



Market Monitoring Issues NICA Integration

Market Integration Stakeholders' Meeting
Chicago, IL
October 7, 2003

Joseph E. Bowring
Manager
PJM Market Monitoring Unit

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NICA Market Analysis

- MMU Report on competitiveness of markets after NICA integration
 - Issued August 7
- MMU Appendix to Report
 - Issued September 24
- Analysis of expected market conditions post integration
- Expected competitiveness of NICA markets post integration

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- MMU Appendix to Report
 - Modeling details
 - Hurdle rates
 - Congestion results
 - Imports/exports
 - Mitigation

- NICA area analysis
 - Components
 - Unit details
 - Unit ownership
 - Bilateral contracts
 - Load data
 - Tie flow data
 - Results
 - Supply curves
 - HHIs
 - Pivotal analyses

- Eastern Interconnection analysis
 - Components
 - Unit details
 - Transmission system
 - Economic dispatch
 - Hurdle rates
 - Pathway
 - Results
 - Flows on pathway
 - Dispatch

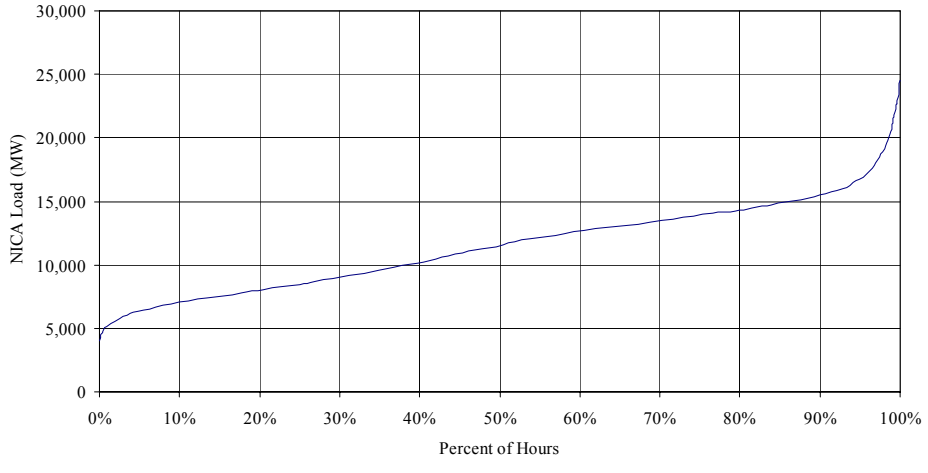
- Analysis
 - Energy Market
 - Capacity Market
 - Regulation Market
 - Spinning Reserves Market
 - Blackstart Market
 - Reactive Market

- Energy Market: Market Conditions
 - Relevant market
 - NICA market
 - PJM market
 - Surrounding control areas
 - Role of through and out transmission rates

- NICA Energy Market
 - Highly concentrated ownership in base load and mid-merit portion of the supply curve
 - Market power concern in absence of external competitive pressures
 - PJM area via pathway
 - External control areas via imports
- PJM Energy Market
 - Competitive results

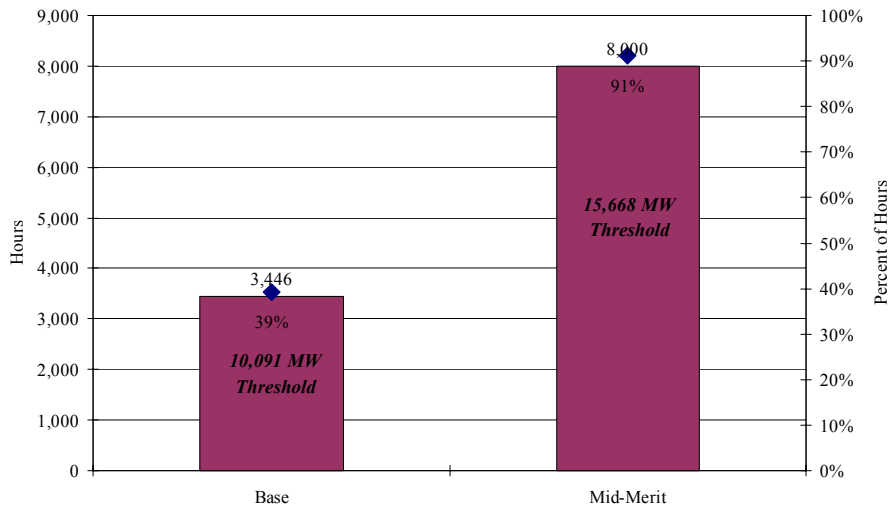


**NICA Load Duration Curve
01Sep03 Through 31Aug04**



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**NICA Operating Hours Within Supply Curve Segments
1Sep2003 Through 31Aug2004**



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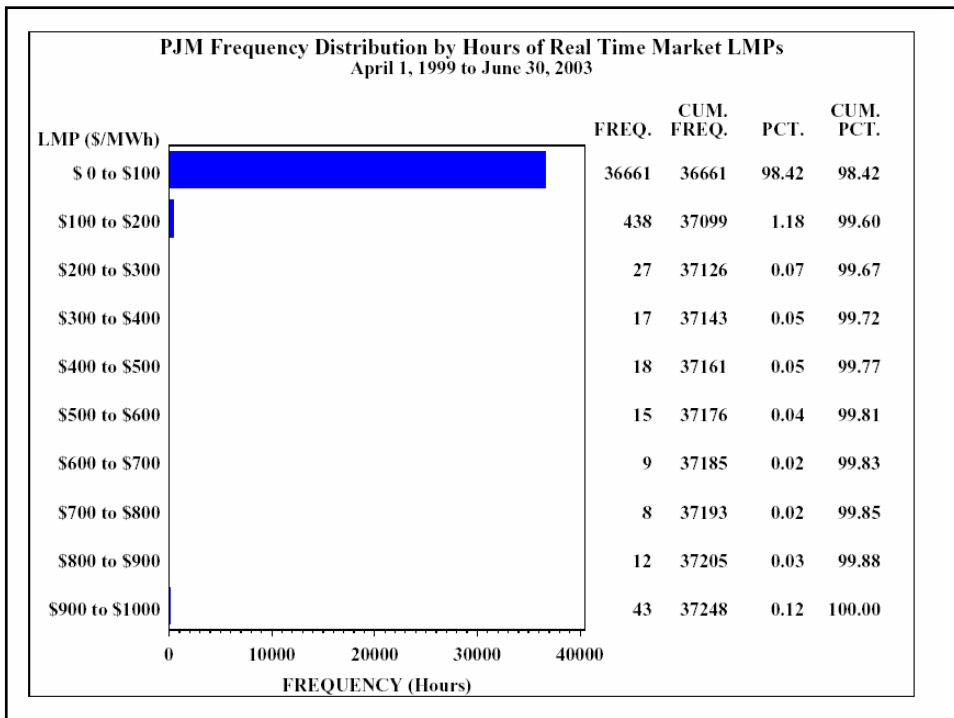
- Unconstrained Pathway
 - NICA and PJM areas jointly dispatched
 - Single energy market
 - Market results expected to be competitive
 - Simulation results
 - Pathway unconstrained 30% of hours under higher hurdle rate scenario
 - Pathway unconstrained 17% of hours under variable hurdle rate scenario
 - Pathway unconstrained 17% of hours under variable hurdle - RTOR rate scenario

