



NORTHREP

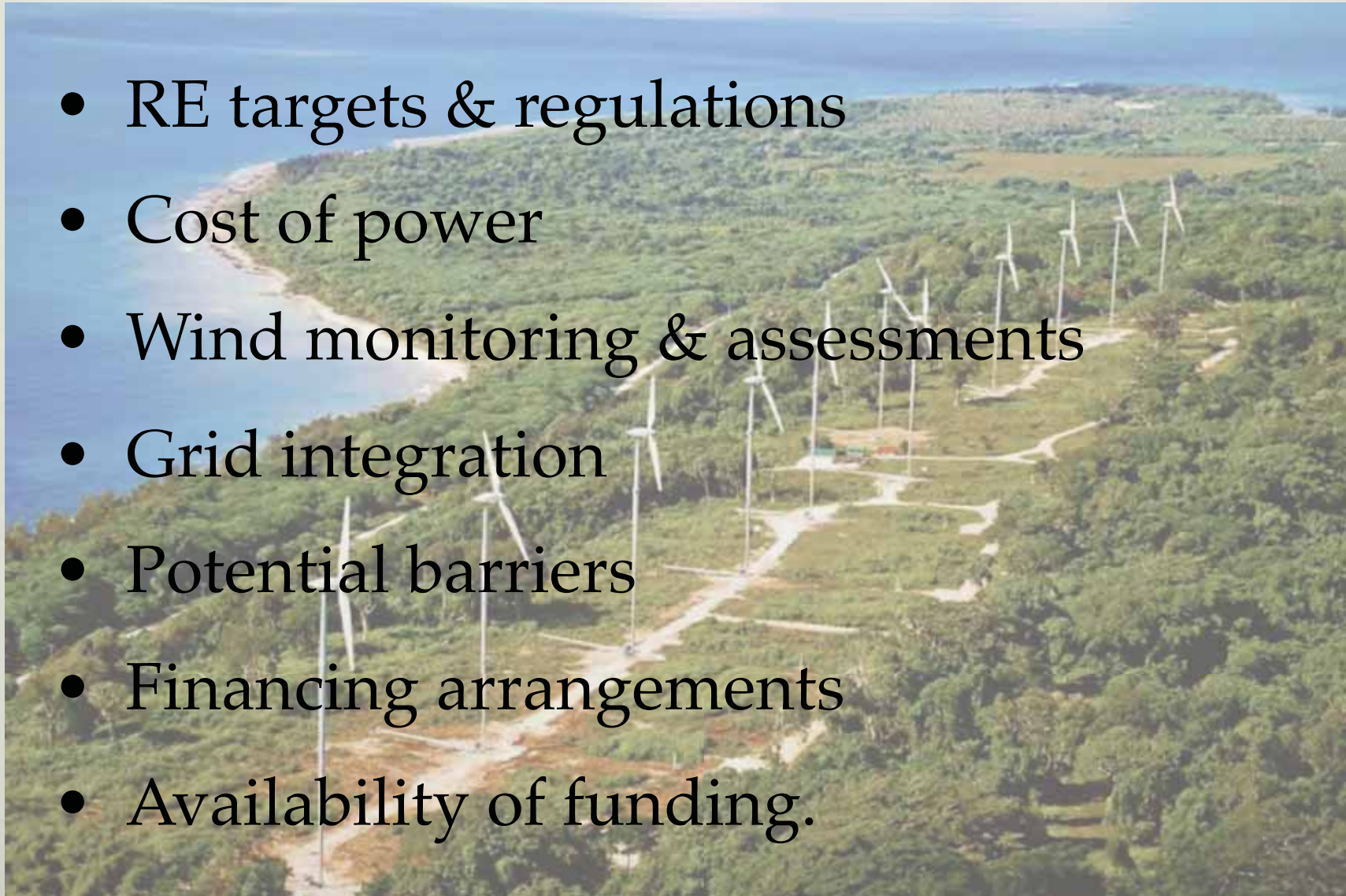
North Pacific ACP Renewable Energy and Energy Efficiency Project

WIND ENERGY OPPORTUNITIES IN THE PACIFIC ISLANDS

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FACTORS AFFECTING POTENTIAL FOR WIND PROJECTS IN THE PICs

- RE targets & regulations
- Cost of power
- Wind monitoring & assessments
- Grid integration
- Potential barriers
- Financing arrangements
- Availability of funding.



