Workshop on Promoting Renewable Energy and Sustainable Development in Myanmar

Current Status of Renewable Energy and Policy Development

6-6-2018

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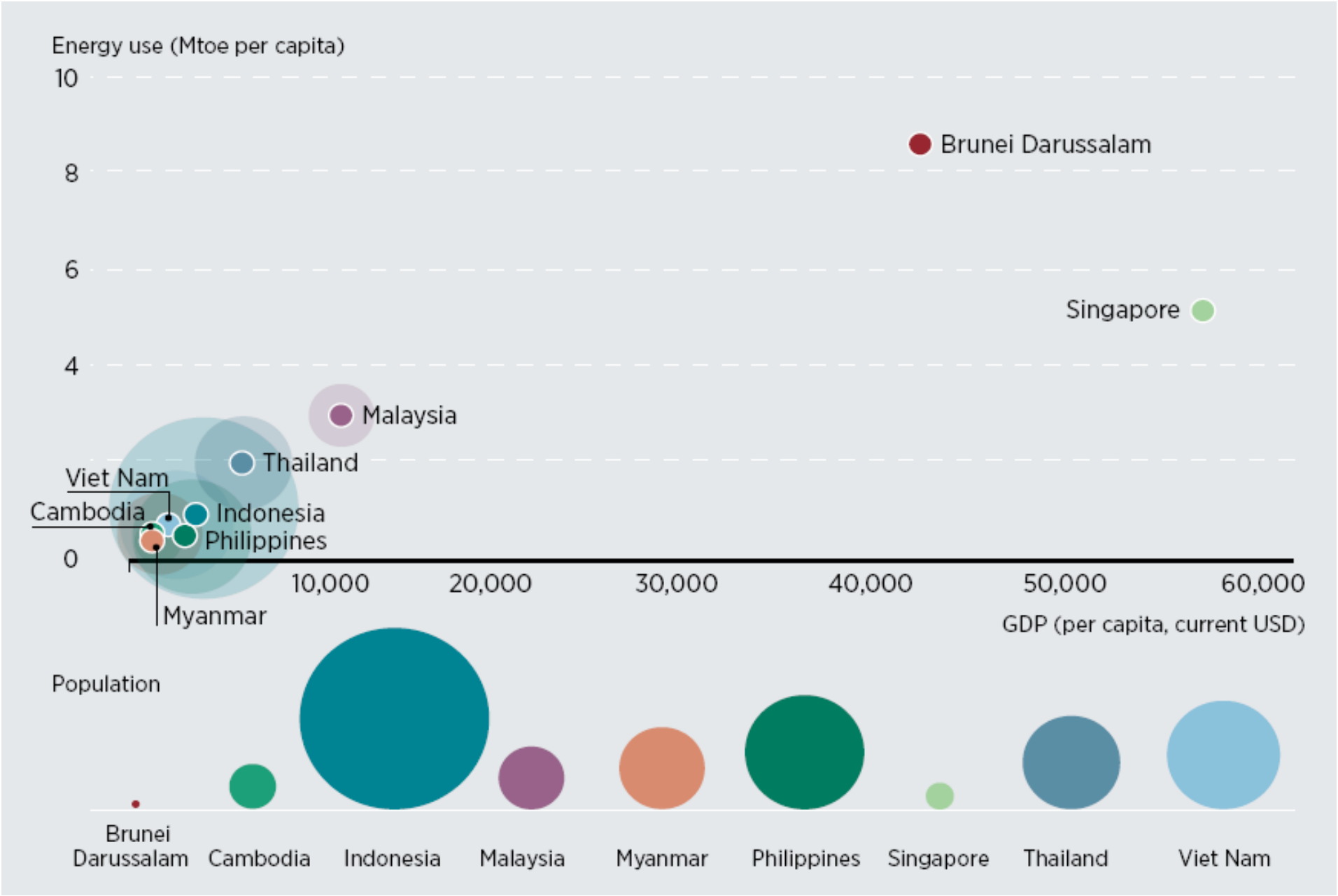
Outlines of Presentation

