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Economic Development Division / La Division développement économique

Japan-IRENA joint workshop:

Accelerating renewable energy deployment in the Pacific region

-Meeting the challenges-

Prospects of the use of renewable energy in transportation sector

26 May 2012, Okinawa, Japan

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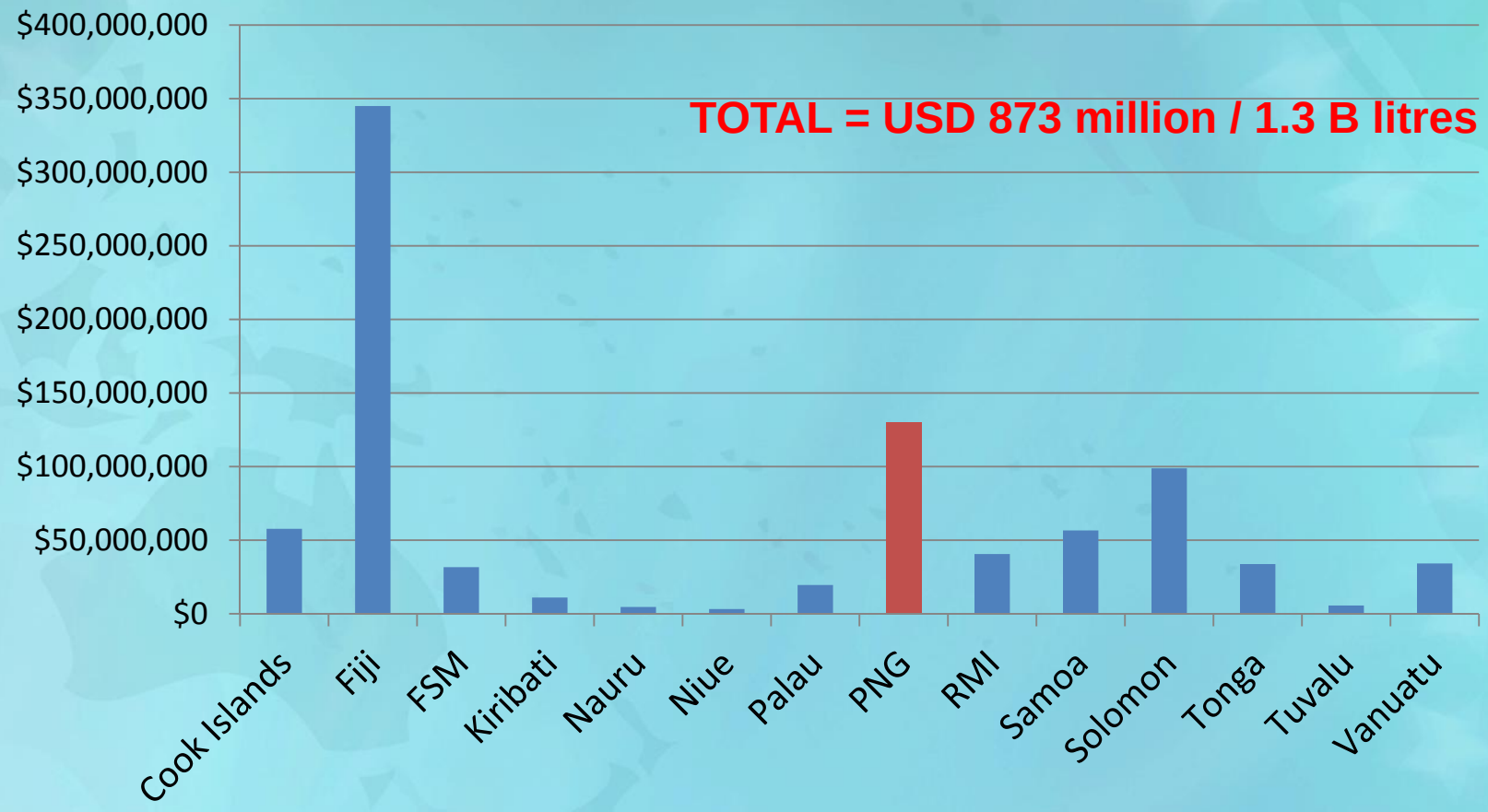
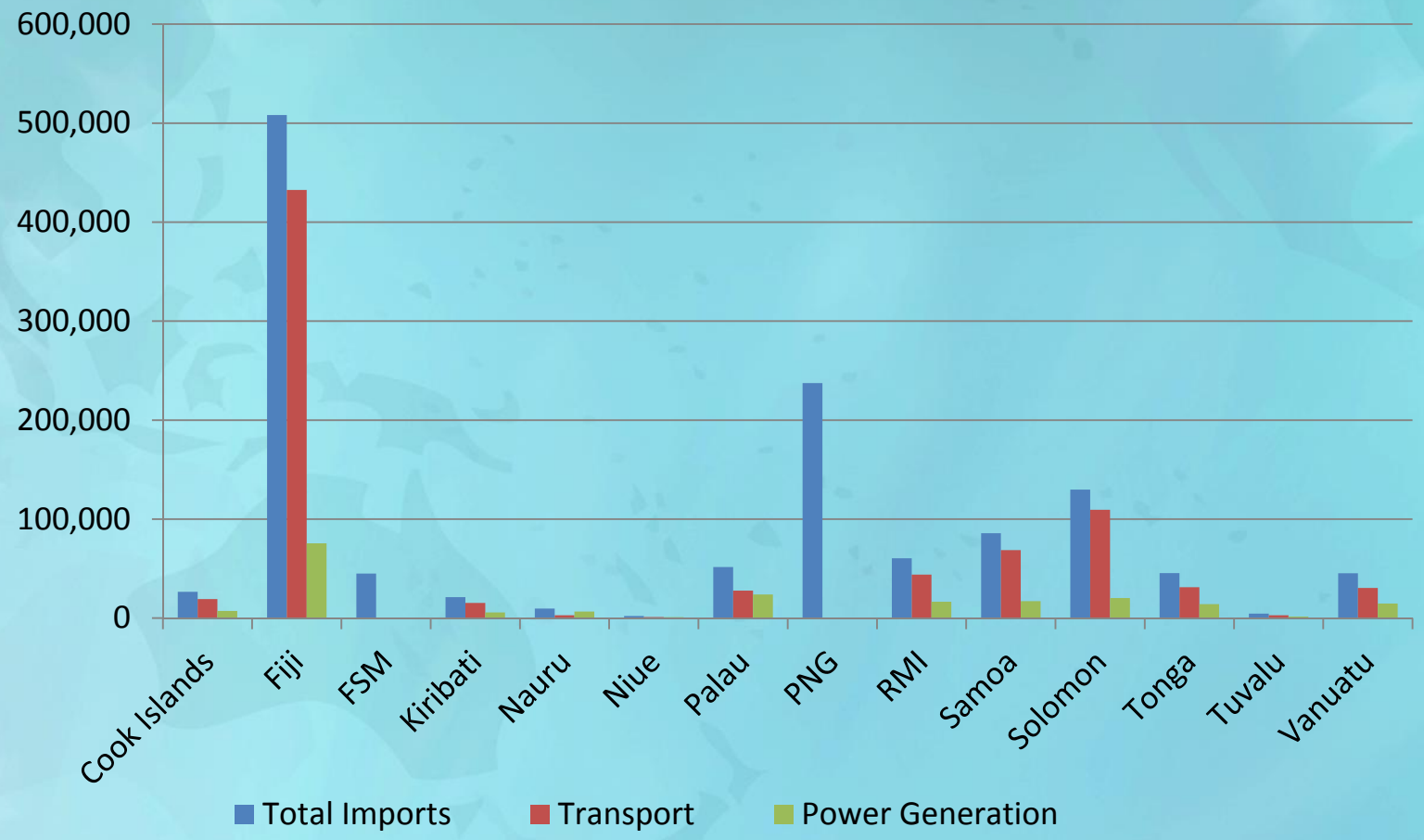
http//spc.int & solomonef@spc.int

