



ASEAN MULTILATERAL POWER TRADING AS A MEASURE FOR SECURITY OF SUPPLY

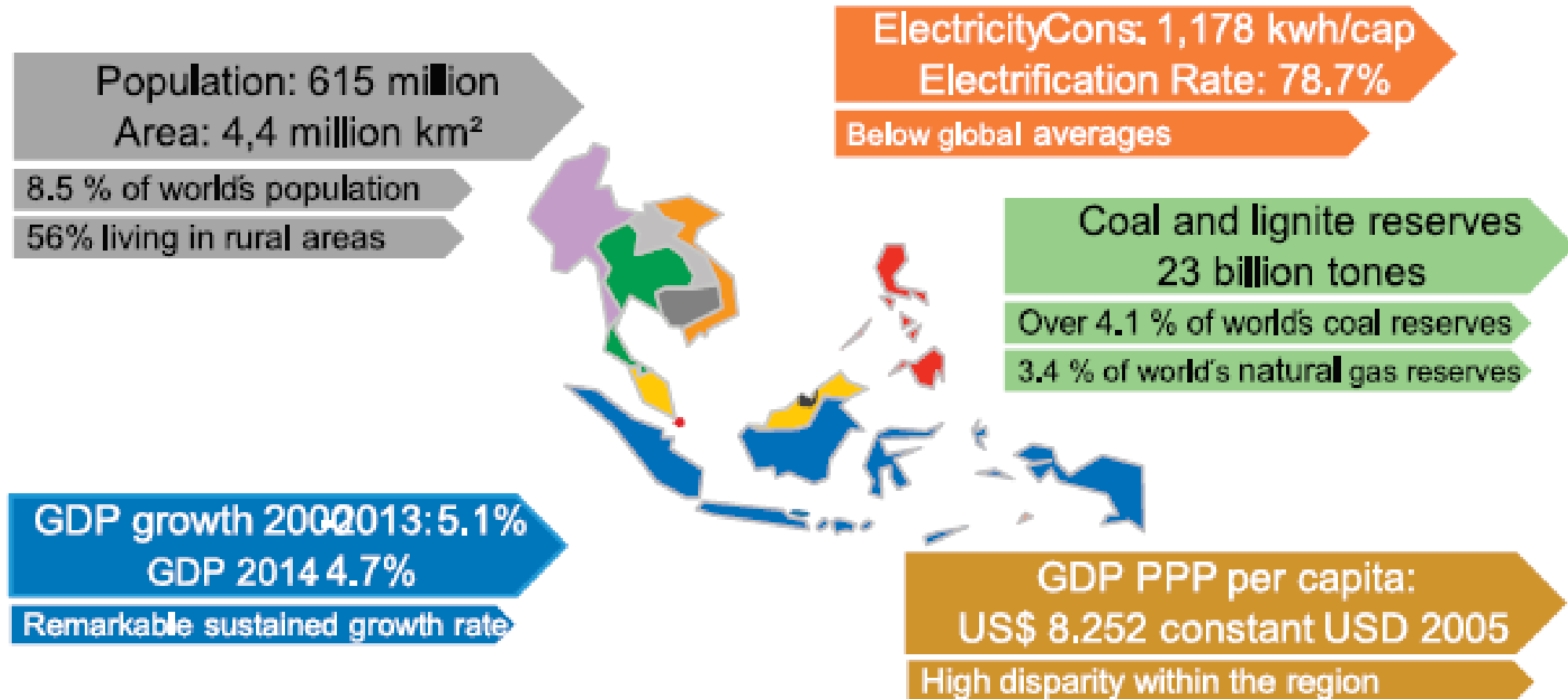
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HAPUA SECRETARY IN CHARGE

OSG WORKSHOP, ITSKURK RUSSIA

JUNE 28, 2017

1. ASEAN ENERGY SNAPSHOT



Source: THE 4TH ASEAN Energy Outlook. ACE 2015

2. ASEAN ELECTRICITY OUTLOOK 2015



Installed Capacity

Country	Cap. (GW)
BRN	0.8
KHM	1.9
MMR	4.8
LAO	6.3
SGP	13
PHL	18.8
	30.9 (Year 2014)
MYS	
VNM	38.6
THA	38.8
IDN	52.9

Source : HAPUA Directory 2016

Peak Load

Country	Peak load (GW)
BRN	0.59 (BPMC)
KHM	0.95
LAO	1.06
MMR	2.5
SGP	6.96
PHL	8.93 (Luzon)
	16.9 (Pen. Malaysia, Th. 2014)
MYS	
VNM	25.81
THA	29.62
IDN	33.38

