Workshop on High Penetration Variable Renewables in Pacific Island Countries: Small grids and Off-grid

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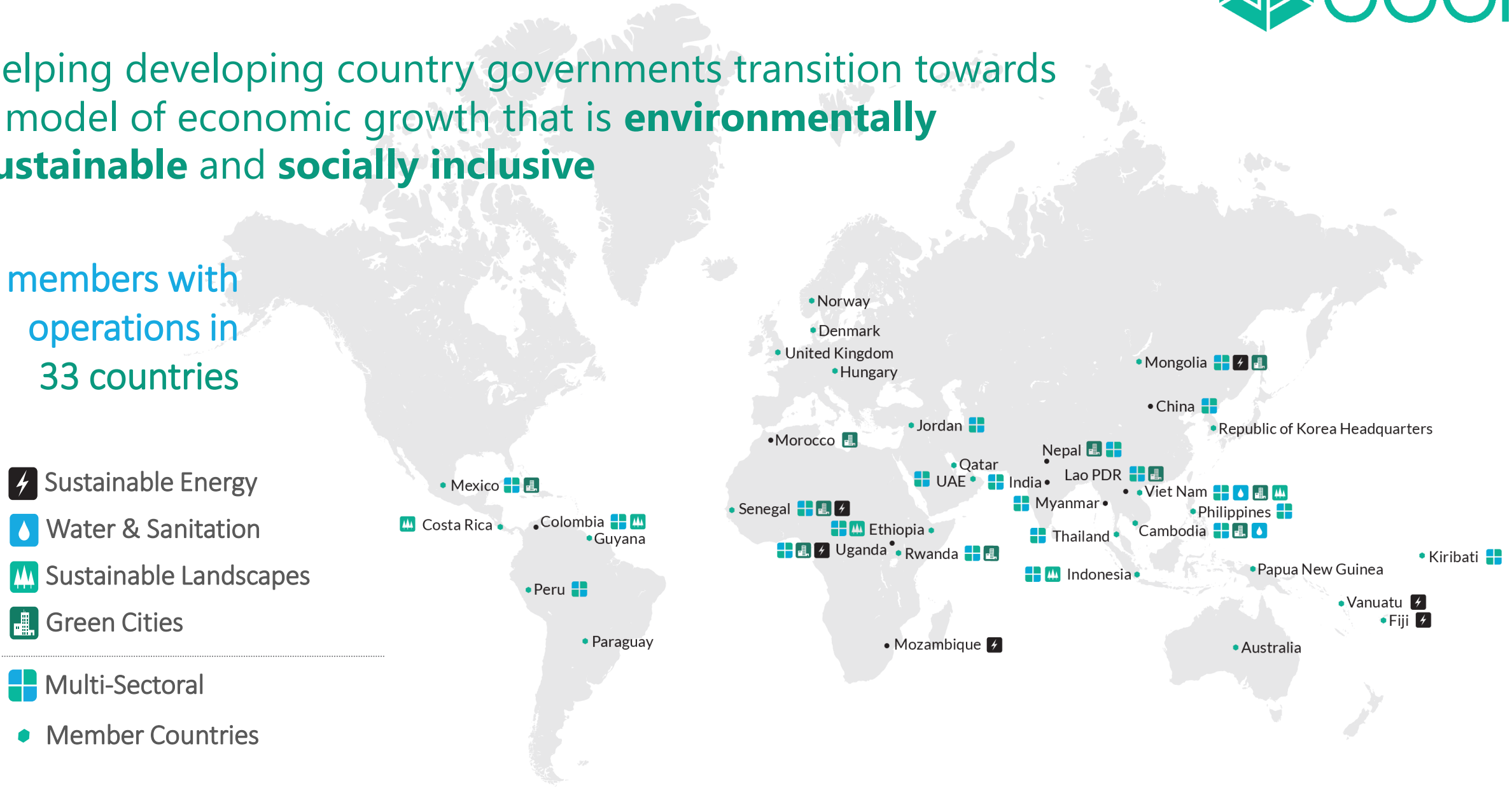
Global Green Growth Institute at a Glance

Helping developing country governments transition towards a model of economic growth that is **environmentally sustainable** and **socially inclusive**

30 members with operations in 33 countries



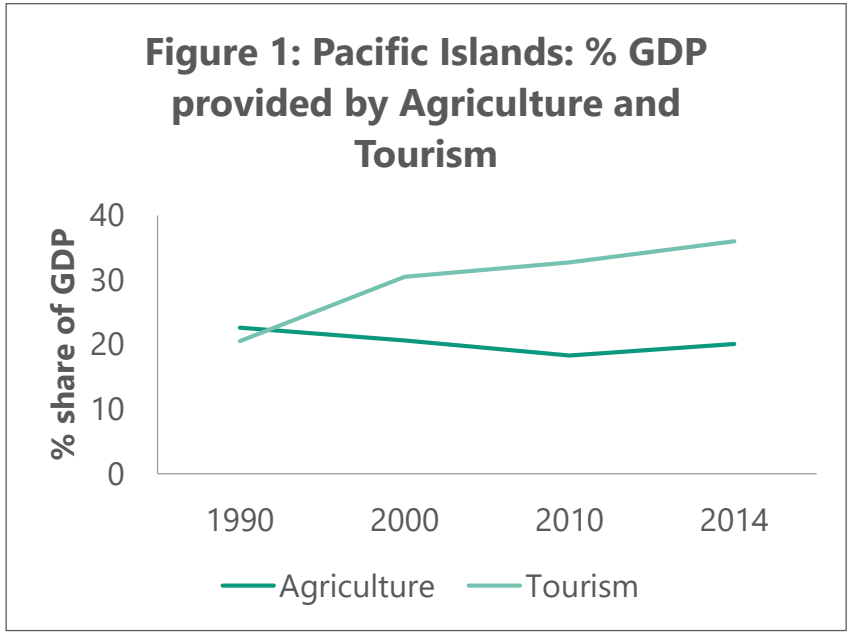
GGGI's Four Thematic Focus Areas and Strategic Objectives

Sustainable Energy | **Water & Sanitation** | **Sustainable landscapes** | **Green cities**

SO1: GHG reduction	SO2: Green Jobs	SO3: Access to services	SO4: Air quality	SO5: Ecosystem services	SO6: Adaptation

