The need for RE and new energy technologies for small scale-grids in South East Asia

Singapore International Energy Week 2017
27 October 2017

Presented by:
Beni Suryadi, Acting Manager of Policy, Research, and Analysis
ASEAN Center for Energy

One Community for Sustainable Energy

One Community
for Sustainable
Energy

Disclaimer

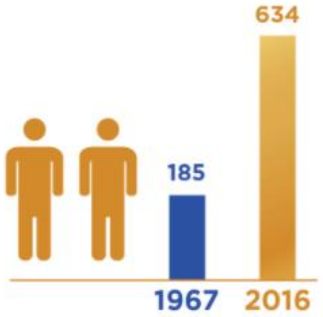
The views, opinions, and information expressed in this presentation were compiled from sources believed to be reliable for information and sharing purposes only, and are solely those of the presenter; do not necessarily reflect the views and opinions of the ASEAN Centre for Energy (ACE) and/or the ASEAN Member States. Any use of this presentation's content should be by ACE's permission.

ASEAN – Community of Opportunities

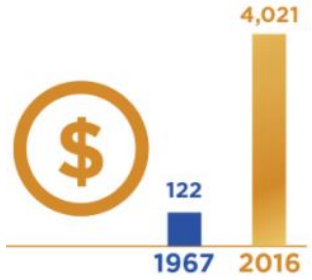
50 years Journey of ASEAN

One Community for Sustainable Energy

Population
(in million)



GDP per capita
(in US$)

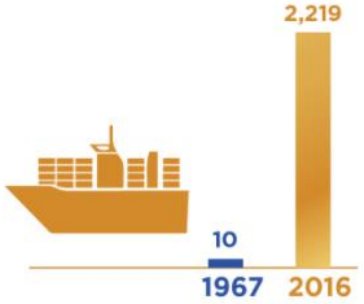


ASEAN population was 8.5% of the world population in 2016

In 2016, attracted US$ 96 billion FDI

Poverty has decline from, 47% in 1990 to 14% in 2015,

Trade
(in US$ billion)



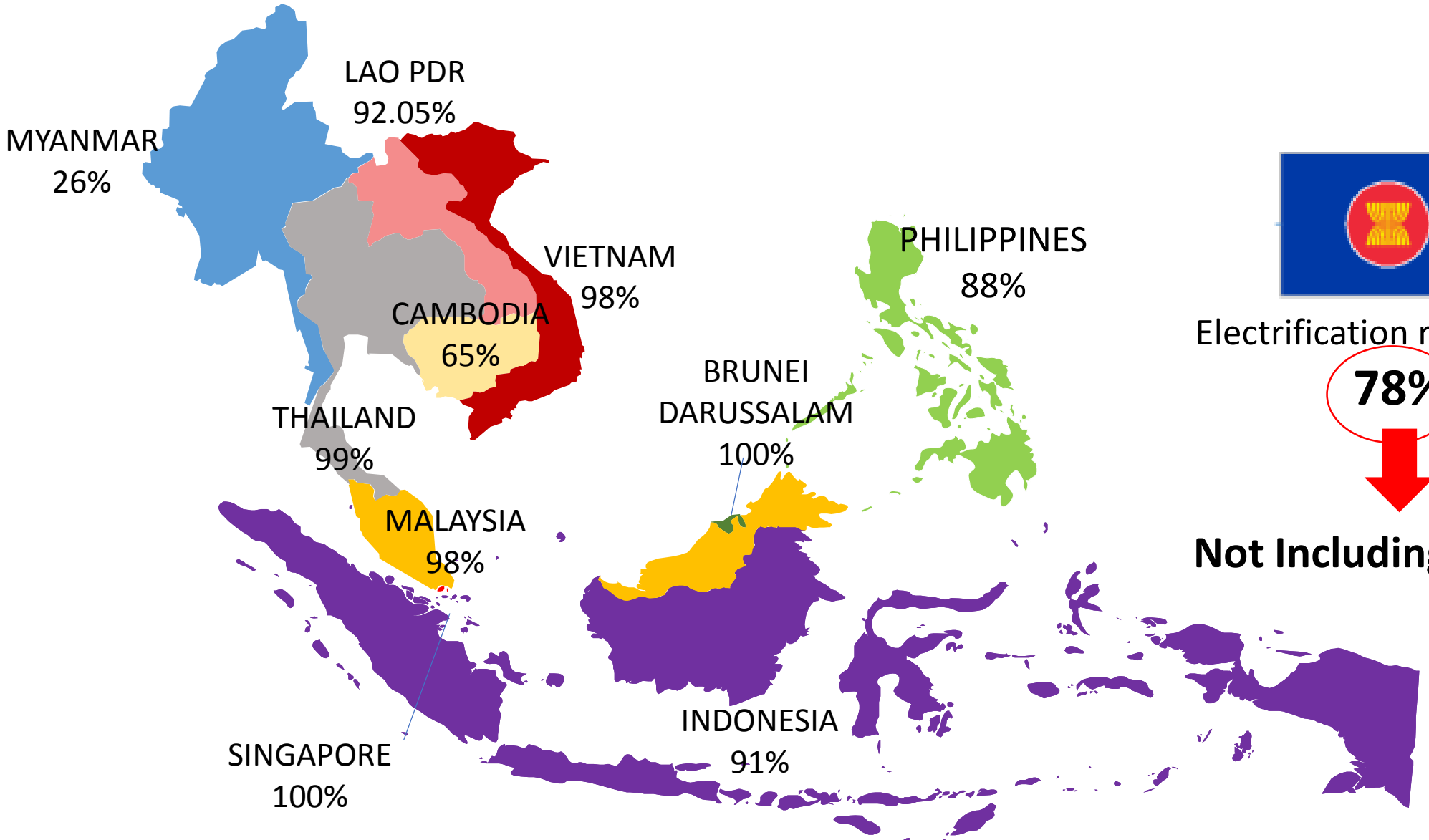
Trade service quadrupled between 1999 and 2016 to reach US$681 billion