Sumber: HAPUA Directory 2016

Electrification ratio

Country	% RE
MMR	34
KHM	66.55
LAO*	87
IDN	88.3
PHL*	89
THA	99
	99.8(Pen. Msia)
MYS	93 (Sabah & Sarawak), 2014
	99.85
VNM	(Commune)
	98.88 (Rural)
BRN	99.9
SGP	100

*untuk Lao PDR dan Philippines, sumber data World energy Outlook 2016 - IEA

Number of Electricity

Country	No. Cust (Million)
BRN	0.12
KHM	0.78
LAO	1.01
SGP	1.5
MMR	3.28
MYS	9.1 (Yr. 2014)
PHL*	17.66
THA	21.08 (Yr. 2014)
VNM	23
IDN	61.17

Sumber: HAPUA Directory 2016

*untuk Philippines, sumber data Philippine Power Situation 2015, Dept. of Energy-Electric Power Industry Management Bureau

Average Tariff

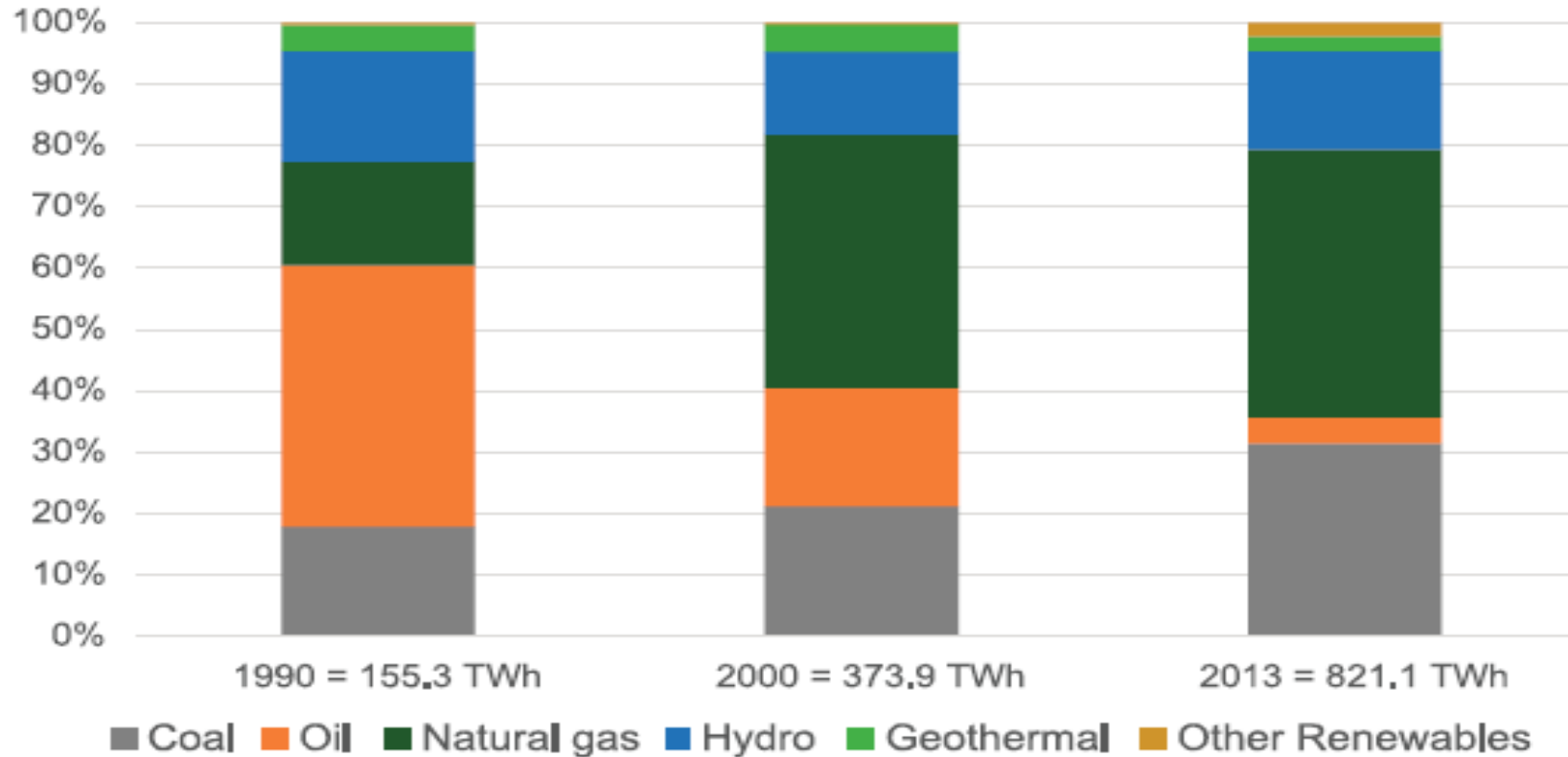
Country	Tariff (Cent USD/kWh)
BRN	5
MMR	6.44
VNM	7.51
LAO	8.69
IDN	9.71
MYS	9.98
THA	11.07
KHM	18
SGP	21.73
PHL	23 (MERALCO)

