REPORT

ON

SOUTH EAST EUROPE MARKET MONITORING

FOR THE PERIOD

MARCH 2008 – JUNE 2008

Sponsored by:

United States Agency for International Development (USAID)

And the

National Association of Regulatory Utility Commissioners (NARUC)

November 2008

Prepared by:

POTOMAC ECONOMICS

Table of Contents

Executive Summary of Main Findings **1**

I. Overview **5**
- A. Current Market Monitoring Activities and Findings 5
  - 1. Data Procurement 6
  - 2. Network Congestion 6
  - 3. Monitoring Activities 7
- B. Market Monitoring Transition Plan 10
- C. Organization of the Remainder of the Report 11

II. Regional Wholesale Market Activity **11**
- A. Prices 11
- B. Peak Regional Power Flows 14

III. Network Congestion **16**
- A. Planning Horizon Congestion 16
- B. Operating Horizon Congestion 18

IV. Market Monitoring Analyses **19**
- A. Capacity Assessment 19
- B. Physical Flows, NTC, and AAC 21
- C. Analysis of Individual Interconnections 25
- D. Summary of Interconnection Capacity Analysis. 44

List of Figures

Figure 1: Regional Spot Market Prices: December 2006 – June 2008 ... 12
Figure 2: Comparison of Romanian and Austrian Prices -- Weekly Average ... 13
Figure 3: Regional Flows at April Peak Load ... 15
Figure 4: Flow-Based AAC Values ... 23
Figure 5: Analysis of the Albania-to-Montenegro Interconnection ... 26
Figure 6: Analysis of the Albania-to-Serbia Interconnection ... 27
Figure 7: Analysis of the Bosnia & Herzegovina-to-Croatia Interconnection ... 28
Figure 8: Analysis of the Bosnia & Herzegovina-to-Montenegro Interconnection ... 29
Figure 9: Analysis of the Bosnia & Herzegovina-to-Serbia Interconnection ... 30
Figure 10: Analysis of the Bulgaria-to-Romania Interconnection ... 31
Figure 11: Analysis of the Bulgaria-to-Serbia Interconnection ... 31
Figure 12: Analysis of the Croatia-to-Bosnia & Herzegovina Interconnection ... 32
Figure 13: Analysis of the Croatia-to-Serbia Interconnection ... 33
Figure 14: Analysis of the Macedonia-to-Serbia Interconnection ... 34
Figure 15: Analysis of the Montenegro-to-Albania Interconnection ... 34
Figure 16: Analysis of the Montenegro-to-Bosnia & Herzegovina Interconnection ... 35
Figure 17: Analysis of the Montenegro-to-Serbia Interconnection ... 36
Figure 18: Analysis of the Romania-to-Bulgaria Interconnection ... 37
Figure 19: Analysis of the Romania-to-Serbia Interconnection ... 38
Figure 20: Analysis of the Serbia-to-Albania Interconnection ... 39
Figure 21: Analysis of the Serbia-to-Bulgaria Interconnection ... 39
Figure 22: Analysis of the Serbia-to-Bosnia & Herzegovina Interconnection ... 40
Figure 23: Analysis of the Serbia-to-Croatia Interconnection ... 41
Figure 24: Analysis of the Serbia-to-Macedonia Interconnection ... 42
Figure 25: Analysis of the Serbia-to-Montenegro Interconnection ... 43
Figure 26: Analysis of the Serbia-to-Romania Interconnection ... 44

Table

Table 1: Summary of Monthly ATC Values less Monthly Allocations ... 17

This publication was made possible through support provided by the Energy and Infrastructure Division of the Bureau of Europe and Eurasia under the terms of its Cooperative Agreement with the National Association of Regulatory Utility Commissioners, No. REE-A-00-07-00050-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development or the National Association of Regulatory Utility Commissioners.

EXECUTIVE SUMMARY OF MAIN FINDINGS

This is the Sixth quarterly report providing an account of market monitoring activities under the South East Europe Market Monitoring Pilot Plan initiated by the United States Agency for International Development (USAID) and the National Association of Regulatory Utility Commissioners (NARUC). The Pilot Plan was initiated after an invitation from the Eighth Athens Forum in June 2006 to proceed with such a plan. It became effective in December 2006 and has continued since that time. At the Twelfth Athens Forum in May 2008, we recommended continuing the market monitoring plan under a two-year transition phase that would lead to a permanent function within the Energy Community Regulatory Board (ECRB). The Athens Forum, after hearing from the ECRB, asked for extension of the project to support ECRB capabilities to carry out monitoring in the future. The ECRB Electricity Working Group (EWG) is presently considering the design and implementation of a Transition Plan.

This report covers the period March to June 2008. The report is in two main parts: (1) monitoring of overall market indicators and (2) monitoring of interconnection capacity.

Overall Market Indicators

We use regional prices and cross-border congestion as indicators of overall market conditions. With respect to regional prices, a comparison of day-ahead spot market prices between Austria and Romania allows us to track general price levels as well as to assess regional market efficiency. We find periodic divergence of prices between the two markets. This gives rise to the possibility that binding transmission constraints or a "seams" between the markets prevents effective trading.

We monitor congestion over both the planning horizon congestion (week-ahead or longer) and over the operating horizon (shorter than week-ahead). Planning horizon congestion occurs when Available Transmission Capacity (ATC) less monthly allocations on an interconnection is zero. This occurs relatively frequently, primarily associated with the southwest part of the region and on the Bulgarian and Romania borders. Operating horizon congestion occurs when a TSO takes actions to curtail transactions in the day-ahead or shorter time frame in accordance with UCTE congestion management procedures. Surprisingly, this type of congestion rarely arises.

Monitoring of Interconnection Capacity

We monitor the market for cross-border capacity by comparing the allocation of interconnection capacity to the actual usage of that capacity. A divergence between what is allocated and what is actually used could be the result of anticompetitive activity, either hoarding of cross-border capacity or over-using the interconnection. We use underlying inputs and results of the Capacity Assessment and estimate the actual flows that would result from reservation of interconnection capacity. More precisely, we estimate the physical flow that would be associated with Already-Allocated Capacity (AAC) values, as well as the physical limits on interconnections that are implicit in the TTC values. These estimated values allow a direct assessment of how the real-time physical flows compare to the capacity requirements that are established in the month-ahead capacity allocation process. Such a comparison provides a market monitoring screen that can detect potential market issues associated with cross-border trading. We emphasize, however, that our monitoring of the interconnections is not meant to convey a judgment that anticompetitive conduct is or is likely to be occurring.

Our analysis estimates the maximum potential physical flow from cross-border capacity reservations (i.e., from AAC). This physical flow arises both from the direct reservation between the two counterparties on the interconnection, as well as potential physical flows from transactions among other TSOs (known as loopflow). The analysis reveals the amount of physical capacity that is reserved by the counterparties to the interconnection, versus the physical capacity that potentially would be occupied by loopflow from reservations on other interconnections. We also estimate the physical capacity that is available for cross-border transactions and compare this to the maximum potential physical flows from all AAC (both the direct AAC from the counterparties and the AAC from all other regional interconnections). Our analysis illustrates that in many instances, the interconnection is over-reserved because the process for establishing capacity rights on the interconnection does not effectively coordinate potential “loopflow” from reservations elsewhere in the region. This shortcoming is a standard problem in a contract-path-based transmission reservation process like the one used in the SEE region (and throughout most of the rest of the EU).

Finally, we estimate the physical limit on each interconnection, which enables us to monitor the physical flow relative to the physical limit. This provides a way of identifying locations where larger NTC could be particularly beneficial. It also allows us to compare the actual physical flows to the estimated flows from the AAC, providing a screen that may indicate unscheduled uses of the system. Some of these issues could be more directly assessed if scheduling data were more readily available, something we are seeking to remedy.

Of the 22 interconnections, the Serbia-Bulgaria and Bulgaria-Serbia interconnections could not be fully evaluated because neither TSO provided line flow data. Of the twenty interconnections that we were able to evaluate at least partially, ten were inactive, meaning reservations were relatively small and little or no physical flow occurred in real-time. These relatively inactive interconnections are: Albania to Montenegro; Albania to Serbia; Bulgaria to Romania; Bosnia & Herzegovina to Serbia; Croatia to Serbia; Macedonia to Serbia,[1] Montenegro to Albania, Montenegro to Bosnia & Herzegovina; Montenegro to Serbia, and Serbia to Romania. These interconnections tend to be ones that serve power transactions in the west-to-east direction, which is against the predominant flow in the region. Our screening did not detect potential market or efficiency problems associated with these interconnections.

The remaining ten interconnections were active, meaning they experienced both significant reservations and significant physical flows. In four cases, the physical flows were roughly equal to the flows that would be expected from transactions between the two parties to the interconnection. These four interconnections are: the Croatia to Bosnia & Herzegovina, Montenegro to Albania, the Romania to Serbia, and Serbia to Albania.

In the six other instances, the physical flows exceeded the flows that would arise solely from AAC between the two counterparties on the interconnection. Therefore, the physical flow above that expected between the counterparties arises from other sources. One source is other regional

---

1 Some of the facilities comprising what we refer to as the Macedonia-to-Serbia and the Serbia-to-Macedonia interconnections as well as some of the facilities comprising what we refer to as Montenegro-to-Serbia, Serbia-to-Montenegro, Albania-to-Serbia, and Serbia-to-Albania interconnections are located within the UNMIK-administered territory. Within UNMIK, KOSTT operates as the TSO. However, the Serbian TSO (EMS) manages the calculation and allocation of ATC on these interconnections. These interconnections are recognized by UCTE based on the manner in which they are operated. The operation of the interconnections is the focus of our monitoring and, accordingly, we adopt the UCTE treatment of the interconnections.

transactions that "loopflows" onto the interconnection. Indeed, on two of these seven interconnections, the flow was consistent with what would be expected if AAC between the counterparties as well as AAC between other TSOs in the region were to be scheduled. This was the case with Bosnia & Herzegovina to Croatia and Bosnia & Herzegovina to Montenegro. The data associated with these interconnections is consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values. However, without actual scheduling data, we cannot eliminate the hypothesis that only part of the flow arises from others' AAC and that some could be unscheduled transactions or from unexpected loop flow not accounted for in the base case. With scheduling data, which we are requesting going forward, the issues would become clearer.

On the remaining four interconnections the physical flow exceeded that which would arise from regional AAC alone while at the same time exceeding the implied physical limit on the interconnection. These interconnections are: Romania to Bulgaria; Romania to Serbia; Serbia to Bosnia & Herzegovina; and Serbia to Croatia. The data on these interconnections suggest other transactions are using the interconnection aside from the ones scheduled pursuant to regional AAC. These other transactions could be unofficial ones or ones that are creating unexpected loopflow not accounted for in the base case. Scheduling data would help to clarify the question.

I. OVERVIEW

The South East Europe Market Monitoring Pilot Plan was initiated after an invitation from the Eighth Athens Forum in June 2006. The Plan became effective in December 2006 and has continued since that time.[2] At the Twelfth Athens Forum in May 2008, the Energy Community Regulatory Board (ECRB) and the ECRB Electricity Working Group recommended continuing the market monitoring plan under a two-year transition phase that would lead to sustainable operations within the ECRB. Accordingly, the Athens Forum asked for extension of the project to support ECRB capabilities to carry out monitoring in the future.

In this section we provide an overview of the current monitoring activities and findings and an overview of the Market Monitoring Transition Plan

A. Current Market Monitoring Activities and Findings

Consistent with the Treaty establishing the Energy Community, which entered into force in July 2006,[3] the overall objective of the Pilot Plan is to advance the competitive structure of electricity markets in South East Europe. To this end, the Pilot Plan seeks to enhance market transparency, facilitate open-access, and detect potential market failure. The Pilot Plan seeks ways to provide benefits to Transmission System Operators ("TSOs") consistent with this objective. The monitoring reports, for example, provide the TSOs with a convenient source of data for analyzing regional market conditions and events.[4] The Pilot Plan also addresses regional market issues that can assist the TSOs in developing effective competition polices. As in previous

2 USAID, in conjunction with NARUC, assembled a team of consultants to develop the Pilot Plan. The consulting team includes Dr. Peter Kaderjak of the Regional Energy Policy Center (REKK) at Corvinus University in Budapest, Dr. David Newbery of the Energy Policy Research Group (EPRG) at Cambridge University in England, and Dr. Robert Sinclair of Potomac Economics in Fairfax, Virginia.

3 It is widely recognized that market monitoring can promote market competition by creating market transparency, facilitating open-access, and detecting market power and other market abuses. See, *e.g.*, Newbery, D., and R. Green, "Review of the Monitoring of Market Power – The Possible Roles of TSOs in Monitoring for Market Power in Congested Transmission Systems", Report to the European Electricity Transmission System Operators, 2004.

4 Even though the key data comes from the TSOs themselves, combining the data to develop regional analyses can assist the TSOs in their own market analyses.

reports, we emphasize the collaborative nature of this project and invite comments and input at any stage of the Pilot Plan.

This report presents our monitoring activities for the period March 2008 – June 2008. It is our sixth report under the Pilot Plan. This report continues the analyses from previous reports as well as provides updates to our ongoing analysis and data collection.

1. Data Procurement

Our data collection activities are facilitated through contact with the individual participants. There are nine participants in the Pilot Plan. The data was provided in a useful format and aside from a few claims of confidentiality of certain data, especially with respect to generator data, the objections did not prevent us from moving forward on our analyses. The main exception to otherwise broad participation was Bulgaria. The TSO in Bulgaria has not responded to our requests for data since the inception of the Pilot Plan. However, Bulgaria has begun to post useful cross-border capacity data which allows some limited evaluation of market activities on its borders. Since January, we have also not received data from FYR of Macedonia or from Montenegro. Since the beginning of the Pilot Plan, TSOs have begun to increase the amount of data available on their websites.[5] This has lessened the need for the TSOs to provide this data directly. However, with out the direct response by the TSOs, data quality is lower and there is a need to make estimates based on aggregated data. Therefore, despite the decline in the TSO participation, we are still able to move forward with our monitoring. However, certain data can only be provided by TSOs and not having direct participation of any one TSO definitely hinders the progress of the Pilot Plan.

2. Network Congestion

Our analysis of network congestion focuses on two indicators of congestion. The first indicator relates to the availability of cross-border transmission capacity through the "capacity assessment", which is a procedure for calculating Net Transmission Capability (NTC) and Available Transmission Capacity (ATC). When ATC less monthly allocations is zero or close to

[5] Montenegro, for example, provides real-time power flow on its interconnections from SCADA data.

zero, this indicates limits on additional market activity and potential market failure.[6] The second indicator is the invoking of congestion management procedures that may lead to curtailment of transactions.

ATC Values. NTC and ATC calculations are coordinated among TSOs in accordance with guidelines established by the UCTE and endorsed by the European Transmission System Operators (ETSO).[7] There are 22 interconnections[8] linking the Pilot Plan participants. We collected ATC values on all of them. We then reduce the ATC values by the amount of ATC allocated on the monthly auction. On fourteen of the paths, this allocation-adjusted ATC value was zero in one or more of the months during the period.

Congestion Management Procedures. Congestion management procedures are designed to ensure reliable use of the transmission network when network transactions cannot be securely accommodated. Congestion management becomes a market monitoring issue in instances when transactions have to be curtailed or otherwise reduced in order to achieve network security. In this phase of the Pilot Plan, we requested data on this issue. During the period of the report, there were no reported incidences of the procedures being implemented.

3. Monitoring Activities

Cross-Border Transmission Capacity. The cross-border transmission capacity market is the major focus of our market monitoring. We are interested in detecting conduct or structure that inhibits the development of competition in the region. These concerns include over- or under-reserving capacity, understated cross-border-capacity values, and other circumstances. We do not have *a priori* evidence that any such anticompetitive activities are occurring and our monitoring is not meant to imply that any such activity is or is likely to occur.

---

6 As explained below, the standardized capacity assessment does not eliminate the possibility of unreasonably restrictive practices in establishing available capacity to the market. Monitoring of the underlying details of the NTC and ATC calculations may be initiated in latter phases of this Pilot Plan.

7 See "Procedures for Cross-Border Transmission Capacity Assessments", ETSO, October 2001; "Definition of Transfer Capacities in Liberalised Market", *Id*. April 2001.

