The need for RE and new energy technologies for small scale-grids in ASEAN

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One Community for Sustainable Energy

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ASEAN – Community of Opportunities

50 years Journey of ASEAN

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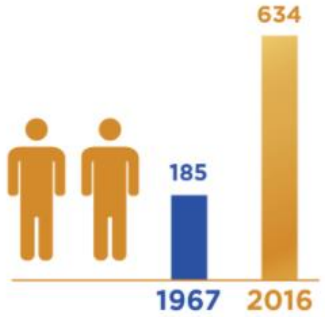
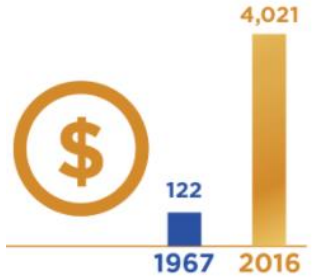
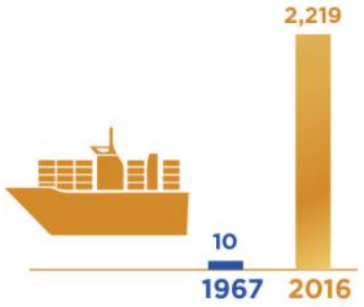
Population (in million)



GDP per capita (in US$)



Trade (in US$ billion)



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

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,

Electricity Consumption **1,287** kWh/cap

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

ASEAN Electrification Ratio by 2015

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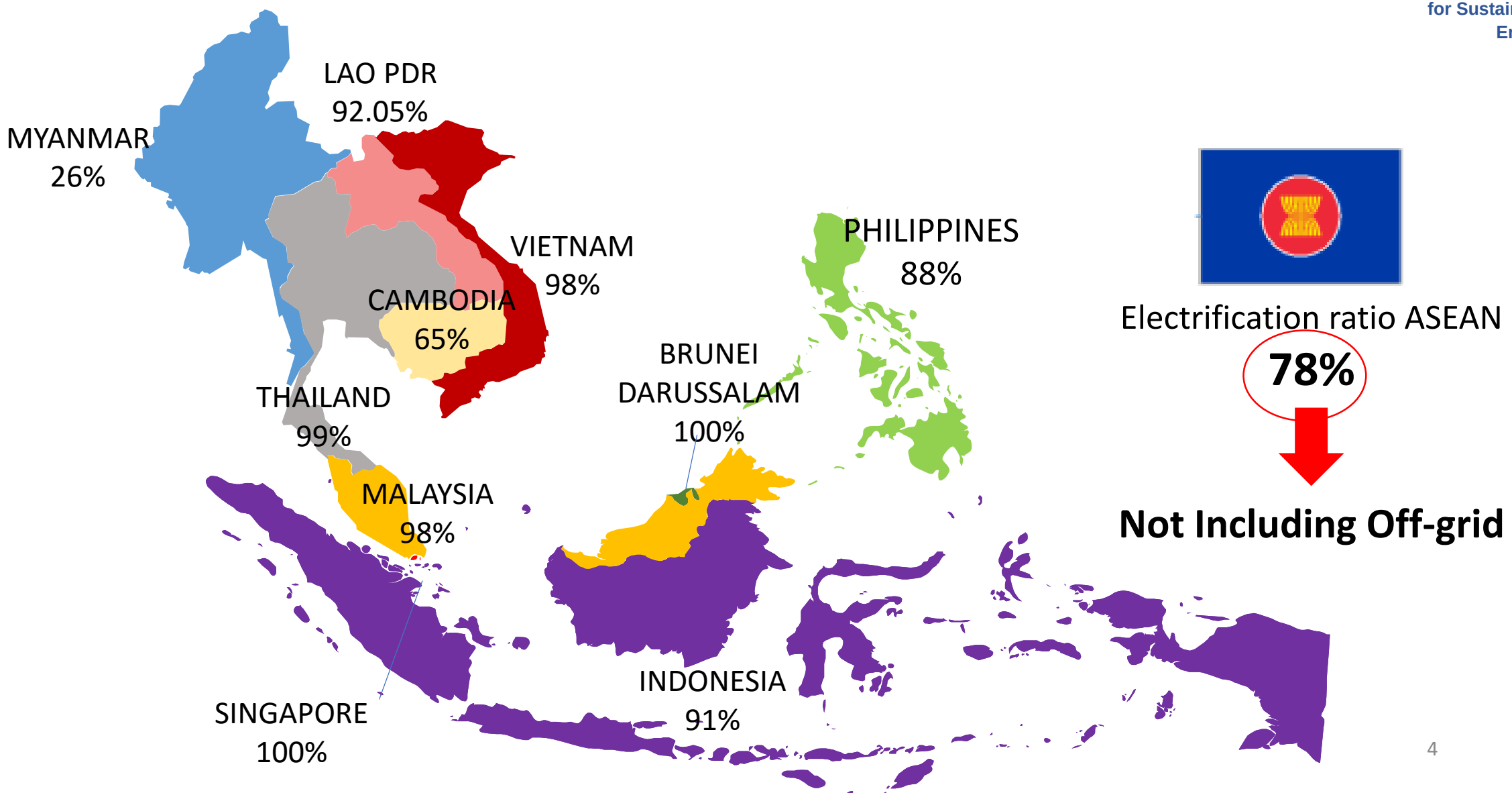