Sumber Utama: HAPUA Directory 2016
Nilai tukar kurs tahun 2015 didasarkan pada World Development Indicators, The World Bank Data

Note :

BRN (Brunei Darussalam); KHM (Cambodia); IDN (Indonesia); LAO (Lao PDR); MYS (Malaysia); MMR (Myanmar); PHL (Philippines); SGP (Singapore); THA (Thailand); VNM (Vietnam)

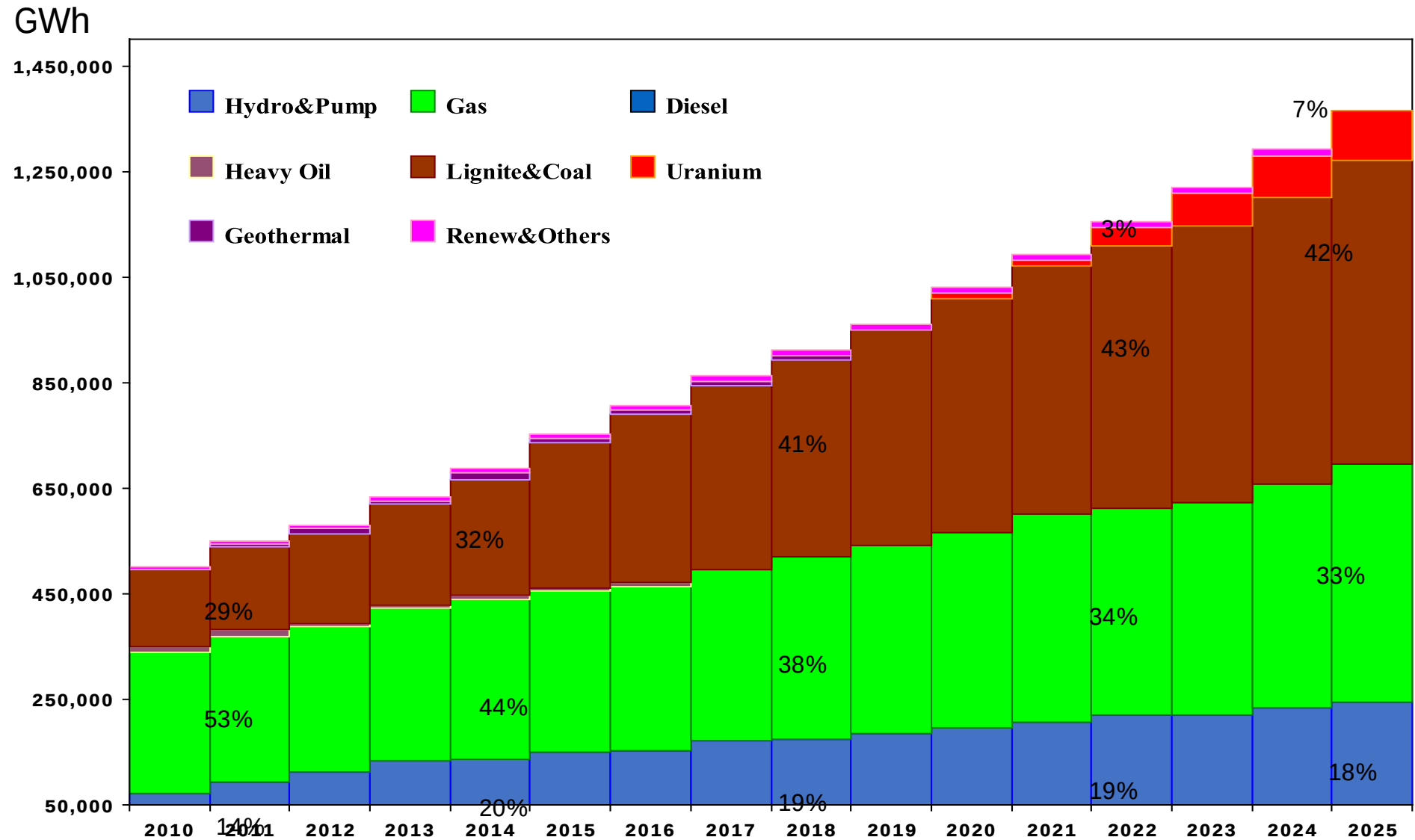
3. ENERGY MIXED IN ASEAN ELECTRICITY PRODUCTION



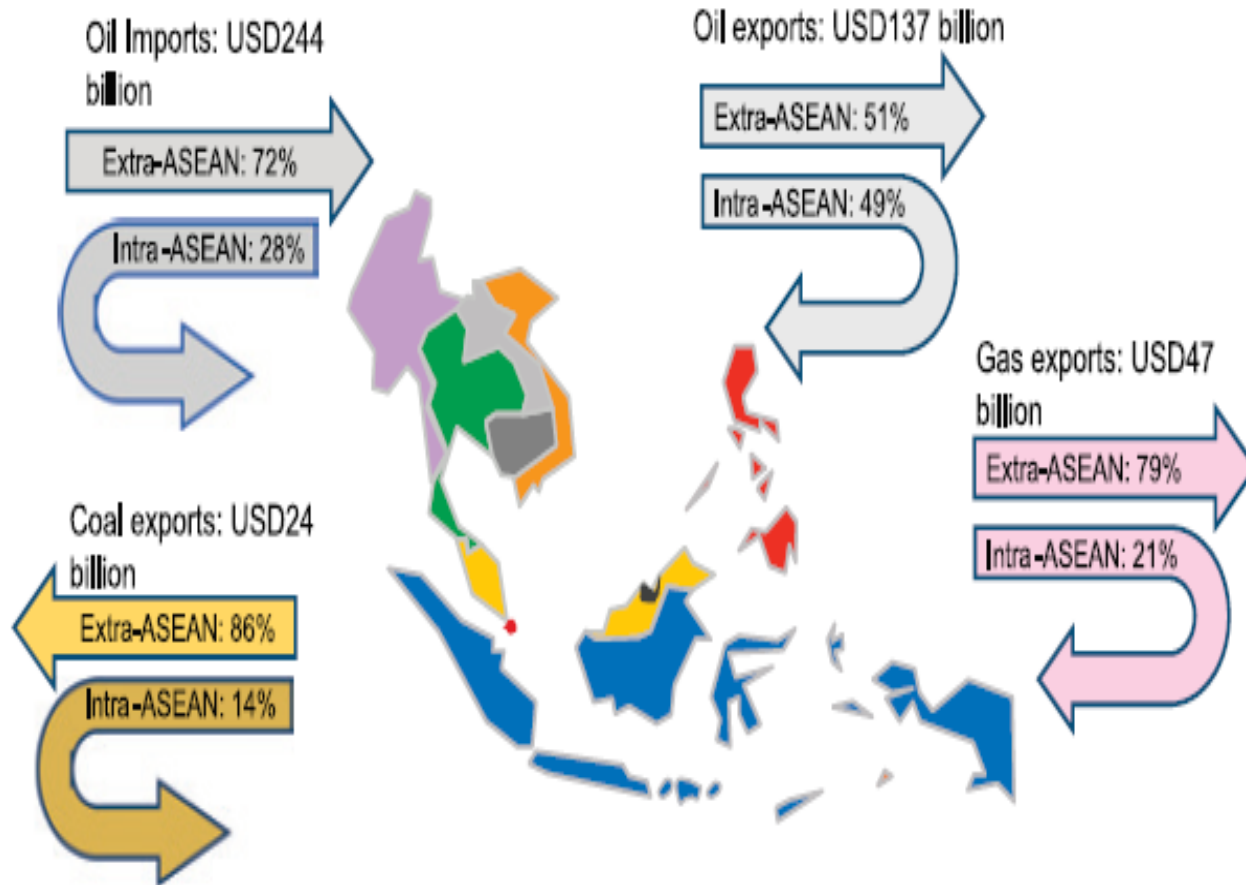
Source: THE 4TH ASEAN Energy Outlook. ACE 2015

NATURAL GAS AND COAL DOMINATED AS PRIMARY ENERGY SOURCES,
DISRUPTIVE TO POWER SUPPLY DUE TO LACK OIL AND GAS IS SIGNIFICANT

