

MARITIME TECHNOLOGY COOPERATION CENTRE IN THE PACIFIC (MTCC-PACIFIC)

CAPACITY BUILDING FOR CLIMATE MITIGATION IN THE MARITIME SHIPPING INDUSTRY
THE GLOBAL MTCC NETWORK (GMN) PROJECT

SAMOA NATIONAL WORKSHOP ON ENERGY EFFICIENT OPERATIONS OF SHIPS

Apia, Samoa

12-14 June, 2018



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EXECUTIVE SUMMARY

The First National Workshop on Energy Efficient Operations of Ships was held at Secretariat of the Pacific Regional Environment Programme (SPREP) in Apia, Samoa from 12-14 June 2018. The workshop was coordinated and facilitated by the Maritime Technology Cooperation Centre in the Pacific (MTCC-Pacific) and attended by representatives from the Ministry of Works, Transport and Infrastructure (MWTI) that include the Samoa Shipping Corporation (SSC), Samoa Ports Authority (SPA), Maritime Training Centre (MTC), and the Samoa Police (Maritime). The list of participants is attached in Annex 1.

The purpose of the NW was to gain Samoa's MWTI to agree on measures to improve energy efficiency of shipping (SEE) in Samoa. Also, to provide them with technical tools to progress toward energy efficient operations of ships (SEEO) to comply with the recent Marine Environment Protection Committee (MEPC) Resolution 72 (9-13 April 2018) 'IMO Strategy' to reduce greenhouse gas emissions by up to 50% by 2050 compared to 2008. The NW agenda is attached in Annex 2.

The NW was held in two parts; the first day consisted of discussions on the initial Drivers-Needs-Barriers-Actions (D-N-B-A) Matrix to identify what is important to Samoa's maritime sector. Then a comprehensive coverage on shore to ship interactions was presented. The second part consisted of technical matters relating to SEEO; climate change, greenhouse gas emissions (GHGE) and Shore to Ship Energy Management measures. There was capacity building on the Energy Efficiency Design Index (EEDI), Energy Efficiency Operational Indicator (EEOI), Ship Energy Efficiency Management Plan (SEEMP) and the overarching Pacific Islands Domestic Ship Safety (PIDSS) programme and potential technologies to reduce and improve energy use performance e.g. Propeller Boss Cap Fins (PBCF), Light Emitting Diodes (LED), Waste Heat Recovery System (WHRS) and such.

This culminated in a closing group discussion to finalise feedback from the participants. The participants agreed to implement relevant actions to progress toward a Green Maritime Industry (ships and ports) in Samoa in order to support a long-term objective for low-carbon maritime transport and contribute to the reduction of GHG emissions in Samoa and the Pacific. The NW Outcome Document is attached in Annex 3.

All NW presentations are attached in Annex 4 in consecutive order as outlined in the Agenda.

INTRODUCTION

The First National Workshop on Energy Efficient Operations of Ships was held at Secretariat of the Pacific Regional Environment Programme (SPREP) in Apia, Samoa from 12-14 June 2018. The workshop was coordinated and facilitated by the Maritime Technology Cooperation Centre in the Pacific (MTCC-Pacific) and attended by representatives from the Ministry of Works, Transport and Infrastructure (MWTI) that include the Samoa Shipping Corporation (SSC), Samoa Ports Authority (SPA), Maritime Training Centre (MTC), and the Samoa Police (Maritime). The list of NW participants is attached in Annex 1.

The purpose of the workshop was to gain Samoa's MWTI to agree on measures to improve energy efficiency of shipping (SEE) in Samoa and provide them with technical tools to progress toward SEE. The national workshop agenda is attached in Annex 2.

The national workshop provided capacity building in the areas of ship energy efficiency operations (SEEO), operational measures (SEEOM), management plans (SEEMP) and systems (SEEMS). However, the key Pilot Project on SEE is based on the critical need for data collection (DC). The significant 'Outcome' process and resulting document was developed to enrol and enhance the local Samoa maritime sector who agreed to provide the essential baseline data on fuel oil consumption (FOC) for up to six months in order to gain an understanding of where they are now and then determine what could be done to improve SEE, reduce fuel, costs and greenhouse gas emissions (GHGE).

This ultimately fulfils the vision of the International Maritime Organization (IMO) implemented and European Union (EU) funded Global MTCC Network (GMN) for climate change mitigation established to assist the maritime transport sector of Small Island developing states (SIDS) and least developed countries (LDC).

A media release was sent out at the end of the workshop noting the commitment of the participants to address issues affecting domestic shipping in Samoa, taking into consideration the need to contribute to national efforts in reducing GHGE, and with the view to operate ships more efficiently and implement energy efficient measures. Several tweets/retweets and posts/re-posts were also sent out on social media. Attached in Annex 7 are examples of communication and visibility activities that took place during the workshop.

Group Discussions *(Dr. M. A. Zullah, Maritime Industry Energy Efficiency Officer, SPC)*

The facilitator opened the floor for discussion and the following notes were recorded:

- The maritime stakeholders present in this NW were receptive to the concept of SEEO confirming that shipping is vital to Samoa for their lively hoods and transportation of goods.
- MTCC-Pacific's initiative is beneficial in highlighting issues that will make the domestic shipping safer and efficient.
- MTCC-Pacific is here to assist Samoa government shipping to achieve the primary objective of reducing GHGE. However, it acknowledges the critical need for relevant and accurate data collection (DC) that will establish the base-line to fulfil this objective.
- Participants feel more needs to be done on implementation of regulations and enforcement on international vessels arriving in Samoa. They also suggest that more needs to be done on domestic vessels operational regulation and implementation of SOP's for safe and efficient journeys.

Ship Energy Efficiency Operations (SEEO) Challenges & Ship Owner Issues with reference to the Drivers-Needs-Barriers-Actions (D-N-B-A) Matrix *(Mark Davis, Transport Greenhouse Gas Adviser, SPC)*

The Drivers-Needs-Barriers-Actions (D-N-B-A) Matrix, tabulated below, was developed through group discussions.

Group Discussion:

- IMSAS audit has highlighter lot of short falls
- Port also have a lot of gaps that we can needs to be looked at
- SSC does not have capacity to measure emission and lack knowledge on how they can mitigate the emission from the maritime sector
- The problem is this is the first training that they have attended a workshop together with all the maritime entities and they will be discussing
- Priority should be for the legal and frame work from regulatory perspective. The point of action is through legal framework. Shipping acts needs to be re-informed and strongly implemented.
- The is no emission control in Samoa, unlike New Zealand and Australia, Samoa has no regulation in place to prevent international vessels calling at the port here to control their emission.

