.

The workshop provided the participants with relevant information for a better understanding of IMO working practices, MARPOL Annex VI and ship energy efficiency regulations and guidelines on EEDI, SEEMP, EEOI and wider aspects of GHG emissions. Also, the workshop provided information on the tasks needed for regulatory enforcement including Flag State implementation and Port State Control enforcement aspects as well as the future likely impacts of these regulations. The issue of technical cooperation, technology transfer and IMO activities in this regard were also covered.

The workshop was conducted interactively. Participants consisted of both Governmental maritime and ministerial sectors from a large number of the South Pacific Region small island developing states. They expressed interest on the subject and actively took part in the workshop deliberations. They demonstrated willingness in understanding the details of regulations, importance of reducing 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 Lead Consultants Dr Zabi Bazari (Energy and Emissions Solutions, UK) and AMSA Policy and Regulatory Senior Advisor Ms. Annalisse Sly (AMSA, Canberra, Australia) and coordinated by SPREP Marine Pollution Adviser Mr Scott Willson (Apia, Samoa). Time was also devoted to present the regional view of the subject that included a presentation on the status of adoption of MARPOL Annex VI in the region and a presentation by Mr Espen Ronneberg (SPREP, Apia, Samoa) on climate change linkages between the UNFCCC and MARPOL and related maritime issues.

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 with the performance of facilitators / experts.

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

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ANNEXES

Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping
Apia, Samoa, 19-21 November 2014

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)) and subsequently enhanced them via additional amendments for inclusion of more ship types in October 2013 (Resolution MEPC.251(66)).

1.2 The above Regulations deal with Attained EEDI (Energy Efficiency Design Index), Required EEDI and the SEEMP (Ship Energy Efficiency Management Plan). It specifies methods of calculations and surveys and verification of EEDI as well as development of a SEEMP. The Regulations are supported by a number of guidelines that was subsequently adopted at the IMO MEPC 63rd to 67th 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 and agreements 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 capacity building efforts are considered imperative to supporting effective implementation.

1.4 The Pacific Region heavily relies on shipping to deliver goods and services to all communities across the Pacific. Climate change is already disproportionally affecting the islands of the Pacific. Although islanders have done little to contribute to the cause – less than 0.03% of current global greenhouse gas emissions – they are among the first to be affected. Most islands are experiencing climate change impacts on communities, infrastructure, water supply, coastal and forest ecosystems, fisheries, agriculture and human health. In the face of Climate Change and International Conventions that are attempting to reduce GHG emissions, Small Island Developing States are suffering financially from the increase in fuel prices for international shipping.

1.5 In order to provide information on MARPOL Annex VI and to increase the ratification rate of the instrument by the Pacific Regions countries and more effective implementation and enforcement, SPREP implemented this workshop with direct support from IMO Marine Environment Division and Australian Maritime Safety Authority and financial support from the Government of Canada (Transport Canada) through 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 the South Pacific Region of the latest developments of MARPOL Annex VI in particular the new Chapter 4 on "Regulations for Energy Efficiency of Ships" with a view to help the Parties with more effective implementation and non-Party 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 Annex VI regulations on various air emissions in particular the 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) and its potential impacts.
- Related guidelines on calculation of EEDI, verification of EEDI, development of SEEMP and calculation and voluntary use of EEOI.
- Implementation and enforcement aspects of MARPOL Annex VI.
- Energy efficiency measures for ship design and operation.
- Alternative fuels and compliance methods.

Expected outcomes

2.3 The expected outcomes of the workshop were as follows:

- Trained staff on MARPOL Annex VI for the region.
- Catalyse the increased regional cooperation on the subject and Annex VI implementation.
- Lead to further ratification of MARPOL Annex VI in the region.

2.4 Time was also allocated to regional presentations (by SPREP) that reviewed the status of regional countries with regard to ratification, national legislation and barriers as well as relevant climate change efforts.

Workshop programme

2.5 The workshop programme is given in **Annex 1**. The workshop was conducted according to this programme. A pre-workshop assignment was given to participations. The text of the assignment questions are given in the last Annex to this report.

3 VENUE, DATES, PARTICIPANTS AND FACILITATORS

3.1 The venue for this Regional Workshop was:
SPREP,
Training and Education Centre,
PO Box 240,
Apia, Samoa

3.2 The Workshop was held on 19-21 November 2014 at the above venue that included all amenities needed for the workshop.

Logistical arrangements

3.3 The workshop was hosted and organized by SPREP. Funding was provided by Transport Canada through the IMO plus additional in-kind support by AMSA, Australia.

3.4 The SPREP provided excellent support during the workshop. This support included providing the workshop venue, 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, 2014 Third IMO GHG Study and other relevant materials.
- A hardcopy book on the MARPOL Annex VI regulations (Consolidated English Edition 2013);
- IMO/KOICA energy efficiency pocket booklet; and
- IMO/KOICA energy efficiency DVD.

3.7 **Mr. Scott Willson (**Marine Pollution Officer, SPREP) had the overall coordinating role for the workshop. He closely worked with facilitators, the IMO and the regional countries to ensure that the workshop was planned and executed smoothly.

3.8 **Ms. Pulemalie Habiri** from SPREP provided administrative logistical support for the workshop, the facilitators and participants before and during the workshop.

Participants

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

Facilitators

3.10 The facilitators for this workshop were **Dr Zabi Bazari** (Energy and Emissions Solutions, UK) and **Ms. Annalisse Sly** (AMSA, Australia). They both have significant level of complementary expertise on the subject and also long-term working experience with the IMO instruments. As indicated above, the workshop proceedings were overall managed by **Mr Scott Willson**. A short resume of the facilitators follows.

3.11 **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 Lloyd's Register 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.

3.12 **Ms. Annalisse Sly** is employed by the Australian Maritime Safety Authority (AMSA) as a Policy and Regulatory Senior Adviser. Annalisse joined AMSA in November 2011 and works in the Marine Environment Standards unit of the Marine Environment Division. Annalisse is responsible for developing, implementing and interpreting international conventions, government policy, legislation and administrative functions, to achieve a reduction in the incidence and effect of ship sourced marine pollution and other adverse environmental effects from shipping activities. In particular, Annalisse works on issues raised at the International Maritime Organization (IMO), primarily through the Marine Environment Protection Committee and the Pollution Prevention and Response Sub-Committee, including those related to MARPOL Annex VI. A highlight of Annalisse's role is meeting various people working towards the same goal of protecting the marine environment, in Australia and internationally. Prior to joining AMSA, Annalisse worked for the Australian Government in policy development for the prevention and management of marine pest incursions, including the development of domestic measures as well as international measures through the IMO.