- Renewable Energy Development in ASEAN
- Renewable Energy Cost and Benefit
- Renewable Energy Investment in Myanmar
- Renewable Energy Policy development in Myanmar
- Conclusion

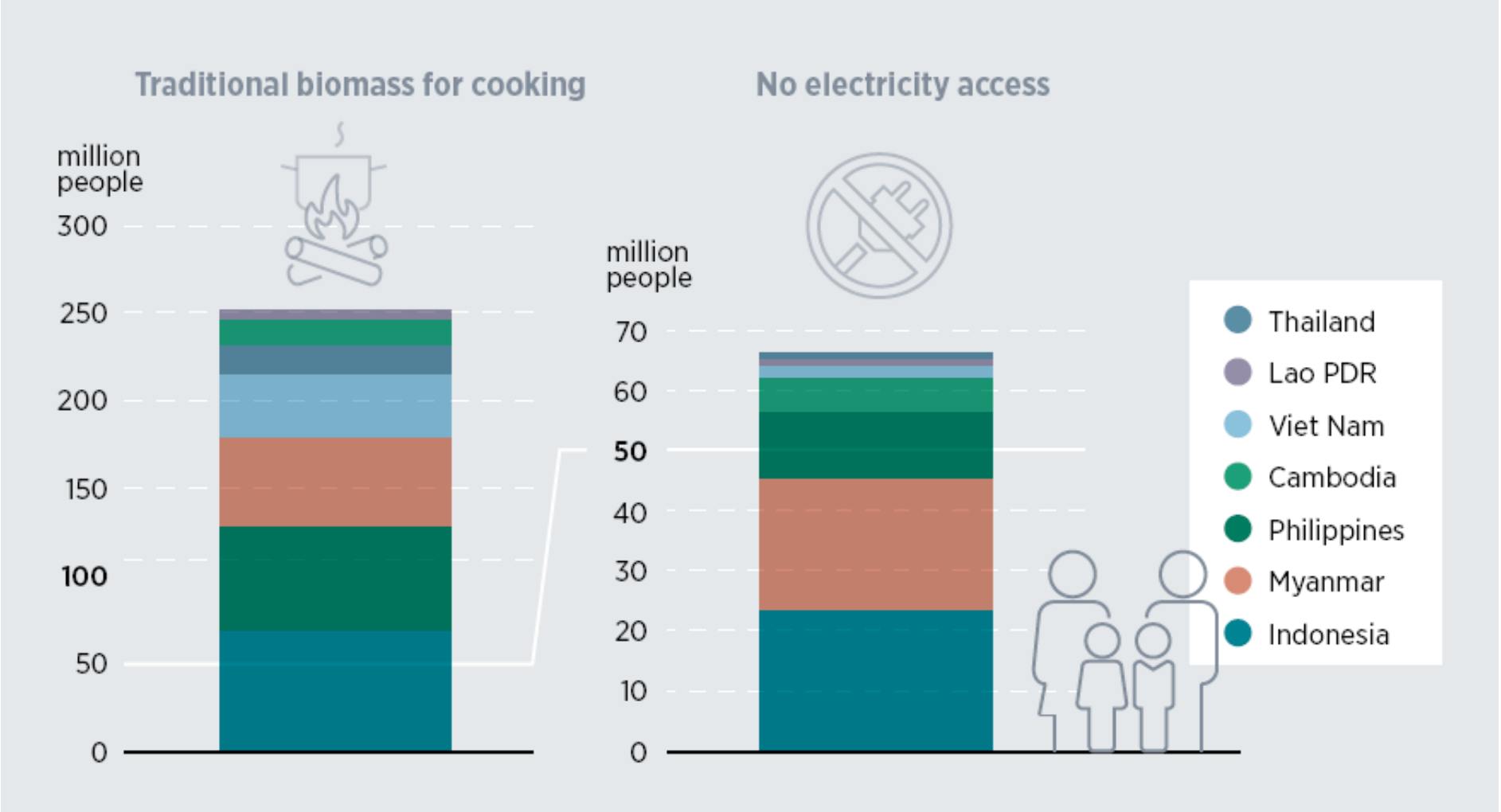
Per Capita Energy Use and GDP for South East Asia Country



Source: IRENA (2018), '*Renewable Energy Market Analysis: Southeast Asia*'. IRENA, Abu Dhabi.

