Charging Issues Standing Group

Transmission Access Review: Forecasting time average SRMC

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Background

Several CUSC amendment proposals envisage charges based on forecast SRMC

- CAP164 WGAA
  - Connect and manage with targeted costs
- CAP166 WGAA3
  - Capacity and duration auction

National Grid has also been working on a potential further CUSC amendment proposal

- Prices set based on Users capacity, load duration and buy-back collar

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Agenda

Introduction

- Locational marginal prices
- Time average LMP: Methodology and assumptions

Preliminary results

- 2008/09 generation and transmission
- 2013/14 generation with developing transmission

Pricing issues

- LMP or LMP/LRMC

Further development work

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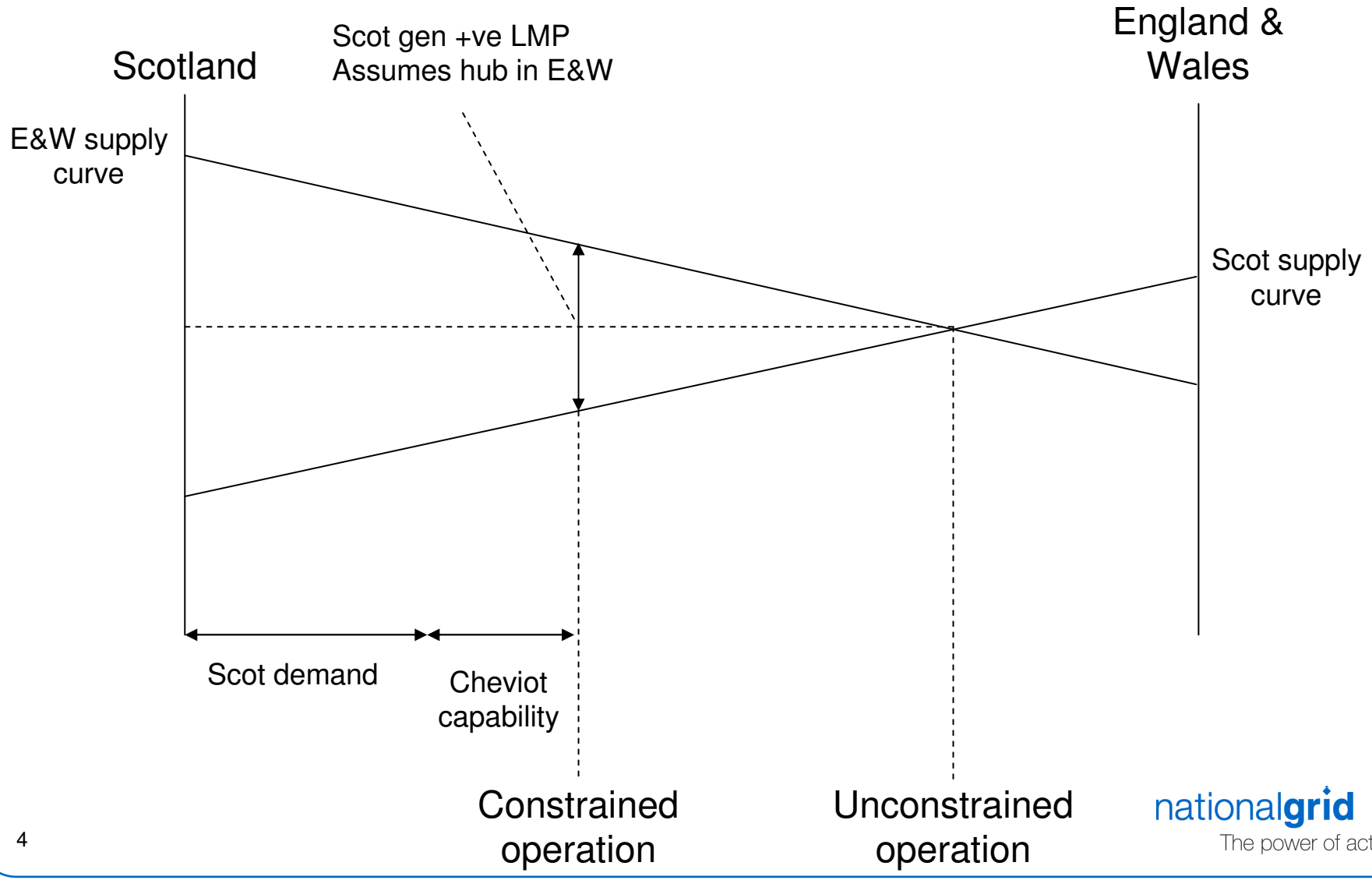
Introduction: Locational marginal prices