3.13 **Mr Scott Willson** is currently employed by the Australian Maritime Safety Authority, Marine Environment Division, as the Equipment Officer looking after primarily AMSA's oil spill equipment across Australia. Scott has a background in the Defence maritime sector, Project Management, test and trials and instructing. As of August 2013, Scott was seconded for two years to the Secretariat of the Pacific Regional Environmental Programme, based in Apia, Samoa, as the Marine Pollution Advisor.

4 ACTIVITIES AND PROCEEDINGS

Opening of the Workshop

4.1 The opening ceremony was initiated and managed by Mr Scott Willson. He invited **Capt. Tafaigata Toilolo**, Principal Shipping Officer, Ministry of Works Transport and Infrastructure of Samoa Government to initiate the workshop by saying a short prayer.

4.2 Mr Willson then invited **Mr David Haynes**, Director General of SPREP to give his opening speech. Dr Haynes welcomed IMO facilitators and participants and expressed happiness for SPREP to be able to organise this workshop. He then elaborated on the importance of fighting marine pollution in particular those from shipping. He then raised the question on how Pacific nations are fighting the war against pollution. He noted that so far, only about 8 Pacific Island Countries are a Party to MARPOL Annex VI and encouraged the rest to actively work towards becoming a Party to this Annex of the Convention. He encouraged the question on how to fight marine pollution and its link to MARPOL Annex VI ratification to be debated in the workshop. Finally, he wished the participants success with the workshop. The full text of Mr Haynes's opening remarks is given in **Annex 3**.

4.3 The opening remarks by **Dr Edmund Hughes**, Head, Air Pollution and Energy Efficiency, Marine Environment Division of IMO was read by Dr Bazari on his behalf. Dr Hughes, on behalf of the IMO, thanked the Government of Canada for funding, the Government of Samoa for hosting and SPREP for organising the workshop. Dr Hughes then referred to importance of energy efficiency both from environmental point of view as well as reduction of fuel cost to shipping, stating that the "as the cost of maritime transport is important to South Pacific Region, this part of MARPOL Annex VI will have added benefit to the region". Dr Hughes also referred to the mandatory IMO Member State Audit Scheme as an important part of future regime for international shipping. Finally, Dr Hughes encouraged the participants to take full advantage of the presence of the IMO consultant and the AMSA expert via full interaction during debates and expressed his best wishes to a useful three day deliberations. The full text of Dr Hughes opening remarks is given in **Annex 4**.

Participants Introduction

4.4 Following the opening speeches, Mr Willson invited the participants to introduce themselves. IMO consultants also explained their areas of expertise and affiliations. Both Dr Bazari and Mrs Sly invited the participants to be interactive as much as possible.

4.5 Mr Willson then introduced the agenda for the three days, safety procedures, logistics, transport and break times. He then explained that various materials and workshop presentations will be provided to participants for future references.

4.6 The group picture of participants is given in **Annex 5**. The Press Release issued by the IMO is given in **Annex 6**.

Workshop Technical Proceedings

Day 1 presentations and discussions

4.7 The first presentation of the workshop was given by Ms Sly and 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 various maritime related international conventions as well as IMO's various committees and departments that deal with various regulatory aspects. She extensively talked about the Maritime Administration responsibilities, delegation of responsibility to Recognised Organisations (ROs) and Port State Control in general. As the second part of this presentation, she provided an overview of the MARPOL convention and its requirements and roles of Flag and Port State Control in implementing and enforcing the MARPOL requirements. She then moved on to provide an overview of MARPOL Annexes I to V.

4.8 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. The session started with an exercise in which the participants were asked to give the full extension for various MARPOL Annex VI acronyms. The exercise was useful to create a participatory mood on the side of the participants and also demonstrated their level of acquaintance with MARPOL Annex VI. Following the exercise, he presented an overview of all the Regulations under various chapters of MARPOL Annex VI. He then moved into a 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.

4.9 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 was had on regulatory requirements; Port State Control aspects; NOx certification process; issues relating to availability of fuels; reception facilitates and obligations of the member Parties; and links between reception facility for Annex VI and Annex V etc.. The issue of regional reception facilities were highlighted and discussed.

4.10 The next presentation of the day by Ms Sly related to an "**Overview of the global GHG emissions and the role of international shipping**". First, she highlighted the changes in atmospheric CO2 emissions; the recent climate activities such as flooding that may have links with GHG emissions; and the significant impact that GHG emissions may have on various countries in particular the small island states. She then discussed various international efforts and initiatives on GHG emission controls including UNFCCC, Kyoto Protocol and IMO obligations within Kyoto Protocol to deal with international shipping. She then continued and explained the related historical activities of IMO since 1997 to date that has led to EEDI and SEEMP regulations. She also touched on past discussions on MBM work within IMO and various schemes that have been proposed by various countries.

Day 2 presentations and discussions

4.11 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 had learned in relation to MARPOL Annex VI regulations and wider aspects of GHG and other emissions during Day 1. The topics they picked up include the following:

- Regulation 12 on ODS and ban of CFC, currently use of HCFCs and future move from HCFCs to HFCs and natural substances.
- IAPP and EIAPP certificates and their differences.
- NOx control Tiers I, II and III limits and differentiation of ECA-NOx and ECA-SOx.

- Reception facilities, regional reception facilities and reasons for the need for reception facility as a result of MARPOL Annex VI (ODS and EGCS residues).
- Regulation 4 on equivalents and discussion of scrubbers as an equivalent to sulphur limits.
- Regulation 3 on exceptions and exemptions.
- Various aspects of Port State Controls.

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.

4.12 The 1st presentation of Day 2 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 the International Energy Efficiency (IEE) Certificate, definition of "major conversions" and waiver clause and roles of Port State Control. He then moved on to talk about regulations 19 to 23 and provided information on the 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 factors and why the Required EEDI has not been mandated for a number of ship types as well as the small size ships. He showed the progress at IMO on inclusion of other ship types and the MEPC 66 decisions. He then described the future review of the regulations in particular in relation to reduction factor (X) and the fact that MEPC has already agreed to set up a correspondence group to look into technologies for Phase 2 of EEDI. 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.

4.13 The next presentation of the day (by Dr Bazari) was on "**Guidelines supporting Chapter 4 of Annex VI on EEDI**". He covered various guidelines including Guidelines on calculation of the Attained EEDI (Resolution MEPC.245(66)), Guidelines for verification of EEDI (MEPC.1/Circ.816 (as amended in MEPC 67 and will be published as 2014 Guidelines), Guidelines for minimum power, Guidelines for innovative energy efficiency technologies and finally Industry Guidelines. He spent time describing the EEDI formula and its various parameters. He then presented a set of slides that described in more detail various aspects of the 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 on to the verification guideline and explained in detail the pre-verification and final verification of the EEDI and what needs to be checked by the verifier. He mentioned that due to complexity of the formula and specific factors used, the verification will most likely be delegated to ROs by flag States. He briefly touched on other relevant guidelines.

