Long Term Solutions to Loop-Flow Concerns
- Issue Background -

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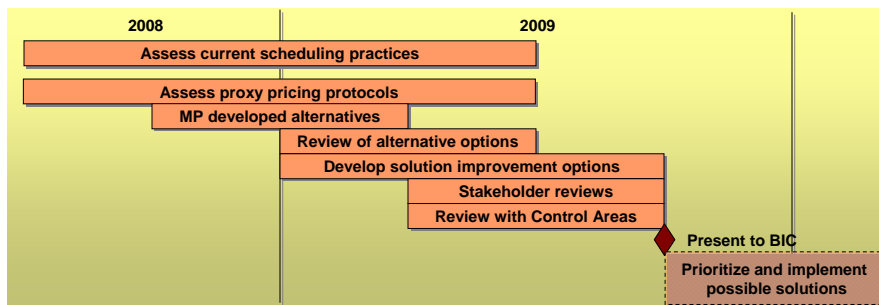
Market Issues Working Group

December 16, 2008

Discussion

- Review and establish thorough understanding of the existing issue and source of loopflows to facilitate examination of alternative proxy pricing methodologies.
- Today's Discussion
  - *Review of existing protocols and incentives for scheduling*
  - *Impact to existing protocols of controlling PARs*
- Future Discussions
  - *Review of alternative proxy pricing methods, including contract path pricing and other market participant suggestions*

Loop-Flow Solution Development

Description	Schedule
Assess proxy pricing protocols	Q2-2009
Market Participant developed alternative proposals	Q1-2009
Review alternative proposals	Q2-2009
Develop solution improvement options	Q3-2009
Stakeholder reviews	Q3-2009
Review options with control areas	Q3-2009
Present recommendations to BIC	Q3-2009

2008   2009

Assess current scheduling practices

Assess proxy pricing protocols

MP developed alternatives

Review of alternative options

Develop solution improvement options

Stakeholder reviews

Review with Control Areas

Present to BIC

Prioritize and implement possible solutions

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OVERVIEW

At least two and perhaps three scheduling strategies have been contributing to loopflow patterns in the Northeast, some reinforcing, some offsetting, the basic loopflow pattern.
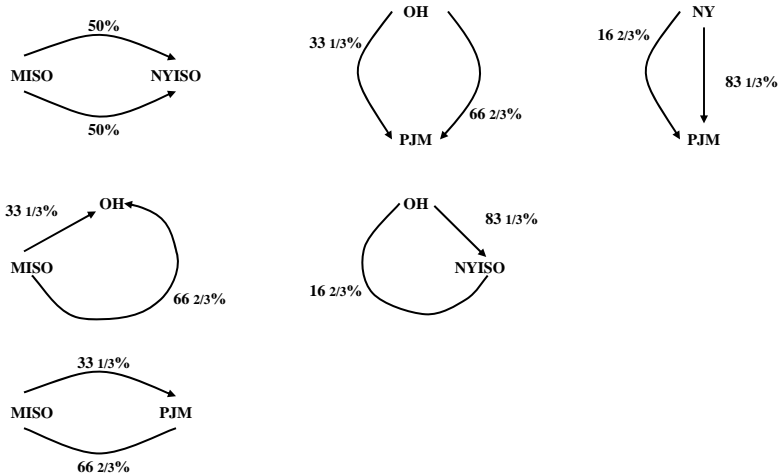
- Indirect/circuitous Lake Erie schedules
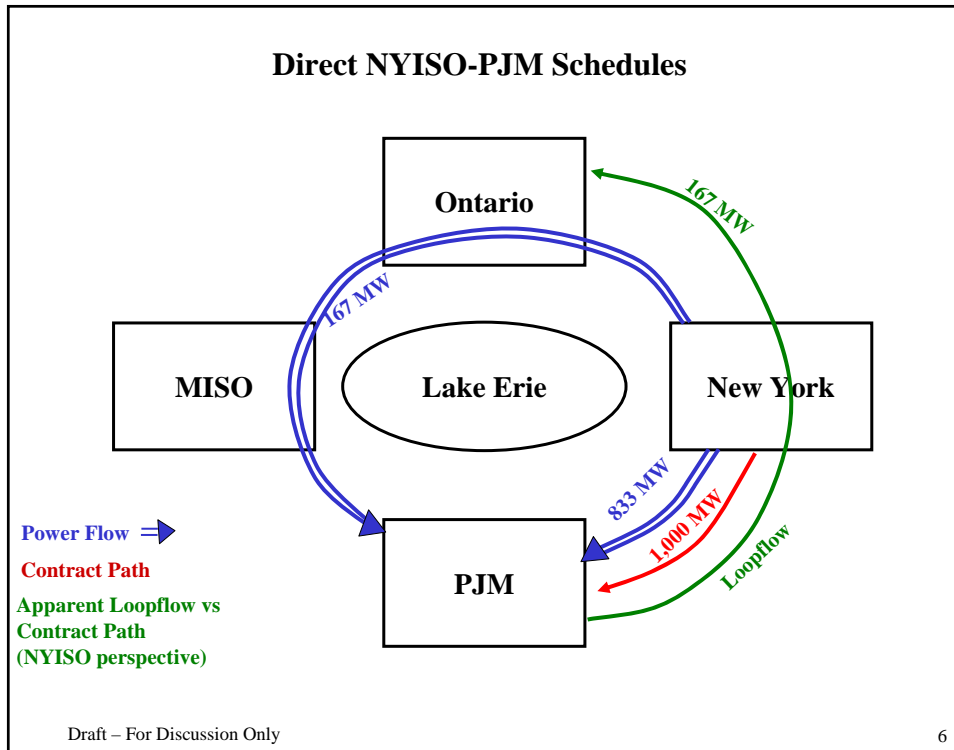- Offsetting schedules
- Chain schedules

