3rd Pacific Energy Investors Forum

Exploring Private Sector Opportunities in the Pacific Energy Markets

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Pacific Energy Market – Real Opportunities

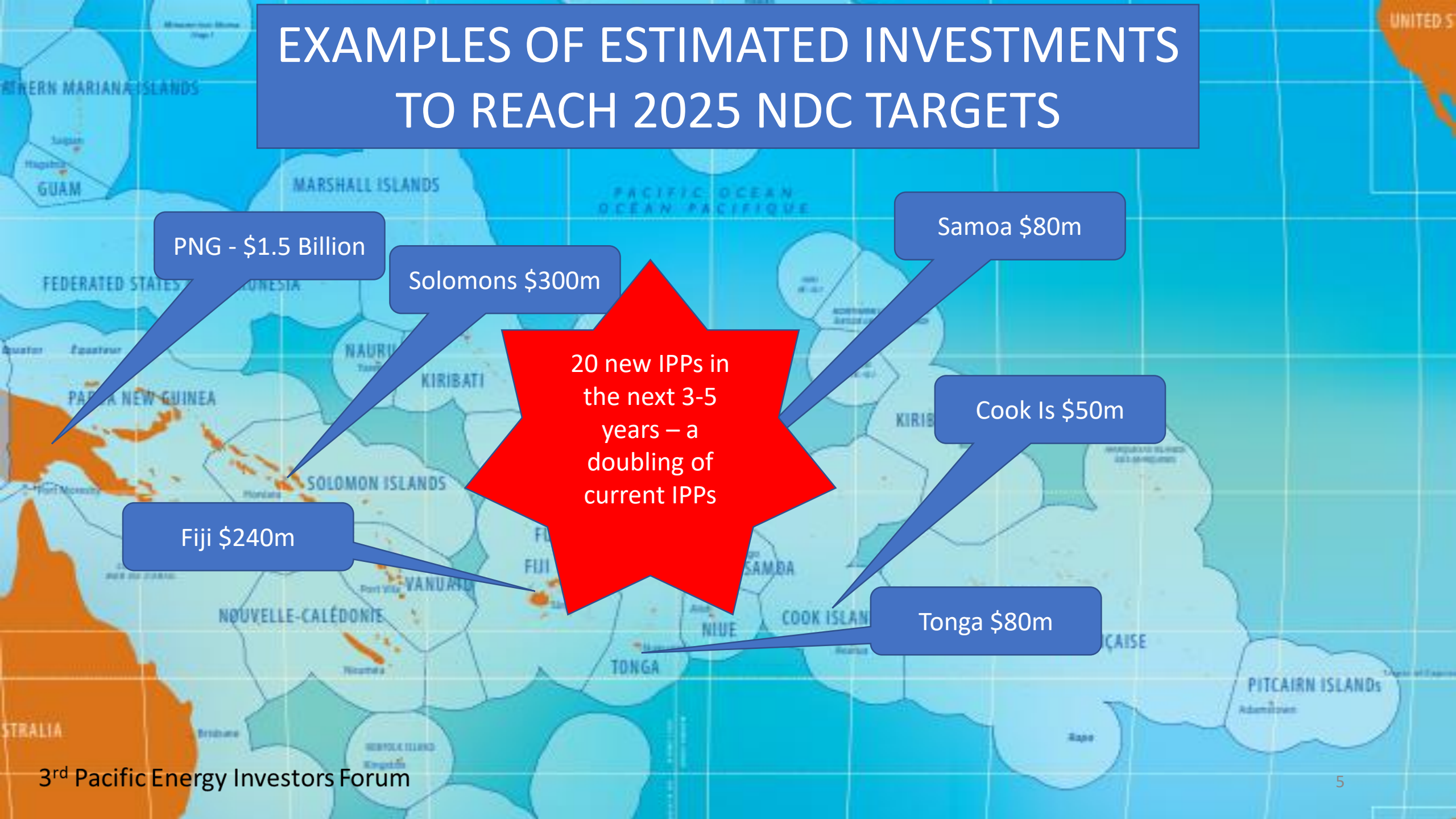
Currently over 15 IPPs in operation; more than 20 IPPs being considered in next 3-5 years – a doubling of IPP operations

