

IRENA Islands Initiative

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About IRENA



International Renewable Energy Agency
Established April 2011

The intergovernmental RE agency

Mission: Accelerate deployment of renewable energy

Scope: Hub, voice and source of objective information for renewable energy

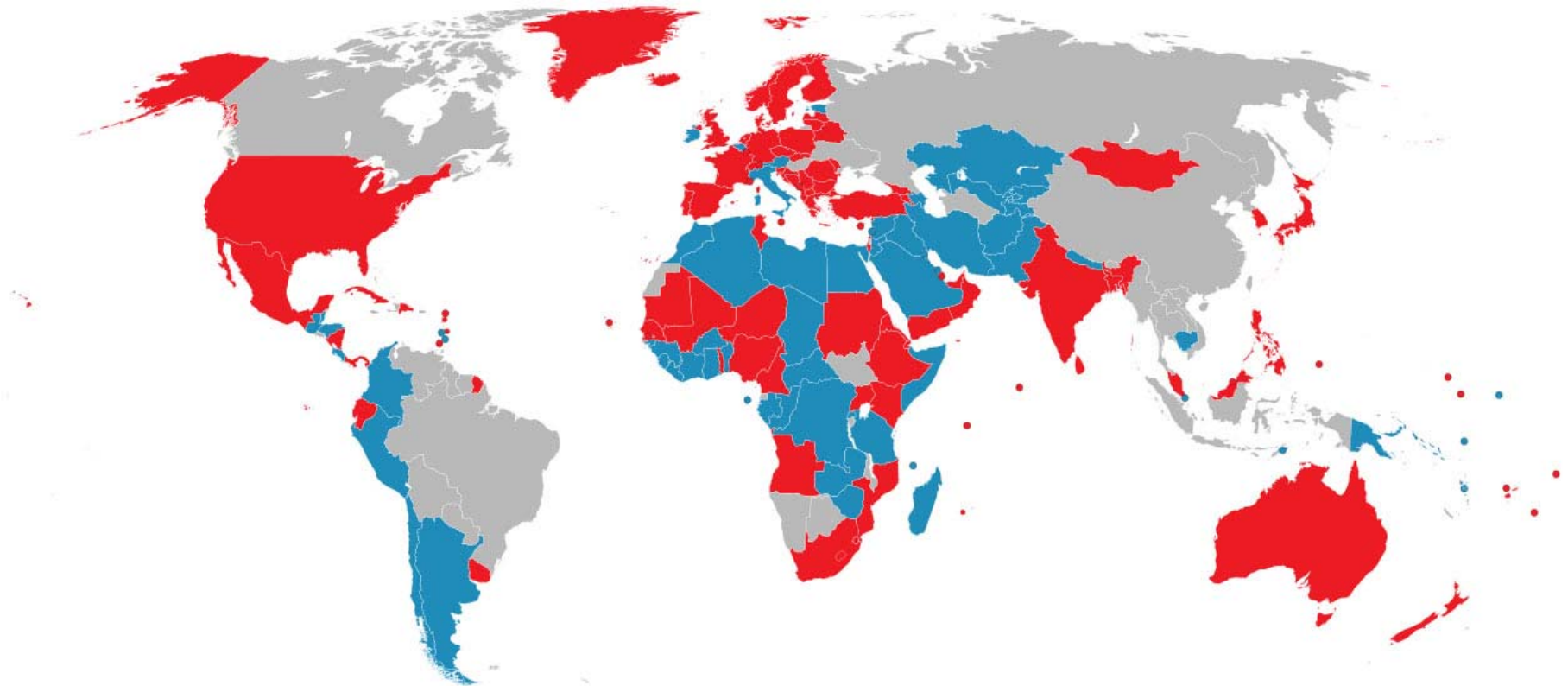
Members: 158 countries are engaged; 95 ratified members