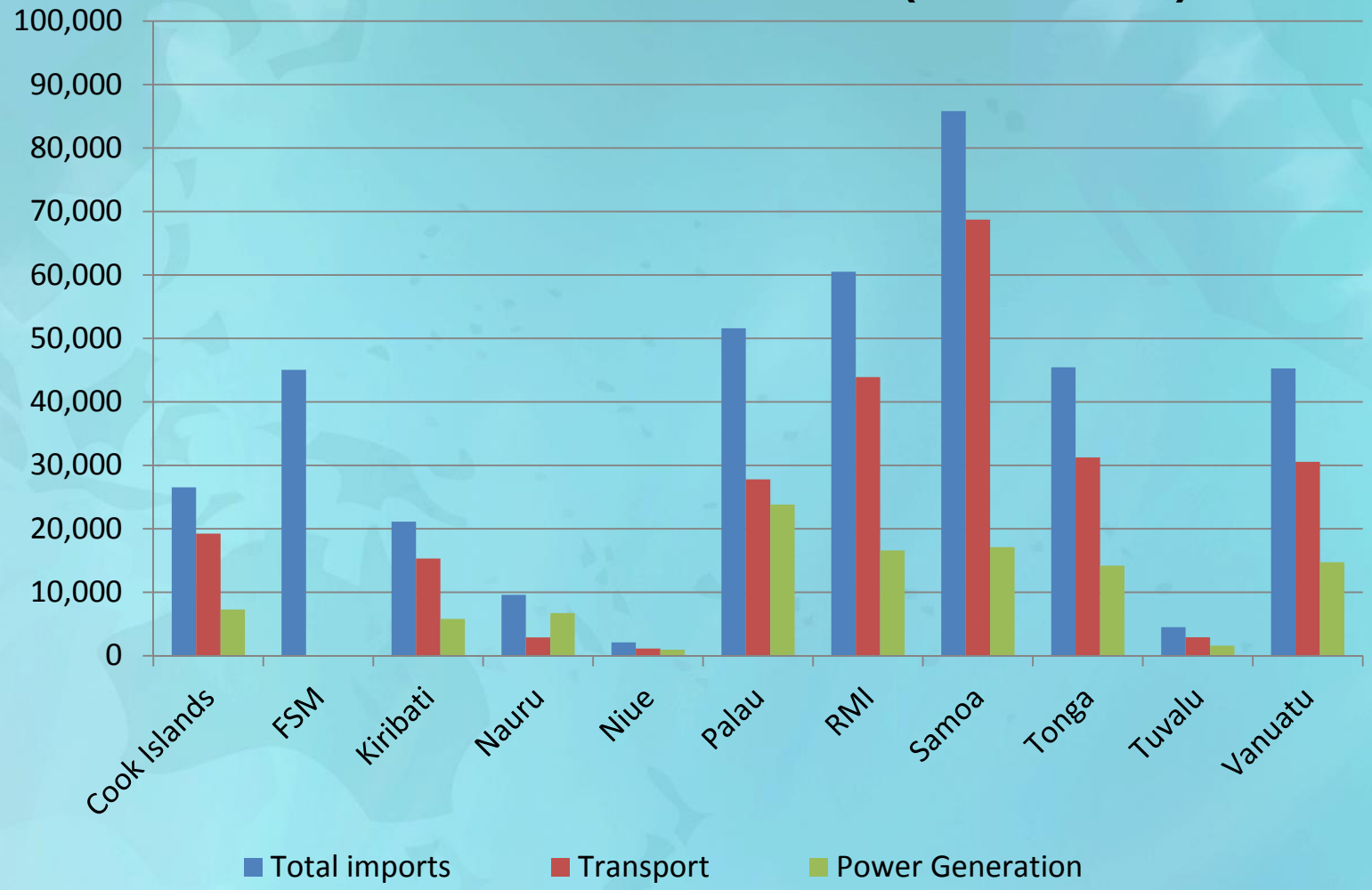
Fuel Imports in USD (2009)