Significant RE potential – estimated $1 billion required if countries are to meet their 2025 NDC targets – excluding PNG (~$1.5 b)

Market is maturing; structured RFPs for developments; sound and mutually acceptable PPAs

Those who will decide on the rate of growth and IPP opportunities are participating in the Forum

EXAMPLES OF ESTIMATED INVESTMENTS TO REACH 2025 NDC TARGETS



Featured Countries

- **Cook Islands**
  - *11MW of solar PV, 2MW of wind and 2MW of hydro pumped storage*
- **Fiji**
  - *15-20MW of solar PV plus 100MW hydro*
- **Papua New Guinea**
  - *220 MW of Hydro plus 200 MW of other RE*
- **Samoa**
  - *15-20MW of solar PV plus 5MW hydro*
- **Solomon Islands**
  - *8 MW of solar and 15 MW of hydro*
- **Tonga**
  - *15 MW of RE plus 20MWh storage*

Near Term Investment Pipeline

COOK ISLANDS						
Rarotonga Grid Tied Solar Extension	Distributed	Rarotonga	Solar PV	Smaller scale solar PV	11MW	2019
Wind	Site Identified	Rarotonga	Wind	Supplement need for storage	2MW	2019/20
FIJI						
Additional Solar	Various	Viti Levu	Solar PV	2 or 3 additional projects	10-15MW	2018/19
Upper Wailoa Diversion	Qaliwana	Viti Levu	Hydro	Alternative developer being sought	36 MW	
Lower Ba Hydro	Lower Ba	Western Viti Levu	Hydro	Full feasibility through EIB.	18MW	
PNG						
Naoro Brown	Hydro with reservoir		Hydro	Tenders under preparation for 2018	80 MW	2020
Ramu 2	Hydro with reservoir		Hydro		180 MW	2021
SAMOA						
IPP Invitation		Upolu	Solar PV	Tenders being prepared	3x2 MW	2018
Wind Development		Savai'i	Wind	Looking at possibility	2.0 MW	
TONGA						
Grid Tied Solar		Tongatapu	Solar PV	IPP invitation April 2018; evaluation	6 MW	2018
Waste to Energy		Tongatapu	Biomass	EOI issued May 2018	2 MW	2018
Wind project		Tongatapu	Wind	Call anticipated in late 2018	8 MW	2020

Market Overview

Significant Market Improvements

Prior Forums presented a number of potential opportunities; immaturity of IPP market and challenges for implementation underestimated?

Early market saw unsolicited bids with poor quality PPAs; developers lacked equity; projects often driven by government without full utility support

Utilities now leading market development; building experience with IPP operations and sound PPAs; competitive marketplace

