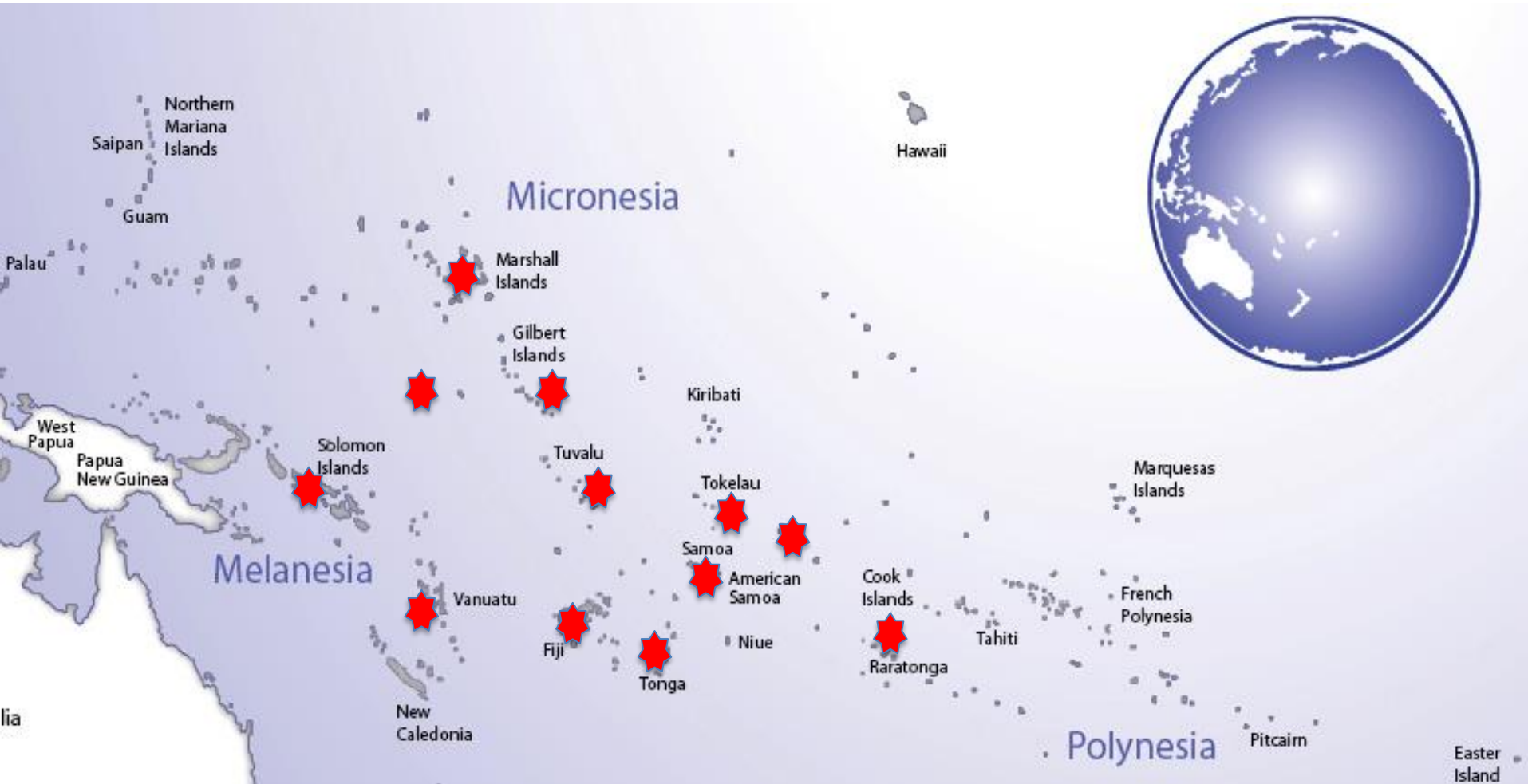


# Turning the Tide: transitioning to low carbon transport futures

## OCEANIA CENTRE FOR SUSTAINABLE TRANSPORT



Dr Peter Nuttall

Research Associate: University of the South Pacific  
Pacific Centre for Environment and Sustainable Development



# You can not have Green Growth in the Pacific .....



.... without a transition to Low Carbon Transport





The World uses about 25% of its energy on transport (the fastest growing GHG emitter sector)

The Pacific imports all its fossil fuel (except PNG) and burns 70%+ on transport.

The World divides its energy thinking into Electricity and Transport. Electricity is its priority. When it thinks about transport as energy it mainly thinks about land transport.

This thinking is then transferred to the Pacific – through donor priorities and imported ‘expert’ opinion.

\$1billion+ for RE electricity.

\$0 for low carbon sea transport

## **Regional highlights**

RMI is the only Pacific country to set a target to reduce transport fuel use

Fiji is the first country to adopt a Green Growth Framework

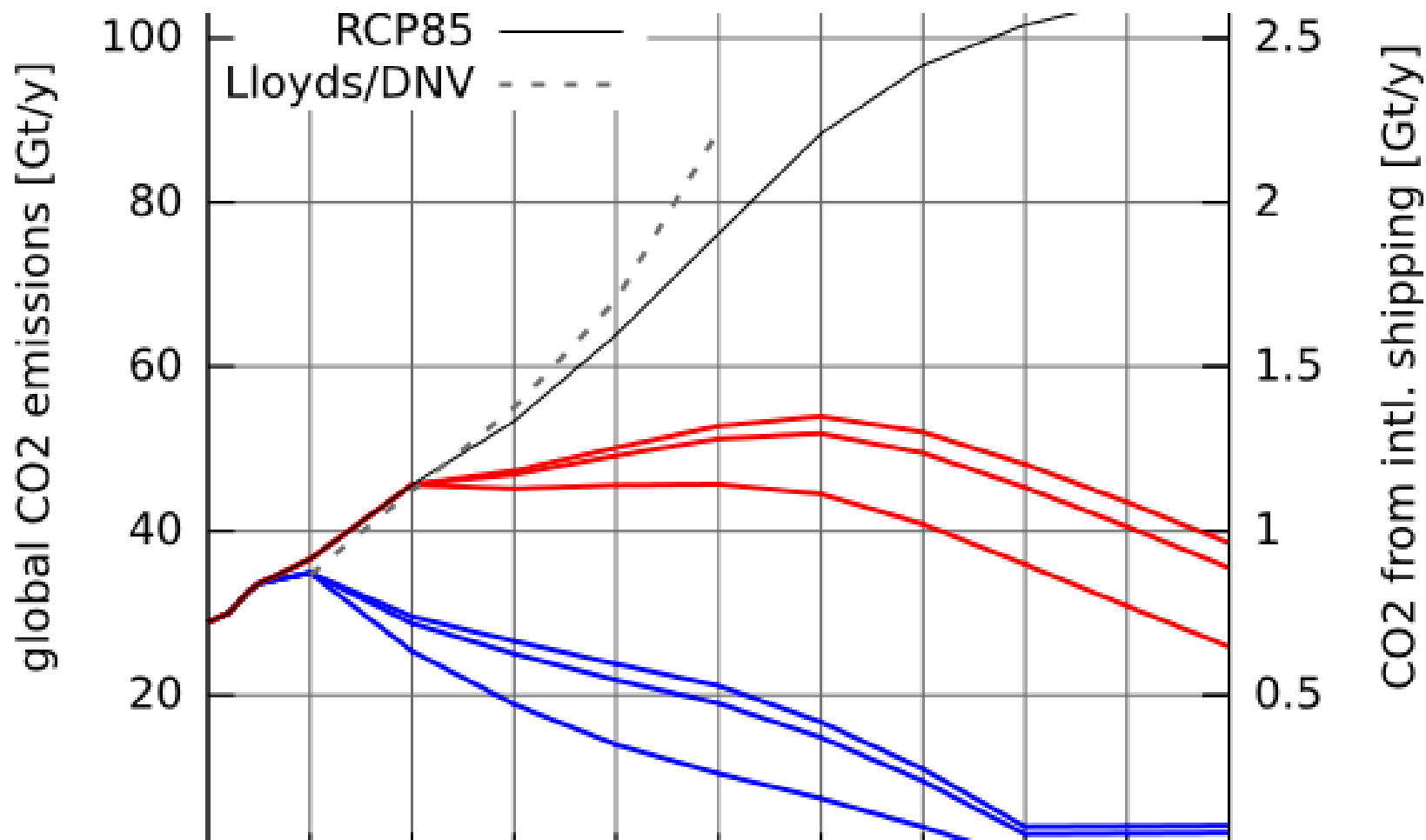
PIDF is the first regional political organ to prioritise low carbon sea transport

Tokelau first PIC to target 100% RE for electricity (94%)

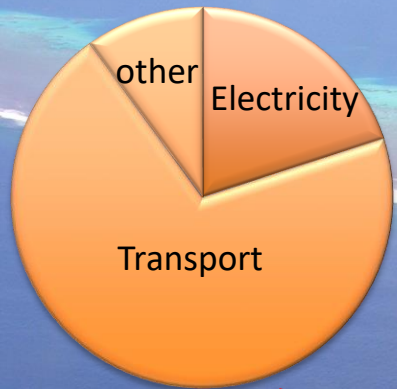
Tokelau uses only 10-25% of its fossil fuel footprint for electricity ... the rest is shipping