Number of People using Traditional Biomass for Cooking and Without Access to Electricity in 2016

The reliance on the traditional use of biomass for heating/cooling is high, especially in Indonesia, Myanmar, the Philippines and Viet Nam.



Source: IRENA (2018), '*Renewable Energy Market Analysis: Southeast Asia*'. IRENA, Abu Dhabi.

The modern renewable energy share in TPES in ASEAN was 9.4% in 2014. Under the Reference Case it will increase to approximately 17% by 2025 – still below the aspirational target of 23%. An additional six percentage points is needed to close this gap (the REmap Options).

Table 4: Country contribution towards increasing ASEAN's renewable energy share to 23%

		Modern renewable energy share in TPES
2014		**9.4%**
Reference Case 2025		**16.9%**
	Indonesia	+1.7%
	Vietnam	+1.3%
	Malaysia	+1.0%
	Thailand	+1.0%
	Philippines	+0.4%
	Myanmar	+0.4%
	Lao PDR	+0.2%
	Singapore	+0.1%
	Cambodia	+0.1%
	Brunei Darussalam	+0.02%
REmap 2025		**23.2%**

Remap Myanmar Roadmap Table

Sector		2014	Ref case 2025	Remap 2025
Total Installed Power Generation Capacity	RE	3.2 GW	7.1 GW	8.7 GW
	Non RE	1.6 GW	9.7 GW	9.1 GW
Total electricity generation	RE	8.8 TWh	18.2 TWh	22.2 TWh
	Non RE	5.3 TWh	12.7 TWh	9.1 TWh
Building and Industry	Total direct use of energy	12.6 Mtoe	13.3 Mtoe	9.6 Mtoe
Transport	Total fuel consumption	1.7 Mtoe	2.8 Mtoe	2.7 Mtoe
RE share	Share of TPES	4%	7%	29%
Financial Indicators	RE Investment needs (2015 to 2025)	-	0.4 USD bin/yr	0.7 USD bin/yr
	CO2 emission from energy	16 Mt/yr	29 Mt/yr	23 Mt/yr

RENEWABLE ENERGY COSTS AND BENEFITS

- Recent declines in the cost of solar PV and wind have strengthened the economic case for the adoption of renewable energy.
- Solar PV experienced the most significant cost reduction from 2012 to 2016.
- Weighted average installed costs were USD 3915/kilowatt (kW) in 2012 and USD 2134/kW in 2016 – a 45% decline in four Years.

Figure 3.3 Investment costs of selected renewable energy technologies

RENEWABLE ENERGY COSTS AND BENEFITS

- The LCOE of hydro projects decreased slightly from USD 0.048/kWh to USD 0.046/kWh.
- rapid decreases in technology costs, the weighted average LCOE of solar PV fell sharply from USD 0.31/kWh in 2012 to USD 0.19/kWh in 2016, a 39% decline over the observed period
- Finally, the second-largest cost decline is observed in onshore wind, whose weighted average LCOE was USD 0.14/kWh in 2013 and USD 0.12/kWh in 2016, a 14% decline.