Broader Electricity Market Overview

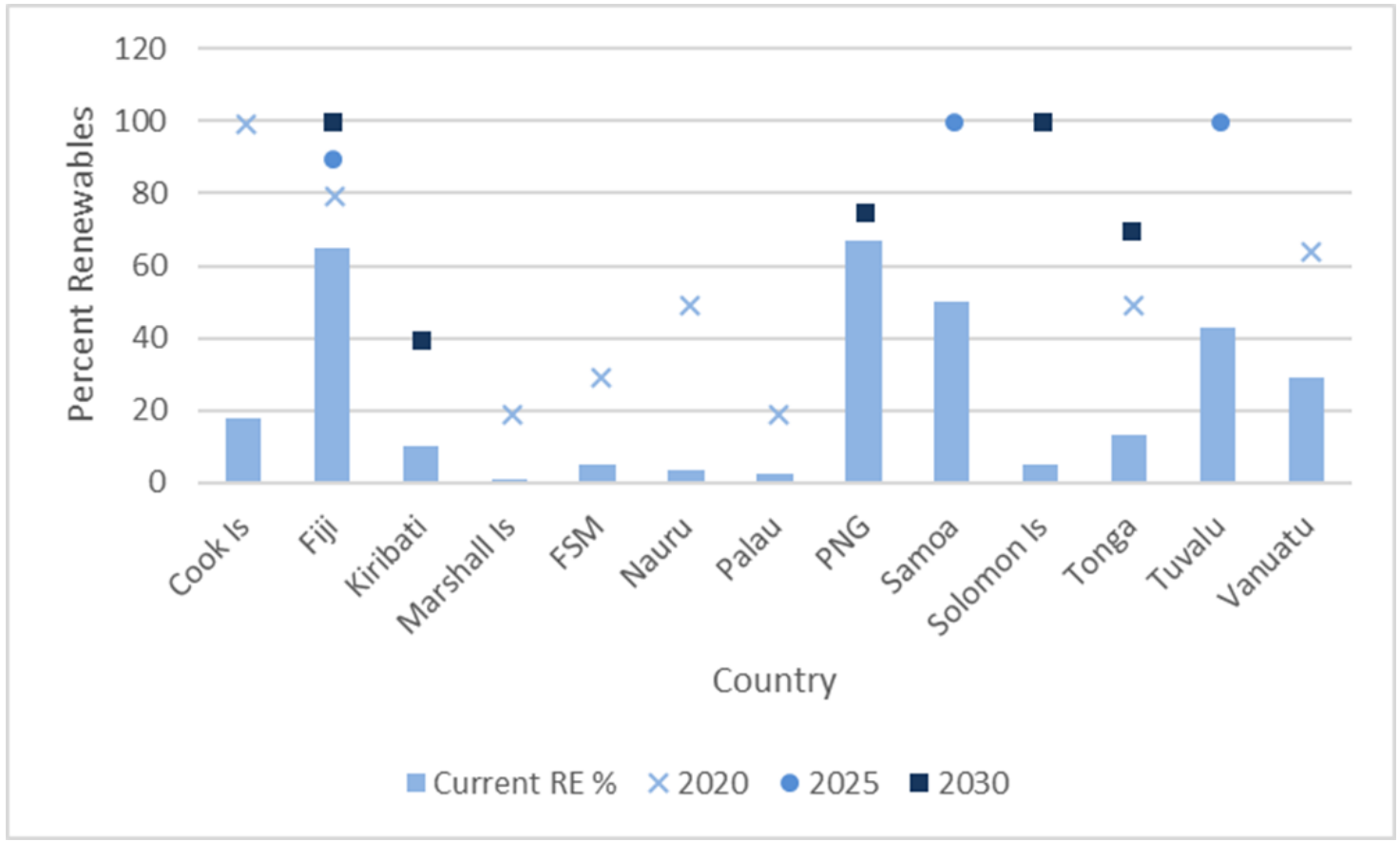
There is considerable activity across the Pacific in the electricity market.

Early donor supported developments are being expanded though IPP engagements.

The emergence of solar PV as a central solution across much of the Pacific is very apparent.

Financing remains a challenge. Issue of guarantees continues.

Renewable Generation Penetration: NDC Targets



A natural fit between NDC targets and uptake of renewables

Technology Options

- Solar PV is dominating the current market; intermittency a challenge
- Hybrid models of diesel/solar PV or diesel/wind reflect transition from diesel dependence
- Larger scale hydro-electric opportunities central to PNG, Fiji and Solomons
- Wind being considered; important role to offset storage needs
- Pumped storage a possibility; relatively high cost but viable storage option with current BESS costs
- Geothermal identified and being investigated – no immediate projects

Storage – an essential investment

Two examples:

Operating Facility:

- Samoa 6MW and 2MW, 13.4 MWh storage - $8.8m investment – 12 months to build; copes with 14 MW of solar PV now in system. Operations demonstrating reduced cost of diesel generation and value of grid stability – 48% RE in 2017/2018.

