

# Chapter 6

## Summary of AGTP Implementation Plan

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# Chapter 6

## Summary of AGTP implementation plan

### 1. Introduction

The implementation plan 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)'. The plan contains the roadmap of actions for the establishment of the APP institution.

Importantly, AGTP implementation plan is developed in a way as not to overlap with the ATSO implementation plan made by Nord Pool Consulting on the same contents, unless necessary. The overall implementation plan and roadmap for a whole organization are elaborated in the ATSO implementation plan. The AGTP implementation plan deals mainly with those concerning system planning.

The following are five of the six chapters of the implementation plan:

#### Chapter 2 Roadmap

This chapter summarizes the ATSO implementation plan that especially relates to system planning. Thereafter, it elaborates the roadmap for system planning.

#### Chapter 3 Function design of system planning

This chapter describes detail contents such as annual schedule, data to be submitted, and how to implement each step of functions of system planning.

#### Chapter 4 Criteria and methods to be standardized for system planning

This chapter elaborates that in implementing the functions of system planning, APP should standardize some technical criteria and methods for developing necessary data to be submitted based on thorough discussion and approval by all AMS experts.

#### Chapter 5 Review for the current functions of system planning

This chapter elaborates current functions of AMS, functions to be updated or standardized, and capacity building for fulfilling the gaps.

#### Chapter 6 Barriers and solutions

This chapter shows the barriers and the solutions thereto. To realize the roadmap of APP, some barriers need to be solved.

## 2. Roadmap

### 2.1. Linking to the ATSO implementation plan

The guideline proposed that the AGTP and the ATSO functions be put under one umbrella called the APP organization to keep a close relationship, which was agreed upon at the first workshop. The implementation plan of the organization is elaborated in the ATSO implementation plan. The AGTP implementation plan details the system planning. This section describes the summary of the ATSO implementation plan especially on the contents related with system planning. Table 4 illustrates four high-level milestones and their respective stages.

**Table 4. Milestones for ATSO Development**

Milestone	Stage description and main activity to be finalized for the milestone
Milestone 1	Enabling agreements
Milestone 2	Organizational establishment
Milestone 3	Initial stage of ASEAN Power Pool (APP) operation
Milestone 4	Advanced stage of APP operation

ATSO = ASEAN Power Grid Transmission System Operators Institution.

Source: ATSO Implementation Plan and Roadmap by Nord Pool Consulting.

Table 5 and Table 6 show the key activities and steps needed, as well as the responsible institution or stakeholder for each step related to system planning.

**Table 5. Activities and Responsible Organizational Units in the Initial Stage.**

Task No.	Key activities needed in the initial stage	Responsible body/entity
3.2	Establish APG-agreed technical standards and performance grid code	Technical standard working group
3.3	Develop the data requirement, procedures, and criteria for APG system planning	System planning working group
3.4	Develop APG third-party access (TPA) agreement	Common transmission capacity mechanism design working group
3.5	Develop APG wheeling and losses methodology	Common transmission capacity mechanism design working group

APG = ASEAN Power Grid.

Source: ATSO Implementation plan and Roadmap by Nord Pool Consulting.