- Pathway Constrained: NICA to PJM – normal market conditions in PJM
 - Marginal generation cheaper in NICA than in PJM
 - Flows from NICA to PJM
 - Competitive constraint on NICA offers from PJM offers
 - Market results expected to be competitive under normal market conditions
 - Simulation results
 - Pathway constrained NICA to PJM 62% of hours under higher hurdle rate scenario
 - Pathway constrained NICA to PJM 79% of hours under variable hurdle rate scenario
 - Pathway constrained NICA to PJM 80% of hours under variable hurdle rate - RTOR scenario



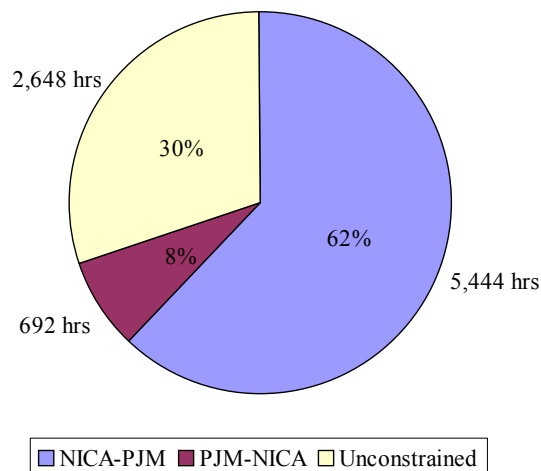
- Pathway Constrained: NICA to PJM – extreme market conditions in PJM
 - Marginal generation cheaper in NICA than in PJM
 - Flows from NICA to PJM
 - Extreme demand conditions in PJM
 - Normal demand conditions in NICA
 - PJM offers do not provide competitive constraint on NICA offers
 - Market power concerns in NICA under extreme market conditions in PJM
 - Simulation Results/Historical analysis
 - Pathway constrained NICA to PJM 62% of hours under higher hurdle rate scenario
 - Pathway constrained NICA to PJM 79% of hours under variable hurdle rate scenario; 80% under variable hurdle rate - RTOR
 - PJM system prices >\$500/MWh for 0.19% of hours since April 1, 1999
 - Expected duration of this scenario is very short

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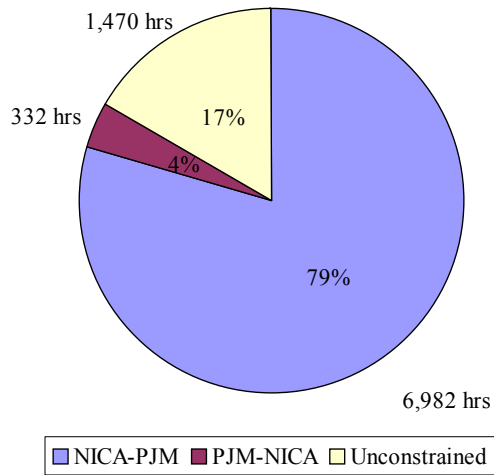


- **Pathway Constrained: PJM to NICA**
 - Marginal generation cheaper in PJM than in NICA
 - Flows from PJM to NICA
 - No competitive constraint on NICA offers from PJM offers
 - Load in highly concentrated portions of NICA supply curve
 - Potential competition from non-pathway imports
 - Market power concerns in NICA
 - Simulation results
 - Pathway constrained PJM to NICA 8% of hours under higher hurdle rate scenario
 - Pathway constrained PJM to NICA 4% of hours under variable hurdle rate scenario
 - Pathway constrained PJM to NICA 3% of hours under variable hurdle rate - RTOR scenario

**Pathway Congestion Hours
15/9 Hurdle Rate
Sept 1, 2003 through Aug 31, 2004**

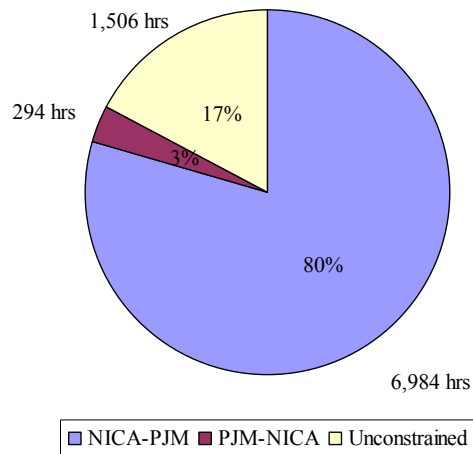


**Pathway Congestion Hours
Variable Hurdle Rate
Sept 1, 2003 through Aug 31, 2004**



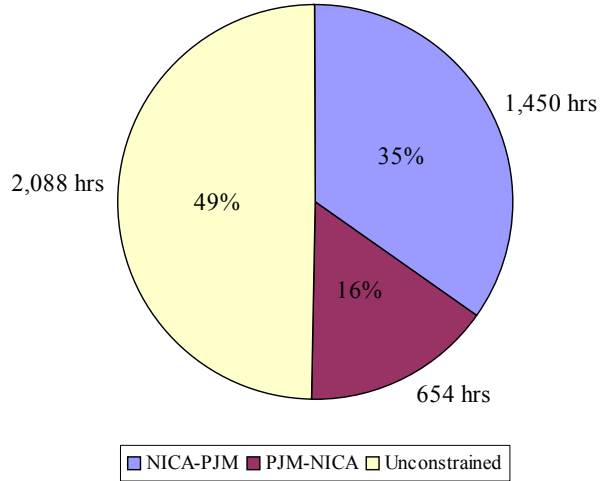
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**Pathway Congestion Hours
Variable Hurdle Rate - RTOR
Sept 1, 2003 through Aug 31, 2004**