8 By "interconnection" we mean what is commonly understood in the region as the electrical interface between two neighboring control areas.

Our monitoring focuses on the Capacity Assessment, the process used in the region to establish and allocate cross-border capacity values. We compare the allocation of interconnection capacity to the actual usage of that capacity. Our analysis estimates the physical flows associated with reservations of cross-border capacity values produced in the Capacity Assessment. More precisely, we estimate the maximum physical flow that would be associated with the Already Allocated Capacity (AAC) values, as well as the physical limit on the interconnection implied by the TTC values. This allows a direct assessment of how the real-time physical flows compare to the capacity requirements that are established in the month-ahead capacity allocation process. Such a comparison provides an effective market monitoring screen that can detect potential market issues associated with cross-border trading.

Our analysis estimates the maximum potential physical flow from cross-border capacity reservations (i.e., from AAC). This physical flow arises both from the direct reservation between the two counterparties on the interconnection, as well as potential physical flows from transactions among other TSOs. The analysis reveals the amount of physical capacity that is reserved by the counterparties to the interconnection, versus the physical capacity that potentially would be occupied by loopflow from reservations on other interconnections. We also estimate the physical capacity that is available for cross-border transactions and compare this to the maximum physical flows from all AAC (both the direct AAC from the counterparties and the AAC from all other regional interconnections).

Our analysis illustrates that in some instances, the interconnection is over-reserved because the process for establishing capacity rights on the interconnection does not coordinate loopflow effectively. This shortcoming is a standard problem in a contract-path-based transmission reservation process like the one used in the SEE region.

We also estimate the physical limit on each interconnection, which enables us to monitor the physical flow relative to the physical limit. This provides a way of identifying locations where larger NTC values could be particularly beneficial and a way of detecting potential misuse. It also allows us to compare the actual physical flows to the estimated flows from the AAC, providing a screen that may indicate over- or under-scheduling. Other means of evaluating scheduling issues are limited because we do not currently have access to scheduling data.

Of the 22 interconnections, the Serbia-Bulgaria and Bulgaria-Serbia interconnections could not be fully evaluated because neither TSO provided line flow data. Of the twenty interconnections that we were able to evaluate at least partially, ten were inactive, meaning reservations were relatively small and little or no physical flow occurred in real-time. These relatively inactive interconnections are: Albania to Montenegro; Albania to Serbia; Bulgaria to Romania; Bosnia & Herzegovina to Serbia; Croatia to Serbia; Macedonia to Serbia, Montenegro to Albania, Montenegro to Bosnia & Herzegovina; Montenegro to Serbia, and Serbia to Romania. These interconnections tend to be ones that serve power transactions in the west-to-east direction, which is against the predominant flow in the region. Our screening did not detect potential market or efficiency problems associated with these interconnections.

The remaining ten interconnections were active, meaning they experienced both significant reservations and significant physical flows. In four cases, the physical flows were roughly equal to the flows that would be expected from transactions between the two parties to the interconnection. These four interconnections are: the Croatia to Bosnia & Herzegovina, Montenegro to Albania, the Romania to Serbia, and Serbia to Albania.

In the six other instances, the physical flows exceeded the flows that would arise solely from AAC between the two counterparties on the interconnection. Therefore, the physical flow above that expected between the counterparties arises from other sources. One source is other regional transactions that “loopflows” onto the interconnection. Indeed, on two of these seven interconnections, the flow was consistent with what would be expected if AAC between the counterparties as well as AAC between other TSOs in the region were to be scheduled. This was the case with Bosnia & Herzegovina to Croatia and Bosnia & Herzegovina to Montenegro. The data associated with these interconnections is consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values. However, without actual scheduling data, we cannot eliminate the hypothesis that only part of the flow arises from others’ AAC and that some could be unscheduled transactions or from unexpected loop flow not accounted for in the base case. With scheduling data, which we are requesting going forward, the issues would become clearer.

On the remaining four interconnections the physical flow exceeded that which would arise from regional AAC alone while at the same time exceeding the implied physical limit on the interconnection. These interconnections are: Romania to Bulgaria; Romania to Serbia; Serbia to Bosnia & Herzegovina; and Serbia to Croatia. The data on these interconnections suggest other transactions are using the interconnection aside from the ones scheduled pursuant to regional AAC. These other transactions could be unofficial ones or ones that are creating unexpected loopflow not accounted for in the base case. Scheduling data would help to clarify the question.

B. Market Monitoring Transition Plan

Pursuant to the Energy Community Treaty and the conclusions of the Twelfth Athens Forum in May 2008, this document contains the Market Monitoring Transition Plan (Transition Plan) to continue market monitoring of the electricity markets in South East Europe. Market monitoring was initiated on a Pilot Plan in 2006 by the United States Agency for International Development (USAID) and the National Association of Regulatory Utility Commissioners (NARUC).[9] A final report on the Pilot Plan was presented at the Twelfth Athens Forum.[10] A critical element of the Final Report was the recommendation to initiate a Transition Phase, with support of USAID and NARUC, that would lead to a permanent market monitoring function under the Energy Community Regulatory Board (ECRB).

The recommendation was considered by the ECRB and the ECRB Electricity Working Group (ECRB EWG). These entities reported to the Athens Forum in favor of the recommendation. The following is the relevant portion of the conclusions of the Twelfth Athens Forum:

> The ECRB supports the enlargement of the market monitoring project to include [Coordinated Auction and Coordinated Auction Office] monitoring with [the]

---

9 The Pilot Plan was proposed in the context of the Treaty establishing the Energy Community which entered into force in July 2006. The Treaty has among its key elements the commitment to advance the competitive structure of the electricity markets. USAID, in conjunction with the National Association of Regulatory Utility Commissioner (NARUC) assembled a team of consultants to perform the market monitoring led by Dr. Robert Sinclair of Potomac Economics in Fairfax, Virginia and including Dr. Peter Kaderjak of the Regional Energy Policy Center (REKK) at Corvinus University in Budapest, Dr. David Newbery of the Energy Policy Research Group (EPRG) at Cambridge University in England. Market monitoring under the plan became operational in December 2006 and has continued through the second quarter of 2008.

10 The Report along with the five quarterly reports and other information associated with the Pilot Plan are posted on the SEE Market Monitoring website: http://www.naruc.org/see_monitoring/reports.html

suggestion to enlarge the geographical scope of market monitoring to the participants in the future [eighth congestion management] region and CAO participants. The ECRB proposed only publicly available data to be used within the market monitoring according to data available by TSOs and in compliance with Regulation (EC) 1228/2003 and the Congestion Management Guidelines.

C. Organization of the Remainder of the Report

In the next section, Section II, present regional market indicators by comparing spot prices in Romania and Austria and by examining intra-regional power flows. In Section 0, we examine congestion patterns. In Section IV, we present our monitoring of the cross-border capacity market.

II. REGIONAL WHOLESALE MARKET ACTIVITY

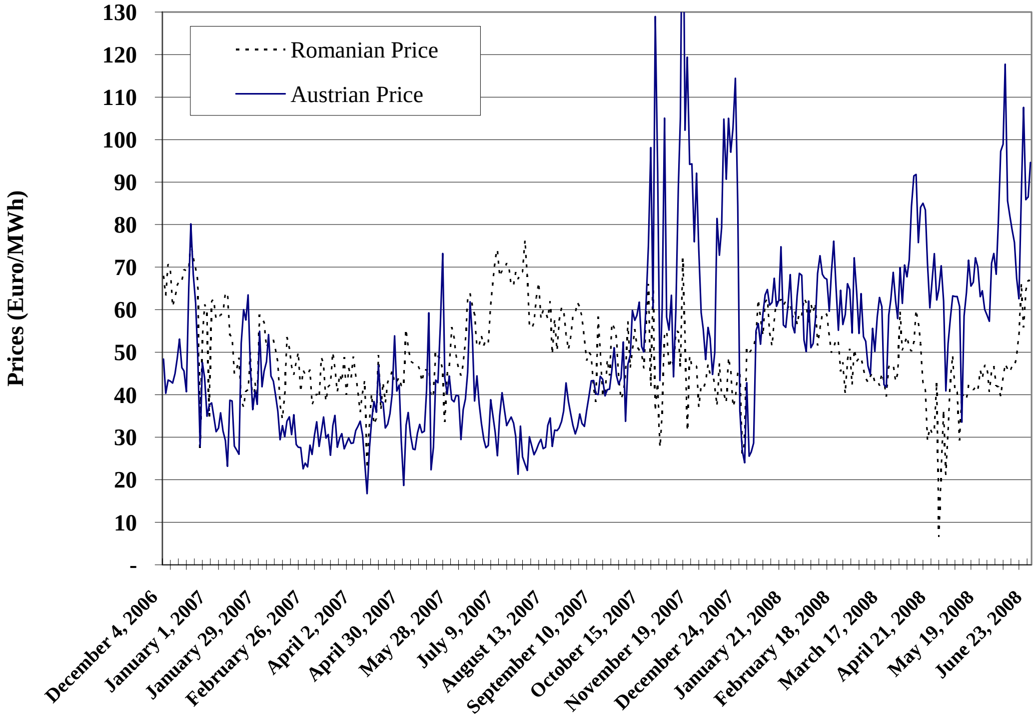
In this section we provide a broad overview of market indicators by presenting regional prices and regional power flow activity. The presentation of these broad indicators can provide insight into specific time periods and locations that can help focus market monitoring resources. Wholesale market activity in South East Europe is conducted mainly under bilateral contracts among utilities and traders. The exception is in Romania where both a day-ahead spot market and a centralized bilateral-contracts market exist.

A. Prices

Our first analysis compares the day-ahead spot market in Austria to that in Romania.[11] This comparison can provide some insight into regional market conditions. Accordingly, Figure 1 provides the Romanian and Austrian prices.

[11] The Romanian bilateral contracts prices are published on a monthly basis.

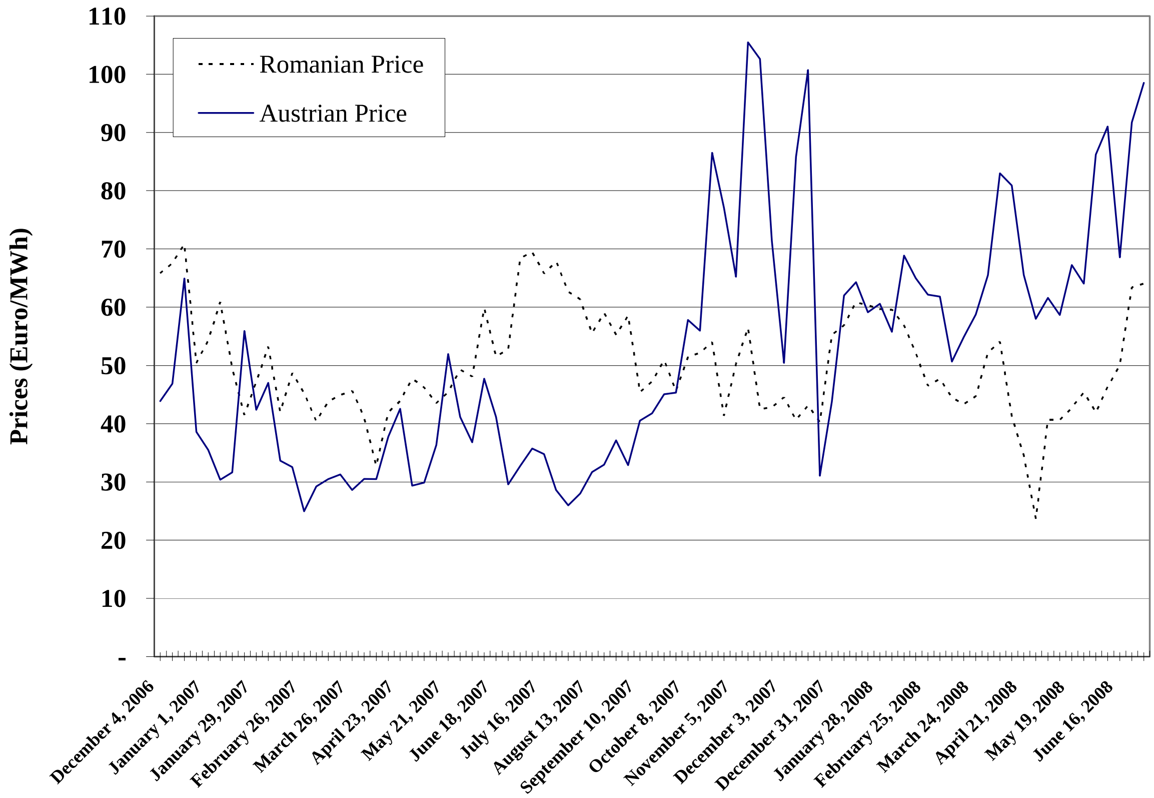
Figure 1: Regional Spot Market Prices: December 2006 – June 2008



As the figure shows, there was periodic divergence of prices. For example, during the summer of 2007, prices were higher in Romania than in Austria but the situation changed in the fall, when volatility and high prices were experienced in Austria. During the winter 2007-2008, prices moved more closely together. We note that Austrian price exhibit a greater volatility than the Romanian prices.

In order to smooth the volatility in the series, we calculated average weekly prices and these are presented in Figure 2. With the removal of daily volatility, the series shows more clearly periods when prices were divergent between the two locations.

Figure 2: Comparison of Romanian and Austrian Prices -- Weekly Average



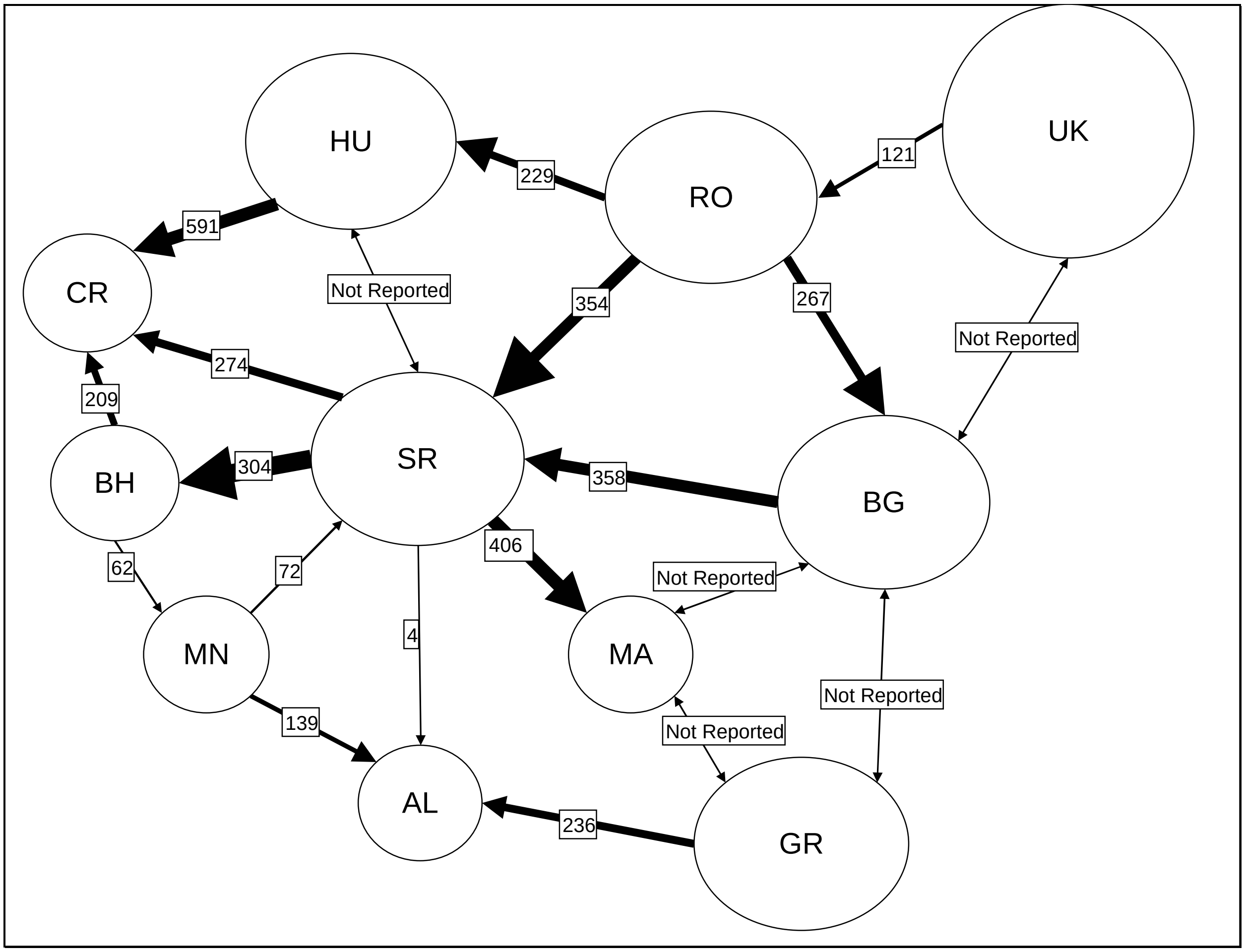
Price divergence may indicate the absence of effective price arbitrage between the regions, which is either caused by the lack of transmission capacity or by poor market integration. The principal transit path between Romania and Austria is through Hungary. This is a direct interconnection between Hungary and Romania and a second path from Hungary to Croatia and then through Serbia into Romania. We examined the amount of transmission capacity available on these path after the monthly for the first six months of 2008. This value represents what would be available to trade on a short-notice basis once the price divergence was discovered. Because prices were lower in Romania compared to Austria during this period, we are interested the ability of trader to buy in Romania and sell in Austria either directly from Romania through Hungary and into Austria or from Romania through Serbia and Croatia into Hungary and then Austria. For all six months, the monthly ATC less the monthly allocations from Romania to Hungary and from Romania to Serbia was zero. Hence, neither path would have been available for through incremental trades.[12] This data supports the hypothesis that the price differential is the result of transmission congestion. To further support the hypothesis, an analysis of the summer 2007 data should indicate that ATC less monthly allocations in the reverse direction was zero. However, we do not have adequate ATC data on the Hungarian-Croatia interconnection to do so.

