



Renewables Readiness Assessment PANAMA



Introduction to the RRA

- Backbone of IRENA's country level engagement
- Comprehensive assessment of the key conditions for renewable energy development in a specific country, as well as recommendations to improve readiness and overcome barriers to deployment.
- Country-initiated, country-led process, where IRENA as facilitator
- Inclusive and multi-stakeholder process promoting consensus
- Process establishing a basis for future collaboration

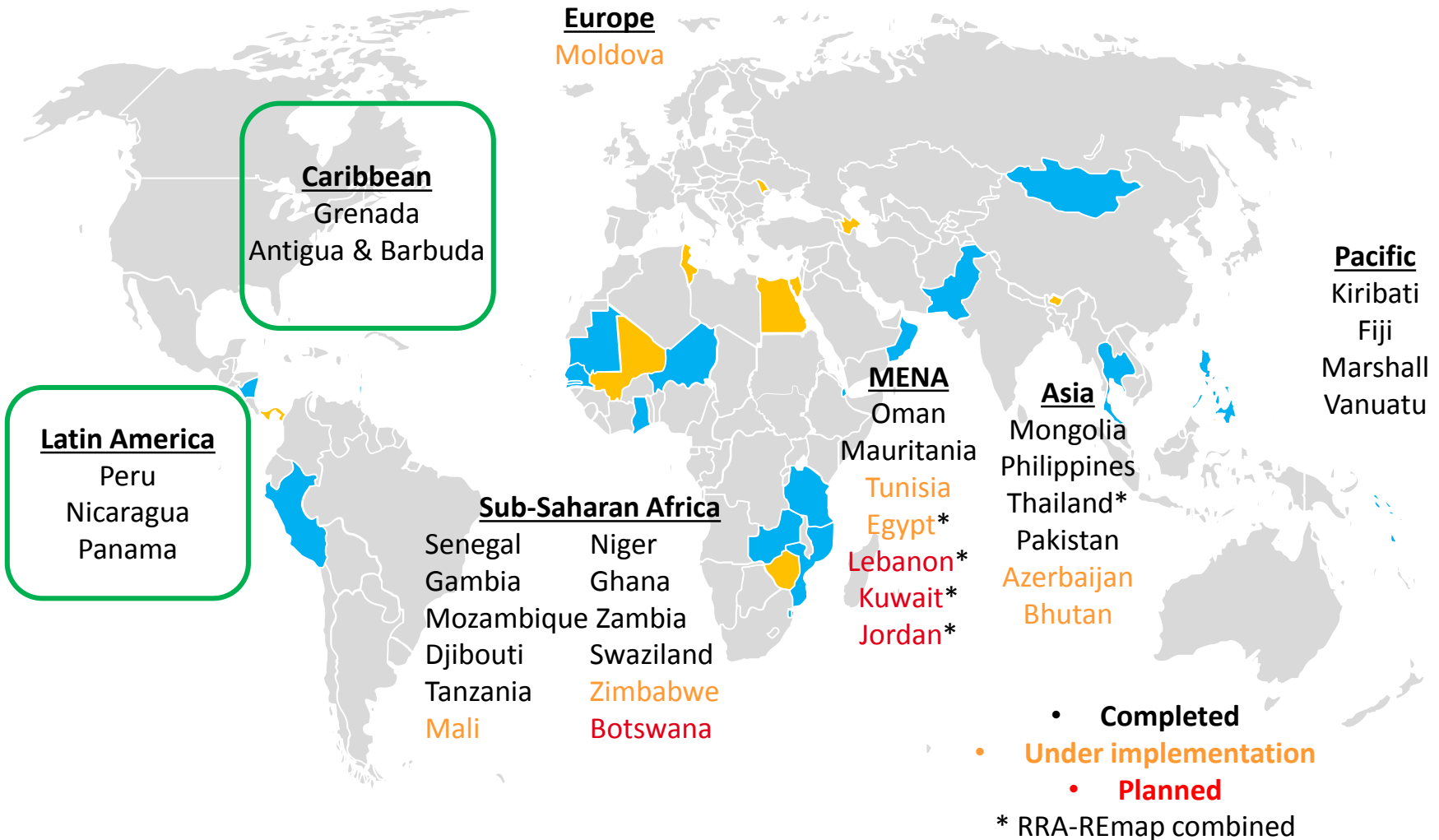


Renewable Readiness Assessment (RRA)