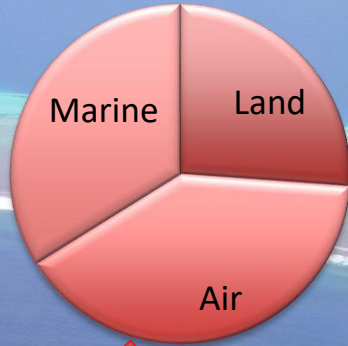
# Global Shipping Emissions Forecast



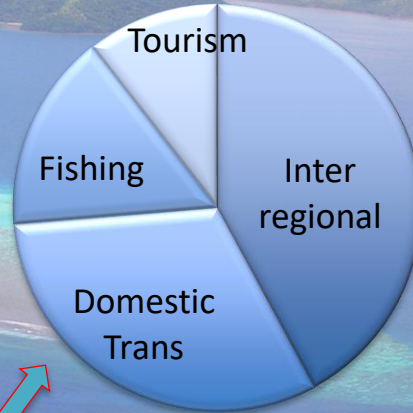
# Imported Regional Fuel by Sector



# Transport Fuel by Sector (Fiji)



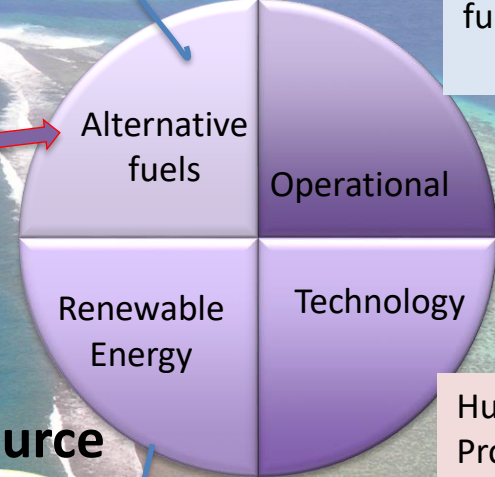
# Marine by sector



LNG; hydrogen, methane, biofuel, biogas, etc

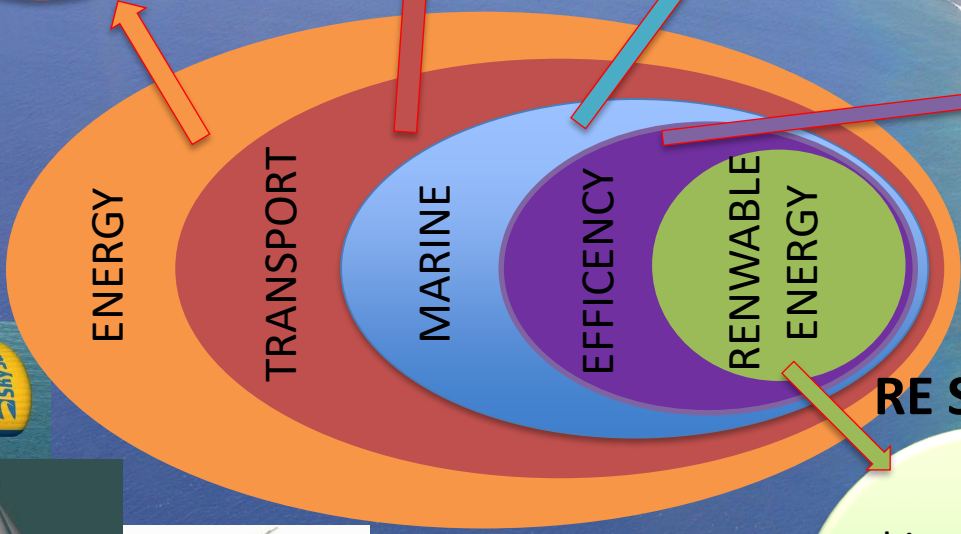
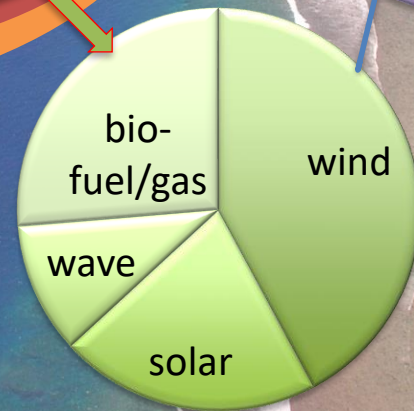
Slow Steaming, Port efficiencies, Weather routing, Just-in-time, bulk fuel purchase, etc

# Efficiency Methods

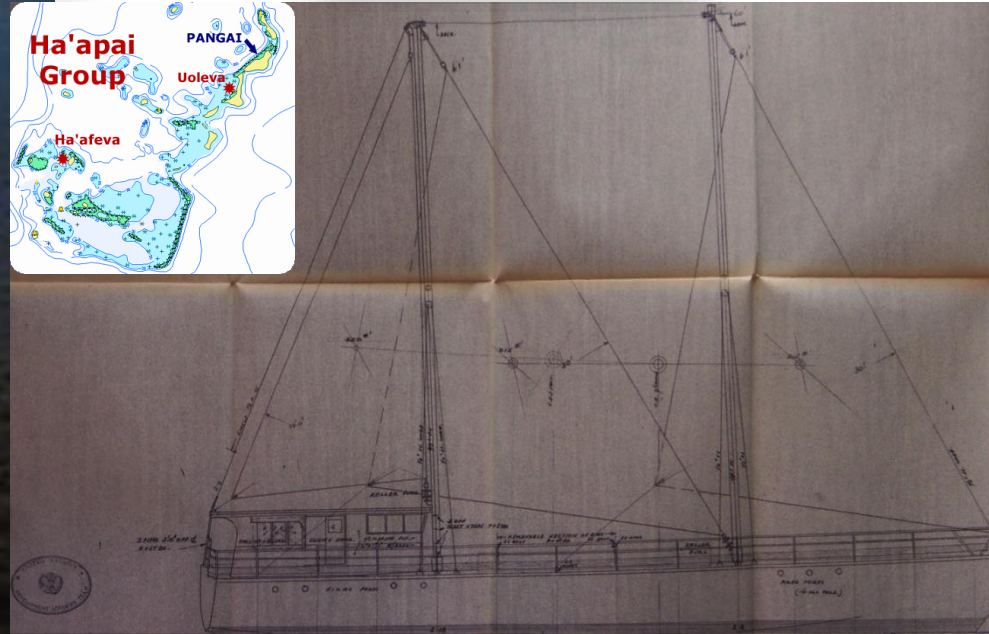
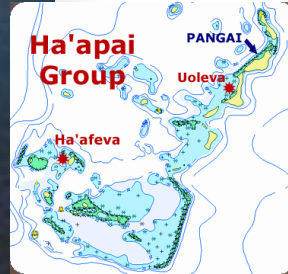
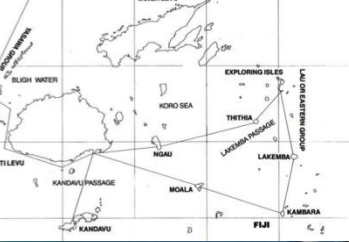


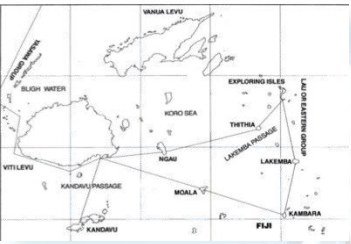
Hull design, Propeller upgrade, Waste heat recovery, etc

