International Conference on Renewable Energy and Climate Change – Focus on the Pacific

6 – 8 December 2010
USP, Suva, Fiji

Renewable Energy in the Pacific Island Countries – Resources, Policies and Issues

A. Singh Email: singh_ag@usp.ac.fj
Head of Renewable Energy Programme
USP, Suva, Fiji

Outline

- Why we need Renewable Energy(RE)-energy resources
- Requirements for the successful development of RE
- Development of the RE sector in the PICs – comparison with Germany
- Barriers to the development of a scientific base

1. Why we need renewable energy - energy resources

Energy sources for electricity production in developed and developing Pacific countries			
	Australia (*source: Energy in Australia 2010*)	Fiji (*source: FEA, Key Statistics*)	Kiribati *(source: JICA report, USP Energy Summit*)
Coal (black and brown)	76%	Nil	Nil
Natural gas	16%	Nil	Nil
Oil	1%	Nil (imported)	Nil (imported)
Hydro	4.5%	Yes (30-70%)	Nil
Wind	1.5%	1%	Yes ?
Biomass	0.5%	Yes	Yes (CNO)
Biogas	0.4%	Yes	?
solar	0.1%	Yes	Yes

Energy resources (cont.)

- Compared to their developed neighbour, PICs have no fossil fuel, and varying degrees of RE resources
- What we need energy for:
- Consider a developed country first -

Energy consumption in Australia

Energy consumption by industry – Australia 2007-8 (source: Energy in Australia 2010)						
	Electricity gen.	Transp.	Manuf.	Mining	Residential	Commercial
PJ	1760	1388	1301	436	426	268
% total	30.5	24.0	22.5	9.6	7.4	4.6

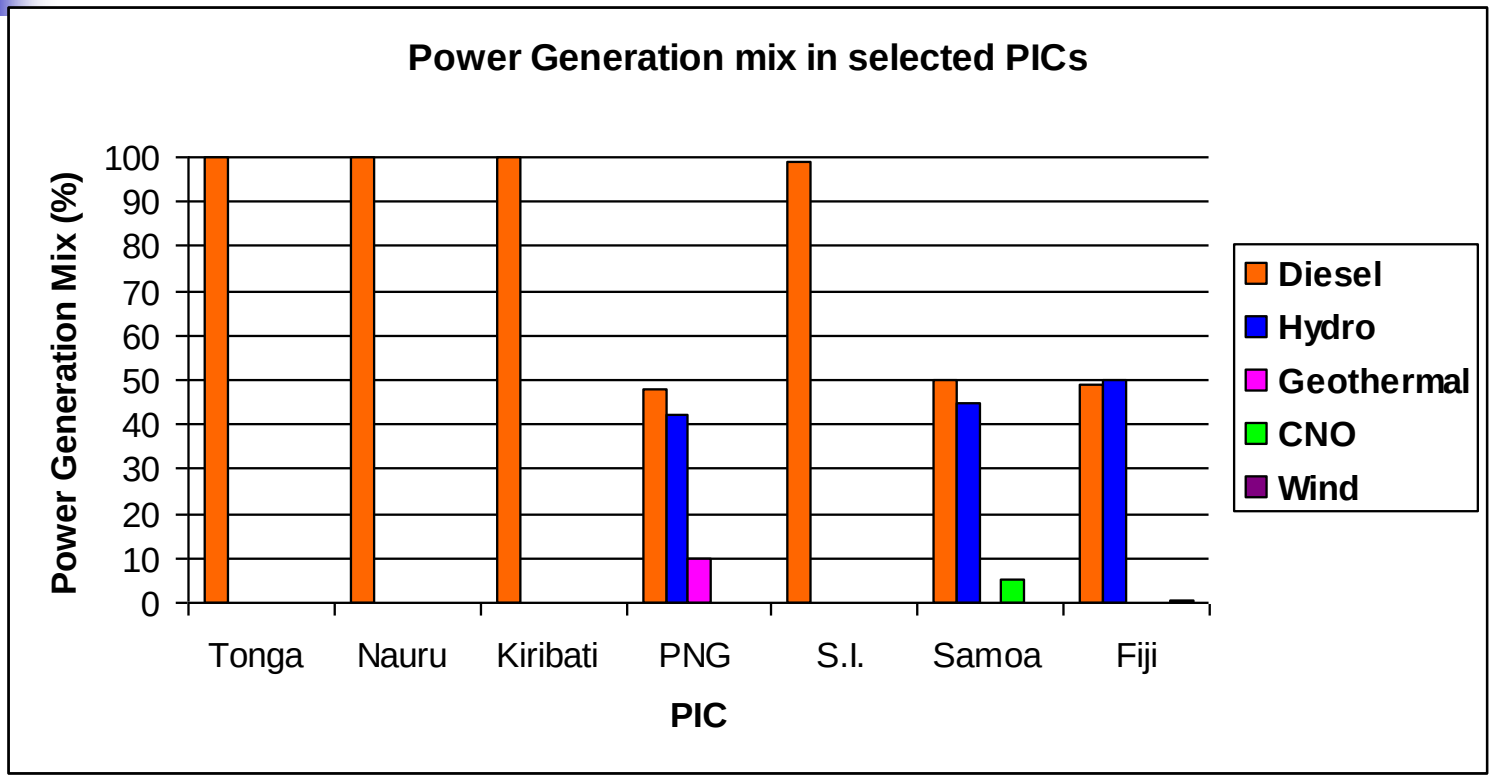
Electricity consumption in Australia (cont.)