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Time average LMP: Dimensions of system modelling issues

Multiple years

- Need to consider test to justify incremental investment

Granularity of time modelling within year

- No of seasons / demand levels

Nature of loadflow model

- Boundary / dc loadflow / ac loadflow

Size of network and network modelling

- Transmission outages and reinforcements

Granularity of generation and merit order modelling

- Simplistic ranking order / derived from bid data

Style of modelling of generation availability

- Deterministic / probabilistic

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Time average LMP: Example methodology

Sample generation availability (based on capacity schedule)

Sample demand (based on forecast load duration curve)

Produce unconstrained schedule by setting generation = demand whilst minimising cost

- Need generation ranking order
  - Based on fuel cost, bid price collar, capacity schedule?
    - Fuel cost used in example
  - Produce constrained schedule by taking bids and offers to resolve system overloads whilst minimising total balancing cost
- Need to assume:
  - System capability
  - Bid prices at collar
  - Offer prices

Optimisation produces nodal shadow costs (locational marginal prices)

Multiply nodal shadow costs by forecast generation output and average to derive price

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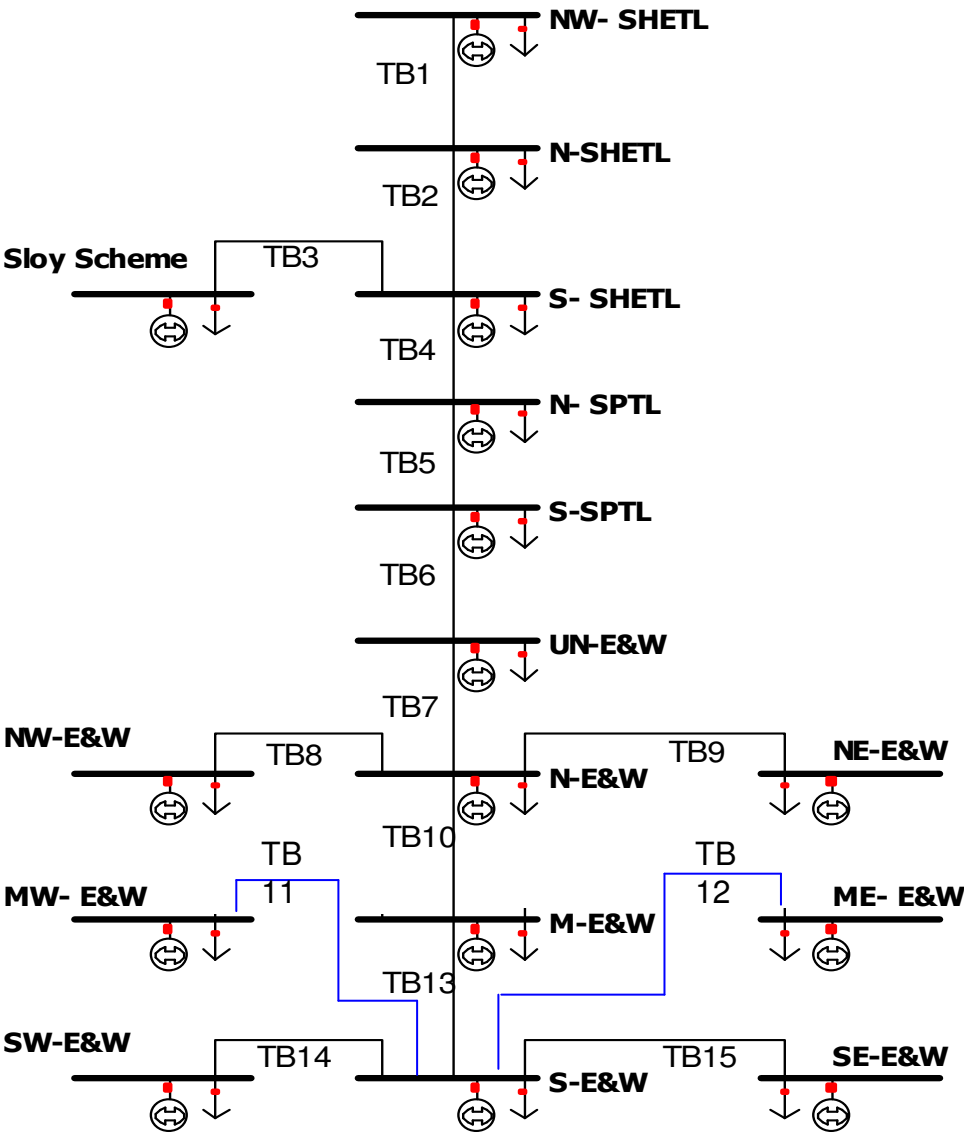
Time average LMP: Example methodology