# RE Source



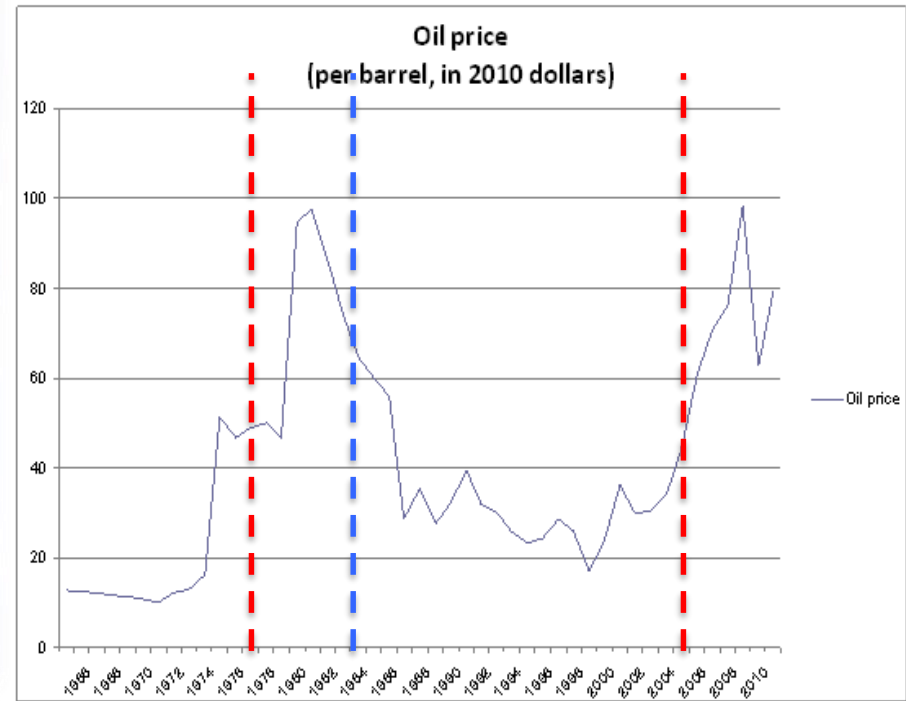
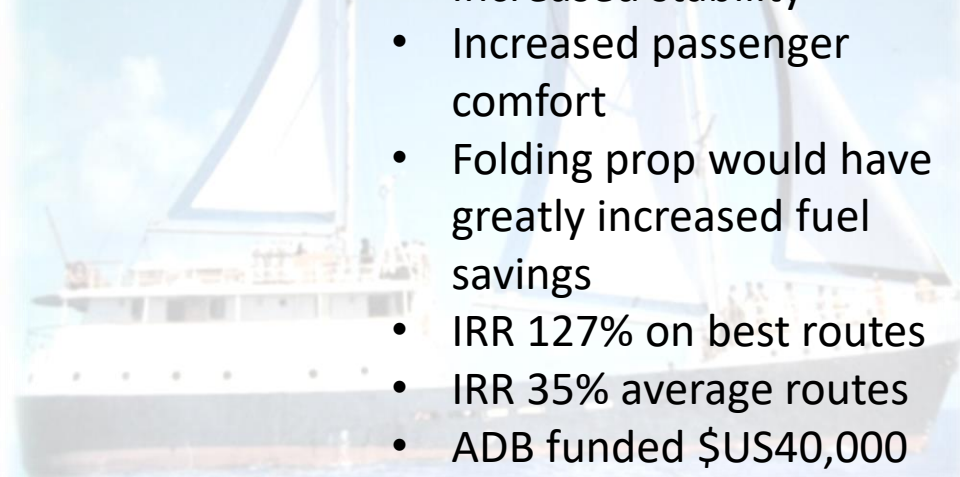
# What happened in the last Oil Crisis?





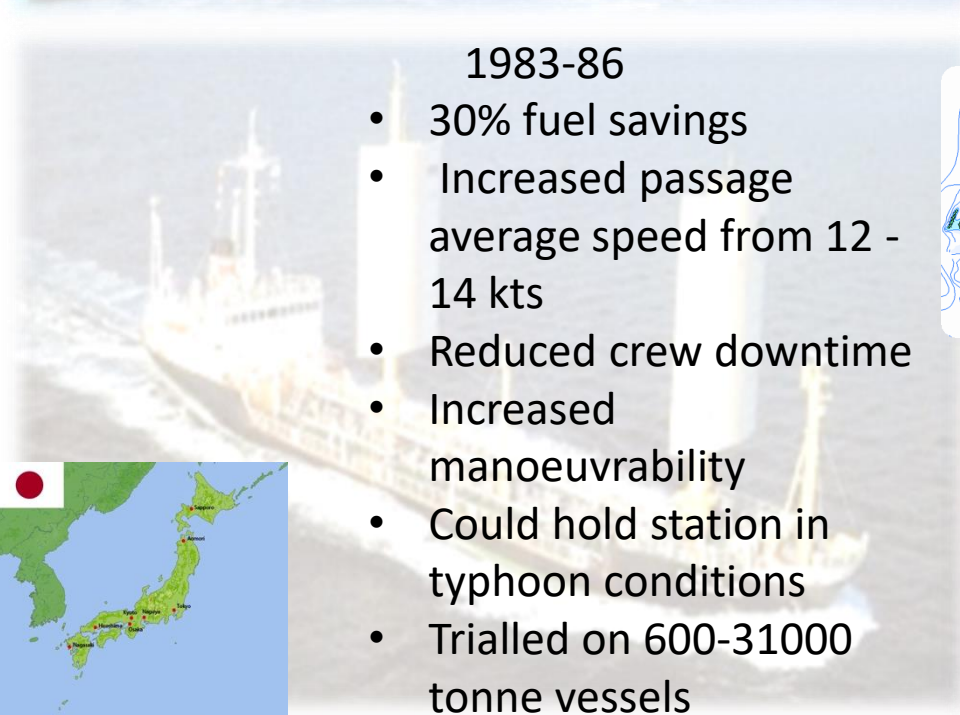
## 1984/86

- 23-30% fuel savings
- 30% reduced engine wear
- Increased stability
- Increased passenger comfort
- Folding prop would have greatly increased fuel savings
- IRR 127% on best routes
- IRR 35% average routes
- ADB funded \$US40,000



## 1983-86

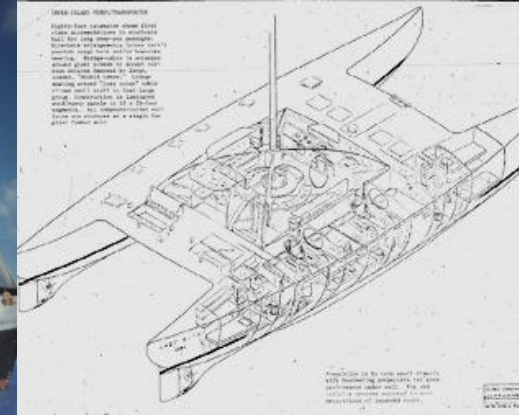
- 30% fuel savings
- Increased passage average speed from 12 - 14 kts
- Reduced crew downtime
- Increased manoeuvrability
- Could hold station in typhoon conditions
- Trialled on 600-31000 tonne vessels



## 1982-85

- UNESCAP/ADB funded needs assessment & analysis
- Recommended network of trading catamarans and small energy efficient sail-freighter
- Commissioned design for 92' freighter carrying 30 T/30pax





PROJECT	Description	Outputs	Agencies	Comments
Fiji soft sail retrofit	Auxiliary rig retrofitted to two government vessels of ~300t. Rigs built and installed in-country	Fuel savings 23-30%, but also 30% engine/prop wear reduction, greater stability, incr passage times. IRR on best route = 127%, average route = 33%	ADB, Southampton University, McAllister Elliot	Southampton University collated historical wind data for all Fiji routes and produced fuel saving ratios for all routes.
Lau Passenger / cargo	50 ton primary sail powered trading vessel, designed and built on Kabara by local builders (1984-87). First of 3 planned vessels to service Lau and Lomaiviti Groups.	<i>Tai Kabara</i> became the main vessel operating on the Sth Lau route until she was scuttled in 2006. Used local materials wherever possible.	European Union	Construction of the other two ships was cancelled when the oil crisis abated.
Ha'apai Freighter	Needs assessment and design analysis led to commissioning of build plans for a 100 ton energy efficient freighter	Needs assessment, transport census and full build plans for a 100 ton energy efficient freighter.	UNESCAP, UNCTAD, UNDP, ADB	Vessel never constructed due to end of crisis. Similar needs assumed today.
SCF/Jim Brown	Save the Children Fund Tuvalu employed catamaran designer Brown to develop locally built boats for Tuvalu/Kiribati	A range of designs and processes for locally built/operated catamarans for artisanal and commercial fishing and local and inter-island transport. Training of local shipwrights. Local materials favoured	SCF	This project closely associated with the FAO/UNDP project. Local build/materials used wherever possible. Fuel savings of up to 60%.
FAO/UNDP	A multi-county fisheries programme to develop RE artisanal and small-scale commercial vessels for local community benefit.	A portfolio of 10 designs from single dugouts to 11m trimarans. 350 vessels built in 8 countries. Demonstrated need for vessels to be affordable and locally appropriate.	FAO UNDP	Uptake ceased with end of project and falling fuel prices. Communities with 'living tradition' of sail had greatest uptake.

# Support PICs transition to low carbon sea transport as a more affordable and appropriate option for remote/island communities in the Pacific



## Research Programme

- train current and future PIC capacity
- macro and micro economic analyses
- quadruple bottom-line reporting framework
- carbon management policy for transport emissions

## Regional Research and Education Strategy

- Long term regional strategy
- Prepare country plans for transition to low carbon
- Provide strong country support - quality research & practical trials

## Oceania Centre for Sustainable Transport

- Portal for knowledge, research, networking, exchange  
[www.oceaniatransportcentre.org](http://www.oceaniatransportcentre.org)
- Multi-partner – IUCN, WWF, PIDF - from village to global

## International Research partnerships:

- with Centres of Excellence – UCL, Tyndall, MARIN, Emden, Columbia
- Post graduate and expert exchange – build long term PIC capacity

# SUSTAINABLE SEA TRANSPORT TALANOA

*Celebrating the Past, Sailing into the Future*

HERITAGE REVIVAL  
NETWORKS, COLLABORATION  
SEA TRANSPORT TECHNOLOGY  
BLUE/GREEN ECONOMIES  
POLICY AND REGULATION

Contact Alison Newell for more information  
Email: [alison.newell@usp.ac.fj](mailto:alison.newell@usp.ac.fj)  
Visit our website: [www.usp.ac.fj/ssitt2014](http://www.usp.ac.fj/ssitt2014)