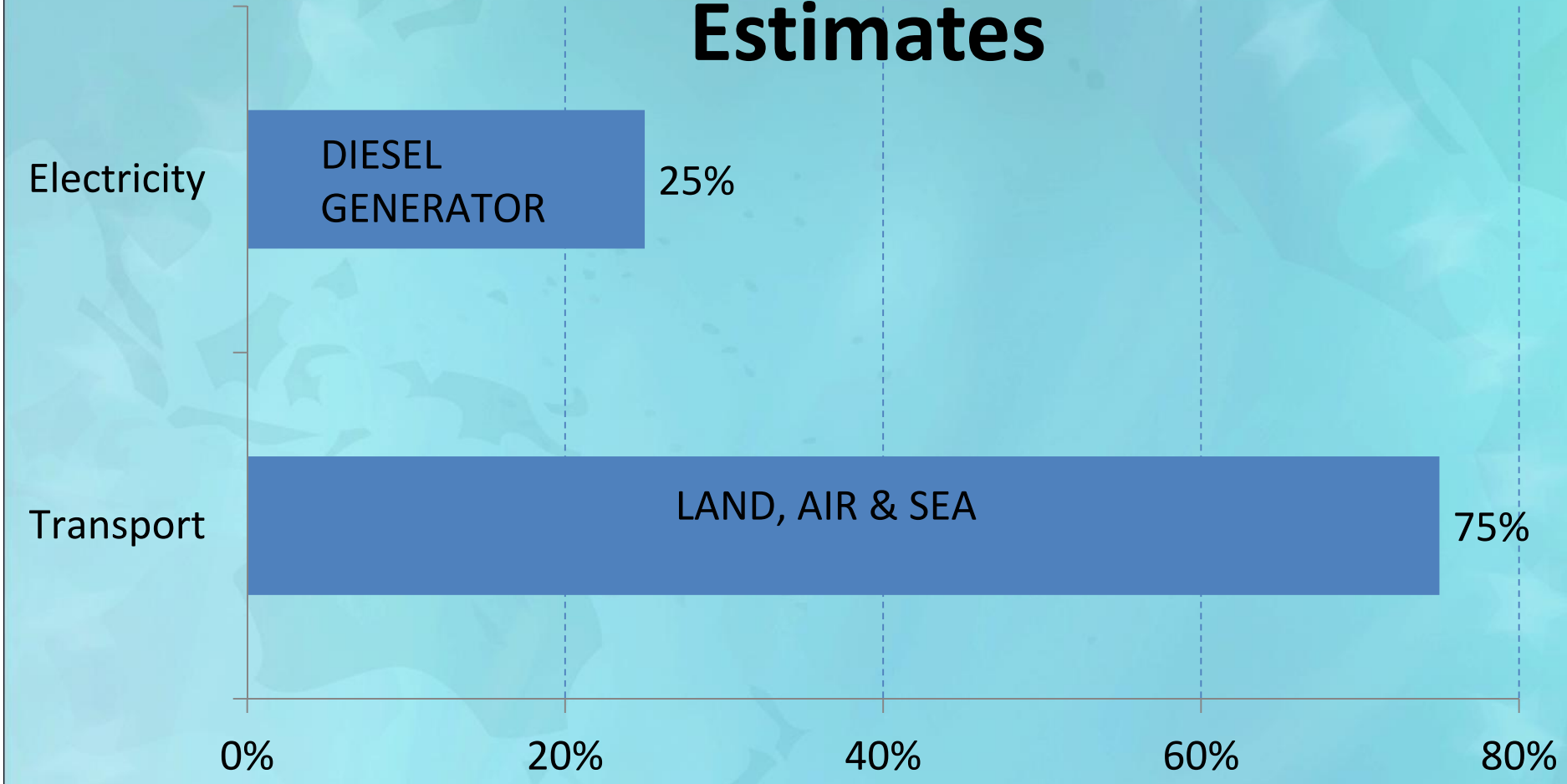
ESTIMATES OF THE FOSSIL FUEL USE FOR POWER GENERATION AND TRANSPORTATION IN THE FICS in 2009 (IN KL)



ESTIMATES OF THE FOSSIL FUEL USE FOR POWER GENERATION AND TRANSPORTATION IN THE FICS (IN KL & 2009)