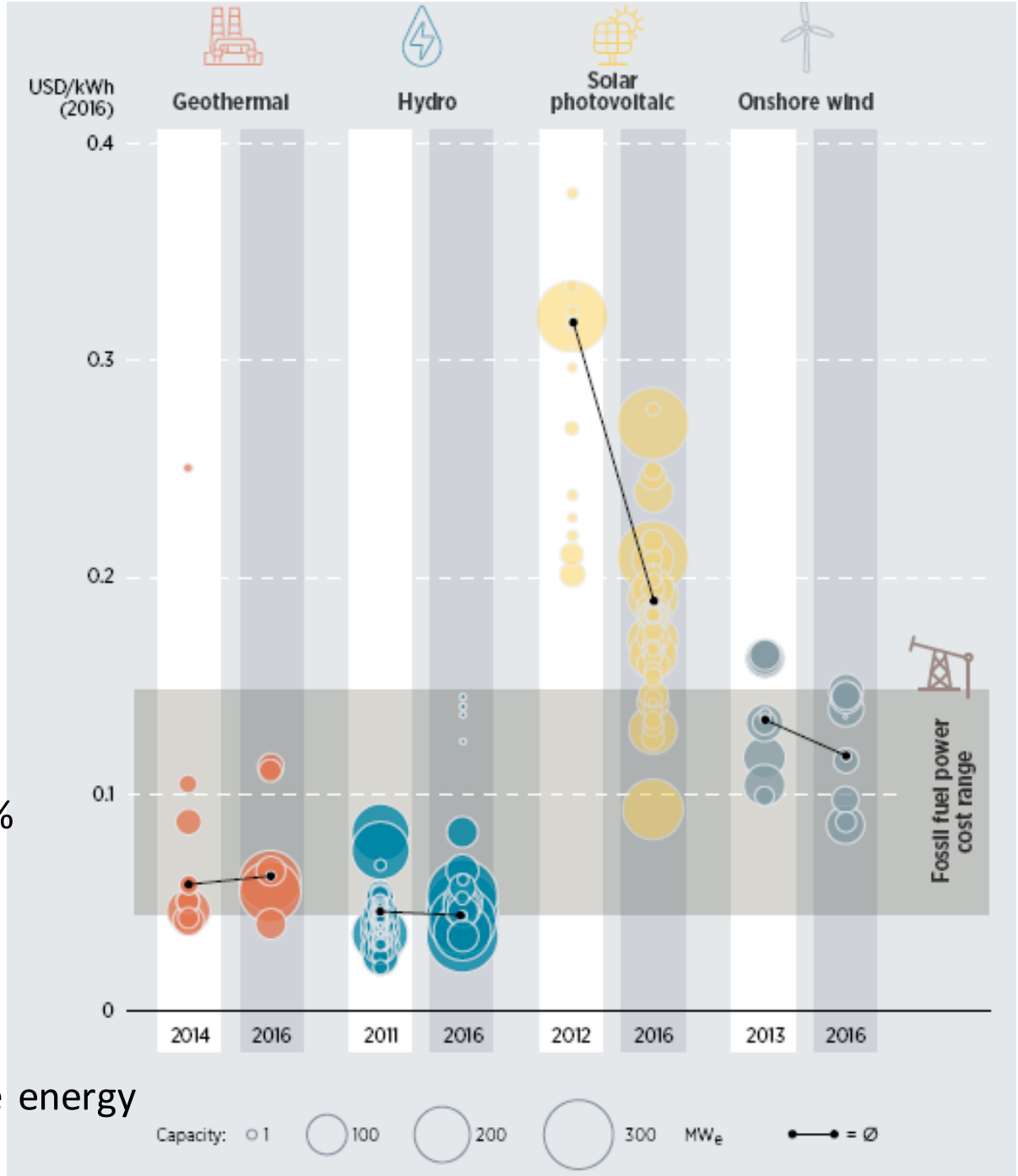


Figure 3.4 LCOE of selected renewable energy technologies

RENEWABLE ENERGY TARGETS AT THE REGIONAL LEVEL

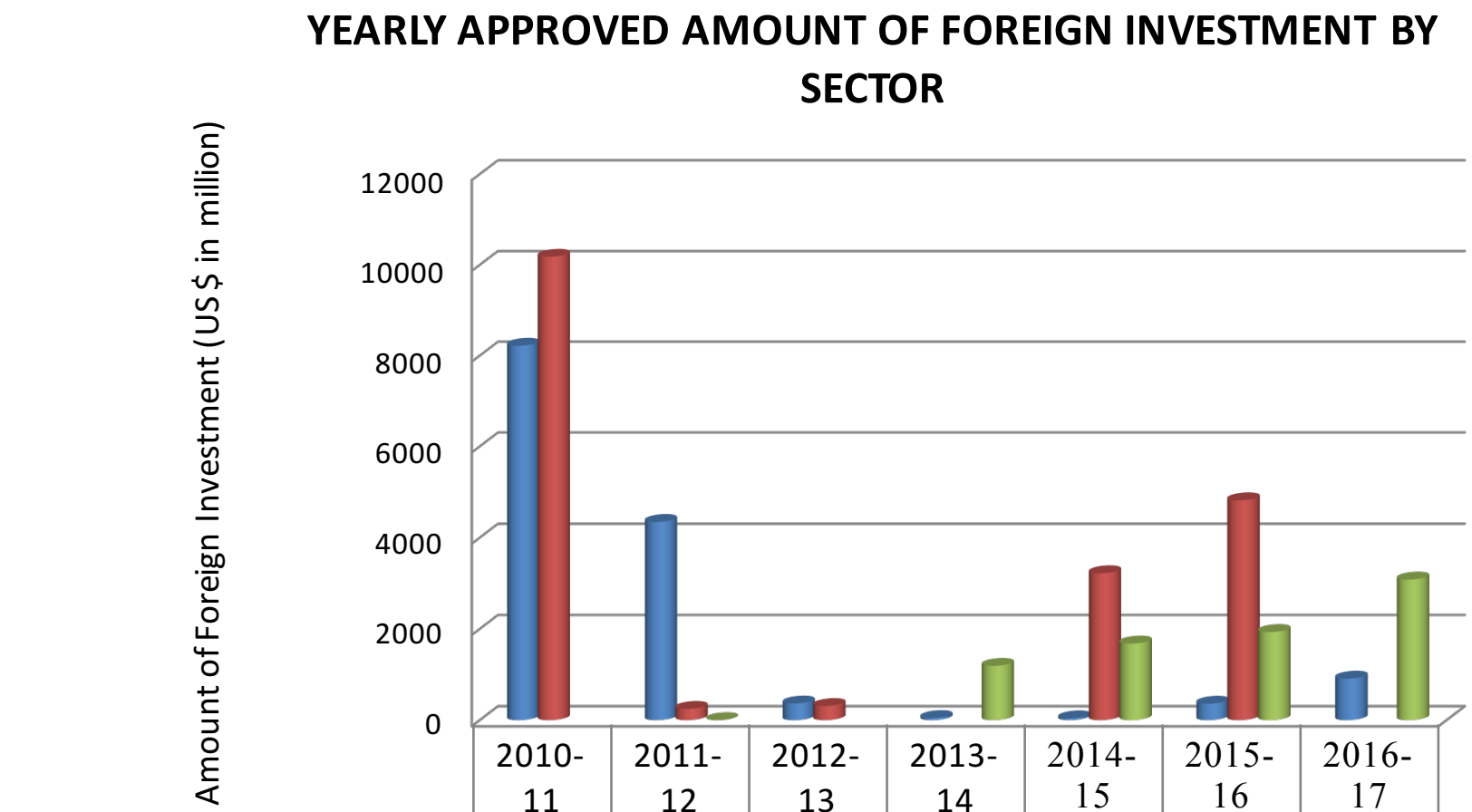
The United Nations Secretary-General has called for a doubling of the renewable energy share in the global energy mix between 2010 and 2030 as one of three objectives of the Sustainable Energy for All (SE4All) initiative (UN and World Bank, 2016).

An interest in environmental protection and climate change mitigation is a key driver, especially since, as part of the Paris Agreement, each ASEAN Member State submitted nationally determined contributions (NDCs) to mitigating the impacts of climate change.

TO IMPLEMENT OUR INDC

Myanmar has initiated a wide range of policies and programmes including The National Climate Change Policy & Strategy , National GE Policy Strategic Framework, National Waste Management Strategic Policy Framework, National Electrification Plan, National Energy Policy (2014), National Energy Efficiency Conservation Policy and National Renewable Energy Policy (Draft).