## THE INTERNATIONAL CONFERENCE ON RENEWABLE ENERGY AND CLIMATE CHANGE

*Focus on the Pacific*

RENEWABLE ENERGY AND CLIMATE CHANGE  
RENEWABLE ENERGY, TECHNOLOGY AND APPLICATION  
RENEWABLE ENERGY AND ENERGY EFFICIENCY  
SUSTAINABLE DEVELOPMENT  
POLICY, ECONOMICS AND FINANCING  
REGIONAL, NATIONAL AND GLOBAL PROJECTS AND INITIATIVES

Contact Sainimere Veitata for more information  
Email: [sainimere.veitata@usp.ac.fj](mailto:sainimere.veitata@usp.ac.fj)  
Visit our website: <http://pace.usp.ac.fj/icrecc/Home>

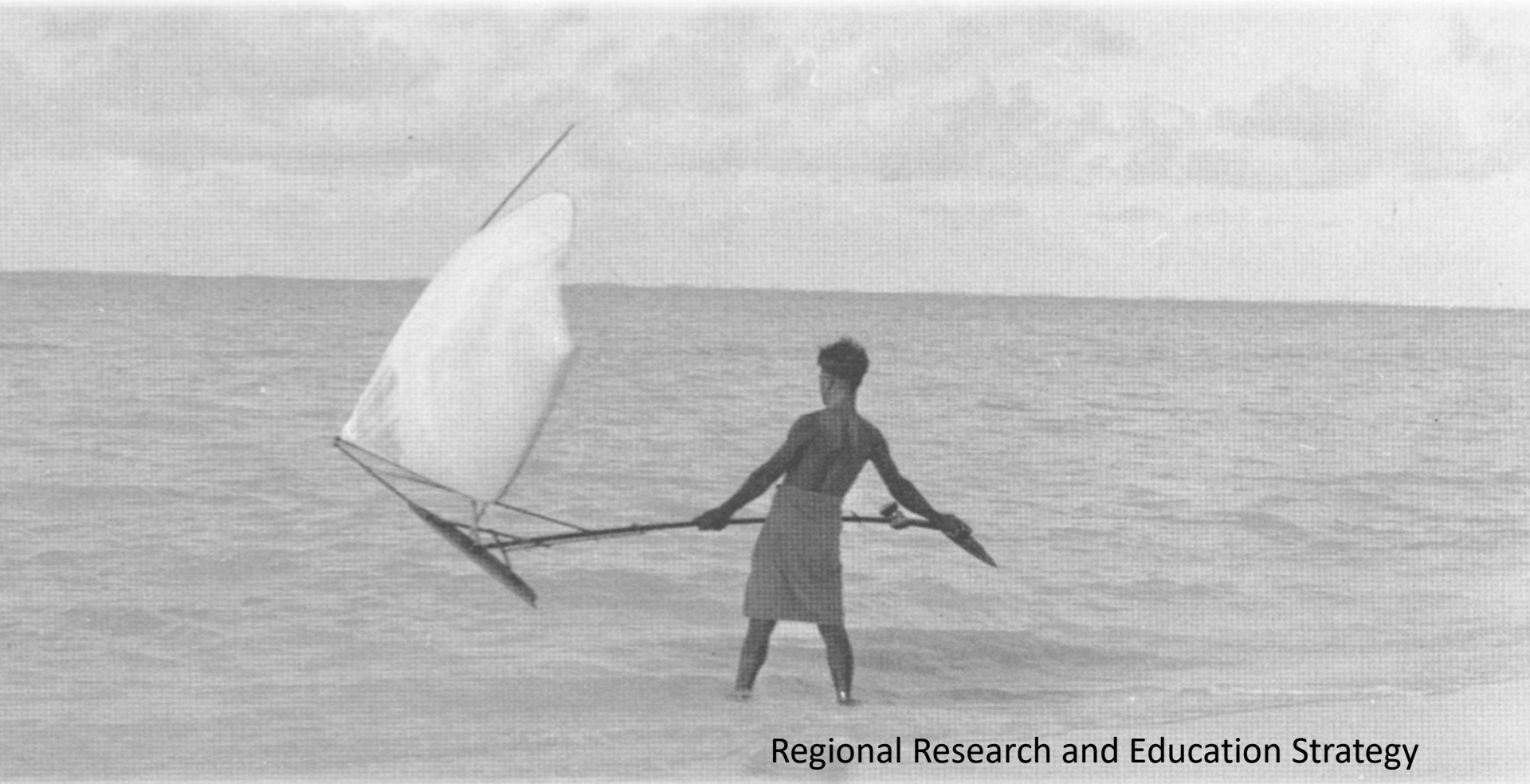
### Chief Guests:

- Honourable Faipule Foua Toloa, Minister of Energy & Transport, Tokelau
- Secretary General PIDF, Feleti Teo
- Honourable Colonel Timoci Natuva, Minister of Works and Transport, Fiji

### Participants included:

- Traditional seafarers, boat builders, sail weavers and artists from Guam, Federated States of Micronesia, Tahiti, Aotearoa, Solomon Islands, Vanuatu, Fiji, Hawaii, Wallis Island
- Global universities and centres of excellence - UCL, Tyndall Centre, Portsmouth, MARIN, Hochschule Emden-Leer, Harvard, Columbia Law School, Keio, Massey, Australia Maritime College, ANU
- Industry - OCIUS, B9 Shipping, DNV

# Transitioning to a low carbon sea transport future for Oceania



Regional Research and Education Strategy

**OCEANIA CENTRE FOR SUSTAINABLE TRANSPORT**

# REGIONAL DRIVERS



Majuro Declaration For Climate Leadership



SIDS DOCK

25% by 2033

FATS

Energy Framework



PIDF Outcomes

Green Growth

Sust Sea Trans

# OSST-RRES

Sustainable Sea Transport

Sustainable Sea Transport Talanoa 2012

Partnerships

Applied Research

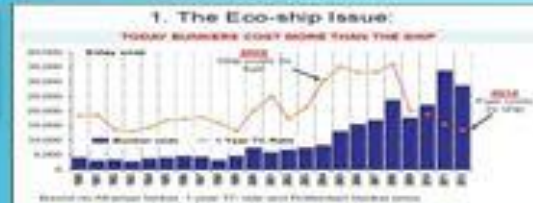
O.C.S.T.

Education & Capacity Building

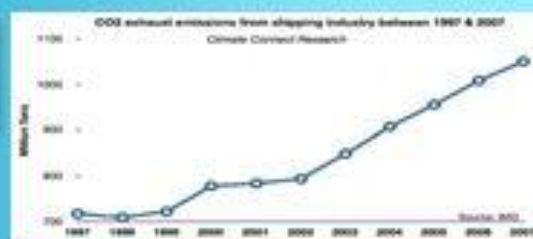
Economic Analysis/Technology Development

# GLOBAL DRIVERS

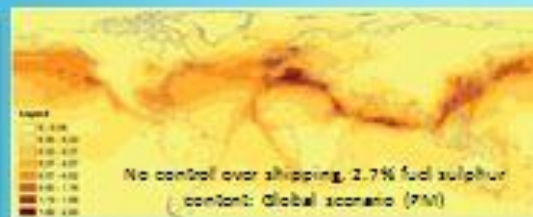
Fuel Costs



Climate Change



Public & Env Health



- CP - MARSHALLS
- CP - TUVALU
- CP - VANUATU
- CP - PNG
- CP - TONGA
- CP - SOLOMONS
- Sustainable Sea Transport Country Program - FIJI