Energy Efficiency Operations Indicator (EEOI) on Data collection

- The project will initially commence with the collection of fuel oil consumption (FOC) data. Templates for this have been developed by MTCC-Pacific. The data serves to provide MTCC-Pacific with a way of quantifying GHGEs and will be used to build a baseline to enable the design of suitable technology and operational activities that will assist in reducing GHGEs.

Table 1 Matrix of Drivers, Needs, Barriers and Actions (D-N-B-A).

| Drivers | Needs | Barriers | Relevant action |
|--|---|--|--|
| <i>Samoa National Workshop on Energy Efficient Operations of Ships, Apia, Samoa, 12-14 June 2018</i> | | | |
| Legislation, Regulations and standards for domestic ships including training on air pollution prevention and energy efficiency | Awareness of maritime compliance through 'MWTI'. | <ul style="list-style-type: none"> • Lack of support to provide information and technical tools on energy efficiency. • New amendments of MARPOL Convention not reflected in the national legislation | <ul style="list-style-type: none"> • Technical support and capacity building provided by MTCC-Pacific, and SPC to implement adapted measures. |
| Data Collection Database | <ul style="list-style-type: none"> • Develop database to capture maritime data • Baseline data collection (DC) of FOC to show GHG emissions from domestic shipping. • Proper recording of the fuel on-board. | <ul style="list-style-type: none"> • Key performance indicators e.g. for the EEOI are not known/understood • Lack of knowledge on the benefits and importance of data logging. • Proper voyage* report/log- FOC (tonnes), weight (tonnes of cargo, pax & Ballast Water), time (hr) and distance (nm). <p>*port-to-port.</p> | <ul style="list-style-type: none"> • Improve practices & establish SEEMP under the current SMS program. • MTCC-Pacific to provide EEOI training. • Captain should conduct regular toolbox meetings prior to departure of vessels, including reminding crew in regards to the importance of SEE & GHGs. • Implement energy management with the support of SPC (MTCC-Pacific). |
| Monitoring equipment | <ul style="list-style-type: none"> • Quantify air pollution around ports. • Suitable, simple and cost effective measure of emission at ports. | <ul style="list-style-type: none"> • No equipment or expertise to use and understand monitoring data. • Cost and effective use. | <ul style="list-style-type: none"> • Acquiring air pollution monitoring equipment and specialised training. |
| Capacity Building e.g. HR development of Awareness and Training opportunities | <ul style="list-style-type: none"> • HR development. • Building maritime expertise within the maritime transport sector. | <ul style="list-style-type: none"> • Insufficient local expertise. | <ul style="list-style-type: none"> • Building an adaptive capacity that will ensure application of SEEMP measures on board domestic vessels. • SPC-SPREP support for increasing trained personnel. |
| Cost and quality of fuel | <ul style="list-style-type: none"> • Fuel standards and quality control | <ul style="list-style-type: none"> • Only one oil company. • Lack of fuel quality testing equipment. | <ul style="list-style-type: none"> • On-board filtering equipment (MTCC-Pacific). • Fuel monitoring. • Pacific Petroleum Services (PPS) provide regular QA data. |
| Planned maintenance | <ul style="list-style-type: none"> • Capacity of slipway (1000 tonnes). | <ul style="list-style-type: none"> • Cost of using American Samoa (USD). | <ul style="list-style-type: none"> • To increase size of slipway, technical maintenance capability or access to cost effective slipways e.g. Fiji. |
| Insufficient specialised staff | <ul style="list-style-type: none"> • Lack of training. • Retention of experienced staff. | <ul style="list-style-type: none"> • International development organisation (IMO, etc.) training. | <ul style="list-style-type: none"> • Request MTCC-Pacific for tailored trainings. |

DAY 1: TECHNICAL WORKSHOP

The following are the NW modules presented by the two MTCC-Pacific trainers as per the Agenda (Annex 1).

1 Ship Energy Efficiency Operations (SEEO) Challenges & Ship Owner Issues- D-N-B-A Matrix (*Mark Davis, Transport Greenhouse Gas Adviser, SPC*)

Discussion

The following points came out of the discussion from this session:

- Ports authority is interested in the offshore power supply. However, Samoa generates approx. 90% of energy through diesel generators and it might not be feasible to have shore power connection at the ports at this time. Samoa is aiming for 100% renewables by 2025 and that would be a good time to change to OPS.

2 SEEO & GHGE Management to Operation (*Dr. M. A. Zullah, Maritime Industry Energy Efficiency Officer, SPC*)

This session covered the origins of air pollution (Airpol), climate change (CC) and GHGEs, international global response; international shipping response and the main IMO instruments and historical developments.

Discussion

The following points came out of the discussion from this session:

- What was the latest GHG emission study by IMO (2014)?
- What about energy efficiency of the exiting vessels?
- Are bigger vessels less efficient than small vessels, because they use more fuel to operate?
- Does Yanmar engine maker have some technology to reduce fuel consumption from the vessels?
- Most of the engineers had worked with the innovative technologies on international vessels and have the capacity to manage it locally.

3 SEE Regulations & Related Guidelines (*Mark Davis, Transport Greenhouse Gas Adviser, SPC*)

This session provided an introduction to ship roles, responsibilities, SEE measures and maintenance.

Discussion

The following points came out of the discussion from this session:

- The MWTI representative reiterated the need for enacting the MARPOL Annex VI into local law. It was clarified that once enshrined into local laws then it could be used to control GHG emissions within the local domestic fleet and provide a compliance tool for the maritime safety organization.

4 Ship-Board Energy Management (*Dr. M. A. Zullah, Maritime Industry Energy Efficiency Officer, SPC*)

This session focused on the following aspects of ship-board energy management: ship-board organisation, roles and responsibilities; overview of main SEEMs; trim optimisation, its impact and best practice; ballast water management; hull and propeller roughness and fouling; engines and machinery utilization management; fuel management: storage, treatment and purification; technology upgrade;

Discussion

The following points came out of the discussion within this session:

- Slow steaming (reducing the steaming speed by 1 knot) in Samoa could be useful.
- Speed can be reduced on the return trip when carrying lower cargo to offset operational costs.
- Ballast water is not carried to American Samoa since no treatment system on board. Required to give 24hrs notice to USCG if ballast water is carried to American Samoa.
- \$200,000 per annum profit has to be achieved by the shipping service.
- Meet ISM Code for SMS development.
- Have regular briefings before voyage.
- No optimization of arrival/departure at/from port despite requirement to provide ETA/ETD.
- Possible to reduce trips (normally 12 per day at set times) during off season.
- No hull inspection by divers.
- One slipway in Samoa but unsure if able to check shaft alignment.
- Hull painting supposed to meet Lloyds certified standard and done 3 yearly.
- Bunker sufficient fuel for whole day trips.
- Most is unplanned maintenance.
- Vessel operations in Samoa are time dependent and operate in efficiently to meet the deadline. There can be some window to reduce the number of trips per day to reduce GHG emission.