4. THE ELECTRICITY DEMAND GROWTH 7 % AND THE FOSSIL FUEL IS MAJOR SHARE WITH COAL REPLACE OIL AND GAS



5. Herfindahl & Hirschman Index (HHI) IN POWER RESOURCE FOR ASEAN COUNTRIES



Country	Crude Oil	Natural Gas	Coal
Brunei	0.43	0.46	0.36
Cambodia	0.54	0.41	0.85
Indonesia	0.19	0.19	0.50
Malaysia	0.10	0.53	0.53
Myanmar	1.0	0.58	1.0
Philippines	0.42	0.2	0.97
Singapore	0.18	0.68	0.87
Thailand	0.19	0.60	0.65
Vietnam	0.37	-	0.41

Source UNESCAP

IMPACT OF FOSSIL FUEL DISRUPTION IN ASEAN POWER SECTOR WILL CUT THE POWER SUPPLY MORE THAN 70 % AND MOSTLY THE HHI INDEX OF HAPUA MEMBER > 0.25 FOR NATURAL GAS, COAL AND OIL

6. ASEAN ENERGY SECURITY IN APAEC 2016 - 2025

The theme of the new ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 ;

Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Sustainability for All

The key initiatives under this :

1. Multilateral electricity trading throoe the ASEAN Power Grid (APG),
2. Gas connectivity by expanding the focus of the Trans-ASEAN Gas Pipeline (TAGP), establishing Liquefied Natural Gas (LNG) regasification
3. Promoting clean coal technologies.
4. It also includes strategies to achieve;
 - to improve EE
 - to increase the uptake of RE sources
 - to building capacities on nuclear energy.

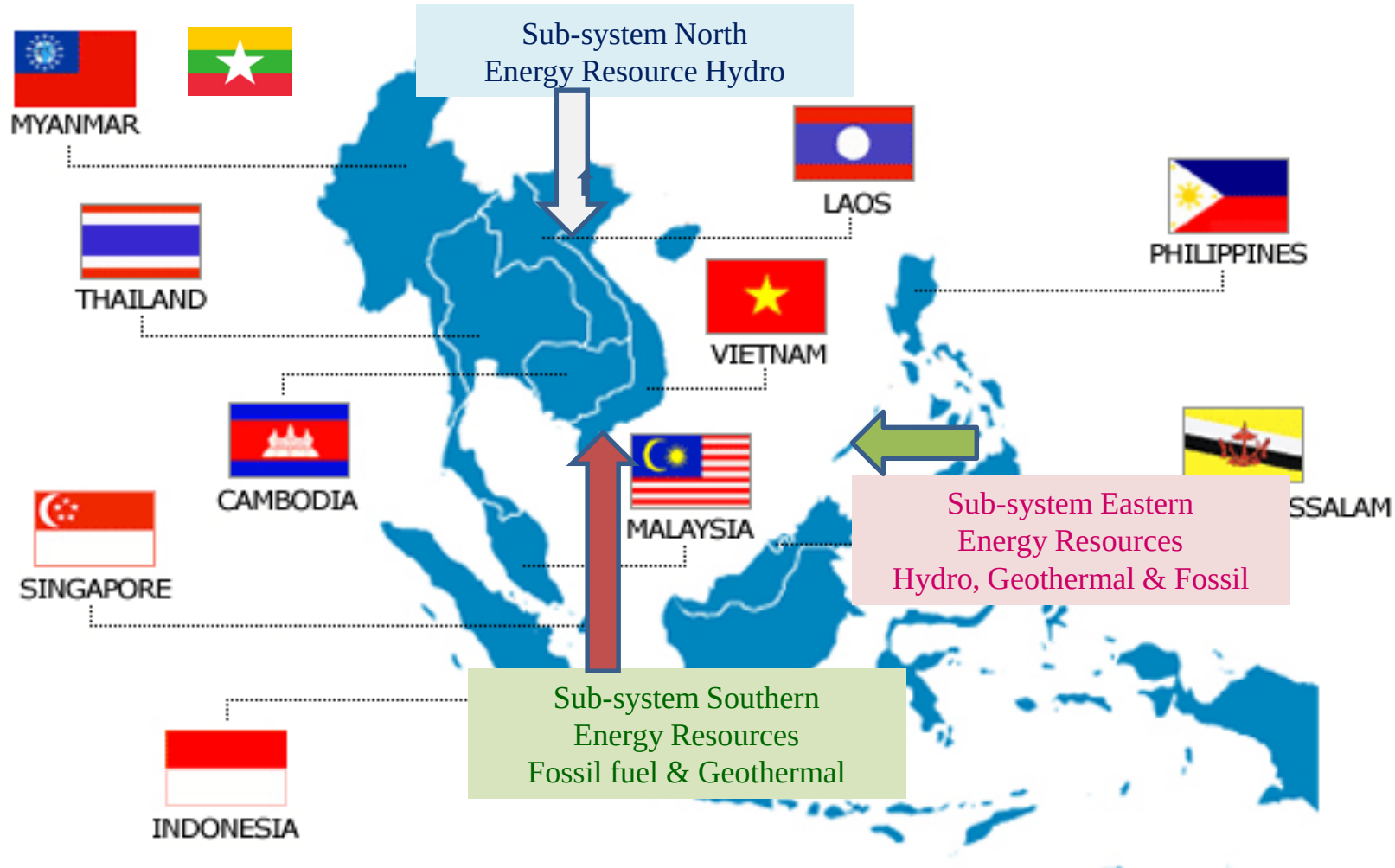
7. THE BACKGROUND OF ASEAN POWER GRIDS PROJECT