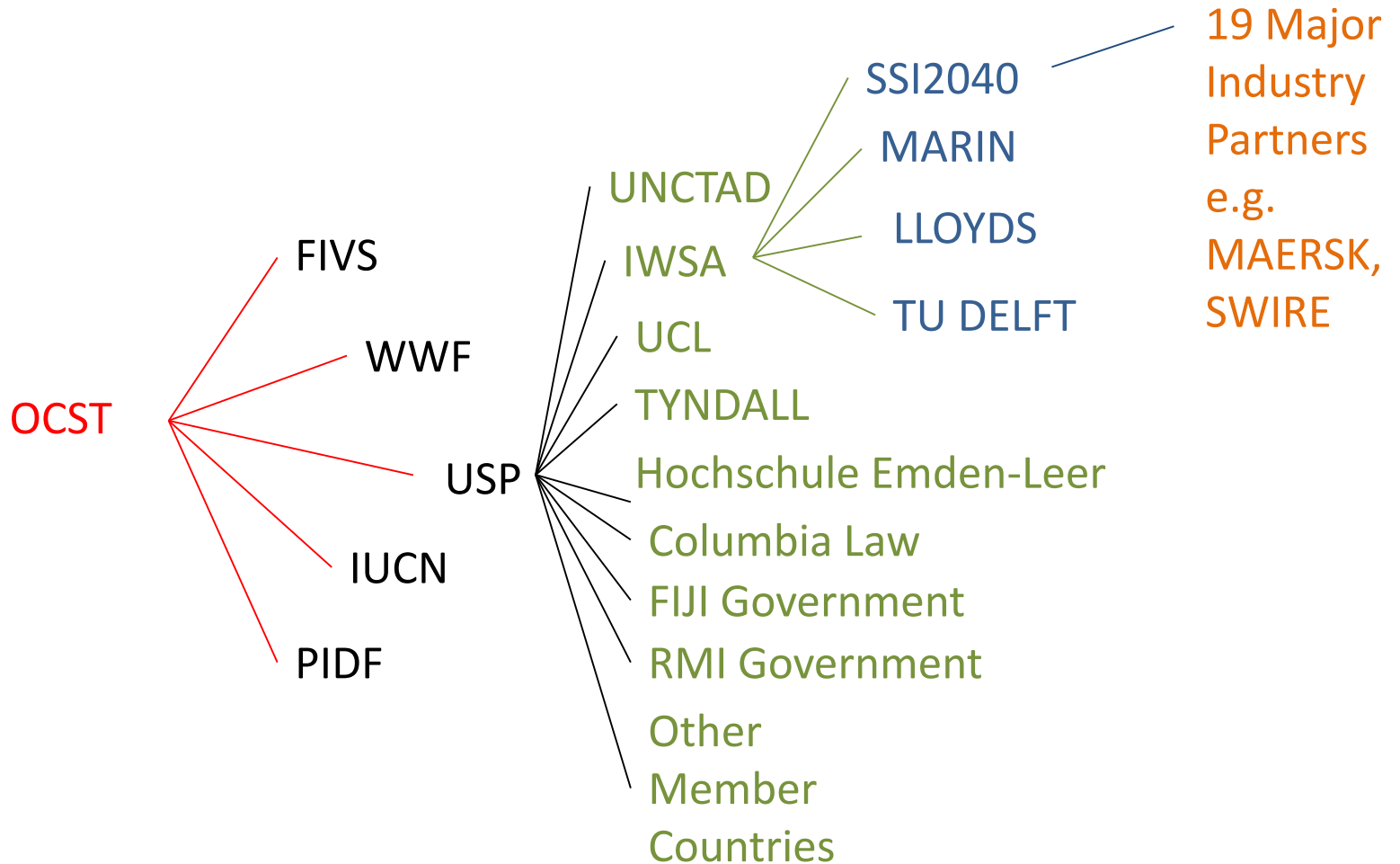
## OSST-RRES Work Streams

- WS1 - Partnerships
- WS2 - Capacity Building
- WS3 - Past Experiments
- WS4 - Country Programs
- WS5 - Economic Analysis
- WS6 - Policy Analysis
- WS7 - Technology
- WS8 - M&E

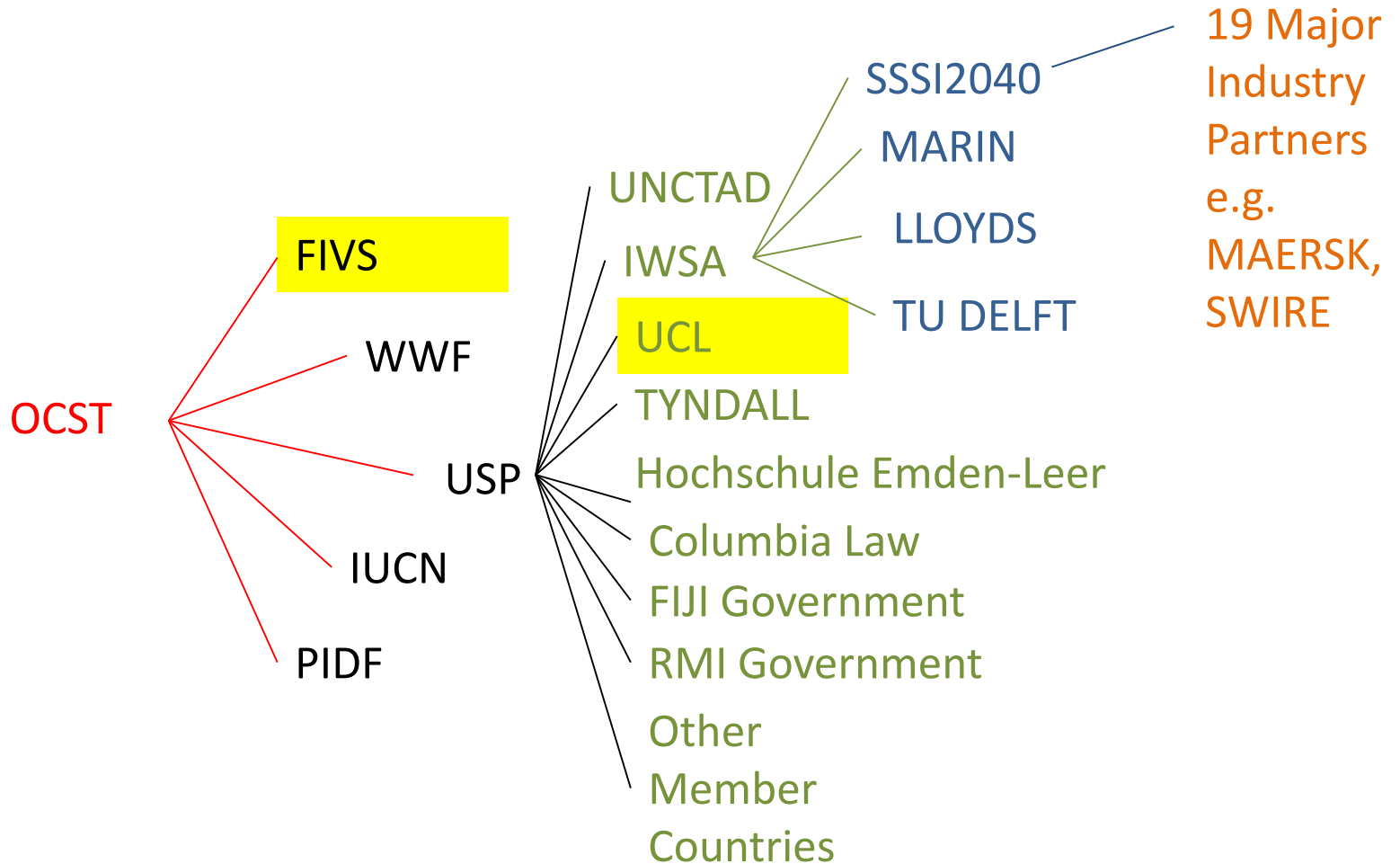
OSST-RRES Country Programme Framework: Fiji

	Policy										Economics					Heritage			Practical Trials			Teaching		Additional Research		
	Strategic				Infrastructure			Fiji Route Case Studies			International Route Case Studies								Practical	Theory						
Relevant Plans	International	Regional	National	Agency	Qualifications	Survey	Licensing	Finance, Tax, Insurance	Sth Lomaiviti	Kadavu	Lau	Rotuma	Central Polynesia	MSG	Micronesia	Traditional Knowledge	Vessel Construction	Voyaging	SVV (Sustainable Village Vessels)	100-ton Cargo / Pax	200-300-ton Freighters	Retrofitting Sail/Rotor Rig	Seafaring, Construction, Naval Architecture, Engineering, Survey, Heritage	Undergraduate (Dip, Bachelors)	Postgraduate (Dip, Masters, PhD)	Data Collection (all sectors), MARPOL Annex V, Carbon Trading (financial mechanisms), letter technology, electric motors, Franchise/Subsidies, emerging technologies
Scoping (current, gap analysis, needs analysis)	IMO Regulations, MARPOL Annex V and associated MDM/MBIs, FATS, National Transport Plans	Pacific Plan, Regional Transport Action Plan, Regional Energy Action Plan, etc	Transport, Energy, Climate Change, economic development policies/plans, etc	World Bank, DB, UNESCAP, UNDP, Bilateral donor strategies, etc	Master/crew, International standards, MSAF standards	MSA Regulation	MSAF, FIRCA												Design, Build, Oper, Ownership/Management models	Design, Build, Oper, Ownership/Management models	Lease Pilot Trials, Ownership/Management models	Sail and Rotor designs, testing			Economics, Marine Studies, Physics, Technology, Climate Change, Law, Academic Studies, History	
Research/Action/Project Plan																										
Monitoring and Reporting Framework																										