RRA Stakeholders

Core RRA Team	National Expert Group	Validation Group
<ul style="list-style-type: none">- Ministry (RRA director & focal Point)- IRENA- RRA consultant- Regional entities- Development partners	<ul style="list-style-type: none">- Ministry of Energy- Utilities- Regulators- Civil society and associations- Private sector- Financing institutions- Academia & research institutes	<ul style="list-style-type: none">- Other key ministries (health water; education; women; etc)- Suppliers, manufacturers, & project developers- Chamber of commerce- Bilateral & multilateral agencies

RRAs: Global Breakdown



The RRA in Latin America



Nicaragua

- Studies on impact of different levels of VRE generation on the grid
- Updated power grid extension plan

Peru

- Renewable Energy Law
- Auction Reform
- Suitability Maps (solar PV and wind)

The RRA process: A 4-phased approach

Phase
1

Demonstration of intent
by government

Phase
2

Detailed country
assessment and action
plan

Phase
3

Validation

Phase
4

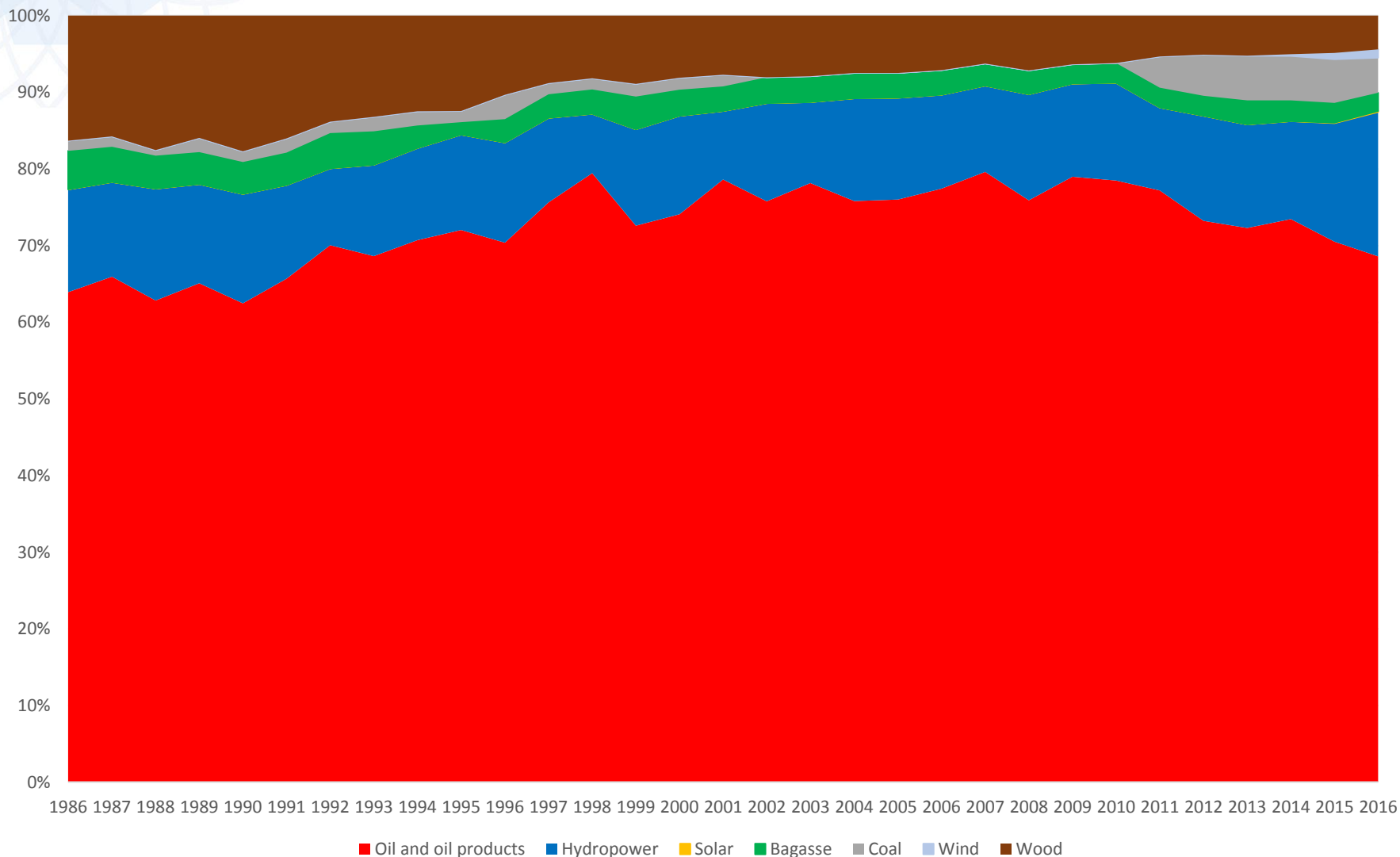
Implementation of
recommendations and
follow up