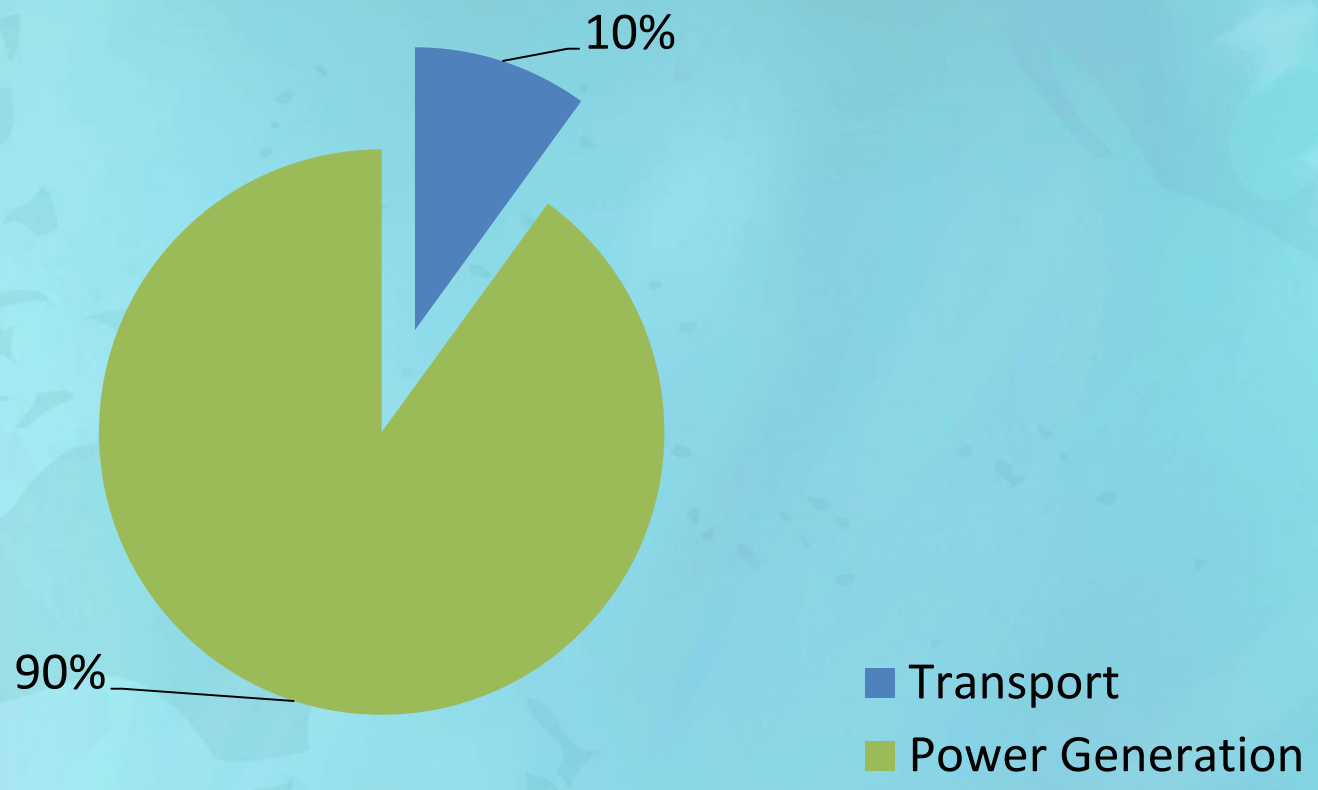
Fossil Fuel Consumption Estimates

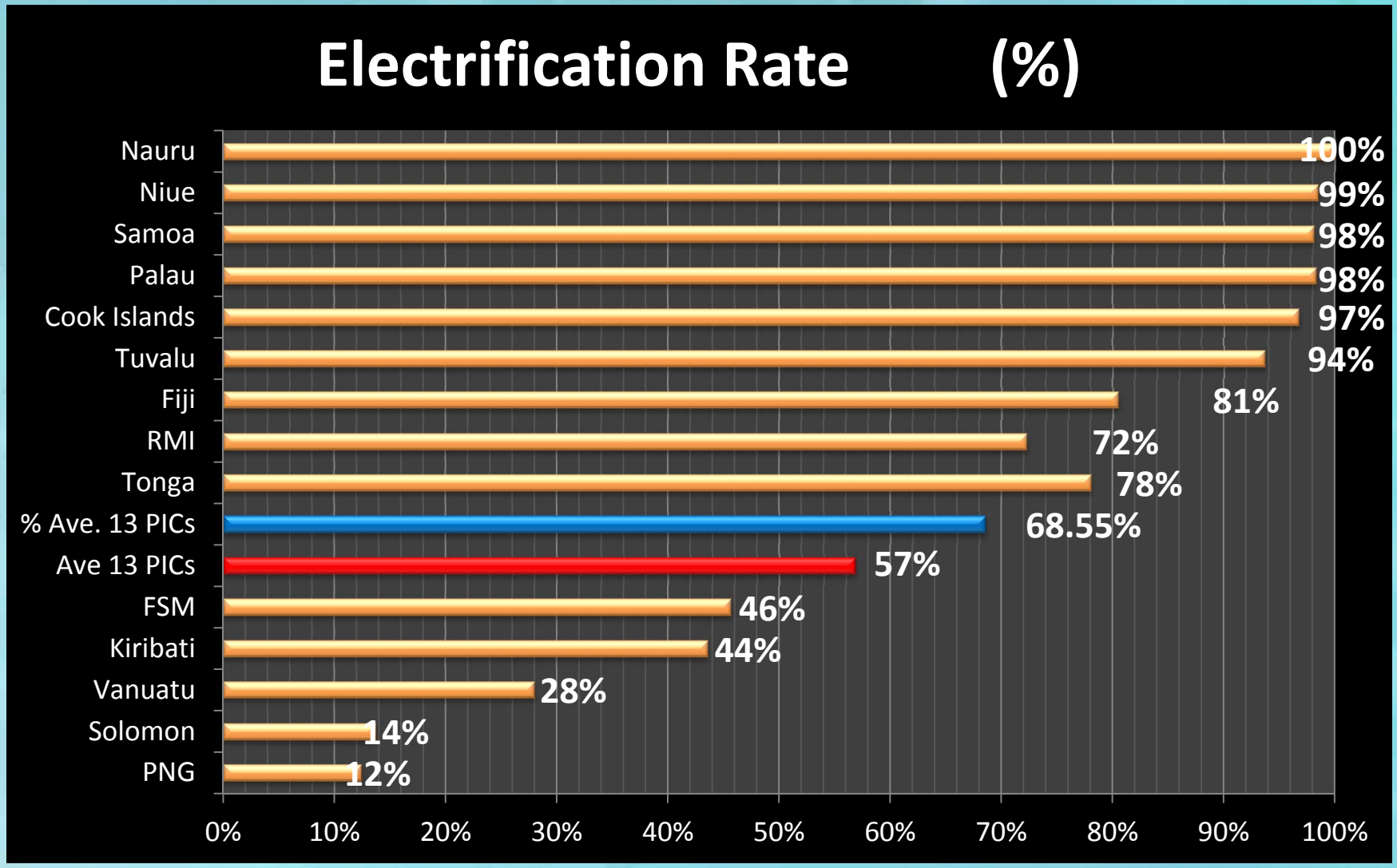


Major Regional Energy Projects: 1981 - 2012

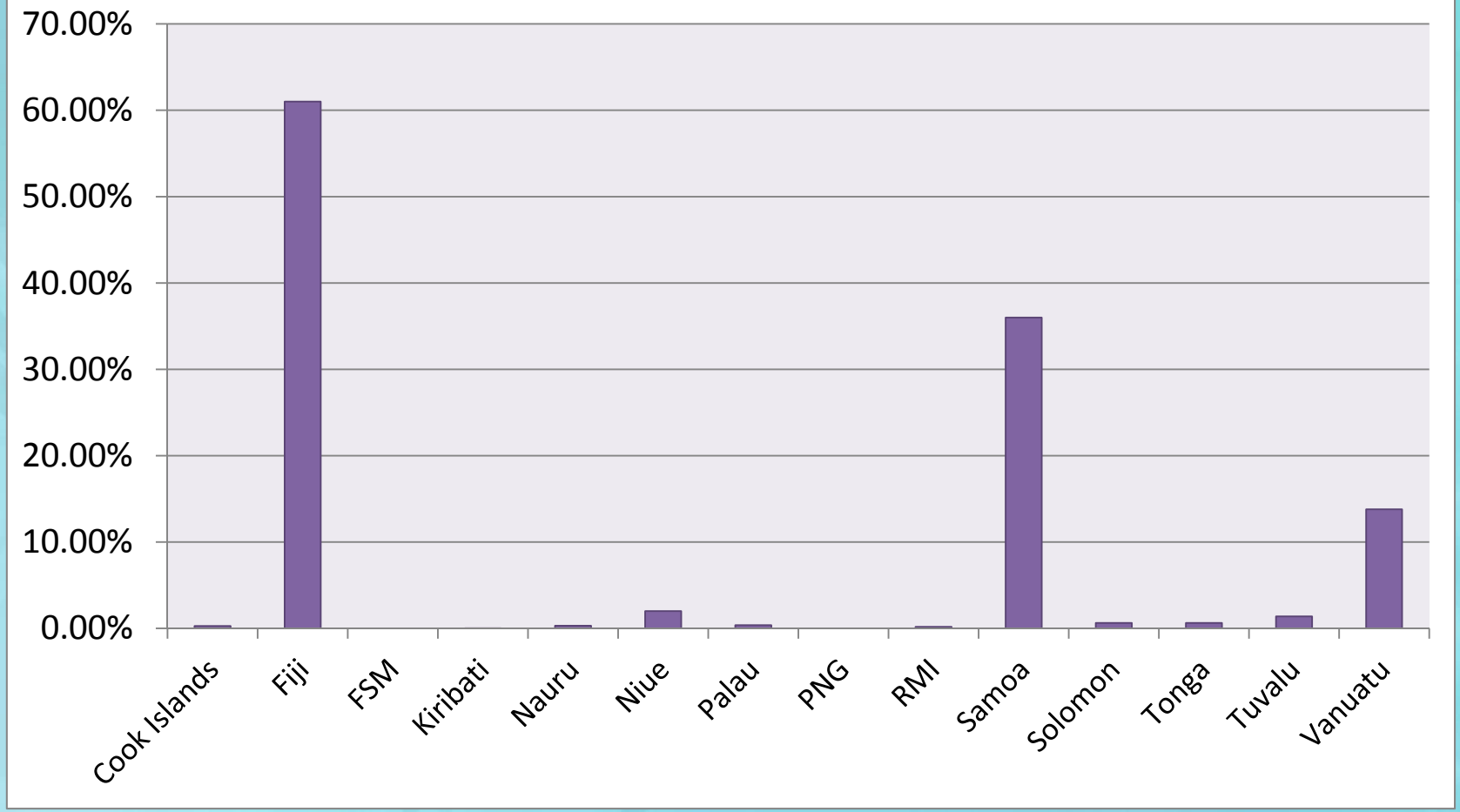
- UNESCAP PEDP, 1983-1991
- EU's PREP Lomé II & Lomé III, 1984-1994
- PREFACE, 2000 – 2002
- PIESAP, 2004 – 2008
- PIREP & PIGGAREP, 2003 – 2013
- North REP, 2010 – 2014
- PECF, 2011 – 2015