B. Peak Regional Power Flows

Another indicator of regional market conditions and transmission system utilization is the peak physical exchanges among TSOs. We calculated the peak interconnection flow between each country on the day of the month when regional peak load was the highest. Figure 3 shows the interregional flows for April.

[12] We also checked actually scheduling data provided from Romania and it confirmed that the two interconnections were fully scheduled.

Figure 3: Regional Flows at April Peak Load



Note: Bulgaria to Serbia peak flow is estimated based on monthly volume, see footnote in text.

We show April because it is the most recent month for which we have a relatively full set of data. Because of a lack of participation by certain TSOs, data for May and June is not provided on many interconnections. Where the data is available, the arrows in Figure 3 indicate the direction of flows as well as their relative magnitude. While the magnitude of flows at the peak hour varies across the interconnections, the general flow is from Ukraine to the south and west into Bulgaria, Romania, and Serbia.[13] The pattern is consistent with what most observers of the region would expect.

[13] The Bulgaria-to-Serbia interconnection was estimated using UCTE monthly exchange volumes. We assumed the ratio of peak flow to total volume on the Bulgaria-to-Serbia interconnection was the same as the ratio on Romania-to-Serbia interconnection. We had the data on the Romania-to-Serbia interconnection to calculate the ratio and so we applied the ratio to the Bulgaria-to-Serbia monthly volumes to get the estimated peak flow.

III. NETWORK CONGESTION

In this section we examine network congestion. This can arise in the *planning horizon* as well as in the *operating horizon*. We use the term planning horizon to mean the time between when the monthly capacity allocation is made and the day-ahead time frame. We use the term operating horizon to be the time between the day ahead and the real-time. In the planning horizon, congestion arises when transmission capacity is zero. When transmission capacity is zero, incremental reservations of cross-border capacity are not possible. This is not physical congestion, but constraints in the ability of traders to arrange future trades. In the operating horizon, congestion arises due to unit commitment or dispatch that is not feasible within the transmission operating parameters. We analyze congestion in both the planning horizon, as well as the operating horizon. In the planning horizon, we use ATC less capacity 'allocated in the monthly auction as the indicator of congestion. In the operating horizon, we use curtailments of transactions pursuant to UCTE guidelines as indicators of congestion.

A. Planning Horizon Congestion

As noted above, NTC and ATC calculations are established in the Capacity Assessment pursuant to UCTE guidelines. We use monthly ATC values (after the allocation of auctioned capacity) as indicators of constraints in the region. If ATC less monthly allocations is zero at a particular interconnection, the network is constrained because no incremental market activity can occur that relies on the particular interconnection.

There are 22 interconnections that link the participants in the Pilot Plan. Of these interconnections, we were able to obtain ATC and monthly allocation data on all of them. A summary of these interconnections and monthly ATC values adjusted for the monthly allocations is shown above, in Table 1.

Table 1: Summary of Monthly ATC Values less Monthly Allocations

	ATC			
Interconnection	Mar 08	Apr 08	May 08	Jun 08
Albania to Montenegro	200	200	200	200
Albania to Serbia	210	210	210	210
Bulgaria to Romania	0	0	0	0
Bulgaria to Serbia	0	0	150	0
Bosnia & Herzegovina to Croatia	212	225	265	185
Bosnia & Herzegovina to Montenegro	84	100	60	103
Bosnia & Herzegovina to Serbia	179	148	255	116
Croatia to Bosnia & Herzegovina	48	54	39	0
Croatia to Serbia	65	0	50	90
Macedonia to Serbia	180	154	150	200
Montenegro to Albania	0	0	0	0
Montenegro to Bosnia & Herzegovina	365	265	250	260
Montenegro to Serbia	95	230	165	185
Romania to Bulgaria	0	0	0	0
Romania to Serbia	0	40	0	0
Serbia to Albania	10	0	0	15
Serbia to Bulgaria	0	0	50	5
Serbia to Bosnia & Herzegovina	75	115	0	0
Serbia to Croatia	1	0	0	1
Serbia to Macedonia	155	150	100	0
Serbia to Montenegro	5	68	0	20
Serbia to Romania	35	50	0	15

Note: ATC Values reflect the result of monthly allocations.

These monthly values are adjusted for allocations from monthly auctions that have been initiated on many of the interconnections starting in 2007. Therefore, the ATC reported herein is that which would be available after the beginning of the month for additional purchases on a weekly or daily basis.

As the table indicates, on fourteen of the interconnections, adjusted ATC was zero in one or more of the months during the period studied. This means that on more than one-half of the interconnections, transmission for incremental transfers would not be available. Moreover, the standardized Capacity Assessment does not eliminate the possibility of unreasonably restrictive practices in making capacity available to the market. This issue is discussed in more detail below. Part of our monitoring effort seeks to detect such issues. We seek to initiate further monitoring of the underlying details of the NTC and ATC a latter phase of the Pilot Plan.

B. Operating Horizon Congestion

In addition to congestion arising in the planning horizon when adjusted ATC is zero, we also collected data associated with congestion management measures.

UCTE[14] Policy 4 of the UCTE Operations Handbook is titled "Coordinated Operational Planning". This policy establishes practices to coordinate, among other things, the capacity assessment and day-ahead and real-time congestion management. These guidelines include the potential to withdraw interconnection capacity and curtail transactions.

We requested that the TSOs identify any instances when this may have occurred. While we have not received responses for all entities in all months, there have been no curtailments reported for the period March to June. This situation is typical. Since we began collecting this data in April 2007, only one instance of curtailments has been reported. We have learned that TSOs may take measures to avoid day-ahead or real-time congestion by coordinating with the generating companies scheduling changes. We do not have a full understanding of these processes continue to be interested.

14 UCTE is the acronym for "Union for Coordinated Transmission of Electricity".

IV. MARKET MONITORING ANALYSES

Our examination of overall market and network conditions in the previous sections is designed to focus monitoring activities on times and locations when market power is most likely to occur. In this section of the report, we provide market monitoring analyses that calculate the utilization of interconnections and seek to detect competitive concerns. We evaluate the usage of the interconnected network in South East Europe with the objective of identifying potential areas for improvement that can advance the development of the market and improve competition.

We have identified two other critical market monitoring issues beyond the monitoring of the interconnections. In particular, we seek monitoring of sales and purchases and analysis of generation markets. With respect to sales and purchases, we seek to detect correlation between prices and congestion to determine whether further investigation regarding anticompetitive conduct is warranted. So far, we have been unsuccessful in collecting the required data to accomplish this monitoring. We anticipate further efforts to gather this data at later phases of the project. However, given the conclusions of the Twelfth Athens Forum, which required use of public data going forward, our attempts to collect confidential data is indefinitely suspended.

A. Capacity Assessment

Bilateral trading activity among market participants in South East Europe relies on cross-border transmission capacity. Therefore, the availability of cross-border capacity is critical to a vibrant regional market. Access to transmission capacity on interconnections that link TSOs in the region is allocated in accordance with procedures set forth by UCTE and endorsed by the European Transmission System Operators (ETSO). The procedures currently employed to allocate this capacity, known as the Capacity Assessment, is based on an estimate of the maximum potential power transfers between two TSOs. This estimate is derived from a “base case” power flow model that reflects anticipated load and generation conditions for the timeframe of interest, e.g., the month ahead. The input data includes the thermal ratings of transmission facilities, the forecast load, and the output range and costs of generators.

The underlying basis of the Capacity Assessment is the estimate of Total Transmission Capacity (TTC). TTC is the maximum possible flows that can be safely accommodated over the interconnection given these base case assumptions about load, generators, transmission conditions, and estimated exchanges among TSOs (called *base case exchanges* or “BCEs”). Essentially, the TTC is estimated by modeling an increasing transfer of power between two TSOs and detecting the maximum transfer amount at the point where transmission constraints are reached. Net Transmission Capacity (NTC) is defined as TTC less Transmission Reliability Margin (TRM). TRM is a margin of capacity that is reserved by TSOs in order to respond to operational uncertainties. It typically accounts for only a fraction of the NTC, but can be up to 25 percent of the TTC.

NTC is then divided between capacity that which is allocated through yearly and monthly auctions (Already-Allocated Capacity (AAC)), and Available Transmission Capacity (ATC). Hence:

TTC = maximal safe power transaction between two TSOs;

NTC = TTC -TRM;

NTC = AAC + ATC;

The Capacity Assessment estimates the maximum transfer between two TSOs without regard to the maximum transfers between any other TSOs. In other words, it is a *non-simultaneous* estimate of the maximum transfer capacity and does not account for the fact that the interconnection’s physical capacity can be used up by transactions between neighboring TSOs (a phenomenon known as loop flow). This is the standard short-coming of *contract-path*-based allocation procedures like the Capacity Assessment: the estimated transfer capability is estimated in isolation of transactions between other TSOs.[15] In reality, the estimated capacity on an interconnection could be substantially used up in real time by transactions on between other parties and the actual physical capacity could be insufficient to accommodate all transfers. When this happens, real-time congestion management is necessary.

15 This is mitigated somewhat by using base case exchanges in the TTC calculations, which are meant to reflect potential regional transactions.

The alternative to a contract-path-based system is a flow-based system where the transfer capability on an interconnection reflects the other uses on the system. In a flow-based system, transactions on other neighboring TSOs that are part of the flow-based arrangement are directly taken into account to determine the regional capacity that is available for a particular transaction.[16] We highlight some of the differences between the contract-path-based allocations and flow-based allocations in our analysis below.

B. Physical Flows, NTC, and AAC

Our monitoring of the cross-border transmission capacity market focuses on the transmission capacity that is made available to the market and comparing that to the physical usage on the interconnections. Our analysis seeks to illuminate the process of reserving and scheduling on the interconnection with the goal of identifying potential impediments to competition. Using values from the Capacity Assessment and data on actual physical flows, we seek to develop meaningful comparisons between reserved uses of the system (AAC) and actual physical flow. To do this, we calculate certain measures of capacity from a flow-based perspective. More precisely, we identify potential physical flows associated with the various contract-path-based estimates in the Capacity Assessment (*viz*., NTC and AAC) using Power Transfer Distribution Factors (PTDFs).

PTDFs indicate what portion of a transaction between two TSOs will physically flow over various interconnections. Typically, most of the physical flow associated with a transaction between two TSOs will flow on the interconnection between them. However, a significant portion can flow over other interconnections. For example, only 64 percent of a transaction from Serbia to Montenegro will flow on the Serbia to Montenegro interconnection. Seventeen percent of it will flow on the Serbia to Croatia Interconnection and ten percent will actually flow easterly to Romania.

Therefore, with respect to AAC, if all AAC on an interconnection is actually scheduled in real time, only a portion of it actually flows on the physical facilities. For example, if the PTDF on an interconnection is 60 percent and the AAC is 100 MW, then a maximum of 60 MW would

[16] The coordinated auction office that is under consideration in the SEE region is a flow-based system. Loopflow from systems not part of the flow-based system need to be estimated in the base power flow cases.

actually flow on the interconnection from those reservations. However, the interconnection would experience physical flow from AAC over other interconnections, i.e., loopflow. Accordingly, for each interconnection, we use the AAC values on all other interconnections to estimate the maximum flow by other TSOs.[17] We used the term "flow-based AAC" because we are measuring the flow on an interconnection arising from AAC. We identify two measures of flow-based AAC, one associated with the flows from direct transactions over the interconnection and the other associate with flows from all other TSOs.

We estimate the physical operating limit on each interconnection using TTC values and certain base case assumptions regarding the physical usage. Starting with the TTC on each interconnection, we calculate how much additional power would flow on the interconnection if a transaction equal to the TTC value were to be scheduled. This value is calculated by multiplying the TTC value by the PTDF on the interconnection. The TTC is defined as the largest transfer that can safely be accommodated on the interconnection above the base case flows already on the interconnection. Hence, the physical flow on the interconnection associated with a transaction equal to the TTC indicates the maximum physical flow above base-case usage that is possible on the interconnection. We call this value the "TTC Flow".

An example can be useful. Suppose the TTC on the Serbia-to-Montenegro Interconnection is 200 MW. The PTDF for a Serbia-to-Montenegro transaction is 64 percent. Hence, the physical flow associated with a schedule equal to the full TTC is .64 x 200 MW = 128 MW (the TTC Flow). To repeat from above, because the TTC is the result of the largest hypothetical transaction from Serbia to Montenegro, the physical limit is reached when 128 MW flows on the facilities between Serbia and Montenegro. It is the maximum physical flow above the physical uses of the base case.

In order to determine the physical limit, the physical flow associated with the TTC is added to the physical usage on the base case. Physical usage in the base case arises from "base loop flow". Base loop flow, called *natural flow,* is the flow on the interconnection in the base case prior to any exchanges between TSOs. It is the flow from the base dispatch. These values were

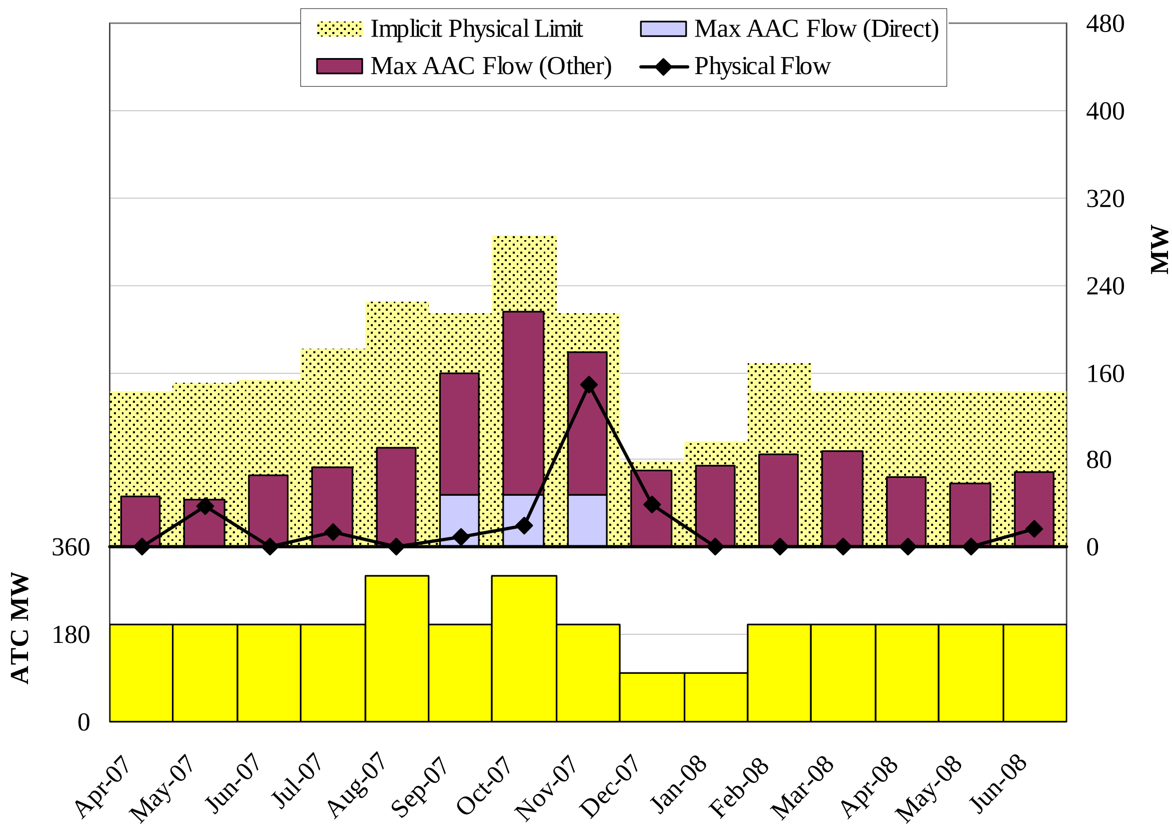
---

[17] AAC includes the capacity allocated in the monthly auction.

provided to us by the TSOs on a monthly basis beginning in April 2007.[18] Hence, the sum of the TTC Flow and the natural flow represents the implicit physical limit on interconnection. We call it an implicit limit because we have derived it from these underlying values; as opposed to receiving such data directly from the base case models.

