

Chapter 1

Introduction

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Chapter 1

Introduction

1. High-level contents of this report

The AGTP report is one of the main deliverables for the project “Study on the Formation of the ASEAN Power Grid Generation and Transmission System Planning Institution (AGTP)”. It provides the related information and background for the AGTP guideline and implementation plan.

The literature report has 6 chapters and each chapter describes as follows.

- Chapter 2 Benefit of the APG
This chapter provides the vision and mission for each institution, like APP, from international experiences of Japan, Europe, and Southern Africa.
- Chapter 3 Case examples about planning process and current situation of Japan, Europe, and SAPP
This chapter describes case examples about functions of system planning and development of current interconnections.
- Chapter 4 Proposed regulations for APP based on Japanese case example
This chapter explains the necessary regulations and manuals for APP to keep its quality and consistency of functions.
- Chapter 5 Summary of the AGTP guideline
This chapter explains the high-level contents of the AGTP guideline.
- Chapter 6 Summary of the AGTP implementation plan
This chapter explains the high-level contents of the AGTP implementation plan.

2. Remarkable Development of ASEAN Power Grid

ASEAN is one of the most dynamic and fastest growing economic regions in the world. It recognizes the critical role of an efficient, reliable, and resilient electricity infrastructure in stimulating regional economic growth and development. To meet the growing electricity demand, huge investments in power generation capacity and power system expansion are required.

In addition, the ASEAN region has an abundance and diversity of not only fossil energy resources such as natural gas, coal, and oil but also renewable energy potential such as hydropower, solar power, wind power, and biomass. Members of ASEAN Power Utilities/Authorities (HAPUA) recognized such circumstance, so, they established a plan of ASEAN Power Grid (APG) in 1997 as a flagship program under ASEAN Vision 2020 to enhance

cross-border electricity trade. This will provide benefits to meet the rising electricity demand and improve access to energy services in the ASEAN region. HAPUA have vitally promoted the ASEAN Interconnection Masterplan Study (AIMS) to formulate the strategy to accelerate the realization of APG.

The study consists of two phases – AIMS I and AIMS II – successfully completed in 2003 and 2010. The strategy, established based on these studies, is to firstly encourage participation on a cross-border bilateral basis, then gradually expand to a sub-regional basis (northern subsystem, southern subsystem, and eastern subsystem), and finally move to a totally integrated APG system. The APG undertaking had planned 16 power interconnection projects. By end of 2014, six of the 16 projects were implemented with a total of 3,489 megawatts (MW) in power exchanges and purchases achieved. It is expected that power exchanges and purchases will triple the capacity during the period between 2014 and 2020, and further increase to 16,000MW post 2020.

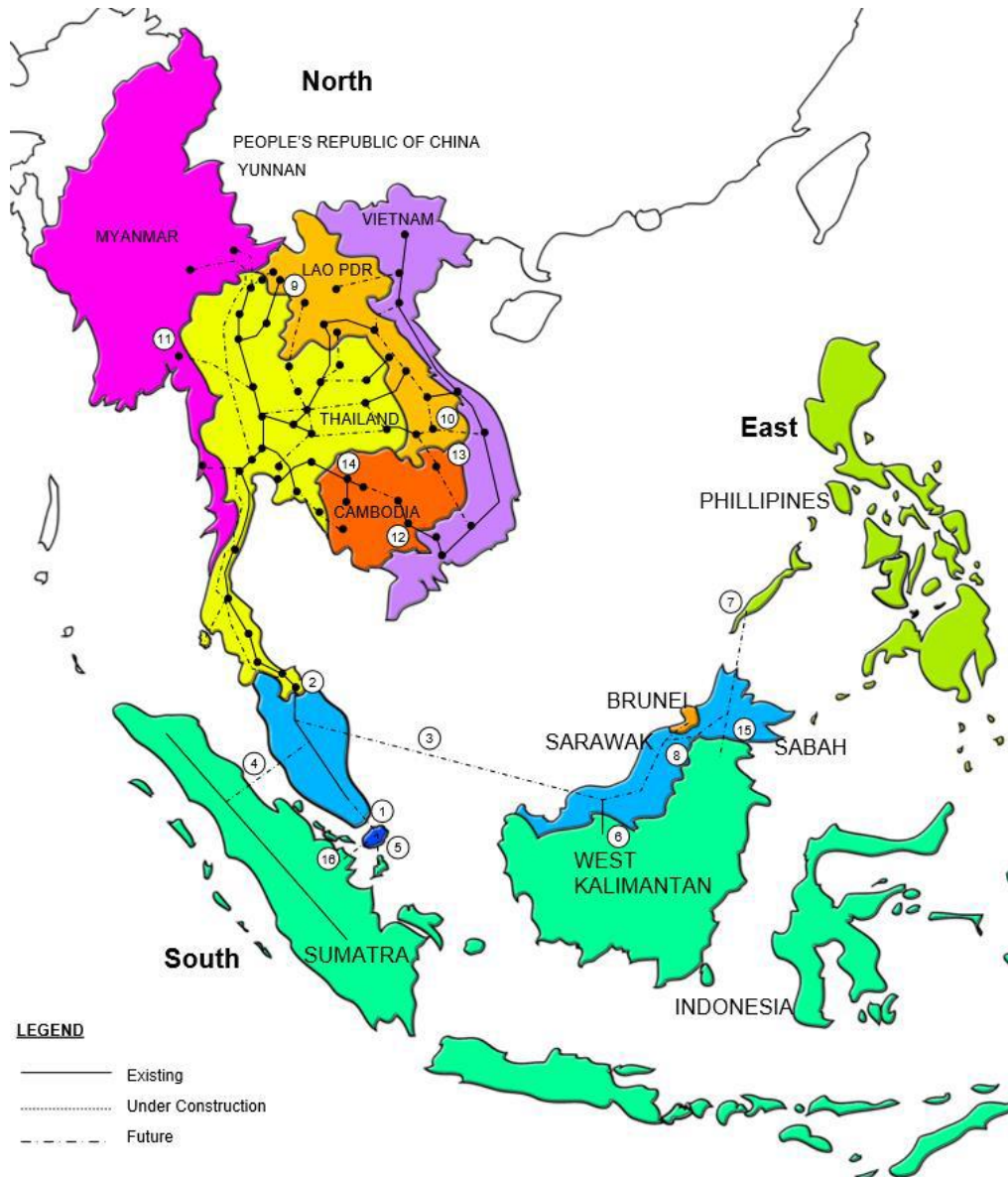
Since then, however, the energy landscape in the region has changed. ASEAN member states (AMSs) have been facing challenges in fulfilling the energy demand since demand has been growing significantly and will continue to grow at a rate of 5% to 6% per year in the coming decades. In addition, AIMS II was not able to explore the utilization of the renewable energy source as ASEAN indigenous resource at maximum level, as a response to the direction from the ASEAN Plan of Action for Energy Cooperation 2016–2025 that the 33rd ASEAN Ministers on Energy Meeting endorsed in September 2015 in Kuala Lumpur, Malaysia.