**Table 6. Activities and Responsible Organizational Units in the Advanced Stage**

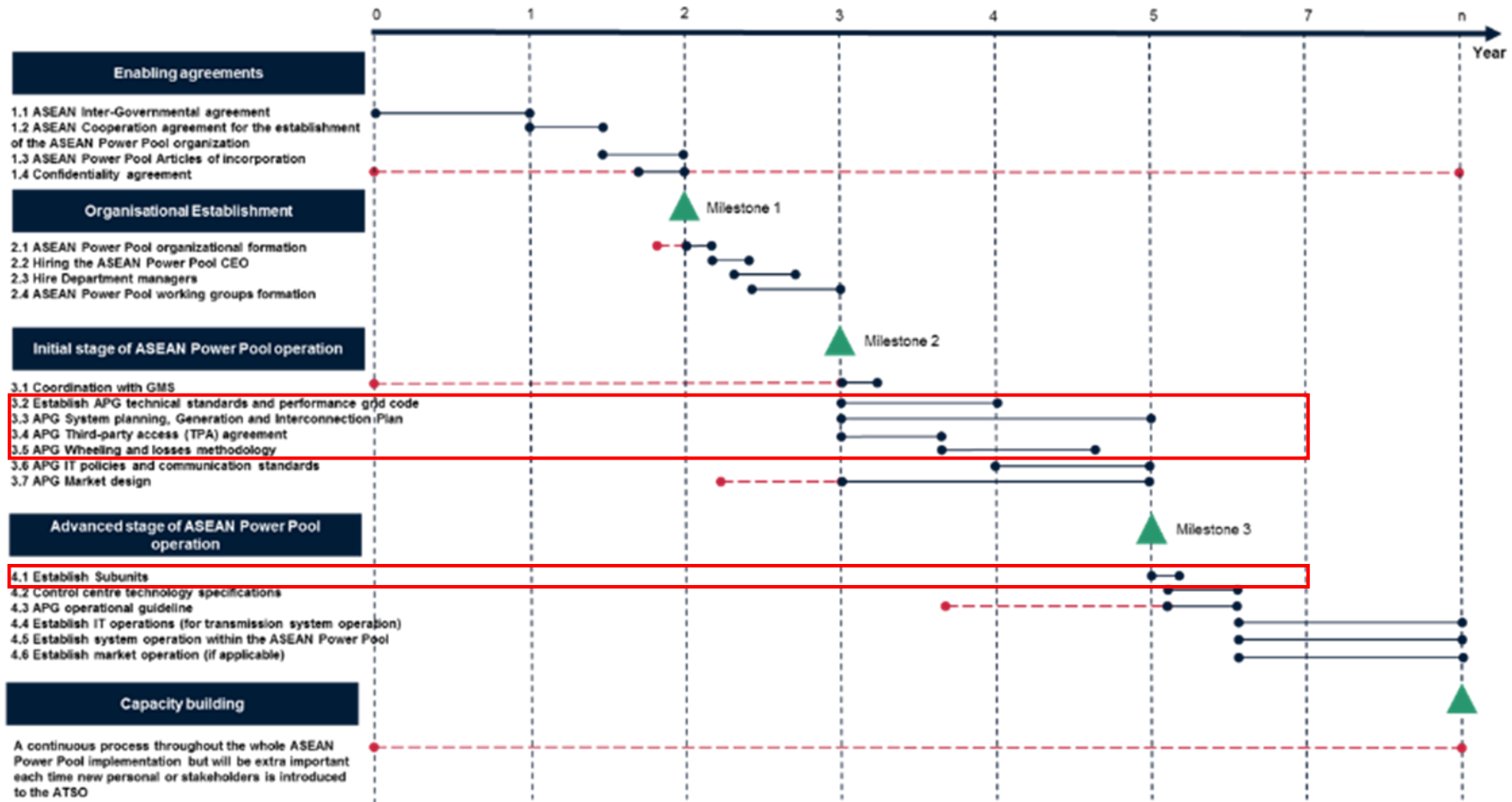
Task No.	Key activities needed in the advanced stage	Responsible body/entity
4.1	Establish subunits:	System planning department manager
	System planning for interconnections	
	Aggregation of supply plan	System operation and coordination department manager
	Monitoring and metering of APG	
	System operation centre	

APG = ASEAN Power Grid.

Source: ATSO Implementation plan and Roadmap by Nord Pool Consulting.

Figure 21 shows the high-level roadmap of APP. The order of all steps based on four milestones is clarified in this figure, and related items with system planning is highlighted in red frame.