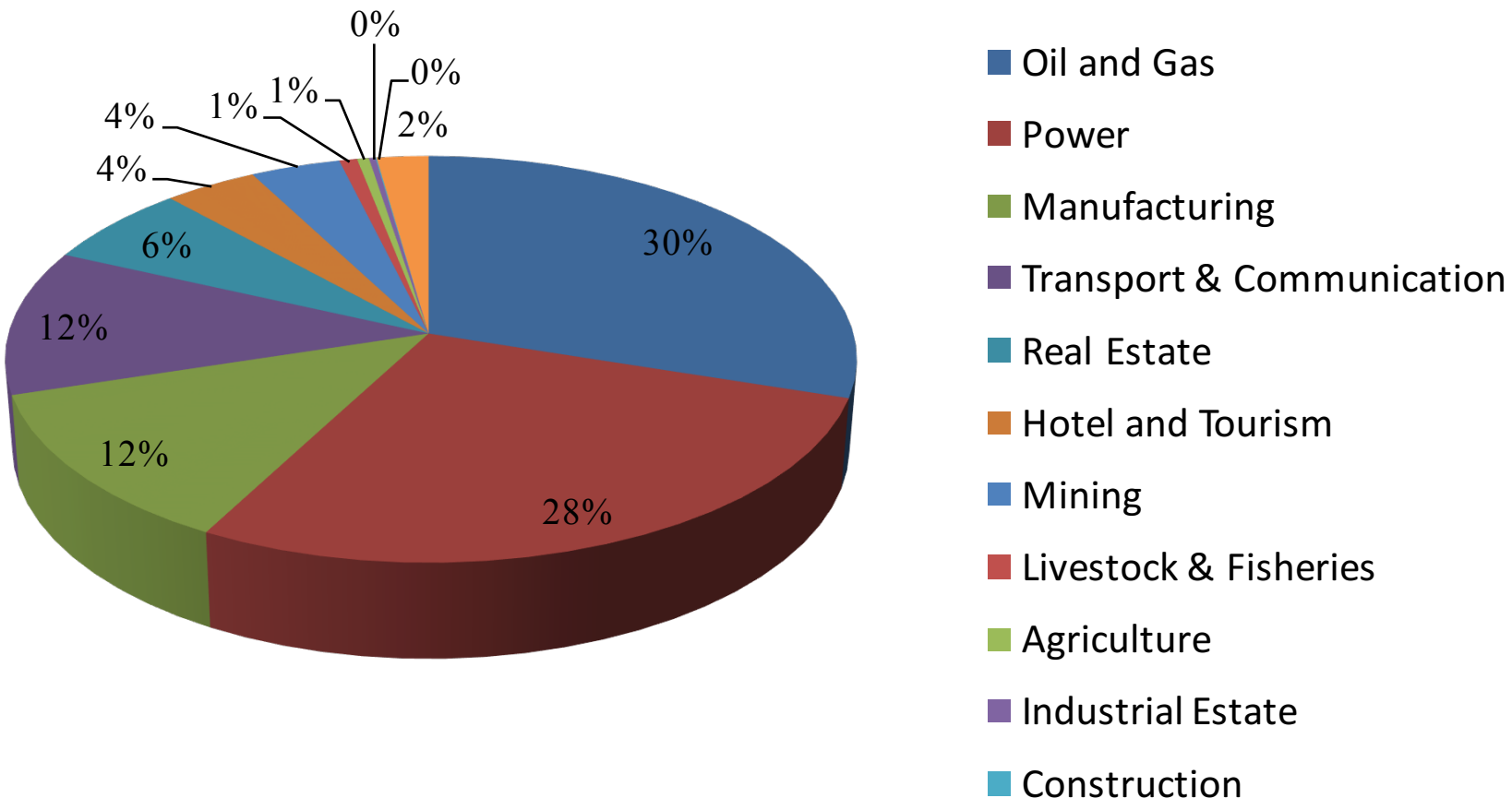
YEARLY APPROVED AMOUNT OF FOREIGN INVESTMENT



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Power	8218.52	4343.978	364.201	46.511	40.11	360.1	909.883
Oil and Gas	10179.29	7247.697	309.2		3220.306	4817.79	
Transport & Communication		0.634		1190.232	1679.304	1930.996	3081.149

Source: Directorate of Investment and Company Administration - http://www.dica.gov.mm/en/topic/foreign-investment-sector

FOREIGN INVESTMENT OF PERMITTED ENTERPRISES AS OF (31/10/2017)