Mandate: Sustainable deployment of the six RE resources (Biomass, Geothermal, Hydro, Ocean, Solar, Wind)

Location: Headquarters in Abu Dhabi, United Arab Emirates
Innovation and Technology Centre IITC, Bonn, Germany

Director-General: Adnan Amin

IRENA Membership



- Members of the Agency
- Signatories to the treaty
- Non Signatory

As of 19 May, 2012

IRENA Islands Initiative

- Many SIDS are IRENA members
- Islands power cost are high and diesel must be imported
- Need for jobs and economic development
- Often good RE resources: wind, geothermal, solar etc.
- Islands as lighthouses and testbeds for a global energy transition

- 2012 focus region Pacific Islands
 - Engagement with Tonga roadmap since 2010
 - Pacific Leaders Meeting, Abu Dhabi, 13 January 2012
 - Japan-IRENA workshop for Pacific, Okinawa, 26 May
 - Pacific power conference, Vanuatu, July
 - Pacific roadmaps meeting
- Post-Rio Islands summit, Malta, 6-7 September 2012

Pacific Islands Energy Context

- Energy is needed for key human activities
- The share of energy cost is very high in the region
 - Energy costs account for a fifth of GDP (varies by country)
 - Heavy reliance on costly oil products
- The region has renewable energy potentials that can reduce oil dependency and energy costs
- Renewable energy should be combined with energy efficiency
- Islands can act as lighthouse projects for a transition to renewable energy
 - Many successful examples in the region: Apolima, Kiribati, Fafa', Namara, Tokelau
 - Interesting insights from other islands elsewhere
- Countries and even island's resource endowment and energy needs vary: tailor-made solutions are needed
- Power generation and transportation are clearly the main energy areas
 - Access to modern forms of energy is still increasing in some countries

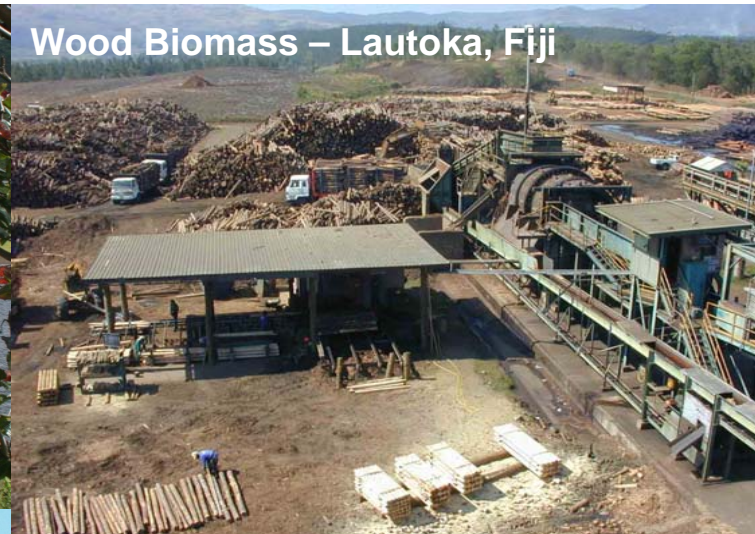
Ambitious targets

Countries, Territories & Associated States	RE Electricity Generation	RE Electricity Targets (*Primary Energy)	
	% of Total	% of Total	Year
Cook Islands	<1%	50%	2015
		100%	2020
Fiji	75%	90%	2015
FSM		Urban 10% Rural 50%	2020
Kiribati	<1%	10%	ND
Marshall Islands	1%	20%	2020
Nauru	<1%	50%	2015
Niue	3%	100%	2020
Palau	3%	20%	2020
Papua New Guinea	46%	No Targets Set	
Samoa	42%	+ 20	2030
Solomon Islands	0%	50%	2015
Tokelau	1%	100%	2012
Tonga	<1%	50%	2012
Tuvalu	2%	100%	2020
Vanuatu	19%	25%	2012

