TA 8830-REG Harmonizing the Greater Mekong Sub-region Power Systems to Facilitate Regional Power Trade

Summary of WGRI Activities
Our work to date

- Initial work focused on defining a **Methodology for Wheeling Charges** (MWC) covering **power flows between countries** – Report 2 – Third Party Access and Wheeling Charges

- The MWC generates revenues for the transmission utility in Country B, but these will be a relatively small proportion of the total revenue requirement

- **National Transmission Charges** are the main source of revenue for the transmission utilities

- Generally in the GMS these are recovered by **Postage Stamp Charges**

- WGRI members expressed interest in **enhanced Postage Stamp Charging methods** in June 2018, with objectives of:
  - More cost reflective charges
  - More accurate price signals to system users
• How to recover revenues from national transmission users?
  – Generators
  – Consumers

• How to ensure cost recovery for transmission utility?

• How to encourage efficient use of the transmission network?

• Trade-offs between efficiency, simplicity, stability…
  – Need to find a methodology that is not too computationally intensive

• Discussion began in WGRI in June 2018, in dialogue with EGAT, but looking for a general approach – considering **seasonal and time of day** improvements, amongst others
# GMS Transmission Pricing Methods

<table>
<thead>
<tr>
<th>Country</th>
<th>Postage Stamp</th>
<th>Contract Path</th>
<th>Distance-based MW-km</th>
<th>Flow-based MW-km</th>
<th>LRMC based nodal/zonal</th>
<th>SRMC-based nodal</th>
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<tbody>
<tr>
<td>Cambodia</td>
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**Notes:**
1. “Implicit” means that in these countries, whilst there is no specific transmission pricing mechanism currently employed, cost recovery for transmission takes place as part of an integrated end-user tariff and all customers are paying the same transmission cost per kWh of energy consumption. A postage stamp method is therefore implicitly being applied.
2. PRC is employing a variety of approaches for different types of transactions (intra-provincial and inter-provincial)
## International Examples of Transmission Pricing Methods

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<tr>
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Key observations

- Within the broad category of postage stamp charging for electricity transmission there is **considerable variation** in the methods employment by different utilities in order to enhance the strength of the price signals sent to system users.
- Significant work continues to be done on the methods that can be used for measuring utilisation of the network through **flow-based analytical techniques**.
- But there is *also* interest in how to modify postage stamp methods to make them more cost reflective:
  - Several options:
    1. Differentiation of charges based on **seasonal** and **time of day** considerations;
    2. Application of charges on the basis of **maximum demand** or **maximum generation capacity**, or on the basis of **energy consumption** or **generation**, or on a **combination** of **capacity** and **energy**;
    3. Tariff variation according to the **duration** over which power demand is taken from the system;
    4. Different levels of charge according to the **voltage level** at which users are connected to the transmission system;
    5. The inclusion of simplified **locational signals**, e.g. based on techniques such as the Tilted Postage Stamp approach.
    6. The inclusion of additional factors such as **reactive power** charging.
Points raised in WGRI discussion

- Questions for the GMS countries:
  - Are the new dimensions introduced, e.g., time of day and time of year; charge to generators and charges to consumers; capacity charges and energy charge; and locational charges can be applied in the GMS power sector/transmission system?
  - Is unbundling a prerequisite for making these sorts of changes, or can this be done already, with oversight from the regulators (either independent or govt. ministries?)
  - Can new factors, once applied, enhance the existing postage stamp scheme?
Many countries have sizable hydro resources, with clear seasonal variation, so there is strong desire to develop and apply **seasonally** varying transmission charges, reflecting changing flow patterns in wet and dry seasons.

Some countries already apply (in variant forms) capacity charges or will consider applying capacity charge in addition to energy (transmission) charge.

Current retailed tariff in all countries already have structures differentiated by consumer categories, which can be further developed for transmission **demand and energy charges**.

Locational charges for generators have limited relevance in countries where generation projects are defined specifically in Power Development Plans.

A more significant challenge is how to identify the costs of the transmission function within vertically integrated utilities.

In countries with more than one network owner, it would be possible for the utility responsible for energy sales to collect uniform postage stamp tariffs and redistribute to transmission owners.
Transco development
Earlier phases of our work on TA8830 (Report 2) have focused on third party access and the importance of having transparent regulations and processes around transmission.

