

vRE Grid Integration in ASEAN

Sanjayan Velautham
Executive Director – ASEAN Centre for Energy

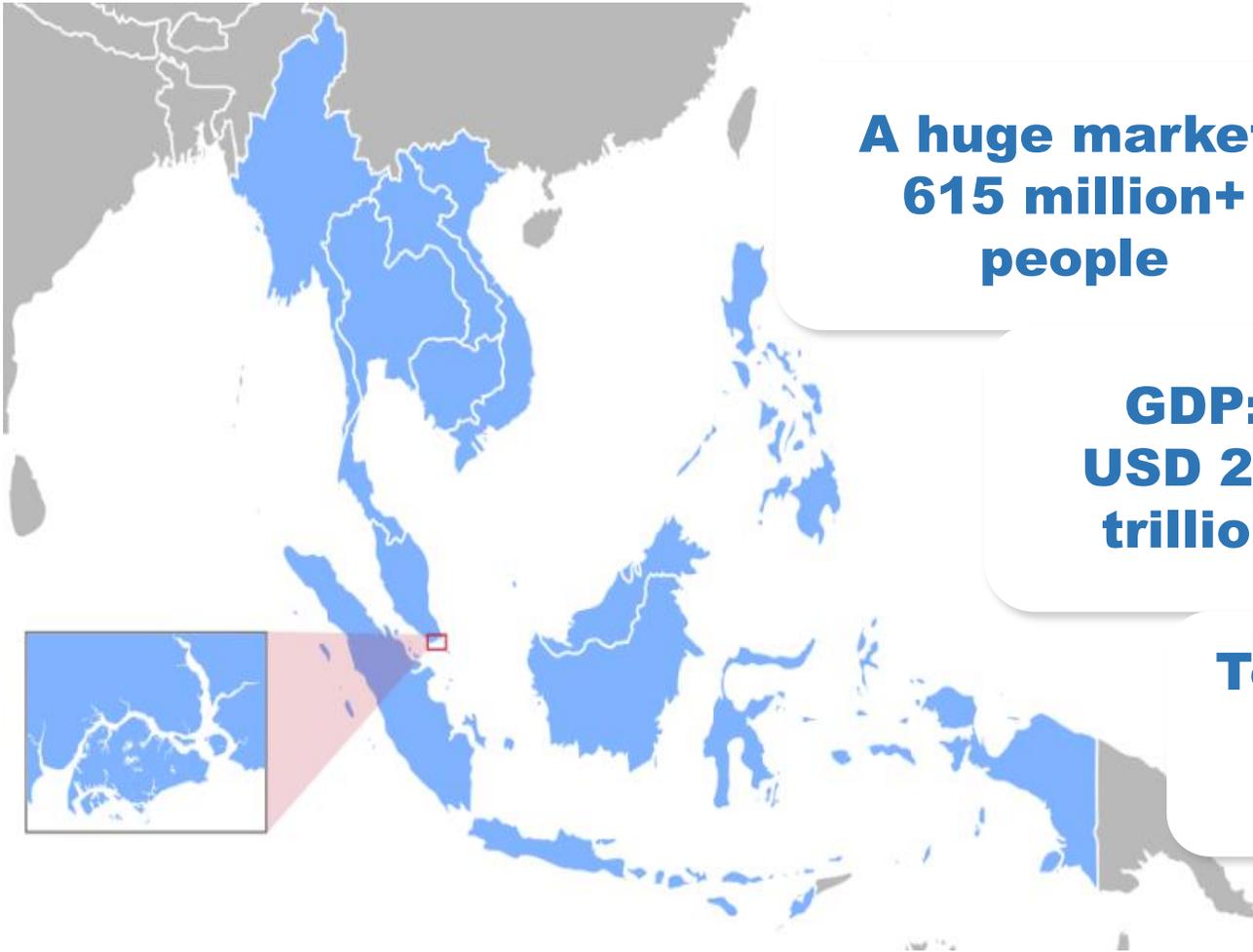


*Asia Clean Energy Forum
Manila, 16 June 2015*

OUTLINE

- ❖ **ASEAN & ASEAN Centre for Energy (ACE) Background**
- ❖ **RE Development in ASEAN :**
 - Potential, Installed Power Capacity (MW), Electricity Generation (GWh),
Export & Import
- ❖ **Requirement on vRE Connection to Grid**
- ❖ **Status of Connection Codes in ASEAN**