In order to clarify the nature of these metrics, an example from the analysis is helpful. Consider the Albania-to-Montenegro interconnection as an instructive example. We use this interconnection because it is the first in alphabetical order.

Figure 4: Flow-Based AAC Values
Albania-to-Montenegro Interconnection



18 We stopped requesting this data in April 2008 due to requirements of the 12th Athens Forum that only public data pursuant to Direct 1228 and the CMG be used in the market monitoring. Therefore, we have used the historical data received up to February as a basis for estimating the natural flows. In particular, for March and April we used October 2007 data. For May and June we used September 2007 data. We believe the historical data provides a reasonable estimate for the near term analyses.

The red-colored bar is the Maximum flow associated with AAC from other interconnections (i.e., loopflow). It represents what would flow on the Albania-to-Montenegro interconnection if all TSOs with AAC on other interconnections that have positive PTDFs with respect to the Albania-to-Montenegro interconnections fully-scheduled their AAC. Using only TSOs with positive PTDFs in relation to the interconnection implies that no counter-flow is considered -- only physical transactions associated with AAC on interconnections that would flow in the Albania-to-Montenegro direction are included. This is why the term “maximum” is used. Occasionally, transactions that contribute to physical power flow in both directions may be in effect at any given time.

The lightly-colored blue bar in the figure is the maximum direct flow associated with AAC on the Albania-to-Montenegro interconnection. It represents what would physically flow if all the reservations from Albania to Montenegro were scheduled. It is the “maximum” because we assume the AAC is fully scheduled. The sum of the blue area and the red area provides the maximum potential flow over the interconnection. Hence, the top of the red-colored bar represents the total maximum AAC flow.

The lightly-colored shaded area is the implicit physical limit. This is the maximum amount of physical capability that would be available to accommodate transfers, i.e., AAC and base-case usage. When the sum of the red areas and the blue areas exceeds the physical limit, the interconnection is over-allocated. This did not occur on this interconnection over the time period analyzed.

The figure also reveals that outside transactions (red bars) have the potential to contribute to power flows in greater proportion than the direct transactions between TSOs (light-blue bars). Given the current system of allocating and compensating for transmission capacity, other TSOs’ are using this interconnection for transactions yet not paying for it. Additionally, because ATC values generally ignore flows caused by AAC on other interconnections, the parties to an interconnection may post substantial ATC when the flow-based capability off the interconnection is already fully allocated. This is a standard shortcoming of the contract-path-based allocation methodologies and is reminiscent of justifications for flow-based methods.

The figure also shows the physical flow. For this particular interface, the physical flows are within the operating limit. In most months, the flows were somewhat below the limit. This could be explained by the unreserved capacity (i.e., positive ATC) that remained on the interconnection (See Table 1). If it had been the case that ATC was zero during time periods when flow was significantly below the physical limit, the data would suggest that additional transmission capacity could be made available in the Capacity Assessment or that interconnection capacity has been reserved and not used.

The implied physical limit on this interconnection, like other interconnections we evaluate below, fluctuates substantially, which may indicate potentially modeling concerns if it cannot be explained by changes in system topology. Ideally, we would like seek physical operating data on each interconnection that will permit further evaluation. However, given the recent instruction provided at the Twelfth Athens Forum, we will confine ourselves to public data in the immediate future.

Finally, the lower panel of the figure shows the monthly ATC values on the interconnection.

In the following subsection, we use the analysis developed in Figure 4 for each interconnection. This provides a basis for our discussion of key observations and conclusions on a case-by-case basis.

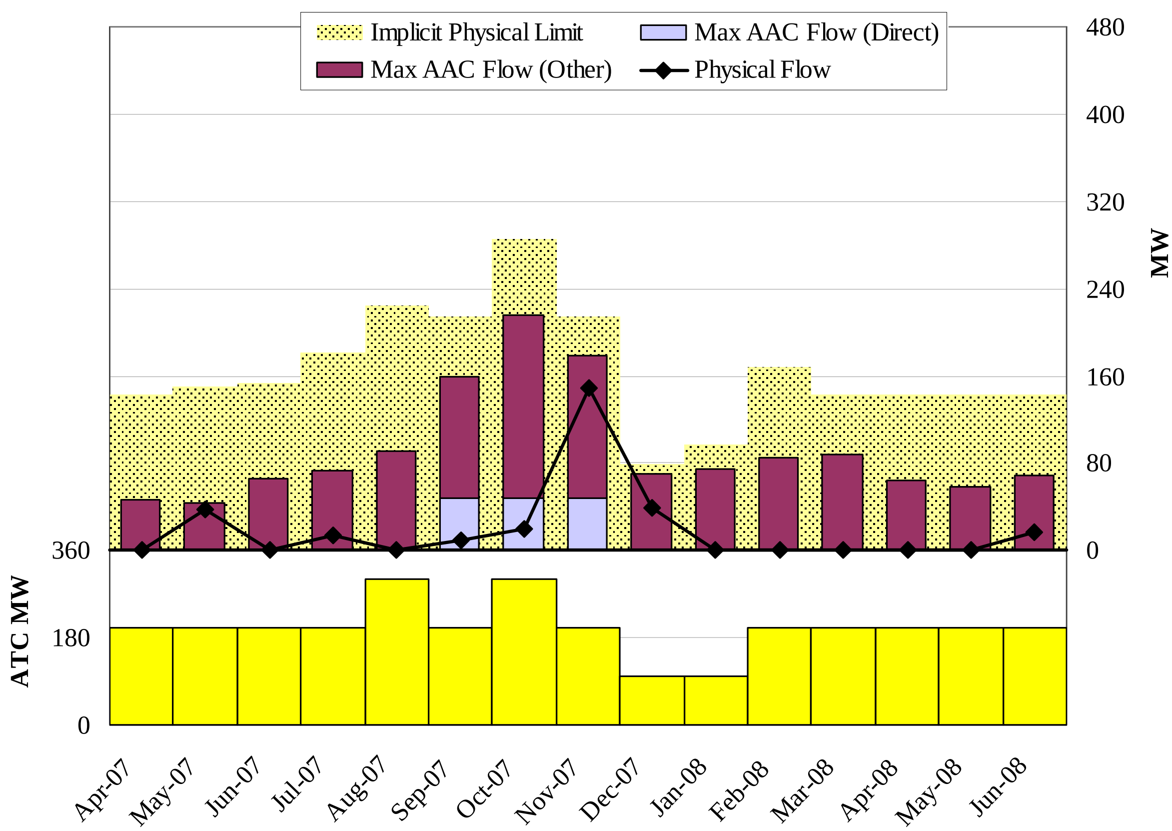
C. Analysis of Individual Interconnections

In this subsection, we conduct individual analysis of each interconnection using the methods described in the previous subsection. As discussed above, there are 22 interconnections that link the Pilot Plan participants. Not all participants provided the necessary data to conduct our analysis. However, if at least one party to the interconnection provided data, then it was possible to perform the analysis. Neither Bulgaria nor Serbia provided the physical flow data necessary to conduct the analysis. Therefore, analysis of the interconnections between Bulgaria and Serbia were not analyzed fully. As explained below, some analysis is possible on these interconnections based on historical data and on estimates of peak hourly flow.

We seek to identify three primary outcomes that have potential competitive or efficiency implications. The first outcome is one in which ATC is zero or close to zero while physical capacity remains unused. In such a situation, the unused capacity could be made available through ATC. The second outcome is one in which physical flows exceed both the physical limit and the maximum flow expected from AAC. Such a scenario would be consistent with unscheduled use of the system by parties within the region or excessive loop flow from outside the region.[19] The third outcome is one in which the ATC is zero and the physical flows are close to or exceed the physical limit. On these interconnections, the transmission constraint is binding and, therefore, additional interconnection capacity would benefit the market. Accordingly, we recommend careful review of the Capacity Assessment in order to determine whether higher TTC values are possible.

The analyses of individual interconnections are presented in alphabetical order, beginning with the Albania-to-Montenegro Interconnection shown in Figure 5.

Figure 5: Analysis of the Albania-to-Montenegro Interconnection

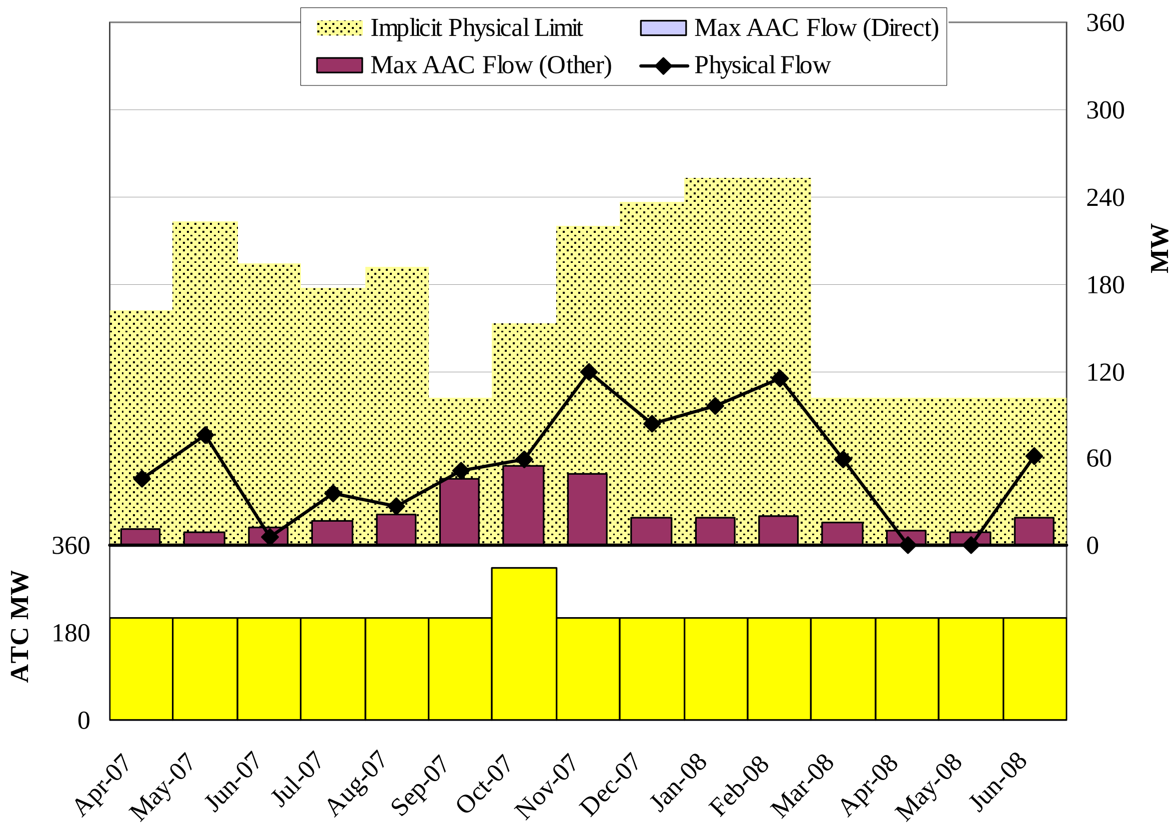


[19] We only account for "natural flows" but not outside loopflow, or so-called "uncertain outside flows".

This interconnection was used as an example in the introduction to this section. The figure shows that physical flow was relatively light on this interconnection. The lower panel shows ATC generally available and is consistent with the physical flows being substantially below the physical limit. The analysis does not indicate to us circumstances that give rise to efficiency issues or competitive concerns.

Figure 6 shows the analysis for the Albania-to-Serbia interconnection.

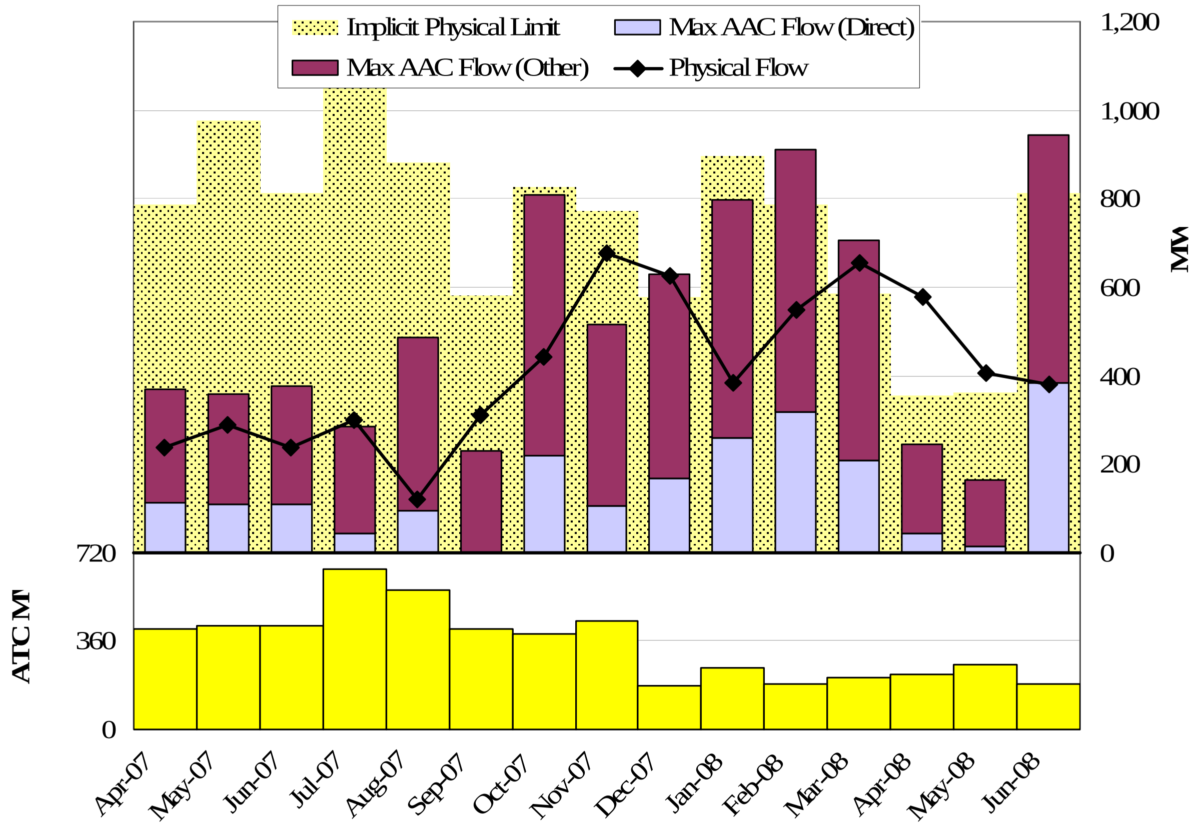
Figure 6: Analysis of the Albania-to-Serbia Interconnection



There is no direct flow from AAC on this interconnection (i.e., no reservations were made) and there exists ample ATC. We also see that physical flows are well within the physical limit, likely explained by positive amounts of ATC throughout the period. In general, this interconnection is not reserved and experiences only light physical flows. The analysis does not indicate to us circumstances that give rise to significant efficiency or market issues.

