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Interconnection and Competition in the Hong Kong Electricity Supply Sector




Overview




Overview – 2 Main Topics

- increasing *interconnection* capacity between CLP and HEC
- potential for electricity *competition*




Overview – Questions to Answer

- increasing *interconnection* capacity between CLP and HEC
 - likely costs
 - potential benefits
 - other implications
- potential for electricity *competition*
 - alternative market structures
 - optimal market structure




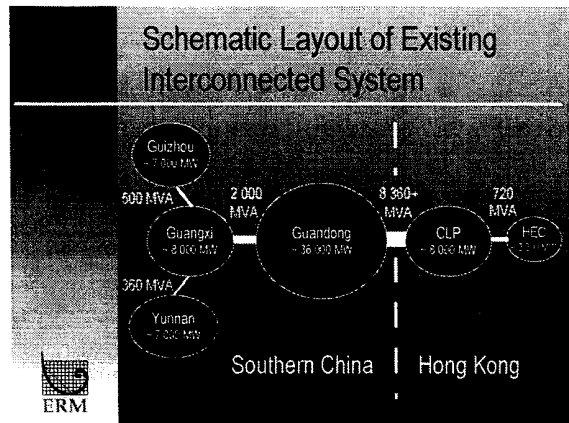
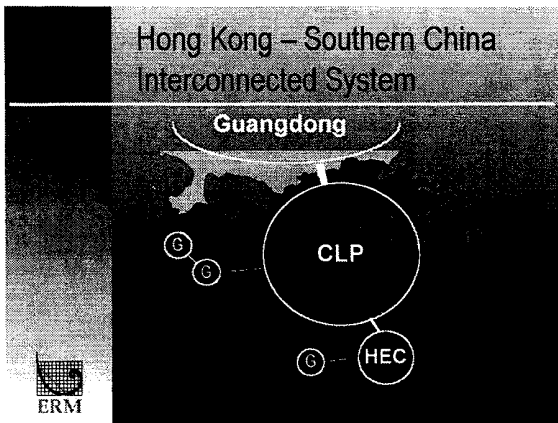
Overview – Significant Implications

- regulation* under the existing SCAs
- the present stage of the *investment cycle* for generation and transmission development of each utility
- Sets the *context* for the analysis



Interconnection





Interconnection Issues – Utility Investment Cycles Compared

CLP	HEC
6 generation units installed / 2 units remaining in first stage of major expansion	some small upgrades: (re-powering, conversion to CCGT) in near term planned major expansion not yet commenced
no major transmission additions required for generation expansion in near term	major transmission investments required
incremental costs low	incremental costs high

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Interconnection Issues – Planning & Regulation

Independent	Joint
Consider internal resource options	Consider internal and external resource options
Under SCA, try to maximise assets, subject to Govt approval	Find minimum assets to meet demand; minimum fuel cost to serve energy
Independent planning assumed under existing separate SCAs	Does not fit naturally with existing, separate SCAs

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Interconnection – Methodology and Approach

identify technically possible future generation and transmission *options*

analyse incremental *costs*

calculate effect on bills/revenues and tariffs under *SCA accounting*

assess any other technical and qualitative considerations

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Interconnection – Definition of Scenarios

Interconnection / Generation Scenarios based on 4 Interconnection Cases:

Base: existing 3 x 240MVA @ 132kV

A: add 4th 240MVA @ 132kV in 2004

B: add 2 x 550MVA @ 275kV in 2004

C: { add 2 x 550MVA @ 275kV in 2004
add 4th 240MVA @ 132kV in 2008

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Interconnection – Reliability

Reliability has many aspects

- Generation (Level I)
 - overall generation adequacy (LOLP)
 - operational considerations
- Transmission (Level II)
 - allowance for contingencies
 - transient stability
 - dynamic stability (LFO)
- Distribution (Level III)



Interconnection – Low Frequency Oscillations

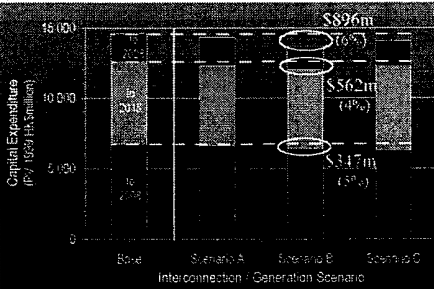
Low Frequency Inter-Area oscillations have been observed on the HEC-CLP interconnector

Eigenvalue analysis indicated that increased interconnection capacity as in Scenario B would help resolve this problem

Result is consistent with general principles of power system design



Interconnection – Economic Results of Scenarios



Interconnection – Key Outcomes

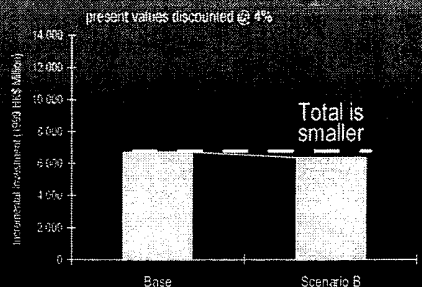
potential exists for *overall economic benefits* from substantially increased interconnection with joint generation expansion planning

but such a planning approach would be a significant extension of current practice requiring tri-partite negotiations

