



ASEAN ENERGY MARKET INTEGRATION (AEMI):

## **POWERING ASEAN: CAN THE NORDIC MODEL WORK?**

HAPUA-AEMI WORKSHOP

24-26 May 2016

Aryaduta Hotel, Jakarta

1. The “ASEAN Vision 2020” placed emphasis on the need to construct transboundary energy networks across ASEAN, and this priority was embodied in all subsequent ASEAN decisions and plans. The ASEAN Power Grid (APG) is the flagship of such a vision, so as to: (1) achieve long-term security, availability and reliability of energy supply; (2) optimize the region’s energy resources; and (3) allow access to affordable energy to populations across the region. While much of the infrastructure for the APG has now been built over the last decade, the grid does not yet function on a multilateral basis.
2. A HAPUA-AEMI Workshop was convened on 24-26 May 2016 to provide participants with an overview of the Nordic electricity exchange Nord Pool and the Southern African Power Pool (SAPP), with a view to examine whether similar approaches could be adapted to ASEAN and allow the APG to operate on a multilateral basis. If deemed appropriate, participants would then contribute to formulating the objectives and spelling out the terms of reference of a Feasibility Study for the creation of an ASEAN Electricity Exchange (AEE). Finally, participants would also consider the collaborative approach for delivering this Feasibility Study, whereby ASEAN officials would work seamlessly with a consortium of experts from Norway (lead), the U.K. and South Africa to deliver such Feasibility Study and to outline the options in moving forward.
3. The Workshop was held under the Chatham House rule, whereby participants are free to use the information received, but neither the identity nor the affiliation of the speakers, nor that of any other participant, may be revealed. It was attended by some 35 participants, including energy officials from the ASEAN Center for Energy, ASEAN Power Grid Consultative Committee, as well as academics from ASEAN institutions. Also present were experts from Nord Pool Consulting (Norway), Ricardo Energy & Environment (U.K.) and from the Embassy of Norway, Singapore. The ASEAN Secretariat participated as an observer.
4. Experts described the Nordic power market, its operational structure and modalities, and its dynamic price setting algorithm. The Nord Pool electricity exchange was created to carry out the task of setting out the price that balances supply and demand in the power market. Its spot market is an auction-based exchange, which receives bids and offers from producers and consumers, and calculates an hourly equilibrium price that balances these two sides. The key benefit is that this system enhances efficiency, and therefore delivers electricity at the most cost-effective price, maximizing the benefits of both producers and consumers. Nord Pool publishes a spot price for each hour of the day, and is currently the central electricity market for Nordic and Baltic electricity, as well as the U.K.

5. The Nord Pool model has been adapted and implemented successfully to create an integrated regional energy market in Southern Africa, the Southern African Power Pool (SAPP), established in 1995, though in a simplified model where state-owned, vertically-integrated utilities sell their net excess capacity. The model has also been successfully adapted and implemented in less than a year in the 29 states throughout India.
6. Experts emphasized that the functioning of the Nordic model as a regional market does not require interference with that the national market, and as such, its creation does not require to modify national pricing systems (including subsidies), or to change the ownership structure of utilities (privatization), or to create regional bodies to supersede national regulatory authorities. In fact, subsidies are still prevalent in several countries participating in such an exchange, utilities have not all been unbundled and privatized, and each participant country has maintained its own regulatory agency. Likewise, although there is a regional market operator, each country has its own market transmission system operator, working closely with the regional operator.
7. Experts also reported that since the introduction of Nord Pool, the demand for power in Nordic countries had steadily increased, while investments in new power generation had not had the same growth rate. This is because the interconnection capacity between Nordic countries resulted in exploiting the diversified power generation sources across the region in a more efficient manner: hydropower in Norway, wind power in Denmark, thermal resources (including nuclear) in Finland, and hydropower in Sweden (north) along with thermal (south). For example, when precipitations are high, Norway and Northern Sweden have excess cheap hydropower, and in dryer seasons the thermal base load comes from southern Sweden and Finland. When the wind blows, Denmark has a lot of cheap wind power, while otherwise it can rely on the support from the regional market.
8. Experts described SAPP operational and organizational structures, serving 16 member countries, 280 million people, with installed generation capacity of 62 GW and available capacity of 47 GW. The aim pursued by the creation of SAPP was comparable to the one pursued by ASEAN through the APG, namely to enable national power capacity to optimize social welfare and to increase security of supply. Leveraging complementarity across countries was a major factor for its success, as was the case in the Nordic countries. Moreover, it has similarly evolved through time, and is expected to continue evolving at its own pace until it reaches its full potential.
9. In discussing the key factors of success of the Nordic and SAPP model, experts identified the following:
  - (a) the stepwise approach adopted for its development, both in terms of geographic coverage and product offerings, which have evolved through learning while doing, and adjusting over time from simple to more comprehensive models;
  - (b) the transparency in the price formation algorithm and for wheeling fees setting, based on prevalent power surplus and deficit conditions traded on the market at a given time;
  - (c) the ability to leverage complementarity and to exploit cost synergies across participating countries, so as to deliver a secure power supply to all involved at a more competitive price.
10. Experts emphasized that bilateral and multilateral contracts are still prevalent both in the case of Nord Pool and SAPP, and that they co-exist along with the instruments provided at the regional level through the regional electricity exchange. Furthermore, in the case of SAPP, member countries still exhibits different degrees of electricity market reform, but this has not impeded the development of their regional trade. Indeed, independent power producers and independent transmission companies

