World Energy Council

CONSEIL MONDIAL DE L'ENERGIE

KOMITE NASIONAL INDONESIA

Prospek Bisnis Terkait Kebijakan *Power Wheeling* dalam Rangka Meningkatkan Penyediaan Tenaga Listrik – *The Way Forward*

Coffee Morning - Short Discussion
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4 Basic Models for Industry Structure [1,2]

Key Items	Model 1	Model 2	Model 3	Model 4
Characteristic	Vertically Integrated Monopoly	Single Buyer	Wholesale Competition	Retail Competition
Definition	Monopoly at all levels	Competition in generation	Competition in generation and choice for DITSCOs	Competition in generation and choice for final consumers
Competing Generators	Tidak	Ya	Ya	Ya
Choice for Retailers?	Tidak	Tidak	Ya	Ya
Choice for Final Customers?	Tidak	Tidak	Tidak	Ya
Note	• No one may buy from independent generator. • All final customers are supplied by the incumbent utility	• Only the existing integrated monopoly in the assigned area is permitted to buy from IPP (the competing generators). • The design of PPAs is a major feature.	• DITSCOs are given the right to buy direct from IPPs, but they retain a local franchise over retailers customers. • IPP will need access to the transmission network through trading arrangement for the network.	• Permits all customers to choose their suppliers & are given the right to buy from IPP. • Access to transmission and distribution network are required.

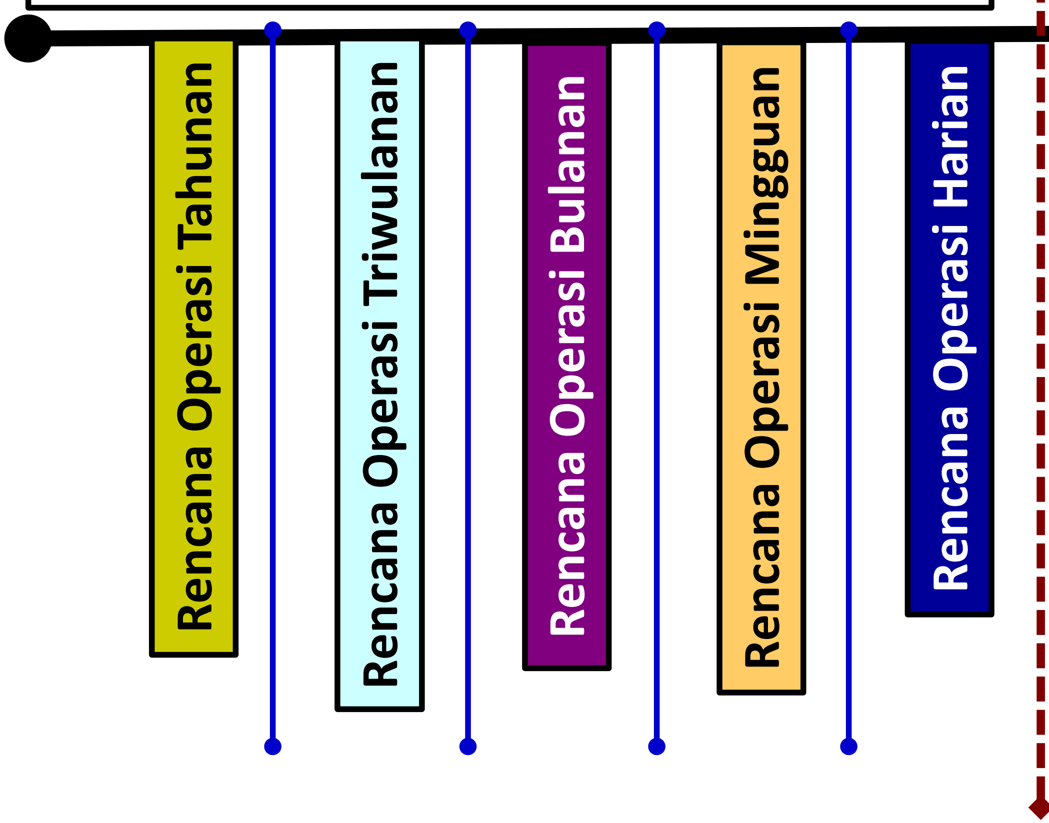
Key Tasks of Power System Operation Planning, Operations & Controls

Pre-Operational Phase

- Load Forecasting
- Generations maintenance scheduling
- Transmissions maintenance scheduling
- Hydrothermal scheduling
- Optimal fuel use and scheduling
- Generations unit scheduling
- Optimal power flow
- Static and dynamic security assessment

Operational Phase

- Hourly – short term (on line load) forecasting
- Static and dynamic security assessment
- Contingency & congestion analysis
- Optimal power flow
- Balancing system
- Preventive, emergency and restoration actions and controls.