4.14 Following this presentation, Dr Bazari gave the participants an exercise on how to reduce EEDI. He asked the participants to use the EEDI formula to come up with new ideas. For each idea, technical feasibility and cost-effectiveness also needed to be evaluated. He explained the reasons why we should use and become more familiar with EEDI formula as well as the techniques for EEDI reduction and their assessment methods. The group picked up a number of measures for EEDI reductions including the following:

- Hull optimisation
- Engine optimisation and reduced SFC (Specific Fuel Consumption)
- Reduced ship's design speed.
- Use of hull air lubrication technology.

Dr Bazari then used the formula to show how each of the above would impact the EEDI with further debates on associated costs and benefits.

4.15 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 and how they can be optimised via references to a ship energy balance. 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.

4.16 The next presentation of the day was on "**Onshore power supply and green port initiatives**" that was delivered by Ms. Sly. She started this session by explaining the shore-power concept, various terms used for this purpose and details of technologies. She then continued to discuss various aspects of onshore power supply including the business case (mainly reduction of port-related pollutants), technology requirements, typical investments, standardisation aspects, regulatory proposals, benefits and sample shore connections. This discussion also provided considerations specifically relevant to the Pacific region. 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 emissions on the local environment was highlighted including:

- Just in time operation.
- Reception facilities
- Port-related energy efficiency
- Bunkering facilities for alternative fuels
- Efficient intermodal activities and transhipment, etc.
- Renewable energy

Ms. Sly then talked about "ship vetting" and relevant benchmarking and introduced initiatives that look into benchmarking of ship energy efficiency in the region as well as initiatives such as the Environmental Ship Index (ESI), calculation method, scoring and incentives.

4.17 Ms Sly then made a presentation on "**Further measures to enhance the energy efficiency of ships**". She talked about commercial aspects of shipping, methods of energy saving, typical ships' energy efficiency measures and MAC (Marginal Abatement Cost) curve. She 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 and reporting of fuel consumption, etc. She discussed the following aspects in detail:

- That the use of the EEOI as an indicator has been proposed as a way of benchmarking ship energy efficiency.
- That a correspondence group on the subject is working under the leaderships of Cyprus to progress this work, noting that MEPC 67 has extended the mandate of this correspondence group to report to MEPC 68.
- General aspects such as data collection system, data aspects, administrative burdens, application thresholds, etc. that are currently being discussed at the IMO.
- The issue of ship energy efficiency measures and the 'metrics' that have been discussed by MEPC, noting so far no agreed indicator has been identified.

She then discussed various ideas on monitoring and reporting, data collection, ownership of data, commercial sensitivity of fuel consumption data and methods of measurement.

4.18 As the last presentation of Day 2, Mr. Scott Willson talked about "**Status of MARPOL Annex VI ratification in the region"** which was a summary of answers to the following questions by the participants:

- Is your country a Party to the MARPOL Convention and its annexes?
- Are there any national legislation or agreements governing the MARPOL (Annex VI)?
- What do you think are the main barriers/constraints to becoming a signatory to MARPOL Annex VI?

The status of ratification in the region of MARPOL Annex VI was given as shown below:

	MARPOL 73/78					Tokyo MOU
	I/II	III	IV	V	VI	
Cook Islands	x				x	N
Fiji*						Y
Kiribati	x	x	x	x	x	N
Marshall Islands	x	x	x	x	x	Y
Micronesia (Fed. States of)						N
Nauru						N
Niue	x	x	x	x	x	N
Palau	x	x	x	x	x	N
Papua New Guinea	x	x	x	x		Y
Samoa	x	x	x	x	x	N
Solomon Islands	x	x	x	x		Observer
Tonga	x	x	x	x		N
Tuvalu	x	x	x	x	x	N
Vanuatu	x	x	x	x	x	Y

Note: Fiji has draft legislation in place for MARPOL Annexes 1,2,4 and 5

On the 2nd question, only few countries had expressed that they have national legislation. Mr Willson offered the support of SPREP for the use of model legislation for participants and elaborated on enforcement aspects.

On the 3rd question, the lack of the following was cited as the main barriers:

- Funds for implementation,
- Adequate legislation (in order to ratify MARPOL Annex VI),
- Capacity for enforcement and controlling the registered ships for compliance
- Technology for fuel oil sampling

Day 3 presentations and discussions

4.19 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:

- Required EEDI versus Attained EEDI
- NOx limits and Emissions Control Areas.
- EEDI calculation formula and its complexity.
- IEEC and its validity and its supplements.
- New and alternative technologies for EEDI reduction.

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.

4.20 Mr Espen Ronneberg, Climate Change Adviser, SPREP gave a presentation entitled "**Linkages between the UNFCCC and MARPOL and related maritime issues**". In which he covered the following topics:

- UNFCCC references to "bunker fuels" that means international transport. These could not easily be attributed to the countries; thus responsibility for limiting their GHG is given to IMO and ICAO.
- Despite this, states are required to report on their GHG emissions due to international transport.
- On application of MBM to shipping, there is still a lot of divergence between maritime players (e.g. Flag, owners, transhipment, shipbuilders, etc.) on how to approach the subject and who is financially responsible for it.
- There are still debates on how to deal with international bunkers and there is expectation that it will come under the new agreement to be reached in Paris in 2015 and enforced from 2020.

He discussed other aspects such as reducing carbon footprint from ports with examples such as waste to energy initiatives and renewable energy. He informed the meeting that climate change financing can be approached for the above aspects if regional countries come up with good ideas. Some of challenges include:

- Limits to capacity of port authorities and shipping. This can be resolved via training and capacity building.
- Reducing energy use requires a change in mind set
- Looking at the comparative advantages of the maritime sector in getting ready to engage in these areas.
- Every country has a climate change commission and climate change negotiators. They have to understand the role of maritime.

On ports, he expressed that SPREP tries to simplify the guidelines for GHG footprint of ports, noting that the SPREP attempts to look into ports carbon footprint have so far not been successful. He informed the workshop that SPREP intends to develop a capacity building training scheme for this purpose. SPREP is ready to seek funding if countries are ready to work with SPREP on port energy efficiency. Finally he described the range of climate change services that SPREP provides.

4.21 Dr Bazari then made a presentation entitled "**Guidelines supporting Chapter 4 of Annex VI on SEEMP and EEOI**". He covered two IMO 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 be carried out by the head office in order to reduce the burden on ship staff.

4.22 Dr Bazari continued with the next presentation of Day 2 on "**Alternative fuels and SOx scrubbers**". He initially focussed on the impact of SOx, NOx, energy efficiency and ECA regulations and fuel cost 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 by saying that there is no single wining solution and depending on ship types, their operation profiles and time of operation in ECAs, different solutions will be adopted.