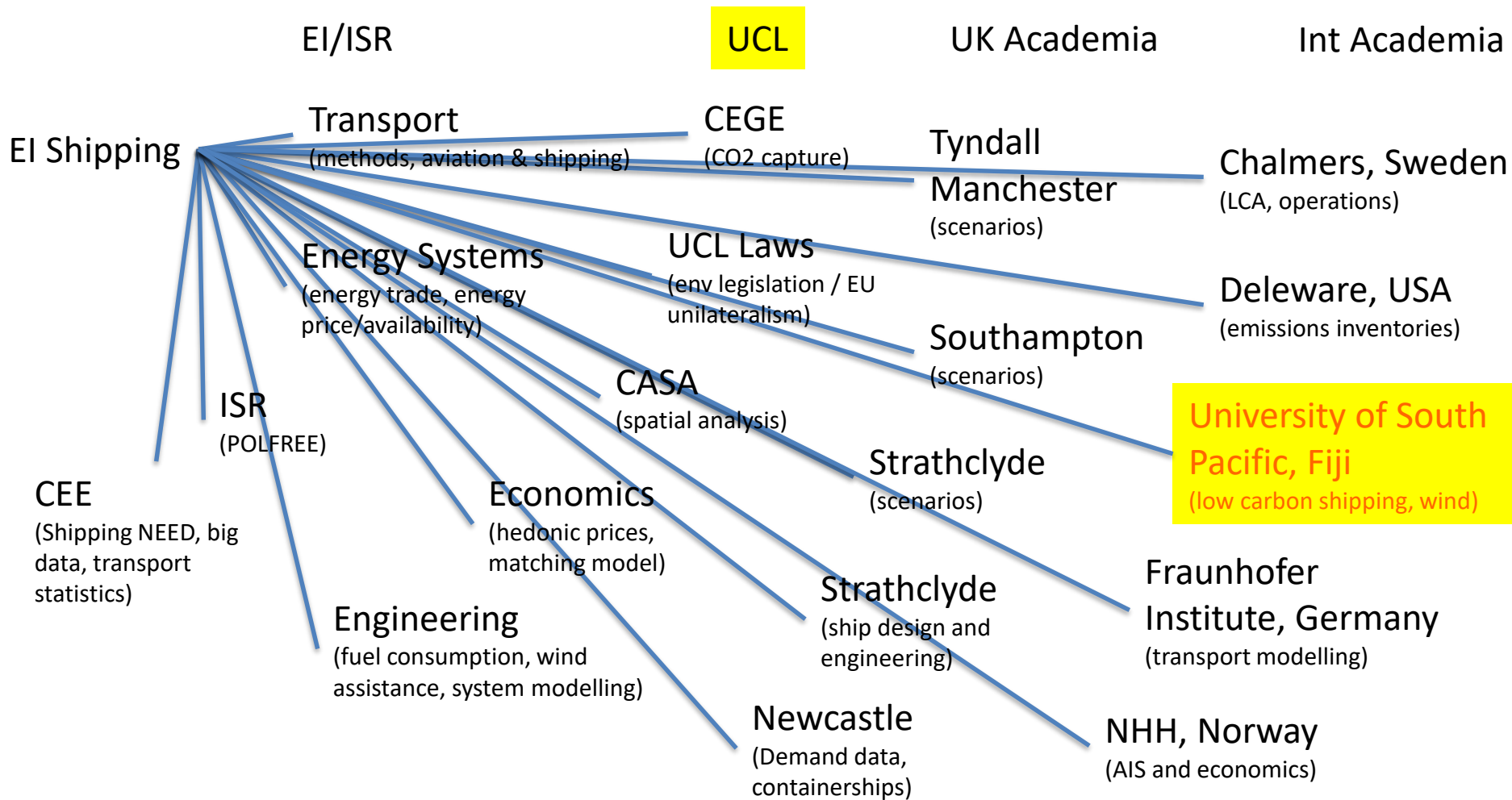
# OCST Networks



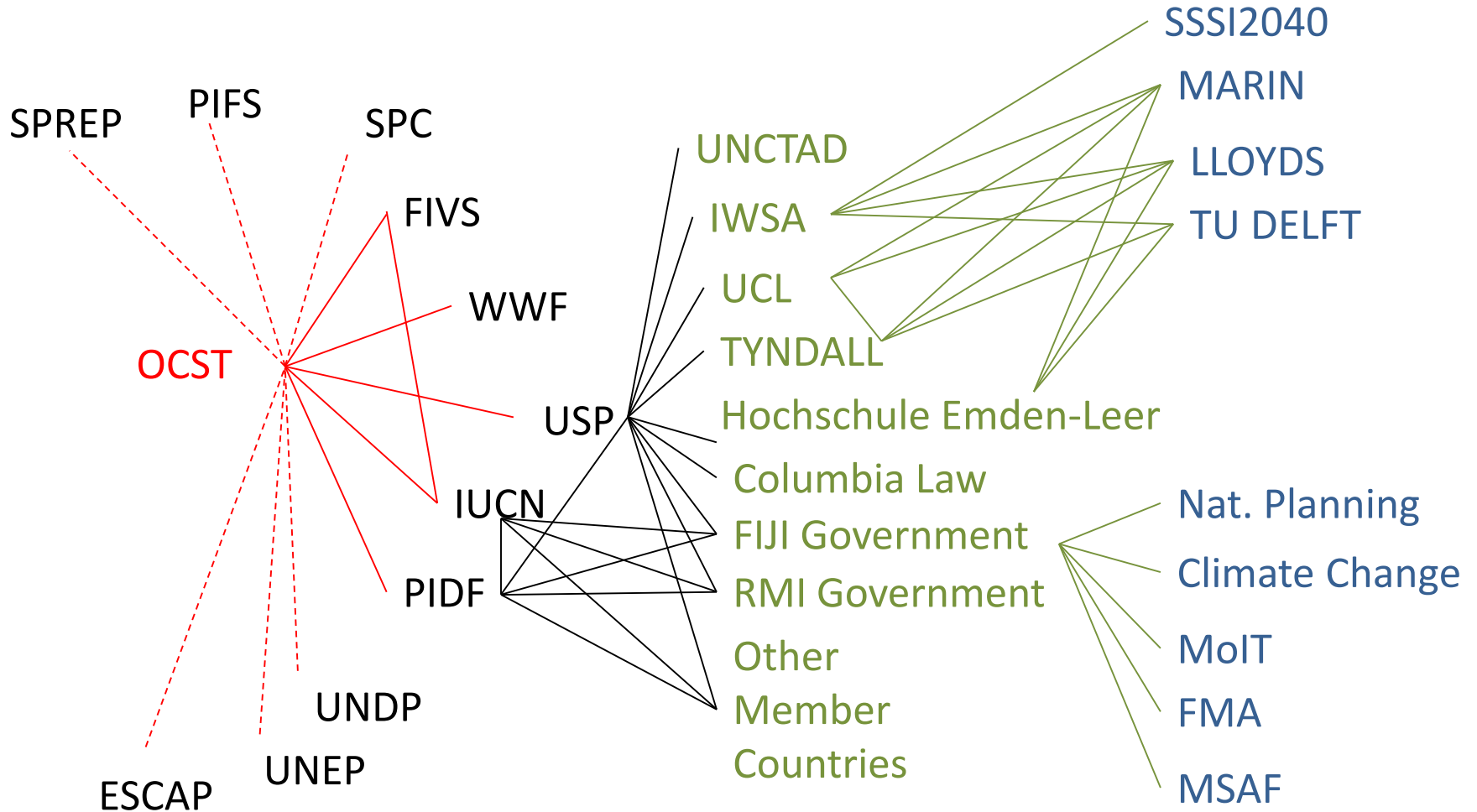
# OCST Networks



# UCL Research Collaborations

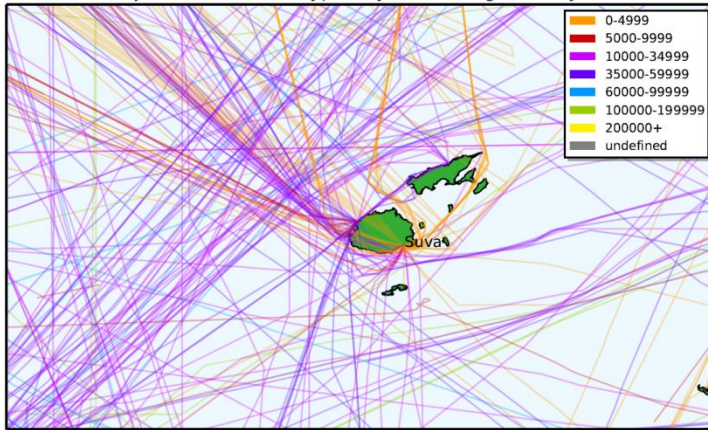


# OCST Networks

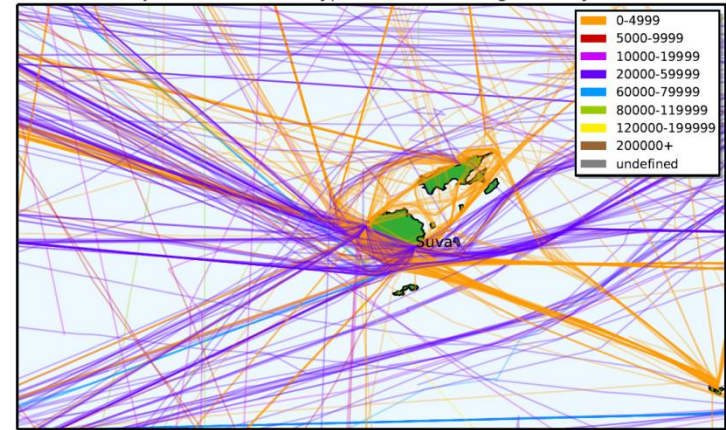


# Vessels by size category: Fiji

Trajectories of vessel type "dry bulk" categorised by dwt



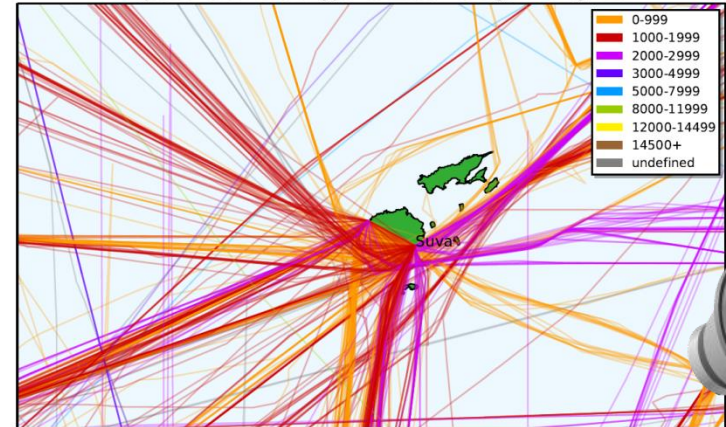
Trajectories of vessel type "wet bulk" categorised by dwt