Figure 7 shows the analysis of the Bosnia and Herzegovina-to-Croatia interconnection.

Figure 7: Analysis of the Bosnia & Herzegovina-to-Croatia Interconnection

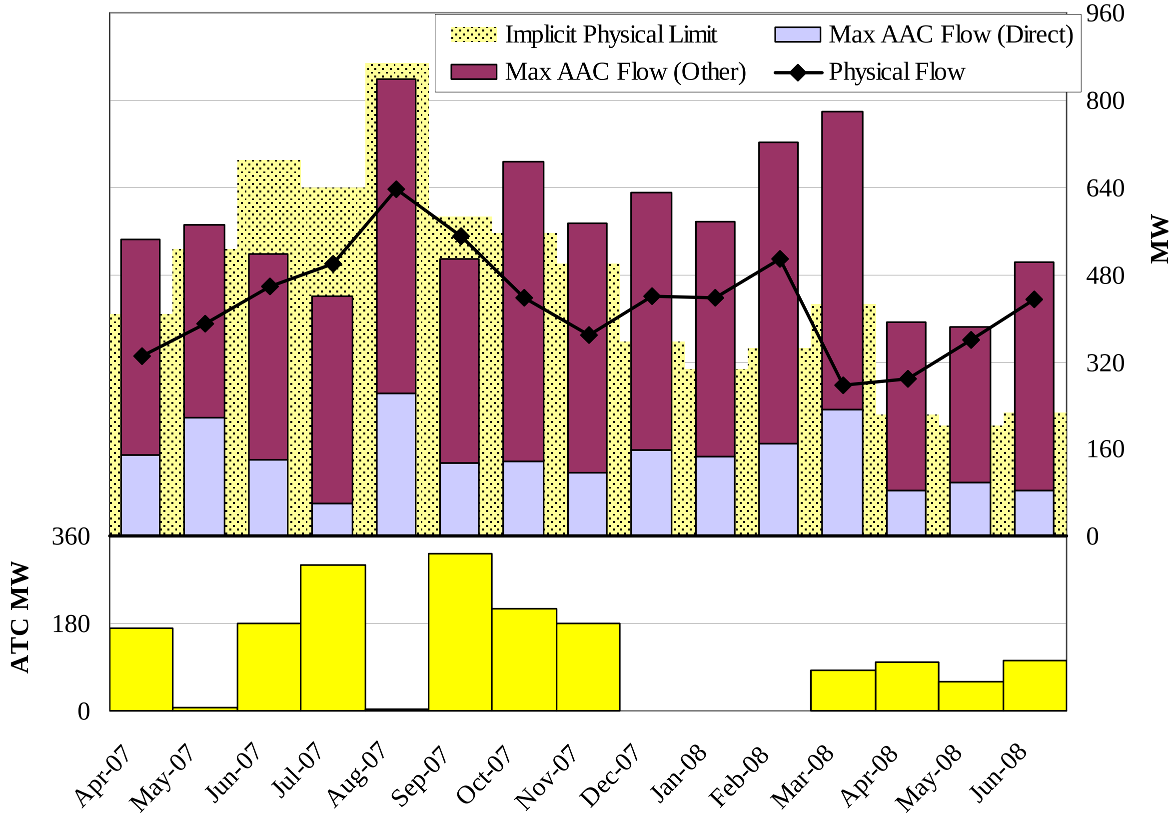


There is generally ATC on this interconnection. The red bar indicates that loopflow from other interconnections could be substantial. There were many instances during the period when physical flows were significantly greater than the blue bar, indicating there were flows are arising from transactions other than the direct transactions between the counterparties. While this is consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values, we cannot eliminate the hypothesis that only part of the flow arises from AAC and that some could be from unofficial usage of the system, i.e., unscheduled transactions or from unexpected loop flow not accounted for in the base case. We have started requesting scheduling data and have been partially successful. However, we need scheduling from both parties to the interconnection. On this interconnection, only Bosnia and & Herzegovina has provided the data. With complete scheduling data, which we continue to seek, the issues would become clearer.

Finally, in three recent months, the actual flow is slightly higher than the physical limit. We are not concerned as it may be the result of a variation in the estimating process. Our estimates of the implicit physical limit may be slightly higher or slightly lower than the actual operating limit. Therefore we are not concerned when physical flows deviate slightly from our estimate.

Figure 8 shows the analysis of the Bosnia & Herzegovina-to-Montenegro interconnection.

Figure 8: Analysis of the Bosnia & Herzegovina-to-Montenegro Interconnection



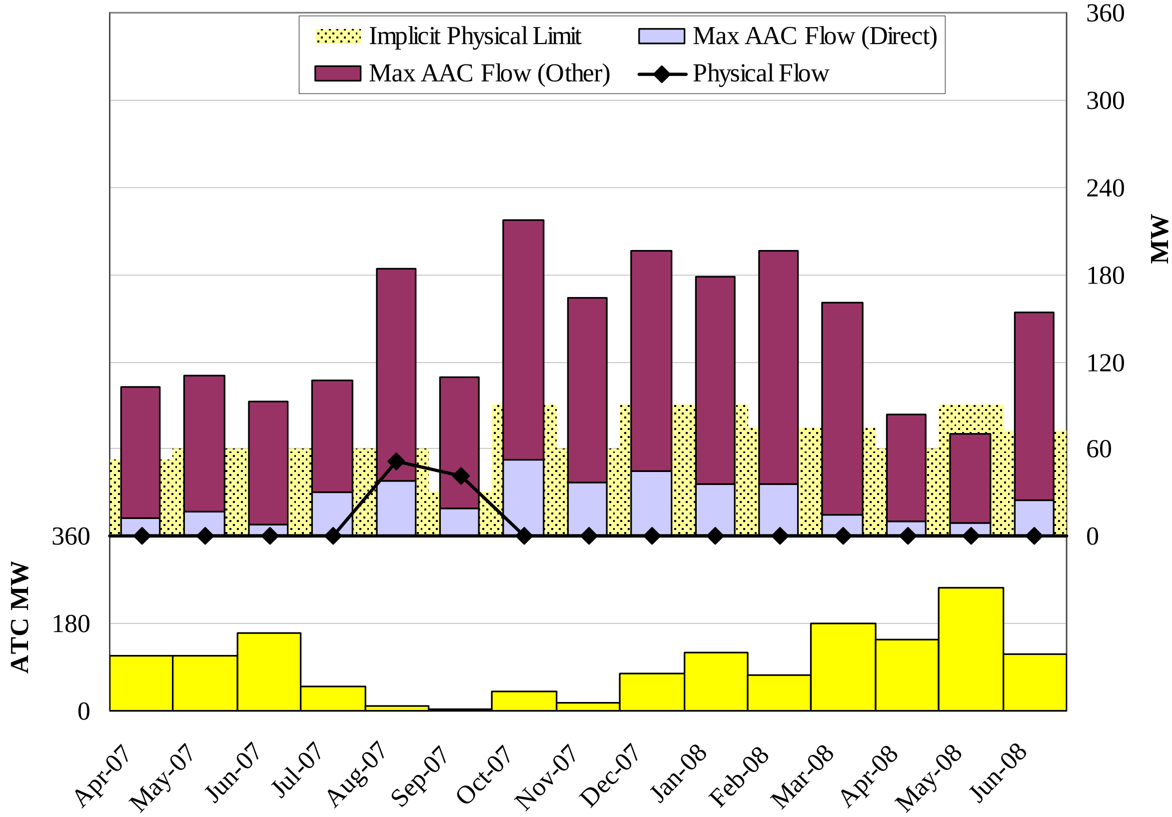
On this interconnection ATC was generally non-zero. The red bars reveal the potential for significant loopflow from other interconnections. The physical flow data, which reaches over 600 MW, is consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values. However, without actual scheduling data, we cannot eliminate the hypothesis that only part of the flow arises from AAC and that some could be from unofficial usage of the system, i.e., unscheduled transactions or from unexpected loop flow not accounted for in the base case.

In some instances in 2008, the stacked red and blue bars were greater than the implicit physical limit. If all of the AAC were actually realized, then flows would exceed the physical limit and real-time congestion management measures would be necessary to maintain reliability of the system. This is not likely to be frequently needed because not all reservations are ultimately scheduled, and some schedules will provide counterflow and relieve the physical loading on the interconnection. This is the value of real-time congestion management – it allows the operators to respond to unforeseen circumstances, such as the event when schedules are heavily weighted toward reservations that contribute to flow in one direction.

Like the previous interconnection, we are not concerned that the physical flows were slightly higher than our estimated physical limit.

Figure 9 shows the analysis of the Bosnia & Herzegovina to Serbia interconnection.

Figure 9: Analysis of the Bosnia & Herzegovina-to-Serbia Interconnection



This interconnection is relatively inactive -- only a small amount of capacity is reserved and physical flow is light. We do observe a potential for large physical impact from other TSOs (red bars). But this is not evident in the physical flow data.

Figure 10 below shows the Bulgaria-to-Romania Interface. ATC was zero throughout the time period on this interconnection. However, during July and August 2007, there was significant physical capacity available. This could be the result of capacity being reserved, but not utilized. This situation was transient, however, as the implicit physical limit declined in later months. The figure indicates that there is a potential for significant loopflow from other TSOs on this interconnection. The physical flow data in recent month suggests this may in fact be the case.

Figure 10: Analysis of the Bulgaria-to-Romania Interconnection

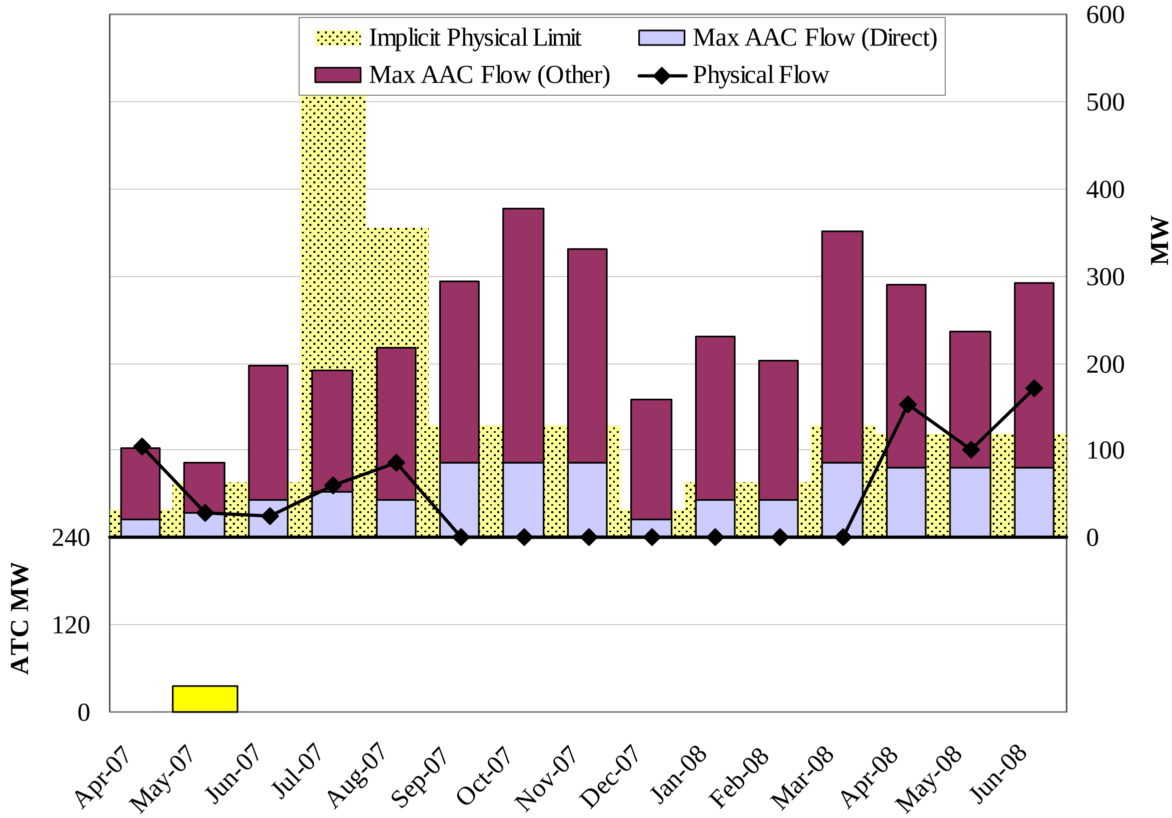
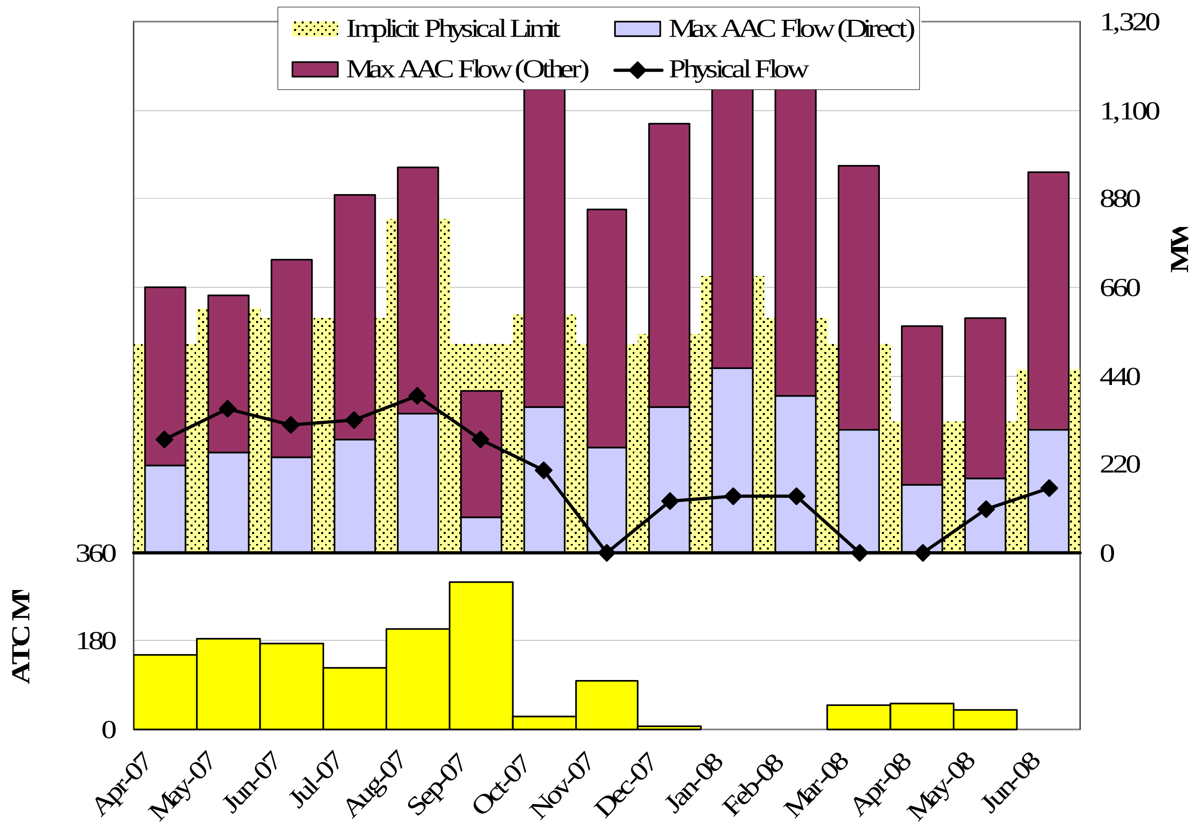


Figure 11: Analysis of the Bulgaria-to-Serbia Interconnection

<<Analysis was not possible due to lack of key data from *Bulgaria* and *Serbia* >>

Figure 12 below shows the analysis of the Croatia-to-Bosnia and Herzegovina interconnection.