5 Ship-Port Interface & Energy Efficiency (*Mark Davis, Transport Greenhouse Gas Adviser, SPC*)

This session introduced ports and port area emissions, ship time in port (TIP) and just-in-time (JIT) operations; technologies for port air quality/GHGE reductions; ship in-port operational energy efficiency measures (OEEM); and onshore power supply (OPS)/cold ironing.

Discussion

The following points came out of the discussion within this session:

- Samoa ports have an issue with vessels not communicating with them for ETA and ETD.
- Vessels tends to stay in the port unnecessary just to meet the requirements of the operators. Vessel stay in port after cargo is loading because the ETD does not align with their schedule while the other vessels at the anchorage are awaiting to berth at the ports.
- Bio-diesel had been used in Samoa for land transportation but had phased due to the issues with machinery

6 Energy Management Plan (EnMP) & System (EnMS) *(Mark Davis, Transport Greenhouse Gas Adviser, SPC)*

This session provided a brief overview of various ship-board management systems; company level energy management; energy audits and reviews, types and processes; and ship performance, monitoring and voyage performance analysis.

Discussion

The following points came out of the discussion from this session:

- SMSs have been developed for the vessels that are delivering cargo to American Samoa, because it is an international voyage.

DAY 2: TECHNICAL WORKSHOP

All Day 2 sessions are presented by Dr. M. A. Zullah, Maritime Industry Energy Efficiency Officer, SPC.

7 Energy Efficiency Design Index (EEDI) Guideline

This session provided an overview of the EEDI formula; EEDI calculation parameters; EEDI factors and correction factors; and example of a sample EEDI calculation

Discussion

The following points came out of the discussion within this session:

- MTCC-Pacific will try and calculate the EEDI of the vessels depending on the availability of the data and drawings. EEDI calculation is used for new vessels only but depending on the availability of specific ship data, EEDI could be calculated for existing vessels.

8 Ship Energy Efficiency Management Plan (SEEMP) Guideline

In this session, the main elements of SEEMP, implementation aspects and EEOI calculation process was covered.

Discussion

The following points came out of the discussion within this session:

- For MTCC-Pacific SEE is central to its mission. Ship operators and engineers must first understand the concept of SEEMP and EEOI before moving forward to implementation to improve their SEE. MTCC-Pacific can assist shipping companies in developing SEEMPs, assessing vessels using this and developing ways to improve SEE.
- The Participants are interested in implementing SEEMP to conserve FOC and want to centralize data collection and has requested help from the MTCC-Pacific to develop their FOC database and training one of their staff on the data analysis.

9 Ship Energy Efficiency Operations (SEEO) Measures

This session focused on operational energy efficiency measures with respect to operational management-JIT; maintenance and condition monitoring; auxiliary load management; trim/ballast optimization; hull and engine conditions; and system planning and reduced demand.

Discussion

The following points came out of the discussion within this session:

- Props not balanced properly e.g. differential corrosion causes uneven wear on bearing
- JIT- requires agreements between all entities.
- Marine pollution could be levied as at this time there is only an environmental levy. According to Anthony Talouli, the SPREP Pollution Adviser, Samoa is currently looking at changing the levying system.
- Only one island trip therefore trim optimization possible. Needs to be re-trimmed for trips to American Samoa to meet more stringent USCG controlled waters.
- BW Convention requires Port to deal with the introduction of harmful aquatic species.
- Requirement for two yearly hull cleaning and anti-fouling painting.
- Variable versus fixed props.
- Their RORO ships use fork hoist mainly.

10 Ship Energy Efficiency (SEE) Technical Measures

This presentation focused on EEDI reduction method; ship hydrodynamics; propeller and propulsion system; engines and power systems; auxiliary machinery; economic assessment; and a case study on futuristic concept ships.

Discussion

The following points came out of the discussion within this session:

- Solar energy will be best for Samoa and also interested to see some wind turbines installed on board their vessels.
- Retrofitting technologies to improve fuel efficiencies such as filters would be good for a start. Fuel quality in Samoa is poor according to the participants.

11 Further SEE Measures

This session focused on the development of DCS for FOC; DC; data analysis; and lastly followed by decision making on what further measures are required, if any.

12 Potential Fuel-oil Consumption (FOC) & Green-house Gas Emission (GHGE) Reductions

This session explored the introduction and forecasting scenarios; simulation models; FOC and fuel cost forecasting.

13 Light Emitting Diodes (LED)

This presentation focused on LED lightings, its efficacy and the cost evaluation of LED. LEDs for lighting solutions are gaining increasing importance in the shipping industry, based on their energy-saving potential and long service life. Any reduction in electricity consumption for lighting leads to a positive impact on the ship's operating costs, as well as reducing the environmental impact.

Discussion

- Samoa Ports Authority are very interested in changing all the lighting to LED. LEDS lights are expensive in Samoa but it will more cost effective in the long term in terms of saving and maintenance.
- MTCC-Pacific consultant had conducted energy audit in August 217 but none of the recommendations has been adopted.
- MTCC-Pacific staff will follow up on the actions in the following week.

14 Shaft Generators

This session focused on what a shaft generator is; vessels currently using shaft generators; energy saving; cost effectiveness and risk.

Discussion

- Useful to manage cargo loading, account for FOC and measure slow speed benefits in Samoa vessels.
- Minimize interaction of human high risk operations due to low skill set of operators in Samoa (Operations and Maintenance)

15 Waste Heat Recovery Systems (WHRS)

This presentation focused on heat balance for engine without and with WHRS; PTG (Power Turbine & Generator) WHRS; STG (Steam Turbine & Generator) WHRS; and PT-ST combined waste heat recovery systems.

DAY 3: WRAP-UP

The final day was focused on presenting, reviewing and adopting the *Outcomes* statement developed from two days of deliberations. This was also an opportunity for ship owners to express their views on the MTCC-Pacific program.

16 Overview (Dr. M. A. Zullah, Maritime Industry Energy Efficiency Officer, SPC)

MTCC-Pacific provided a summary on the deliberations of the NW:

- Good overall attendance and participants keen interest on energy efficiency
- Group discussion on issues relating to SEEO.
- Discussion on CC, GHGE and S/SEM measures.
- Interactive knowledge transfer on EEDI, EEOI, SEEMP and PIDSS.

- Energy saving devices such as PBCF, LED, WHRS, SG and PV.