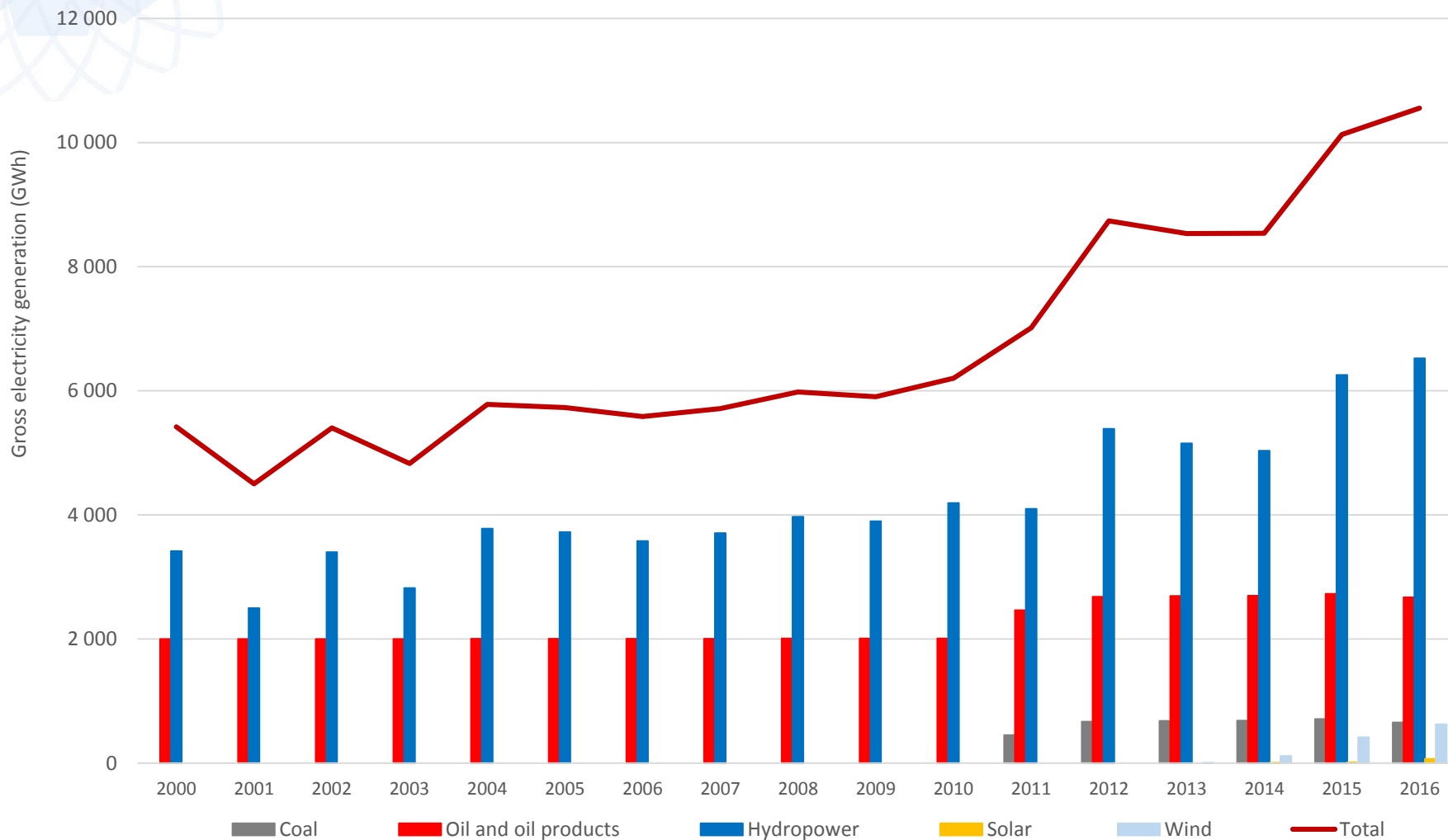
Renewables in Panama

An Overview

Primary Energy Supply: 1986 - 2016

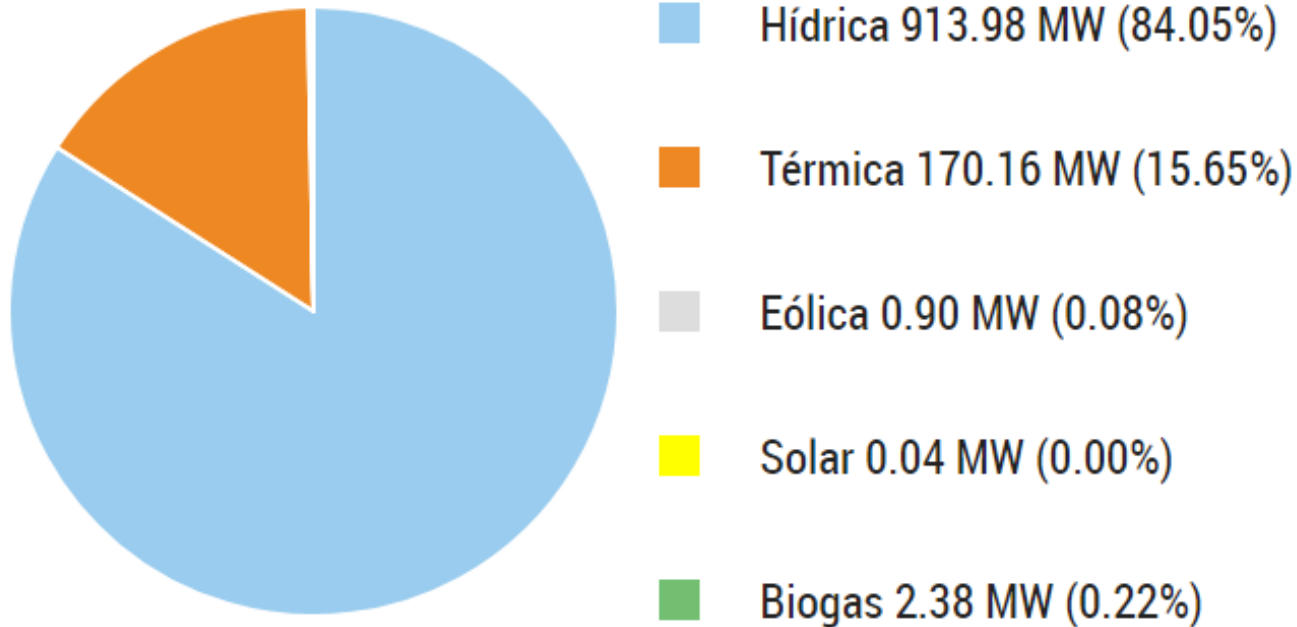


Gross Electricity Generation: 2000 - 2016



Real-time Generation Profile: 22 May 2018