Figure 20: High-level Road Map of APP

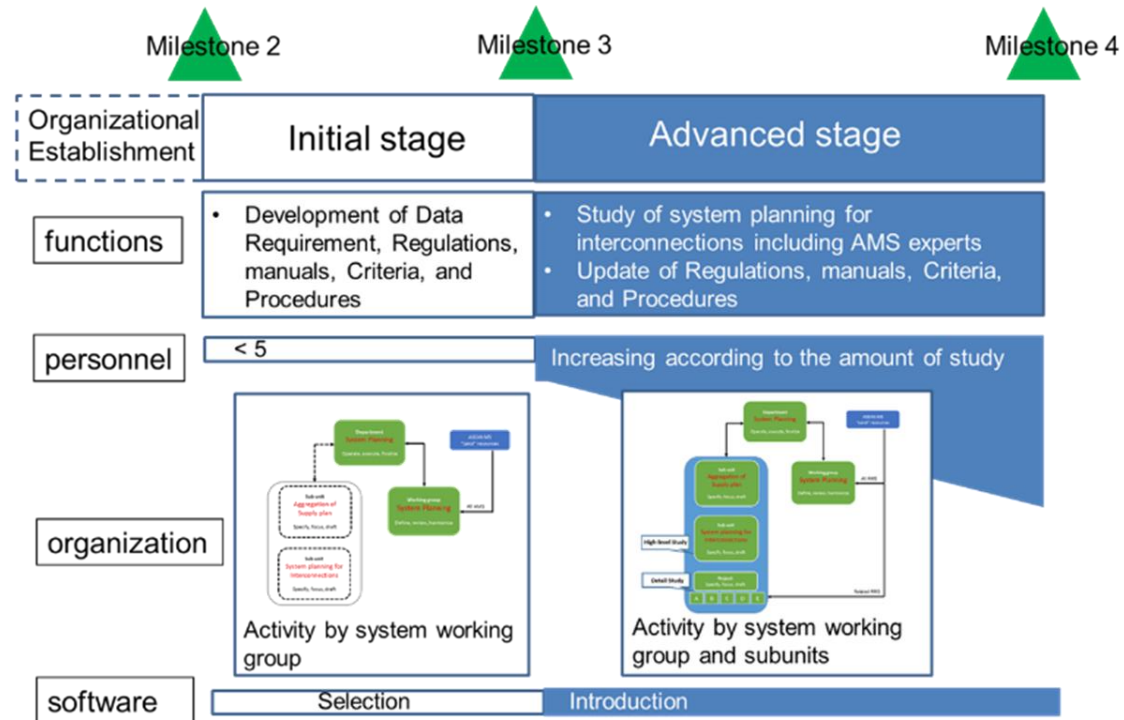


Source: Authors.

## 2.2. Roadmap for system planning

Figure 21 shows the high-level roadmap for system planning department. Functions of system planning start after the establishment of APP at the point of milestone 2. Figure 20.

**Figure 21: High-level Road Map for System Planning Department**



Source: Authors.

### 3. Implementing the function design of system planning

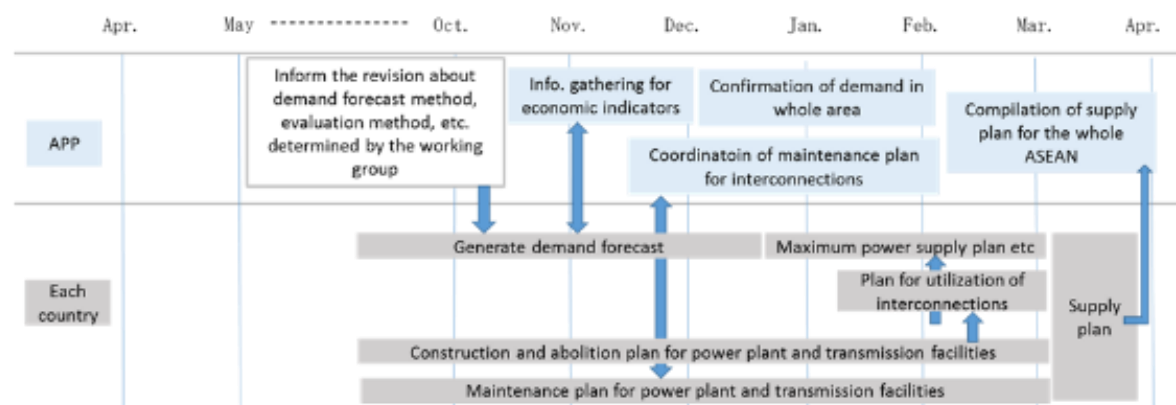
#### 3.1. Aggregation and evaluation of power supply plan

To prepare power supply plan, AMSs have to submit data according to a standardized format based on a unified annual schedule.

##### (1) Annual schedule

Figure 22 shows a Japanese case example of annual schedule. April is the beginning of the fiscal year, and the power supply plan and the interconnection line plan need to be prepared by end of March. For this purpose, the annual schedule is desirable as shown in the figure.

**Figure 22. A Japanese Case Example of Schedule for System Planning**



Source: Authors.

##### (2) Data to be submitted to APP for system planning

###### Purpose

It is necessary to evaluate each country's supply plan for APP to realize the following:

- To judge whether to build the new interconnection lines
- To make a future reinforcement plan of interconnection lines

###### Types of data

It takes a long time, about 10 years, to construct interconnection lines. To quantify this long-term plan, each country needs to submit annually to APP the following 10-year data.

###### Demand or supply capability

- Plan to construct/depreciation power supply and distribution facilities
- Plan to utilize interconnection line

## Utilization

APP knows that such data and information are prohibited in principle to be leaked to not only countries other than ASEAN but also other ASEAN countries. In case APP needs to disclose information for ASEAN or countries other than ASEAN to realize the above object, it has to obtain permission of the country related to information.