Pacific Island Economies in brief

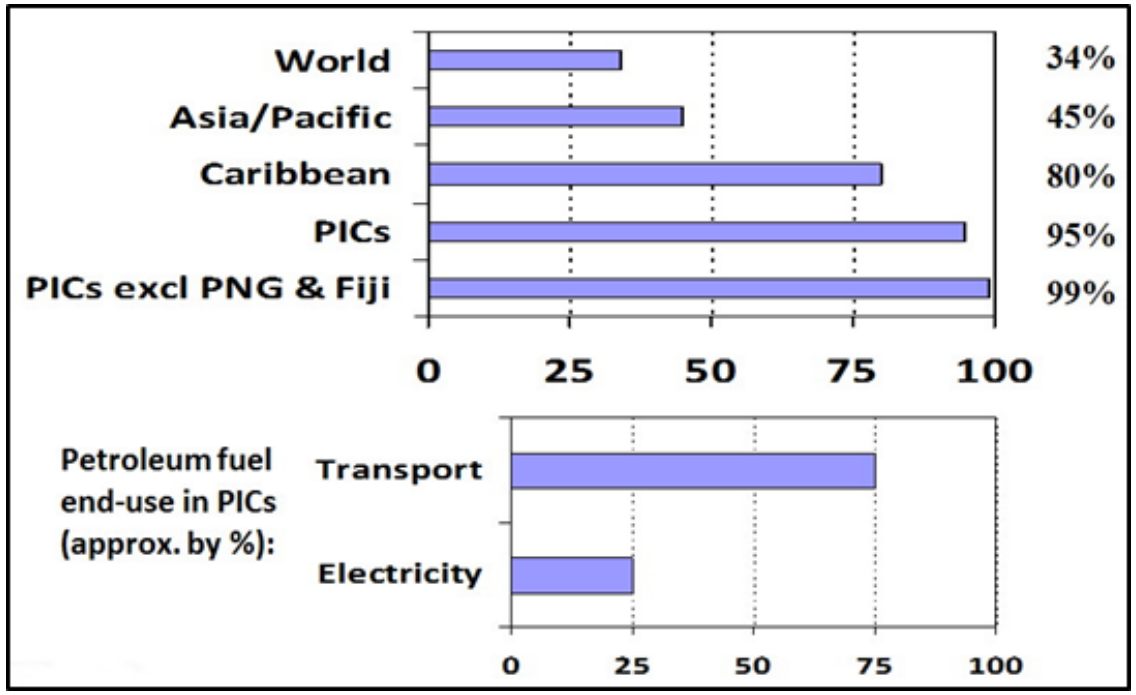
- US$1,000 to $15,000 GDP / capita
- highly dependent on development assistance, agriculture and fisheries, tourism, receipts from migrants living abroad, and government services
- Mineral resources limited to a few countries only
- high import costs and often receive low prices for exports



Source: FAO, 2016

Vulnerability

- Climate change – but impacts are different
- Extreme susceptibility to external economic fluctuations/shocks & natural disasters
- Food insecurity & high transport costs
- Extreme dependence on imports for commercial energy



Source: ADB

Why VRE for the Pacific?

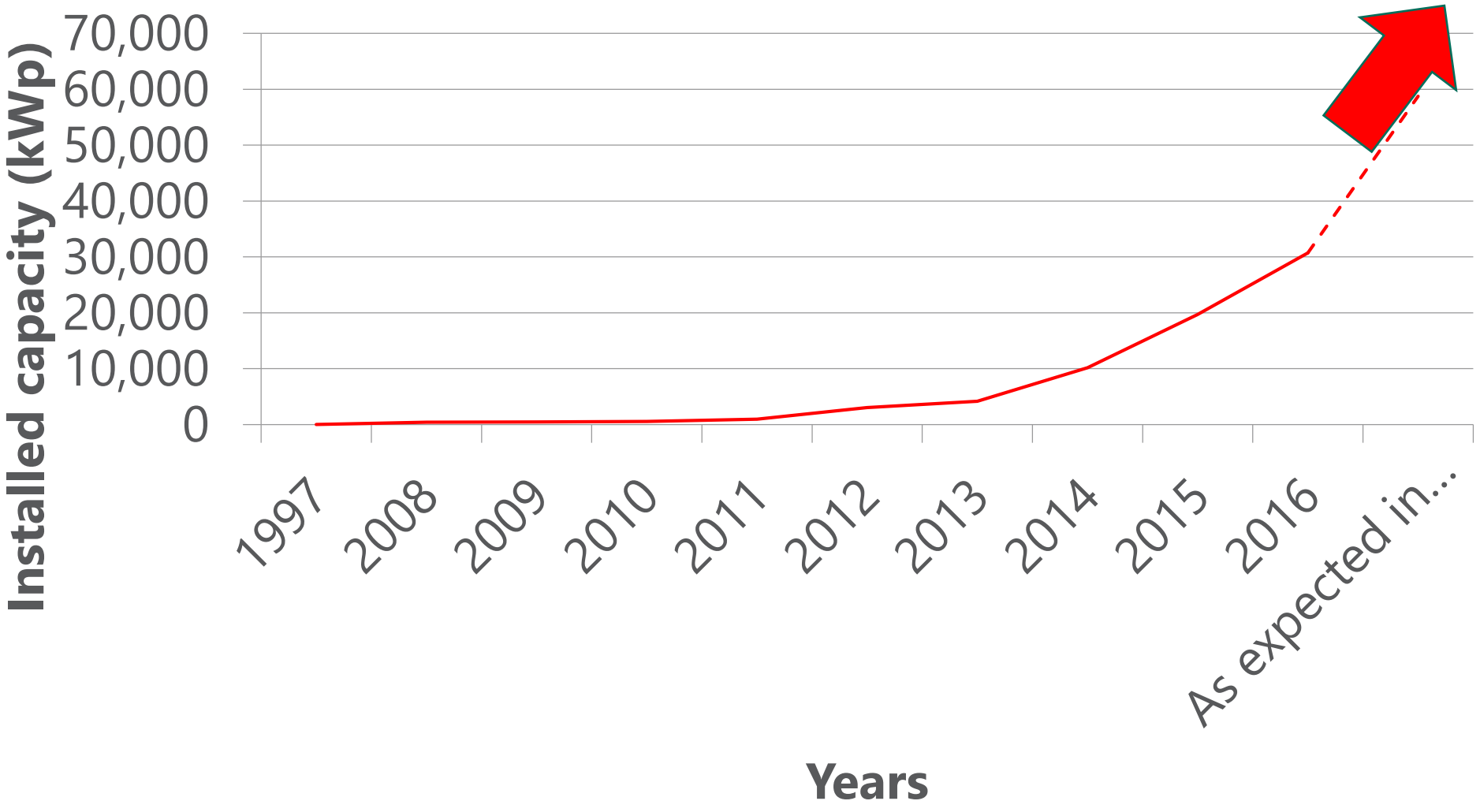
Energy Security

- Meeting national development goals
- Developing key economic sectors
- SDGs
- Energy access across small islands