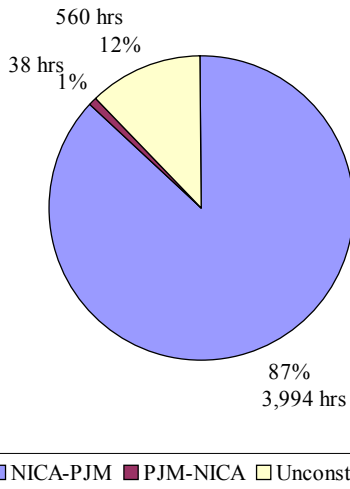
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**Pathway Congestion During Peak Hours
15/9 Hurdle Rate
Sept 1, 2003 through Aug 31, 2004**



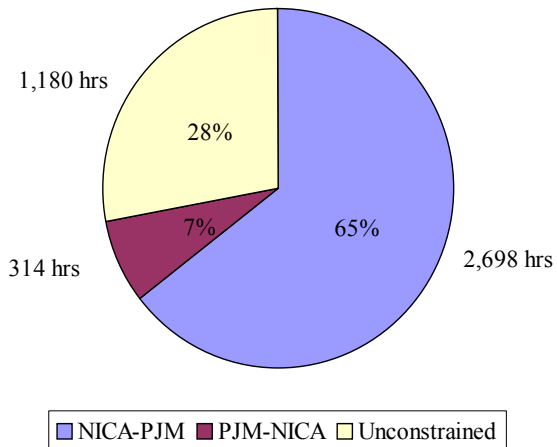
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**Pathway Congestion During Off-Peak Hours
15/9 Hurdle Rate
Sept 1, 2003 through Aug 31, 2004**



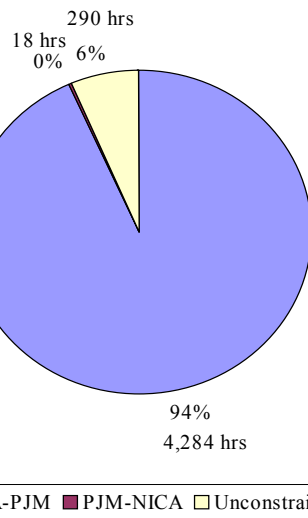
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**Pathway Congestion During Peak Hours
Variable Hurdle Rate
Sept 1, 2003 through Aug 31, 2004**



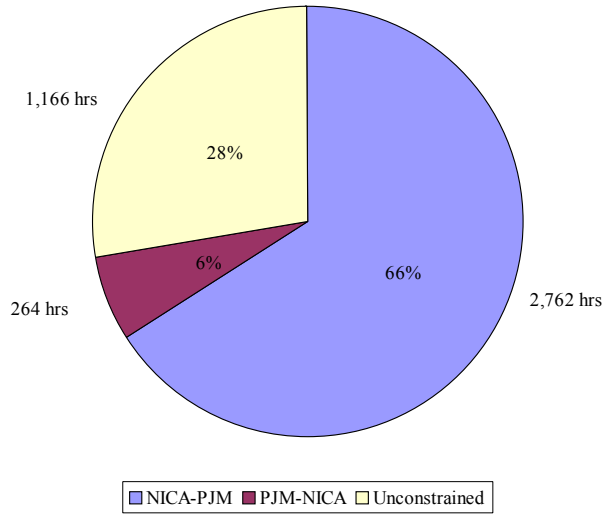
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**Pathway Congestion During Off-Peak Hours
Variable Hurdle Rate
Sept 1, 2003 through Aug 31, 2004**



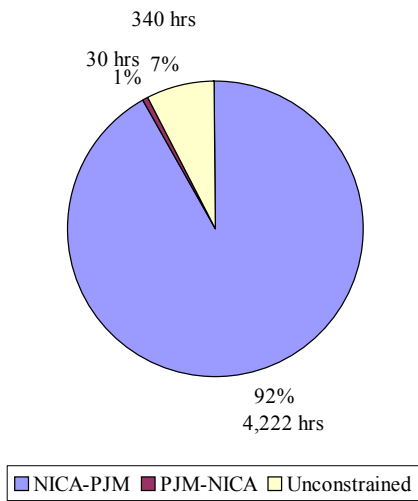
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**Pathway Congestion During Peak Hours
Variable Hurdle Rate - RTOR
Sept 1, 2003 through Aug 31, 2004**



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**Pathway Congestion During Off-Peak Hours
Variable Hurdle Rate - RTOR
Sept 1, 2003 through Aug 31, 2004**