17 Open table discussion

- The participants were very receptive of the energy efficiency protocols and had highlighted that this was the first of its kind workshop they had attended in a while.
- Samoa Shipping Cooperation and Samoa Ports Authority do not had prior knowledge of the importance for data collection relating to energy efficiency and also proper maintenance programme for engineers
- Lack of trained staff on board the domestic vessels
- Improvement of outer islands maritime Infrastructure especially on loading and unloading. Most of the works are carried out manually and by forklifts with no record keeping.
- Vessel going to American Samoa has ISM implemented and SEEMP will be adopted. The ISM audit was carried out last year by SPC.

18 Review of Outcomes Document (*Dr. M. A. Zullah, Maritime Industry Energy Efficiency Officer, SPC*)

MTCC-Pacific presented a draft outcome document for review and adoption; after edits were made. The Outcome document was then adopted with the consideration that slight wordsmithing may take place. The finalized document is attached in Annex 3.

19 Closing Remarks (*Acting Chief Executive Officer (Legal) of MWTI, Ms. Kalameli Seuseu-Soo*)

On behalf of the Samoan Government, Ms. Kalameli thanked SPC and SPREP for conducting a invigorating workshop on safety and efficiency and also the participants for their contribution to its successful completion. Ms. Kalameli recapped on the importance of data collection for the MTCC-Pacific pilot project and urged all participants to collectively collaborate towards reducing the GHG emission from the maritime transport sector.

ANNEXES

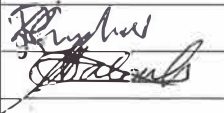
ANNEX 1: Signed List of Participants

SAMOA NATIONAL WORKSHOP ON EFFICIENT OPERATIONS OF SHIPS (12 June 2018)

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| 32 | | | | | | | | | | | | | |
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| | | | | | | | | | | | | Resource | |
| | | | | | | | | | | | | Resource | |

Antony A. Croker

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ANNEX 2: Agenda

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MTCC-PACIFIC – Samoa National Workshop on Ship Energy Efficient Operations (SEEO)
Apia, Samoa, 12th- 14th June, 2018

PROGRAMME

| Time | Agenda item | Agenda issues | Presenters |
|---|-------------|--|--------------|
| Day 1 – 12th June, 2018 – Technical Workshop (Ship Energy Efficient Operations) | | | |
| 0800 | | Registration | |
| 0830 | | Welcome Address: Ministry of Works, Transport & Infrastructure (Mr Su'a Afamasaga Pou Onesemo) MTCC-Pacific Transport Greenhouse Gas Adviser | |
| 0900 – 1030 | 1 | Ship Energy Efficiency Operation (SEEO) Challenges- Ship Owners Issues- Discussion of N-D-B-A Matrix: 'Outcome' | MTCC-Pacific |
| | 2 | Ship Energy Efficiency Regulations and Related Guidelines - Introduction to ship roles and responsibilities | MTCC-Pacific |
| 1030-1100 | | Tea Break | |
| 1100 – 1230 | 3 | Ship Management to Operation - Origins of air pollution (airpol) and climate change (CC) - CC and GHG emissions (GHGE) - International global response - International shipping response - Main IMO instruments and historical developments | MTCC-Pacific |
| | 4 | Ship-Board Energy Management - IMO regulatory framework - ship energy efficiency (SEE) - MARPOL Annex VI Chapter 4 - Brief introduction to SEEMP Guideline - Brief introduction to SEE Operations Index (EEOI) Technical Advisory | MTCC-Pacific |
| 1230 – 1330 | | Lunch | |

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| 1330- 1500 | 5 | Ship-Port Interface and Energy Efficiency <ul style="list-style-type: none">- Introduction to ports and port-area emissions- Ship time in port and just-in-time (JIT) operations- Technologies for port air quality (AQ)/GHGE reductions- Ship (in-port) energy efficiency operational measures (SEEOM)- Onshore power supply (OPS) | MTCC-Pacific |
| | 6 | Energy Management Plan (EnMP) and System (EnMS) <ul style="list-style-type: none">- Brief overview of various ship-board management systems- Company level energy management- Energy audits and reviews, types and processes- Ship performance, monitoring and voyage performance analysis | MTCC-Pacific |
| | 7 | Pacific Island Domestic Ship Safety (PIDSS) <ul style="list-style-type: none">- Goals, Objectives & Outcomes- PIDSS SMS- Components- Status- Issues and Lessons Learnt | MTCC-Pacific |
| 1500- 1530 | 8 | Open Discussions | |
| 1530- 1600 | Tea Break | | |
| End Day 1 | | | |
| | | | |

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| Time | Agenda item | Agenda issues | Presenters |
|---|----------------------------|---|--------------|
| Day 2 - 13th June , 2018 – Technical Workshop (Ship Energy Efficient Operation) | | | |
| 0845 | Participants arrive | | |
| 0900 – 1030 | 1 | Guidelines for EEDI <ul style="list-style-type: none"> - Overview of EEDI formula - EEDI calculation parameters - EEDI factors and correction factors - Example of a sample EEDI calculation | MTCC-Pacific |
| | 2 | Guidelines for SEEMP <ul style="list-style-type: none"> - Main elements of SEEMP - Implementation aspects - EEOI calculation process - Video - Best Practice For Fuel-Efficient Operation | MTCC-Pacific |
| 1030-1100 | Tea Break | | |
| 1100 – 1230 | 3 | Operational energy efficiency measures <ul style="list-style-type: none"> - Operation management - Maintenance and condition monitoring - Auxiliary load management - Trim/ballast optimization - Hull and engine conditions - System planning and reduced demand | MTCC-Pacific |
| | 4 | Technical energy efficiency measures <ul style="list-style-type: none"> - EEDI reduction method - Ship hydrodynamics - Propeller and propulsion system - Engines and power systems - Auxiliary machinery | MTCC-Pacific |
| 1230 – 1330 | Lunch | | |



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| 1330 – 1545 | 5 | Further measures to enhance the energy efficiency of ships - Development of a data collection system (DCS) for fuel consumption <ul style="list-style-type: none">o data collection;o data analysis; ando followed by decision-making on what further measures, if any, are required | MTCC-Pacific |
| | 6 | Potential to reduce emissions and fuel consumption - Introduction and forecasting scenarios - Simulation model - Fuel consumption and fuel cost forecast | MTCC-Pacific |
| | 7 | LED - What is LED? - Efficacy of led - Cost evaluation for LED application | MTCC-Pacific |
| | 8 | Shaft Generators - What is shaft generator system? - Vessels using shaft generator - Energy saving - Cost effect - Risk | MTCC-Pacific |
| | 9 | Waste Heat Recovery System (WHRS) - Heat Balance for Engine without & with WHRS - PTG (Power Turbine & Generator) WHRS - STG (Steam Turbine & Generator) WHRS - PT-ST Combined Waste Heat Recovery System | MTCC-Pacific |
| 1545- 1600 | 10 | Open Discussions | |
| 1600- 1630 | Closing Remarks | | |
| End Day 2 | | | |