Electrification ratio ASEAN

78%

Not Including Off-grid

ASEAN Off-grid Demand

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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

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Capacity of decentralized diesel-generator in Indonesia

Data source: GIZ, 2014

ASEAN Off-grid Electrification Status

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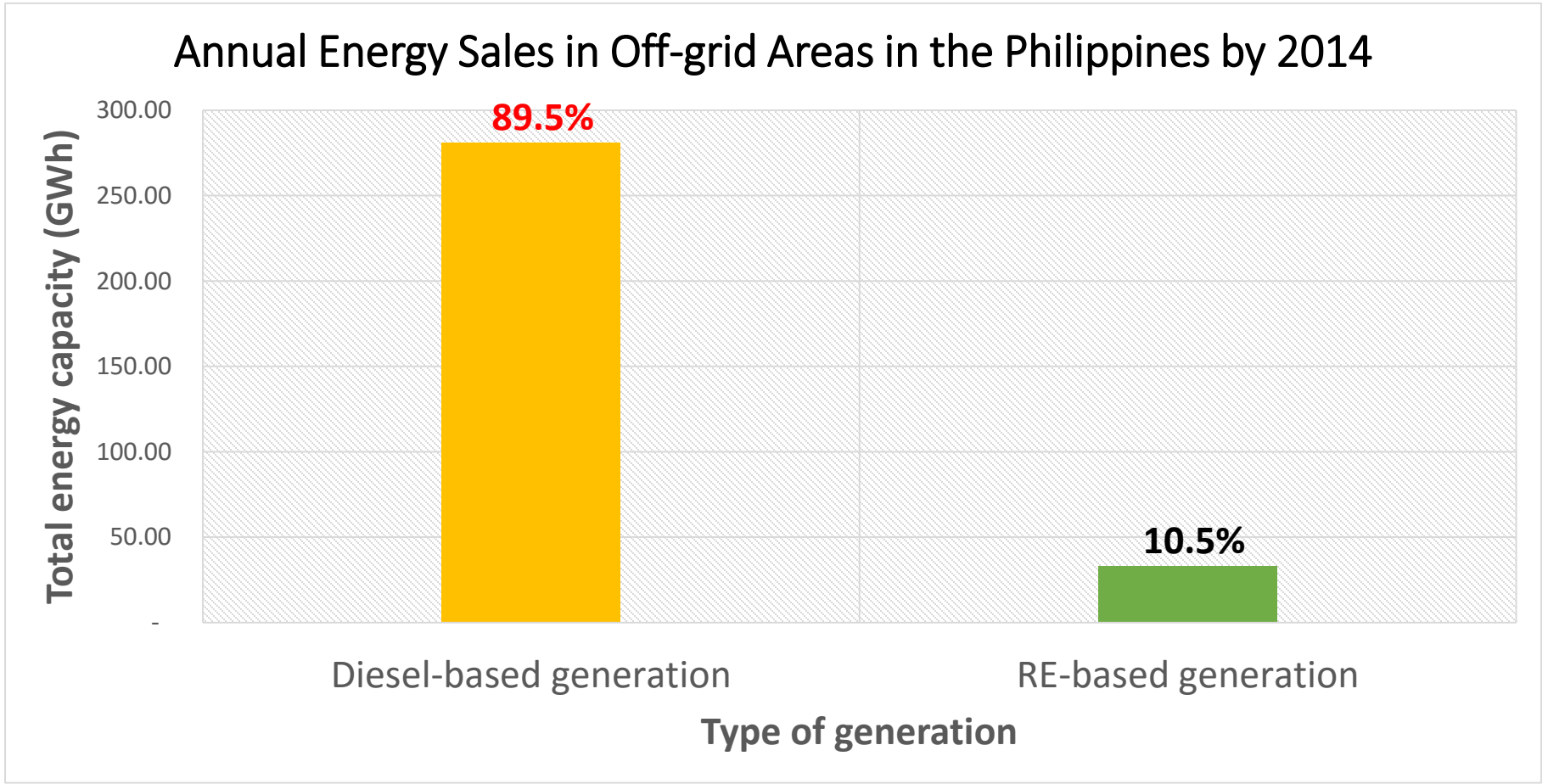