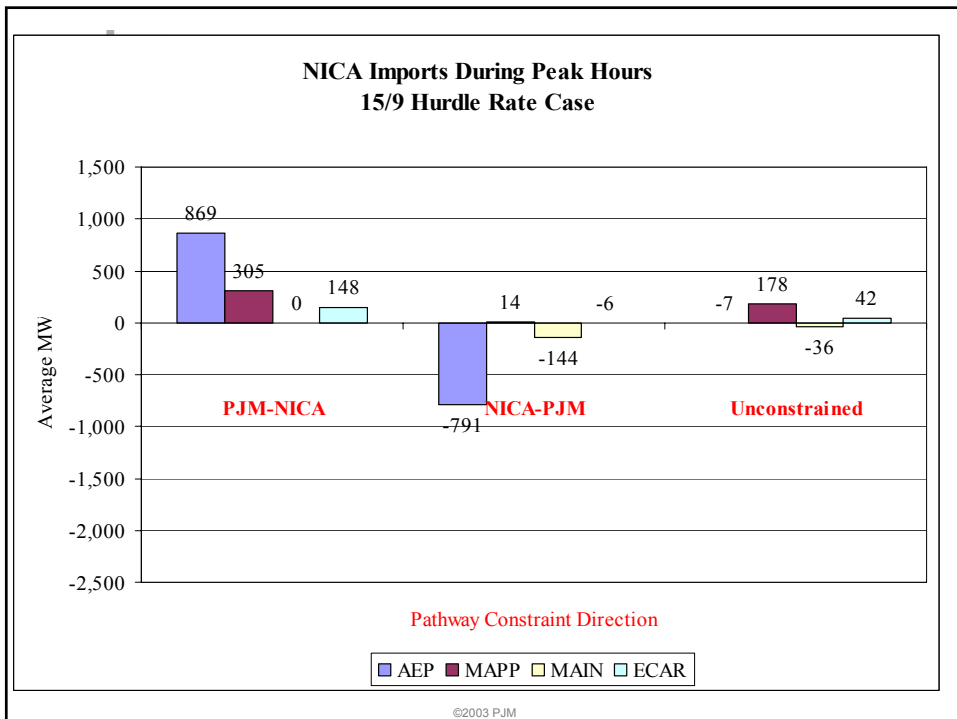


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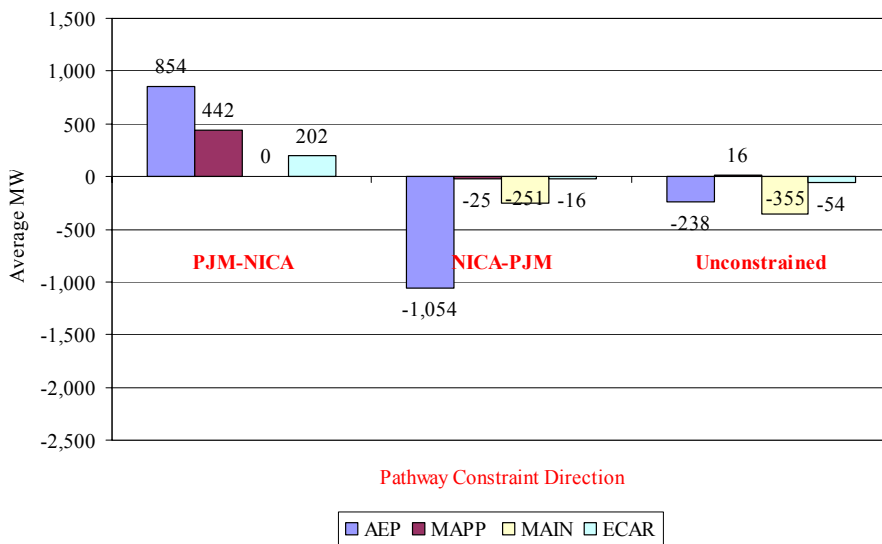
- NICA Imports/Exports
 - Regardless of pathway conditions, the energy market in the NICA will experience competition from external sources
 - NICA resources may export to external areas
 - NICA may import from external resources
 - The GE MAPS simulations result in calculations of the level of economic exports from and imports to NICA.

- NICA Imports/Exports
 - Constrained PJM-NICA
 - NICA is net importer
 - Constrained NICA-PJM
 - NICA is net exporter
 - Unconstrained
 - NICA exports approximate NICA imports

- NICA Imports/Exports
 - In the variable hurdle rate - RTOR case, exports from NICA to MAIN increased, when compared to the other two scenarios.
 - The increase in exports resulted from the removal of through and out rates between PJM and MISO mandated by FERC Order EL02-111.
 - NICA generation displaced more expensive generating units in surrounding control areas, particularly during off-peak periods when through and out rates were removed.

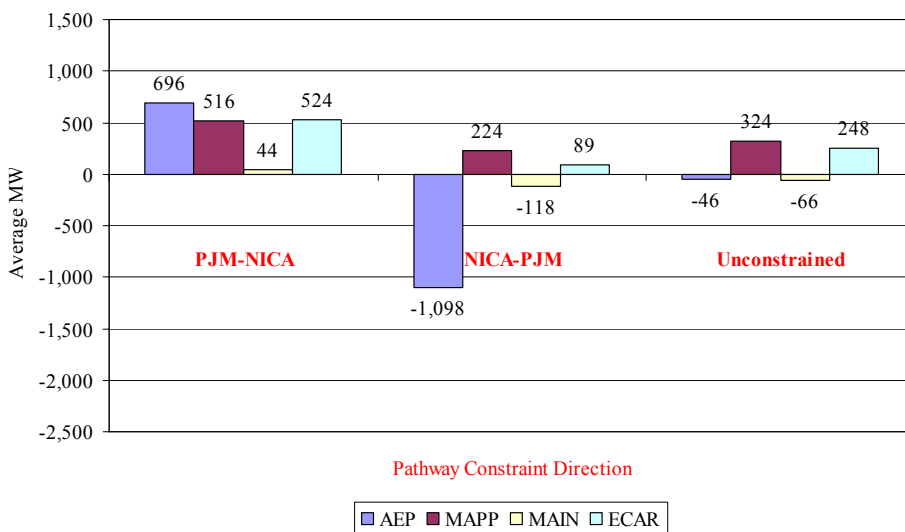


NICA Imports During Off-Peak Hours 15/9 Hurdle Rate Case

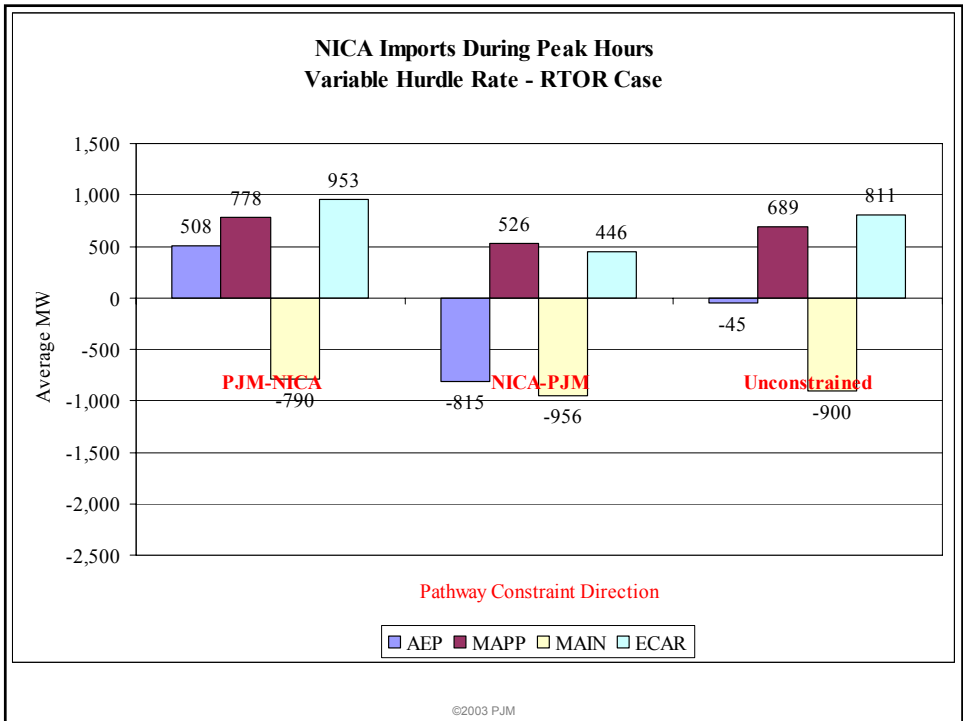
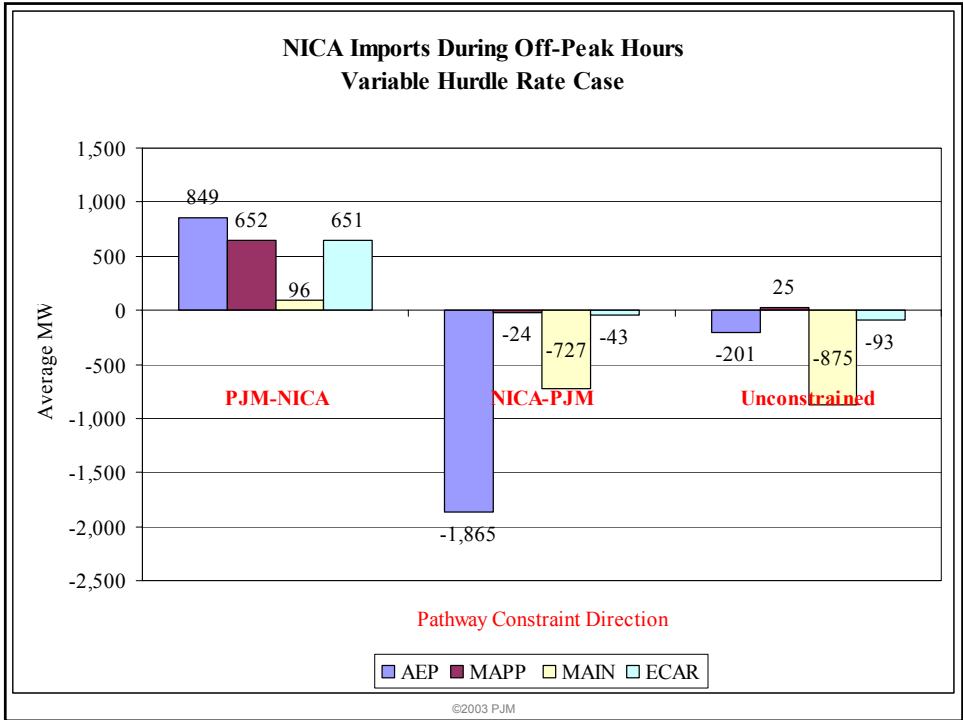