Dr Bazari briefly talked about other alternatives such as biofuels and synthetic fuels. He concluded that as a result of the MARPOL Annex VI regulations, the shape of ship technologies and ship operation will change in the future.

4.23 Following this presentation, Dr Bazari asked the participants to do an exercise 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:

- Hull and propeller cleaning
- Just in time operation
- Route planning
- Engine monitoring.

The group then discussed potential saving, costs and major barriers for the first two measures in detail.

4.24 Dr Bazari then 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 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, trim and ballast optimisation, hull and propeller condition improvement and engine condition monitoring; using practical energy saving examples from his own ship-board energy audit experiences.

4.25 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 was commissioned by the IMO in order to quantify the impact of EEDI and SEEMP regulations on the 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 of IMO regulations 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 pressures on the IMO to do more work in this area as the continuously rising trends will not be acceptable to the international community.

4.26 The next presentation was made by Ms Sly on the topic of "**Port State Control and enforcement of MARPOL Annex VI**". She first introduced the benefits of a country becoming a Party to MARPOL Annex VI by explaining the importance of air pollution controls and also privileges that becoming a Party entitles. She then moved to details of PSC including MARPOL provisions for survey and inspection, clear grounds for detailed inspection and on to Flag and Port State Control aspects of MARPOL requirements, including reporting responsibilities. She then highlighted that without national legislation, a country will not be able to effectively implement MARPOL Annex VI and undertake relevant prosecution and penalisation of non-compliant ships. In applying PSC, she explained that effective enforcement is based on national laws which should be based on MARPOL regulations. She then asked participants to find relevant regulations in the consolidated MARPOL Annex VI book (2013 Edition). She highlighted that as part of inspection there should not be undue delays in ship movements, and the consequences of causing undue delay to ships. She then described initial inspection, clear grounds and detailed inspections. She showed a typical EEDI Statement of Compliance and accompanying Technical File and Records of Construction. A number of Guidelines and useful Administration websites were introduced and encouraged participants to review them to assist with collecting information on various PSC issues.

4.27 The next presentation of the workshop was given by Ms Sly entitled "**Chapter 4 of MARPOL Annex VI –future capacity building activities"**. In this presentation, she initially explained the IMO's Technical Cooperation (TC) and Integrated Technical Cooperation Programmes (ITCP) in terms of their objectives, method of working and achievements. She then provided examples of recent IMO Technical

Cooperation activities. She also explained the historical background on MDGs (Millennium Development Goals) and the maritime sustainable development goals. She explained that international cooperation forms the main cornerstone of fighting GHG emissions and global warming. She discussed that the main beneficiaries of technical cooperation are the marine stakeholders in developing countries. She also provided information on the IMO Member State Audit Scheme and highlighted the status of the region in terms of adoption of MARPOL Annex VI.

She then moved to MARPOL Annex VI Regulation 23 and explained the scope of this regulation. Additionally, she referred to the important Resolution 229 (65) on technology transfer and presented its full text. Ms Sly also provided information on already existing training courses such as for ship design and ship operation. She also provided the contact points for IMO Technical Cooperation programme.

4.28 The last presentation of the workshop was given by Dr Bazari entitled "**Chapter 4 of MARPOL Annex VI – Technical cooperation, technology transfer and major projects**". In this presentation, he first provided the objectives of the IMO Technical Cooperation Programme and Regulation 23 of MARPOL Annex VI. He then moved to Resolution 229 (65) on technology transfer and presented its full text; reasons why it has been adopted, the mandate to establish the AHEWG-TT and its terms of reference and work plan and role of IMO and Member States.

He then provided information on the work so far carried out by the IMO on Capacity Building as well as Major Projects. References were made to the IMO-KOICA initiative, IMO-TC activities, LNG studies in the Caribbean region and IMO-GEF-UNDP project that is currently under development. Dr Bazari encouraged the participants to form partnerships in the region and approach IMO for support if required.

Final discussion

4.29 Before the close of the workshop, Dr Bazari summarised the workshop proceedings and invited the participants to express their views on the subject and the areas that may need further action. As part of this brainstorming, the following were expressed by participants as ideas for future consideration:

- Qualified PSC inspectors in the region. Noting the assistance that can be provided, is there specific assistance to the region in developing PSC officers and training them to be able to appropriately cover the IMO Conventions that a country is a Party to, noting some Countries do not have PSC in place at all and are looking to set this up.
- Agreed to the need for common regional action with regard to marine pollution and MARPOL.
- Expressed that access to information and finding information in order to maintain up to date is difficult for the region. Dr Bazari encouraged participants to closely work with each other on exchange of information, use of IMODOCS webpages, effective use of Google (as most of public documents can be found openly on the internet), etc. Ms Sly also offered to work with participants on identifying simple ways of obtaining this information.
- Technology transfer for EEDI for the region was discussed. How technology transfer will work for us? Can we ask for financial support for a regional assessment activity?
- Inclusion/reflection of what was discussed in the workshop in the training curriculum of maritime training centres was raised and discussed as a very good idea.

Evaluation Forms

4.30 The "workshop evaluation forms" were circulated to attendees early in the workshop and collected at the end of the workshop. The feedback from attendees were analysed; a summary of which is given in **Annex 7** of this report. The feedback was quite positive and shows that the workshop has fully achieved its objectives.

5 CLOSING REMARKS AND EXPRESSION OF APPRECIATION

5.1 The closing ceremony was managed by Mr. Willson who invited Ms. Sly and Dr Bazari to hand over the workshop certificates to participants.

5.2 Mr Anthony Talouli, Pollution Adviser, SPREP thanked everybody on behalf of SPREP for taking part actively in the three day event. He expressed thanks to IMO, the two facilitators, the Government of Canada and the Government of Australia for their support. He stressed the importance of mitigating air emissions from shipping and wished for the participants to use the knowledge gained in promoting the subject in their country.

5.3 Finally Mr Willson thanked the participants and the facilitators for the "engaging three-day event" and invited the participants to take part in the social drink that had been organised for the end of the workshop.

5.4 The workshop was formally closed at 17:00 hours on 21st November 2014. As a result of the three-day deliberations, all agenda items were completed successfully.

6 CONCLUSIONS

6.1 The IMO/SPREP workshop entitled "Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping" was organised and successfully delivered in Apia, Samoa on 19-21 November 2014.

6.2 A total number of 23 people from 16 regional small island countries took part. The workshop was preceded with an opening ceremony and finished with the hand-over of certificates to attendees and some closing remarks.

6.3 The workshop covered at its core the MARPOL Annex VI with emphasis on its new Chapter 4 regulation on Energy Efficiency Regulations for ships. 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 on were discussed extensively

6.4 Regional perspective of MARPOL Annex VI and climate change were covered by local presenters from SPREP with input from participants and widely discussed.