Electricity Consumption
1,287 kWh/cap

the 6th largest in the world & the 3rd largest in Asia.

ASEAN Electrification Ratio by 2015

One Community for Sustainable Energy



Electrification ratio ASEAN

78%

Not Including Off-grid

ASEAN Off-grid Demand

One Community for Sustainable Energy

107 million people live without electricity

- Huge part of it lives in **remote area**

ASEAN covers **wide area & islands**

- **13,000** inhabited island
- **Indonesia** & **Philippine** owns big islanded communities

Off-grid generation is still dominated by **diesel-based** plant

Data source: ASEAN Secretariat Data base 2016

ASEAN Off-grid Electrification Status

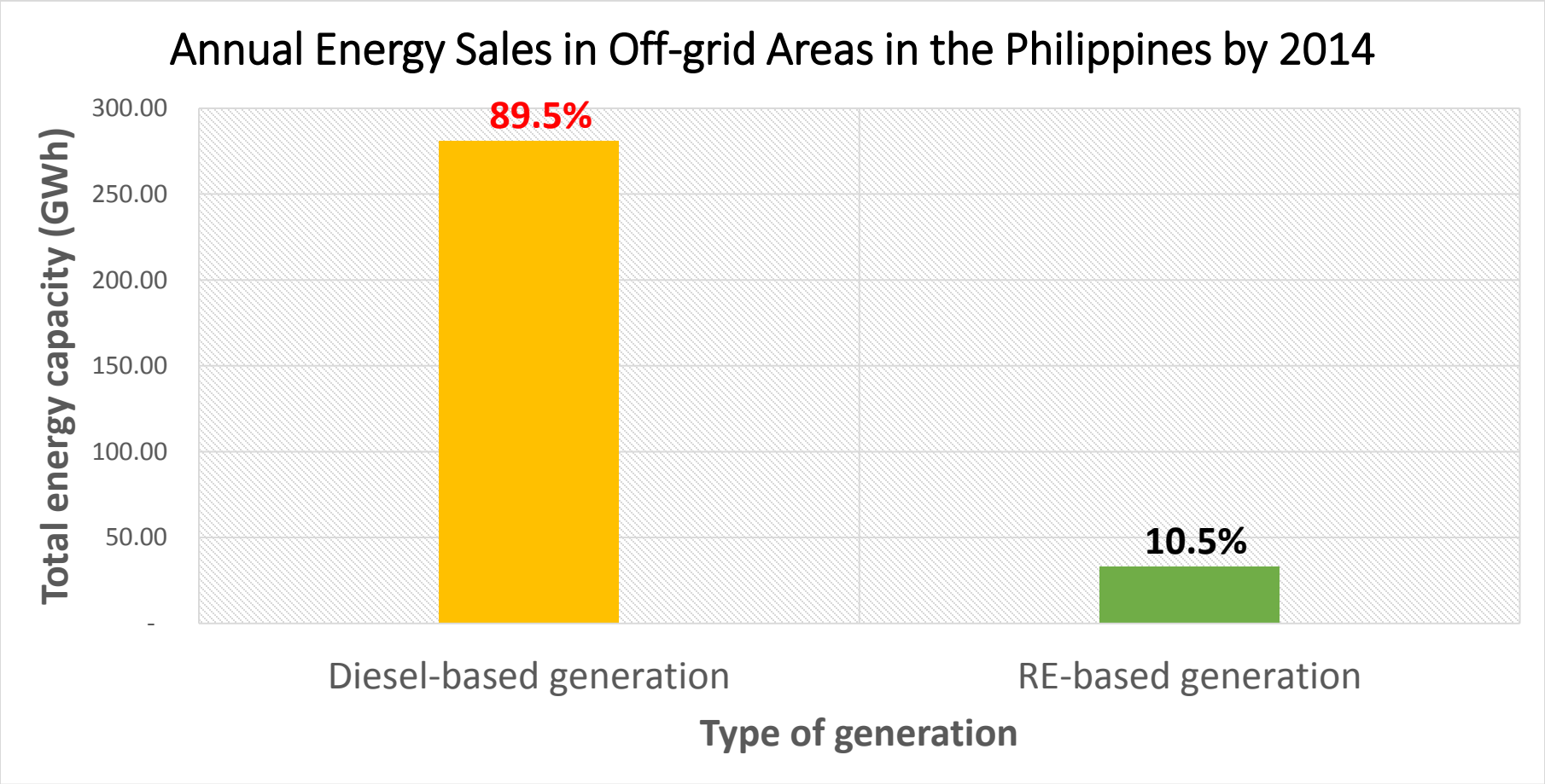
One Community for Sustainable Energy

Capacity of decentralized diesel-generator in Indonesia

Data source: GIZ, 2014

ASEAN Off-grid Electrification Status

One Community for Sustainable Energy



Data source: NPC-SPUG 2017

Off-grid Electricity Supply Status : The case of Philippines

One Community for Sustainable Energy

True cost of Diesel generation by NPC-SPUG vs Effective Selling rate in 2012

NPC SPUG Area	Municipality	True Cost of Diesel (pesos per kWh)	Effective Selling Rate (pesos per kWh)	Difference
ROMBLON	Alad	28.03	6.59	21.44
CATANDUANES	Palumbanes	21.56	6.59	14.97
MINDORO	Cabra	19.8	5.75	14.05
LEYTE	Caluya	18.89	6.84	12.05
TAWI-TAWI	Manuk Mankaw	17.6	6.27	11.33
KALINGA	Lubuagan	16.52	5.76	10.76
DAVAO DEL NORTE	Talicud	16.87	6.27	10.6
SIQUIJOR	Siquijor	15.49	6.07	9.42
CEBU	Camotes	15.35	6.07	9.28
PALAWAN	El Nido	14.93	6.59	8.34
BATANES	Basco	14.04	6.59	7.45
QUEZON	Polilio	13.92	6.59	7.33
BASILAN	Basilan	13.7	6.58	7.12

Source: GIZ, SPUG-NPC (2012)