## Submission form

The system planning working group creates and revises the format of demand forecast method, supply capability, and each evaluation method, and presents the submission form to each country in October.

### (3) Evaluation method of the supply plan

APP evaluates the supply plan submitted by each country focusing on the following points: (i) whether each country has supply capability for 10 years of demand and (ii) if interconnection lines are incorporated as supply power, whether cooperation is aligned with the utilization plans of interconnection lines amongst countries.

## **3.2. Development of interconnection plan**

### (1) Individual project

#### Decision of members

In case the system planning working group decides that it is necessary to establish the new interconnection lines, APP orders the launch of an individual project and the dispatch of representatives to the countries related to establish the new interconnection lines.

Related countries means not only two countries physically connected by the interconnection but also beneficial or affected countries when the interconnections are completed. The working group also discuss the rules on how to select such countries.

Principally, APP is an advisory organization, and the countries related to establish the new interconnection lines decide whether to establish the line.

#### The development of construction plan

Members of individual project engage in specific tasks to establish the new interconnection line. In case expertise is required, it is desirable to proceed with the work while utilizing consulting companies to support the discussion and prepare necessary documents.

### (2) Planning of repair and augmentation of interconnection lines

APP creates a repair and augmentation plan for interconnection lines based on the plan for future use of interconnection lines submitted by each country.



#### 4. Criteria and methods to be standardized for system planning

In preparing the supply plan and the new interconnection lines plan, it is necessary to apply standardized criteria, consideration method, and software to improve efficiency of the system operation and planning.

##### 4.1. Criteria

There are five criteria. However, the specific criteria need to be carefully set based on the policies of each country's electric power business: (i) voltage, (ii) frequency, (iii) power stability, (iv) regulation power, and (v) spinning reserve.

##### 4.2. Standard method

The system planning working group standardize the evaluation methods such as demand forecast, supply planning, and interconnections construction plan.

##### 4.3. Software to be used for generation planning

Table 7 shows the software to be used for PDP based on the answers to the questionnaire. There are no de facto standards at present for generation planning software.

**Table 7. Software to Be Used for PDP**

Country	Software
Indonesia	Power development plan: WASP-IV Energy production/dispatch: jROS
Lao PDR	-
Malaysia (TNB)	<ul style="list-style-type: none"> <li>• PLEXOS</li> </ul>
Malaysia (Sarawak)	<ul style="list-style-type: none"> <li>• EGEAS</li> <li>• Forecast Pro XE version6</li> <li>• PSS/E version32</li> <li>• Digsilent</li> </ul>
Myanmar	<ul style="list-style-type: none"> <li>• WASP</li> <li>• PSS/E</li> </ul>
Philippines	<ul style="list-style-type: none"> <li>• PSS/E</li> </ul>
Singapore	<ul style="list-style-type: none"> <li>• P-Plus</li> <li>• PLEXOS</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>• Strategist</li> </ul>

EGEAS = Electric Generation Expansion Analysis System.

Lao PDR = Lao People's Democratic Republic.

PDP = power development plan.

PSS/E = Power System Simulator for Engineering.

TNB = Tenaga Nasional Berhad.

WASP = Wien Automatic System Planning.

Source: Authors

Table 8 shows the features of and remarks for each software.

**Table 8. Features of the Generation Planning Software**

Software	Developer	Released	Note
EGEAS (Electric Generation Expansion Analysis System)	EPRI (Electric Power Research Institute, Inc.) USA	1983	The forerunner and funded by MISO (Midcontinent Independent Transmission System Operator)
PLEXOS® Integrated Energy Model	Energy Exemplar (Australia)	2000	Used in 43 countries, including PJM (Pennsylvania, New Jersey, Maryland), AEMO (Australian Energy Market Operator).
Strategist	ABB (ASEA Brown Boveri)	1980	The industry standard for nearly 30 years.
WASP (Wien Automatic System Planning)	IAEA	1972	Developed in 1970s to meet the needs of IAEA (International Atomic Energy Agency)

Source: Authors.

#### 4.4. Software to be used for transmission planning

Table 9 shows the software to be used for TDP based on the answers to the questionnaire. PSS/E is currently used in many countries for transmission planning software.

**Table 9. Software to Be Used for TDP**

Country	Answer
Indonesia	PSS/E DigSILENT
Lao PDR	PSS/E Version 32 DigSILENT Version 15.0
Malaysia (TNB)	PSS/E
Malaysia (Sarawak)	PSSE Version 32
Myanmar	PSS/E NEPLAN
Philippines	PSS/E
Singapore	PSS/E
Thailand	DIGSILENT GmbH

Lao PDR = Lao People's Democratic Republic.