Energy is needed for electricity generation, transportation, manufacturing, residential and commercial uses

Electricity need in developing countries

- Developing countries need the same (esp powergen, transportation)
- but no indigenous supply of fossil fuels
- need to import fossil fuels
- heavy burden and subject to oil price shocks

Fraction of imported fossil fuel for power generation in selected PICs



Source: JICA report (2009); TERM (2010); FEA annual report (2008)

2. Requirements for successful development of RE

What are the perceived requirements for developing a renewable energy (RE) sector?

- RE resources, policy framework
- human resources and institutional mechanisms
- science and economic base
- Availability of mature and market-tested technology

3. Development of RE sector in the PICs – comparison with Germany

- Energy supply was mostly coal, oil, natural gas – all imported
- to develop RE to reduce imported fuel dependence
- New Policy frameworks including RE sources Act, Federal Market Incentive Programme, RE Heat Act 2000, Biofuel Quota Act (part of National Biomass Action Plan)

Comparison with Germany (cont.)

- Recognised that R and D are key elements to RE development
- Energy research programme (now 5th energy research programme)
- Result - RE share in various energy sectors has increased rapidly since 1998:

German success …

RE share in various energy sectors in Germany: 1998 and 2008 (source: project DIREKT report – Veronika Schulte)		
Energy sector	%RE (1998)	%RE(2008)
Heat	3.5	7.4
Electricity	4.8	15.1
Total	3.1	9.5

PICs- what they have and what they need

- Policy frameworks – yes (PIEPSAP)
- RE resources - varied
- human resources and institutional mechanisms – no
- Technology – no

Renewable energy resources of selected PICs

Country	Geog	Solar (kWh/ m^2/day)	Wind	Hydro	Biomass/fuel	Geothermal	Ocean	
Nauru	21 km^2	Yes (5.8)	?	No	No	No	No	
Kiribati	32 atolls	Yes (5.7)	No – atolls	No	CNO (5500Mton	No	No	
PNG	mountaneous	Yes (6)	Yes – 19 sites	**Yes** (1400MW)	Timber, palm oil	Yes (1 station)	No	
S.I.	6 volc.Is	Yes	No data	Yes (JICA 330MW)	CNO	Maybe	No	
Samoa	2 volc is	Yes (6)	~ 3m/s	**Yes** (issues)	5%CNO blend	No	No	
Fiji	2 volc	Yes	Yes - Butoni	yes	Timber, CNO	?	?	

What is appropriate technology?

Technical Assessment of RE Technologies for power generation

RET	Technology efficiency	Capacity Factor	Lifetime	Cost/kW	Payback period	Commercial availability
Wind	~40%	10-25%	> 25 yrs maintenance reqd	~$10,000	<25 yrs	Yes
PV	12-15%	~50%	25-30 yrs	~$25,000	25-35 yrs	Yes
Micro-Hydro	90%	~100 %	>25 yrs low maintenance	$2000-5000	5-10 yrs	Yes
Biomass	< 60%	Biomass availability	~25 yrs	-	< 25 yrs	Yes
Biofuel	< 60%	Biofuel availability	~25 yrs	-	< 25 yrs	Yes/No

Science and research policy – the weakest link in the development chain

- Science base – research policies and framework weak or non-existent in PICs
- shortage or total lack of research institutions (government, universities, private sector research)
- universities number less than a dozen in the whole of the region
- government scientific research is minimal, and confined to surveys and monitoring exercises

Where we stand amongst our peers

- PICs are amongst the least developed of SIDS in science and technology infra-structure
- compare PICs with ACP

Comparison with ACP countries

Comparison of science and research base amongst ACP countries		
Trinidad and Tobago	**Mauritius**	**Fiji**
Trinidad has **Ministry of Science, Technology and Education** – policies for scientific research. The National Institute of Higher Education, Research, Science and Technology (NIHERST) There is also a **Ministry of Energy and Energy research in** wind turbines, waste to energy, solar PV and hot water systems.	It has a **Ministry of Industry, Science and Research**. Future plans for RE: **Waste to energy generation** is planned. A 20MW Waste-to-Energy plant at La Chaumiere, A 3 MW Gas-to-Energy unit	**No scientific research policies exist in Fiji** (and the other PICs (?)) to determine and guide scientific research. There are **no ministries or departments of science and technology.** Only research being done are resource assessments, feasibility studies.

Summary – what PICs need to do

PICs need to

- acquire appropriate RE technology (mature and market-tested)
- Build human capacity for RE
- PICs need to strengthen their science base – starting from research policies and frameworks.

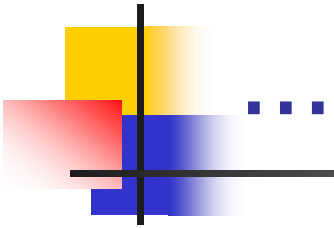
4. Barriers to the development of a scientific base

Barriers to the development of a scientific base include

- lack of awareness of the need, and/or appropriate vision amongst the country's leaders
- lack of the infra-structure, institutional mechanisms and intellectual environment that would normally be required to initiate and stimulate such development

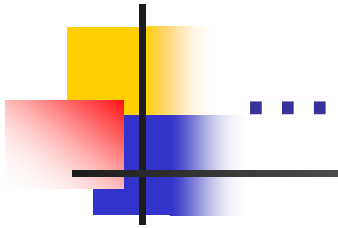
Barriers (cont.)

We need to engender a socio-political value system and intellectual environment that is conducive to the development of a sustainable scientific culture



Other countries our size can do it

So can we.



Thank you for your attention!