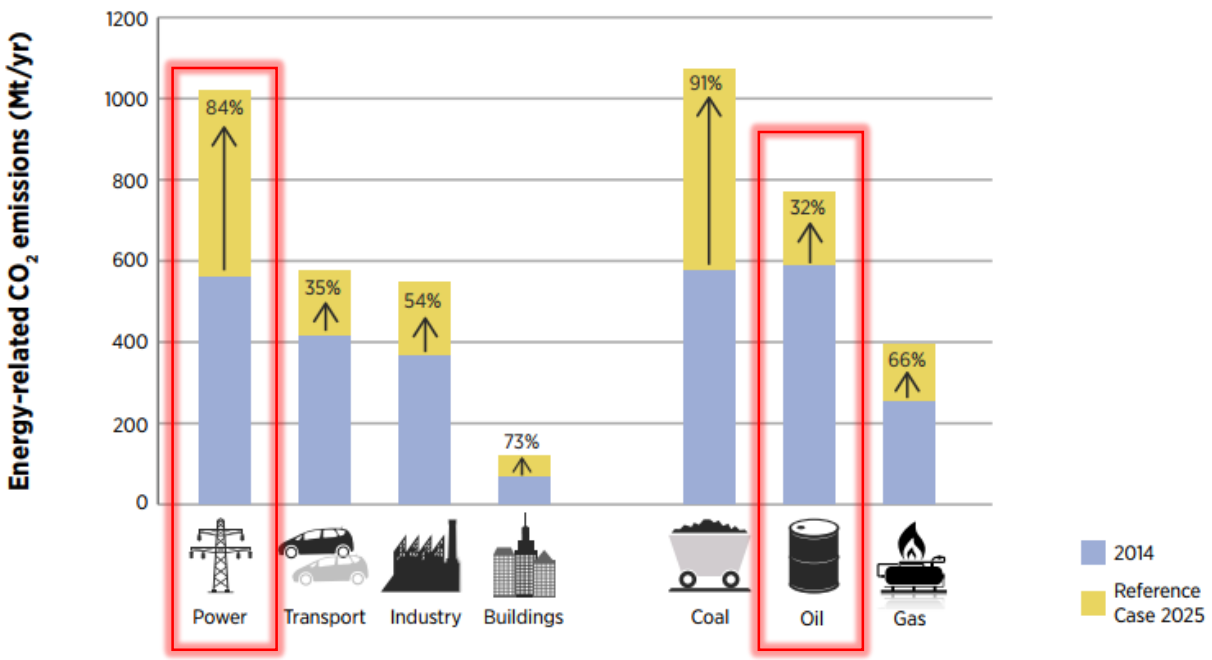
- Diesel generation has **volatile fuel cost** and **high transportation cost**
- Causing **curtailment of service hours** (4-12 hours supply only)
- In some remote area, fuel can exceed **USD 1.2 per liter**, **1.5x** than Philippines average
- **10.32 billion** PHP is estimated to cover projected fuel and transportation cost in 2017 to meet off-grid demand
- **Huge subsidies** disbursed for covering fuel and transport cost

Source: Electricity Sector Opportunity in the Philippines – IEEFA,2017

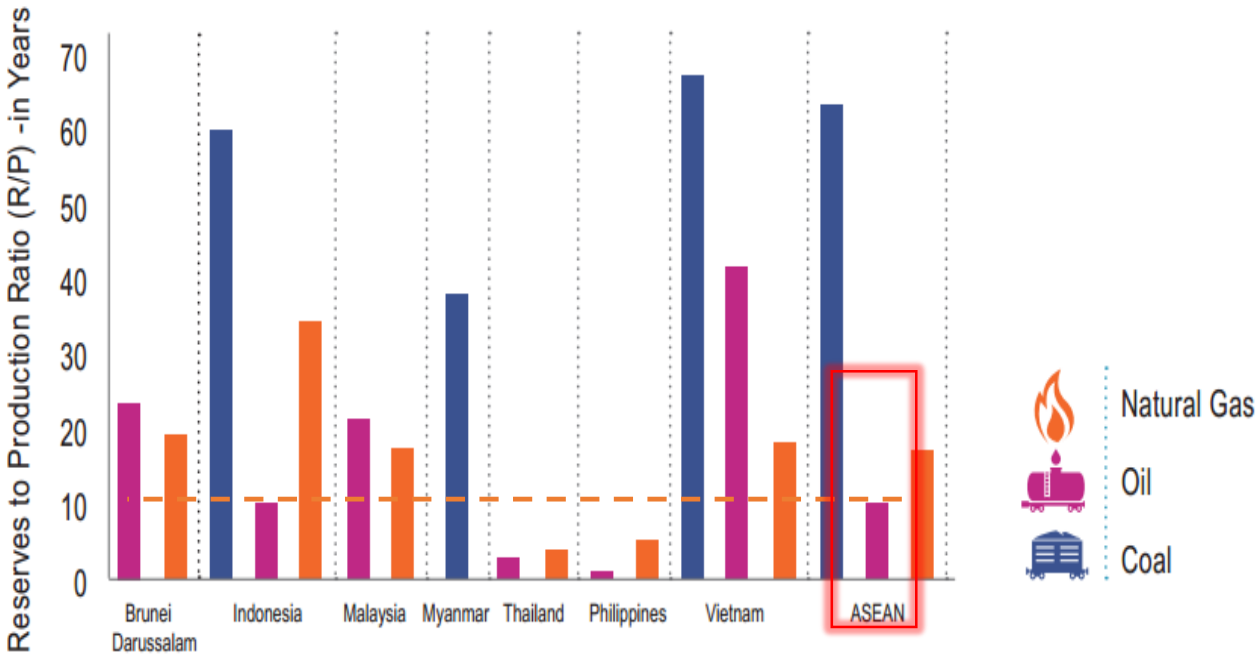
Off-grid Generation Issues using fossil-fuel based generation