Planned development:

- Tonga – application to GCF for funding for 8.3MW / 18.37 MWh some $18m budget for battery units

Case Studies

IPP Case Studies

- A selection of case studies is presented to highlight how the IPP approach is being addressed in various countries.
- **These will be addressed in PANEL 1.**
- The number of IPP arrangements are still small but the need for private sector involvement can only grow.
- The importance of proof of concept through donor support is apparent; the success of early IPPs builds confidence

IPP Models

- Scale – centralised solar PV systems 2MW plus
- Term – typically 20-25 years; production for solar PV 3.5 GWh per annum for 2MW
- Pricing – offers confidential but understood as low as US$0.15 / kWh
- Guarantees – early agreements often without guarantee; may be increased pressure for guarantee on PPA payment as installations increase
-  BESS – clearly vital to allow increase in intermittent power – now reaching 50% and more – role of GCF crucial

Case Studies

- Rarotonga - Cook Islands -A Distributed IPP Solution
- Fiji - Biomass and Solar PV IPPs
- Samoa - Rapid Expansion of Solar PV – Public and IPP
- Solomons – hydroelectricity to meet substantial portion of Honiara’s demand
- Tonga - Public Sector Projects attract IPP engagement in Solar PV

The Forum Itself

- ***Designed to be interactive through panel discussions***
- **Opening panel** will consider IPP experience from utility viewpoint
- **Second panel** brings input from the private sector
- **Third panel** outlines market influences and support mechanisms across the sector
- **Final panel** provides an opportunity to reflect on market evolution and opportunities for sharing experiences and knowledge

8:30 – 9:00	Registration	
9:00 – 9:10	Opening and Welcome Remarks	**Andrew Daka**, CEO, FFA
9:10 – 9:30	Highlights of the Third Pacific Energy Investors Forum Report: **Exploring the private sector opportunities in the Pacific Energy Markets**	**Mike Allen**, Consultant
9:30 – 10:30 Panel 1	**Panel 1: A utility view of the electricity market** • Engaging with IPPs • Integrating intermittent generation • Energy Storage Challenges and Solutions • Diversification beyond solar PV	**Apii Timoti**, CEO TAU, Cook Islands **Hasmukh Patel**, CEO, EFL, Fiji **Tile Leia Tuimaleali'fano**, GM, EPC, Samoa **Pradip Verma**, CEO, Solomon Power *Moderated by* **Mike Allen**
10:30 – 11.00	Coffee/tea break	
11.00 – 12.00 Panel 2	**Panel 2: A market view of opportunities** • Domestic capacity to meet market needs • Deepening markets for the private sector • IPP Options and opportunities • Financing – bankable projects	**Steve Anderson**, Andersons, Cook Islands **Terrense Liu**, Singyes, Hong Kong **Peter McGill**, Transnet, New Zealand **Isabel Neto**, World Bank, Sydney *Moderated by* **Anthony Maxwell**, *ADB, Sydney*
12:00 – 13:00	Lunch	
13:00 – 14:00 Panel 3	**Panel 3: Market influences & support mechanisms** • The driving force of NDCs • Aspirations and practical realities • Market place support mechanisms • Donors encouraging the private sector	**Manuel Coxe**, IRENA, Bonn **Solomone Fifita**, PCREEE, Tonga **Martin Garrood**, MFAT, New Zealand **Peter Storey**, FFAN, Austria *Moderated by* **Jane Romero**, *PRIF, Sydney*
14:00 – 14.45 Panel 4	**Panel 4: Maximising the collective benefits of experience to date** • Adjusting to an IPP market • Policy and Regulation • Attracting the private sector • Sharing Pacific experiences • The role for the FFA in changing markets ***Open floor discussion***	**Brian Clayton**, Chapman Tripp, NZ **Andrew Daka**, FFA, Fiji **Hasmukh Patel**, CEO, EFL, Fiji **Anthony Maxwell**, ADB, Sydney *Moderated by* **Jack Whelan**, *PRIF, Sydney*
14:45 – 15.00	Close	**Andrew Daka**, FFA **Jack Whelan**, PRIF

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#1:

UTILITY VIEW OF THE ELECTRICITY MARKET

Engaging with IPPs

Integrating intermittent generation

Energy Storage Challenges and Solutions

Diversification beyond solar PV

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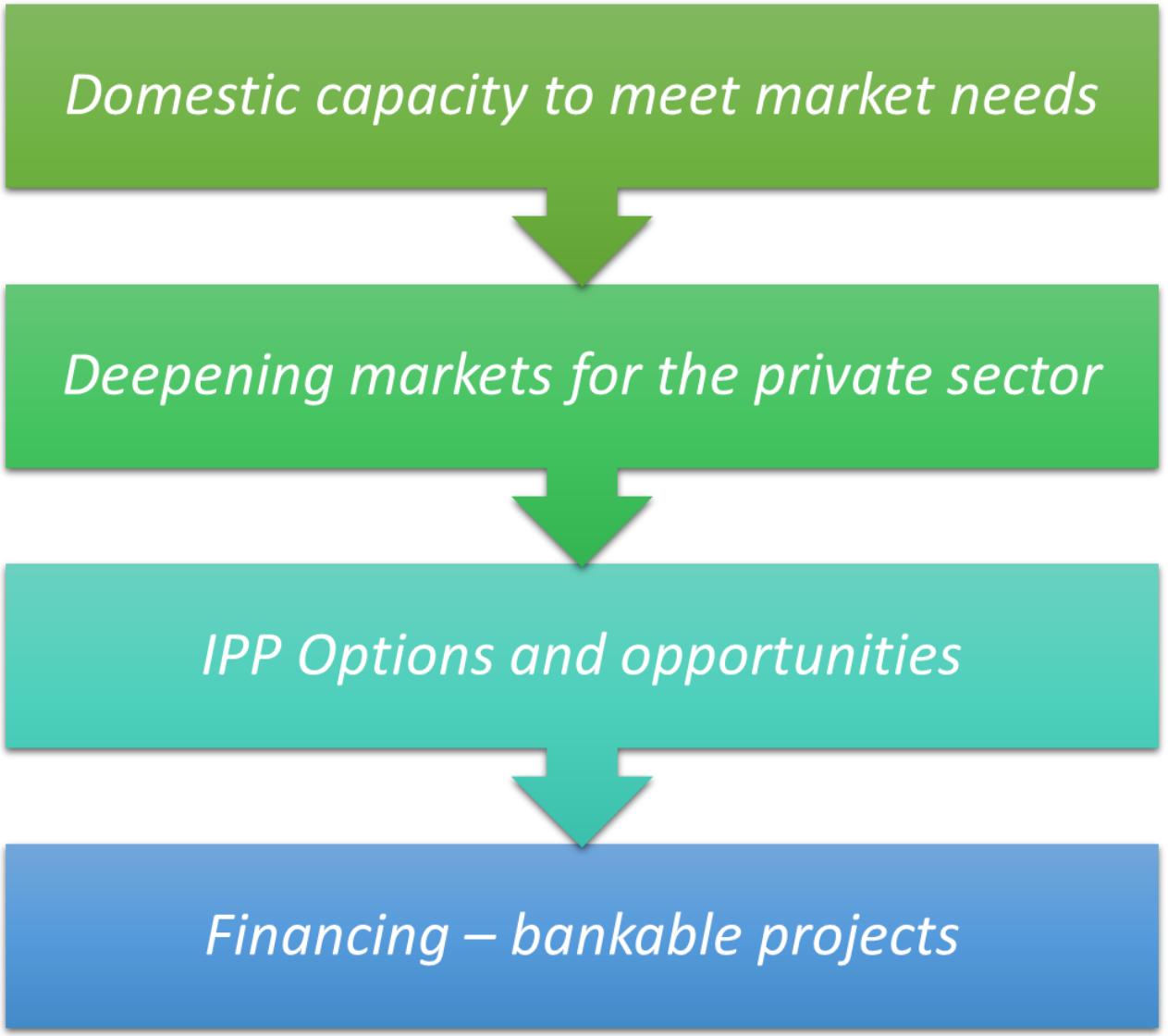
#2:

MARKET VIEW OF OPPORTUNITIES



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#3:

MARKET INFLUENCES & SUPPORT MECHANISMS

The driving force of NDCs

Aspirations and practical realities

Market place support mechanisms

Donors encouraging the private sector

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#4:

MAXIMISING BENEFITS OF EXPERIENCE TO DATE

- Adjusting to an IPP market
- Policy and Regulation
- Attracting the private sector
- Sharing Pacific experiences
- The role for the PPA in changing markets