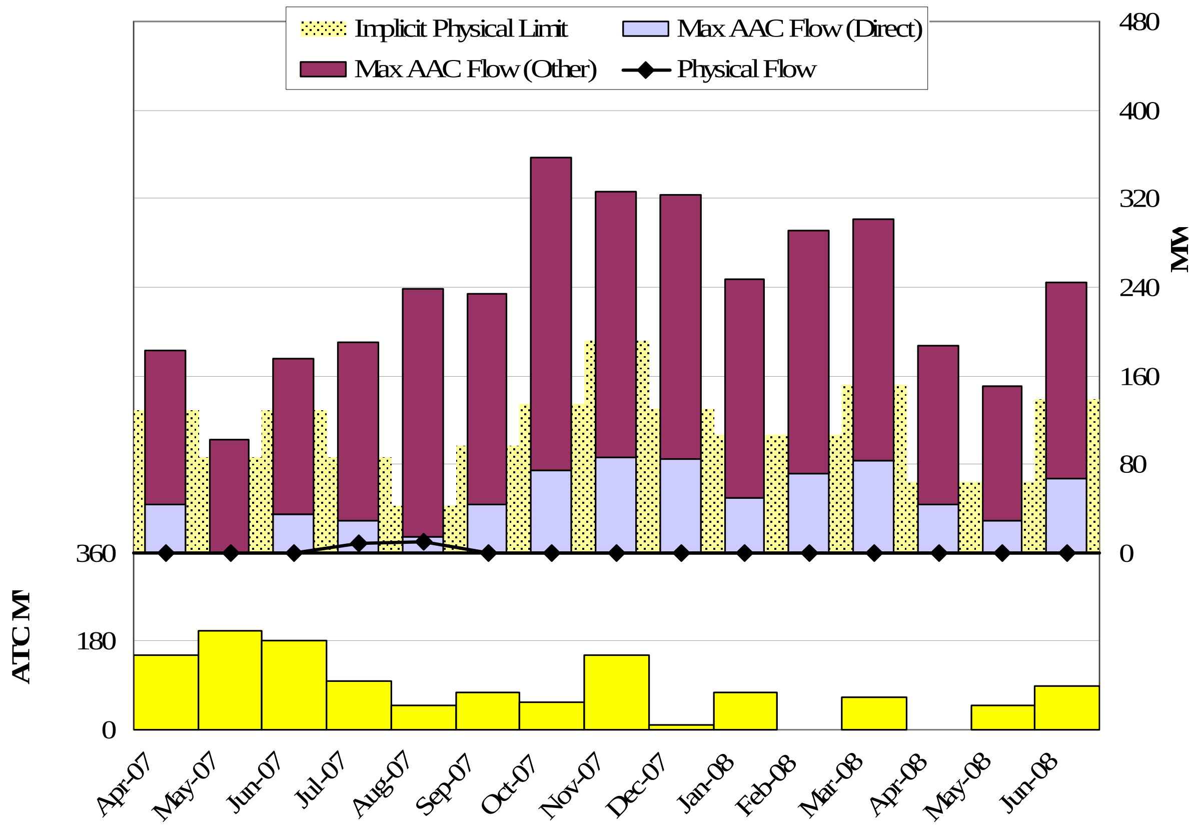
Figure 12: Analysis of the Croatia-to-Bosnia & Herzegovina Interconnection



On this interconnection, ATC is relatively low and was zero in June. Like many of the other interconnections, the potential for physical flows from others' AAC is substantial. However, the physical flows during the period studied were relatively consistent with the direct AAC on the interconnection. The analysis does not indicate to us circumstances that give rise to efficiency or market concerns.

Figure 13 shows the analysis of the Croatia-to-Serbia interconnection.

Figure 13: Analysis of the Croatia-to-Serbia Interconnection



This interconnection is relatively inactive. It has very little direct AAC and very little physical flow. The analysis does not indicate to us circumstances that give rise to efficiency or market concerns.

The analysis of the Macedonia-to-Serbia Interconnection is shown in Figure 14. This interconnection is relatively inactive and ATC is relatively plentiful. The analysis does not indicate to us circumstances that give rise to efficiency or market concerns.

Figure 14: Analysis of the Macedonia-to-Serbia Interconnection

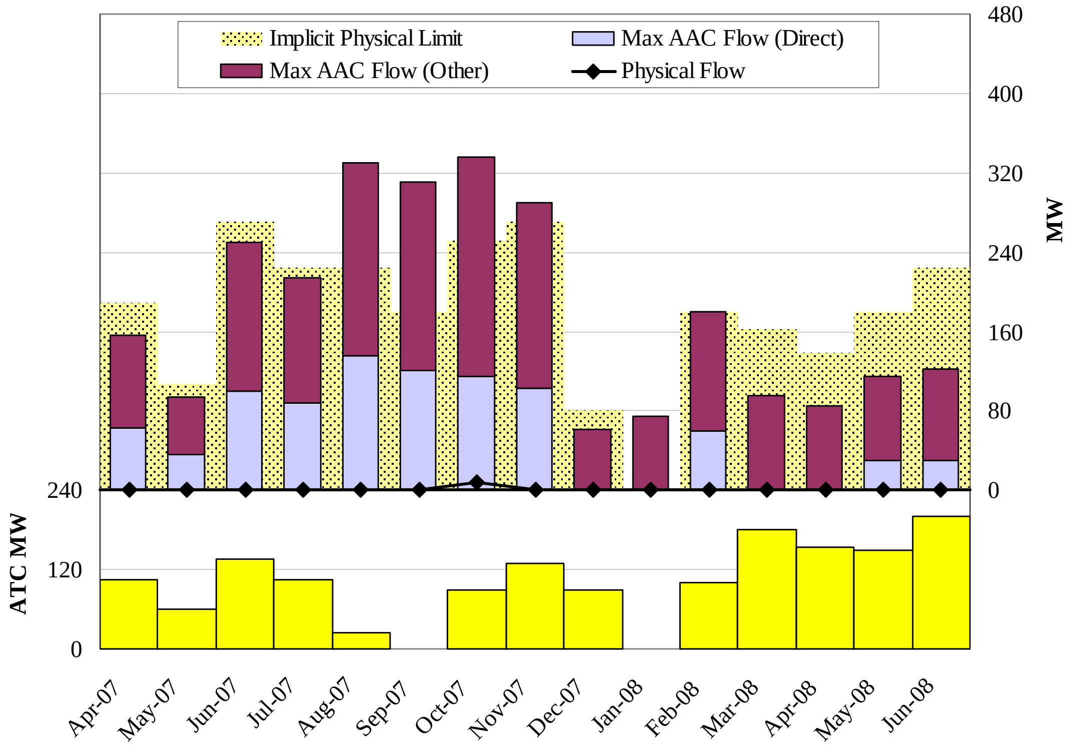


Figure 15: Analysis of the Montenegro-to-Albania Interconnection

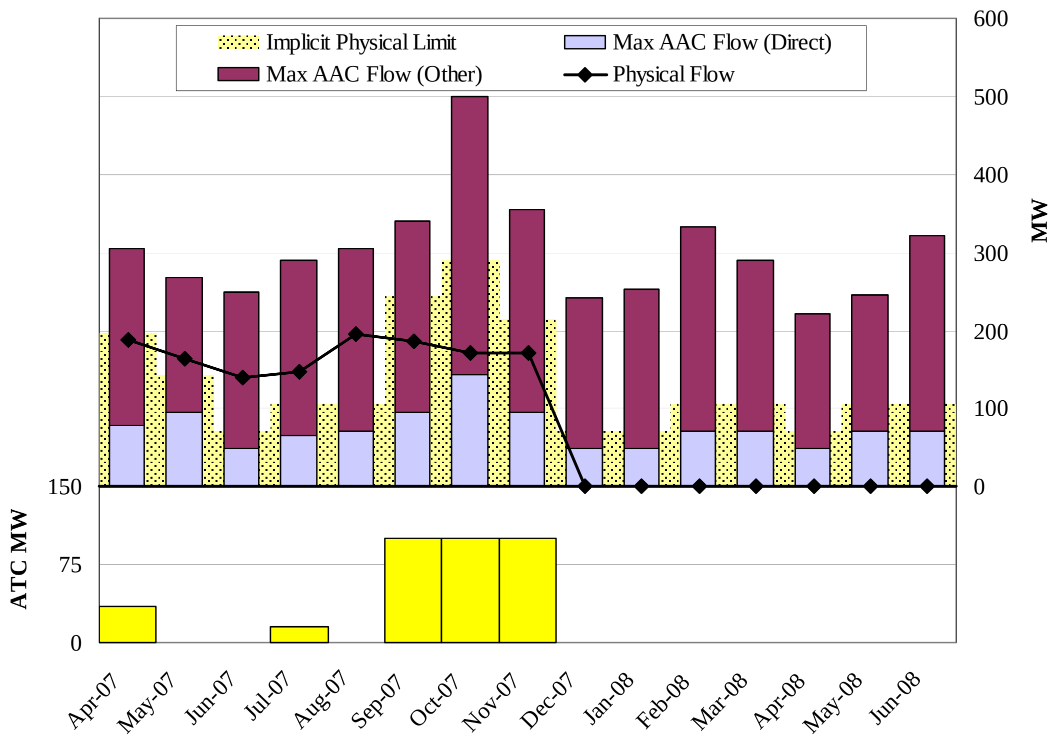
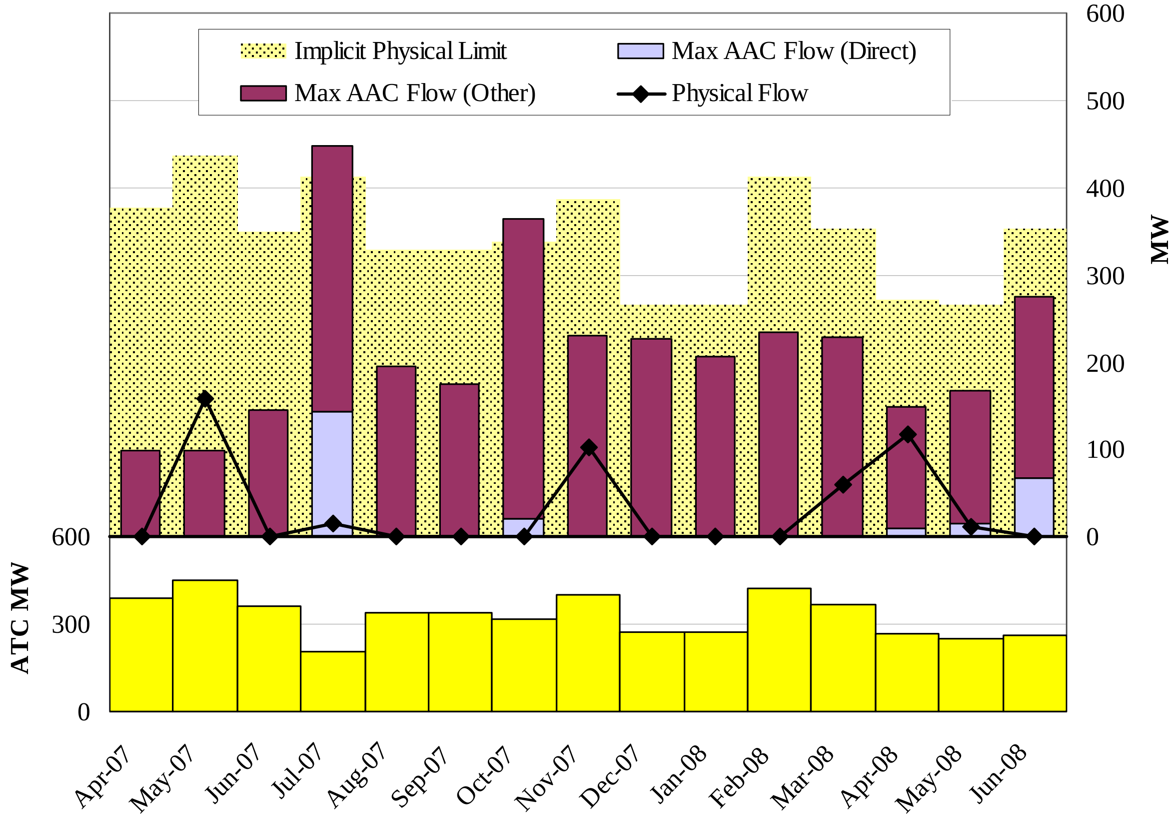


Figure 15 above shows the analysis of the Montenegro-to-Albania interconnection. It shows that over the time period, the ATC was often zero. In recent months, the actual physical flow is higher than what would be expected from direct AAC (i.e., from transactions between the counterparties to this interconnection). The physical flow data, which reaches up to 200 MW, is consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values. However, without actual scheduling data, we cannot eliminate the hypothesis that only part of the flow arises from AAC and that some could be from unofficial usage of the system, i.e., unscheduled transactions or from unexpected loop flow not accounted for in the base case. With scheduling data, which we are requesting going forward, the issues would become clearer.

The analysis of the Montenegro-to-Bosnia and Herzegovina interconnection is shown in Figure 16.

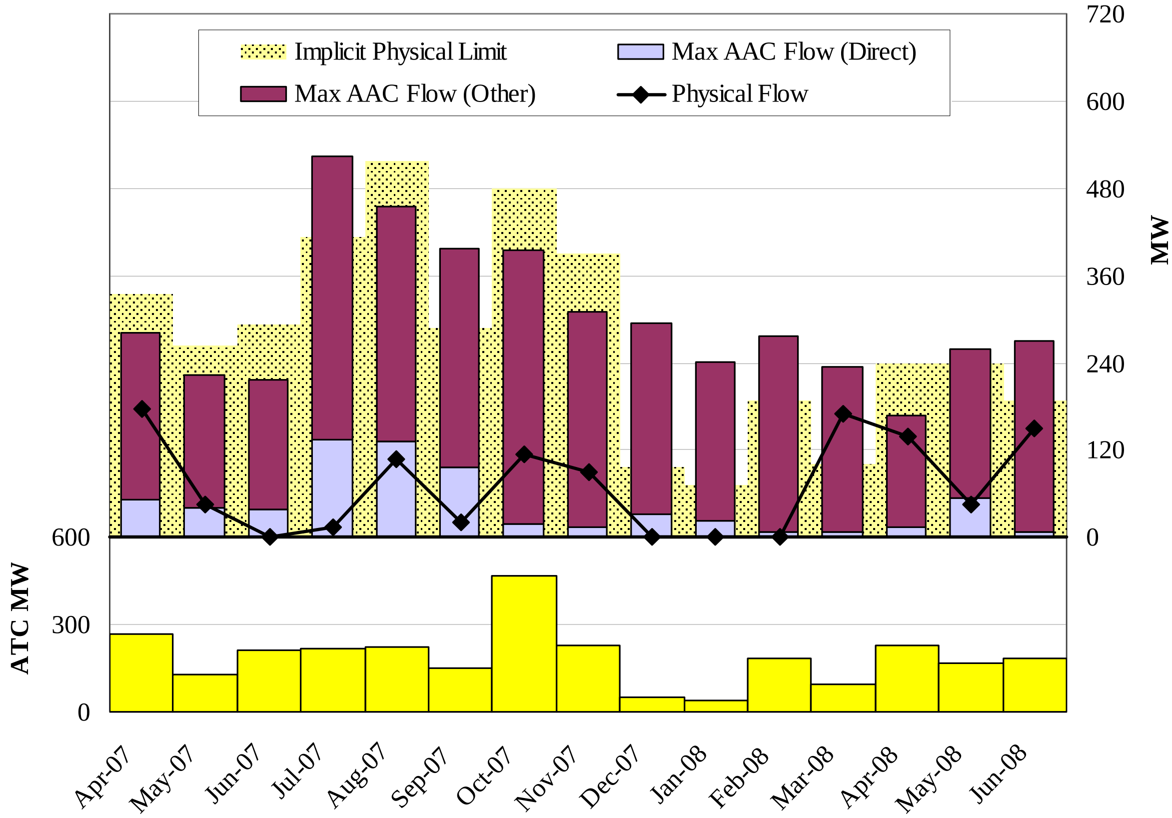
Figure 16: Analysis of the Montenegro-to-Bosnia & Herzegovina Interconnection



This interconnection is relatively inactive -- there is not much capacity reserved, ATC is abundant, and there is also not much physical flow. We do not detect circumstances that give rise to competitive concerns on this interconnection.