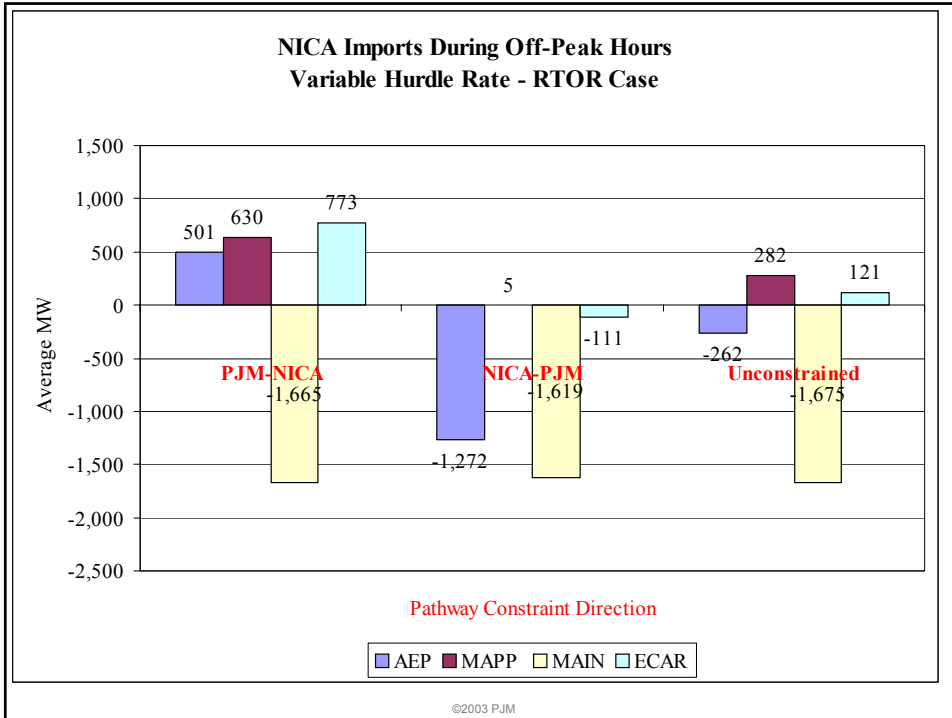
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NICA Imports During Peak Hours Variable Hurdle Rate Case



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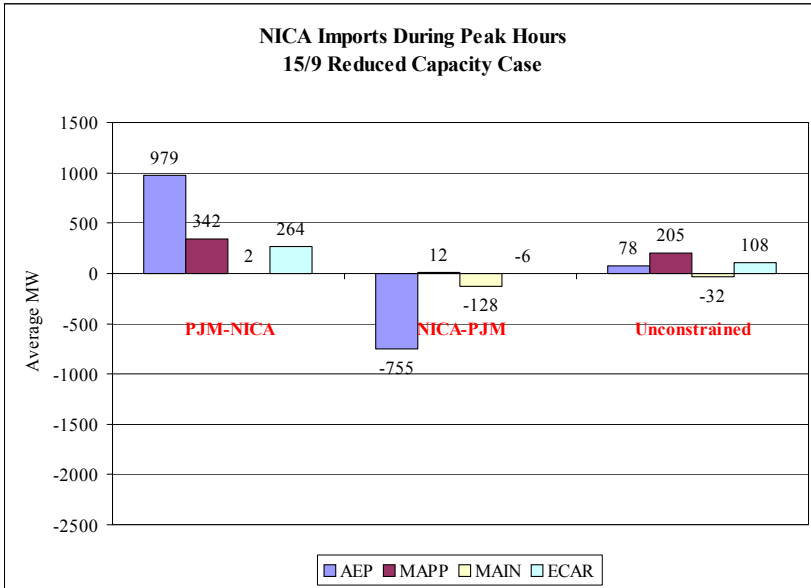




- **Competition From Regions Surrounding NICA**
 - **Reduced Capacity Case**
 - **3,000 MW Of NICA Mid-merit Generation Is Removed In The Reduced Capacity Case**
 - **Comparison Of NICA Net Import Characteristics with and without 3,000 MW**
 - **Extent of Competition from Surrounding Markets.**

