EIUG – Wheeling Methodologies

Wheeling methodologies with advantages and disadvantages of each method

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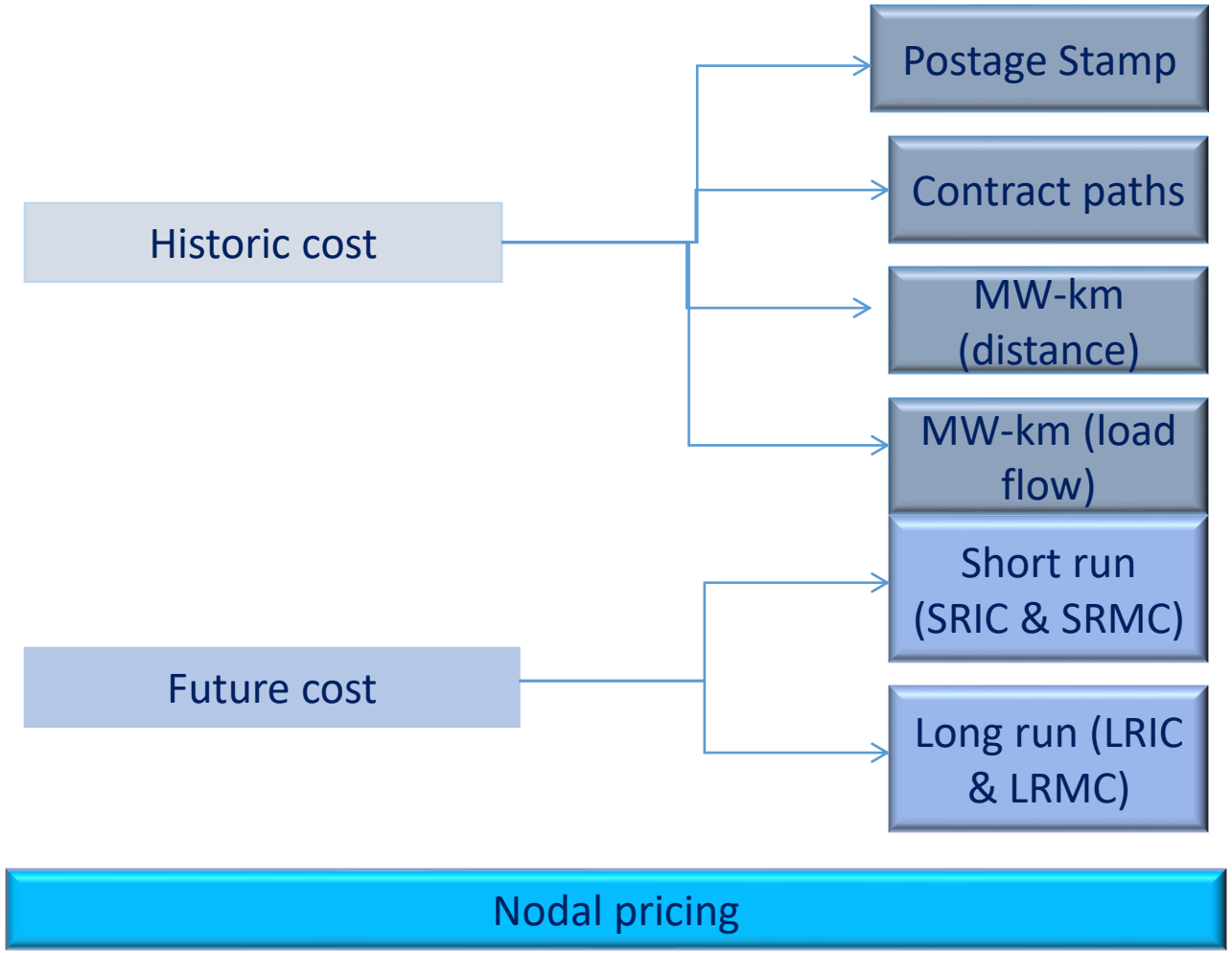
SUMMARY OF TRANSMISSION PRICING METHODS



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HISTORIC COSTS – POSTAGE STAMP

- Method
  - Costs shared equally regardless of location or utilisation.
  - An enhancement to the methodology is to apply different postage stamp charges to different zones or areas
- Advantages
  - Full historic cost recovery encouraging efficient level of investment
  - Simple, stable charges
  - An improved ability to signals the costs of decisions of individuals
- Disadvantages
  - Does not take into account of utilisation of system, lack of incentive for system users
  - Potentially discriminates between users
  - Low economic efficiency as it may lead to investments out of contract path as well.

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HISTORIC COSTS – CONTRACT PATHS

- Method
  - Costs based on the specific path agreed for an individual wheeling transaction
- Advantages
  - Full historic cost recovery encouraging efficient level of investment
  - Simple, stable charges
  - An improved ability to signals the costs of decisions of individuals
- Disadvantages
  - Does not take into account of utilisation of system, lack of incentive for system users
  - Potentially discriminates between users
  - Low economic efficiency as it may lead to investments out of contract path as well
  - Administratively complex when multiple wheeling transactions are facilitated

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HISTORIC COSTS: MW-KM (DISTANCE BASED)

- Method
  - Distance travelled by the energy in a specific transaction (MW-km) in relation to the total MW-km in the system
- Advantages
  - An improved version of postage stamp and contract path approaches
- Disadvantages
  - Does not take into account of system costs and actual operation in the system
  - Does not provide accurate economic signals to users

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HISTORIC COSTS: MW-KM (LOAD FLOW BASED)