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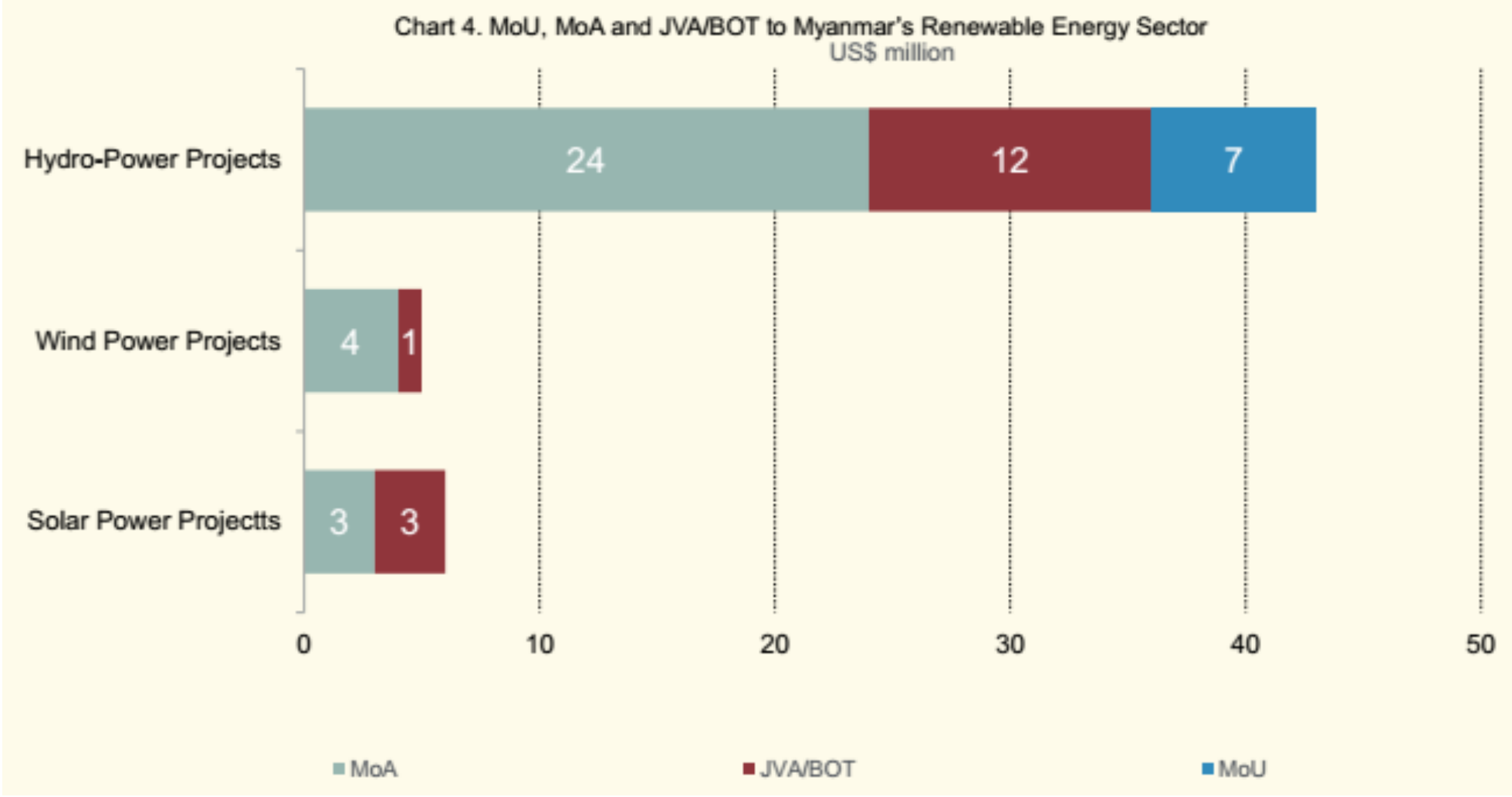
MoU, MoA & JVA/BOT in Myanmar's Renewable Energy Sector



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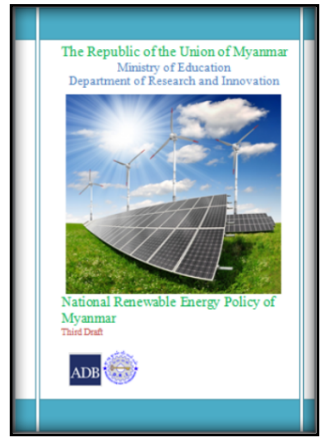
Vision and Target and Policy of Renewable Energy