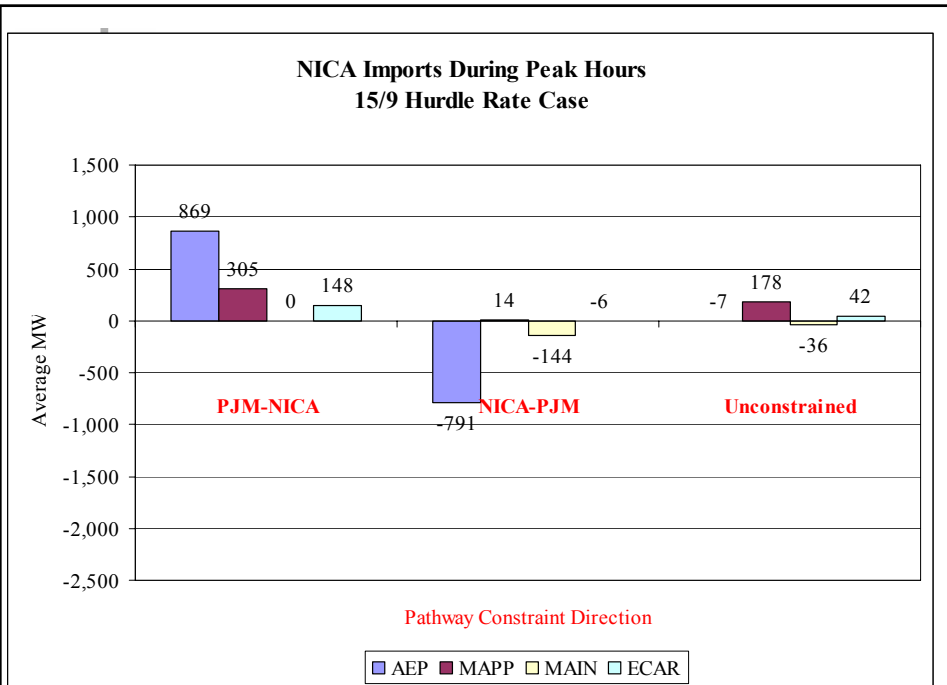


NICA Imports During Peak Hours 15/9 Reduced Capacity Case



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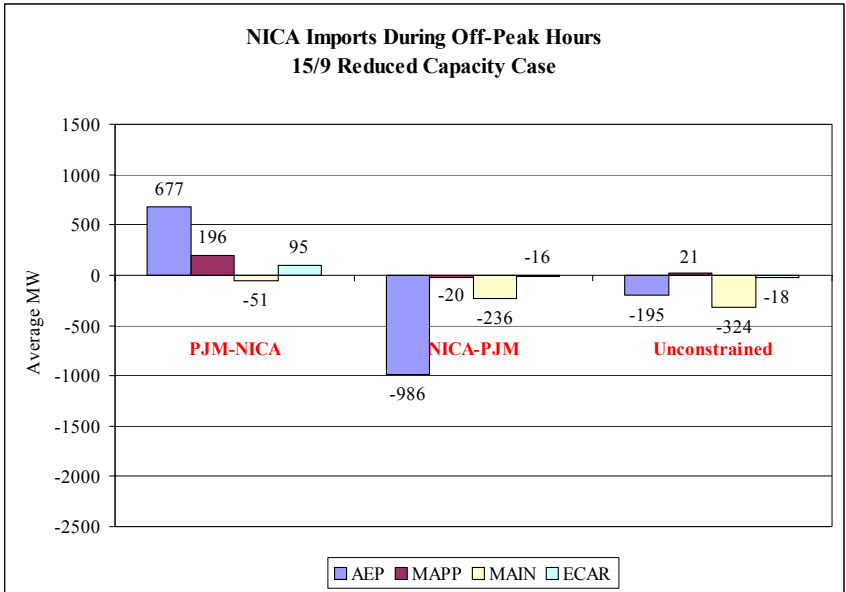
NICA Imports During Peak Hours 15/9 Hurdle Rate Case



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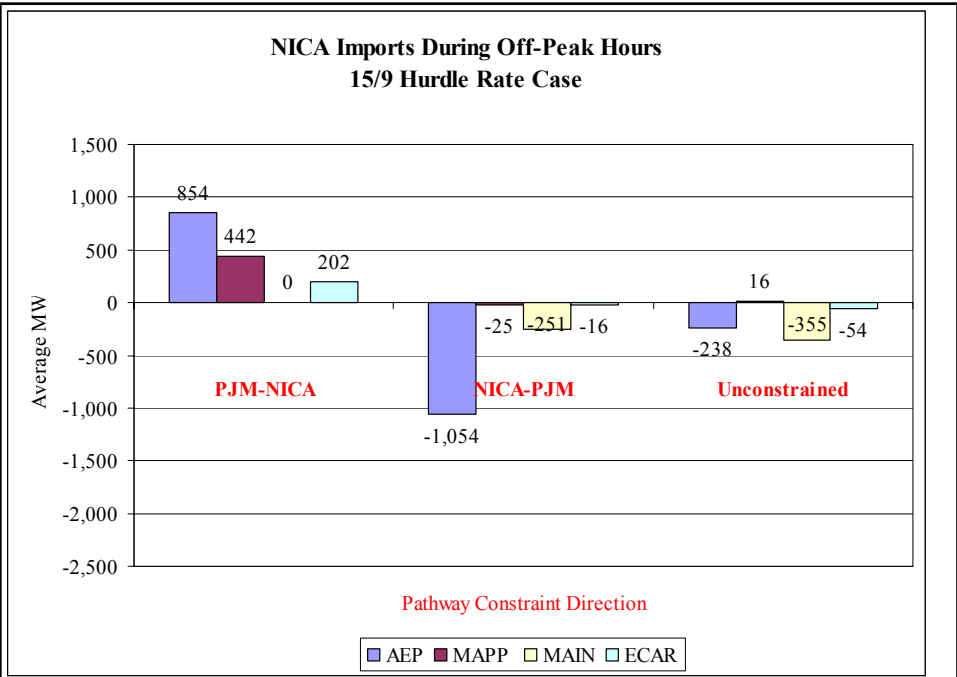


NICA Imports During Off-Peak Hours 15/9 Reduced Capacity Case



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NICA Imports During Off-Peak Hours 15/9 Hurdle Rate Case



Pathway Constraint Direction

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- **Difference Between 15/9 Reduced Capacity and 15/9 Base Cases**
 - **Peak Hours**
 - **91-96% of the 3,000 MW Deficit Is Replaced By NICA Internal Resources**
 - **Increased Imports Primarily From AEP, MAPP And ECAR**
 - **During PJM-NICA Constraint, NICA remains a net importer**
 - **During NICA-PJM Pathway Constraint, NICA Remains A Net Exporter (most hours)**

- **Difference Between 15/9 Reduced Capacity and 15/9 Base Cases**
 - **Off Peak Hours**
 - **96-100% Of The 3000 MW Deficit Is Replaced By NICA Internal Resources**
 - **NICA Remains A Net Exporter (97-99% Of Hours)**
 - **NICA Is a Net Importer During PJM-NICA constraints**
 - **Exports Are Mostly To AEP And MAIN**