ASEAN: A COMMUNITY OF OPPORTUNITIES



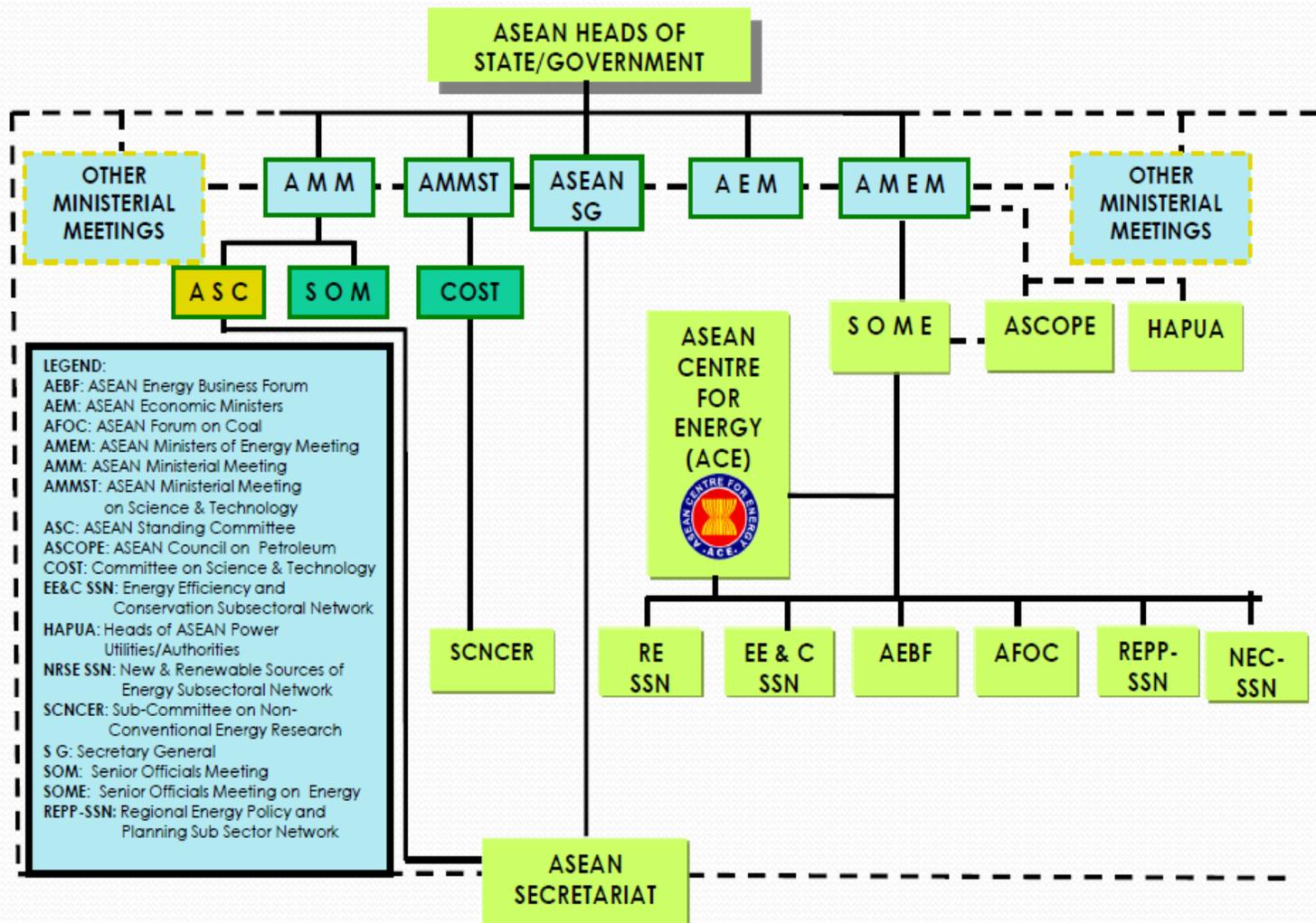
**A huge market:
615 million+
people**

**GDP:
USD 2.4
trillion**

**Total Trade
USD 2.5
trillion**

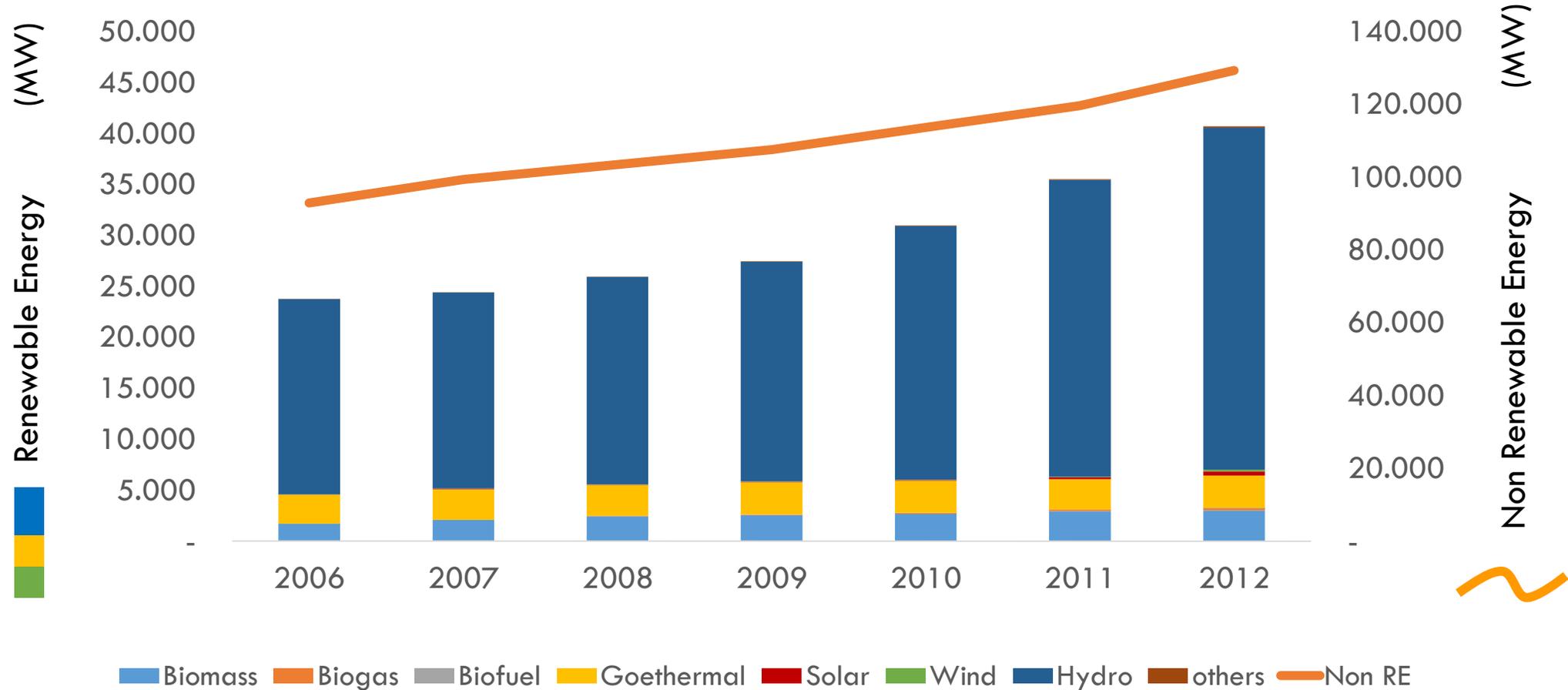
The AEC Blueprint, signed in 2007 in Singapore ... to establish ASEAN as a single market and production base with the goal of making ASEAN more dynamic and competitive.”