Important efforts in renewable energy implementation



Hydro Power Plant - Samoa



Wood Biomass - Lautoka, Fiji



Wind farm - Butoni, Fiji



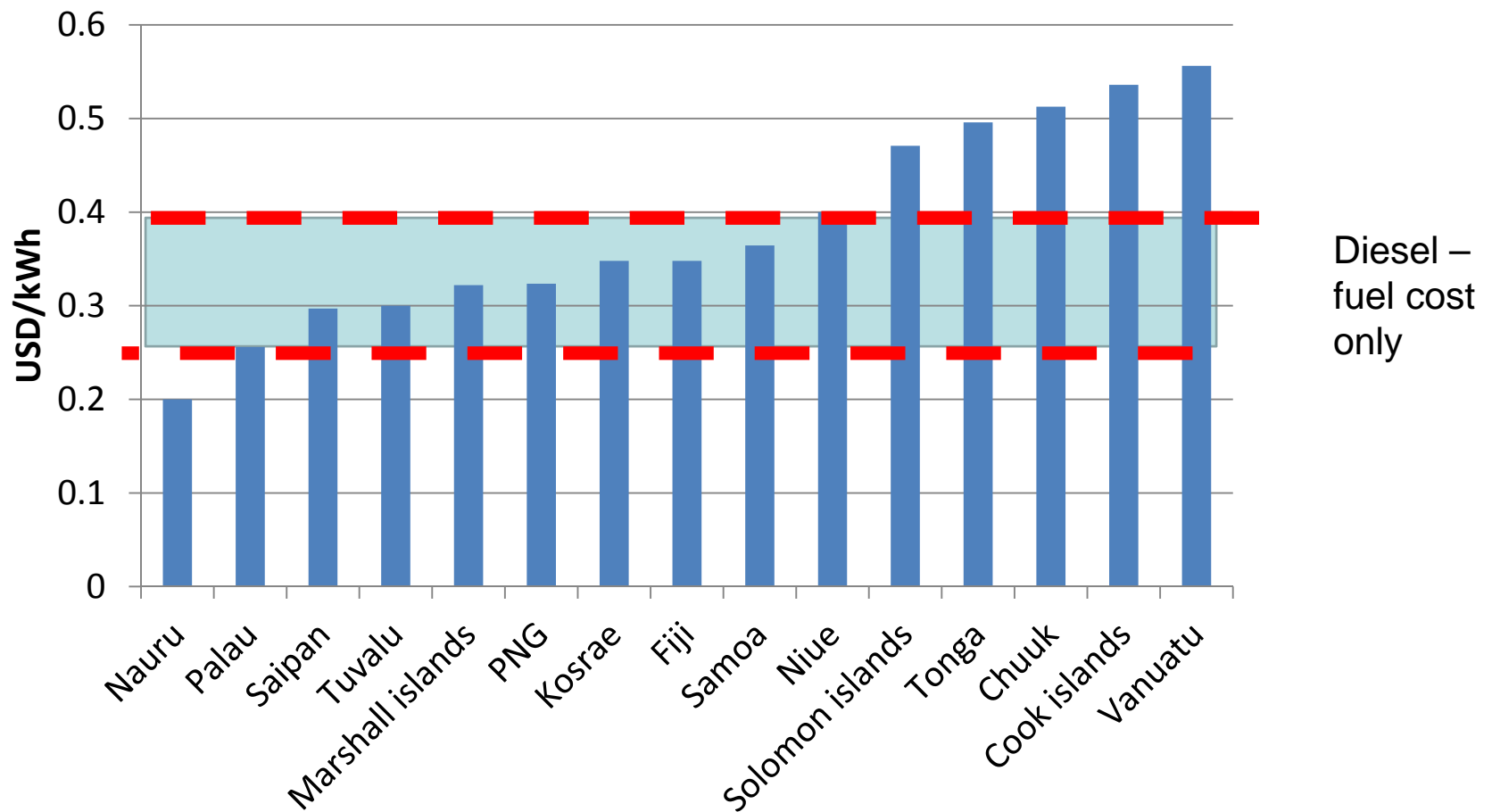
Solar Home Systems - Kiribati

IRENA Activities for the Pacific region in 2012

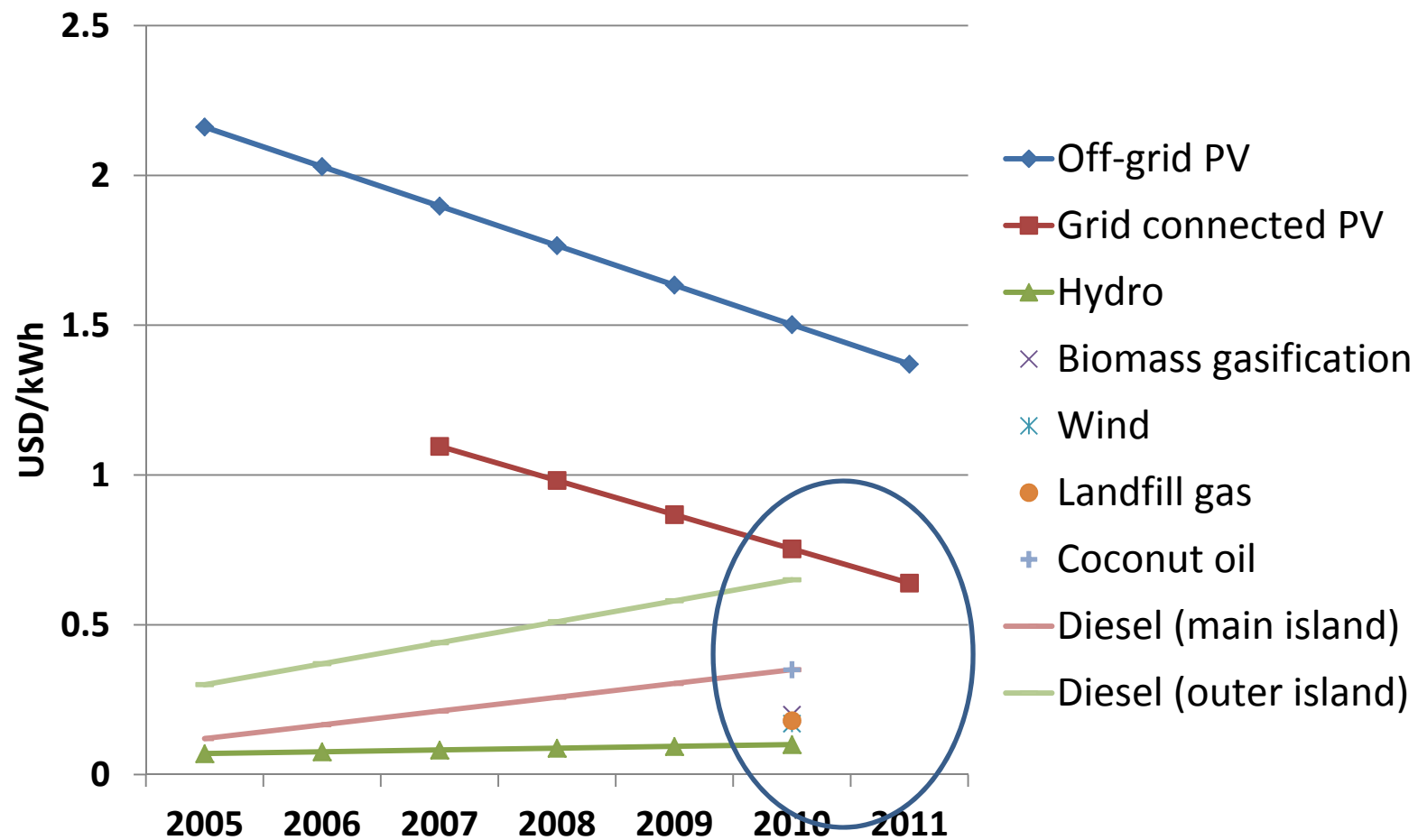
- Developed together with country experts (Sydney workshop October 2011)
- Endorsed by Pacific leaders (Abu Dhabi Pacific Leaders Meeting, January 2012)
 - Renewable power system stability assessment
 - Assess renewable energy solutions for the transportation sector
 - Land use, energy and water nexus – optimal strategies
 - RE resource assessment
 - Renewables readiness assessment - Kiribati
 - Capacity development for operation and maintenance
 - Support enabling environment for private sector (development of PPAs, IPPs)
 - One-stop-shop for technology RE information
 - Roadmaps: Nauru and comprehensive regional roadmap outlining the strategy ahead
- IRENA staff in SPC to help implement IRENA work programme for the Pacific