Data source: NPC-SPUG 2017

Off-grid Electricity Supply Status : The case of Philippines

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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

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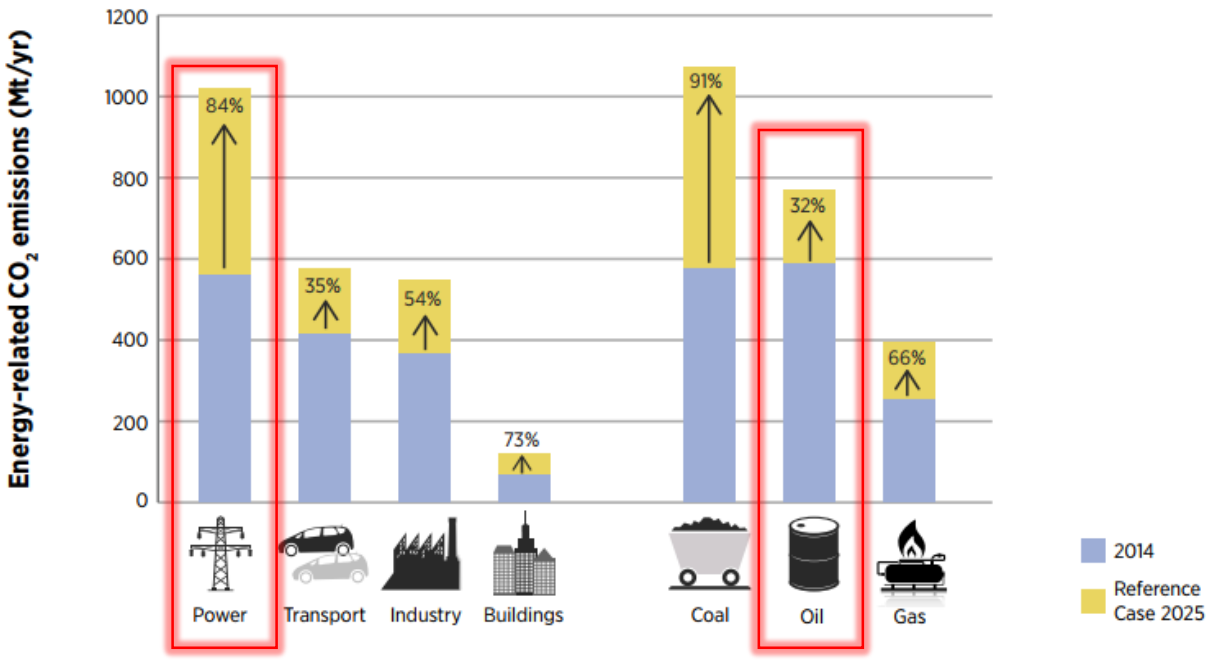
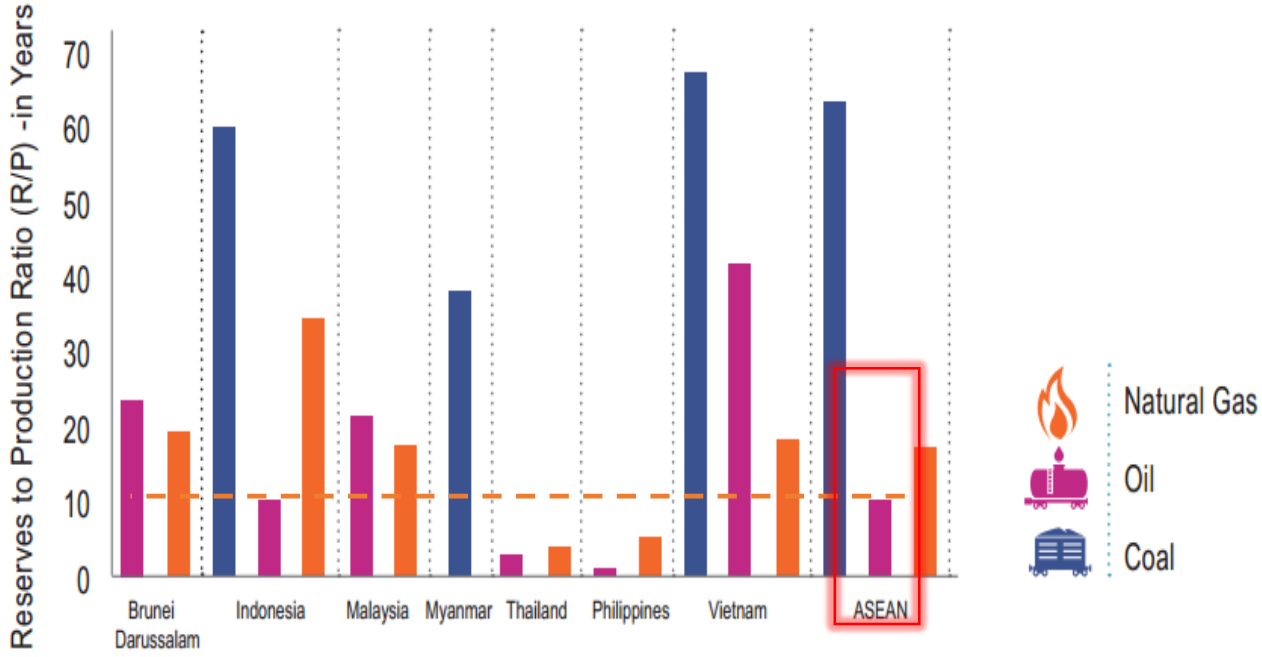
ASEAN's Energy-related CO2 Emission by fuel & sector