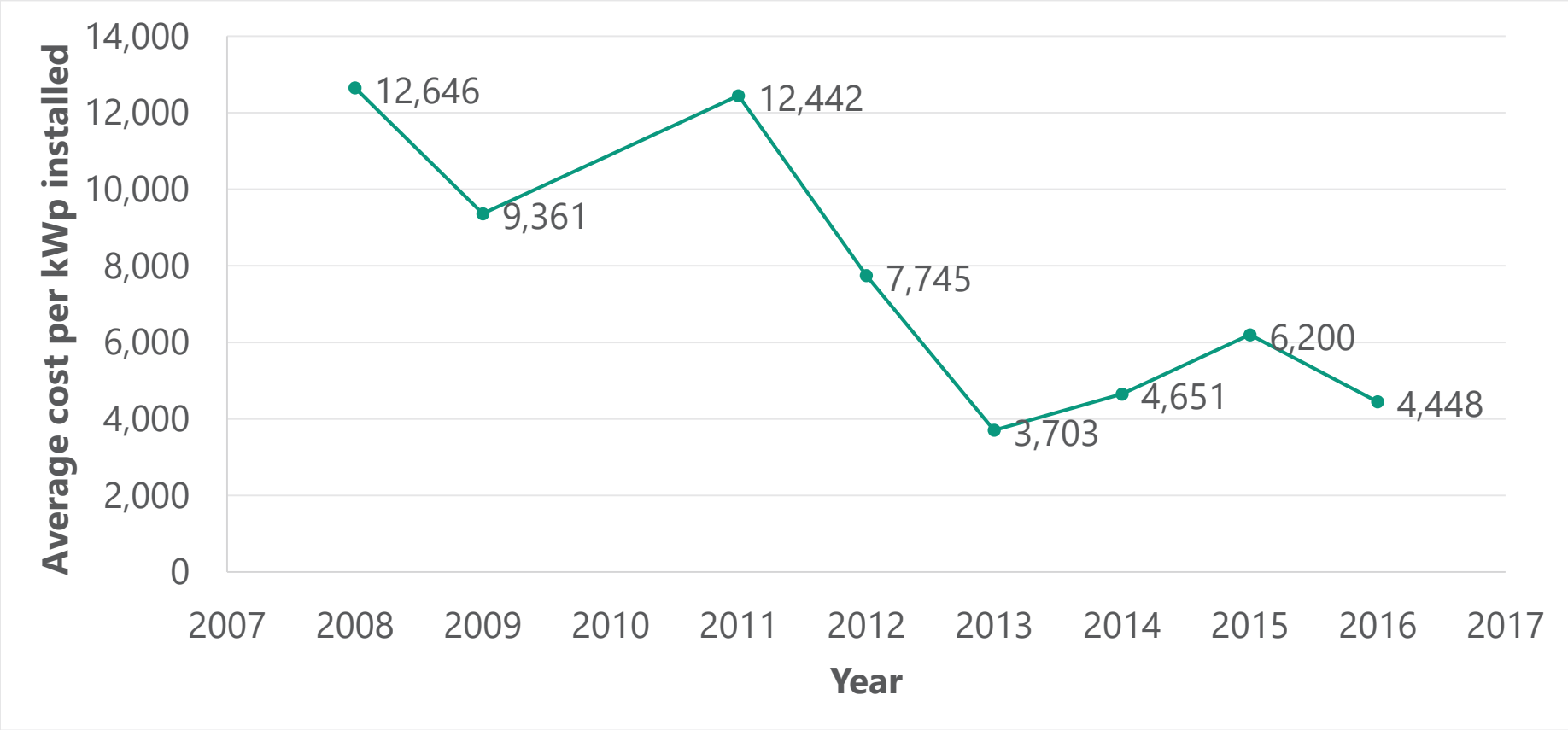
Climate Change

- Leadership on Climate Change
- Mitigation
- NDCs
- LEDS
- Resilience

Installed Grid-connected Solar in the Pacific (no batteries)



Grid-connected solar installation costs

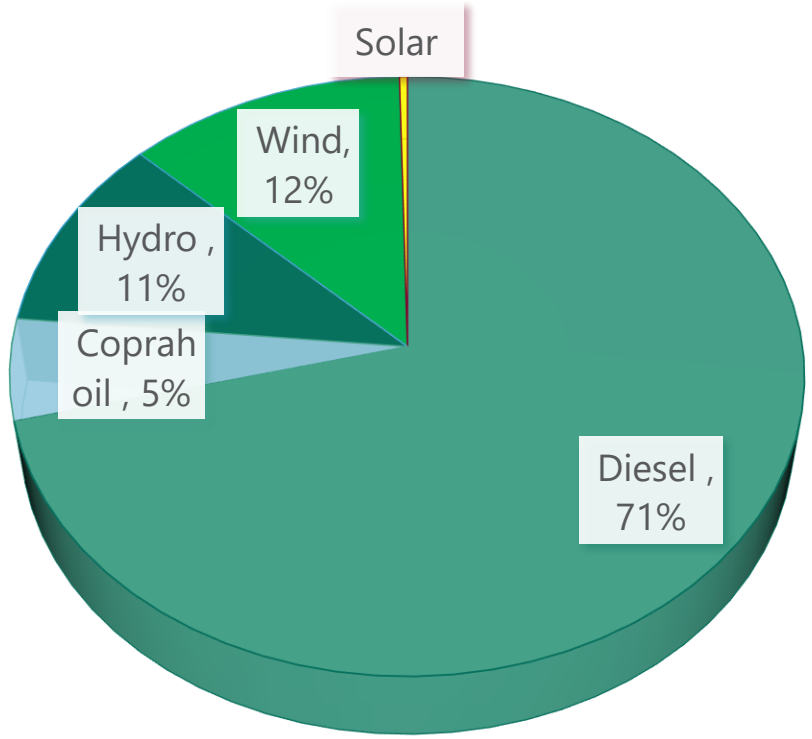


But storage costs are pushing prices back up

Vanuatu - Renewables as a basis for economic growth

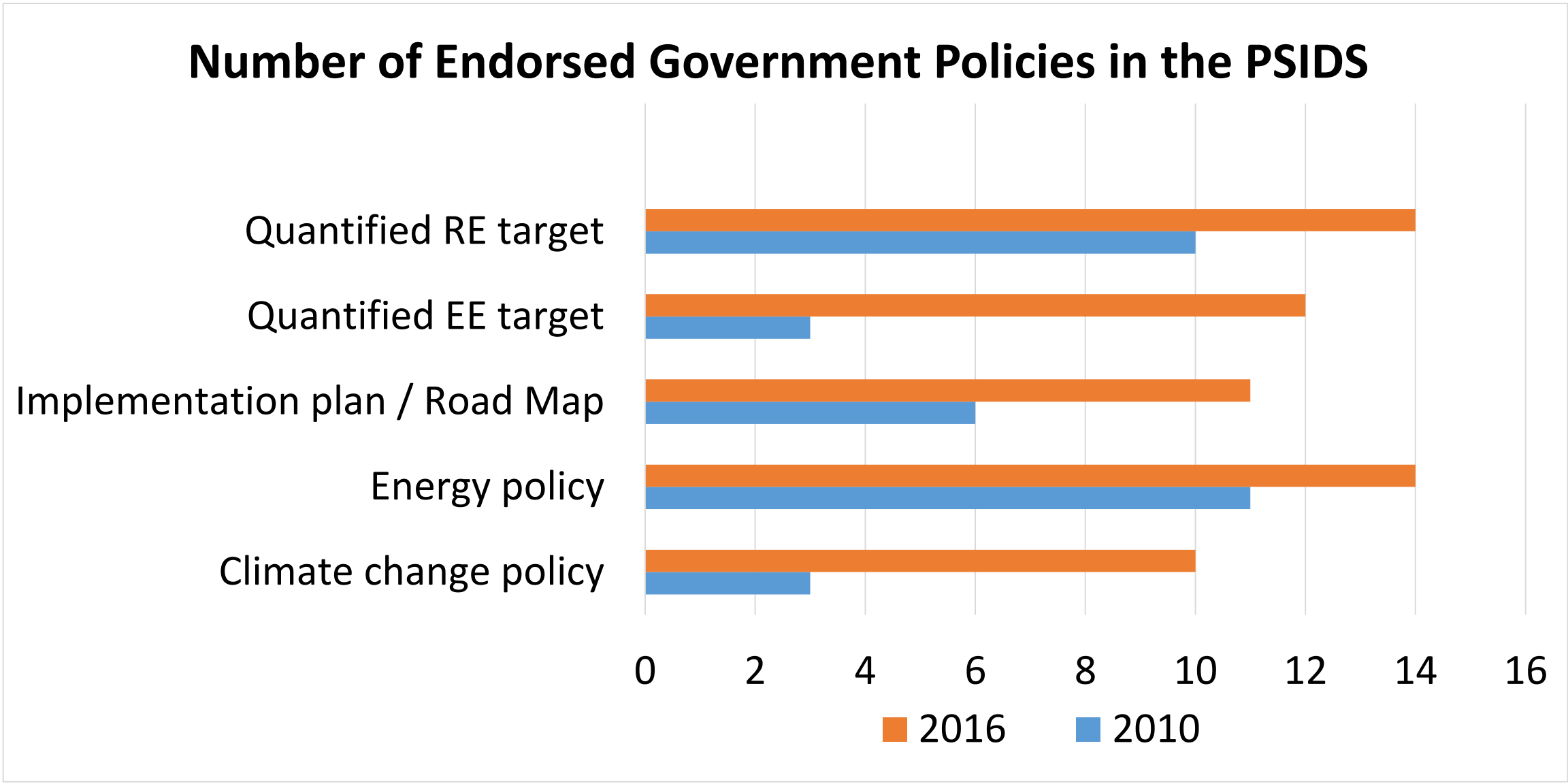
- Increasing renewables in the grid – from 19% in 2012 to 29% in 2015 hitting 50% in August 2015
- Renewables as a key solution for rural electrification
  - Solar lanterns
  - SHS
  - Solar and solar/diesel mini-grids
- Increasing the use of biofuels for electricity production