Pacific Power Prices (lower end, early 2011)

High oil cost determine power prices – early opportunity



Many Renewables are Cheaper than Diesel *Generation cost in the Pacific are high*



Source: Syngellakis, 2011

Power sector transition challenges

- How to operate existing diesel generators with high shares of variable renewables
 - Provide utilities confidence that power supply is reliable during and following a transition
 - What is the role of electricity storage (IRENA storage reports)
 - How much backup capacity is needed
 - What can be done with demand side management
 - How to fund a transition
 - Focus on proven technologies but adjustment to local conditions may be needed
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- Average age diesel generators more than 20 years
 - Operation in combination with variable renewables is possible but requires new control units
 - Batteries make sense for various reasons
 - So far no *validated* software package for island grid operation identified

Grid stability assessment

How can the grid absorb variable renewables without affecting the power quality

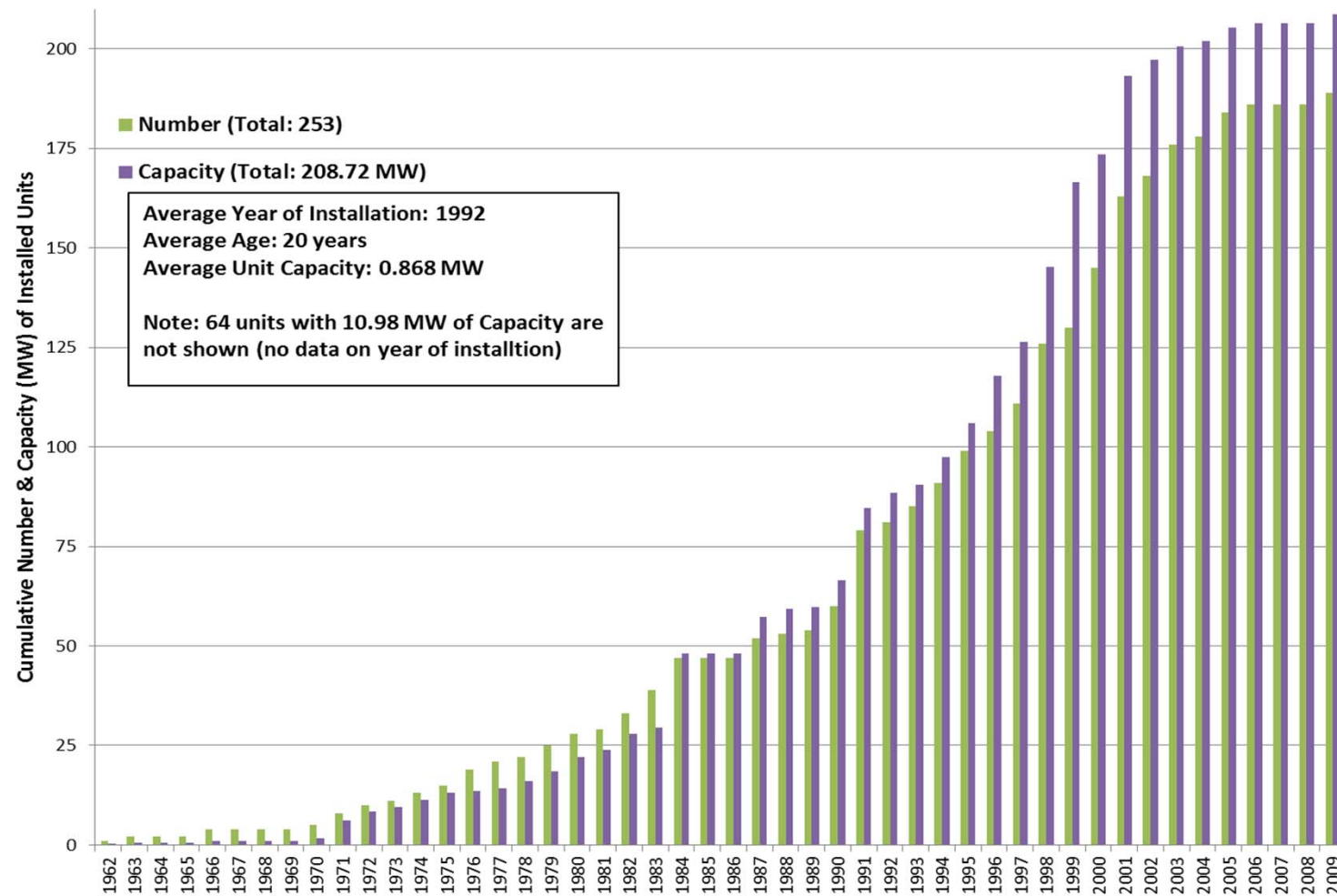
- First step: assess diesel generator stock and their potential to operate at partial and variable load
- Second step: grid simulation
 - Assessing the behavior of frequency and voltage is the key – dynamic modeling is necessary
 - Supply and demand variations must be simulated
 - Various modeling packages are available for dynamic modeling but many are for the large grids and not validated for small island grids – Simulink, PowerFactory, KERMIT, PSSE, PSLF, etc.
 - Model validity is a precondition – quality of the modeling results depends on the user – use measurement equipment to validate models?
 - Other criteria such as: user friendliness, licensing cost, software support.