The analysis of the Montenegro-to-Serbia interconnection is shown in Figure 17.

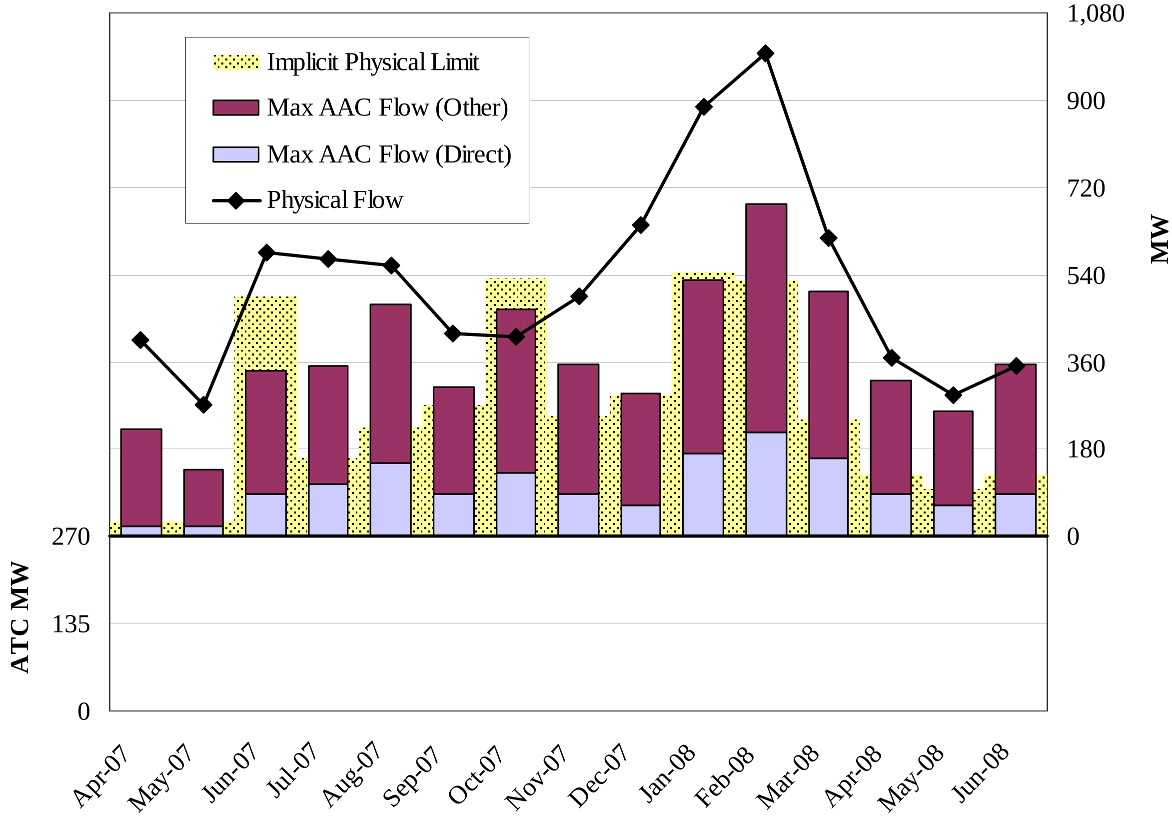
Figure 17: Analysis of the Montenegro-to-Serbia Interconnection



This interconnection experiences some light flow that is relatively consistent with the direct AAC. There is also relatively ample ATC. Accordingly, we do not detect circumstances that give rise to competitive concerns on this interconnection.

Figure 18 below shows the analysis of the Romania-to-Bulgaria interconnection. This is a fairly active interconnection. Physical power flows extend up to 1,000 MW during the period studied. The capacity is fully reserved in all months, i.e., ATC is zero. Like the Bulgaria-to-Romania interconnection analyzed above, we estimated the Bulgarian AAC on this interconnection for months prior to January 2008 because Bulgaria did not make its ATC value readily available for those periods.

Figure 18: Analysis of the Romania-to-Bulgaria Interconnection



During the winter, the physical flows far exceeded the implicit physical limit. Part of this excessive flow could be explained by loop flow from other interconnections, as shown in the red area of the lower panel. However, the maximum impact from other interconnections combined with the flows from direct AAC is less than the physical flows. This additional physical flow could be from unexpected transactions or from unscheduled or unofficial flows. The situation improved in recent months with the flows being consistent with total AAC.

Figure 19 below shows the analysis of the Romania-to-Serbia interconnection. Like the Romania-to-Bulgaria interconnection, this interconnection is fully reserved and has large physical flows, often approaching physical limit. The physical flow is relatively consistent with the maximum AAC flow (red-area plus the blue area), consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values. However, without actual scheduling data, we cannot eliminate the hypothesis that only part of the flow arises from AAC and that some could be from unofficial usage of the system, i.e., unscheduled transactions or from unexpected loop flow not accounted for in the base case.

Figure 19: Analysis of the Romania-to-Serbia Interconnection

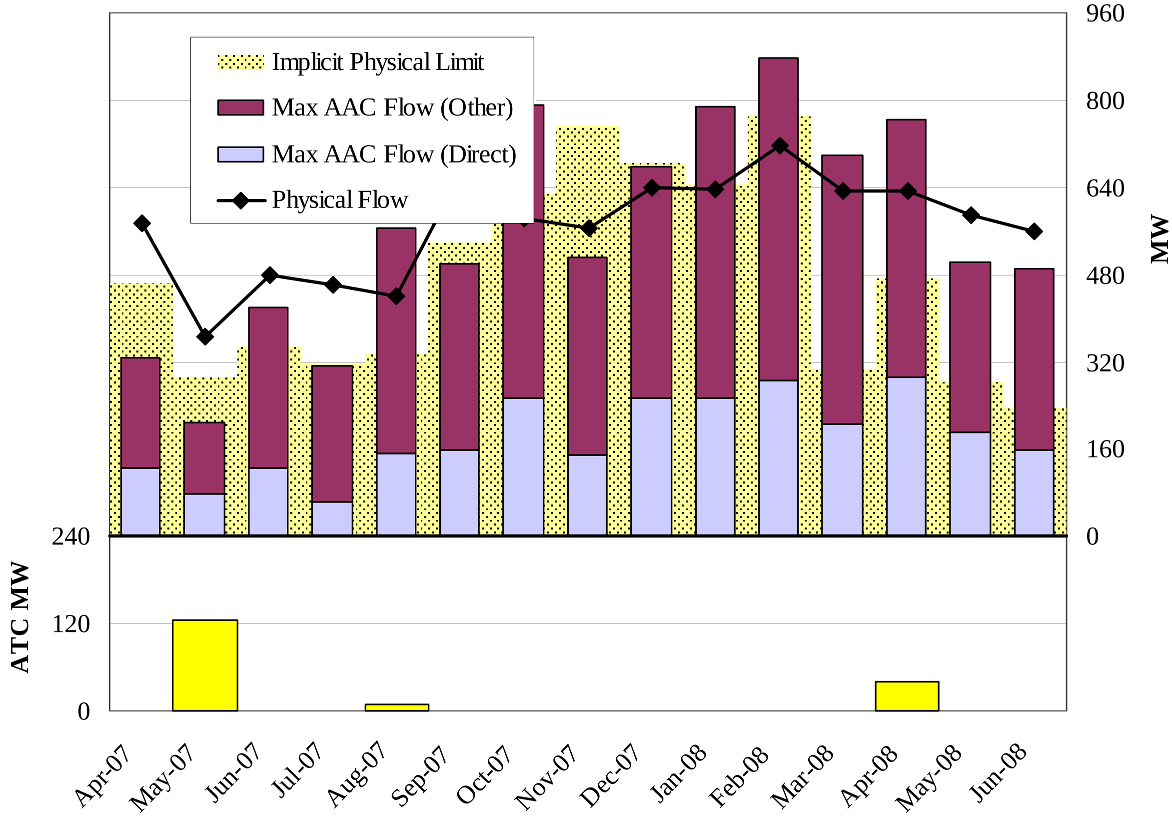


Figure 20: Analysis of the Serbia-to-Albania Interconnection

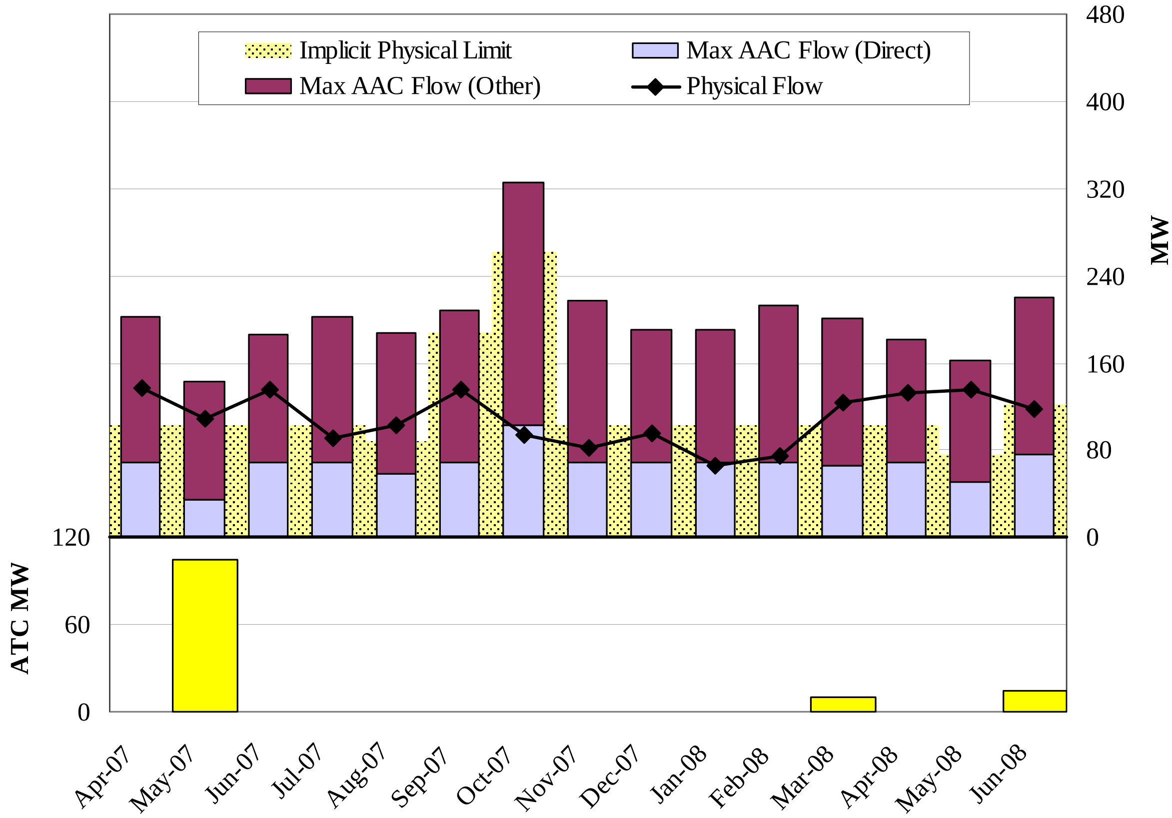


Figure 20 above shows the analysis of the Serbia-to-Albania interconnection. This interconnection is fully-reserved in all months shown. The physical flows are consistent with these direct reservations. Because the physical flows also approach the physical limit, additional NTC on this interconnection would likely contribute to increased efficiency.

Figure 21: Analysis of the Serbia-to-Bulgaria Interconnection

<<Analysis was not possible due to lack of *Serbia* and *Bulgaria* data >>

Figure 22 below shows the Serbia-to-Bosnia & Herzegovina interconnection. Physical flows on this interconnection exceed the maximum flow that would occur as a result of all AAC and the implicit physical limit. It is possible that loopflow not accounted for in the base case or other unexpected events have occurred over the period, but such contingencies would not support a sustained pattern as shown. One possibility is that additional physical flow is occurring from transactions that are not associated with AAC, either ones for internal dispatch or cross-border ones that are unscheduled. Our data does not permit a resolution of these circumstances.