Continue real time system operation to maintain sustainable secure, optimal, standard quality level of real time supply and demand balance

Wheeling – Direct Access [3,4]

- Wheeling is the conveying of electric power from a seller to a buyer through a third-party-owned transmission network (i.e. Utility to utility; Utility to private customer; Private generator to utility; Private generator to private user)
- In the deregulated markets, the objective of pricing the transmission service are economic efficiency, revenue sufficiency (achieve financial objective), ease of implementation/monitoring, and efficient regulation. In contrast to the traditional regulated market, the knowledge of costs is used to set prices, not just to minimize the total cost of building, operating and maintaining transmission lines.
- The two critical elements determining the wheeling rates are the prices determined in relation to the real-time situation and those determined through market-based competition. The components of cost are operating cost, existing system cost, opportunity cost and reinforcement cost.

Transmission Open Access (TOA) [3,4]

- Since open access, entities that did not own transmission lines were granted the right to use the transmission system.
- The aim of TOA is to introduce competition into the traditional cost-of-service regulated utilities without giving up the existing regulating structure and at the same time obtain reliable and economic electric service.
- There are two big issues concerning the implementation of TOA: i) Economic issues – marginal pricing with a supplement for revenue incentives is an economically efficient option. The different kinds of allocations are rolled-in allocation, contract path allocation, incremental cost allocation and megawatt mile allocation, and ii) Operational issues – the three different considerations are before the fact, real-time and after the fact.

Some of Associated Transmission Access Issues [5,6,7]

Institutional Issues: the evolving industry structure; Industry Structure: Relationships between business functions, Transmission rights, Operating systems, Pricing models, etc.

Planning Issues: Reliability under TOA; Parallel paths/loop flows; Network capacity evaluation; Reserves; Responsibilities & obligations.

Operation Issues: Scheduling; Dispatch and Controls: Balancing challenges, Keeping voltages & frequency at appropriate level, Guaranteeing system security, and Restoration planning, as well as covering transmission losses; System monitoring & reporting;

Analytical Issues: How to evaluate the impact of a wheeling transaction; How to determine if a transaction is making unauthorized use of the transmission system; How much is a system's reliability degraded due to a transaction, and What's a "fair" price to charge for use of a transmission system.

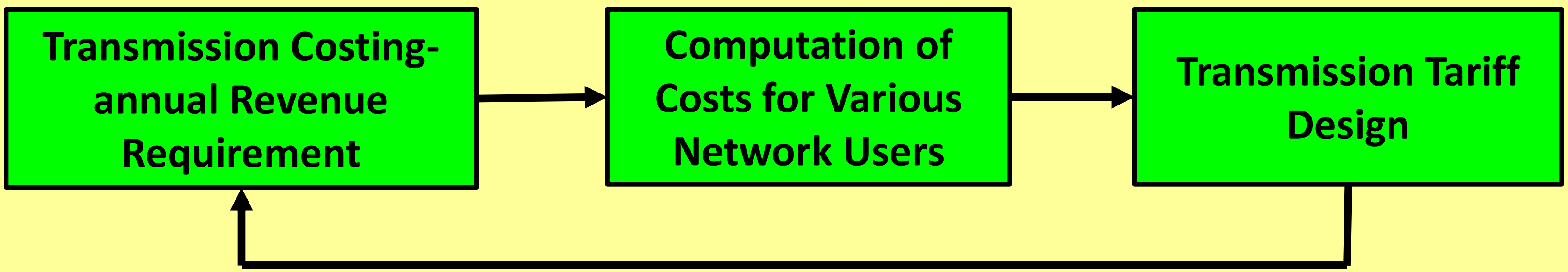
Economic Issues: Costs of transmission services; Cost of wheeling methodologies; Contract path versus actual power flows; Formation of transmission region.

Asset Management Issues: Safety, reliability and sustainability; Planning and controlling financing and expenditures; Optimizing maintenance activities.

Key Associated Issues of Appropriate Transmission Pricing Framework [4]

- **What transmission services will be provided?**
- **How much do these services cost?**
- **What are the reasonable revenue requirements for the transmission service provider?**
- **What methods are most appropriate for charging transmission customers (generators, distribution business, large high-voltage customers)?**

Transmission Pricing Process



Annual Revenue Requirement

- **Annual Depreciation Expenses.**
- **O & M Expenses.**
- **Return on Net Fixed Assets.**
- **Losses.**

In addition to meeting revenue requirements, some key issues need to be addressed: Promote efficient day-to-day operation of the bulk power market; Encourage investment and determine location of generation and transmission lines; Compensate owners of transmission assets; and be fair and practical to implement.