Maritime Technology Cooperation Centre - Pacific
Pacific Community, Suva Regional Office
Private Mail Bag, Suva, Fiji
Tel: (679) 337 0733 | Fax: (679) 337 01 46
Email: mtcc-pacific@spc.int | Web: www.spc.int

| Time | Agenda item | Agenda issues | Presenters |
|---|-------------|---|------------------|
| Day 3 – 14th June, 2018 – Technical Workshop (Ship Energy Efficient Operations) | | | |
| 0845 | | Participants arrive | |
| 0900 – 1030 | 1 | Overview of the Samoa National Workshop | MTCC-Pacific |
| | 2 | Update by the <i>Marine Department</i> | MWTI |
| 1030 – 1000 | | Tea Break | |
| 1100 – 1230 | 3 | Discussion of the workshop Outcome document | MTCC-Pacific |
| | 4 | Certificate of Attendance Awarded | CEO |
| | 5 | Closing remarks | CEO/MTCC-Pacific |
| Lunch & End Day 3 | | | |

ANNEX 3: Outcomes Document

FIRST NATIONAL WORKSHOP ON ENERGY EFFICIENT OPERATION OF SHIPS

Apia, Samoa, 12-14 June 2018

OUTCOMES

1. The First National Workshop on Energy Efficient Operations of Ships was held at Secretariat of the Pacific Regional Environment Programme (SPREP) in Apia, Samoa from 12-14 June 2018. The workshop was coordinated and facilitated by the Maritime Technology Cooperation Centre in the Pacific (MTCC-Pacific) and attended by representatives from the Ministry of Works, Transport and Infrastructure (MWTI) representing the maritime administration and including the Samoa Shipping Corporation (SSC), Samoa Ports Authority (SPA), National University of Samoa School of Maritime Training, and Ministry of Police (Maritime). The list of participants is attached in Annex 1.
2. MTCC-Pacific is hosted by the Pacific Community (SPC) in collaboration with SPREP and forms part of the Global MTCC Network (GMN), a project implemented by the International Maritime Organization (IMO) and funded by the European Union (EU) with the aim of building capacity of small island developing states (SIDS) and least developed countries (LDC) for climate mitigation in the maritime industry.
3. The welcoming speech was delivered by the Samoa's Acting Chief Executive Officer of MWTI, Mr. Nanai Junior Saaga, said *"the maritime sector is vital for Samoa's transportation and it is important for Samoa to take advantage of the workshop and build capacity for climate mitigation. Samoa is impacted by global activities but we have to make a strong stand and be resilient to climate change. I thank MTCC-Pacific for coming here and hope they will continue to provide this kind of workshop to inform and educate technical staff in Samoa. As they say in Samoa 'Laititi ae maini' meaning 'small but effective contribution', I encourage each and everyone here to play their part in making small and effective contributions."*
4. In his opening address, MTCC-Pacific (Maritime) Transport Greenhouse Gas Advisor recapped the commitments from MTCC-Pacific, it's Host Institutions and GMN partners, to assist the Pacific region in climate mitigation in the maritime transport sector and was *"pleased with the commitment shown by Samoa and confident that the knowledge shared during this week will make a positive contribution toward greenhouse gas emission targets"*.
5. The purpose of the workshop is to gather the relevant maritime transport sector stakeholders from the government and agree on measures to progress low carbon maritime transport in Samoa that contributes to the Strategy for the Development of Samoa (SDS) 2017-2020 and achievement of the sustainable development goals.

The participants:

6. Agreed to take relevant action to mitigate greenhouse gas (GHG) emissions and create awareness among the maritime transport sector in Samoa on the benefits of ship energy efficient operations (SEEO) toward reduction in fuel oil consumption and GHG emissions, and uptake of renewable technologies;
7. Recognize the drivers, needs, barriers and relevant actions stated in Annex 2 that include:
 - i. Legislation, Regulations and standards for domestic ships including training on air pollution prevention and energy efficiency;
 - ii. Data base development to capture baseline data;
 - iii. Access to air monitoring equipment;
 - iv. Capacity Building e.g. HR development of Awareness and Training opportunities;
 - v. Cost and quality of fuel; and
 - vi. Planned maintenance.
8. Agreed to participate and be involved in MTCC-Pacific pilot-projects on energy efficient operations of ships and data collection that will assist in implementing immediate actions adapted to domestic ships in Samoa and in the four ports;
9. Agreed to collect and share relevant data on fuel oil consumption and request MTCC-Pacific to provide templates and assist in collection and reporting, ensuring confidentiality and accessibility of information;
10. Agreed to implement Ship Energy Efficiency Management Plan (SEEMP) on board domestic ships in Samoa; and
11. Requested MTCC-Pacific to conduct a follow-up workshop to present and discuss progress in measures implemented in 2017-2018 related to energy efficiency and data collected from Samoan operated vessels and Samoa Ports Authority.