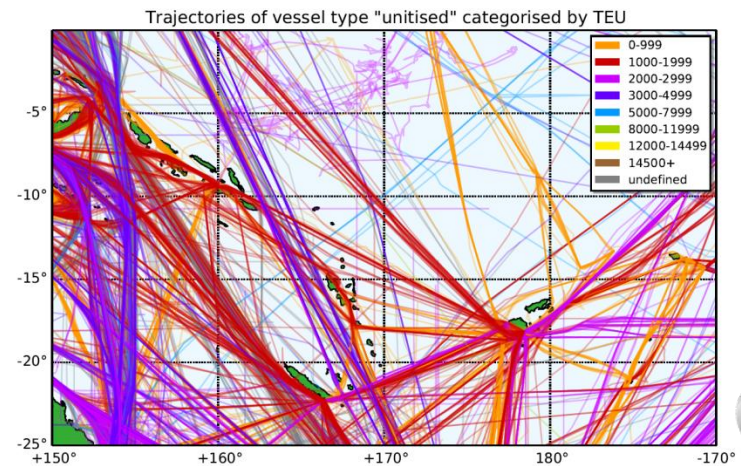
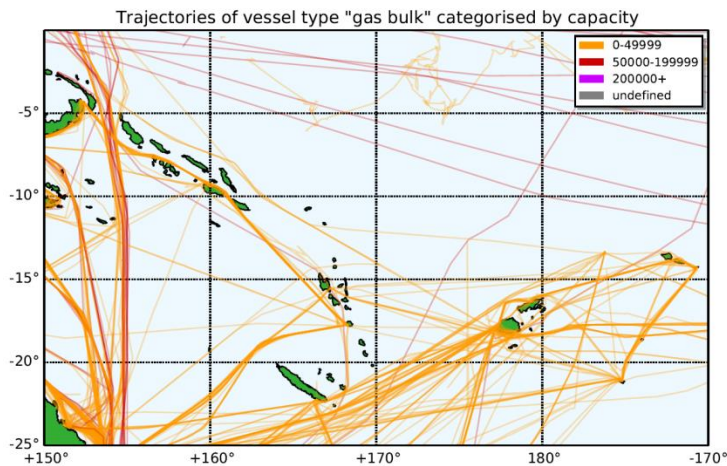
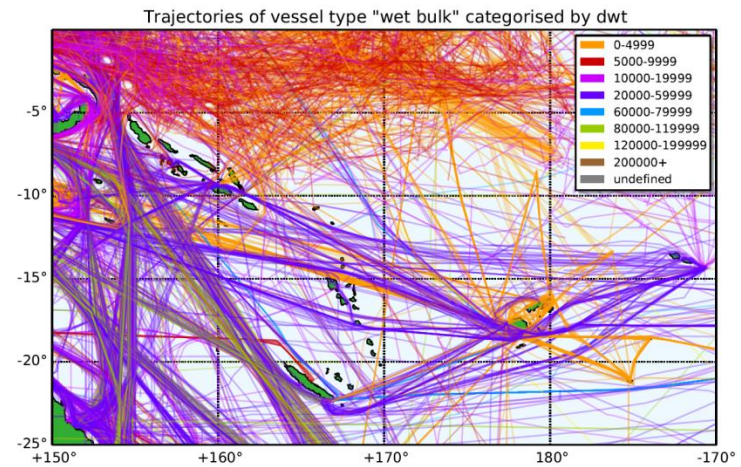
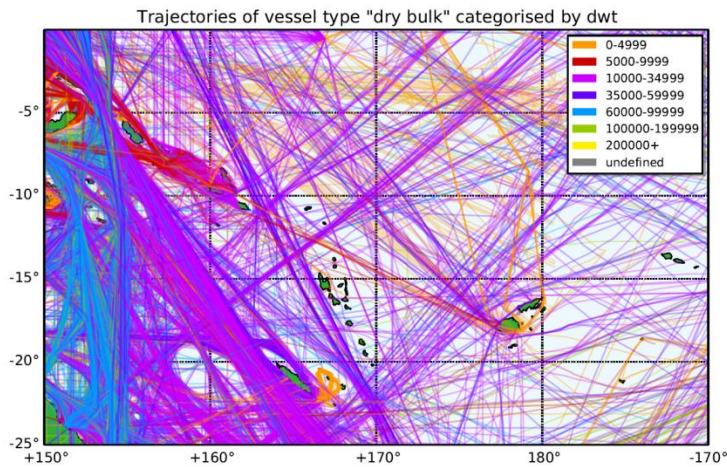
Trajectories of vessel type "gas bulk" categorised by capacity



Trajectories of vessel type "unitised" categorised by TEU



# Attachment: area type + category



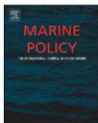


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## Marine Policy

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### A review of sustainable sea-transport for Oceania: Providing context for renewable energy shipping for the Pacific

Nuttall Peter<sup>a,\*</sup>, Newell Alison<sup>a</sup>, Prasad Biman<sup>b</sup>, Veitayaki Joel<sup>c</sup>, Holland Elisabeth<sup>d</sup>

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#### ABSTRACT

This paper summarises research and options for sustainable sea transport in Oceania with a focus on domestic shipping. This debate is situated initially within the context of the current Pacific domestic shipping scenario, a region of minute economies connected by some of the longest sea transport routes in the world. All current options are fossil fuel powered and increasingly uneconomic and unsustainable. Many routes are marginal or unviable and a vicious cycle of old ships replaced with old ships prevails. Although a central and essential issue of many Pacific communities, the option of pursuing sustainable sea transport is currently invisible within the policy space at all levels. Various renewable energy options are possible and increasingly available. Recent research finds that these have strong potential for providing benefits across multiple wellbeings. The barriers to pursuing this agenda are complex and poorly understood but are perceptual and institutional more than technological. A small number of critical experiments during the last oil crisis provide critical lessons and direction.

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frontiers in  
**MARINE SCIENCE**

#### REVIEW ARTICLE

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### Policy and financing—why is sea transport currently invisible in the search for a low carbon future for Pacific Island Countries?

Peter R. Nuttall<sup>1,\*</sup>, Alison Newell<sup>1</sup>, Amelia Bola<sup>1</sup>, John Kaitu'u<sup>1</sup> and Biman Prasad<sup>2</sup>

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The role of financing and policy in research, development, trialing and introduction of renewable energy technologies in the Pacific maritime sector is considered. Key research and trials of renewable energy technologies for sea transport in the Pacific from the 1980s and the critical role played by agencies such as the United Nations in leveraging support from funders such as the Asian Development Bank and European Union are reviewed. The lack of current policy on potential renewable energy technology use in sea transport at national, regional, and development agency levels is discussed with the Asian Development Bank used as a case study. The urgent need for such technology to be commercially trialed as a means of reducing the region's dependency on fossil fuels given the importance of sea transport to socio-economic development in the Pacific is outlined in light of the proportion of fossil fuel currently used by the maritime sector. The paper concludes that review of current funding strategies and policies to include both sea transport and the potential for use of renewable energy technologies in the maritime sector in the Pacific is a priority and current reliance on the private sector acting alone needs review.

**Keywords:** financing, policy, sea transport, Pacific, renewable energy, fossil fuel reduction



Working together for a safer world

## RENEWABLE ENERGY OPTIONS FOR SHIPPING

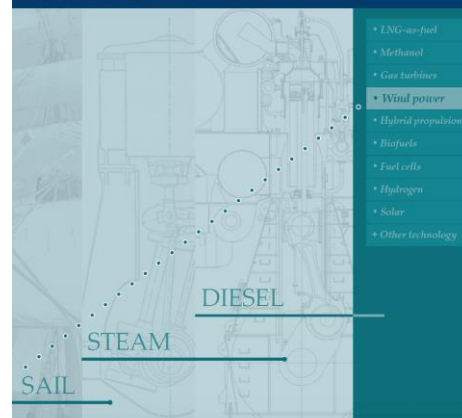
TECHNOLOGY BRIEF



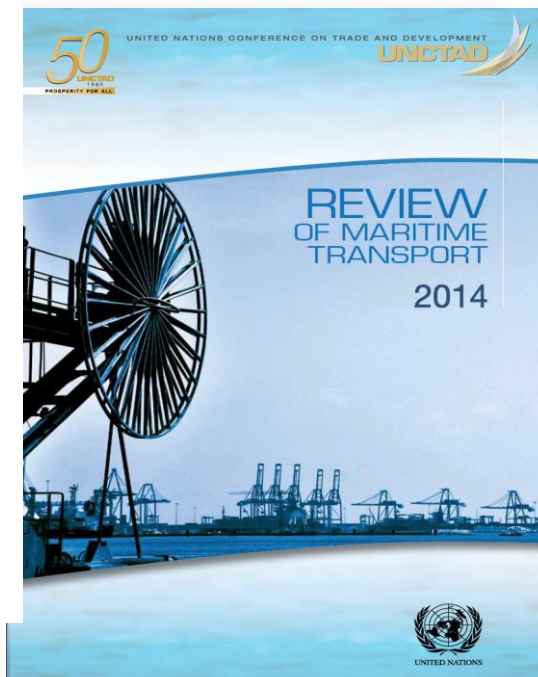
### Wind-powered shipping

A review of the commercial, regulatory and technical factors affecting uptake of wind-assisted propulsion