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

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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

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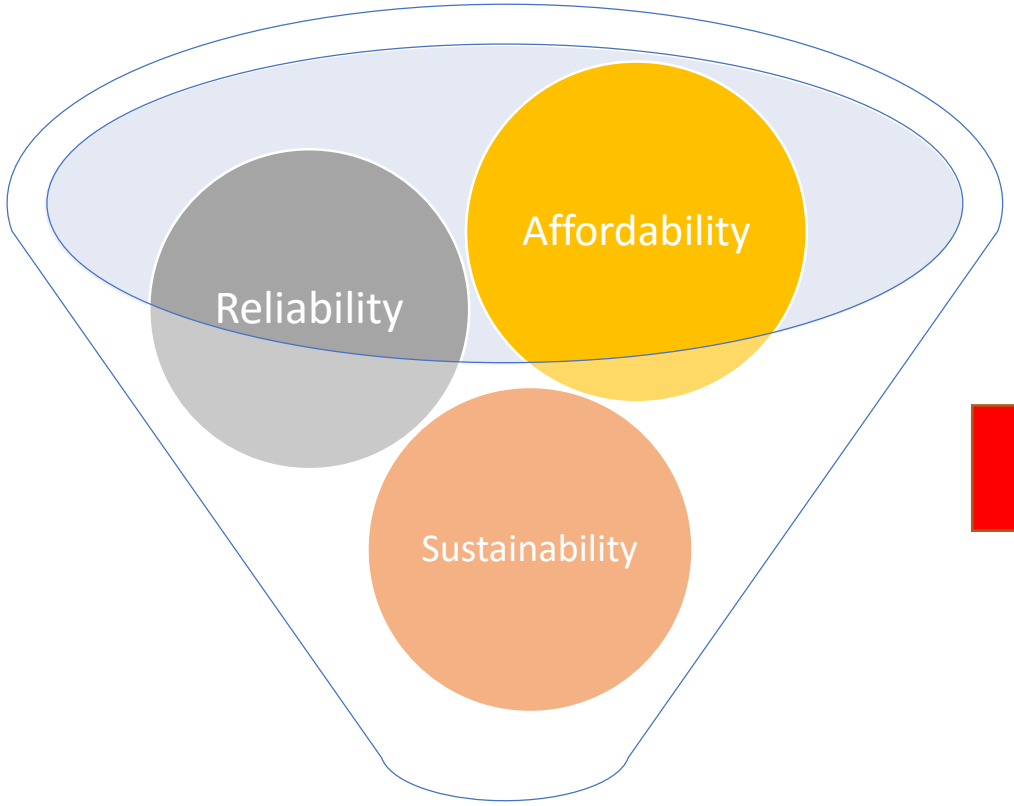

Apply in On-grid generation, but Off-grid?