ACE IN ASEAN'S STRUCTURE

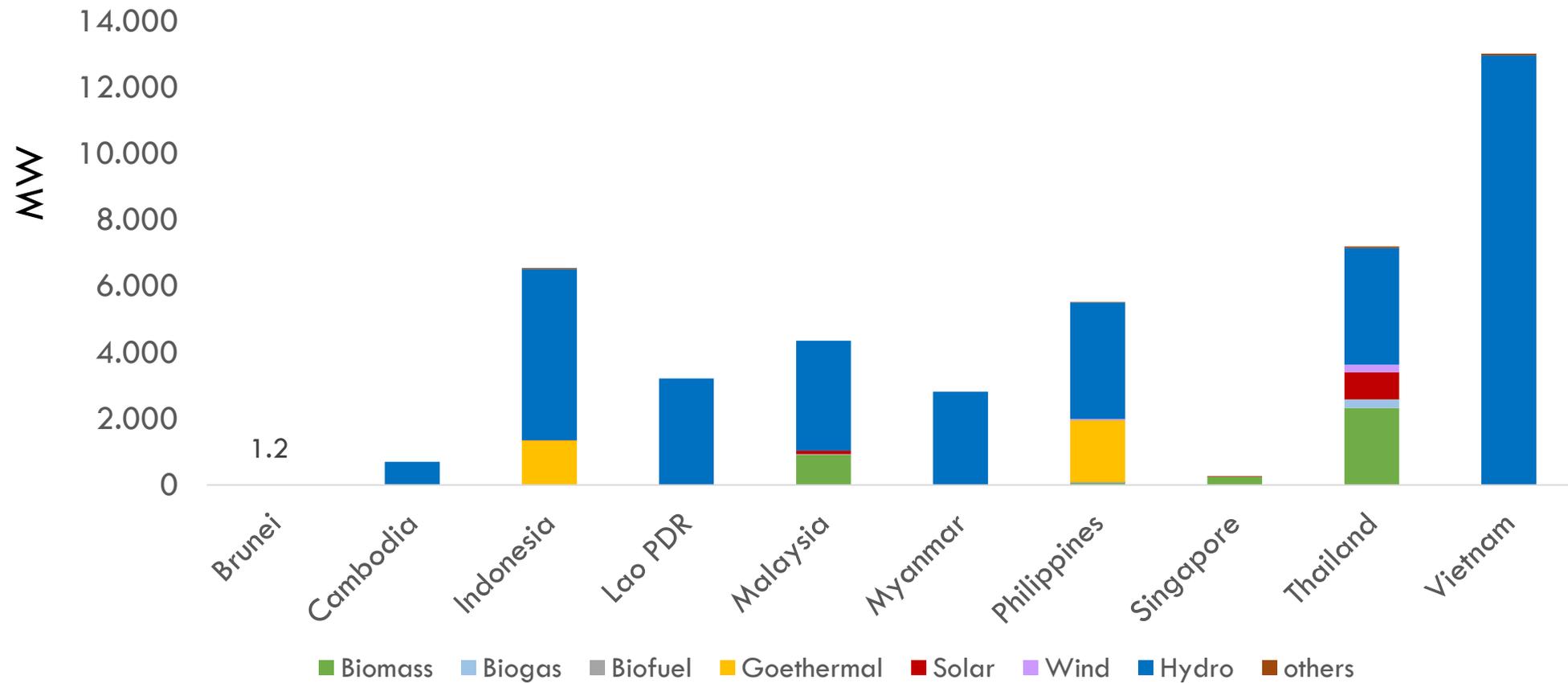


- Established on in1999 by the 10 Member Nations of ASEAN
- Hosted by the Government of the Republic of Indonesia
- Vision
 - ✓ A regional centre of excellence that serve to advance ASEAN energy goals
 - ✓ Function as an energy data and knowledge hub; and
 - ✓ Secretarial and Administrative functions.