One Community for Sustainable Energy

ASEAN's Energy-related CO2 Emission by fuel & sector



Reserve to Production ratio of ASEAN's Fossil fuels



Source: ACEAN REmap, the 5th ASEAN Energy Outlook

Off-grid Generation Issues using fossil-fuel based generation

One Community for Sustainable Energy

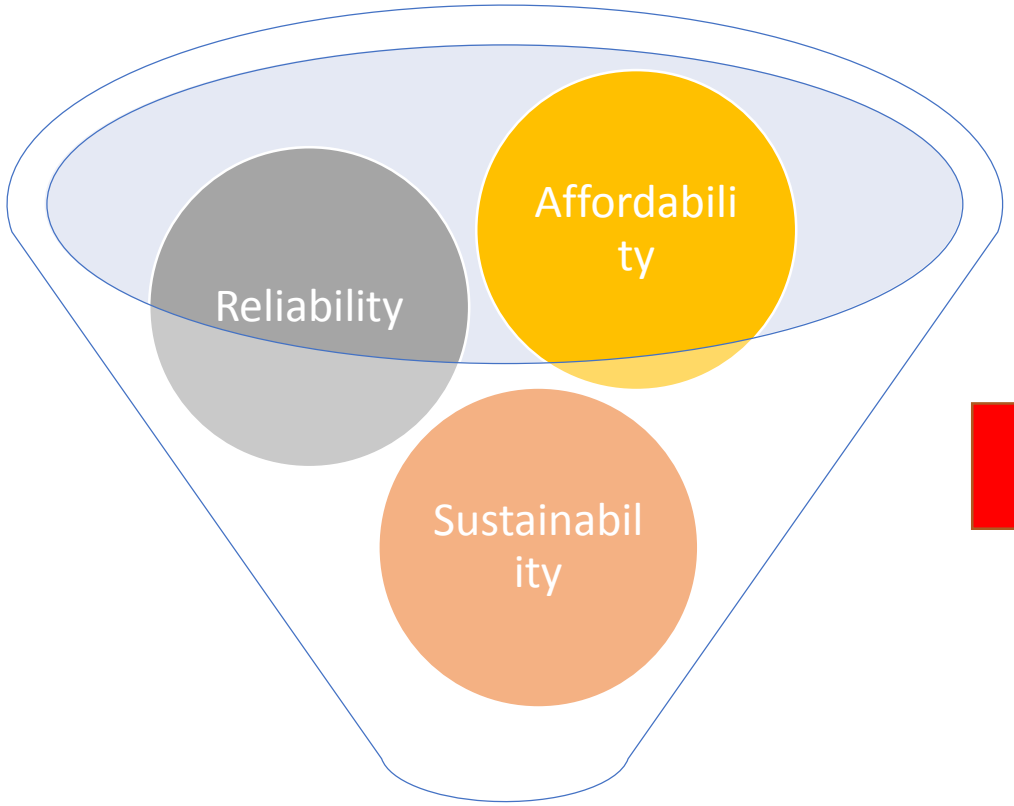
Classification of Mini-grid per hours of Generation in Philippines

Service Hours of Mini Grids	Mini Grid Areas (Numbers)
6-8 hours	149
10-15 hours	36
16-20 hours	11
24 hours	25
Total	221

Source: NPC-SPUC,2011

Issues for Off-grid Generation

One Community for Sustainable Energy



Apply in On-grid generation, but Off-grid?