Tipos de Generación



Hydropower

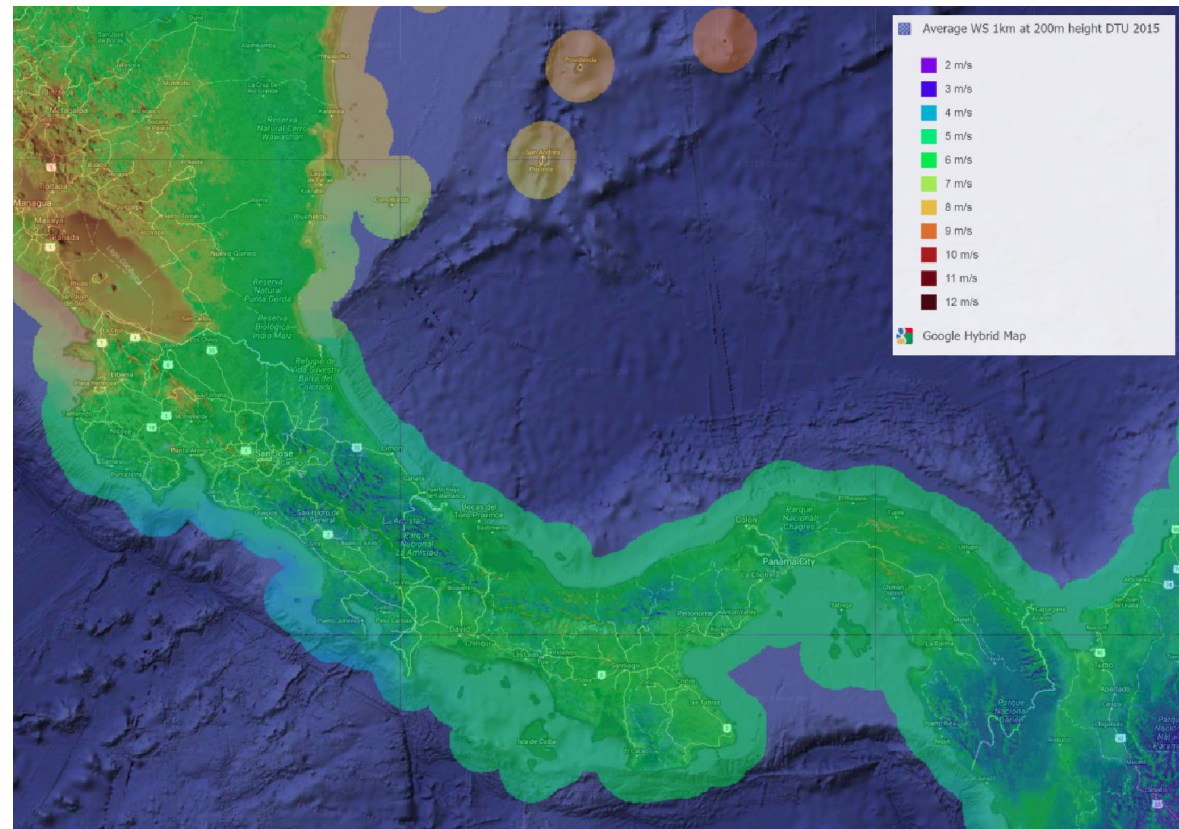
- Estimated potential of **11 879 GWh/year** or an installed capacity of **2 389 WM**
- Potential for large plants (over 100 MW) has been exhausted