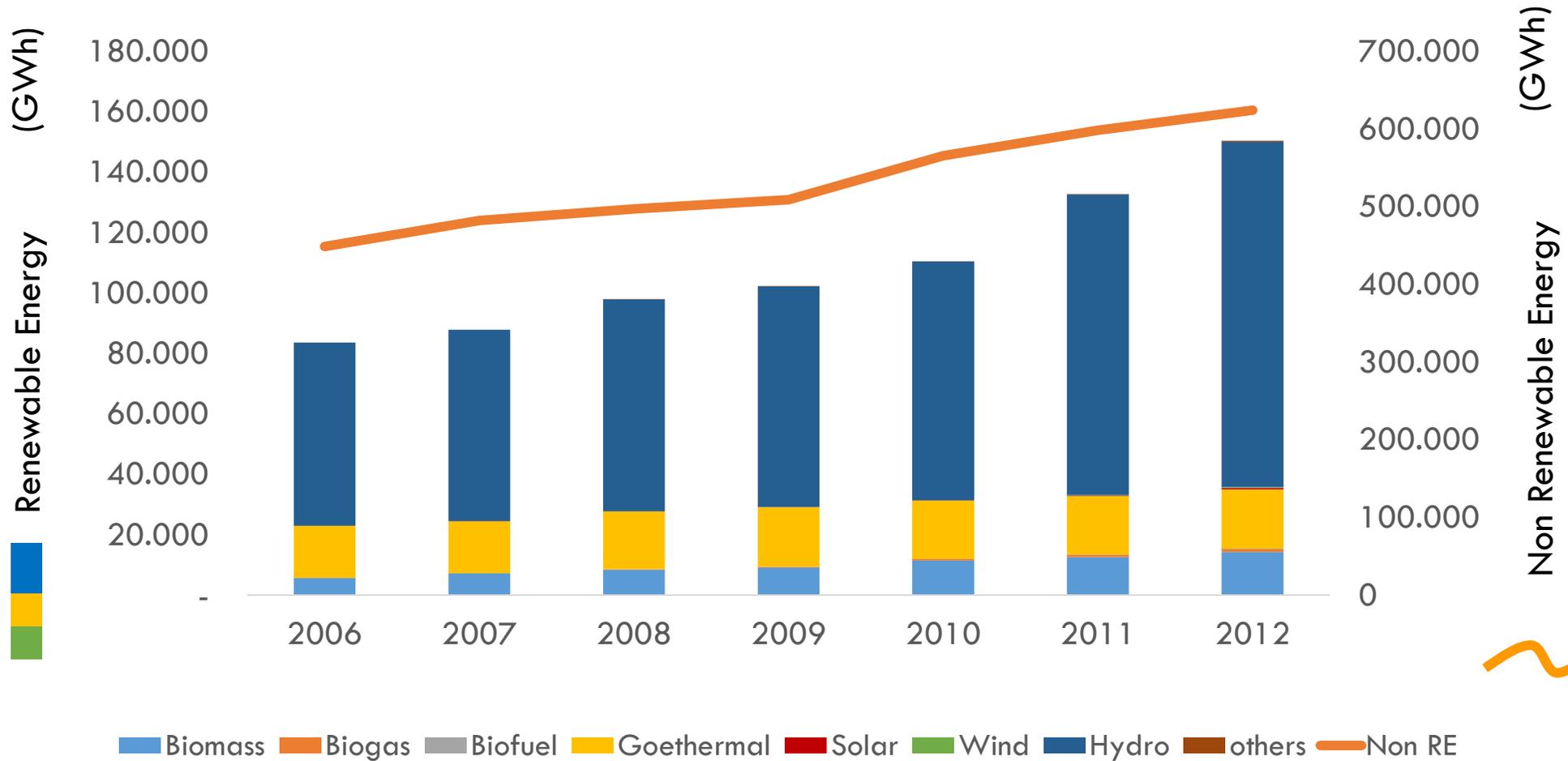
INSTALLED POWER CAPACITY IN ASEAN (MW)



RE INSTALLED POWER CAPACITY (2012)