Not addressed in

Common diesel-plant generation in off-grid areas

Converted to

RE & new technologies

RE & New Technologies for Off-grid Generation

One Community for Sustainable Energy

Levelized Cost of Energy Generation Technology

		Levelized Cost of Energy	Carbon Neutral/Rec Potential	State of Technology	Location			Dispatch			
					Distributed	Centralized	Geography	Intermittent	Peaking	Load-Following	Base- load
Alternative Energy	Solar PV	$46 - 222	✔	Commercial	✔	✔	Universal	✔	✔		
	Solar Thermal	$199 - 182	✔	Commercial		✔	Varies	✔	✔	✔	
	Fuel Cell	$106 - 167	?	Emerging/ Commercial	✔		Universal				✔
	Micro turbine	$76 - 89	?	Emerging/ Commercial	✔		Universal				✔
	Geothermal	$79 - 117	✔	Mature		✔	Varies				✔
	Biomass Direct	$77 - 110	✔	Mature		✔	Universal			✔	✔
	Onshore Wind	$32 - 62	✔	Mature		✔	Varies	✔			
Conventional Energy	Diesel Reciprocating Engine	$212 - 281	✗	Mature	✔		Universal	✔	✔	✔	✔
	Natural Gas Reciprocating Engine	$68 - 101	✗	Mature	✔		Universal	✔	✔	✔	✔
	Gas Peaking	$165 - 217	✗	Mature	✔	✔	Universal		✔	✔	
	IGCC	$94 - 210	✗	Emerging		✔	Co-located or rural				✔
	Nuclear	$97 - 136	✔	Mature/ Emerging		✔	Co-located or rural				✔
	Coal	$60 - 143		Mature		✔	Co-located or rural				✔
	Gas Combined Cycle	$48 - 78	✗	Mature	✔	✔	Universal			✔	✔