are starting to participate in the regional market, alongside traditionally vertically integrated companies.

11. Participants agreed that the creation of an ASEAN Electricity Exchange (AEE) would allow utilities to sell power from excess capacity and purchase power to satisfy excess demand so as to balance the full operation of their national markets. It would therefore create the possibility (and not the obligation) to share resources between countries where there is excess generation and those where there is a lack of sufficient generation. From an operational perspective, this would allow utilities to balance services on a more cost effective basis, by trading with other participating countries rather than through striving for self-provision, subject to the availability of sufficient APG transmission capacity between them.
12. Participants recognized the Nord Pool and SAPP models provide novel approaches to making the APG multilateral, different from all those considered so far within ASEAN. They agreed that utilities will have a major role in driving the successful implementation of the AEE, and in supporting ASEAN objective for the APG to operate on a multilateral basis by 2018. A turning point will be for them to view such an approach as an opportunity to enlarge the scope of their operational activities, and enhance their profitability. Based on the Nord Pool and SAPP experiences, utilities would need to take into account the following facts:
  - (a) utilities could continue to remain vertically integrated, as unbundling is not a pre-requisite for regional connectivity and cross border trading on a commercial basis;
  - (b) utilities need not be privatized for the regional market to function properly, so long as they develop their approach to transitioning into regional operation, and agree a path to get there;
  - (c) utilities could develop new modes of operation in the regional market that would enhance their profitability and meet rising demand at a lower cost.
13. In terms of pre-conditions for the model to operate properly, experts emphasized that, based on international experience:
  - (a) a step wise approach is necessary, rather than a big bang where everything is attempted at the same time;
  - (b) bilateral and multilateral arrangements can continue to be developed, and if successful, they will expand as other members become ready to join; however, these should be concluded within the framework of the regional perspective, and also part of a market concept that includes short term trading;
  - (c) energy subsidies would not impede the functioning of the multilateral market, and their abolishment is not a pre-requisite for its establishment. However, from a fiscal perspective, it would be advisable to decouple subsidies from national market prices, so as to avoid distorting energy markets, and to develop alternative instruments that would best target the poor.
  - (d) complete regulatory harmonization across ASEAN is not a requirement for a successful AEE implementation.
14. Participants took note of the challenges of implementing the Laos, Thailand, Malaysia and Singapore Power Integration Project (LTMS-PIP), as a pathfinder to complement existing efforts towards making the APG function on a multilateral basis. Nevertheless, notwithstanding possible advances in the ongoing discussions to realize the LTMS, the creation of an AEE would provide a complementary approach to move forward with multilateral power trading across ASEAN. Participants recommended

that the core differences between these two approaches, and their inherent risks and benefits, be examined as part of an AEE Feasibility Study.