- Method
  - Uses power flow model, hence reflects to a better extent, the actual use of the system.
  - Transmission prices reflect the proportion of system use.
- Advantages
  - An improved version of postage stamp and contract path approaches.
  - Simple, clear, stable charges
  - System congestion is starting to be taken into account
- Disadvantages
  - As power flows are less than circuit capacity fails to recover full capital costs.
  - Does not provide correct economic signals to users for future investments.
  - Results can fluctuate significantly following the introduction of new generators and loads that have an impact on load flows

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FORWARD LOOKING – SHORT RUN PRICING

- SRIC (Short Run Incremental Cost)
  - Short run incremental operating cost
  - Uses a model of optimal power flows
- SRMC (Short Run Marginal Cost)
  - The marginal cost of extra use of transmission system
  - The marginal operating cost of an extra MW
- Disadvantages of short run methods
  - Difficult to estimate the operating cost of a single transaction while multiple transactions are occurring simultaneously
  - Requires future forecasting , the accuracy of which can become decreasingly accurate
  - Data volatility in the short run can result in under investment
  - Additional disadvantages of SRMC method

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FORWARD LOOKING – LONG RUN PRICING

- LRIC and LRMC (Long Run Incremental Cost and Long Run Marginal Cost)
  - Both take into account of investment cost, in addition to incremental operating cost
  - Full long term costs including new investments
  - More stable prices compared to short run

- Disadvantages of long run methods
  - Difficult to estimate the operating cost of a single transaction while multiple transactions are occurring simultaneously
  - Double counting of investment requirements

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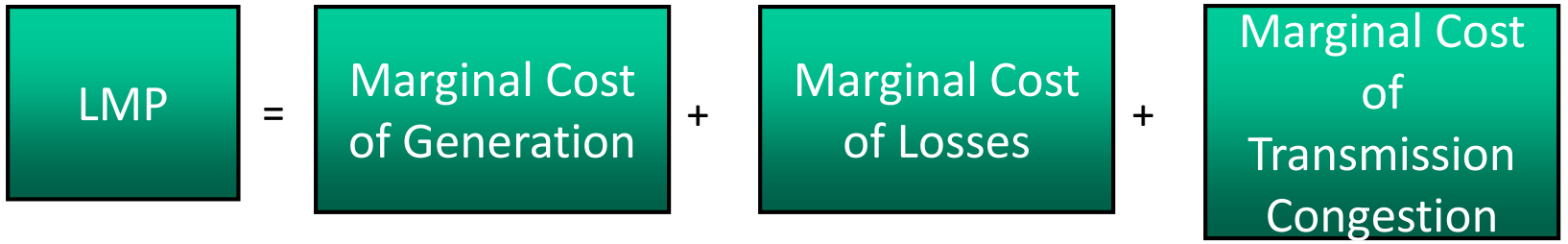
NODAL

- Node is typically a substation
- Generators and loads connecting at a node will have the same energy price, energy price at the node will depend on congestion on the transmission lines
- Each node has its transmission and losses charge for loads and generators depending on flow on lines towards or out of substation, these are the marginal costs and depend on the whole network

LOCATIONAL MARGINAL PRICE (LMP)

- A Locational Marginal Price is the cost of serving the next MW of load at a given location (node)
- LMPs are formulated using a security constrained dispatch and the marginal costs of supply are based upon participant offers and bids
- LMP consists of three components:



Source IMO Ontario www.theimo.com

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NODAL PRICING

- Method
  - Nodal charges vary at nodes depending on marginal cost of losses and congestion at that node
- Advantages
  - Economically ideal transmission prices
  - Ensures optimal dispatch thus maximizing allocative and dynamic efficiency
- Disadvantages
  - Possible under recovery of fixed costs due to marginal pricing
  - Requires constant real time information about loads, generators, bids and condition of the equipment
  - Potential Instability and complexity in methodology implementation

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SUMMARY

- The most prevalent wheeling charge methdologies are:
  - Postage stamp
  - MW-km
  - Load flow
  - Nodal
- Forward looking methodologies are economically and theoretically sound but suffer from revenue instability

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APPROPRIATENESS OF METHODOLOGY TO SOUTH AFRICA

Attributes	Postage Stamp per Zone (Eskom/NERSA)	MW KM	Load flow based	Nodal
Cost reflectiveness	Very little discrimination on location – encourages development in rural areas	Transaction based and cannot be easily applied to all consumers. Two methods required	Transaction based and cannot be easily applied to all consumers. Two methods required	Actual flow based
Prices	Prices are stable	Prices are stable	Prices are unpredictable in long term	Prices are based on marginal costs and vary dramatically
Cost recovery	Full recovery of transmission costs	Full recovery of transmission costs	Off sets required to fully recover costs	Off sets required to fully recover costs
Transparency	Transparent and Non discriminatory between customers	Transparent but potential discriminatory between customers	Transparent but potential discriminatory between customers	Transparent
Differentiation	Voltage level discrimination is cost reflective	Not applicable	Not applicable	Complex to explain and implement
Losses	Losses vary with periods based on pre-determined loss factors	Proportional to distance	Defined by load flow analysis	Losses marginally calculated
Cost allocation consistency	Generation and load charges are based on different zones and methodologies	Consistent	Consistent	Consistent
Complexity	Simple	Complex	Complex	Very complex

OVERALL OBSERVATIONS & RECOMMENDATIONS

- Eskom's approach represents a fair balance between cost reflectivity and complexity.
- However, there are potential areas for improvement including:
  - Subsidies represent a large proportion of perceived wheeling costs resulting pricing anomalies
  - Losses rebate limitation for distributor generators should be removed, and
  - Separate methodologies (and zone definitions) between generators and loads cause further distortions and pricing anomalies

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