- Total – approx USD 100 million

Estimate of Regional Energy Programme Spending 1981- 2012

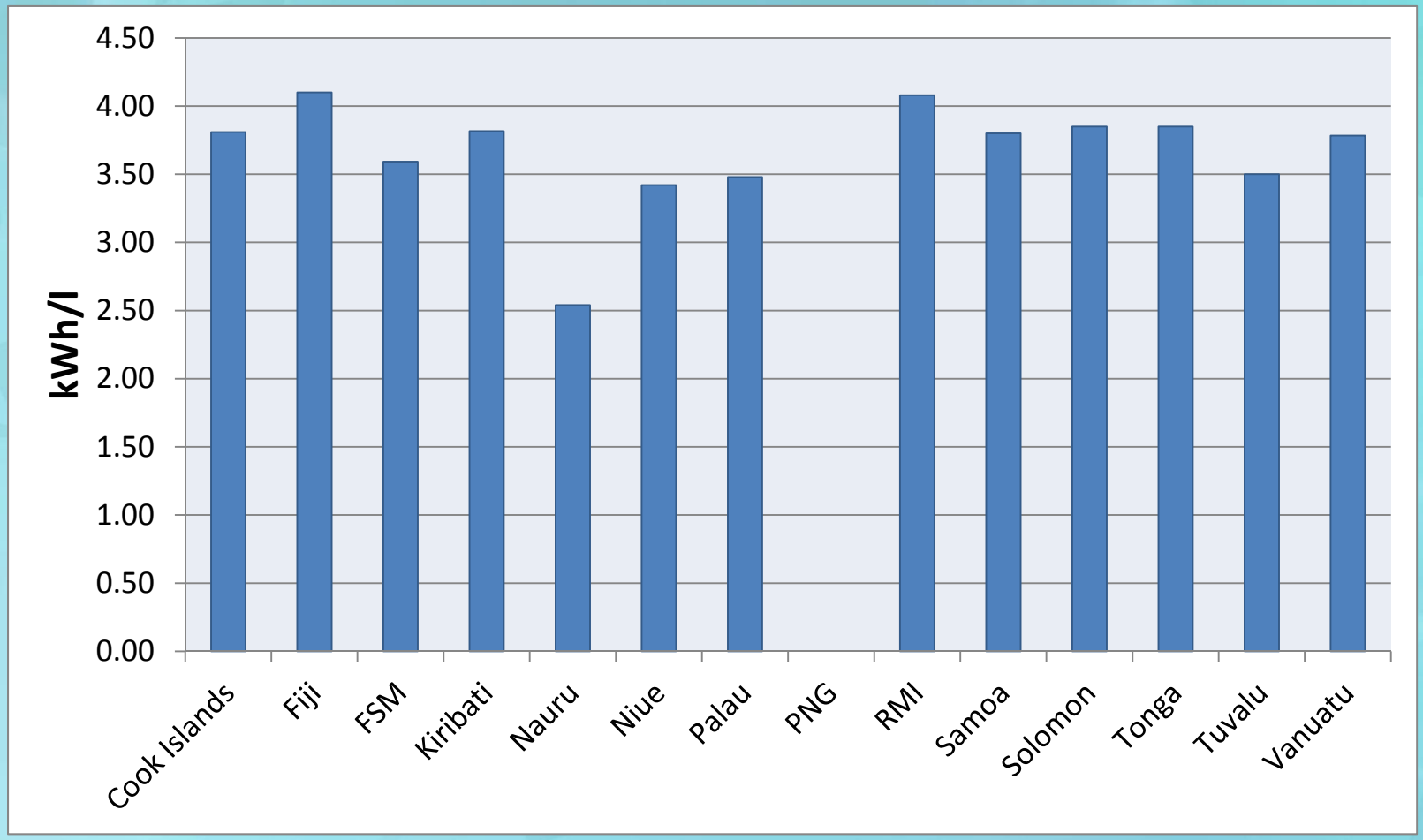



Electrification Rate (%)
Nauru
Niue
Samoa
Palau
Cook Islands
Tuvalu
Fiji
RMI
Tonga
% Ave. 13 PICs
Ave 13 PICs
FSM
Kiribati
Vanuatu
Solomon
PNG
100%
99%
98%
98%
97%
94%
81%
72%
78%
68.55%
57%
46%
44%
28%
14%
12%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