No fuel & transport cost

+

•Abundant indigenous resource

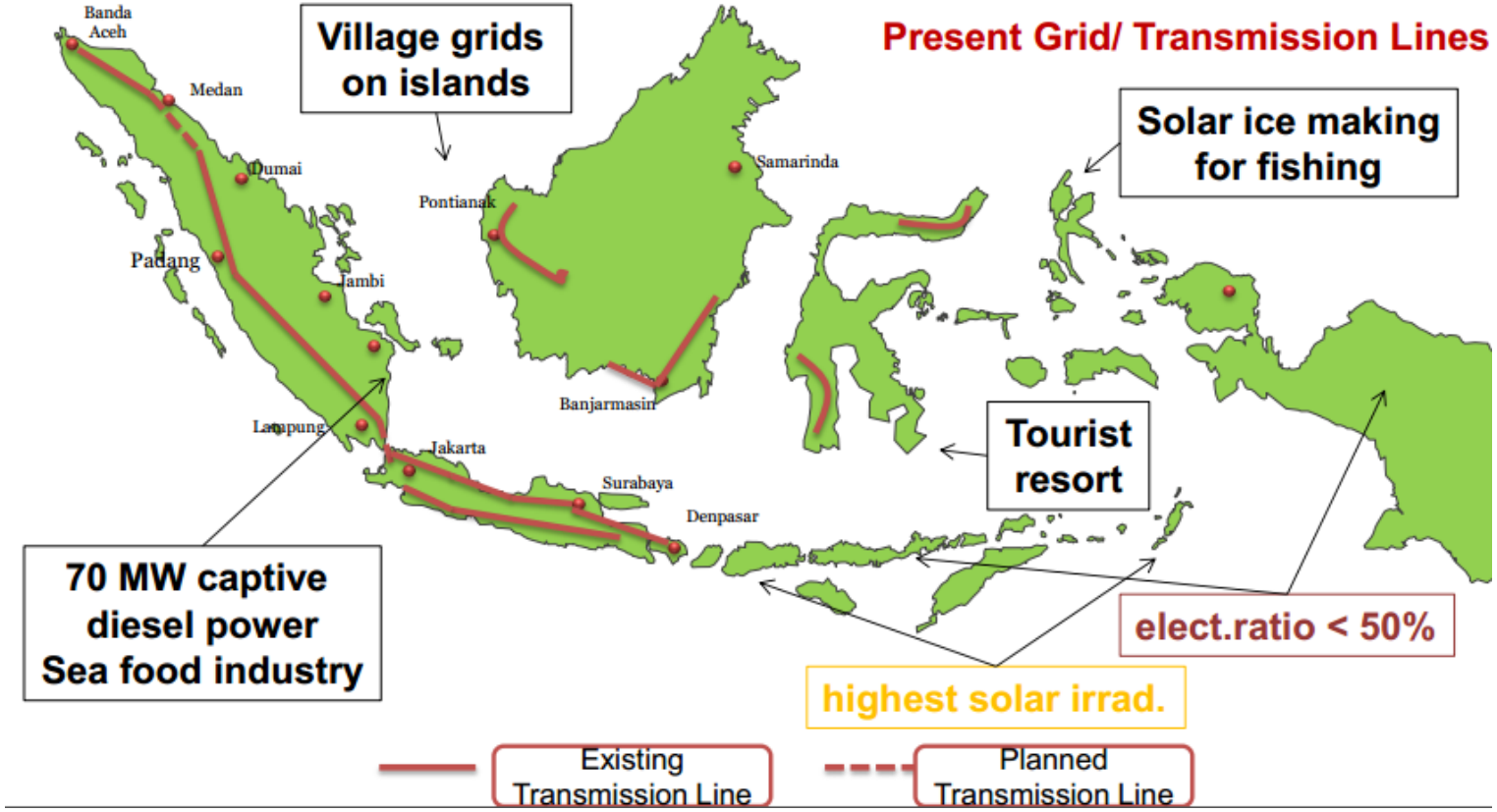
Cheaper cost over the lifetime

Source: Electricity Sector Opportunity in the Philippines – IEEFA,2017

RE & New Technologies for Off-grid Generation

One Community for Sustainable Energy

- **Huge RE & New technology potential in Off-grid areas**

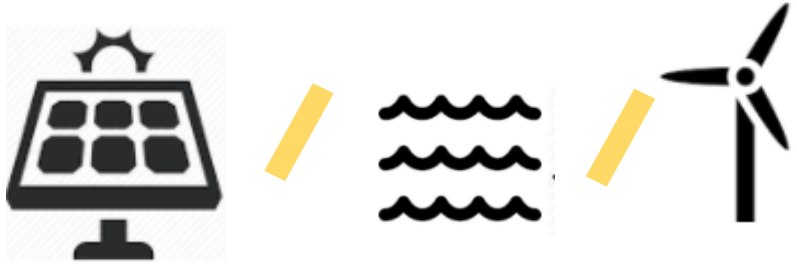


Source: GIZ Indonesia, 2013

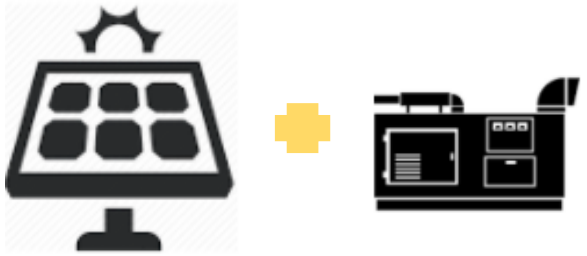
RE & New Technologies for Off-grid Generation

One Community for Sustainable Energy

- **High Flexibility and Expandability**



RE Off-grid system



RE-Hybrid Off-grid system

Mini-grid system

More Sustainable & Reliable

Opportunities and Challenges

One Community for Sustainable Energy

Opportunities

- Abundant RE and new technology resource to be utilized
- Huge off-grid market potential to be untapped
- Commitment to increase RE share in the region

Challenges

- High investment cost for RE & new technologies
- Capability in developing RE & new technologies
- Lack of financing support for RE & new technologies in off-grid electrification
- No stringent target & rule for RE in off-grid electrification

Conclusion

One Community for Sustainable Energy

- There are huge opportunities of utilizing RE & new technologies for fulfilling off-grid demand in islanded communities in ASEAN
- RE & new technologies can be more affordable, reliable, and sustainable solution than fuel-based generation to provide electricity in off-grid areas
- ASEAN should support RE & new technologies for off-grid electrification by establishing target, supporting policies and financing scheme.
- By using RE & new technologies for off-grid electrification it can fulfill off-grid demand while help achieving regional RE target of 23% energy mix in 2025

Thank you.

For more information, please visit our website: www.aseanenergy.org or email us at secretariat@aseanenergy.org

One Community
for Sustainable
Energy