Figure 1: Vanuatu's Energy Generation by Source as at December, 2015



Source: Utilities Regulatory Authority

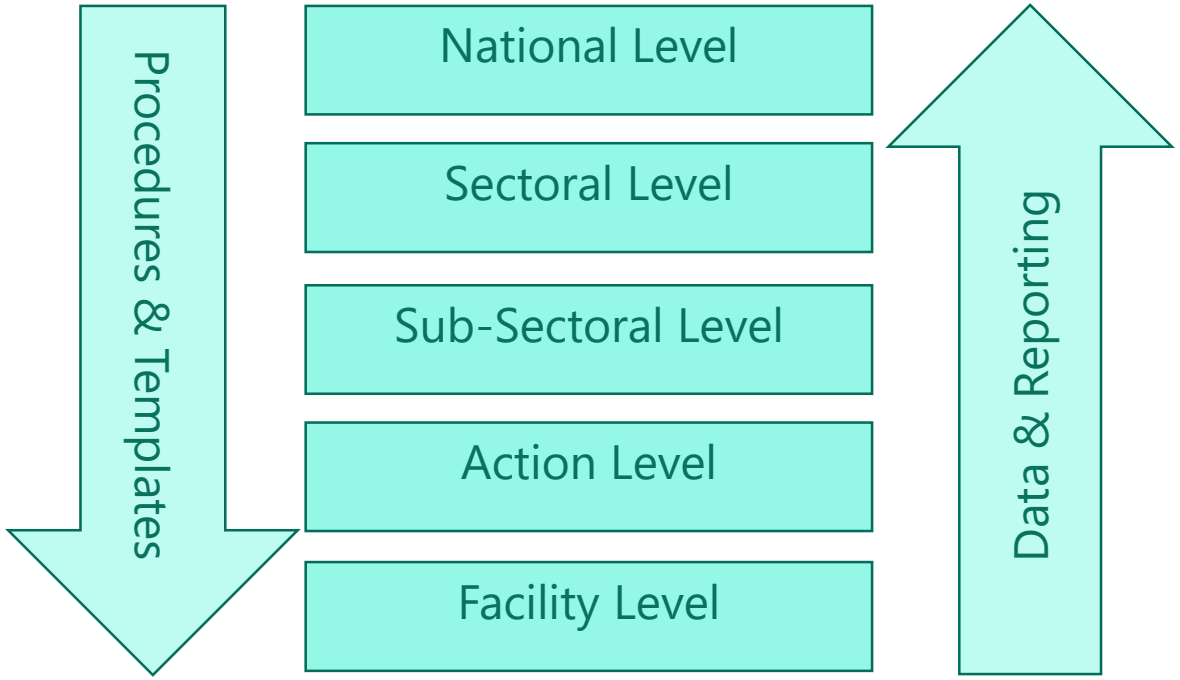
Policies and Governance


Number of Endorsed Government Policies in the PSIDS
Quantified RE target
Quantified EE target
Implementation plan / Road Map
Energy policy
Climate change policy
0
2
4
6
8
10
12
14
16
2016
2010

COUNTRY	RE TARGET FOR POWER GENERATION	by [YEAR]
COOK ISLANDS	50%	2015
	100%	2020
FIJI	81%	2020
	100%	2030
FSM	30%	2020
KIRIBATI	23% (South Tarawa)	2025
	40% (Kiritimati)	2025
	40% (rural public infrastructure)	2025
	100% (Rural households)	2025
NAURU	50%	2020
NIUE	100%	2020
PALAU	30%	2020
	45%	2025
PNG	100%	2050
RMI	100%	2020
SOLOMON ISLANDS	50%	2020
	100%	2030
TONGA	50%	2020
TUVALU	100%	2020
VANUATU	100%	2030

Country	Energy Committee / Task Force	Independent Tariff Regulation	Feed in Tariff	Net Metering Policy
Cook Islands	Yes	No	Yes	Yes
Fiji	No	Yes	Yes	No
FSM	Yes	No	Yes	No
Kiribati	No	No	No	No
Nauru	Yes	No	No	No
Niue	No	No	No	No
Palau	Yes	No	Yes	Yes
PNG	No	Yes	Yes	No
RMI	Yes	No	No	No
Samoa	Yes	Yes	Yes	No
Solomon Islands	No	No	Yes	No
Tonga	Yes	Yes	Yes	Yes
Tuvalu	No	No	No	No
Vanuatu	No	Yes	Yes	Yes