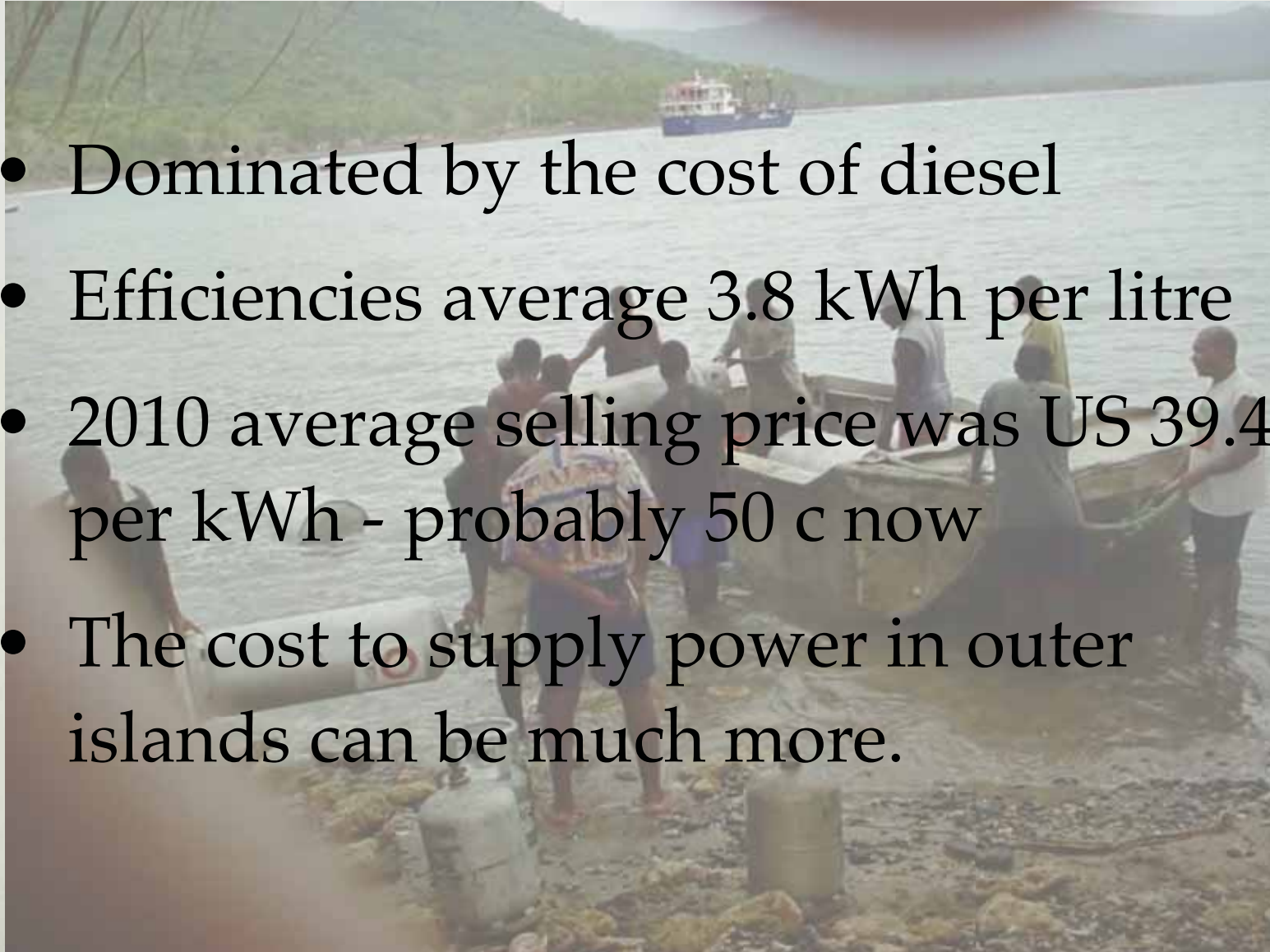
RENEWABLE ENERGY TARGETS & REGULATIONS

Country	RE Target	Date	Country	RE Target	Date
Fiji	90 % electricity	2015	Solomons	20 % electricity	2018
Marshalls	20 % electricity	2020	Cook Islands	50 % electricity	2015
FSM	10/50 % electricity Urban/Rural		Kiribati	10 % electricity	
Nauru	50 % energy	2015	Tonga	50 % electricity	2012
Niue	100 % electricity	2020	Tuvalu	100 % electricity	2020
Palau	20 % electricity	2020	Vanuatu	100 % electricity	
Samoa	20 % electricity	2030			

The country RE targets are due to be updated at the Pacific Energy Summit in Auckland next week.

POWER COSTS

- Dominated by the cost of diesel
- Efficiencies average 3.8 kWh per litre
- 2010 average selling price was US 39.4 c per kWh - probably 50 c now
- The cost to supply power in outer islands can be much more.