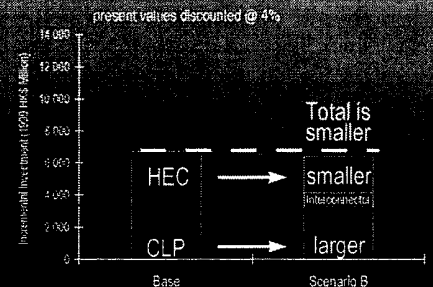
Also, under existing SCAs, benefits and costs would be *distributed asymmetrically* between the utilities and their customers



Interconnection – Focus on Base v Scenario B to 2008



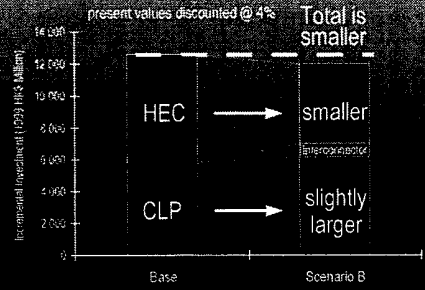
Interconnection – Focus on Base v Scenario B to 2008



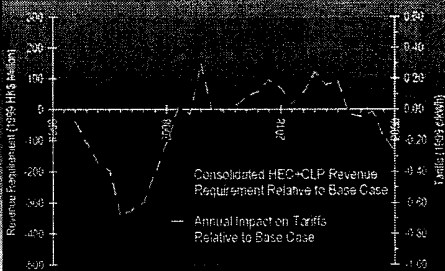
Interconnection – Focus on Base v Scenario B to 2018



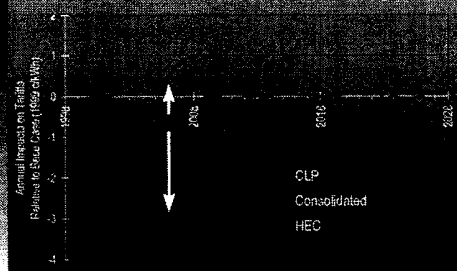
Interconnection – Focus on Base v Scenario B to 2018



Interconnection – Consolidated Financial Results Under SCAs



Interconnection – Asymmetric Financial Results Under SCAs



Interconnection – Conclusions

Critical decision point for additional capacity to meet HEC peak ~ 2004
two broad alternatives:
increase generation capacity at HEC; or
increase interconnection and sharing of reserve plant resources
timelines and logistics for planning, approval, design and construction need to be assessed, risk minimised




Interconnection – Recommendations

Increase interconnection and share reserve plant, subject to key considerations
Identify critical path for decision-making
Investigate the logistics and timing issues for the increased interconnection alternative
Negotiate ways to resolve the dilemma between overall economic benefits and SCA financial incentives with asymmetric investments



Competition




Competition – Key Issues

Hong Kong small/few power stations
 there are two vertically integrated, private electricity companies
 transmission interconnections exist between Hong Kong Island and Kowloon (small) and between Hong Kong and mainland China (large)
 increased HEC-CLP interconnection is a pre-requisite for competition
 existing SCA expires in 2008



Competition – Methodology and Approach

delineate *alternative market structures*
 evaluate each structure and its *applicability to Hong Kong*
 identify *optimal market structure*
 assess alternative *transition paths* from the present structure to alternative structures



Competition – Alternative Market Structures

<i>Single Wholesale Purchaser</i>	– competitive procurement possible as a first step
	– an ISO would need to be established
<i>Multiple Wholesale Purchasers</i>	– Need >2 competitors
	– China most likely source
	– Possible after 2008
<i>Full Wholesale & Retail Competition</i>	– Best to implement MWP first




Competition – Market Structure and Transition Paths

Best to introduce competition from the top down – from wholesale end
Single Wholesale Purchaser promising as a first step, followed by *Multiple Wholesale Purchasers*
 True wholesale competition requires a larger market with a bigger pool of competing generators



Competition – Conclusions

electricity sector competition is possible in Hong Kong
 but would require some degree of market integration with China
 so the exact timing depends on the development of the electricity sector in Southern China
 early discussions and broad, high-level planning could begin immediately



Competition – Recommendations

Competition is possible in the
medium- to long-term

Monitor developments in the
Southern China electricity sector
restructuring

Initiate discussions with the relevant
authorities in mainland China and the
Hong Kong utilities on possible future
market integration



Major Recommendations



Major Recommendations

Government develop a *long-term
strategy* for the electricity sector

specify the long-term goal

describe the transition path

specify relationships between time-line
and external developments outside Hong
Kong direct control



Advantages of the Recommended Approach

Stable environment & certainty for:

consumers

utilities

investors

Facilitate planning during transition

Ensure electricity needs are reliably
met at reasonable cost