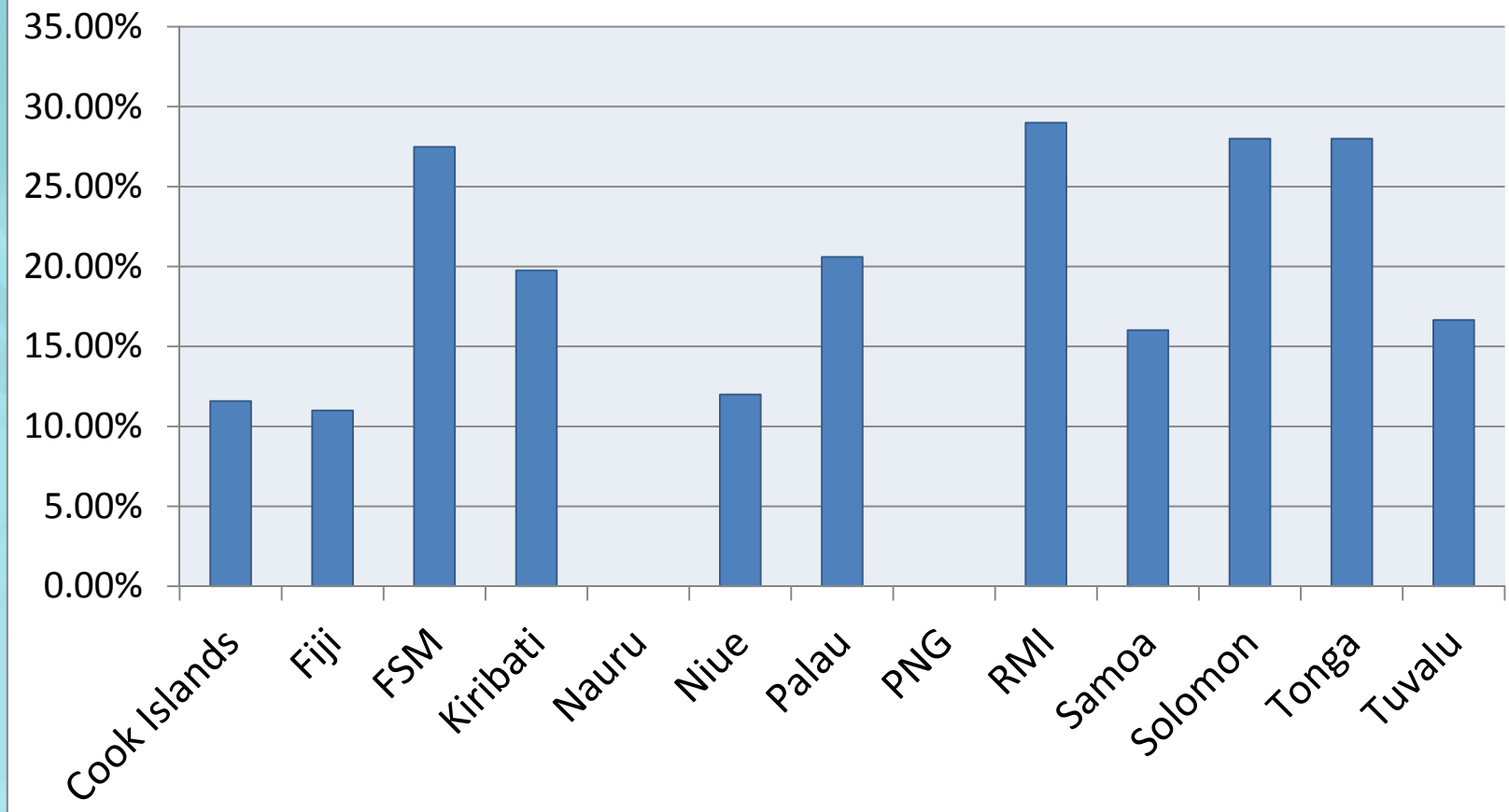
Clean Electricity Contribution (%)



Power Generation Efficiency



Distribution Losses



Why More on Power?

- Easier to measure the impacts in terms of additional consumers electrified
- Multiplier effects
- Easier to estimate fuel / GHG savings: kWH
- Transport is more diversified
- Harder to estimate the savings, impacts on transportation costs, etc

Modes of Transport

- Land – vehicles & roads
- Sea – outboard motors, boats, ships & water
- Air – light aircrafts, jet planes & air

Determinants of Fuel Consumption in Transport

- Area and quality of roads of the main island
- Area of the capital and its population
- Principal economic activities
- Number and proximity of outer islands
- Reliability of outer islands shipping and flight services

Land Transport in FICs

- Second hand cars and vans
- Transport of goods and people
- Mostly within the 3-4 km radius of the capital
- Increasing use of taxis / minibuses in Kiribati, RMI and Vanuatu
- Electric vehicles in golf courses

RE for Land Transport

Cycle

Walk

30 km walk for Earth Hour 2012

RAROTONGA, Cook Islands (Cook Islands News, Nov. 30, 2011) – The Cook Islands government has plans to introduce a series of **cycle ways and footpaths** to Rarotonga and the outer islands, but not in the short term.

Walk /Cycle for life and Save Energy Too

- The 2011 Forum Leaders meeting declared that the Pacific is in a Non-Communicable Diseases (NCDs) Crisis
- 75 percent of all adult deaths in the Pacific are due to NCDs
- Leaders called on the SPC and the WHO and other CROP agencies to work with all PICTs to address NCDs as a matter of urgency.

