Regional Power Trade Unrealized Benefits for Central Asia for 2010-2014

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Objectives of the Study

Main Questions:

- What would have been the aggregate additional benefits for the fourcountry region had efficient trade been pursued during 2010-2014?
- How might those total benefits been distributed among the four countries had a set of pricing rules which evenly shared the benefits for cross-border trade been adopted?
- How might those benefits have changed if fuel prices for generation in the region had been at "export market" levels for cross-border trade, rather than at the levels which historically prevailed?





The Actual Situation for 2010-2014





Average Demand Growth Rate By Country, 2010 -- 2014



Water Spills by Country, GWh Total for 2010 -- 2014 was 14 TWh





Summary of Scenarios

REAL SIM C	 dispatch based on historic values of generation, consumption, fuel prices and approximated historic levels of cross-border power exchange (though Tajikistan is modelled as completely isolated).
T100C	 Economic least-cost dispatch, with 100% of cross-border transmission capacity available Historic levels of demand (i.e., actual consumption plus actual unserved energy) and fuel prices
REAL SIM	 dispatch based on historic values of generation, consumption, and approximated historic levels of cross-border power exchange (though Tajikistan is modelled as completely isolated). Fuel costs (for the computation of import / export benefits) correspond to "export" price levels with USD 20 / ton cost for CO₂ emissions
T100	 Economic least-cost dispatch, with 100% of transmission capacity available Historic levels of demand Cross-border electricity trade and dispatch based on "export" fuel prices with USD 20 / ton cost for CO₂ emissions





Modeling

SDDP Regions and Maximum Transfer Capacity (MW)







The Base Case: REAL SIM C

Cross-Border Power Flows, REAL SIM C 2010 -- 2014 (GWh)







The Efficient Trade Case: T100C Comparison between T100C and REAL SIM C

Cross-Border Power Flows, T100C (2010 -- 2014 GWh)

Increase / (Decrease) in Flows, T100C - REAL SIM C (2010 -- 2014 GWh)



Dispatch and Unserved Energy

Aggregate Dispatch and Unserved Energy 2010 – 2014 total (TWh)



Dispatch by Country 2010 – 2014 total (TWh)







Benefits of Efficient Trade for 2010-2014 at Actual Prices for Fuel: T100C vs REAL SIM C (USD Billion)

Benefits of Efficient Trade T100C vs REAL SIM C (2010 – 2014 total USD Billions)



Kazakhstan

Benefits of Efficient Trade T100C vs REAL SIM C 2010 – 2014 total (USD Millions)

Category	Incremental Benefits	Incremental Costs	Total Net Benefits
Dispatch Cost	116		
Unserved Energy			
Imports	927		
Exports		(853)	
Total			190





Uzbekistan

Benefits of Efficient Trade T100C vs REAL SIM C 2010 – 2014 total (USD Millions)

Category	Incremental Benefits	Incremental Costs	Total Net Benefits
Dispatch Cost		(615)	
Unserved Energy	4,529		
Imports		(788)	
Exports	99		
Total			3,226





Kyrgyzstan Benefits of Efficient Trade T100C vs REAL SIM C 2010 – 2014 total (USD Millions)

Category	Incremental Benefits	Incremental Costs	Total Net Benefits
Dispatch Cost		(396)	
Unserved Energy	986		
Imports	249		
Exports	61		
Total			900





Tajikistan Benefits of Efficient Trade (T100C) vs REAL SIM C 2010 – 2014 total (USD Millions)

Category	Incremental Benefits	Incremental Costs	Total Net Benefits
Dispatch Cost		(27)	
Unserved Energy	1,188		
Imports		(1,370)	
Exports	1,088		
Total			879





Ancillary Services

Cost of Providing Reserves 5-Year Period, (USD Millions)



Benefits of Efficient Trade for 2010-2014 at Export Parity Prices for Fuel and CO2 at USD20/ton: T100 vs REAL SIM (USD Billion)



Conclusions

- 1. The current situation is costly for all countries
- 2. Efficient trade brings significant benefits to the region
- 3. All countries in the region will benefit from efficient trade
- 4. The estimates of trade benefits are robust to different scenarios





Proposed Near-Term Steps

- Develop inter-governmental and stakeholder agreement on the potential benefits and the nature and objectives of the systems to be adopted
- Define the type of transactions or market to be developed (e.g., bilateral contracts; spot markets, etc) and well as principles for a fair methodology for settlements and compensation of schedule deviations
- Identify the role of central trading and dispatch institutions
- Improve regional control systems, communications, and acquire appropriate software
- Identify and adopt necessary pan-regional technical and commercial documents (e.g., grid codes, metering codes, settlement rules)
- Define a scheme for mutual support during emergency operations





Proposed Medium-Term and Longer-Term Steps

Medium-Term

- Improve system supervision and control software
- Improve commercial metring
- Adopt a system for coordinated system planning, especially insofar as high voltage grid development is concerned

Longer-Term

- Implement necessary technological changes and improvements
- Move forward with regional grid development and power system projects



THANK YOU