1. Response to the threat of Energy Supply Security
2. Has the strength commitment of ASEAN leader and support from the solidity of HAPUA council

SHARE THE FUTURE BENEFIT OF POWER MARKET INTEGRATION

- Optimization the indigenous energy availability
- Utilizing the technology excellent
- The commercial viability
- The multilateral trading among ASEAN Member States

8. THE AMS INDIGENOUS ENERGY FOR POWER



9. THE FINDINGS FROM AIMS II STUDY

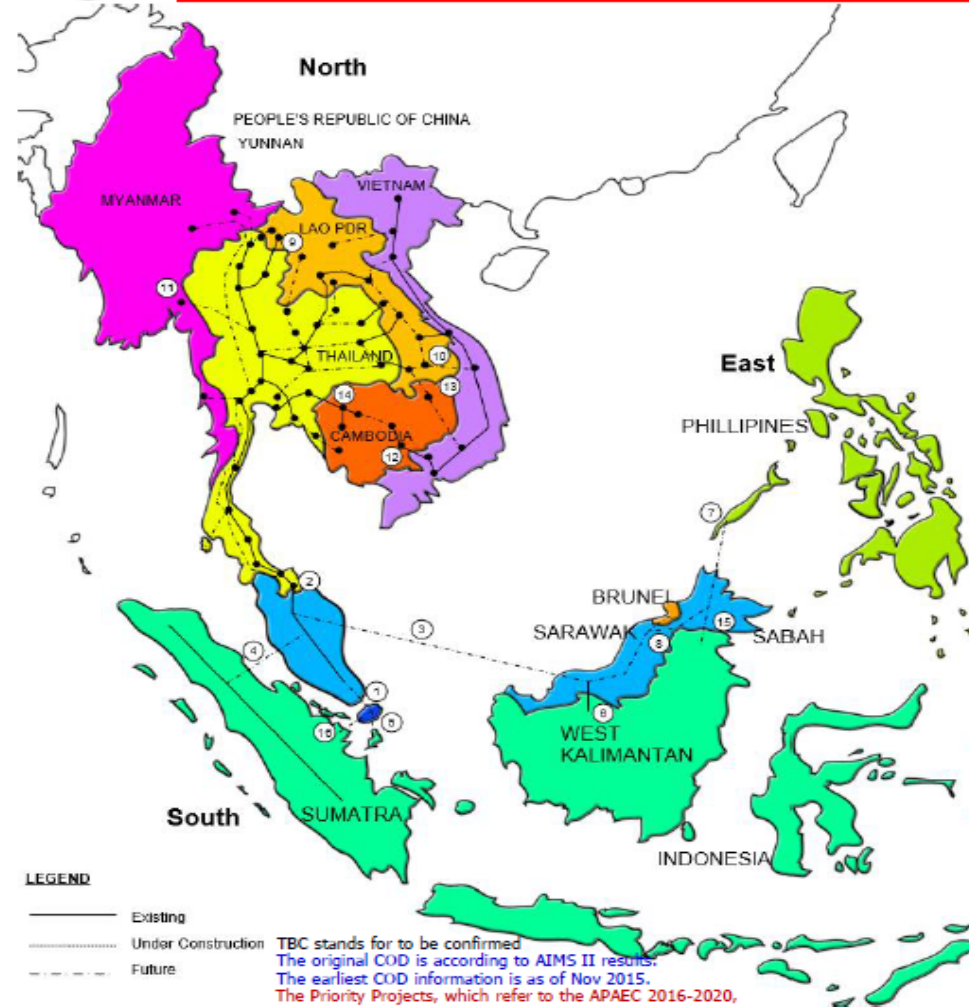
- The study confirmed that the power interconnection is economically and technically feasible within the region.
- AIMS-II identified at least 14 generic interconnection projects plus 2 additional projects which are feasible for the purpose of economic energy exchange and power import/export.
- The results of AIMS-II also identified significant saving in investment of new power projects and operating costs within member countries.
 - By 2025, there will be up to **19,576 MW** of cross-border power purchase and **3,000 MW** of energy exchange through the cross border interconnections
 - The integration of ASEAN Network resulted in a net saving of **788 MUSD** and a reduction in installed capacity **by 2,013 MW**