Bicycles for Capitals (B4C)

- Promotion of bicycle riding in schools and at work and as a sport
- Declaring certain roads in the capitals to be non-motorized free during certain times of the day, allowing only bicycles and pedestrians
- Training on establishing a bicycle-related business
- Aggressive public awareness, public relations and training campaigns to promote a cycling culture

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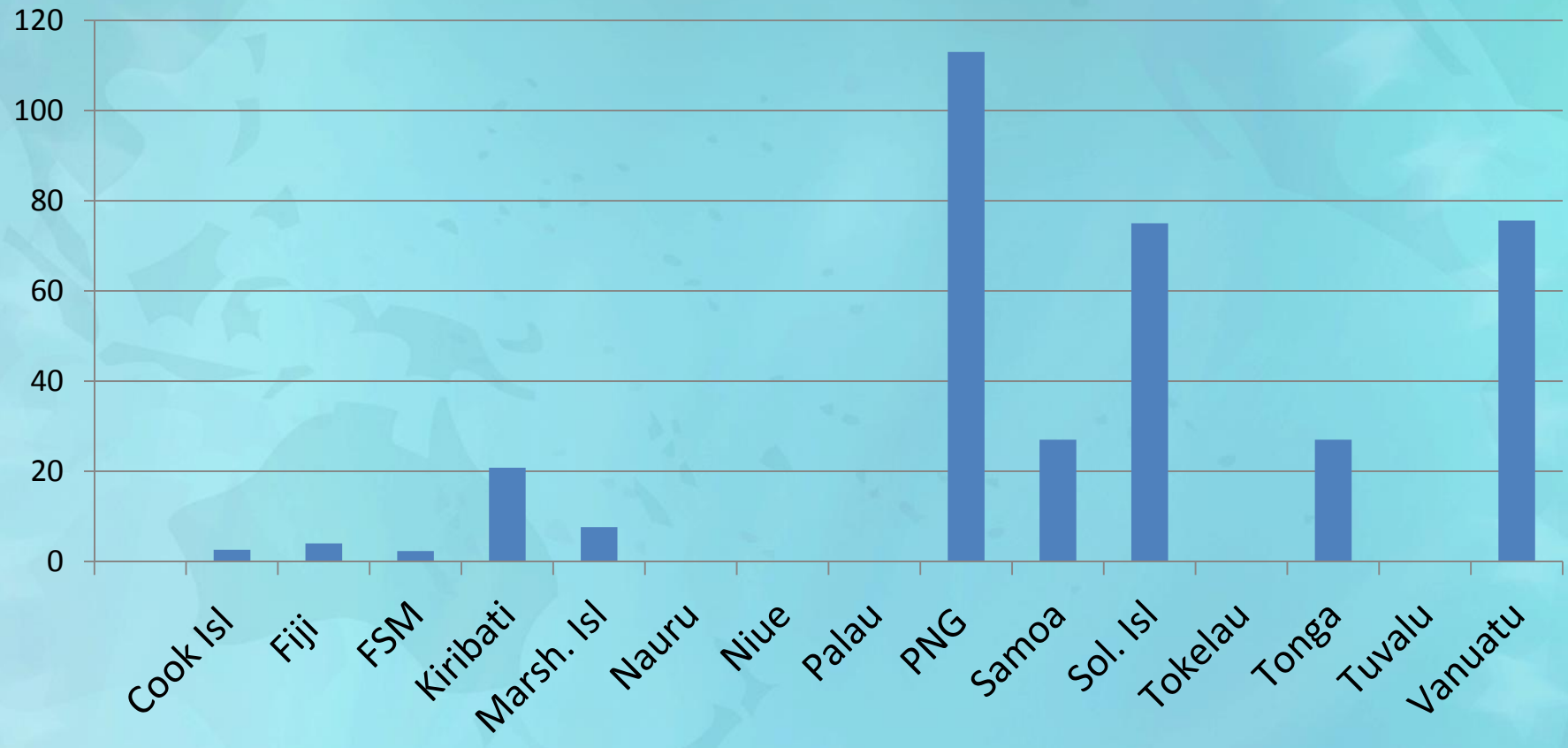
RE for Land Transport

Biofuel / Biodiesel

Country	Projected GHG emissions in 10 years, BAU		Potential GHG Savings with Renewable Energy & Energy Efficiency Investments: (Gg per year, 10 years from the baseline year)								
	CO_2 (Gg)	Year	Total	Efficiency	Geo-thermal	Hydro	Bio-diesel	Ethanol	biomass	Solar PV	Wind
Cook Isl	42.9	2013	13.1	2.1	0	0	2.6	0	0	2.1	6.3
Fiji	1487	2010	966	37	43	818	4	27	17	1	19
FSM	168	2012	23.9	7.1	0	14.2	2.3	0	0	0.3	0
Kiribati	72.2	2013	26.5	2	0	0	20.8	0	0	3.7	
Marsh. Isl	400	2013	22.3	14.3	0	0	7.6	0	0	0.4	0
	46.9	2013	16.6	13.8	0	0	0	0	0	2.8	0
Niue	8.7	2012	1.08	0.44	0	0	0	0	0	0.64	
Palau	441	2013	49	37	0	0	0	0	0	12	0
PNG	2056	2011	1586	0 *	333	691	113	430	Very small	9	10
Samoa	357.3	2013	96.1	12.2	12.8	40.2	27	0	0.3	2.5	1.1
Sol. Isl	313	2012	~121	10.7	Low	31	75	0	<2	3	<1
Tokelau	1.3	2013	0.22	0.07	0	0					0
Tonga	121	2010	34.5	3.3	0	0	27	0	0	1.4	2.8
Tuvalu	13	2013	2.2	1.4	0	0					0
Vanuatu	155.7	2013	~109	1	17	14	75.6	0	< 1	< 2	<<1

Potential GHG Savings from Bio-diesel in FICs by 2013 (Gg)



Copra Industry

- Declining Industry
- Very strong competition with the domestic users, producers of virgin oil and sellers of green drinking coconuts

Tobolar's Experiences with Biofuel Development (RMI)

Republic of the Marshall Islands

- It would cost $4.00 a gallon to produce coconut oil fuel versus Mobil Oil's price of $5.20 per gallon for diesel at this time

Republic of the Marshall Islands

Filtering and Delivery System

1. Pump raw coconut oil into a 15,000 gallon settling tank.

2. After one week, draw off any sediment and pump into a 6,000 gallon tank through a one-micron filter.

Republic of the Marshall Islands

Filtering and Delivery System (continued)

3. After 3 to 4 days, we draw any sediment off the 6,000 gallon tank and pump through a water separator into a 500 gallon service tank.

4. Finally, from the service tank we go through an additional water blocking filter, through a metering pump and dispense to vehicles.

Republic of the Marshall Islands

Filtering and Delivery System (continued)

5. For bulk sales, go directly from the 6,000 gallon settling tank to the customers bulk carrier.

Republic of the Marshall Islands

Filtered Coconut Oil (FCNO) as Fuel

In February 2002, started using 100% filtered coconut oil in two new vehicles that had seen very little petrol diesel before use of filtered coconut oil (FCNO).

Mitsubishi Canter 1-ton Flatbed truck.