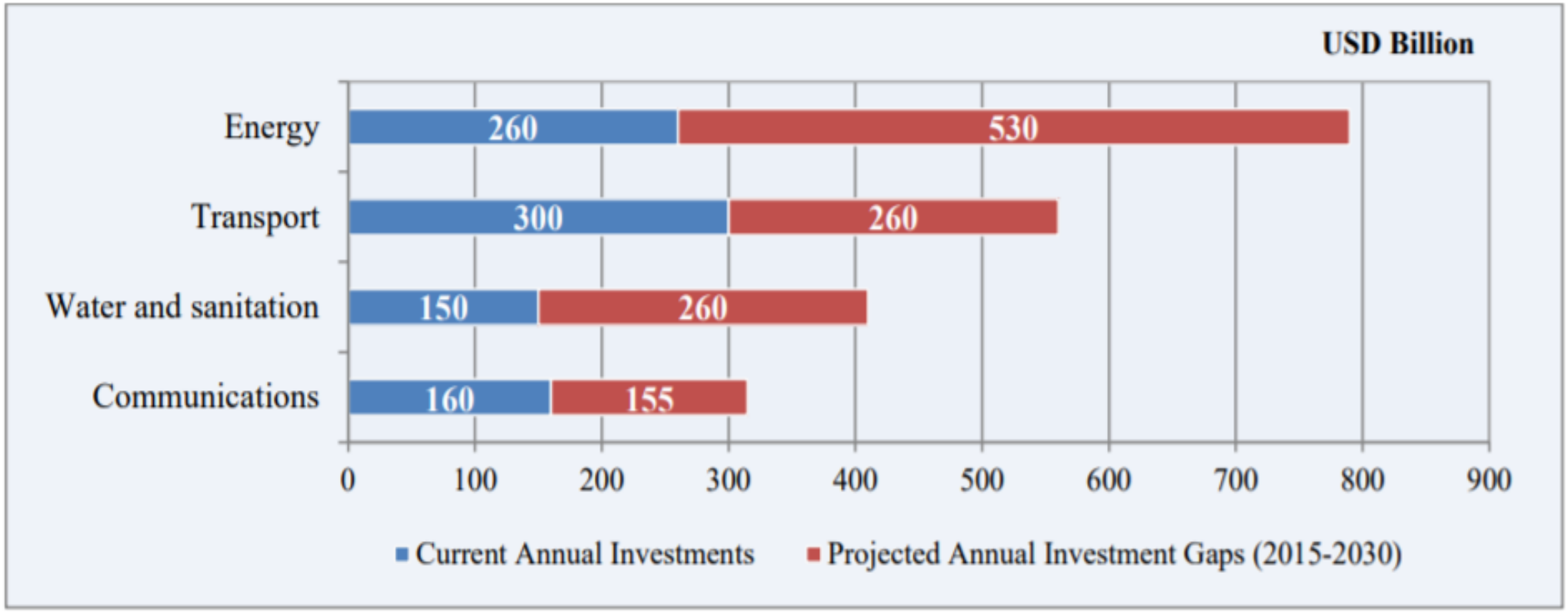
Creating stronger feedback loops



Moving beyond energy sector institutions and involving Ministries of finance, Bureau of statistics, transport agencies, forestry

Financing

SDGs Global PROJECTED GAP (Red bar) 2015-2030 vs CURRRENT INVESTMENTS (Blue bar) (USD billions)



Source: Estimates based on UNCTAD (2014) World Investment Report (See Technical Note, Section I.C.)

Source: http://www.oecd.org/g20/topics/development/Official-Development-Finance-for-Infrastructure.pdf

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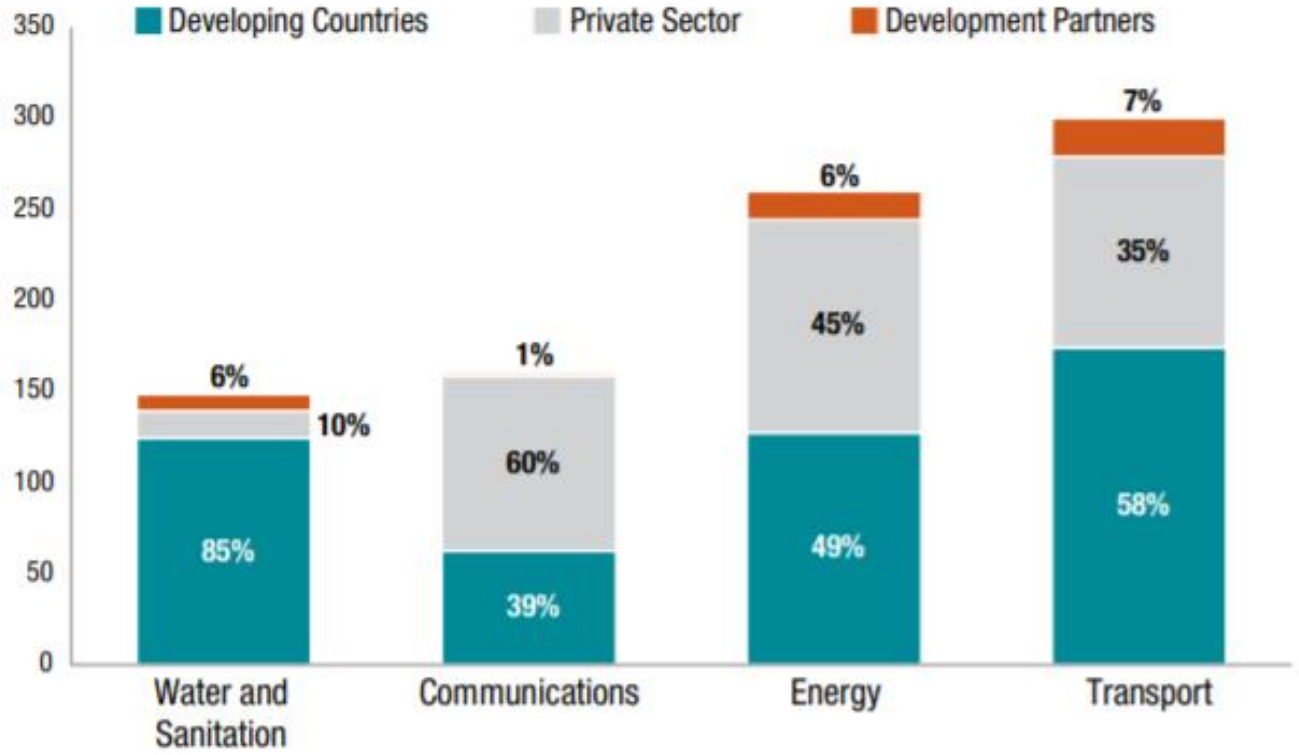
Development Partners' funding only 6%-7%



Source: Gross disbursements. UNCTAD (2014) and OECD "CRS: Aid activities", *OECD International Development Statistics* (database) DOI: http://dx.doi.org/10.1787/data-00061-en. It includes estimates by the authors.

Source: http://www.oecd.org/g20/topics/development/Official-Development-Finance-for-Infrastructure.pdf

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Is there enough capital?

There appears to be no dearth of capital; the bottleneck is the lack of green bankable projects that can meet risk-reward expectations of investors and unlock capital.

USD 120 Trillion
Assets under management

?