- **NICA Competition From Imports**
 - **Level Of Competitive Forces On NICA Market From Immediate Neighbors Appears Uncertain**
 - **NICA Units Economically Displace External Generation**
 - **Most Hours**
 - **NICA-PJM constrained**
 - **Unconstrained**

- **Local Market Power**
 - Simulation scenarios resulted in congestion simultaneously on one or more facilities during more than 50 percent of all hours
 - Contrast with ComEd experience
 - Small number of TLRs
 - No congestion
 - Definition of congestion and redispatch
 - PJM reviewing
 - ComEd Special Operating Procedures that provide switching options to relieve congestion
 - ComEd operation of PARs



- Congestion
 - West to east 345 kV transmission lines were the most constrained
 - Most limited line was between Cherry Valley and Silver Lake, closely followed by the Nelson to Electric Junction line
 - 345 kV lines from Quad Cities to Cordova and from Quad Cities to Electric Service Station H 471 were also constrained a significant proportion of hours



NICA Constrained Facilities
15/9 Hurdle Rate Case

Constrained Facility	Percent of Hours
Cherry Valley - Silver Lake 345 kV	51%
Nelson - Electric Junction 345 kV	43%
Quad Cities - Cordova 0403 345 kV	28%
Quad Cities - H 471 345 kV	25%
Byron - Cherry Valley R 345 kV	3%
Byron - Cherry Valley B 345 kV	1%
Total Constrained Hours per Year	61%

NICA Constrained Facilities
Variable Hurdle Rate Case

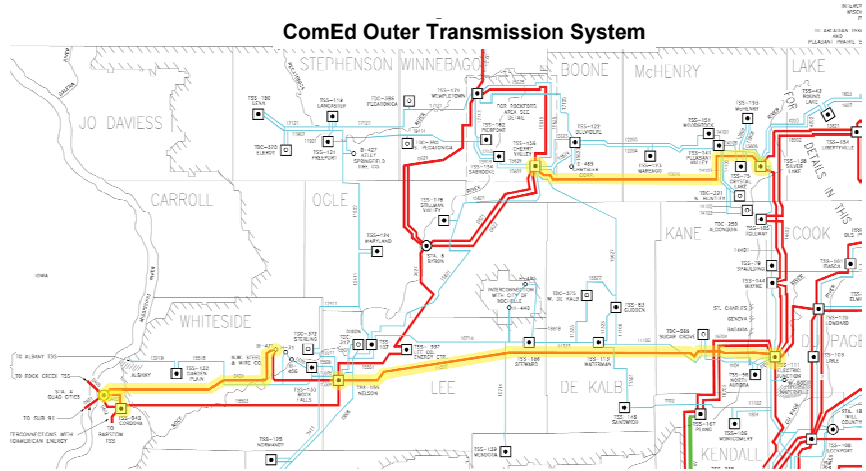
Constrained Facility	Percent of Hours
Cherry Valley - Silver Lake 345 kV	47%
Nelson - Electric Junction 345 kV	37%
Quad Cities - Cordova 0403 345 kV	24%
Quad Cities - H471 345 kV Line	22%
Byron - Cherry Valley R 345 kV	2%
Byron - Cherry Valley B 345 kV	1%
Total Constrained Hours per Year	56%

NICA Constrained Facilities
Variable Hurdle Rate - RTOR Case

Constrained Facility	Percent of Hours
Cherry Valley - Silver Lake 345 kV	46%
Nelson - Electric Junction 345 kV	36%
Quad Cities - Cordova 0403 345 kV	26%
Quad Cities - H 471 345 kV	23%
Byron - Cherry Valley R 345 kV	3%
Byron - Cherry Valley B 345 kV	1%
Total Constrained Hours per Year	55%



ComEd Outer Transmission System



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- Hurdle Rate Approach
 - Basic GE MAPS approach would result in an optimal, security constrained, economic dispatch of the entire Eastern Interconnection if operated without any institutional or economic limitations
 - Hurdle rates represent these limitations in model
 - Modeling introduced hurdle rates affect the level of economic transactions between areas.
 - Used to represent the test or hurdle that must be passed or exceeded before economic transactions between areas will take place in the model
 - Commitment hurdle rates reflect cost of starting a unit
 - used when unit is not running
 - Dispatch hurdle rates used when unit is running

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- Pathway Treatment
 - In all hurdle rate sensitivity cases, the hurdle rate for PJM-NICA transactions along the pathway was set to zero.
 - No transmission rates apply to pathway transactions
 - Units within the PJM-NICA market will be dispatched based on economics

- Hurdle Rate Scenarios
 - **15/9 Case** (Approach used in PJM Cost-Benefit Analysis)
 - **Variable Hurdle Rate Case** Based on Historical Interregional Market Price Differentials
 - **Variable Hurdle-RTOR Case** modeled the explicit removal of all PJM/MISO through and out rates, consistent with the FERC Order in Docket EL02-111 issued July 23, 2003.



NICA Tier-1 Interconnected Control Areas

NERC Region

CA	CA Name	Tier	ECAR	MAIN	MAPP	Grand Total
AELC	AESC, LLC - Lincoln Center	1		1		1
AEP	AEP Service Corp.	1	1			1
ALTE	Alliant Energy - CA - ALTE	1		1		1
ALTW	Alliant Energy - CA - ALTW	1		1		1
AMRN	Ameren Transmission	1		1		1
CILC	Central Illinois Light Co.	1		1		1
DELI	DECA, LLC - Lee	1		1		1
IP	Illinois Power Company	1		1		1
MEC	MidAmerican Energy Company	1			1	1
NIPS	Northern Indiana Public Service Corp.	1	1			1
WEC	Wisconsin Energy Corporation	1		1		1
Grand Total			2	8	1	11

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Variable Hurdle Rate Matrix

Commitment Hurdle Rate (\$/MWh)

Pools	AEP	COME	CPL	DP&L	DUKE	ECAR	ENTR	FRCC	PJM	MAIN	MAPP	NEPL	NYP	SOU	SPP	TVA	VAC	VEP
AEP	9	9	9	9	9	9			12	9						9		9
COME	9	9								9	9							
CPL	9		9			9											9	9
DP&L	9			9													9	9
DUKE	9				9									9				
ECAR	9	9		9		9			12	9							9	
ENTR							9			9	9			9	9		9	
FRCC								9						9				
PJM	12					12			9				15					12
MAIN	9	9				9	9			9					9	9		
MAPP		9					9			9					9			
NEPL													13					
NYP									15			13						
SOU					9		9							9			9	9
SPP							9			9	9							
TVA	9		9		9	9	9			9				9				
VAC			9		9									9				
VEP	9		9						12									