Understanding technology



JANUARY 2015



COLUMBIA LAW SCHOOL  
CENTER FOR CLIMATE CHANGE LAW

### AUTHORITY OF PACIFIC ISLAND STATES TO REGULATE GREENHOUSE GASES FROM THE INTERNATIONAL SHIPPING SECTOR

BY MEREDITH WILENSKY  
[mwilensky@law.columbia.edu](mailto:mwilensky@law.columbia.edu)



Photo Credit: NOAA

FEBRUARY 3, 2014



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by A Newell

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### [A review of sustainable sea-transport for Oceania: Providing ...](#)

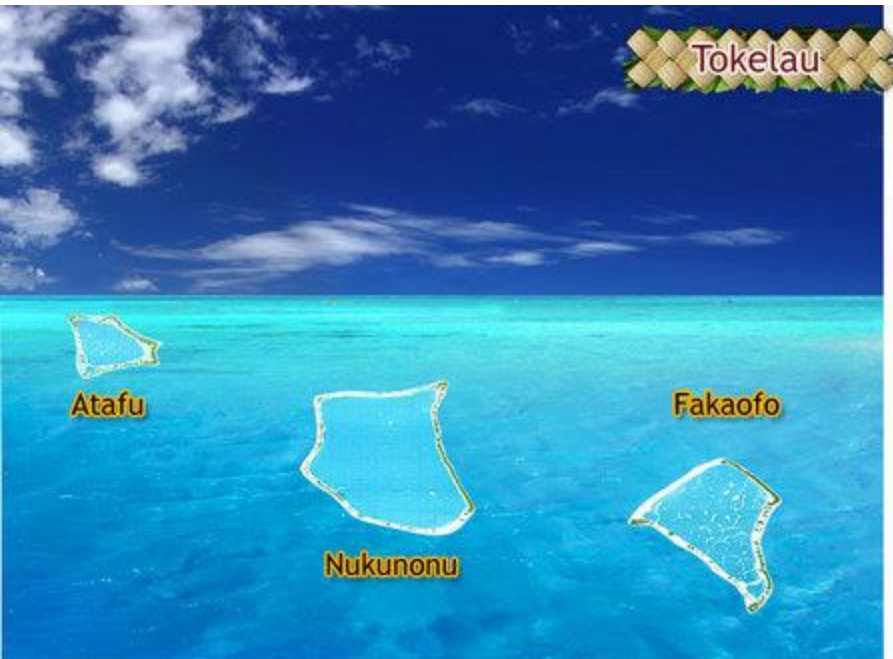
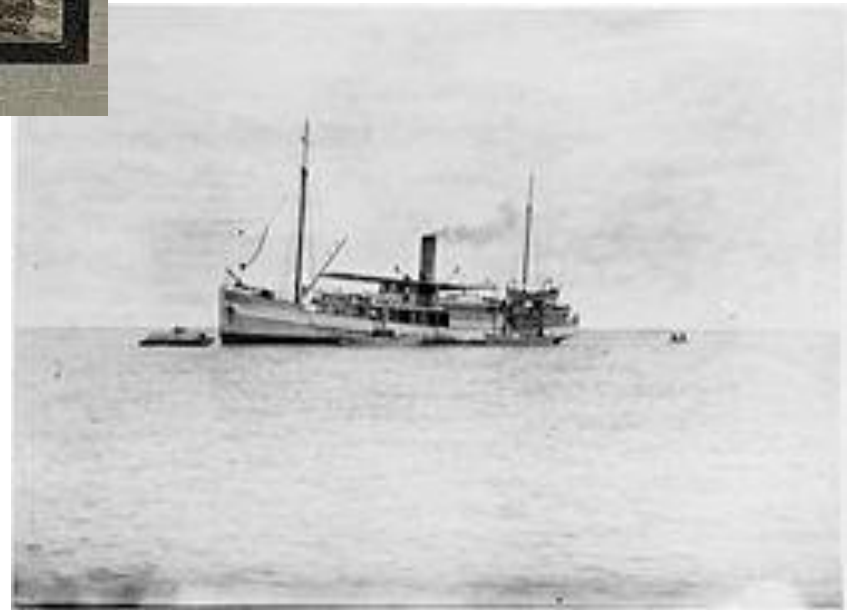
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# Take home messages

- Low carbon transport transition is essential – it is logical, rational and highly achievable.
- Sea transport is the highest priority – it is currently almost invisible in regional agendas
- A structured, regional and **collaborative** approach is the only path forward.
- The primary barriers are POLICY, **Financing**, *perception* and siloing.
- A global network of leading expertise exists and is actively supporting our work on this Ocean





Tokelau

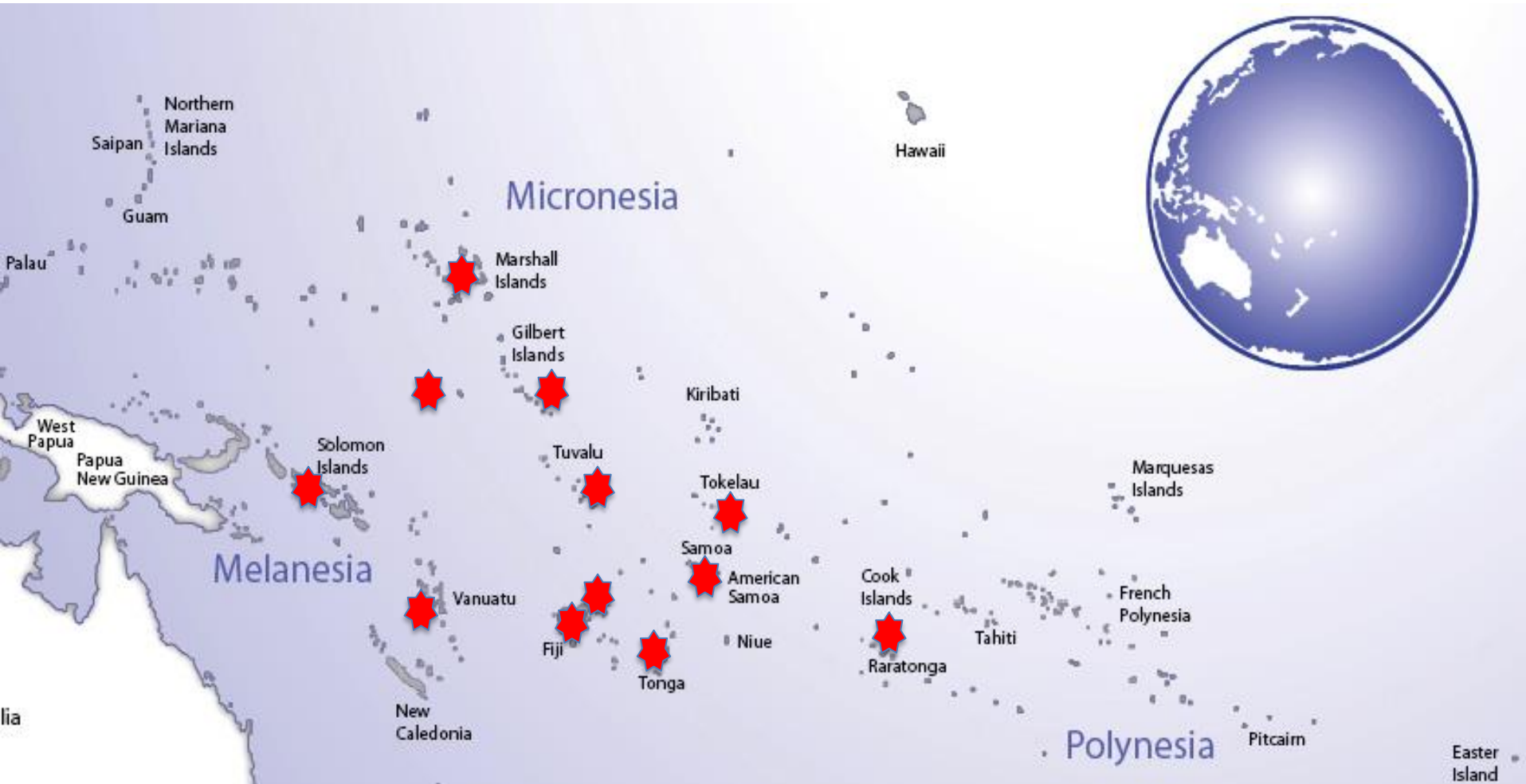
Atafu

Nukunonu

Fakaofu

# Turning the Tide: transitioning to low carbon transport futures

## OCEANIA CENTRE FOR SUSTAINABLE TRANSPORT



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