10. THE 16 INTERCONNECTION PROJECTS CONSISTED 27 LINKS



ASEAN Interconnection Projects

(Updated in Mar 2016)



Presented to APGCC#18, HWC#23 and HAPUA Council#32 - Vientiane, Lao PDR, 03-06 April 2016
Prepared by HAPUA Working Group No. 2 – APG/Transmission

		<u>Earliest COD</u>
1)	P.Malaysia – Singapore	
	• Plentong – Woodlands	Existing
	• P.Malaysia – Singapore (2 nd link Plentong – Woodlands)	post 2020
2)	Thailand – P.Malaysia	
	• Sadao – Bukit Keteri	Existing
	• Khlong Ngae – Gurun	Existing
	• Su Ngai Kolok – Rantau Panjang	TBC
	• Khlong Ngae – Gurun (2 nd Phase, 300MW)	TBC
3)	Sarawak – P. Malaysia	2025
4)	<u>P.Malaysia – Sumatra</u>	<u>2021</u>
5)	Batam – Singapore	post 2020
6)	Sarawak – West Kalimantan	Existing
7)	Philippines – Sabah	TBC
8)	Sarawak – Sabah – Brunei	2020
	• Sarawak – Sabah	2020
	• <u>Sarawak – Brunei</u>	<u>2019</u>
9)	Thailand – Lao PDR	
	• Roi Et 2 – Nam Theun 2	Existing
	• Sakon Nakhon 2 – Thakhek – Then Hinboun (Exp.)	Existing
	• Mae Moh 3 – Nan – Hong Sa	Existing
	• Udon Thani 3 – Nabong (converted to 500KV)	2019
	• Ubon Ratchathani 3 – Pakse – Xe Pian Xe Namnoy	2019
	• Khon Kaen 4 – Loei 2 – Xayaburi	2019
	• Nakhon Phanom – Thakhek	2015
	• Thailand – Lao PDR (New)	2019-2023
10)	Lao PDR – Vietnam	2016 - 2020
	• Xekaman 3 – Tranhmy	Existing
	• Xekaman 1 – Pleiku 2	2016
11)	Thailand – Myanmar	2018-2026
12)	Vietnam – Cambodia (New)	
	• Chau Doc – Takeo – Phnom Penh	Existing
	• Tay Ninh – Stung Treng	TBC
13)	<u>Lao PDR – Cambodia</u>	<u>post 2018</u>
14)	Thailand – Cambodia (New)	post 2020
	• Aranyaprathet – Banteay Meanchey	Existing
	• Thailand – Cambodia	post 2020
15)	East Sabah – East Kalimantan	TBC
16)	Singapore – Sumatra	post 2020

11. ACHIEVEMENT OF APG (as November 2016)



	Exist	On-going (Up to 2021)	Future	Total
Northern System	4,152	2,469	15,774-18,924	22,395-25,545
9 Thailand - Lao PDR	3,584	1,879	1,865	7,328
10 Lao PDR -Vietnam	248	290	TBC	538
11 Thailand - Myanmar	-	-	11,709-14,859	11,709-14,859
12 Vietnam - Cambodia	200	-	TBC	200
13 Lao PDR - Cambodia	TBC	300	-	300
14 Thailand - Cambodia	120	-	2,200	2,320
Southern System	450	600	1,800	2,850
1 P.Malaysia - Singapore	450	-	600	1,050
4 P.Malaysia - Sumatra	-	600	-	600
5 Batam - Singapore	-	-	600	600
16 Singapore - Sumatra	-	-	600	600
Eastern System	230	30-100	600	860-930
6 Sarawak - W.Kalimantan	230	-	-	230
7 Philippines - Sabah	-	-	500	500
8 Sarawak - Sabah - Brunei	-	30-100	100	130-200
15 E.Sabah - E.Kalimantan	-	-	TBC	-
Northern - Southern System	380	100	300	780
2 Thailand - P.Malaysia	380	100	300	780
Southern - Eastern System	-	-	1,600	1,600
3 Sarawak- P.Malaysia	-	-	1,600	1,600
Grand Total	5,212	3,199-3,269	20,074-23,224	28,485-31,705

12. ASEAN MULTI LATERAL POWER TRADING

a. The project will be implemented in two phases:

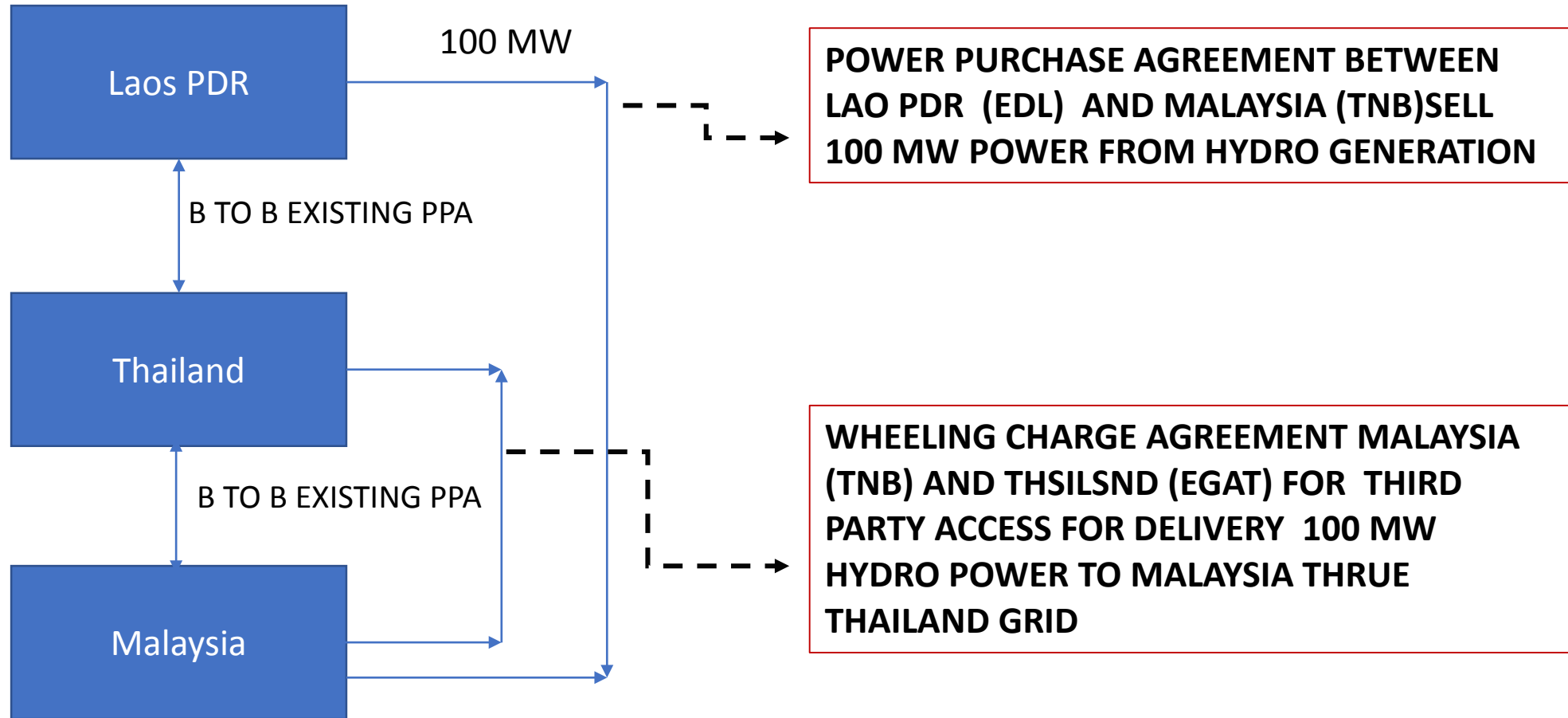
- Phase 1- 2018-2019, Power Trade of up to 100MW between Lao PDR and Malaysia via Thailand only utilizing existing grid and interconnections
- Phase 2- 2020 or beyond, Possible expansion to include Singapore when second interconnection cable between Singapore and Malaysia is back in service

b. MOU (between LTM Governments) was signed on 21 Sept 2016 at the 34th AMEM held in Myanmar for implementation of Phase 1. The validity of MOU : 5 years (21 Sept 2016 – 20 Sept 2021)

- Scope of Cooperation
- – Explore the technical-economic feasibility and viability.
- – Exchange information on existing and planned electricity generation demand within each respective participant.
- – Identify the legal and regulatory issues, explore possible commercial arrangements

c. Start of electron transfer for LTM-PIP – on 1 January 2018

13. LTM POWER INTEGRATED PROJECT TRADING SCHEME





THANK YOU
TERIMA KASIH



THANKS TO : TO ALL HAPUA COUNTRY COORDINATOR



HAPUA 2017