15. In discussing potential benefits from the introduction of an AEE, experts suggested that proper investigation of such benefits and costs should be examined as part of the AEE Feasibility Study. Nevertheless, on the basis of international experience (including Nord Pool and SAPP), the creation of an AEE would have the potential to carry significant benefits as follows:
  - (a) Allow the APG to operate on a multilateral basis, thereby unleashing the benefits pursued by its creation by ASEAN leaders in the first place;
  - (b) Achieve a more efficient utilization of ASEAN energy resources, connecting countries with surplus power generation capacity to countries facing a deficit within the region;
  - (c) Help ASEAN utilities balance their excess supply and demand, improve access to energy services, and reduce costs of developing energy infrastructure;
  - (d) Reduce the need for investment in power reserves to meet peak demand, therefore lowering operational costs while achieving a more reliable supply and reducing system losses;
  - (e) Attract additional investment in APG interconnection, by providing a price signal as a key catalyst to investors for their financial returns;
  - (f) Accelerate the development and integration of renewable power generation capacity into the APG, notably the abundant hydropower resources in Myanmar, Lao PDR and Viet Nam, as well as Cambodia (with hydropower yet to be fully developed). Such efficient sharing of renewable energy sources would also help substitute hydropower to present coal and other fossil fuels, thereby helping to curb emissions;
  - (g) Help expand power networks and client base, in a region where some 120 million people still lack access to electricity and clean cooking energy sources. In several cases, access to electricity will prove more economically viable through connections to the APG rather than extensions of the national grid, when additional investments are required. Moreover, even countries with an energy surplus can benefit from regional interconnections by servicing their deficit areas more efficiently with power imports from the APG.
16. Regarding next phases for considering the creation of an AEE, participants agreed to recommend three phases, each providing a clear decision point before proceeding further:
  - (a) *Feasibility Phase* (6 months), to deliver an AEE Feasibility Study;
  - (b) *Design Phase*, to identify and deliver preparatory tasks needed to create the multilateral market;
  - (c) *Implementation Phase*, to deliver an AEE, ready to operate.
17. Participants agree that the core purpose of the AEE Feasibility Study is to allow ASEAN policy-makers to determine whether its creation would enable the APG to operate on multilateral basis by 2018, therefore allowing it to deliver the benefits it holds for ASEAN Member States (AMS). In this respect, the study should be conducted in a collaborative approach, with an ASEAN core team working seamlessly with the consortium of experts. The AEE Feasibility Study should cover the following components:

## **0. ASEAN Economic and Energy contexts today**

### **I. Rationale for a multilateral electricity exchange in ASEAN**

- a. Why an Electricity Exchange in ASEAN?
- b. What are the alternative models for electricity exchanges?
- c. What are the learnings from experience with electricity exchanges around the world, notably in Nordic countries and Southern Africa?
- d. Which of these models would be most suitable for adaptation to ASEAN?
- e. Based on international experience, what are the expected benefits for AMS?
- f. Increased operational economic and financial efficiency
- g. The Day-Ahead Market (DAM) as cornerstone for an ASEAN multilateral market design
- h. Financial and economic impact of the new multilateral market

### **II. Features of an Electricity Exchange**

- a. Key design features
  - The DAM as a tool for connecting the region
  - Local control, regional cooperation
  - Co-existence of bilateral trade and markets
- b. Key operational roles
  - Transmission System Operators (TSO)
  - Utilities and other stakeholders in the national electricity market
  - Regulatory Authority
  - Roles of national regulatory authorities
  - Agreements & Licenses

### **III. ASEAN SWOT-Analysis**

- a. Identify the parameters for conducting a SWOT (Strength, Weakness, Opportunity, Threat) Analysis to gauge preparedness to participate in a multilateral market; and to identify the opportunities emerging from such participation
- b. Implications on utilities and governments at the national and ASEAN levels, including required adjustments to current investment and business planning.

### **IV. AEE: Operational Structures**

- a. Business model for the AEE
  - Income model
  - Operational costs
- b. Ownership model
- c. Legal setup
  - Governance
  - Ownership structure

**V. AEE: Organizational Structures**

- a. Legal requirements
- b. Design of the Electricity Exchange organization
- c. Design Products and Draft Market rules
- d. Capacity building
- e. Market structure
- f. IT requirements

**VI. Options and Recommendations**

- a. Main findings
- b. Identification of options for AEE structure
- c. Recommendations

**VII. Next steps**

- a. Action plan for the establishment of the AEE by 2018
- b. Cost estimates for AEE design and implementation

18. Participants agreed that the decision to carry out the AEE Feasibility Study would require an assessment of the resources needed (both human and financial).
19. Participants recommended that HAPUA present the conclusions from this Workshop to HAPUA Member States, asking for their response, and report to the next SOME on 12-15 July 2016 in Naypyidaw, Myanmar, that HAPUA will conduct the Feasibility Study for the creation of an ASEAN Electricity Exchange (AEE), to allow the APG to operate on a multilateral basis by 2018.

*Adopted unanimously*

*HAPUA-AEMI Forum, Jakarta, 26 May 2016*