Internationally, unbundling of the electricity sector to separate the transmission function has been part of this:
- There are many different models and examples of the creation of Transcos to draw on;
- Key features vary: network ownership and system operation may be combined roles or separate roles…

We have carried out more work to investigate a range of questions for the GMS:
- What are the advantages (maybe also disadvantages) of having a Transco?
- Why and When is a Transco needed?
- What are the regulatory requirements, licensing needs and commercial agreements required for creating a new Transco?
- How would the Transco be funded?
- Which assets would be transferred, and how would their costs be recovered?
Factors to consider

• The key reasons why a Transco is needed, as part of a broader electricity sector reform process.
  – these can include a combination of technical and commercial issues
  – planning, construction of new assets and operation of the power system.
• The roles and responsibilities of the Transco, highlighting the interfaces between the Transco and other power sector participants.
• The appropriate institutional and regulatory structures that would support the creation and regulation of the Transco’s activities.
  – Given that the Transco functions would form part of a monopoly activity in the power sector, it is important to ensure that there is adequate transparency in the operation of the Transco to protect users of the transmission network and end consumers of electricity.
• The principles for funding the Transco:
  – cost recovery
  – securing revenue requirements and reviewing regularly
• Transferring assets to the Transco and the basis on which these would be transferred from the incumbent utility.
Transmission Unbundling Options

Status Quo
- Vertically Integrated Utility
  - Generation
  - Transmission System
  - System Operation
  - Distribution/Supply

Option 1: TSO
- Vertically Integrated Utility
  - Generation
  - Transmission System Operator

Option 2: ISO
- Vertically Integrated Utility
  - Generation
  - Transmission System Owner
  - System Operation
  - Distribution/Supply
  - Lease
  - System Operation

Option 3: ITO
- Independent Transmission Operator
  - Generation
  - Transmission System
  - System Operation
  - Distribution/Supply
Possible regulatory structure for Transco

- **Regional Grid Code**
- **Country 1**
- **Country 2**
- **Country N**
- **Government Ministry**
- **Concession Agreement**
- **TRANSCO (Network Owner)**
- **Transmission Service Agreement**
- **System Operator**
- **Grid Code**
- **Technical Standards**
- **Use of System Agreement**
- **Connection Agreement**
- **Interface Agreement**
- **Regional Grid Code**
- **IPP** (Independent Power Producers)
- **State owned Gencos Distribution**
Conclusions

- There are many good reasons for establish transmission as an independent function from other activities, especially separating from generation, particularly to facilitate third party access.
- Models are fairly well defined, key issues are how best to meet a number of objectives:
  - New investment in transmission;
  - Level playing field for all electricity sector participants;
  - Meeting the needs of both power system operation and electricity market functions.
- Regulatory issues are significant:
  - Transmission is still a natural monopoly, however we organise it;
  - Complex range of licences and agreements required to protect all parties.
- Note the connection with transmission pricing/cost recovery:
  - An integrated approach is required to ensure financial viability of Transcos;
  - Important to remember that the residual element of charges is important;
  - Without a financially viable Transco, market and system operation would be jeopardised.
All countries acknowledge the advantage of Transco, namely relieving the financing burden by the governments.

A variety of Transco models are currently being explored in the GMS countries, and some of these are evolving.

Even in situations where there is a vertically integrated utility, e.g. Thailand, steps are underway to ringfence the Independent System Operator function and expose this to clear regulation.

Different models are being explored involving state ownership of the Transco (Thailand, China), potential private ownership (Lao PDR).

It is possible to take the generic model shown and adapt it to many of the specific situations in the GMS – noting that in Cambodia, for example, EDC is both the system operator and single buyer, but there are 4/5 different transmission owners.
Next Steps

Sources: Transpower
In many countries the **enabling environment is already in place** to enable the sorts of developments in pricing and Transco organisation that were discussed.

It was noted that Transcos can be “for-profit” organisations, especially if they have private investors. **Ancillary services costs** need to be recoverable by the Transcos through charges. Wheeling charges need to recover an element of **capital cost** as well as just **short-term operating costs**, as a contribution towards the sunk costs of system assets.