Not addressed in

Common diesel-plant generation in off-grid areas

Converted to

RE & new technologies

RE & New Technologies for Off-grid Generation

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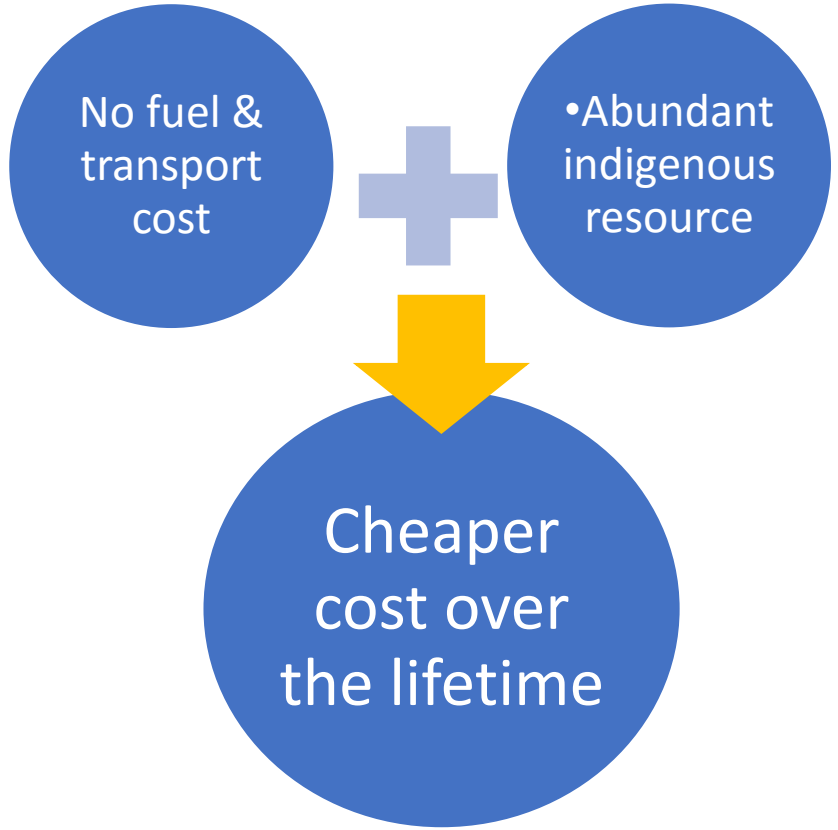
Levelized Cost of Energy Generation Technology