14 June 2018

Annex 1 – List of participants

| # | Name | Job Title | Organisation | Email Address/ Phone Number (+685) |
|------------------|---------------------------|--|---|--|
| | | | | |
| 1 | Nanai Junior Saaga | Acting CEO | Ministry of Works, Transport & Infrastructure | 7748955 |
| 2 | Kalameli Seuseu-Soo | Acting CEO Legal | Ministry of Works, Transport & Infrastructure | 28688 |
| 3 | Makerita Atonio | Acting CEO Maritime (Principal Shipping Officer) | Ministry of Works, Transport and Infrastructure | makerita.atonio@mwti.gov.ws / 28688 |
| 4 | Tapaga Collins | Principal Surveyor | Ministry of Works, Transport and Infrastructure | tapaga.collins@mwti.gov.ws / 7780872 |
| 5 | Ioane Efeso | Shipping Officer | Ministry of Works, Transport and Infrastructure | ioane.efeso@mwti.gov.ws / 7249290 |
| 6 | Sonny Brown | Head of School | Maritime School (National University of Samoa) | s.brown@nus.edu.ws / 7611225 |
| 7 | Faataui Audoa Tuiletufuga | Nautical Lecturer | Maritime School (National University of Samoa) | a.tuiletufuga@nus.edu.ws / 7511462 |
| 8 | Sanele Pio Tavita | Constable | Police Maritime Wing | tavita.sanele@gmail.com / 7681767 |
| 9 | Alaifatu Saisola | Marine Captain | Samoa Port Authority | 7780350 |
| 10 | Ielome Mulumulu | Deputy Port Master | Samoa Port Authority | ierome@spasamoa.ws / 7704811 |
| 11 | Mavaega Mupo | Senior Electrician | Samoa Port Authority | 7704844 |
| 12 | Ioritana Maliko | Marine Engineer | Samoa Port Authority | 7704813 |
| 13 | Viane Tavita | Captain | Samoa Shipping Corporation | tavitaviane@gmail.com / 7775091 |
| 14 | Elisala Faleafa | Able body Seaman | Samoa Shipping Corporation | elisalafaleafa09@gmail.com / 7242810 |
| 15 | Mika Matamua | Ships Officer | Samoa Shipping Corporation | 7523322 |
| 16 | Ioane Siatua Fomai | Maritime Manager | Samoa Shipping Corporation | pipi@samoashipping.com / 7577672 |
| 17 | Pisi Evile | Officer on Ship | Samoa Shipping Corporation | 7233195 |
| 18 | Siolame Salima | Chief Engineer | Samoa Shipping Corporation | 7514091 |
| 19 | Siutavae Lotoa | First Engineer | Samoa Shipping Corporation | 7759441 |
| ORGANISER | | | | |
| 1 | Mark Davis | Transport Green House Gas Adviser | MTCC-Pacific | markd@spc.int |
| 2 | Zullah M. A | Maritime Industry Energy Efficiency Officer | MTCC-Pacific | zullahm@spc.int |
| 3 | Anthony Talouli | Pollution Adviser | SPREP | anthonyt@sprep.org |
| 4 | Lore Croker | Administration & Information Assistant | MTCC-Pacific | lore@spc.int |

Annex 2 – Matrix of drivers, needs, barriers and relevant actions

| Drivers | Needs | Barriers | Relevant action |
|--|---|---|--|
| <i>Samoa National Workshop on Energy Efficient Operations of Ships, Apia, Samoa, 12-14 June 2018</i> | | | |
| Legislation, Regulations and standards for domestic ships including training on air pollution prevention and energy efficiency | Awareness of maritime compliance through 'MWTI'. | <ul style="list-style-type: none"> • Lack of support to provide information and technical tools on energy efficiency. • New amendments of MARPOL Convention not reflected in the national legislation | <ul style="list-style-type: none"> • Technical support and capacity building provided by MTCC-Pacific, and SPC to implement adapted measures. |
| Data Collection Database | <ul style="list-style-type: none"> • Develop database to capture maritime data • Baseline data collection (DC) of FOC to show GHG emissions from domestic shipping. • Proper recording of the fuel on-board. | <ul style="list-style-type: none"> • Key performance indicators e.g. for the EEOI are not known/understood • Lack of knowledge on the benefits and importance of data logging. • Proper voyage* report/log- FOC (tonnes), weight (tonnes of cargo, pax & Ballast Water), time (hr) and distance (nm). *port-to-port. | <ul style="list-style-type: none"> • Improve practices & establish SEEMP under the current SMS program. • MTCC-Pacific to provide EEOI training. • Captain should conduct regular toolbox meetings prior to departure of vessels, including reminding crew in regards to the importance of SEE & GHGs. • Implement energy management with the support of SPC (MTCC-Pacific). |
| Monitoring equipment | <ul style="list-style-type: none"> • Quantify air pollution around ports. • Suitable, simple and cost effective measure of emission at ports. | <ul style="list-style-type: none"> • No equipment or expertise to use and understand monitoring data. • Cost and effective use. | <ul style="list-style-type: none"> • Acquiring air pollution monitoring equipment and specialised training. |
| Capacity Building e.g. HR development of Awareness and Training opportunities | <ul style="list-style-type: none"> • HR development. • Building maritime expertise within the maritime transport sector. | <ul style="list-style-type: none"> • Insufficient local expertise. | <ul style="list-style-type: none"> • Building an adaptive capacity that will ensure application of SEEMP measures on board domestic vessels. • SPC-SPREP support for increasing trained personnel. |
| Cost and quality of fuel | <ul style="list-style-type: none"> • Fuel standards and quality control | <ul style="list-style-type: none"> • Only one oil company. • Lack of fuel quality testing equipment. | <ul style="list-style-type: none"> • On-board filtering equipment (MTCC-Pacific). • Fuel monitoring. • Pacific Petroleum Services (PPS) provide regular QA data. |
| Planned maintenance | <ul style="list-style-type: none"> • Capacity of slipway (1000 tonnes). | <ul style="list-style-type: none"> • Cost of using American Samoa (USD). | <ul style="list-style-type: none"> • To increase size of slipway, technical maintenance capability or access to cost effective slipways e.g. Fiji. |
| Insufficient specialised staff | <ul style="list-style-type: none"> • Lack of training. • Retention of experienced staff. | <ul style="list-style-type: none"> • International development organisation (IMO, etc.) training. | <ul style="list-style-type: none"> • Request MTCC-Pacific for tailored trainings. |

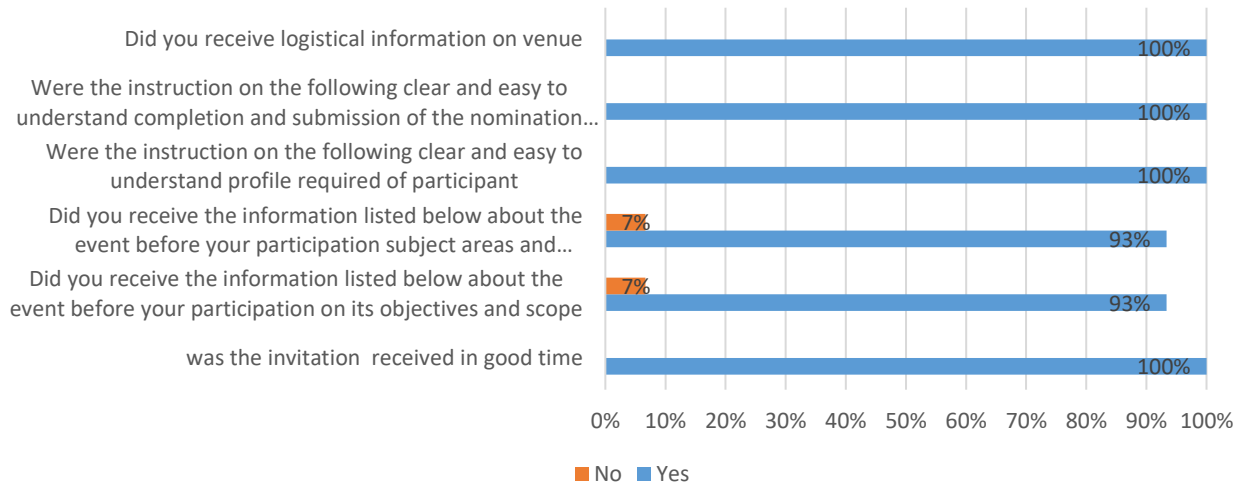
ANNEX 4: Workshop Presentations

(Please refer to separate document
attached)