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

6.6 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

Annex 1 - Workshop Programme

Regional Workshop on MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping
Apia, Samoa, 19-21 November 2014

Day One		Speaker
08:30-09:00	**Arrival and registration of participants**	
09:00-09:30	**Official opening** • Welcome and opening remarks by IMO and SPREP • Photo session	SPREP and IMO
09:30-10:00	**Roundtable introduction and workshop programme** • Introduction to programme, facilitators and participants	Z Bazari
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.	A Sly
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 NOx Technical Code. • Review of Chapters 1 and 2 Regulations including Equivalents, Notifications, Survey and Certification	Z Bazari
12:30-13:30	***Lunch***	
13:30-14:45	**Overview of MARPOL Annex VI, Chapter 3** • ODS: Types and impacts, regulatory framework, current and future developments, compliance aspects incl. record books and reception facilities. • NOx and SOx: Regulatory framework and future limits, Emissions Control Areas, requirements and compliance. • VOC, Incineration, Fuel Oil Quality and Availability regulations. • Current status, application, survey, certification, enforcement	Z Bazari
14:45-15:00	**Overview of the GHG issue and the role of international shipping** • Work by IMO to address GHG emissions and link to UNFCCC • Role of international shipping • IMO consideration of the issue & Resolution A.963(23) • 2nd (2009) and 3rd (2014) IMO GHG studies – Key findings and conclusions	A Sly
15:00-15:30	***Refreshments***	
15:30-17:00	**MARPOL Annex VI, Chapter 4 - Regulations for Ship Energy Efficiency** • Resolutions MEPC.203(62) and MEPC251(66) on the new Chapter 4 of MARPOL Annex VI on energy efficiency regulations for ships. • Energy Efficiency Design Index (EEDI) • Ship Energy Efficiency Management Plan (SEEMP) • Survey and certification requirements • Discussion on implementation and progress so far	Z Bazari
17:00	**End of day one**	

Day Two		**Speaker(s)**
09:00-9:30	**Review of Day 1 learning points** • Participants will talk about learning topics of Day 1.	Z Bazari
9:30-11:00	**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
11:00-11:30	***Refreshments***	
11:30-12:30	**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.	Z Bazari
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	A Sly
14:00-15:00	**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)	Z Bazari
15:00-15:30	***Refreshments***	
15:30-16:15	**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	A Sly
16:15-17:00	**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	Z Bazari
17:00-17:30	**Regional countries maritime status with specific reference to MARPOL Annex VI and GHG emissions** • The regional countries' perspective on their maritime status and IMO's work on MARPOL Annex VI and GHG emissions from international shipping. • Further discussion by participants from the region.	S Willson
17:30	**End of day two**	

Day Three		**Speaker(s)**
09:00-9:30	**Review of Day 2 learning points** • Participants will talk about learning topics of Day 2.	Z Bazari
09:30-10:15	**Energy efficient ship operation and operational energy efficiency measures** • Introduction to ship operation for energy efficiency. • Slow steaming, just in time, ship handling, hull and propeller, engines and auxiliary system. • Identification of key operational measures for improving energy efficiency and input to SEEMP	Z Bazari
10:15-11:00	**MARPOL Annex VI – Potential impact on reduced GHG emissions and fuel consumption** • Methodology used for estimating the effect of amendments to MARPOL Annex VI • Estimated reductions in GHG emissions and fuel savings and costs.	Z Bazari
11:00-11:30	Refreshments	
11:30-12:30	**Implementation and enforcement of MARPOL Annex VI** • MARPOL Annex VI – How to do it. • Roles and responsibilities of Administrations • Flag Administration considerations • Port State Control under MARPOL Annex VI • Reference to and use of relevant IMO guidelines	A Sly
12:30-13:30	Lunch	
13:30-14:00	**Implementation and enforcement group discussion on:** • Processes and procedures. • Checklists and documents • Role, responsibilities and delegations, Etc.	Z Bazari
14:00-14:45	**MARPOL Annex VI - Capacity building activities** • Identification of Member State needs associated with the provision of support with a view to ratification and/ or implementation. • IMO Technical Cooperation Programme • Past, current and future capacity building activities on ship energy efficiency. • How to request IMO's capacity building services?	A Sly
14:45-15:30	**Chapter 4 of MARPOL Annex VI – Technical cooperation, technology transfer and major projects** • MARPOL Annex VI Regulation 23 • Resolution MEPC.229 (65) on promotion of technical co-operation and transfer of technology on ships energy efficiency • Major Projects: Past KOICA, IMO-GEF project, etc.	Z Bazari
15:30-16:00	***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	Z Bazari + A Sly
16:30-17:00	**Presentation of certificates and closing remarks**	SPREP/IMO
17:00	**Close of workshop**	

Annex 2 – List of Participants and Facilitators

Participant			
No.	**Country**	**First name**	**Last name**
1	Cook Island	Ngatokorua	Ngatokorua
2	Fiji	Phil	Hill
3	FSM	Henry	Susaia
4	Kiribati	Ioteba	Atanimakin
5	Marshall Island	Robert	Heine
6	Niue	Sonya	Talagi
7	Nauru	Jaden	Agir
8	Palau	Francesca	Sungino
9	PNG	Pawa	Lima
10	Solomon Island	William	AUBASI
11	Tokelau	Asofa	Fereti
12	Tonga	Meliame	Kakala
13	Tuvalu	Taasi	Pitoi
14	Vanuatu	Kembro	Maderson
15	Samoa	Leulua'itumua Fatu	Lafoai
16	Samoa	Kalolo	Bartley
17	Samoa	Faatamaliiamio	Meredith·Leiataua
18	Samoa	Lucie	Saia
19	Samoa	Tafaigata	Toilolo
20	Samoa	Tapaga	Collins
21	Samoa	Fepulea'i Faleniu	Alesana
22	Samoa	Aisiga	Nauma
23	SPC	Alobi	Bomo
Facilitators			
24	UK (IMO Consultant)	Zabi	Bazari
25	Australia (AMSA)	Annalisse	Sly
SPREP Staff			
26	Samoa (SPREP)	Scott	Willson
27	Samoa (SPREP)	Anthony	Talouli
28	Samoa (SPREP)	Espen	Ronneberg
29	Samoa (SPREP)	Pulemalie	Habiri

ANNEX 3 – OPENING STATEMENT BY DAVID HAYNES, A/DIRECTOR GENERAL, SPREP 19 November, 2014, Apia, Samoa

Mrs. Annalisse Sly, Policy And Regulatory Senior Adviser, Marine Environment Division, AMSA.
Mr. Zabi Bazari, IMO Consultant, London
Distinguished participants
Ladies and gentlemen
SPREP Staff

Talofa and Good Morning to you all.