WIND RESOURCE MONITORING AND ASSESSMENTS

Country	Monitoring masts	Height monitored (m)	Data duration	Reporting	Predicted mws (m/s)
Fiji	9+	up to 48	17 months	No	4.4 to 6.5
PNG	0		*	No	6 @ 25m
Marshall Islands	2	34	5 months	No	8.0
FSM (Yap)	1 (2 more soon)	30	29 months	Yes	6.2 (LT)
Nauru	1	30	1 year	Yes	4.2
Niue	1		27 months	No	6
Palau	1 (2 more soon)	34	1 month	No	6.8
Samoa	5	34	8 months	Yes	6.7 @ 55m
Solomons	0		*	No	4 @ 25m
Cooks	2	30	Approx 2 years	Yes	6.7
Kiribati	2	34	20 months	No	6.6
Tonga	1	50	23 months	Yes	6.6 (6.8 LT)
Tuvalu	2	30	Approx 3 years	Yes	5.8
Vanuatu	7	34	4 months	No	6
				High Certainty	Low Certainty

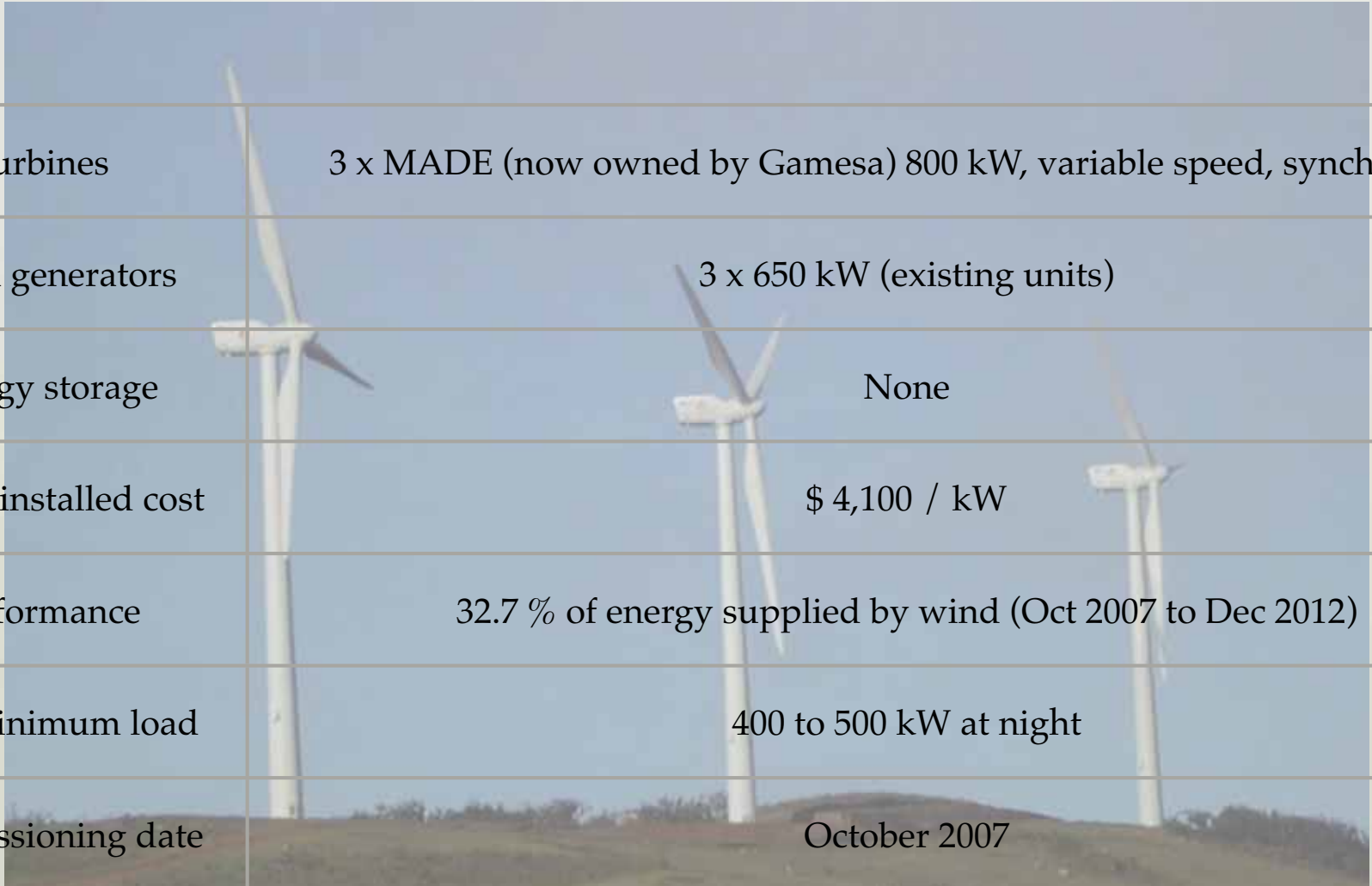
Note: * denotes a numerical weather modeling approach.