Private capital USD 243 Bn

Capital flow to Climate Finance in 2014[2]
USD 391 Billion

Institutional investors alone have **US$ 120 trillion**[1] as assets under management. Capital advanced towards green projects in both developing and developed world, however, remains constrained - **US$ 391 billion** in 2014

Most of the national level financial institutions are limited in their ability to access and handle same capital

National Financing Vehicles (institutions, funds, mechanisms)

Innovative Financial Instruments and Structures

Lack of available financial structures and instruments which can meet risk-reward expectations of investors and unlock capital

USD 748 Million to Pacific SIDS 2010-2014[3]

Country level green projects and programs

[1] OECD, 2013 - Assets under management for institutional investors – Investment funds, insurance companies, pension funds, sovereign wealth funds
[2] Climate Policy Initiative
[3] SEI, 2017

POTENTIAL FUND SOLUTION TO CLIMATE CHANGE FINANCING

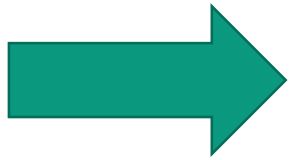
- Institutional investors and commercial banks can contribute to close the investment gap -- particularly for green infrastructure
- Their combined pool of capital is estimated to be about $120 trillion

Institutions	Amount of Pooled Capital
Banks	$40.2 trillion
Investment companies	$29.0 trillion
Insurance companies	$26.5 ttillion
Public pensions and superannuation plans	$10.9 trillion
Sovereign wealth funds	$6.3 trillion
Infrastructure operators and developers	$3.4 trillion
Infrastructure and private equity funds and private pensions	$2.7 trillion
Endowments and foundations	$1 trillion

Source: https://www.adb.org/sites/default/files/publication/357156/catalyzing-green-finance.pdf

Pacific climate finance – USD 748 million 2010-2014[1]

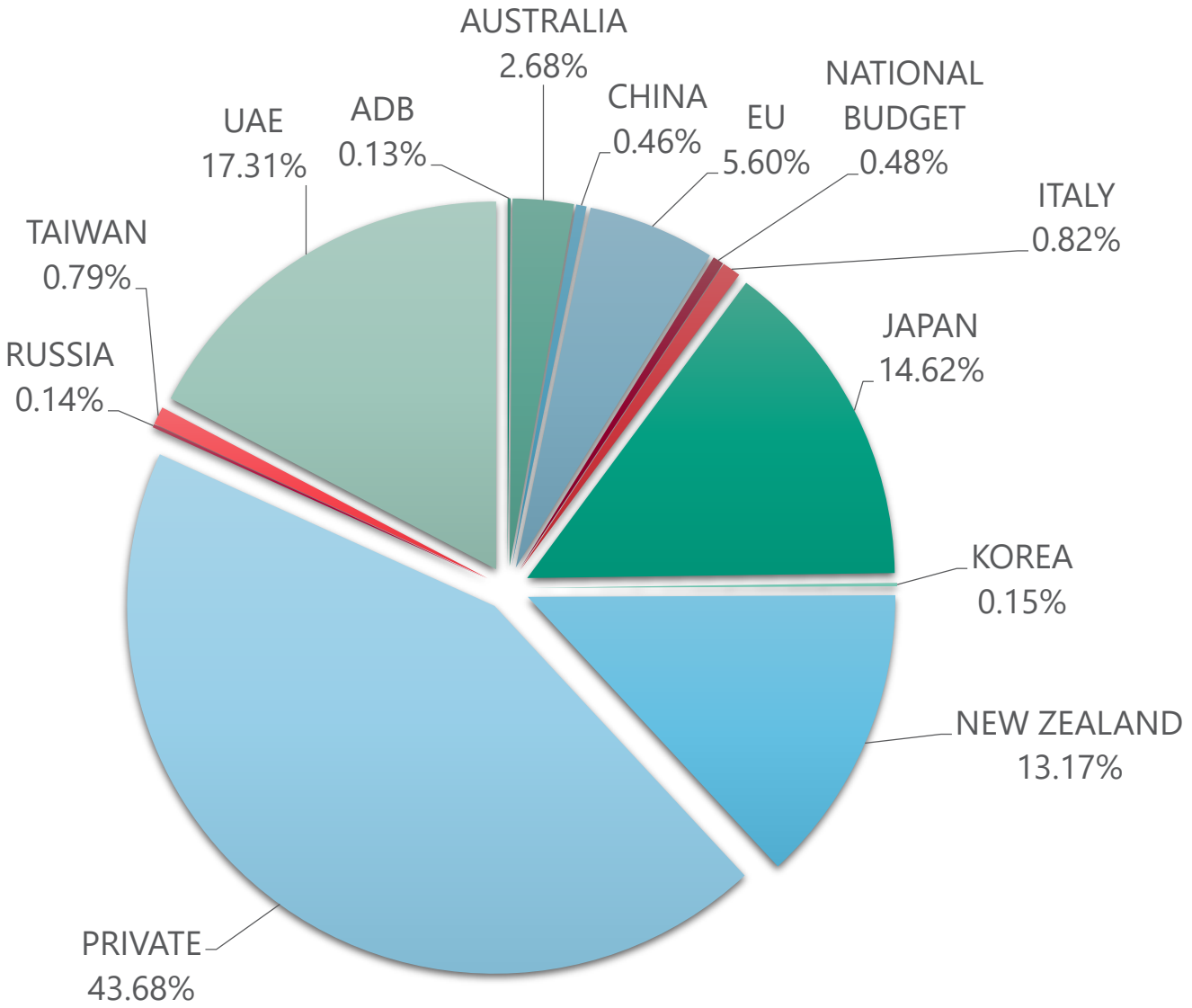
- Enabling environment – 314m
- Renewable energy – 147m
- Research – 69m
- DRM & DRR – 60m
- Multi-sector aid – 32m
- Road infrastructure and vehicles – 31m
- Water supply and sanitation – 20m
- Biodiversity protection – 18m
- Irrigation – 15m
- Capacity building – 9m
- Others – 31m



FIJI
32m climate finance in Fiji (DRR, Renewables, Multi-sector)
Renewables – 2% portfolio obligation
Sustainable Energy Financing Project – 35m
GCF – 31m
And more