		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			✔	✔



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

RE & New Technologies for Off-grid Generation

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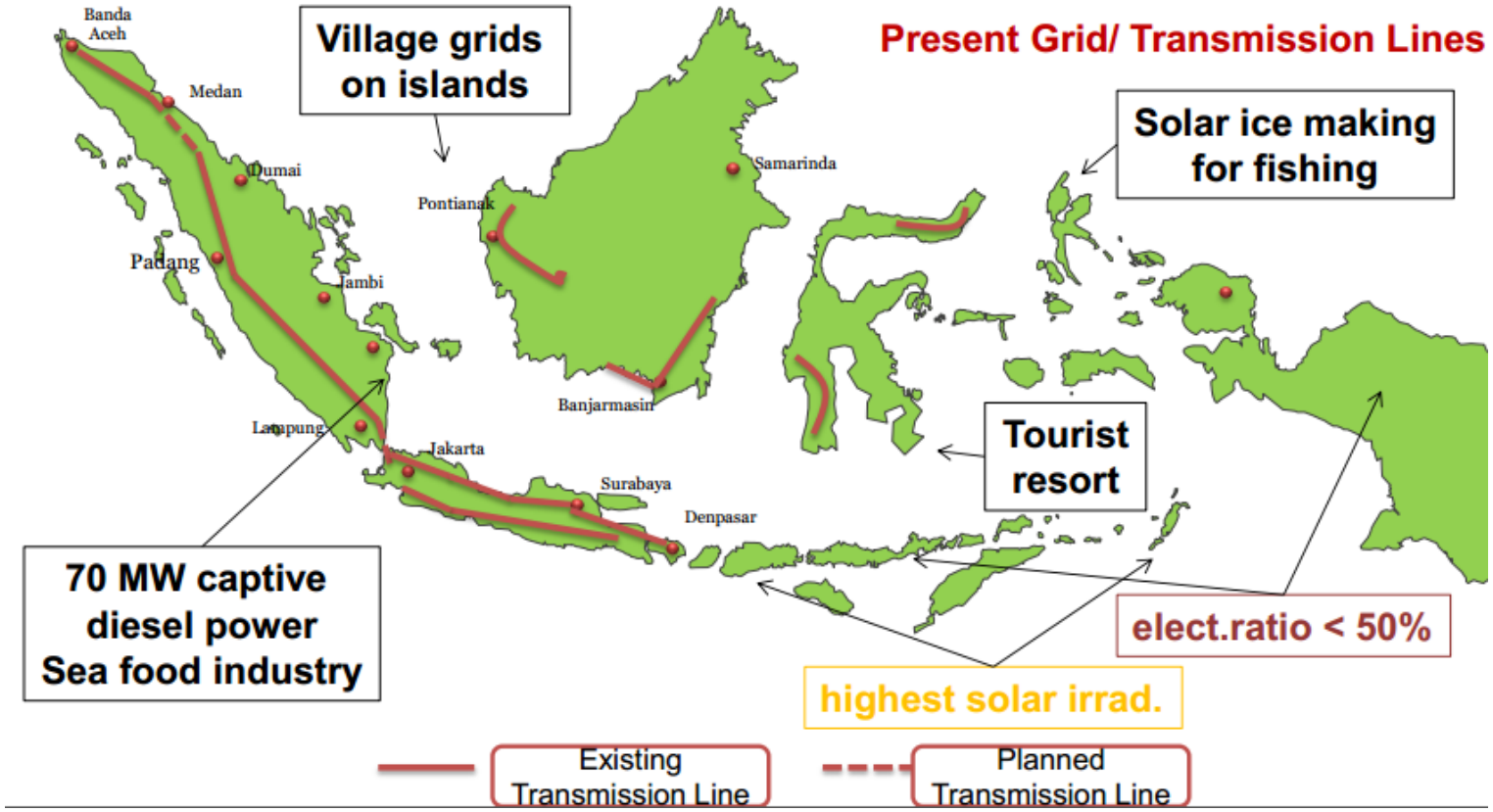
- **Huge RE & New technology potential in Off-grid areas**



Source: GIZ Indonesia, 2013

RE & New Technologies for Off-grid Generation

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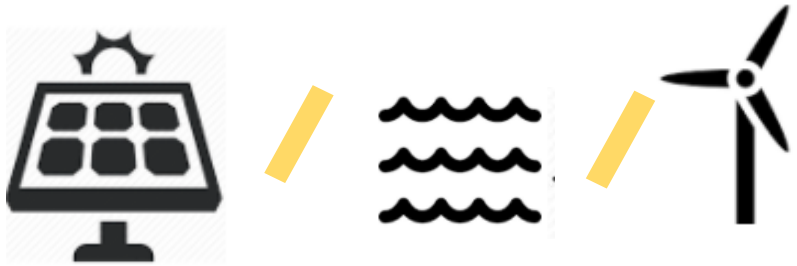
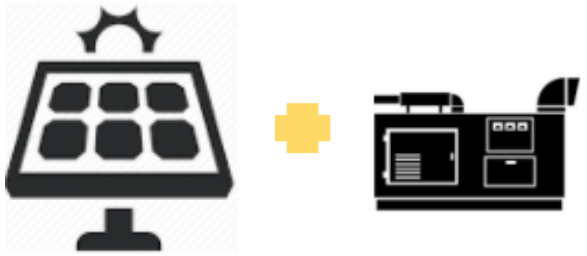
- **High Flexibility and Expandability**



RE Off-grid system



RE-Hybrid Off-grid system

Mini-grid system

More Sustainable & Reliable

Opportunities and Challenges

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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

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- 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

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