Transaction Cost Allocation [3,8]
(Contoh)

The rules can be divided into 2 main categories:

- **Embedded-Cost-Based Approaches, and**
- **Marginal-Cost-Based Approaches.**

Embedded-Cost-Based Approaches

1. **Postage Stamp Method**: this transmission pricing method allocates transmission charges (existing or rolled-in) based on the magnitude of the transacted power. The main justification for using this pricing method has been that the entire transmission system is considered as a centrally operated integrated system. The simplicity of this approach is also one of its strongest selling points. Since this method ignores the actual operation, it is likely to send incorrect economic signal to transmission customers.
2. **Contract Path Method**: in this method a specific path between the points of delivery and receipt is selected for a wheeling transaction. This path is called the "contract path" and is selected by the utility company and the wheeling customer usually without performing a power flow study to identify the transmission facilities that are actually involved in the transaction. A portion or all charges associated with transmission facilities in the contract path is then allocated to be the wheeling customer. If new transmission facilities are to be built as a result of the wheeling transaction, they usually included in the contract path. This method also ignore the actual system operation.

Transaction Cost Allocation [3,8]
(Contoh)

3. **Distance Based MW-mile Method**: This method allocates the existing or rolled-in transmission charges to wheeling customers based on the magnitude of the transacted power and the aerial distance between the transacted power delivery and receipt points.

   This method also neglects the actual system operation. The aerial distance does not indicate the actual transmission facilities involved in the transaction or the reinforcements required to accommodate the transaction. Hence, wheeling customers are likely to receive and act upon incorrect economic signal.

3. **Power Flow Based MW-mile Method**: The power flow based MW-mile method allocates the charges for each transmission facility to transmission transactions based on the extent of use of that facility by these transactions. The allocation charges are then added up over all transmission facilities to evaluate the total price for use of transmission system. For this reason, this method is also called facility-by-facility method.

   Since this method allocates transmission charges facility by facility based on maximum use of each facility, it emulates the actual transmission planning process for system reinforcements which is based on local consideration rather than coincident peak condition for the overall system.

Transaction Cost Allocation [3,8]
(Contoh)

Marginal-Cost-Based Approaches

1. **Short-Run Marginal Cost (SRMC) Pricing Method**: In this pricing method, the marginal operating cost of the power system due to a transmission transaction is calculated first. Marginal operating cost is the cost of accommodating a marginal increase in the transacted power. The marginal operating cost per MW of transacted power can be estimated as the difference in the optimal cost of power at all points of delivery and receipt of that transaction. The marginal operating cost is then multiplied by the magnitude of the transacted power to yield the SRMC for the transmission transaction. SRMC prices for a transmission transaction are normally calculated with the transaction included in the base case. As a result SRMC prices are higher than the actual operating cost of accommodating the transaction. It has been proposed that this extra "profit" be accumulated by the wheeling utility to fund future transmission expansions.

   In addition, SRMC prices my not closely follow a transmission transaction actual operating cost if the magnitude of the transacted power large compared to the magnitude of native load in the transmission system. Finally, "profit" collected through this pricing methodology generally fall far short of the cost of lumpy transmission reinforcements. Hence, SRMC prices may discourage the host utility from expanding its transmission system. In fact, should the host utility make any expansion in its transmission system, the SRMC prices will decrease dramatically reducing the possibility of recovering transmission reinforcement costs.

Transaction Cost Allocation [3,8]
(Contoh)

Marginal-Cost-Based Approaches

2. **Long-Run Marginal Cost (LRMC) Pricing Method**: In this pricing method, the marginal operating and reinforcement costs of the power system are used to determine the prices for a transmission transaction.

   Over a "long' time horizon of several years, all transmission expansion projects are identified and costed. This cost is then divided over the total power magnitude of all new planned transactions to calculate the marginal reinforcement cost.

   The reinforcement cost component of a transmission transaction can be evaluated based on the changes caused in long-term transmission plans due to the transmission transaction. Although the concept of reinforcement cost is straightforward, its evaluation is very difficult as it involves solving the least cost transmission expansion problem. There are concerns related to allocation of the reinforcement costs among multiple transactions that collectively cause such costs.

The Way Forward

- **Identification of resource requirements of each alternative transmission pricing methods, such as: i) Metering Equipment, ii) Billing/collection system, iii) Required software/hardware, iv) Required associated staff, and v) Training requirement.**
- **Analyze and evaluation of potential transmission pricing methods, with evaluation criteria, such as:**
  - **Economic efficiency: Cost/Usage reflective; Loss reflective; Congestion reflective.**
  - **Pricing objective: Meeting revenue requirement; Fairness; Stable & predictable.**
  - **Ease of implementation: Resource requirements; Complexity.**
- **Recommendation of the most appropriate methods. Advance the methodology in phases (if exists in this option) which is in line with the power sector situations, and establish the implementation plan consistent with sector migration process.**
- **Recommend procedures and its associated required steps, required resource, and its time frame in line with the recommended implementation plan.**

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Thank You