Renewable Energy Resource Potential

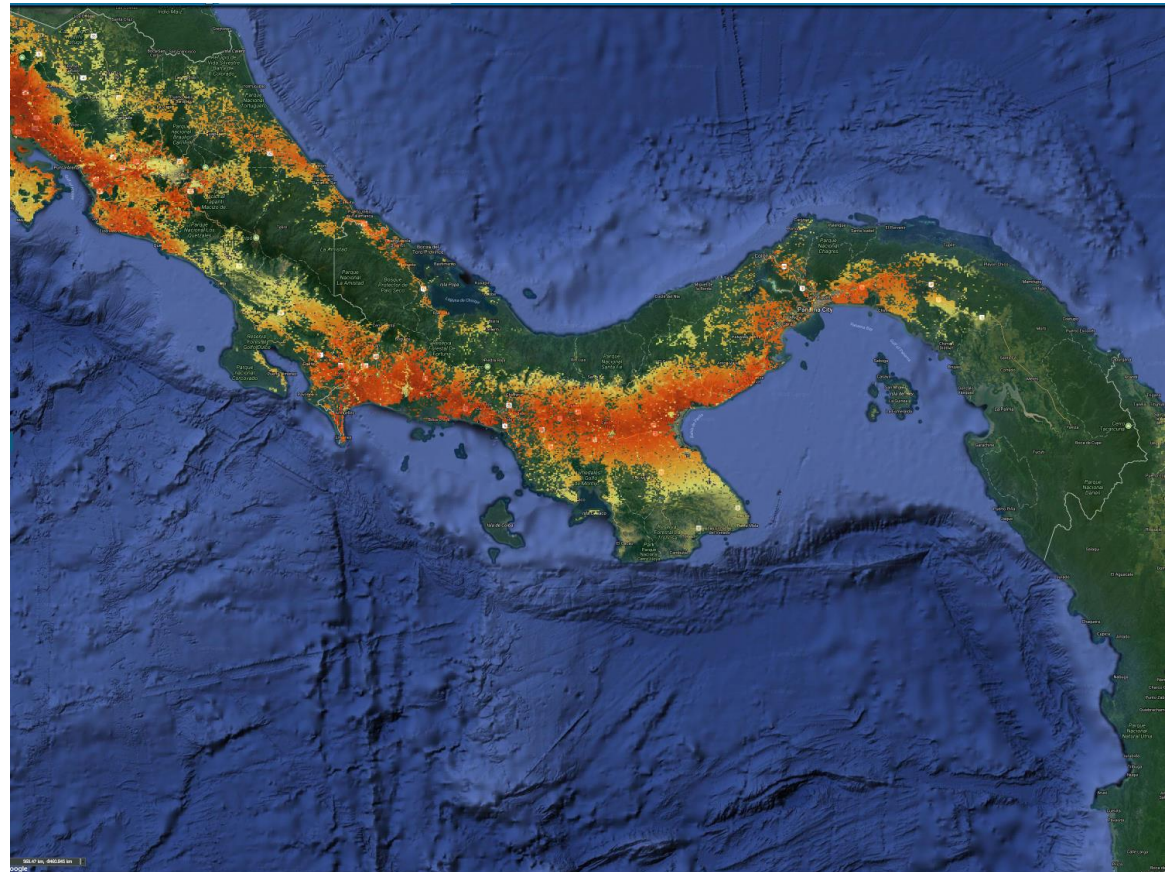
Wind Power

- Measurements at 40 m high shows sites with **average speed of 6 m/s and 11 m/s**, with a capacity factor of 35%
- Currently installed wind power capacity of **270 MW**



Solar Power

- Panama receives **average irradiance of 4.8 kWh/m²/day**
- Strongest resources identified in the south of the provinces Chiriqui and Veraguas at **5/kWh/m²/day**
- Installed capacity of **127 MW**



Bioenergy

- Cane bagasse has an estimated annual generation potential of **28 GWh**
- Biogas installed capacity of **8 MW**





Key Challenges and Recommendations

Assessment Framework

Energy and Power
Sector

Challenges

Recommendations

Renewable Energy
Resources

Institutional
Governance, Policy
& Regulation

Challenges and Proposed Recommendations.....1/6

**Lack of enabling
regulation for
renewables**



**Assess the regulatory
and financial
incentives for VRE
development (PPAs)**

Challenges and Proposed Recommendations.....2/6

Uncertainty in Long-term Power System Planning for VRE

Develop Strategy for Long-term Power System Planning with Higher Shares of VRE

Challenges and Proposed Recommendations.....3/6

**Power System
Operation Still Based
on Centralized,
Disptachable
Generation Units**

**Assessment to
Identify New Flexible
Operational Practices**

Challenges and Proposed Recommendations.....4/6