Firstly for those that have come here for the first time, welcome to our SPREP Campus, welcome to Samoa and for those that have been here before welcome back.

We are very happy that you are able to be here, to be part of this IMO Regional Workshop on MARPOL Annex VI – Air Pollution and Greenhouse Gas (GHG) Emissions From International Shipping, the first Annex VI regional activity that has been held in the Pacific.

Marine Pollution is widely recognized as one of the four major threats to the world's oceans, along with climate change, habitat destruction and over-exploitation of living marine resources. Pollution from ships - spills of oil and other chemicals, garbage disposal, sewage and ballast water discharge and greenhouse gas emissions are some of the ways in which the marine bio-diversity and ecosystems are being affected.

MARPOL Annex VI is the link from maritime transport to climate change which has been noted recently by the United States as a "weapon of mass destruction (MD's)". Nations have gone to war because of MD's. So how is the maritime transport sector preparing for this war? How are we the Pacific nations preparing for this war?

The International Maritime Organisation with assistance from the Secretariat of the Pacific Regional Environment Programme (SPREP), and the Australian Maritime Safety Authority (AMSA) is conducting this workshop that is focused on MARPOL Annex VI – Air Pollution And Greenhouse Gas (GHG) Emissions From International Shipping, which has been targeted at government administrators, and senior officials with responsibility for technical and policy-making decisions.

International shipping is the most energy efficient mode of mass cargo transport. Noting that the demand for sea transportation will continue to grow with the growth of world trade, the IMO considers it very important that a global approach to improve further its energy efficiency and effective emissions control to limit the impacts on human health and the environment. The 1997 Air Pollution Conference was an historic response by IMO to the need to minimize emissions from ships and their contribution to global air pollution and environmental problems. Through this process the IMO has set its own rules for emissions control which do not make special considerations for developing countries with special challengers. The question for you this week is why not? I look forward to your response on this.

That's could be the reason why to date there are only 8 PICs party to MARPOL Annex VI. I would like to state how important MARPOL and all its Annexes are to assist the Pacific nations in protecting your marine environment and I encourage you all to urge your leaders to ratify all Annexes of MARPOL.

You may ask Why? Why should we ratify and what is the benefit of ratifying the Articles, Protocols, Annexes and Unified interpretations of the International Convention for the Prevention of Pollution from Ships (MARPOL)**.** The question seems self-explanatory don't you think. I look forward to your response on this and hope that you will, upon your return to your home country, promote the full ratification of MARPOL.

Over the next three days the facilitators will elaborate on the emissions control rules and why it is important that we all cooperate in reducing greenhouse emissions from ships particularly for developing

countries with special challengers. As the saying goes "*Where there is a hazard, whatever we do is only mitigating the risk*."

In closing I would like to acknowledge again the assistance of IMO and AMSA. I wish you well in this training, however, as the saying goes *"all work and no play makes Jack a dull boy"* so I encourage you to use every opportunity to explore and enjoy beautiful SAMOA.

Faafetai tele lava, thank you and Soifua.

Annex 4 – Opening Statement by Dr Edmund Hughes, Head, Air Pollution and Energy Efficiency, Marine Environment Division, International Maritime Organization

Delivered by Dr Zabi Bazari on behalf of Dr Hughes,

Good morning ladies and gentlemen,

Firstly I would like to apologise for not being able to be with you in person. Unfortunately other commitments, not least my preparations for next month's UNFCCC COP 20 meeting in Lima, Peru, have prevented me from travelling to the South Pacific to be part of your workshop.

Indeed this regional workshop on "MARPOL ANNEX VI – Air Pollution and Greenhouse Gas (GHG) Emissions from International Shipping" comes at a very important time for international climate change negotiations and as Pacific States seek to implement the Suva Declaration on Improving Maritime Transport and Related Services in the Pacific.

Before saying something about this workshop and why I am delighted we are able to hold this workshop now, I would like to thank several parties.

Firstly I wish to thank the Government of Samoa for hosting this workshop and to the Government of Canada for its financial support.

You have two excellent consultants in Dr Zabi Bazari and Ms Annalisse Sly. Over the next three days do please make full use of their complimentary expertise that will be invaluable in providing you with the necessary insight into what is often a complex and highly technical area of international shipping policy.

I am indebted to Scott Willson and Anthony Talouli of the Secretariat of the Pacific Regional Environmental Programme for their support and assistance to deliver this workshop.

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.

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!

The Marine Environment Protection Committee – the IMO technical body responsible for considering and developing international regulations to protect the marine environment – held its last meeting, MEPC 67, in October and 2 of the 3 possible working groups worked on matters related to air pollution and further energy efficiency measures. Also just prior to MEPC 67 an ad-hoc expert group met to consider the effective implementation of resolution MEPC.229(65) on promotion of technical co-operation and transfer of technology. So you can see the issues highlighted during this workshop are very much at the heart of current IMO work.

Some of the regulations you will be hearing about are already leading to significant improvements in the energy efficiency of international shipping. This is resulting in less fuel oil being consumed by ships and so a reduction in emissions of harmful pollutants and greenhouse gases such as carbon dioxide. Further, and specifically for this region, is the cost of maritime transport and its impact on your economies. Regulation is often considered to have a detrimental impact on costs. As fuel oil makes up a significant proportion of the operational cost of ships these energy efficiency regulations could potentially significantly reduce the cost of maritime transport for South Pacific States.

Finally, the mandatory IMO Member State Audit Scheme will increasingly be an important part of the governance regime for international shipping. As international shipping is under increasing scrutiny it is

imperative that member States demonstrate a clear willingness to fully implement international maritime regulations – indeed IMO's theme for this year has been "IMO Conventions: Effective implementation".

These regional workshops provide a valuable opportunity for progressive maritime Administrations to benchmark themselves, and consider future necessary action. I would urge you to keep this in mind this week.

May I wish you all a successful and insightful workshop.

Thank you.

Annex 5 – Picture of event

Group picture

Annex 6 – Text of IMO Press Release

Combating emissions in the Pacific

20/11/2014 A three-day regional workshop on MARPOL Annex VI for Pacific States is being held in Apia, Samoa (19 - 21 November). The workshop is addressing energy efficient ship design and technical energy efficiency measures, further measures to enhance the energy efficiency of ships, shore power supply and green port initiatives and MARPOL Annex VI guidelines.

The Cook Islands, Fiji, Federated States of Micronesia, Kiribati, Marshall Islands, Niue, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and the Secretariat of the Pacific Community are represented at the workshop. The workshop is being hosted by the Secretariat of the Pacific Regional Environment Programme (SPREP) in partnership with IMO and the Australian Maritime Safety Authority (AMSA) and is being supported using funds kindly donated to IMO by the Government of Canada through Transport Canada.