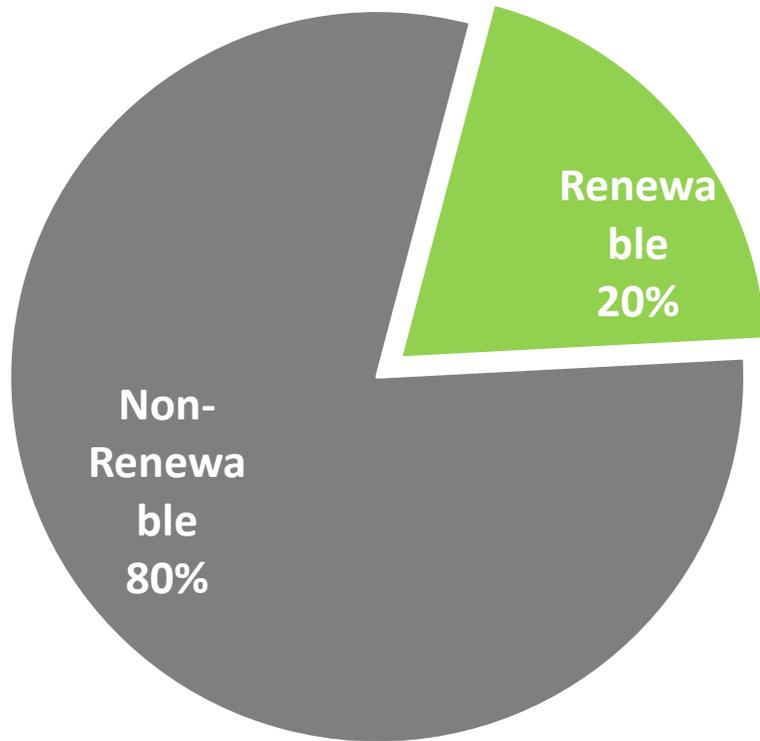


POWER GENERATION IN ASEAN (GWh)

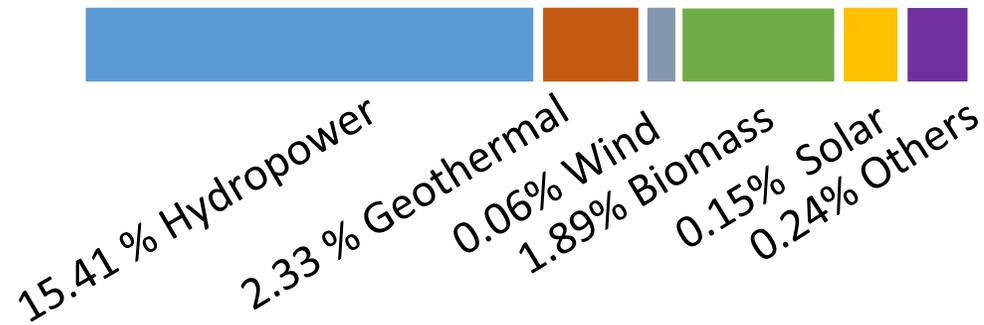


Total Power Generation in ASEAN in 2013

**ASEAN Total Power Generation:
814,629 GWh**



**ASEAN Power Generation for Renewable Energy
163,533 GWh**

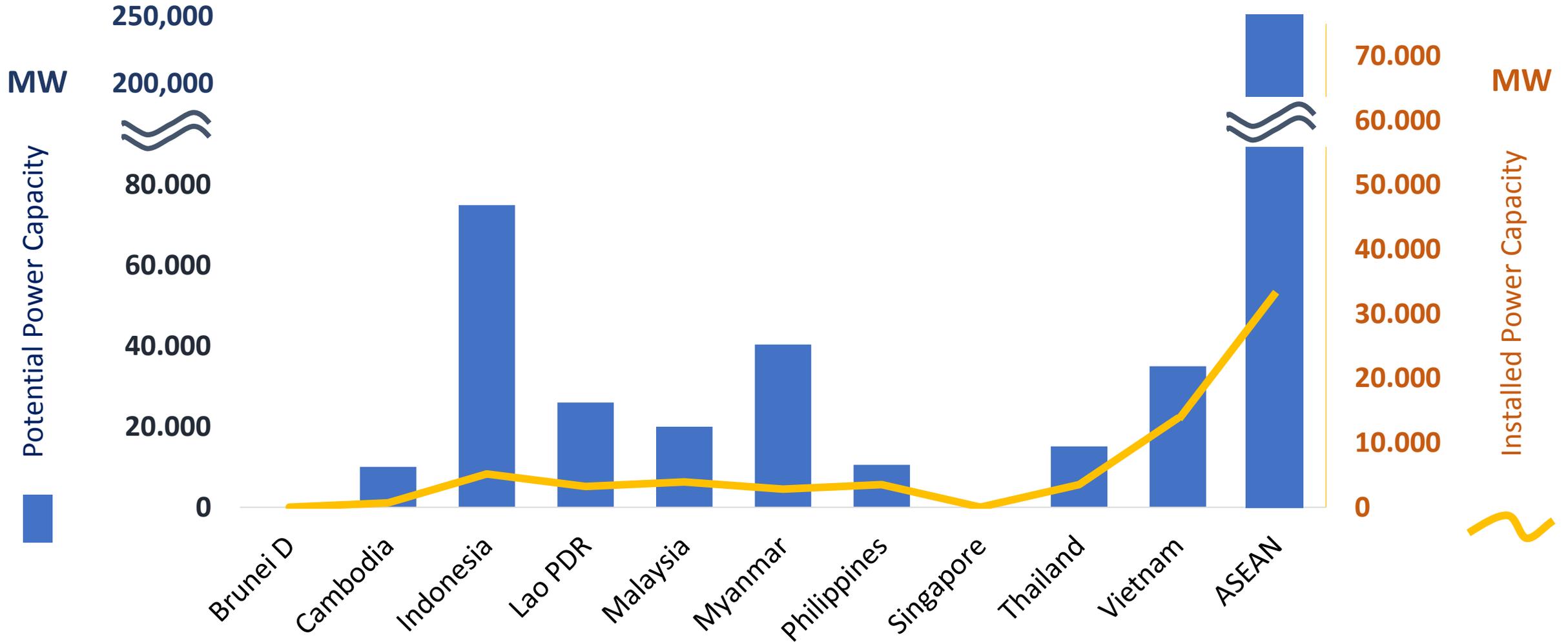


Unit	Non-Renewable	Biomass	Goethermal	Solar	Wind	Hydro	Others*
GWh	651,096.25	15,386.97	19,019.85	1,191.04	464.84	125,556.08	1,914.93