National Energy Policy

The Policy had been accomplished with the help of ADB and already promulgated by NEMC's Order No.(1/2015) dated; 6th January 2015. (7-energy related ministries are cooperating under the National Energy Management Committee, patronage by Vice President)



Country	Vision	RE Target
Myanmar	to promote the development of renewable energies to ensure energy security, sustain socio-economic development, and enhance environmental and social sustainability.	to achieve the 27% share of renewable energy in the total installed capacity of primary energy by 2030

Country	Renewable Energy Policy
Myanmar	5. To implement programs on a wider scale, utilizing renewable energy resources such as wind, solar, hydro, geothermal and bio-energy for the sustainable energy development in Myanmar

Objectives of Renewable Energy Policy

Country	Objectives for RE policy
Myanmar	i. To implement on a priority basis the Renewable Energy program in accordance with ASEAN targets ii. To implement responsible investment with minimum impact on natural environment and social environment in the energy development program iii. To promote capacity building program necessary for the energy sector development iv. To promote utilization of renewable energy v. To implement strategic reserve program in order to support the state energy security and economic stability vi. To promote increased utilization of renewable energy to meet the energy requirement of industrial and commercial activity vii. To encourage research program and awareness campaign program on the importance of renewable energy sources

Policy Scope of Renewable Energy

Country	Policy Scope
Myanmar	According to Policy draft, The focus is on the development of the following: ✓ Domestic Energy ✓ Thermal Energy ✓ Grid Connected Renewable Energy ✓ Off-Grid Renewable Energy ✓ Energy Research

Renewable Energy Resources in Myanmar

Resources	Potential
Hydro Power	108 GW 232.5MW for Small Scale Hydro Power
Solar Energy	Myanmar has good solar resource potential with 60% of the land area which is suitable to PV. GHI levels of between 1,600 and 2,000 kWh/m2/yr, DNI levels of approximately 1,400 kWh/m2/yr (ADB) 51973.8 TWH per year (NEDO)
Wind Energy	The theoretical installed wind capacity is about 33 GW and the theoretical generation potential could be in the order of 80 TWh/yr. (ADB report) 365 TWh as the technical potential per year (NEDO) Promising areas to harness wind energy are in 4 regions (Coastal regions in the south and western part).
Biomass Energy	Rice husk 4.4 M ton/year, Lumber waste 1.5 M ton/year, Bagasse 2.1 M ton/year and Livestock Waste 34.4 M ton/year
Geothermal	93 Locations

Institutional Framework for Renewable Energy

Ministries	Responsibility
MoEE	the overall focal point for energy policy, coordination and international cooperation and also the oil and gas sector for developing, operating, and maintaining all large hydropower and coal-fired thermal plants; for developing and maintaining the transmission and distribution systems throughout the country, and for operating gas-fired thermal plants and mini hydropower plants
MoAI	Take the lead in the development of biofuels, micro-hydropower (with installed capacity of up to 10 MW), bioenergy from agricultural residues, for off-grid electrification (Solar Home system, mini-gird system, etc)
MoE	for the research and development of RE technologies and promotion of renewable energy. And also conduct formulation of RE policy and Training course on RE
MoNREC	Conduct the formulating National Environmental Policy and Strategic Framework & Master Plan. Regulates the use of biomass from forest resources for energy purposes and climate change issues
MoI	Implementation of Energy Efficiency and Conservation policy and development plan

Conclusion

- To consider revising the National Renewable Energy Policy draft to play vital important role of Energy development sector.
- Facing challenge of significantly scaling up renewable energy investment and deployment
- No energy regulator currently exists and the government has little experience with private energy sector investment or contracting of independent power producers (IPPs).
- A comprehensive policy frameworks, fiscal incentives, strong targets and robust institutions are necessary to attract private investment and to overcome some of the most prevalent barriers to RE deployment.
- To provide the public awareness, human resource development, capacity building
- To promote Research and Development

Thank You for your attention