GRID INTEGRATION

Country	Generation (MW)	Generation (GWh)	Non-renewable generation (GWh)	Minimum load (MW)	RE "hosting capacity" @ 25% min load (MW)
Cooks	8	32.8	32.5	3.4	0.9
Kiribati	5.8	22.8	21.7	2	0.5
Marshall Islands	17	66.8	66.7	6.5	1.6
FSM	28	69	56.6		
Nauru	5	21.2	21.0	1.7	0.4
Niue	2.5	3	2.9	0.3	0.1
Palau	39	84.9	84.6	8	2.0
Samoa	42	108	75.6	6.4	1.6
Solomon Islands	36	84.3	84.0	4.9	1.2
Tonga	12	51.6	51.3	3.1	0.8
Tuvalu	4	6.4	6.3	0.5	0.1
Vanuatu	31	64.7	51.8	2.4	0.6
Fiji	215	793.5	349	60	15.0
PNG	722	3501	2101	33	8.3

Wind energy can complement hydro resource and daily demand pattern.

2.4 MW WIND-DIESEL PROJECT IN SAN CRISTOBAL, GALAPAGOS



Turbines	3 x MADE (now owned by Gamesa) 800 kW, variable speed, synchronous
Diesel generators	3 x 650 kW (existing units)
Energy storage	None
System installed cost	\$ 4,100 / kW
Performance	32.7 % of energy supplied by wind (Oct 2007 to Dec 2012)
Grid minimum load	400 to 500 kW at night
Commissioning date	October 2007

- Poor wind resource
- Prices pre-2007
- Configuration since updated.

75 KW WIND-DIESEL PROJECT IN PATAGONIA, ARGENTINA

Project	Recently commissioned by Global Sustainable Energy Partnership
Turbines	3 x HSWind Viking 25 kW - stall-regulated, fixed speed
Fuel savings predicted	60,000 litres of diesel per year
Load	75 kW wind capacity supplying average load of 35 kW
Energy Storage	No batteries. System will run without the diesel and dump excess power
Corrosion resistance	Turbine now designed to withstand extreme corrosion conditions found in PICs
Extreme winds	Turbine can be easily tilted down for maintenance or extreme wind conditions

POTENTIAL WIND CAPACITY REPLACING NON-RENEWABLE GENERATION

	Replacing 20% non RE	Replacing 30% non RE	Replacing 40% non RE
Country	MW	MW	MW
Cooks	2.5	3.7	4.9
Kiribati	1.6	2.5	3.3
Marshall Islands	5.1	7.6	10.2
FSM	4.3	6.5	8.6
Nauru	1.6	2.4	3.2
Niue	0.2	0.3	0.4
Palau	6.4	9.7	12.9
Samoa	5.8	8.6	11.5
Solomon Islands	6.4	9.6	12.8
Tonga	3.9	5.9	7.8
Tuvalu	0.5	0.7	1.0
Vanuatu	3.9	5.9	7.9
Fiji	26.6	39.9	53.1
PNG	159.9	239.8	319.7
Grand Total	228.7	343.0	457.3.

-Assumes 30 % Capacity Factor

-A lower Capacity Factor increases the potential wind capacity.