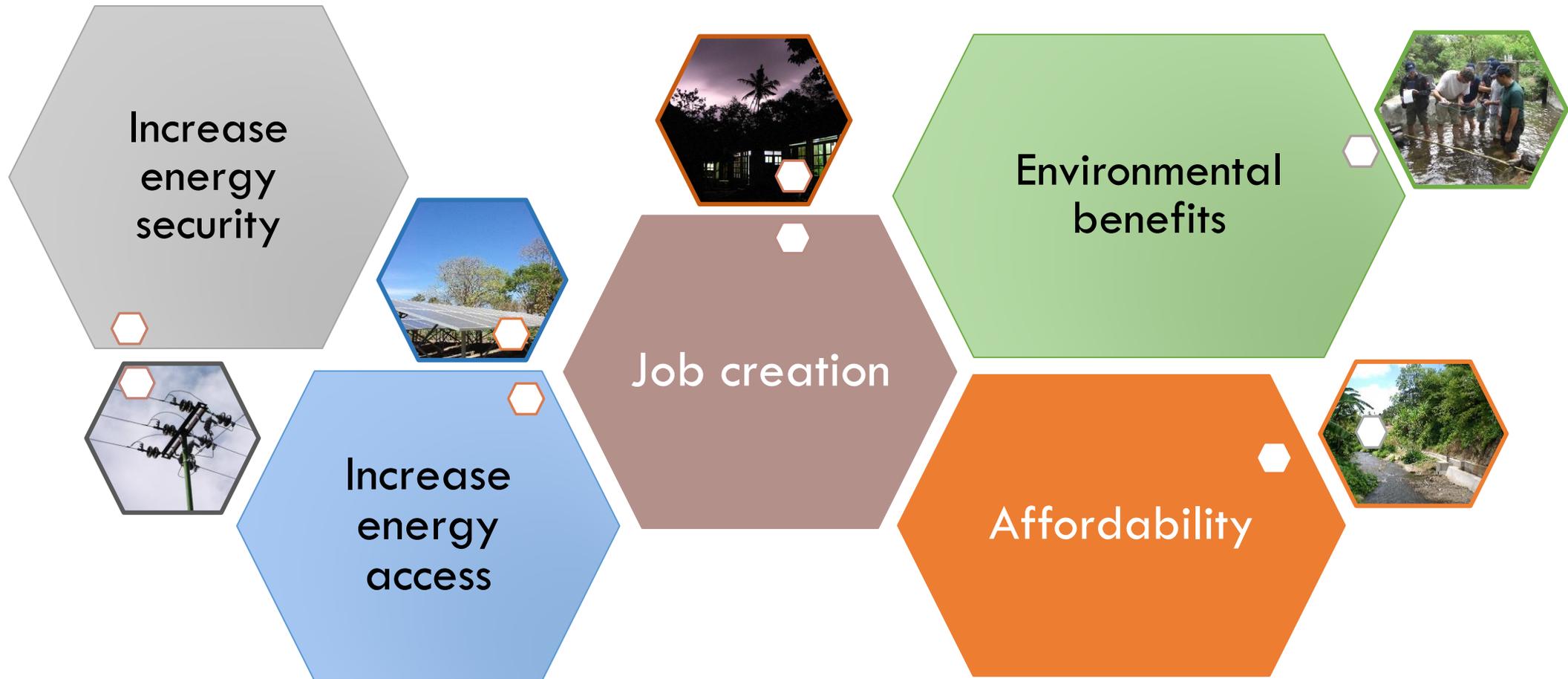
*Others : Biogas and waste

Sources : ACE Database, as of 2013

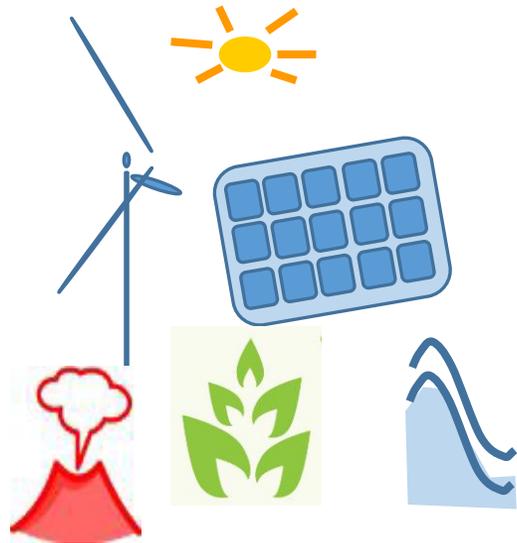
Hydropower Potential vs Installed Power Capacity