[1]SEI, 2017

Financing solar

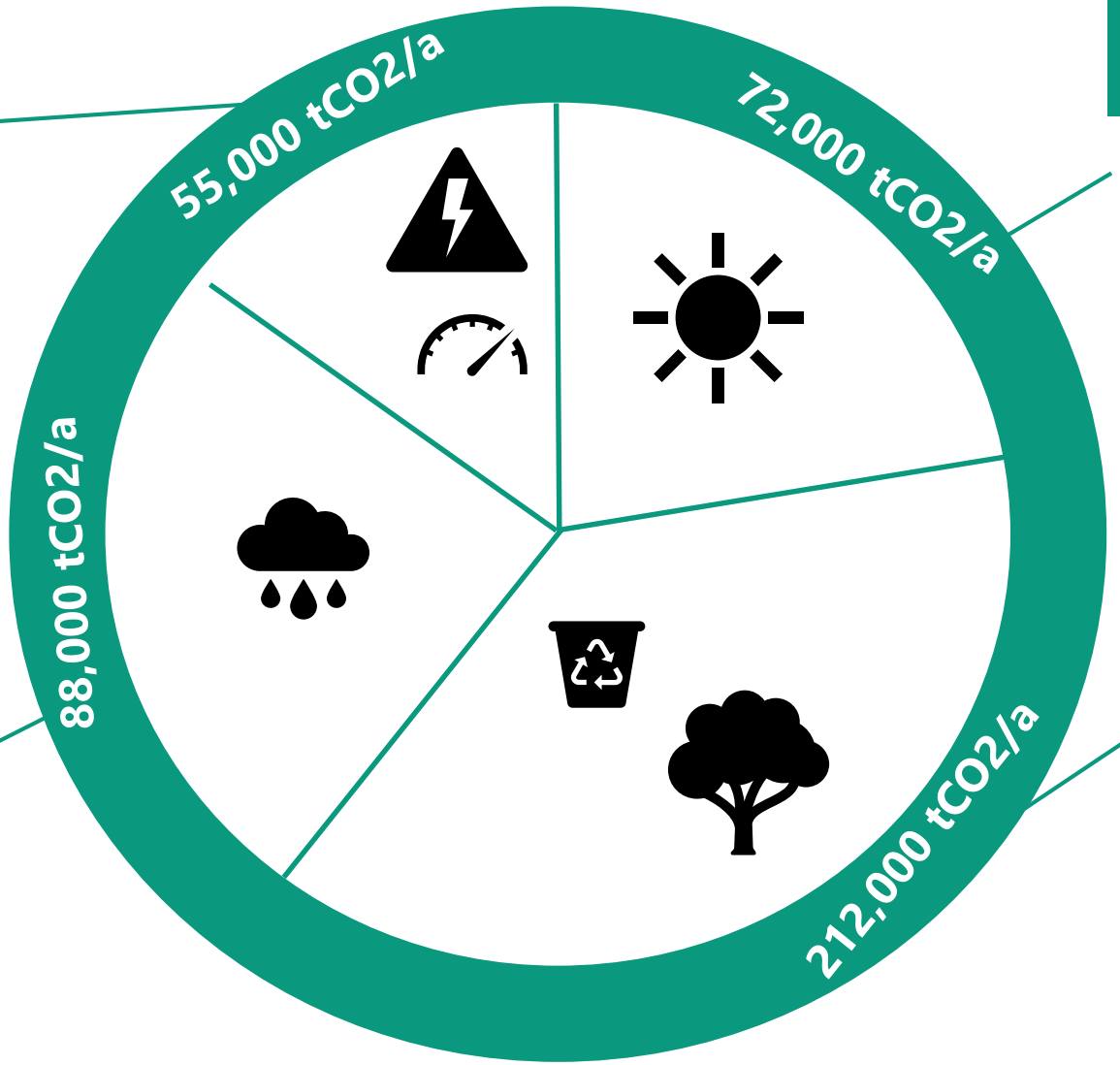


Fiji – Road to 100% RE

Grid Extension & Improvement (2,400 km)

Grid Storage (162 MWh)

Hydro (84 MW)

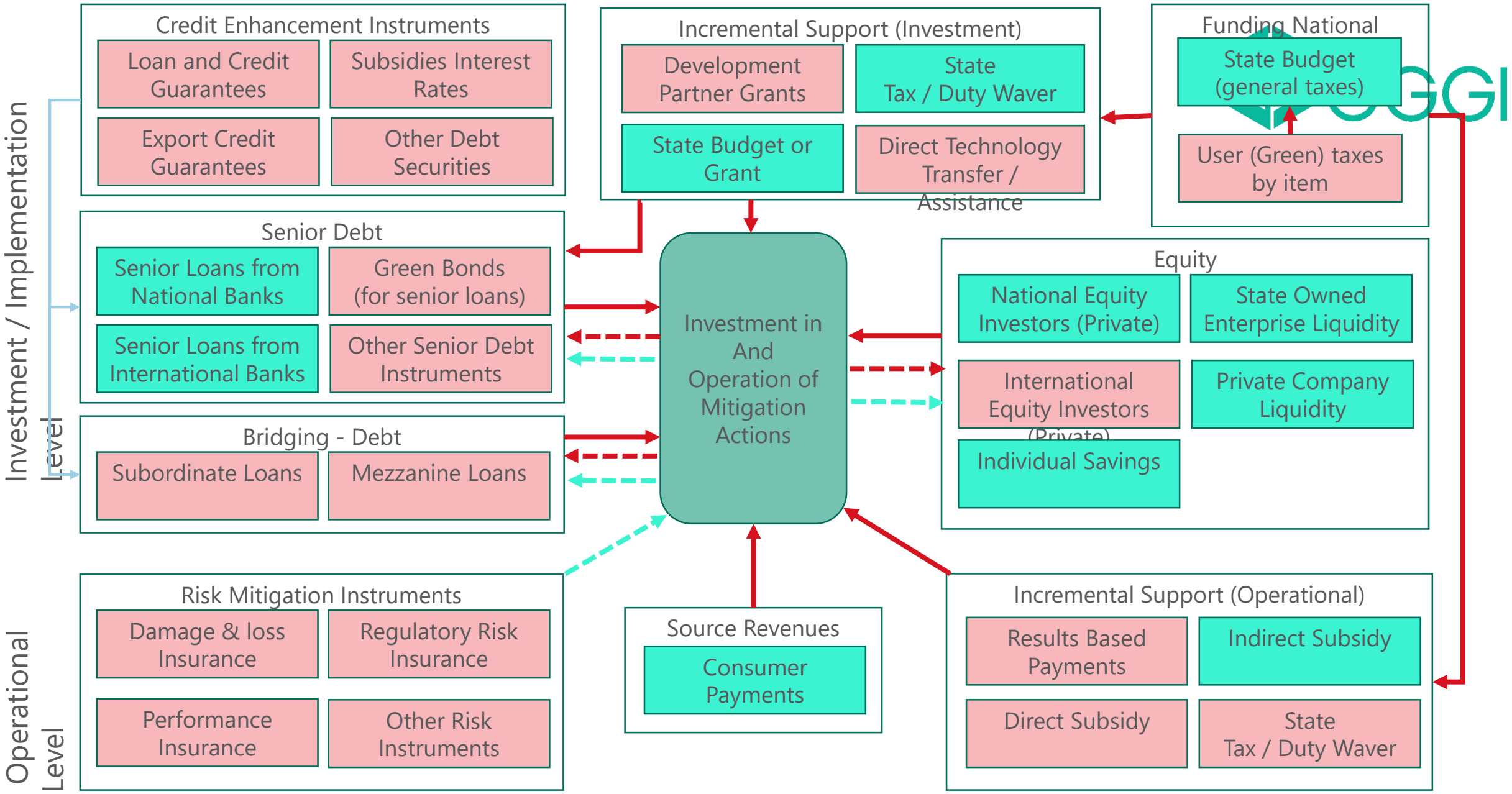


Solar PV (127 MWp)

FIJI NDC Roadmap – 1.6billion USD by 2030 for the renewable energy sector - electricity

Biomass & WTE (65 MW)

Sustainable Biomass (33,000 ha)


Credit Enhancement Instruments
Loan and Credit Guarantees
Subsidies Interest Rates
Export Credit Guarantees
Other Debt Securities
Incremental Support (Investment)
Development Partner Grants
State Tax / Duty Waver
State Budget or Grant
Direct Technology Transfer / Assistance
Funding National
State Budget (general taxes)
User (Green) taxes by item
Senior Debt
Senior Loans from National Banks
Green Bonds (for senior loans)
Senior Loans from International Banks
Other Senior Debt Instruments
Investment in And Operation of Mitigation Actions
Equity
National Equity Investors (Private)
State Owned Enterprise Liquidity
International Equity Investors (Private)
Private Company Liquidity
Individual Savings
Bridging - Debt
Subordinate Loans
Mezzanine Loans
Risk Mitigation Instruments
Damage & loss Insurance
Regulatory Risk Insurance
Performance Insurance
Other Risk Instruments
Source Revenues
Consumer Payments
Incremental Support (Operational)
Results Based Payments
Indirect Subsidy
Direct Subsidy
State Tax / Duty Waver
Investment / Implementation Level
Operational Level
Types of new or expanded financial instruments and support which are needed
Types of existing financial instruments and support which are needed