Since the conclusion of the agreement at the 21st Conference of the Parties to the UN Framework Convention on Climate Change held in 2015, governments around the world have been promoting policies on the use of renewable energy. In some countries where the potential of solar and wind power energy is high, it is becoming prominent that too much amount of installation plan precedes the expected electricity demand.

As recognized by many, to stably integrate a variable renewable energy power source such as solar power generation and wind power generation into a power system, it is necessary to absorb the fluctuation and maintain the balance between supply and demand. This requires the synchronous generators to respond more sensitively to the system frequency fluctuation and be prepared to cover the cost. If the APG is properly developed, reserves for supply–demand adjustment and frequency regulation provided from synchronous generators can be widely shared or exchanged throughout the ASEAN region. Thereby, it is possible to maximize economic benefits through effective utilization of renewable energy sources and reduce comprehensive generation cost. In addition, the whole AMSs can enjoy the benefits such as prevention of environmental pollution and global warming.

AIMS III will be planned to be implemented in April, 2018. The crucial point in its development is to propose optimal allocation of power sources including variable renewable energy and the reasonable reinforcement plan of interconnection lines. The aim is to reduce the cost of electricity supply while enhancing the economic integration of the whole ASEAN region through the completion of APG, taking into account the rapidly growing power demand and the ambitious promotion of deploying renewable energy sources.

Figure 0: Interconnection Projects of ASEAN Power Grid



Source: Heads of ASEAN Power Utilities/Authorities (HAPUA), 2017.

1) P.Malaysia – Singapore	
Plentong – Woodlands	Existing
P.Malaysia – Singapore (2 nd link Plentong – Woodlands)	post 2020
2) Thailand – P.Malaysia	
Sadao – Chuping	Existing
Khlong Ngae – Gurun	Existing
Su Ngai Golok – Rantau Panjang	TBC

Khlong Ngae – Gurun (2ndPhase, 300MW)	TBC
3) Sarawak – P. Malaysia	TBC
4) P.Malaysia – Sumatra	TBC
5) Batam – Singapore	TBC
6) Sarawak – West Kalimantan	Existing
7) Philippines – Sabah	TBC
8) Sarawak – Sabah – Brunei	2021
Sarawak – Sabah	2021
Sarawak – Brunei	TBC
9) Thailand – Lao PDR	
Nakhon Phanom – Thakhek – TheunHinboun	Existing
UbonRatchathani2 – HouayHo	Existing
RoiEt 2 – Suvannakhet – Nam Theun2	Existing
Udon Thani 3 – Na Bong – Nam Ngum 2	Existing
NakhonPhanom2 – Thakhek – Then Hinboun (Exp.)	Existing
Mae Moh3 – Nan2 – Hong Sa (3Units)	Existing
UdonThani3 – Nabong – Nam Ngiep (converted to 500KV)	2019
UbonRatchathani3 – Pakse – XePianXeNamnoi	2019
KhonKaen4 – Loei2 – Xayaburi	2019
Nakhon Phanom –Thakhek (Suggested by AIMS–II)	TBC
Thailand – Lao PDR (New)	TBC
10) Lao PDR –Vietnam	2016 – 2020
Xekaman3 – Trinhmy	Existing
Xekaman1 – Pleiku2	Existing
11) Thailand – Myanmar	TBC
12) Vietnam – Cambodia (New)	
Chau Doc – Takeo – Phnom Penh	Existing
Tay Ninh – Stung Treng	TBC
13) Lao PDR – Cambodia	
Ban Hat – Kampong Sralao	Existing
Ban Hat – Stung Trengpost	Post 2018

14) Thailand – Cambodia (New)	Post 2020
WatthanaNakhon – Aranyaprathet – BanteayMeanchey	Existing
Thailand – Cambodiapost	Post 2020
15) East Sabah – East Kalimantan	TBC
16) Singapore – Sumatra	TBC