DRIVER FOR RENEWABLE ENERGY UTILIZATION



vRE CONNECTION TO GRID



Site Specific

Variable

Limited Predictability

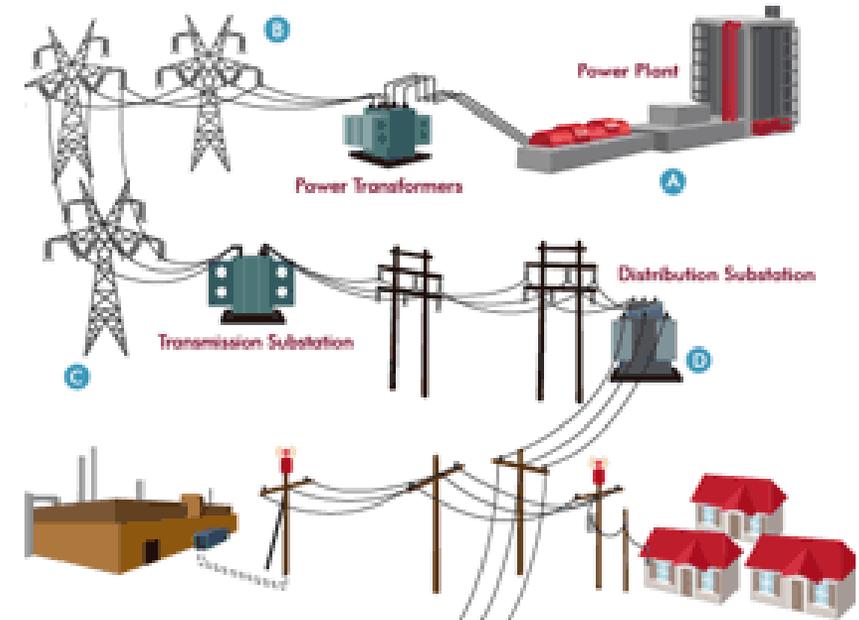
RE CHARACTER

Power Sector Investment

Policy and Regulation

Operational Strategies

REQUIREMENT



Source: peswiki.com, 2015

VRE CONNECTION TO GRID



Power sector investment

Grid reinforcement, Centralized Dispatching Control Centre (CDCC), Demand Side Management (DMS), etc



Operational Strategies

vRE forecasting, CDCC, DMS, etc



Policy and Regulation

Technical standards and certification, vRE Grid Codes, Authorities coordination, etc

STATUS OF CONNECTION CODES IN ASEAN

Country	Grid Code		Distribution Code		Interconnection	
	Conv.	For vRE	Conv.	For vRE	Conv.	For vRE
Brunei	✓					
Cambodia						
Indonesia	✓					
Lao PDR						
Malaysia	✓	As novel unit	✓		✓	
Myanmar						
Philippines	✓	✓	✓		✓	PV Rooftop
Singapore	✓		Covered by Grid Code			
Thailand	✓	Being Developed				PV Rooftop
Viet nam	✓	Being Developed				