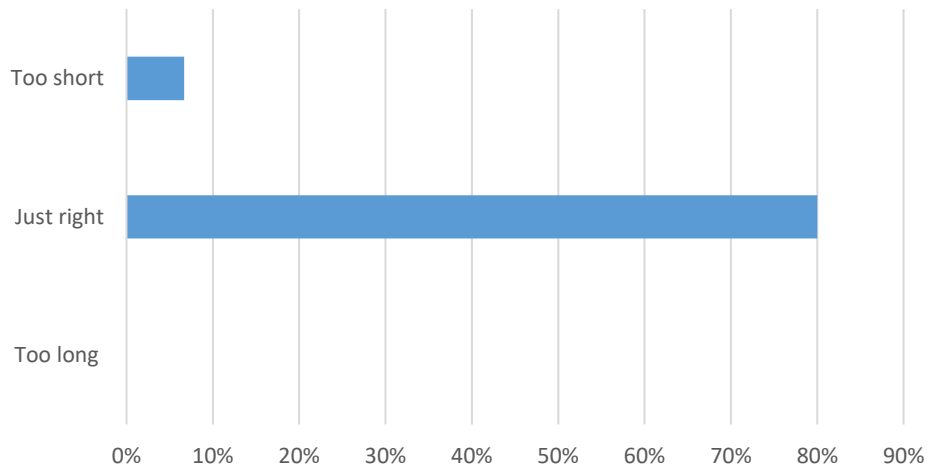
ANNEX 5: Workshop Evaluation Analysis

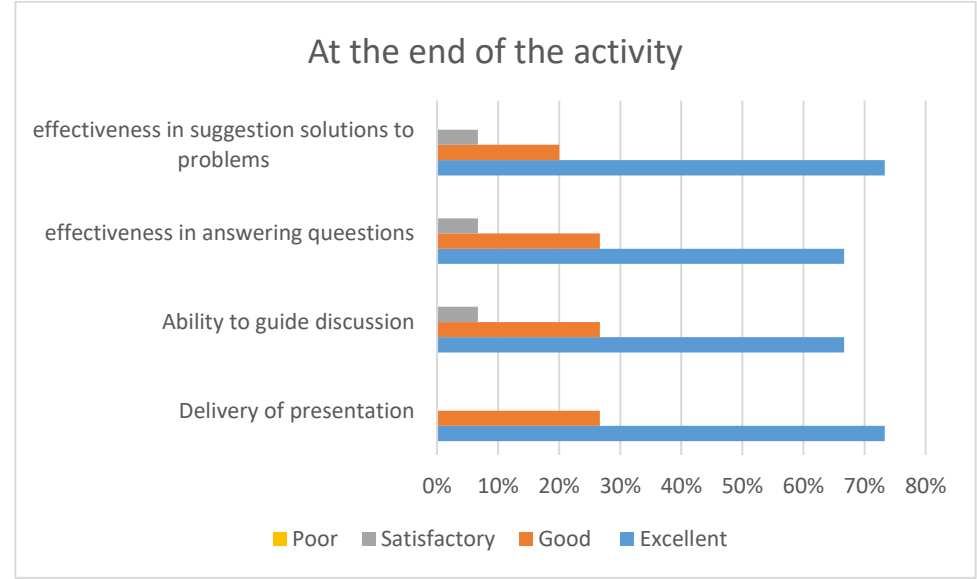
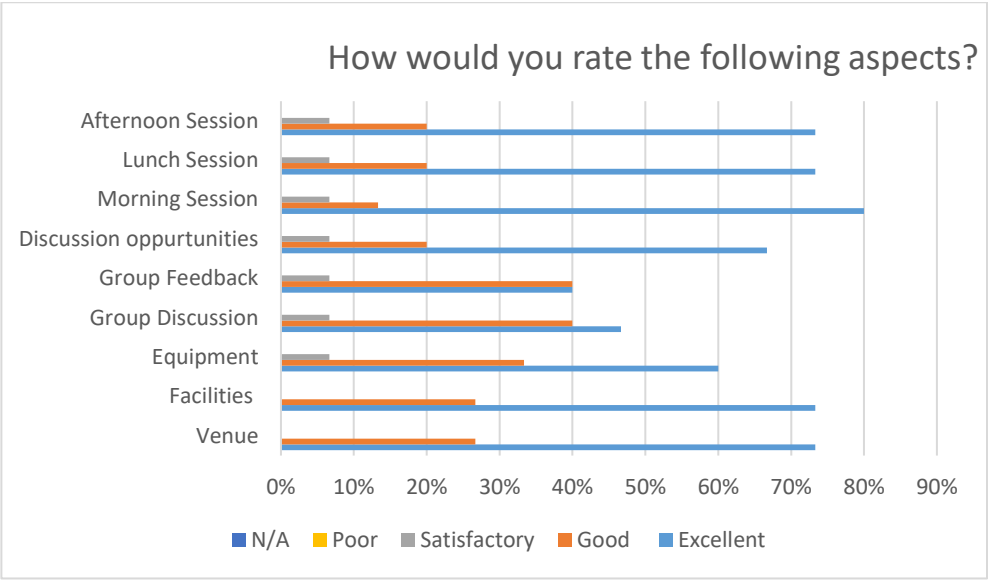
Workshop Evaluation Analysis

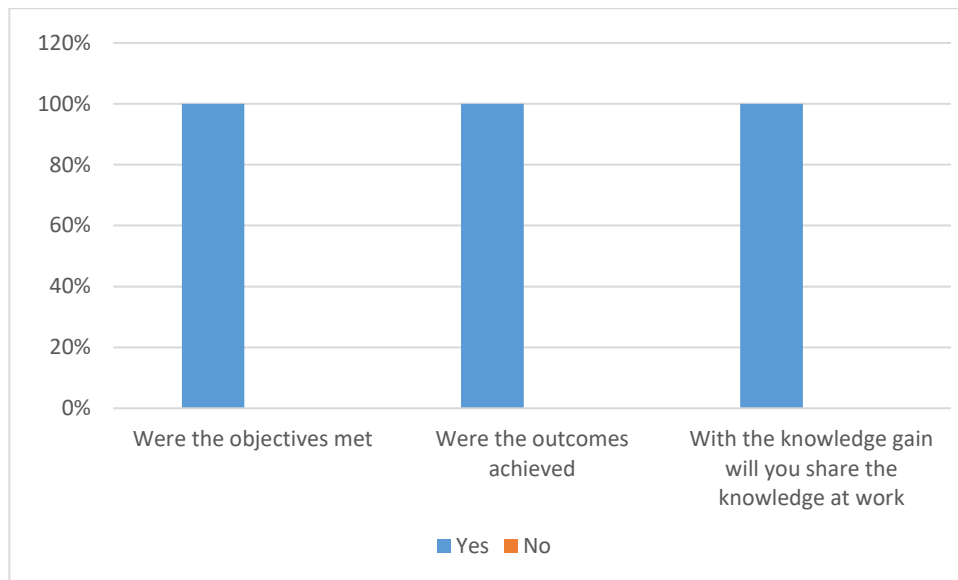
Arrangements prior to the activity



To cover the topic fully, was the event...