**What issues remain for the WGRI to address?**
- Developing the basis for trading energy in the region, as opposed to wheeling charges etc. This could begin with simple, **pilot bilateral trades** developed as a paper exercise to test pricing principles (the early development of Nord Pool was quoted).
- Practical steps for the region, based on international experience, which has now been fully researched. Need to move from **research to implementation**.
- There will always be country-specific factors to be considered in Transco organisation and network pricing, but **pilot studies of how trading could work** are important.
- This should include examining the effects on charges of **wheeling through multiple countries**.
- Should consideration be given to having a **single Transco** for the region?
- More **capacity building** in trading practicalities will be required in the region.
Thank you!
Road Map
Objectives of Transmission Pricing Road Map

- At the RPTCC-24 Meeting in June 2018 it was agreed that a Road Map should be developed for integrating regional and national wheeling charges.
- The **key purpose of a road map** for implementing transmission prices is to **set down the overall strategy for achieving successful implementation of the methodology for wheeling charges** and any revisions that may be required to the national transmission pricing arrangements in the GMS countries.
- This includes a number of stages:
  - The completion of a set of **case studies** demonstrating specific aspects of the wheeling charge application, as discussed by the WGRI and RPTCC in June 2018;
  - The development of **national regulatory processes and procedures**;
    - including the changes to national transmission tariff regulations;
  - The completion of regulations and licences supporting **third party access**;
  - The development of a detailed **calculation procedure for developing the wheeling charges themselves**; and
  - Liaison with GMS power sector stakeholders to make them aware of the licensing and charging regimes that are being put into place.
The Road Map seeks to bring all these recommendations together and to show all the major steps that are required to implement wheeling charges successfully.

A first draft of the Road Map has been prepared to show the possible format and level of detail – this is for discussion and is not the finished article.

The Road Map shows activities that are required over a two-year time-frame, with indicative phasing of tasks.

It also splits the responsibilities for different actions between relevant stakeholders and organisations, as follows:

- The **RPTCC** – as the highest level body making authorising new transmission charging arrangements, and responsible for the work of existing and new working groups and bodies (including the RPCC);
- The **WGRI**, where much of the work on developing new regulations and final implementation of the wheeling charge methodology will be focused;
- The **WGPG (or WGPO)**, which has ongoing responsibilities for the development and implementation of a regional Grid Code and will coordinate regional planning activity.
Other parties with responsibilities:

- A proposed new **Working Group on Capacity Building (WGCB)**, which will have responsibilities for ensuring that GMS Stakeholders are fully familiarised with the opportunities for undertaking cross-border trading and the regulations and procedures involved;

- A new **Working Group on Market Monitoring (WGMM)**, which would monitor cross-border trading and review PPAs or any inter-company transactions that are entered into by the electricity companies in the GMS for compliance with the relevant regulations;

- The **power utilities and/or government agencies** in the GMS Member Countries, who will have specific responsibilities for supporting the calculation and implementation of new transmission tariffs in an integrated way; and

- The new **Regional Power Coordination Centre (RPCC)** - as and when this is established.
RPTCC Activities

2019

Q1
Create
Develop/Implement
Study
Recommend

Q2
WGCB
Regional transmission asset database
Platform for information exchange

Q3
Review results of case studies
Review the wheeling charge solution after case studies
Development of harmonised national transmission structures
Tariff arrangements to give 3rd party access to interconnectors with spare capacity

Q4
Implement Wheeling Charge Methodology (see separate roadmap)

2020

Q1
WGMM
Open access commercial principles and charges

Q2
RPCC
Implementation and management of wheeling charge methodology, supporting RPCC

Q3

Q4

Implementation and management of wheeling charge methodology, supporting RPCC

Open Access regulations

Review results of case studies
Implement Wheeling Charge Methodology (see separate roadmap)
Review the wheeling charge solution after case studies
Development of harmonised national transmission structures
Tariff arrangements to give 3rd party access to interconnectors with spare capacity
Points raised in WGRI discussion

- There is overall support for the concept of developing a road map for implementation of wheeling charges in this sort of format.
- The importance of specific activities such as the development of a regional transmission asset database was noted – getting an agreed database of standardised costs will be very important for calculating wheeling charges.
- There is a need for a broader roadmap of activities than just the wheeling charge tasks – this should be integrated with a road map of WGPO work.
- The possibility of creating new working groups was noted.
- The road map must be a practical document and not seek to be a “perfect” description of the ideal way of implementing changes.