Figure 22: Analysis of the Serbia-to-Bosnia & Herzegovina Interconnection

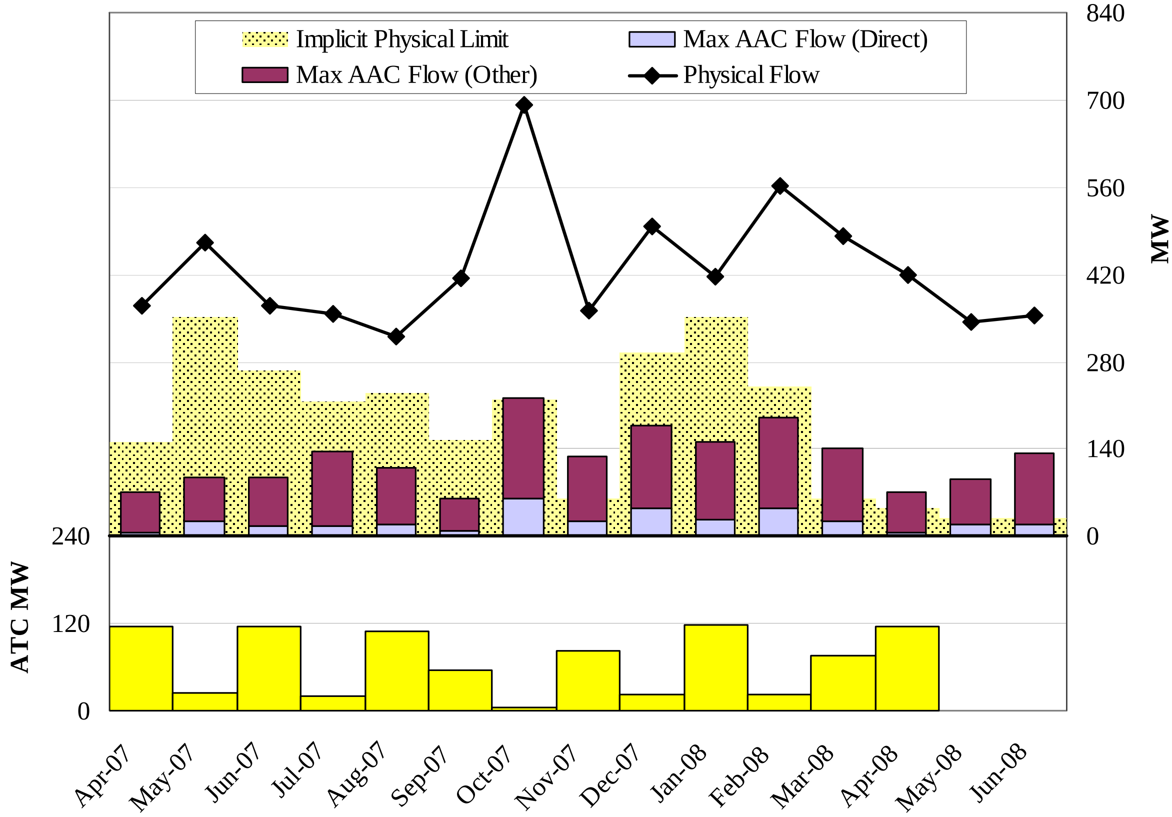


Figure 23: Analysis of the Serbia-to-Croatia Interconnection

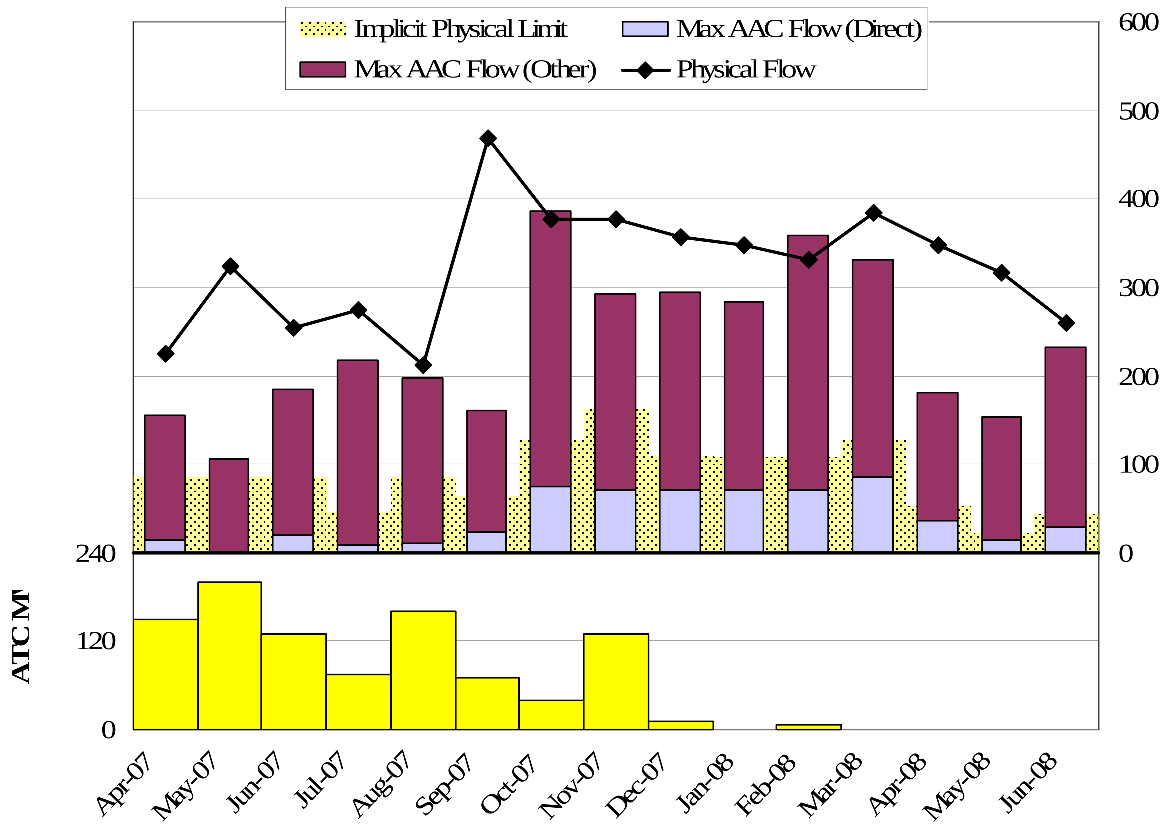
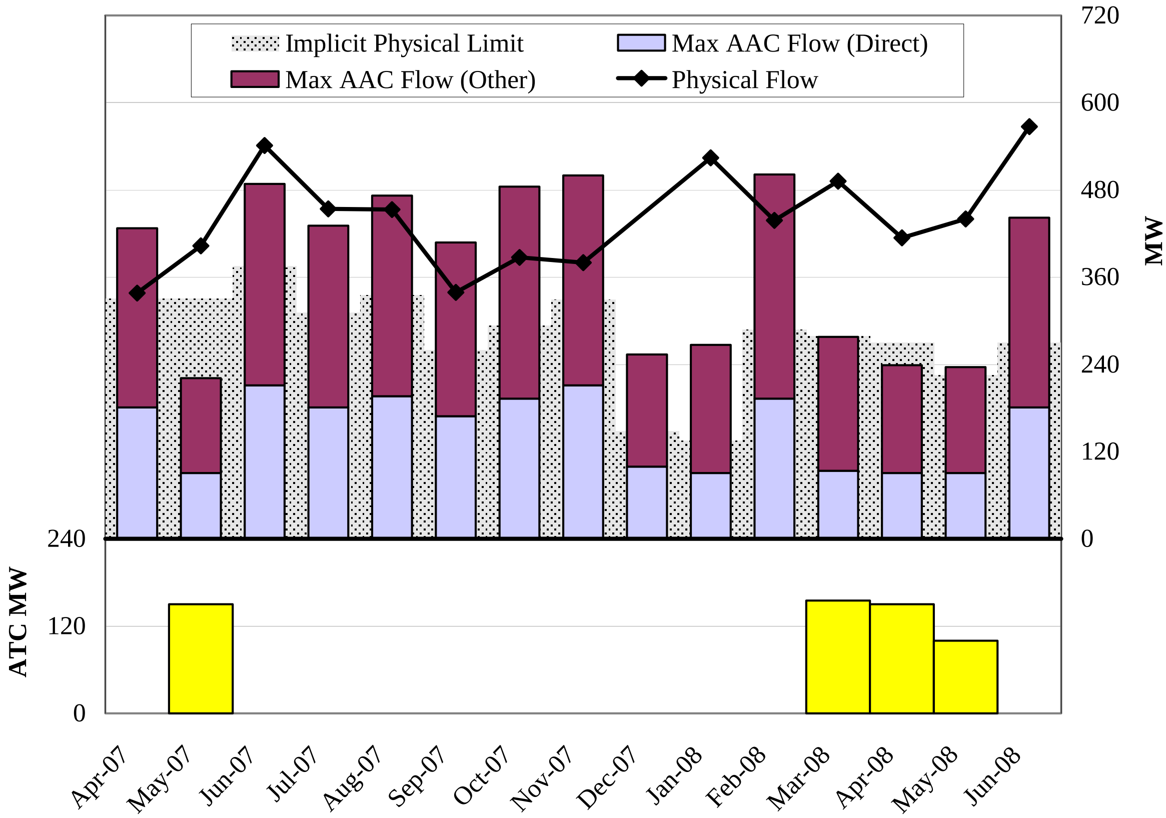


Figure 23 above shows the analysis of the Serbia-to-Croatia interconnection. The figure shows that this interconnection is susceptible to large loopflow from other TSOs (red bar). Our analysis of this interconnection is limited because we have no information about natural flows (i.e., the loopflow from the base dispatch, as opposed to the loop flow from transfers over the interconnection). Because the implicit operating limit is significantly lower than actual flows, we suspect there are significant natural flows on this interconnection. However, we currently are not in possession of the necessary facts to make a conclusion.

Figure 24 shows the analysis of the Serbia-to-Macedonia interconnection.

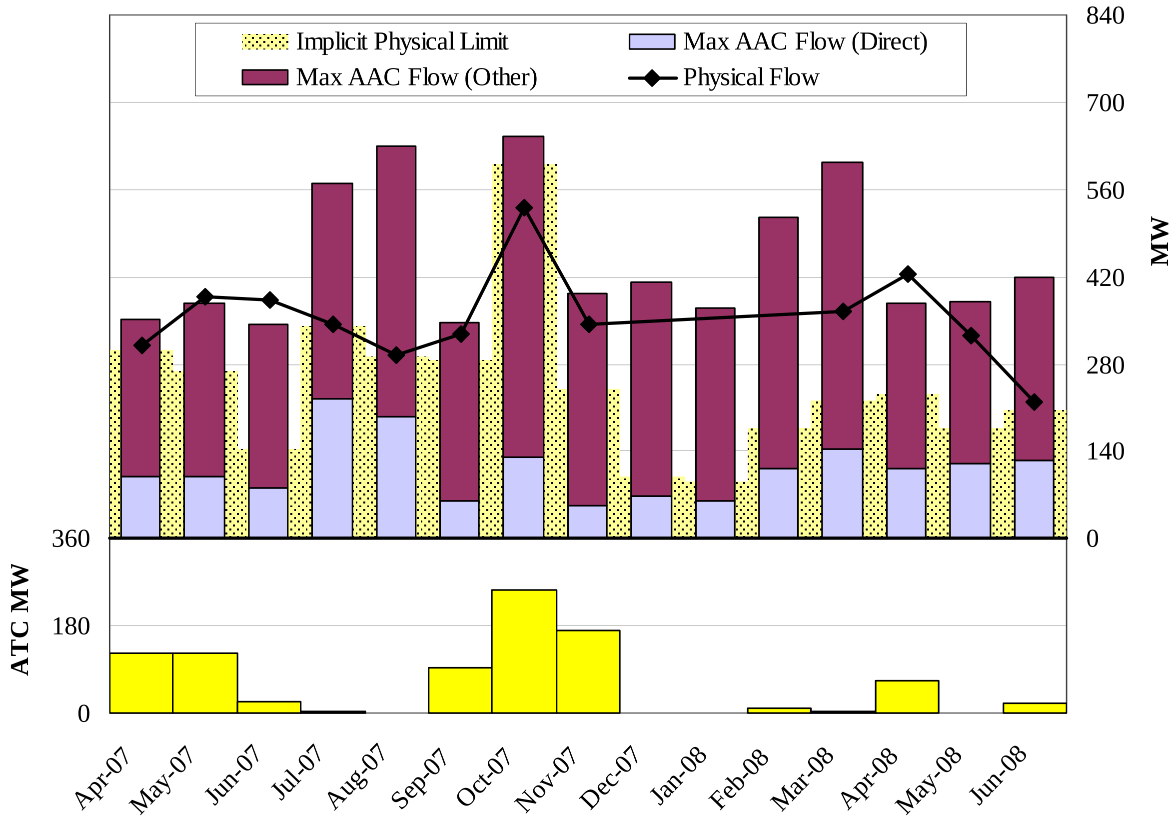
Figure 24: Analysis of the Serbia-to-Macedonia Interconnection



Physical flows on this interconnection exceed the maximum flow that would occur as a result of all AAC and exceeds the implicit physical limit. It is possible that loopflow not accounted for in the base case or other unexpected events have occurred over the period, but such contingencies would not support a sustained pattern as shown. One possibility is that additional physical flow is occurring from transactions that are not associated with AAC, either ones for internal dispatch or cross-border ones that are unscheduled. Our data does not permit a resolution of these circumstances.

The analysis of the Serbia-to-Montenegro interconnection is shown in Figure 25.

Figure 25: Analysis of the Serbia-to-Montenegro Interconnection



Similar to the Serbia-to-Macedonia interconnection, physical flows on this interconnection exceed the maximum flow that would occur as a result of all AAC and exceeds the implicit physical limit in some instances. It is possible that loopflow or other unexpected events have occurred over the period, but such contingencies would not support a sustained pattern as shown. One possibility is that additional physical flow is occurring from transactions that are not associated with AAC, either ones for internal dispatch or cross-border ones that are unscheduled. Our data does not permit a resolution of these circumstances.

Figure 26: Analysis of the Serbia-to-Romania Interconnection

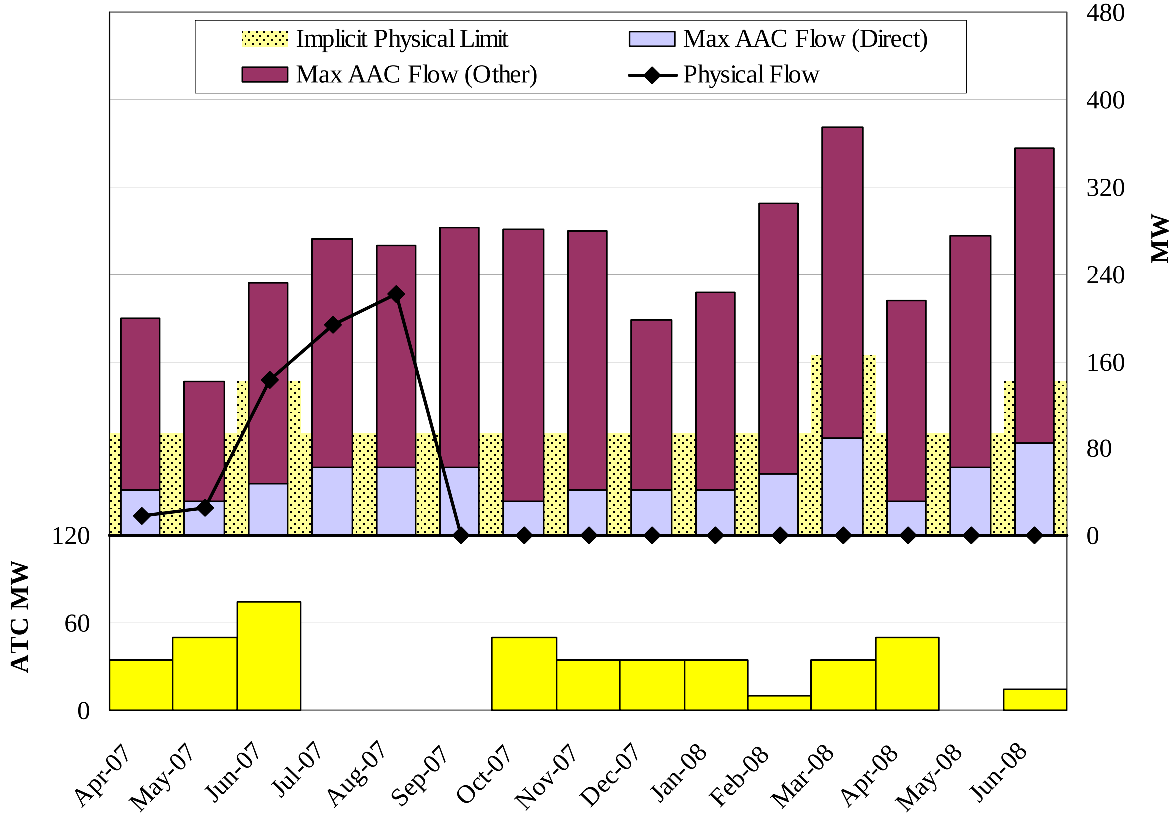


Figure 26 above shows the analysis for the Serbia-to-Romania interconnection. Except for a few peak days early last summer, this is a relatively inactive interconnection. Most activity is in the opposite direction (see Figure 19). Very little is reserved on this interconnection and there are very little flows. The analysis does not indicate to us circumstances that give rise to efficiency concerns.

D. Summary of Interconnection Capacity Analysis.

Overall, we find in many instances the actual physical usage to be consistent with physical usage associated with reservations and base case activity.

Of the 22 interconnections, the Serbia-to-Bulgaria and Bulgaria-to-Serbia interconnections could not be fully evaluated because neither TSO provided line flow data. Of the twenty interconnections that we were able to evaluate at least partially, ten were inactive, meaning reservations were relatively small and little or no physical flow occurred in real-time. These relatively inactive interconnections are: Albania to Montenegro; Albania to Serbia; Bulgaria to

Romania; Bosnia & Herzegovina to Serbia; Croatia to Serbia; Macedonia to Serbia, Montenegro to Albania, Montenegro to Bosnia & Herzegovina; Montenegro to Serbia, and Serbia to Romania. These interconnections tend to be ones that serve power transactions in the west-to-east direction, which is against the predominant flow in the region. Our screening did not detect potential market or efficiency problems associated with these interconnections.

The remaining ten interconnections were active, meaning they experienced both significant reservations and significant physical flows. In four cases, the physical flows were roughly equal to the flows that would be expected from transactions between the two parties to the interconnection. These four interconnections are: the Croatia to Bosnia & Herzegovina, Montenegro to Albania, the Romania to Serbia, and Serbia to Albania.

In the six other instances, the physical flows exceeded the flows that would arise solely from AAC between the two counterparties on the interconnection. Therefore, the physical flow above that expected between the counterparties arises from other sources. One source is other regional transactions that “loopflows” onto the interconnection. Indeed, on two of these seven interconnections, the flow was consistent with what would be expected if AAC between the counterparties as well as AAC between other TSOs in the region were to be scheduled. This was the case with Bosnia & Herzegovina to Croatia and Bosnia & Herzegovina to Montenegro. The data associated with these interconnections is consistent with the hypothesis that flows arise from transactions scheduled in accordance with regional AAC values. However, without actual scheduling data, we cannot eliminate the hypothesis that only part of the flow arises from others’ AAC and that some could be unscheduled transactions or from unexpected loop flow not accounted for in the base case. With scheduling data, which we are requesting going forward, the issues would become clearer.

On the remaining four interconnections the physical flow exceeded that which would arise from regional AAC alone while at the same time exceeding the implied physical limit on the interconnection. These interconnections are: Romania to Bulgaria; Romania to Serbia; Serbia to Bosnia & Herzegovina; and Serbia to Croatia. The data on these interconnections suggest other transactions are using the interconnection aside from the ones scheduled pursuant to regional AAC. These other transactions could be unofficial ones or ones that are creating unexpected loopflow not accounted for in the base case. Scheduling data would help to clarify the question.