Opportunities

Opportunities for VRE for Pacific Island Countries

- Renewables and energy efficiency = greater energy security
- Resilience to climate change
- More reliable (and affordable?) energy for the productive sectors
- Creating green jobs
- Rural electrification - reducing poverty and income gaps
- Good position to adopt best practices and learn from bad practices: infrastructure has a long lasting impact
- Opportunity for leapfrogging straight to the newest most efficient technologies

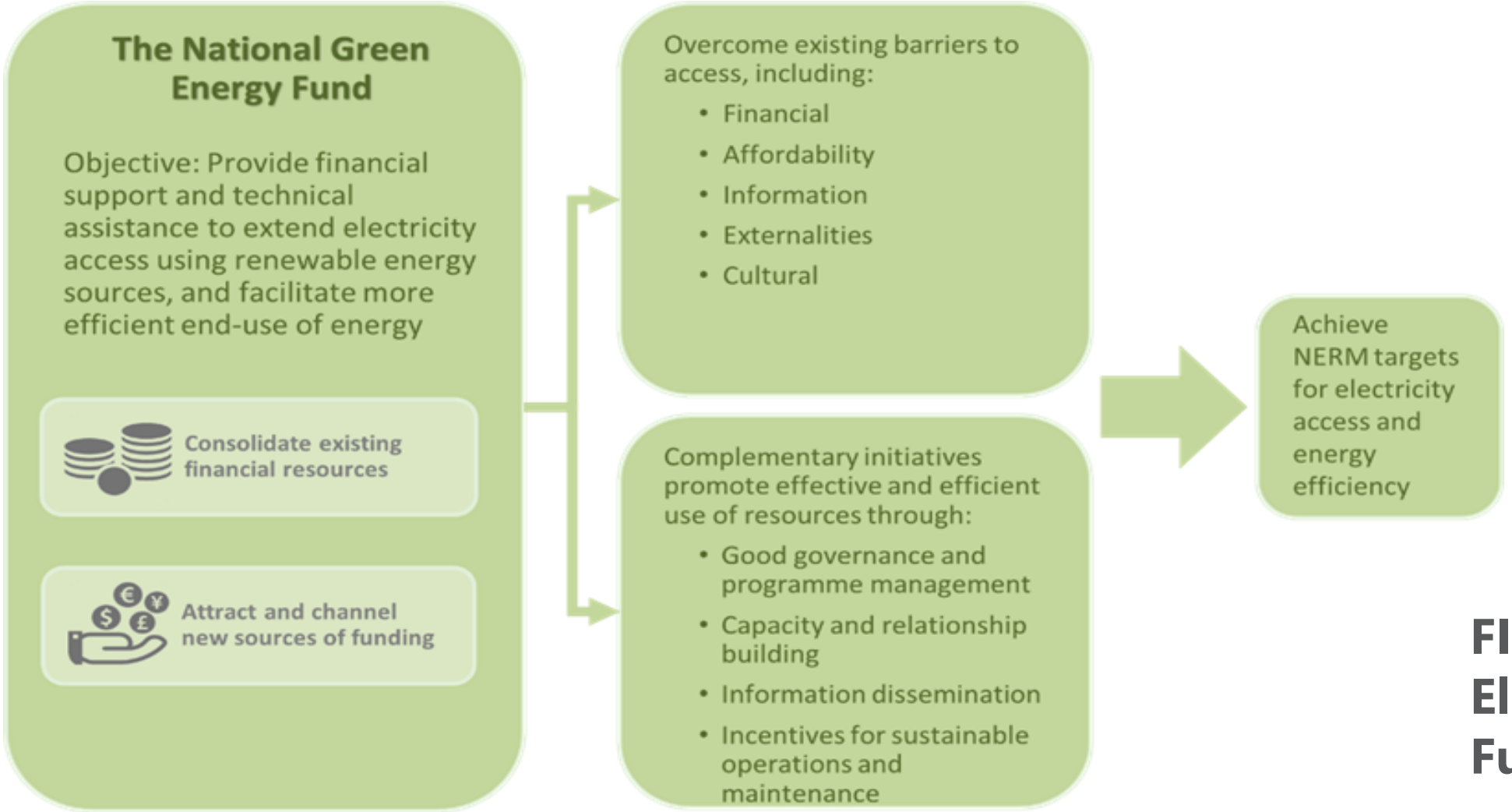
VRE for the tourism sector

- Highly dependent on reliable, affordable energy supply
- Making tourism industry vulnerable to oil price shocks and supply chain disruptions
- Solar PV is now competitive in many markets
- SWH also but has not taken off – why?
- Need to improve access to info rmation, finance and O&M for renewables

Lowering the cost of information, market knowledge and payment services through ICTs

- Mobile phones in Pacific HH - from 49%in 2007 to 93% in 2014.
- Cost of mobile calls has declined by 1/3 between 2005 and 2014.
- Solar lanterns with mobile charging now widespread, commercially available, reliable and affordable
- Opportunity to provide information to dispersed, rural end-users
- Link producers to markets
- Link agriculture and tourism sectors
- New software to facilitate remote payment for solar energy services (mini-grid / SHS) via mobile phone - PAYG

National financing – Vanuatu
National Green Energy Fund



FIJI – Fiji Rural Electrification Fund

Some thoughts

- Consider how the shift to low-carbon economy creates jobs and align the education institutions to provide right vocational and other curricula.
- Integrated planning needs to be reflected in national budgets.
- Government and industries should be partners in this effort and be leaders in setting the example.
- All stakeholders need to be engaged to secure ownership (e.g. land owners). Also, cities and towns are key to stimulating action and securing ownership at local levels.
- Current NDCs / RE targets need to be internalized in national planning, regulations, policies and institutional setups.
- Prioritize resource efficiency.
- Regional approach and cooperation on best practice, standards, etc., to help aggregation of projects and incentivize the private sector investment.
- Tourism, maritime, and transport are major sectors that need to be considered in the transition to renewables
- VRE needed to meet demand from transport electrification – both land and maritime
- Vehicles as storage?

	Current Actions	3 year	10 year
PIC Utilities	• Solar • Solar +Storage	• Solar +storage • Transmission and distribution	• Pumped storage • Electric vehicles • Biofuels?
PIC Govt	• Policies • Plans • Strategies • Sectoral	• New policies • Legislation • Regulation • Incentives • Standards • Enforcement / MRV • Integrated approaches	• Regulation • Incentives • Standards • Enforcement • MRV
Research	• Technologies • Power sector planning • Resource assessment	• Resource assessment • Forecasting • Business modelling • Consumer behavior • Pumped storage • Electric vehicles • Biofuels?	• Resource assessment • Forecasting • Business modelling • Consumer behavior • Pumped storage • Electric vehicles • Biofuels?
Donors/finance	• Project financing • Blended finance • Institutional strengthening • Multi-partner	• National budgets • PPPs • Consumer financing • Multi-sector • Institutional strengthening	

Thank You

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