Annex 7 – Summary of Evaluation Questionnaire

Total number of participants: 23 Total number of completed questionnaires: 13

Q1: Was the invitation received in good time?

YES: 13
NO: 0
No answer: 0

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

- **on its objective and scope**

YES: 11
NO: 1
No answer: 2

- **subject areas and programme**

YES: 10
NO: 1
No answer: 2

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

- **profile required of participant**

YES: 13
NO: 0
No answer: 0?

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

YES: 13
NO: 0
No answer: 0?

Q4 - Did you receive logistical information on?

- **Venue**

YES: 12
NO: 0
No answer: 1

- **travel arrangements**

YES: 9
NO: 0
N/A: 3
No answer: 1

- **DSA payments**

YES: 9
NO: 0
N/A: 3
No answer: 1

- **Accommodation**

YES: 9
NO: 0
N/A: 3
No answer: 1

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

YES: 11
NO: 0
N/A: 0
No answer: 2

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	0	8	4	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	13	0	0	0	0
Facilities	13	0	0	0	0
Equipment	12	1	0	0	0

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

	Excellent	Good	Satisfactory	Poor	No Answer
Presentation	11	2	0	0	0
Clarity	9	3	0	0	1
Technical content	11	1	0	0	1
Comprehensiveness	10	2	0	0	1
Quantity	9	4	0	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	11	1	1	0	0
Clarity	10	2	1	0	0
Technical contents	11	2	0	0	0
Comprehensiveness	9	4	0	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	12	1	0	0	0	0
IMO reference materials	12	1	0	0	0	0
Other resource materials	10	3	2	0	0	0
Group and practical activities	11	2	3	2	7	0
Field trips	6	1	0	0	5	1

Q11 - Please rate each lecturer with regard to the following

Dr Zabi Bazari

	Excellent	Good	Satisfactory	Poor	No Answer
content of lecture	13	0	0	0	0
delivery of presentation	11	2	0	0	0
ability to transfer knowledge	12	1	0	0	0
Effectiveness in answering questions	12	1	0	0	0
Effectiveness in suggesting solutions to issues	11	2	0	0	0

Ms Annalisse Sly

	Excellent	Good	Satisfactory	Poor	No Answer
content of lecture	13	0	0	0	0
delivery of presentation	12	1	0	0	0
ability to transfer knowledge	11	1	1	0	0
Effectiveness in answering questions	11	2	0	0	0
Effectiveness in suggesting solutions to issues	10	3	0	0	0

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

- Green Port (SPREP Climate Change Presentation)
- Bunker (SPREP UNFCCC Presentation)
- All topics (2 persons)
- Operational energy efficiency measures (2 persons)
- EEOI
- PSC and enforcement (2 persons)
- Ships operational measures
- Positive impact of EEDI
- ODS
- Technical aspects

Q13: Are there any topics which should be added?

YES: 1
NO: 9
No answer: 3

Proposed new areas:

-

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

YES: 13
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: 13
NO: 0
No answer: 0

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

YES: 13
NO: 0
No answer: 0

Comments given

1. SPREP to recommend to stakeholder of each country in terms of capacity building of personal to cater for need in terms of technical skills to carry out enforcement and implementation, or to do a port study of one regional port to gauge the outcomes in order for other regional countries to implement according to the study conducted.
2. Thanks for this great opportunity to earn of the IMOs regulations and the three day workshop and also to share ideas with other countries. Thanks to SPREP for holding the workshop and this opportunity.
3. The mathematical formulas hit me like a brick wall and I loved it.
4. Should be extra days to ensure that all participants have absorbed and validate knowledge from the technical expertise of the lectures.
5. Training very interesting and also very challenging in terms of implementation and monitoring. Topics discussed a bit too much for the time allocated with a limited time frame. Develop networks amongst participants for further discussions and deliberation.
6. Conference very useful to my country.
7. A great opportunity to get together and discuss with colleagues Annex VI.
8. Workshop too short.

Annex 8 – Text of pre-workshop assignment

PART I – ENERGY EFFICIENCY REGULATIONS

Use **IMO MEPC Resolution 203(62)** to answer the questions

- ***Please tick only one box for each question.***

MARPOL Annex VI Regulations deal with:

☐ Air pollution ☐ Ballast water ☐ Water pollution ☐ Oil pollution

Chapter 4 of MARPOL Annex VI deals with Regulations on:

☐ NOx ☐ SOx ☐ Energy Efficiency ☐ Fuel quality

Chapter 4 of MARPOL Annex VI was adopted on:

☐ 17 August 2009 ☐ 1st March 2012 ☐ 1st January 2010 ☐ 15 July 2011

Regulation 22 of MARPOL Annex VI deals with:

☐ Attained EEDI ☐ EEOI ☐ SEEMP ☐ Required EEDI

Attained EEDI means:

☐ The actual EEDI of a ship as calculated according to IMO Guidelines and verified by Flag Administration or a Recognised Organisation on its behalf.

☐ The reference EEDI value for a specific ship.

☐ The regulatory limit for EEDI of a vessel as calculated from the Reference Line and Reduction Factor

☐ None of the above

Required EEDI means:

☐ The actual EEDI of a ship as calculated according to IMO Guidelines.

☐ The reference EEDI value for a specific ship.

☐ The regulatory limit for EEDI of a vessel as calculated from the mandated Reference Line and Reduction Factors.

☐ None of the above

The unit of EEDI for cargo ships in relevant Regulations is:

- ☐ gGHG emissions/tonne.nm (nm stands for nautical mile; tonne refers to tonne DWT)
- ☐ gCO2/tonne
- ☐ gCO2/tonne.nm
- ☐ Tonne CO2/voyage

The Reference Value of EEDI for a VLCC of 300,000 DWT is:

- ☐ 10.12 gCO2/tonne.nm
- ☐ 6.62 gCO2/tonne.nm
- ☐ 2.59 gCO2/tonne.nm
- ☐ 1.95 gCO2/tonne.nm

The Required EEDI Value for a new building VLCC of 300,000 DWT with a contract date of 30th January 2015 will be:

- ☐ 4.46 gCO2/tonne.nm
- ☐ 8.92 gCO2/tonne.nm
- ☐ 2.11 gCO2/tonne.nm
- ☐ 2.33 gCO2/tonne.nm

The Required EEDI Value for a new building VLCC of 300,000 DWT with a contract date of 30th January 2025 will be:

- ☐ 7.21 gCO2/tonne.nm
- ☐ 5.18 gCO2/tonne.nm
- ☐ 1.81 gCO2/tonne.nm
- ☐ 0.52 gCO2/tonne.nm

The following ships are excluded from EEDI Regulations for the time being:

☐ Tankers.

☐ RoRo ships.