Lack of renewable energy workforce

Assess the skills development needs in Panama's workforce to support long-term renewables

Challenges and Proposed Recommendations.....5/6

**Lack of National Plan
for Sector Coupling
(electrifying end-use
sectors)**

**Create a Long-term
Plan for E-mobility
and assessment for
electric cook stoves**

Challenges and Proposed Recommendations.....6/6

**Insufficient regulation
leaves the Regional
Energy Market
Underutilized**

**Assess Regulatory
interfaces between
the National and
Regional Electricity
Market**

Way Forward – Post RRA Success

**RRA
IMPLEMENTATION**

Commitment and Leadership by SNE



**Engagement with Development Partners
and Key Regional Institutions**



IRENA

International Renewable Energy Agency



Thank you



RRA Recommendations

Assess the Regulatory and Financial Incentives for VRE development

Develop a National Strategy to improve Power System Planning and Modelling with higher Penetrations of VRE

Identify New Operational Practices to Increase the Flexibility and Reliability of a Grid with Growing Shares of VRE

Assess the Regulatory Interfaces Between the National Electricity Market and the Regional Electricity Market

Examine the Skills Development Needs of Panama's Workforce to Support Efforts Towards Reaching the 2050 Renewable Energy Goal

Develop a Long-term Plan for Electric Mobility and Sector-Coupling