Dispatch Hurdle Rate (\$/MWh)

Pools	AEP	COME	CPL	DP&L	DUKE	ECAR	ENTR	FRCC	PJM	MAIN	MAPP	NEPL	NYP	SOU	SPP	TVA	VAC	VEP
AEP	3	3	3	3	3	3			6	3	3							3
COME	3	3				3				3	3							
CPL	3		3			3											3	3
DP&L	3			3													3	3
DUKE	3		3		3									3				
ECAR	3	3		3		3			6	3							3	3
ENTR							3			3	3			3	3		3	
FRCC								3										
PJM	6					6			9				7					6
MAIN	3	3				3	3			3					3	3		
MAPP		3					3			3					3			
NEPL												7						
NYP									9				7					
SOU					3		3	3						3			3	3
SPP							3			3	3							
TVA	3		3		3	3	3			3				3				
VAC			3		3									3				
VEP	3		3						6									

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Variable Hurdle Rate – RTOR Matrix

Commitment Hurdle Rate (\$/MWh)

Pools	AEP	COMED	CPL	DP&L	DUKE	ECAR	ENTR	FRCC	PJM	MAIN	MAPP	NEPL	NYP	SOU	SPP	TVA	VAC	VEP
AEP	6.6	6.6	9	9	9	9			9.6	9	6.6						9	9
COMED	6.6	6.6	9	9	9	6.6												9
CPL	9		9		9												9	9
DP&L	9			9	9												9	9
DUKE	9		9		9									9			9	9
ECAR	9	6.6		9					9.6	9								9
ENTR							9			9				9	9			9
FRCC								9										9
PJM	9.6					9.6			9.6				15					12
MAIN	9	6.6				9	9			9						9	9	
MAPP	3	6.6				9			9									9
NEPL												13						
NYP									15			13						
SOU					9		9	9									9	9
SPP			9		9	9	9			9	9							
TVA	9		9		9	9	9			9								9
VAC					9									9				
VEP	9		9						12									

Dispatch Hurdle Rate (\$/MWh)

Pools	AEP	COMED	CPL	DP&L	DUKE	ECAR	ENTR	FRCC	PJM	MAIN	MAPP	NEPL	NYP	SOU	SPP	TVA	VAC	VEP
AEP	0.6	0.6	3	3	3	3			3.6	3							3	3
COMED	0.6	0.6				0.6				0.6	0.6							
CPL	3				3												3	3
DP&L	3				3												3	3
DUKE	3		3		3									3			3	3
ECAR	3	0.6		3					3.6	3								3
ENTR							9			3	3			3	3	3		
FRCC								9										3
PJM	3.6					3.6			3.6				9					6
MAIN	3	0.6				3	3			3	3					3	3	
MAPP	3	0.6				3				3						3		
NEPL												7						
NYP									9			7						
SOU					3		3	3									3	3
SPP							3			3	3						3	
TVA	3		3		3	3	3			3						3		
VAC					3												3	
VEP	3		3						6									

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NICA Market Analysis

- Monopsony Market Power
 - Single large buyer of energy
 - Potential concerns
- Local Market Power
 - Significant congestion in modeling of NICA
 - Ongoing analysis

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- **Market Power Mitigation – NICA Energy Market**
 - Unconstrained pathway
 - No mitigation necessary
 - Pathway constrained: NICA to PJM
 - No mitigation necessary during normal demand conditions in PJM
 - Mitigation necessary during extreme demand conditions in PJM but not in NICA
 - Limit bids to marginal cost plus 10% in NICA region during these conditions
 - Pathway constrained PJM to NICA
 - Mitigation necessary
 - Limit bids to marginal cost plus 10% in NICA region during these conditions

- **Market Power Mitigation – NICA Energy Market**
 - Monopsony issue
 - No automated mitigation measures
 - Local market power
 - Cost capping - marginal cost plus 10%
 - All units with local market power included

- Capacity Market: Market Conditions post Transition
 - Relevant market
 - NICA market
 - PJM market

- NICA Capacity Market
 - Concentrated ownership
 - Pivotal suppliers
 - Capacity market issues
 - Market power concern

- **Market Power Mitigation – NICA Capacity Market**
 - Offers limited to marginal cost
 - Definition of marginal cost is inclusive
 - Direct costs
 - Opportunity costs
 - Risk
 - Pricing during shortage periods
 - Monopsony issue

- **NICA Regulation Market: Market Conditions**
 - Relevant market: Internal to NICA
 - Highly concentrated ownership
- **NICA Regulation Market: Market Power Mitigation**
 - Cost based market
 - Market clearing price
 - Costs include opportunity costs

- **NICA Spinning Reserves Market: Market Conditions**
 - Relevant market: Internal to NICA
 - Highly concentrated ownership
- **NICA Spinning Reserves Market: Market Power Mitigation**
 - Structure market like that in PJM
 - Tier 1 price: LMP plus adder during spinning events
 - Tier 2 price: Availability price based on costs, plus a defined margin, plus opportunity costs

- **NICA Blackstart Market: Market Conditions**
 - Relevant market: Internal to NICA
 - Structural conditions do not support market solution
- **NICA Blackstart Market: Market Power Mitigation**
 - Structure like that in PJM
 - Blackstart services provided based on unit-specific costs per tariff

- NICA Reactive Market: Market Conditions
 - Relevant market: Internal to NICA
 - Structural conditions do not support market solution
- NICA Reactive Market: Market Power Mitigation
 - Structure like that in PJM
 - Reactive services provided based on unit-specific costs per FERC-approved rate

- Summary of MMU Conclusions
 - NICA energy market expected to be competitive under most conditions (90 to 95% of hours)
 - MMU proposes specific market power mitigation measures that would be applied to the aggregate energy market if required
 - Market power mitigation measures in the aggregate energy market must balance the prevention of market power and ensuring a competitive market price signal

- Summary of MMU Conclusions
 - NICA capacity market is not expected to be competitive
 - MMU proposes specific market power mitigation measures
 - Capacity market power mitigation measures must balance the prevention of market power and ensuring a competitive market price signal

- Summary of MMU Conclusions
 - NICA regulation market is not expected to be competitive
 - MMU proposes that the regulation market be cost based until conditions for competitive market evolve
 - NICA spinning reserves market is not expected to be competitive
 - MMU proposes that the spinning reserves market be structured as it is in the PJM Eastern Region

- Summary of MMU Conclusions
 - NICA blackstart services market is not expected to be competitive
 - MMU proposes that the blackstart services market be cost based per the PJM tariff
 - NICA reactive services market is not expected to be competitive
 - MMU proposes that the reactive services market be cost based per FERC approved rates