Mazda 2900 pickup truck

Republic of the Marshall Islands

Partially Refined Coconut Oil as Fuel

- When fueled with partially refined oil, the Mazda truck engine began malfunctioning.

Republic of the Marshall Islands

FCNO Problems Encountered

- Started running other trucks and larger engines on the FCNO that had been using diesel.

- Problems we experienced:
- clogged filters
- clogged injector pumps
- rising oil levels in crankcases
- poor engine performance

Republic of the Marshall Islands

FCNO / Diesel Mix

- A little over 2 years ago, started using a blend of 50% FCNO with 50% diesel.
- Being alerted to the possibility of rapidly clogged filters from dissolved sediments, this blend allows satisfactory use of our FCNO
- All diesel equipment and engines, from 5 to 1,000 horsepower, run on this blend.
- Have not noticed any significant reduction in speed or power on most engines.

Republic of the Marshall Islands

FCNO in Use

Republic of the Marshall Islands

FCNO in Use

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Republic of the Marshall Islands

FCNO in Use

Republic of the Marshall Islands

FCNO Conclusions

- To maximize the use of FCNO will require experimenting and developing different blends for different engines.
- Filtered raw coconut oil, without any further processing, appears to be the least cost-technology solution with the most cost-benefit and will help energize the economies of copra producing countries.

Vanuatu Experiences with Biofuel Development


14. 8. 2001 15:16


537
14. 8. 2001 13:30


14. 8. 2001 15:52


MOTOR TRADERS
& Microtech
Coconut Oil Fuel
Project
Coco-Diesel is heated
to 80 deg. C before it
passes through the
filters of the vehicle
ISUZU
14. 8. 2001 15:54

2005 in Vanuatu

- PORT VILA, Vanuatu (Vanuatu Daily Post, Jan. 22) – The Vanuatu Minister of Lands, Geology, Mines, Energy, and Water Resources, Paul Telukluk, has announced that all vehicles under the Ministry will switch to coconut bio-fuel.
- The first government department that decided to use bio-fuel was the Vanuatu Meteorology Department.

Biofuel Feasibility Studies

- ADB and PIGGAREP in the Solomon Is
- PIGGAREP in Christmas Is, Kiribati
- Fiji has endorsed a national Biodiesel and Ethanol Fuel standard

Sea Transport

- Outboard motors
- Inter-island ferry
- Container ships, etc

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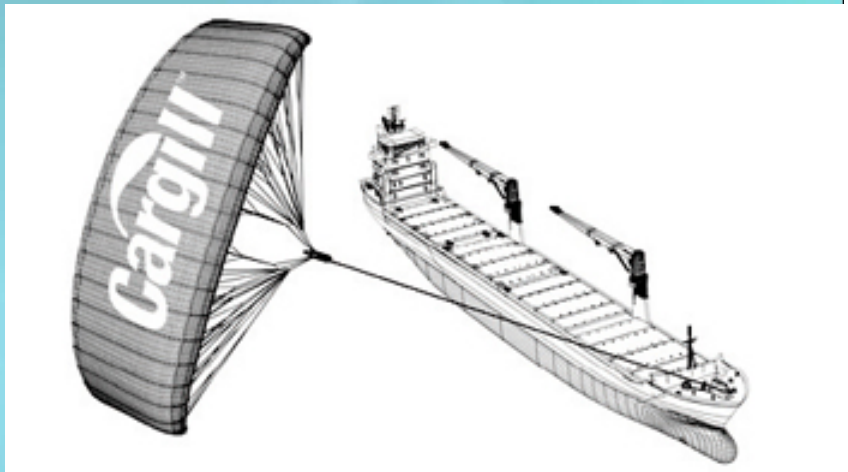
Wind powered bulk carrier

In the first quarter of 2012, the dry bulk cargo vessel *Aghia Marina* will be equipped with a 320 square meter Skysail. At 170 meters long and a dwt of 28,500 tons, the *Agia Marina* will be the largest vessel ever to be equipped with the wind propulsion technology patented by the Hamburg-based company SkySails GmbH.

Can **reduce consumption of bunker fuel by 35%** in ideal sailing conditions.



Solar powered boats

Telescopic hard sail concept for bulk carrier

Recently a pair of Japanese professors designed a cargo ship with telescopically reefing hard composite sails, 50 metres high and 20 metres wide. The motor assisted vessel would **use 64% less fuel** according to a simulation done using an actual trade route.

H2 ship

Project objectives:

- Collaborate in the construction and operation of a fuel cell powered 50 passenger sight-seeing boat in the Golden Horn
- Consortium of Turkish partners IMM/BELBIM, ICHET, IDO, GYTE, HABAŞ, SME's

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Air Transport

Airlines move to RE

- 28 May 2009 - Scientific testing has found that up to 1.4 tonnes of fuel can be saved on a twelve-hour long haul flight powered by a 50/50 blend of second generation **jatropha** sustainable biofuel and traditional Jet A1.
- 14 December 2011 - Air New Zealand today announced it has signed a Memorandum of Understanding (MOU) with Licella Pty Ltd to examine the development and commercialisation of a process to convert **woody biomass** into sustainable biofuel in New Zealand.
- **Tokyo, January 30, 2009: Today,** Japan Airlines (JAL) became the first airline to conduct a demonstration flight using a sustainable biofuel primarily refined from the energy crop, **camelina**.

Rupeni Mario, Energy Adviser, Community Lifelines Programme

Transport and Energy Efficiency

Air Pacific

- 25 October 2011 – Air Pacific to Acquire New Airbus A330-200 Aircraft. Fiji's national airline Air Pacific today announced that it has ordered three new Airbus A330-200 aircraft to replace its current fleet of B747 and B767 aircraft.
- The Airbus A330-200 model will replace its Boeings – 747 and 767 aircraft.
- A330-200 is a fuel-efficient aircraft that will **use 45 per cent less fuel** than the present fleet, according to Air Pacific.

Conclusion

- RE for land transport has promises in some PICs and not in others
- Walking and cycling are the easiest
- Need further detailed studies on biofuel / biodiesel, noting land area requirements and competing uses for food, perfume, etc
- Wind power looks promising for sea transport
- Use of renewable energy in air transport are underway
- Sea and air transport are well taken care of by the private sector
- Fuel substitution in transport must go together with energy efficiency

Thank You!

2012 INTERNATIONAL YEAR OF
SUSTAINABLE ENERGY
FOR ALL