☐ Passenger ships.

☐ Ships with turbine propulsion.

The IEE Certificate refers to:

☐ International Air Pollution Prevention Certificate

☐ International Engine Air Pollution Prevention Certificate

☐ International Energy Efficiency Certificate

☐ International Environmental and Energy Certificate

The EEDI Reduction Factor for a Refrigerated Cargo Carrier of 10,000 DWT with a building contract date of 16 July 2020 is:

☐ 10%

☐ 20%

☐ 30%

☐ 15%

For "Existing Ships" compliance with requirements of Chapter 4 of MARPOL Annex VI means:

☐ Verification that a SEEMP is on board the ship.

☐ Have a verified Attained EEDI.

☐ Have an EEDI that is below the Required EEDI.

☐ Certified to relevant ISO standards.

For "Existing Ships" compliance with the requirements of Chapter 4 of MARPOL Annex VI will be checked by verification on:

☐ 1st January 2015.

☐ 1st January 2016

☐ At first intermediate or renewal survey, whichever is first, on or after 1 January 2013.

☐ None of the above.

A Recognised Organisation is:

- ☐ Organisations that are part of Flag State establishment.
- ☐ Organisations recognised by Classification Societies.
- ☐ Organisations recognised by Flag State Administration to perform Survey and Certification on their behalf.
- ☐ Organisations that do the Port State Control.

A "Record of Construction Relating to Energy Efficiency":

- ☐ Is a checklist that must be completed and permanently attached to IEE Certificate.
- ☐ Must be completed by shipyards before the delivery of all types of vessels.
- ☐ Must always show the Attained and Required EEDI of the vessel.
- ☐ None of the above.

On promotion of technical co-operation and transfer of technology relating to energy efficiency of ships:

- ☐ There is a Regulation on the above subject that encourages the active cooperation of Flag Administrations with other Parties on the subject.
- ☐ There is no regulation on the subject.
- ☐ There is scope only for cooperation between developing and developed countries.
- ☐ None of the above.

A ship with an IAPP (International Air Pollution Prevention) Certificate:

- ☐ Does not need an IEE Certificate.
- ☐ The IAPP and IEE Certificates both are needed when applicable and existence of one does not eliminate the need for the other one.
- ☐ Both IAPP and IEE certificates should be issued by the same Recognised Organisation.
- ☐ None of the above.

MARPOL Annex VI applies:

☐ Only to ships that fly the flag of a State that is Party to MARPOL Annex VI.

☐ Only to ships that visit ports of a State that is Party to MARPOL Annex VI.

☐ To ships with both of the above.

☐ All ships irrespective of flag or port state control requirements.

The "waiver clause" in Chapter 4 of MARPOL Annex VI stipulates that:

☐ An Administration could delay the Chapter 4 implementation for 4 years.

☐ Ships can be exempted from Chapter 4 for 6 years.

☐ An Administration may delay imposing the requirements of MARPOL Annex VI Regulations 20 and 21 on a ship by a maximum of 4 years from the date that Chapter 4 comes into force.

☐ None of the above.

PART II – MARPOL ANNEX VI PORT STATE CONTROL

Use **IMO MEPC Resolution 181(59)** and answer the following questions

- ***Please tick only one box for each question.***

The current applicable maximum global sulphur limit is:

☐ 4.5% ☐ 3.5% ☐ 1% ☐ 0.5%

The current applicable maximum sulphur level in Emission Control Areas is:

☐ 1.5% ☐ 1% ☐ 0.5% ☐ 0.1%

The North West Europe ECAs are:

☐ ECA NOx only ☐ ECA SOx only ☐ Both NOx and SOx ☐ None of them

An IAPP Certificate is required:

☐ For all ships of 400 GT or above engaged in international voyages.

☐ For all ships of any size engaged in international waters.

☐ For all ships of 400 GT or above engaged in international voyages that have the flag of a state that is a Party to MARPOL Annex VI.

☐ None of the above

Tier I NOx emission limits applies to:

☐ All applicable marine diesel engines installed on ships constructed on or after 1 January 2000 and prior to 1 January 2011.

☐ All applicable marine diesel engines installed on ships constructed on or after 1 January 1997 and prior to July 2005.

☐ Is not applicable to any engines installed prior to 1 January 2000.

☐ All applicable marine diesel engines installed on ships constructed on or after 1 January 2011.

An EIAPP Certificate is issued for:

☐ A ship that comply with all provisions of MARPOL Annex VI.

☐ A ship that uses LNG as fuel.

☐ All marine diesel engines installed on board ships

☐ None of the above.

The Port State Control inspection with regard to engine NOx certification, for applicable ships, would include inspection of:

☐ The EIAPP certificate and its supplement for each applicable engine

☐ The relevant Technical Files

☐ The Record Book of Engine Parameters or other methods of compliance,

☐ All of the above.

Ships moving in and out of ECA and use fuel change-over for compliance, should have:

☐ Computer system for managing the fuel oil change-over process.

☐ Written procedures covering fuel oil change-over operations

☐ No documented procedure is needed.

☐ None of the above.

The following Records are subject to MARPOL Annex VI Port State Control inspection:

☐ The Ozone Depleting Substances Record Book

☐ The Record Book of Engine Parameters for NOx compliance

☐ The Bunker Delivery Notes

☐ All of the above

A ship constructed before the date of entry into force of MARPOL Annex VI:

☐ Does not need to have an IAPP certificate.

☐ Flag State shall decide if an IAPP certificate is needed.

☐ Shall be issued with an IAPP Certificate no later than certain period of time.

☐ None of the above.

MARPOL Annex VI came into force on:

☐ 1st January 2000.

☐ 11th July 1997

☐ 19th May 2005

☐ October 2008.

On Ozone Depleting Substances:

☐ Hydro-chlorofluorocarbons are not harmful to Ozone layer.

☐ Hydro-chlorofluorocarbons are not permitted to be used on ships.

☐ Hydro-chlorofluorocarbons are prohibited on new ships from 19 May 2015.

☐ Hydro-chlorofluorocarbons are not permitted to be used on-board any ship from 2020.

An Ozone Depleting Substances Record Book is required by:

☐ All ships to which MARPOL Annex VI is applicable.

☐ All MARPOL Annex VI ships with rechargeable systems that contain Ozone Depleting Substances.

☐ All ships to which MARPOL Annex VI is applicable from May 2015.

☐ None of the above.

Clear grounds to conduct a more detailed inspection of a ship (by PSC officers) are:

☐ Evidence that certificates required by Annex VI are missing or clearly invalid.

☐ The presence of equipment or arrangements not specified in the certificates or documents

☐ Information or evidence that the master or crew are not familiar with essential ship-board operations relating to the prevention of air pollution, or that such operations have not been carried out.

☐ All of the above.