PSS/E = power system simulator for engineering.

TDP = Transmission Development Plan.

TNB = Tenaga Nasional Berhad.

Source: Authors.

Figure 10 shows the features of and remarks for each software.

**Table 10. Features of the Transmission Planning Software**

Software	Developer	Released	Note
PSS/E (Power System Simulator for Engineering)	Siemens (Germany)	1976	Leading global market share (>40%) Used in over 140 countries
PowerFactory	DigSILENT (Germany)	1990s	
NEPLAN	NEPLAN (Switzerland)		

Source: Authors.

#### 4.5. Functions to be updated

To compare the current functions with function design and standardized criteria and procedures described, the following are some important points to be updated:

- (1) Procedures, criteria, and software
  - a) AMS should develop and submit data and information to APP for the study of necessary interconnections on agreed schedule and format according to conclusions of the working group.
- (2) Corporation process with other countries
  - a) AMS should support or involve the working group to study, discuss, and decide criteria, rules, and procedures about system planning.
  - b) AMS should support or involve the individual project to study, discuss, and decide necessary interconnections proposed by APP.

#### 4.6. Capacity building for next steps

Basic idea and methodology about capacity building is consistent with ATSO implementation plan. The following are the key points from the ATSO implementation plan made by Nord Pool Consulting:

- (1) The introduction of the APP organization will create a need for training and capacity building for both the APP organization and relevant shareholders in the AMS.
- (2) The capacity building is most likely needed throughout the whole APP establishment and organizational building phase from initial stage to advanced stage.
- (3) The capacity building should be applied whenever and wherever a new function or field of work is added to the APP where the employees require additional knowledge and expertise to run the new tasks and operation duties.
- (4) The training of AMS TSO controllers is key to ensuring operational security and reliability of the interconnection.
- (5) The high-level training plan for the APP organization should consist of three parts:

- a) Administrate APP, business transparency and business execution
- b) Manage APP, business improvement and development
- c) Operate APP, system planning, operation and coordination, IT and SCADA, trading

In capacity building for system planning, the system planning department starts activity after the establishment of APP. At the initial stage, the working group discuss the rules, regulations, procedures, and criteria on how to implement system planning study in APP supported by AMS experts. To prepare for the discussion, capacity building to APP staff and AMS experts to participate in the working group is essential. Capacity building is implemented at the first stage of the working group activities. At the advanced stage, after decision on rules, capacity building to inform new standard to the AMS experts and all related shareholders in the AMS is necessary. A summary of the two stages is shown below.

(1) Initial stage

a) Contents

To prepare for the discussion in the working group to decide the rules, regulations, procedures, and criteria on how to implement system planning study in APP supported by AMS experts

(b) To whom

- (i) APP staff in charge of system planning
- (ii) AMS experts of system planning
- (iii) Relevant shareholders in the AMS

(2) Advanced stage

b) Contents

To inform new standard

c) To whom

- (i) APP staff in charge of system planning
- (ii) AMS experts of system planning

## 5. Barriers and solutions

For next steps, the key point is discussion in the working group at the initial stage after APP establishment. Table 11 summarizes the discussion points.

**Table 11. Discussion Points in the System Planning Working Group**

No.	Barriers	Solutions
1	Error! Reference source not found. To set the annual schedule and decide date of submission	All items should be discussed in the working group with AMS experts, and minimum parts should be standardized.
2	Error! Reference source not found. <b>for system planning</b> To decide the necessary and minimum data to submit to APP (i) Demand/supply capability (ii) Plan to construct/depreciation power supply and distribution facilities (iii) Plan to utilize of interconnections	
3	Error! Reference source not found. To decide the evaluation method of the supply plan to judge the necessary interconnections	
4	Regarding individual project, to decide who participates, how to proceed, what to be discussed	
5	Error! Reference source not found. Regarding planning of repair and augmentation of interconnections, to decide the criteria, how to study, what to be proposed by APP	
6	Error! Reference source not found. <b>and s</b> Error! Reference source not found. To standardize criteria and procedures to develop demand forecast, PDP, TDP, etc.	
7	<b>Software for system analysis</b> Each software for generation and transmission planning should be discussed whether to set the standard	

AMS = ASEAN member state.

APP = ASEAN Power Pool.

PDP = power development plan.

TDP = transmission development plan.

Source: Authors.

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