Existing Pacific diesel generator stock

Operating units only

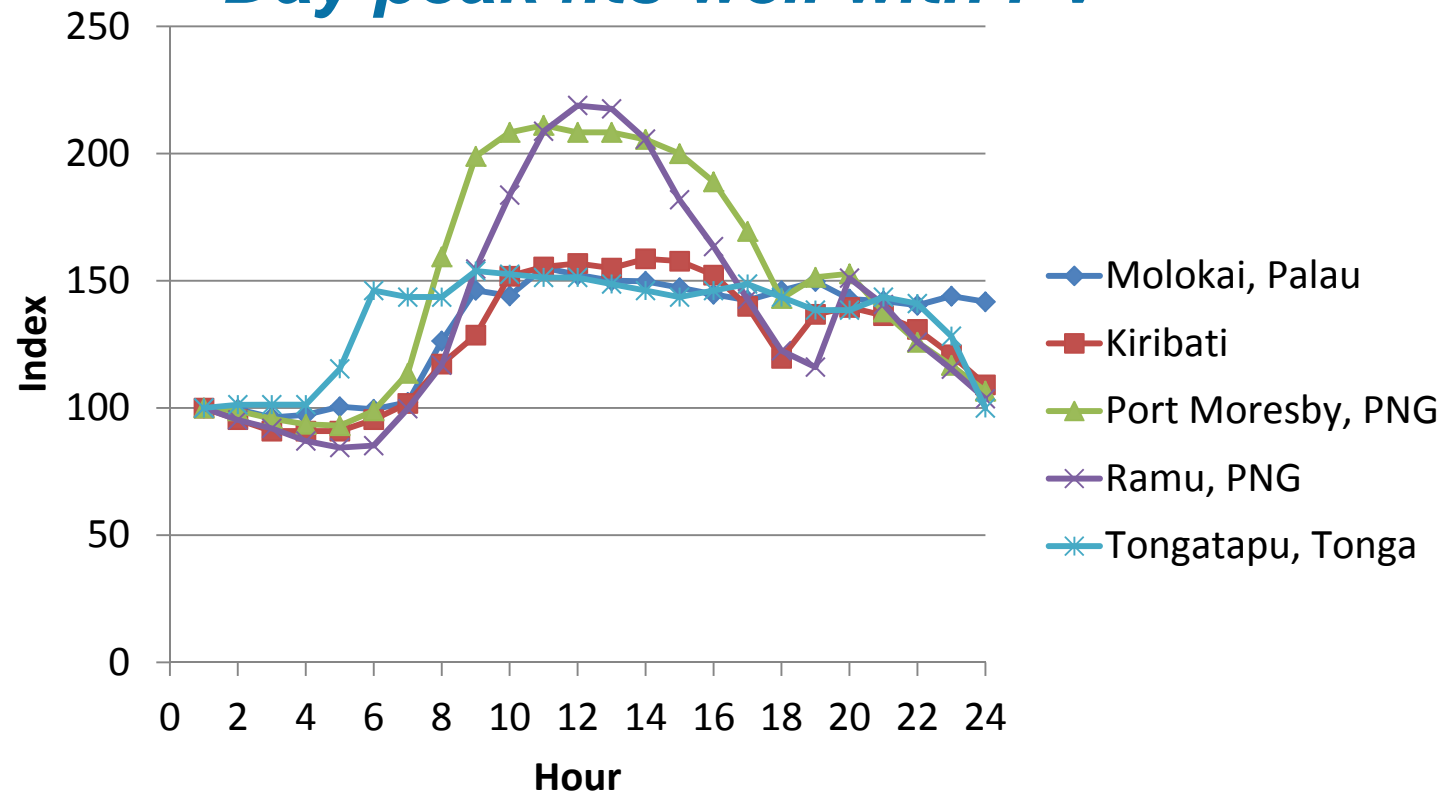
Country or State	Capacity	Units	Unit Size (MW)			1st Operational Year		
	MW	#	Min	Max	Avg.	Old	New	Avg.
Cook Islands	11.04	24	0.025	2.1	0.460	1990	2009	2001
FS of Micronesia	29.66	31	0.027	3.2	1.362	1974	2006	1993
Fiji	112.17	43	0.06	10.15	2.621	1953	2005	1990
Kiribati	9.40	13	0.135	1.4	0.989	1976	2005	1992
Marshall Islands	41.90	33	0.06	6.4	1.270	1982	2003	1997
Nauru	4.00	5	0.8	0.8	0.800	2002	2005	2003
Niue	1.68	4	0.421			No Data		
Palau	26.83	13	0.2	3.4	2.064	1984	2000	1992
Papua New Guinea	1050.51	120	0.1	60	8.754	1968	2009	1991
Samoa	16.59	15	0.045	3.5	1.106	1979	2001	1992
Solomon Islands	37.78	44	0.04	4.2	0.859	1971	2006	1992
Tonga	14.44	19	0.056	1.729	0.760	1972	1998	1988
Tokelau	No Data							
Tuvalu	3.71	30	0.045	1	0.124	1982	2001	1993
Vanuatu	22.64	22	0.1	4.23	1.029	1962	2001	1985
Total	1382.34	416						

Cumulative capacity and age profile of current diesel generators (excludes Fiji, PNG)



Pacific load curves

Day peak fits well with PV



Source: IRENA, 2012



Thank you !

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