Topic of most interest

- Potential to reduce emission and fuel consumption
- LED
- Ship energy efficiency and GHG emission
- New technology in renewable energy
- LED fuel
- Ship energy efficient management plan
- Fuel consumption of tug in port
- Lighting mode, gauging GHG emission in ports
- Calculation of emission control
- Overview of EEDI formula
- Operational/Technical energy efficiency measures

Topics that should be added

- Collaboration between ships and ports

Additional comments

- We need more training for this workshop and this is a good opportunity to say thank you for this good knowledge for us.
- More training/workshop and thanks for the new knowledge.
- Recommend more workshop as this in future as well as overseas trainings.
- Good workshop for us on-board ship for saving fuel.
- Capacity building and awareness programmes will equip personnel to play a vital role in energy efficiency.
- Request for ongoing capacity building by MTCC-Pacific in future.
- This is a very interesting workshop which share knowledge and experience of expertise in minimising and controlling pollution caused by ships as well as saving companies from ship operation due to fuel consumption.
- Thanks for the opportunity to be part of this training and knowledge shared.
- We need to encourage the enforcement of regulations and laws to guide our work in Samoa and government ministries.
- Need to extend more time for explanation. Should be upgraded at every 6 months.
- Energy efficiency in shipping is new for us but it is good as it helps in saving costs, time and also in climate change mitigation.

ANNEX 6: Photos





ANNEX 7: Communication and Visibility Activities


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Samoa is impacted by global activities and we need to make a strong stand and be resilient to climate change. "Laititi ae maini" meaning "Small but effective contribution" - Nanai Junior Saaga, Ag CEO, MWTL...


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Pacific Community and 3 others Retweeted



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
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Ore Tosa and 2 others liked



Thierry Nervale @ThierryNervale · Jun 11

#MTCCPacific continue workshop on energy efficient operations of ships in Samoa & close collaboration w/ @SprepChannel thanks again to @EUPasifika & @IMO HQ for supporting @spc_cps



Lore Croker @Lore_Croker

Ripple effect. Small but effective. Day 1 of #MTCCPacific's national workshop on energy efficient operation of ships in Samoa @IMO HQ @DrZullah @ThierryNervale twitter.com/spc_live/statu...

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MEDIA RELEASE



Samoa Government calls for transition to energy efficiency within its maritime sector

Samoa - The Samoa government has called upon the maritime transport sector to make shipping safer and more energy efficient in this week's National Workshop on Energy Efficient Operations of Ships delivered in a joint collaboration of the Pacific Community (SPC) and the Secretariat of the Pacific Regional Environment Program (SPREP) through the Maritime Technology Cooperation Centre in the Pacific (MTCC-Pacific) project.

The maritime sector is crucial for national development and social cohesion in any modern society, but more so for the Pacific and in this case Samoa, that primarily depend on the sea for commerce, trade and mobility. The sole shipping operator, Samoa Shipping Cooperation (SSC) operates ship occasionally to Tonga, Niue, Fiji and Wallis and Futuna, and regularly to Tokelau; and Pagopago and Manu'a of American Samoa. Its mission is "to provide seagoing transportation and shipping related services that are; safe and reliable, environmentally friendly and climate resilient, cost effective and profitable in providing high returns to our shareholders."

In his welcome remarks, the acting CEO of the Ministry of Works, Transport and Infrastructure (MWTI), Nanai Junior Saaga said that "It is important for Samoa to build capacity for climate mitigation from this workshop. Samoa is impacted by global activities but we have to make a strong stand and be resilient to the climate change. As we say in Samoa "*Laititi ae maini*" meaning "Small but effective contribution". I encourage each and everyone here to play your part of making small and effective contributions."

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Anthony Talouli, Pollution Adviser at SPREP said, "Pacific leaders have raised their concerns on GHG emission at the IMO Marine Environment Protection Committee (MEPC) Meeting 72 in 2018 and we are pleased to support MTCC-Pacific with our continuing partnership with SPC and Pacific island countries."

Domestic ships' fuel oil consumption and greenhouse gas emissions could be reduced significantly by applying ship energy efficient operational measures and retrofitted technologies. MTCC-Pacific is on the cutting edge of climate-change mitigation and, at the same time, is opening up a world of opportunities for those who participate. The 2.5-day workshop provided participants with an understanding of the latest developments at the international level; new technologies, tools and methods available to monitor and reduce energy from the operations of ships in Samoa, in order to contribute to national efforts to reduce GHG emissions.

The workshop participants agreed to implement relevant actions to continue progress towards safe and energy efficient shipping in Samoa and recognised priority actions such as the implementation of laws and standards, capacity building and gaining access to new technologies.

Meeting Samoa's target under the Paris Agreement to 100% renewable electricity generation by 2025 is an opportunity to provide clean energy to ports and ships by way of onshore power supply and thereby reduce the use of fossil fuels in the highly energy intensive maritime transport sector.

MTCC-Pacific is part of the Global MTCC Network (GMN), a project implemented by the International Maritime Organization (IMO), and funded by the European Union, to build the capacity of developing countries for climate mitigation in the maritime industry and thereby contributing to Samoa's Nationally Determined Contributions (NDC) and broader Sustainable Development Goals e.g. SDG 14 Oceans.

MTCC-Pacific experts will follow-up on the workshop's learnings in the next days to provide technical assistance to Samoa's domestic vessels in implementing on board energy management and promote the uptake of low carbon technologies and operations.

Media contacts:

Lore Croker, Administration and Information Assistant, lore@spc.int

Useful links:

<http://mtccpacific.spc.int/>
<http://gmni.imo.org/>
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Subject: [SPC-News] Media Release: Samoa Government calls for transition to energy efficiency within its maritime sector



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