THANK YOU

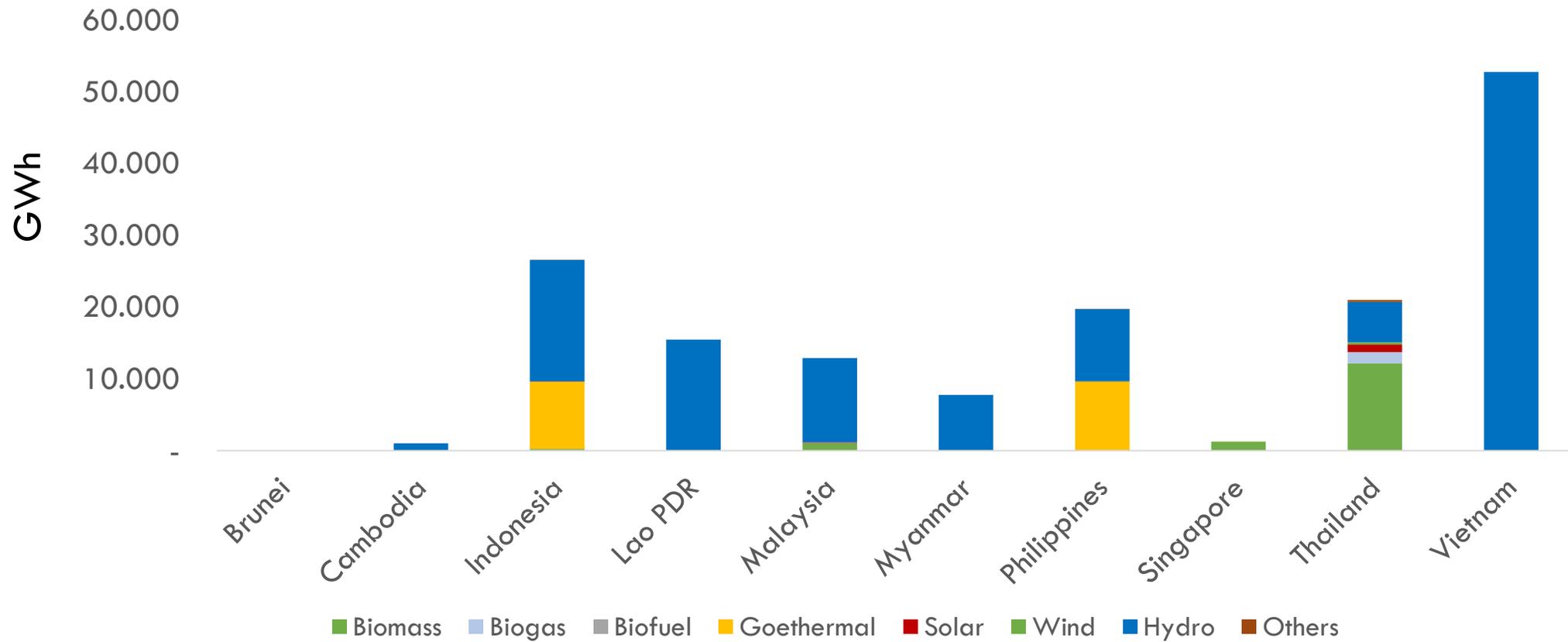


www.aseanenergy.org

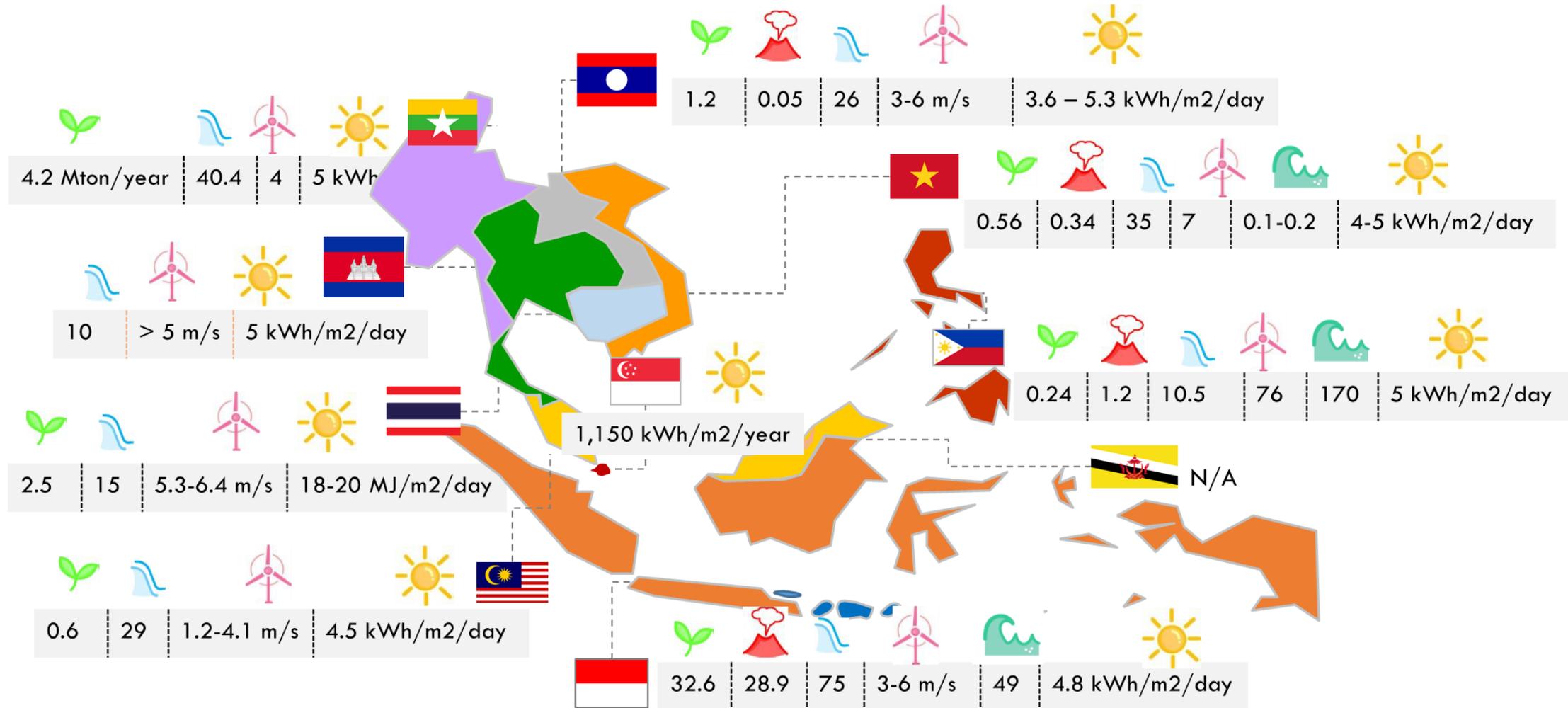
ASEAN Centre for Energy

ACE Building, 6th. Floor
Jl. H.R. Rasuna Said Block X-2, Kav. 07-08
Jakarta 12950, Indonesia
Website : www.aseanenergy.org

RE POWER GENERATION (2012)



RE POTENTIAL IN ASEAN (GWh)



ELECTRICITY EXPORT AND IMPORT (2013)

ASEAN MEMBER STATES	Brunei D	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Singapore	Thailand	Vietnam
Brunei D									
Cambodia									
Indonesia					O				
Lao PDR		O X						O X	O X
Malaysia									
Myanmar									
Singapore									
Thailand		X		O X	X	X			
Vietnam		X							

Notes :
 O : Import
 X : Export

ASEAN ECONOMIC COMMUNITY