POTENTIAL BARRIERS TO WIND ENERGY IN PICs

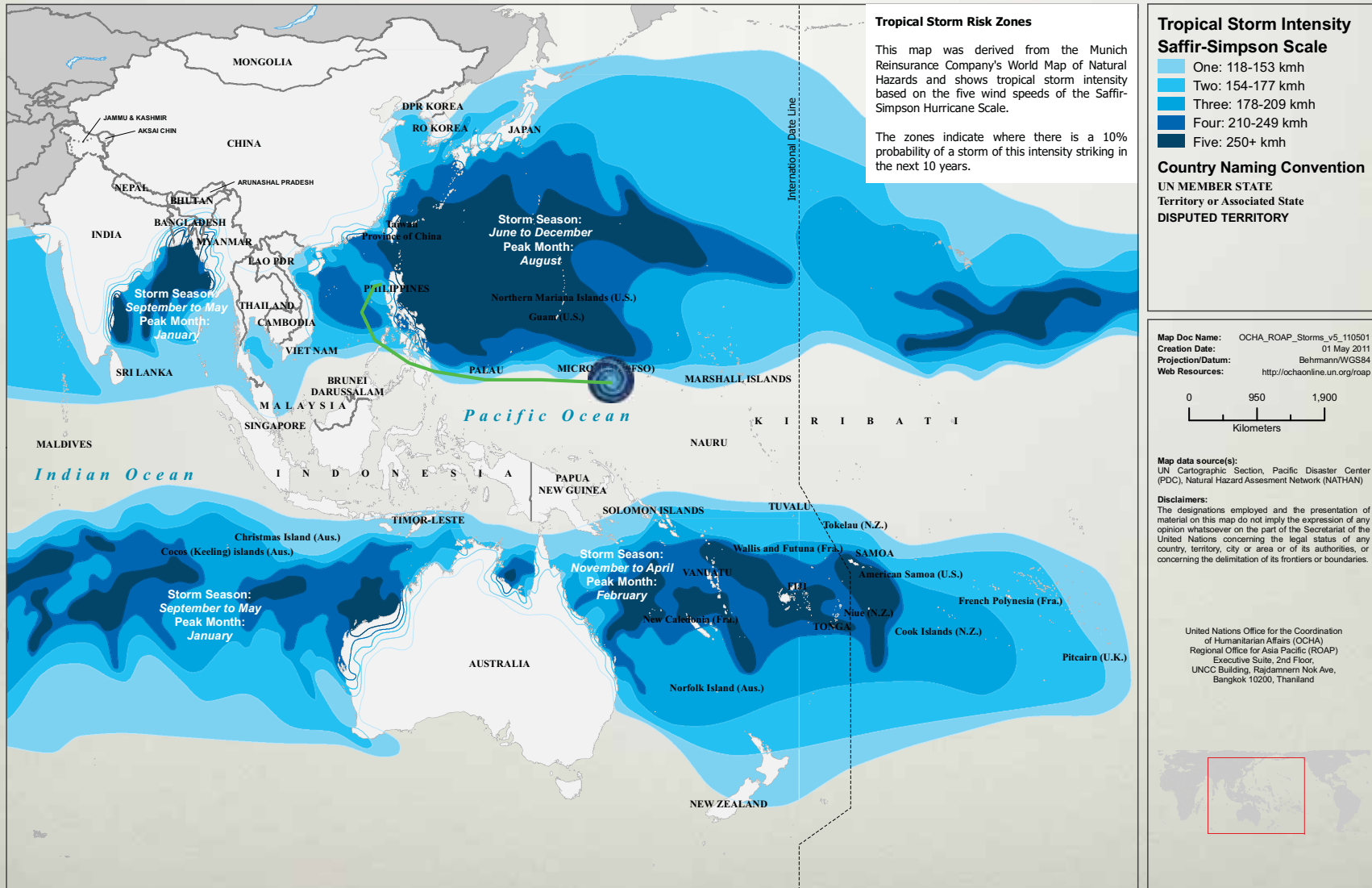
- Tropical cyclones
- “Tropical marine” corrosion class: salt spray, high humidity and high temperatures
- Maintenance requirement of wind greater than Solar PV
- “Complex” projects need careful management in PICs.



EXTREME WIND SPEEDS

Tropical Storm Risk in Asia-Pacific

Issued: 01 May 2011

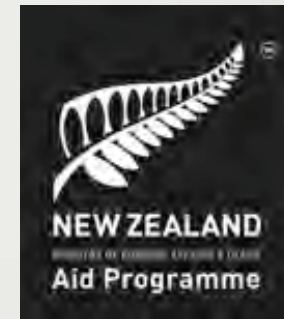


PROJECT FINANCING: INDEPENDENT POWER PRODUCER ARRANGEMENT

- The Client is generally the PIC Utility
- In the absence of donor funding, IPPs are in demand
- Attractive to the countries who are often short of capital
- Removes responsibility from PICs for operation and maintenance
- Removes construction and operational risk from the countries
- IPP's monitoring, operation and maintenance costs are potentially lower than the country's

DONOR FUNDING

- European Union
- New Zealand Aid
- Australian Aid
- Asian Development Bank
- United Nations Development Programme
- World Bank
- China
- Japan
- US and others.



Australian Government
AusAID



SUMMARY

- RE targets & Regulations
- Cost of power



The demand
is there



- Wind monitoring & assessments
- Grid integration



The resource
and knowledge
is there



- Potential barriers



Barriers are
surmountable



- Financing arrangements
- Availability of funding



Funding and
financing
mechanisms are
available.





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Thanks for your attention.