Transmission system

- 16 node 'tree' model used to represent GB transmission network
  - Based on SQSS review work on DTIM
  - Modelled 2008/9 network and 2013/14 network

Other

- Typical bid and offer prices
- Typical capacity schedules

Note:

Model based on intact network only

Model has not been validated against more detailed constraint forecast work

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New amendment proposal: Initial pricing results

	North Scot Wind	North Scot Pump Storage	North Scot Base Gas	South Scot Marg Coal	Scot Nuclear
2008/09 generation & transmission	£17.05/kW	£30.89/kW	£42.82/kW	£39.36/kW	£36.92/kW
2013/14 generation					
2008/09 transmission	£162.48/kW	£277.46/kW	£299.55/kW	£274.55/kW	£257.47/kW
2012/13 transmission	£90.37/kW	£151.74/kW	£226.14/kW	£206.99/kW	£194.08/kW
2014/15 transmission	£20.02/kW	£36.46/kW	£49.93/kW	£45.47/kW	£42.61/kW

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Transmission investment

In 6 months prior to 'allocation', Users apply for local connection

SO and TOs derive appropriate local investments and range of wider investments

- Wider investments used to derive transmission supply function

Transmission investments triggered if test satisfied

- 50% NPV of investment paid by generation Users that benefit from lower LMPs as a consequence

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Pricing

Charge based on average LMP

- At efficient investment level, average LMP = LRMC
- Model anticipated investments (best attempt at efficient investment level given constraints such as planning delay, lumpiness, etc.)
  - Under investment – average LMP > LRMC
  - Over investment – average LMP < LRMC
    - Prospect of long bookings at low price could be mitigated by using LRMC as a ‘floor’

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Potential CUSC amendment proposal

Capacity, duration, load duration and buy-back collar

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Introduction

What is the theoretical 'right answer'?

- Expose all Users to ex post LMPs
- Sell FTRs (perfect hedge against LMP; rationed to system capability) in price auction

What are the practical problems?

- Impossible to 'bank' new projects based on exposure to ex post LMPs
- Users (particularly wind) don't know:
  - What level of FTRs they need
  - How much they should bid

How do we solve them?

- SO makes decisions on Users behalf based on information revealed via a capacity process
- SO calculates price based on the most efficient mix possible of FTR and LMP

What do we (may we) lose?

- Short-term signals (unless we can discover willingness to run in the short-term via the capacity process)

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High level description

Transmission access is allocated in an annual multi-round process

Users bid with capacity schedule (MW; proportion of the year), duration (years) and bid price collar

National Grid forecast average marginal prices (location and running regime dependent)

Users have the opportunity to revise their position

Process closes when deadline is reached or stability criterion is satisfied

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Further development work

Ranking order

- Based on User submissions of capacity schedule / bid price

Short-term signal

- Users submit bid price collar for windy / non-windy days?

Finalise charging proposals

- Generation only or generation and demand
- Average LMP only or combination of LMP & LRMC

Finalise investment test

- 50% NPV

Calculation of overrun volume and appropriate price

Impact of bid price collar

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