OVERVIEW

We begin by portraying the impact of each of these scheduling practices given the current NYISO pricing rules and modeling and operation of the Ontario PARs.

OVERVIEW

The following examples are based on the following distribution factors assuming the Ontario PARs not in operation.

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Direct NYISO-PJM Schedules

Power Flow ⇒
Contract Path
Apparent Loopflow vs
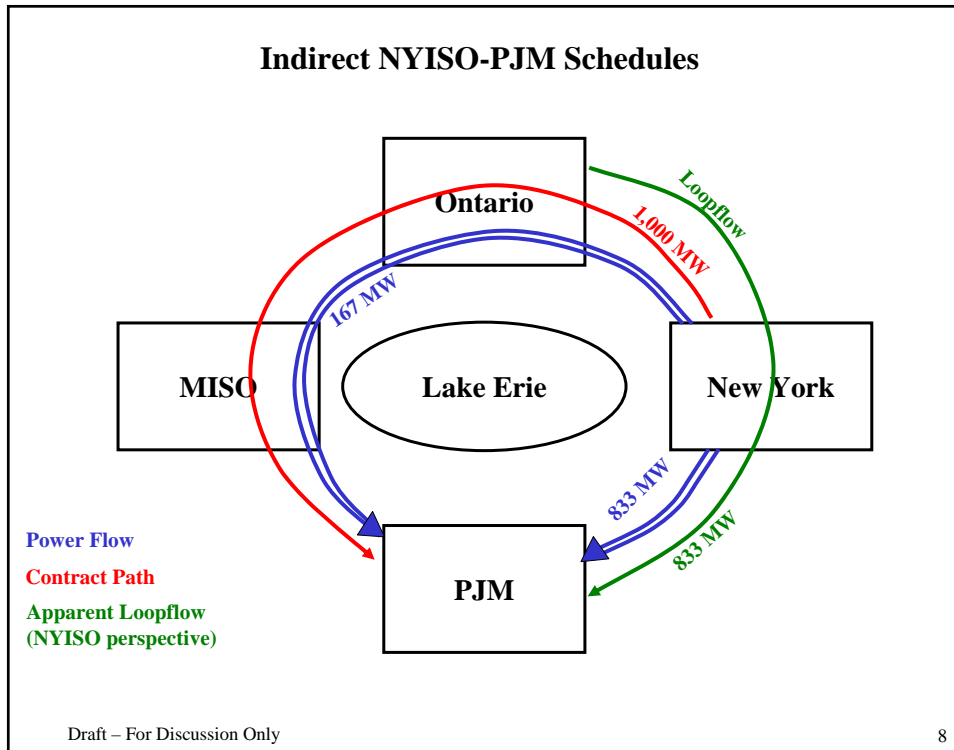Contract Path
(NYISO perspective)

NYISO-PJM SCHEDULES

NYISO-PJM transactions are normally expected to be scheduled with a contract path over the NYISO-PJM interface.

- The NYISO models and prices all of the power as flowing along the contract path.

- Until all of the Ontario/Michigan PARs are placed in service and operated to conform power flows to schedules, approximately 20% of the power that is scheduled directly from NY to PJM will flow around Lake Erie through Ontario. Hence, the normal contract path scheduling of exports to PJM over the NYISO-PJM interface results in low levels of apparent counterclockwise loopflows through New York.

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Indirect NYISO-PJM Schedules

Ontario

MISO

Lake Erie

New York

PJM

Loopflow
1,000 MW
167 MW
833 MW
833 MW

Power Flow
Contract Path
Apparent Loopflow
**(NYISO perspective)**

NYISO-PJM SCHEDULES

In the past year, transactions from NYISO to PJM have also been scheduled over an indirect contract path through Ontario.

- The NYISO modeled this power for pricing purposes as flowing over the OH-NYISO interface and sinking in Ontario.

- Approximately 80% of the power actually flowed over the NYISO-PJM interface (same as the direct schedules), producing relatively higher levels of apparent clockwise loopflow through New York.
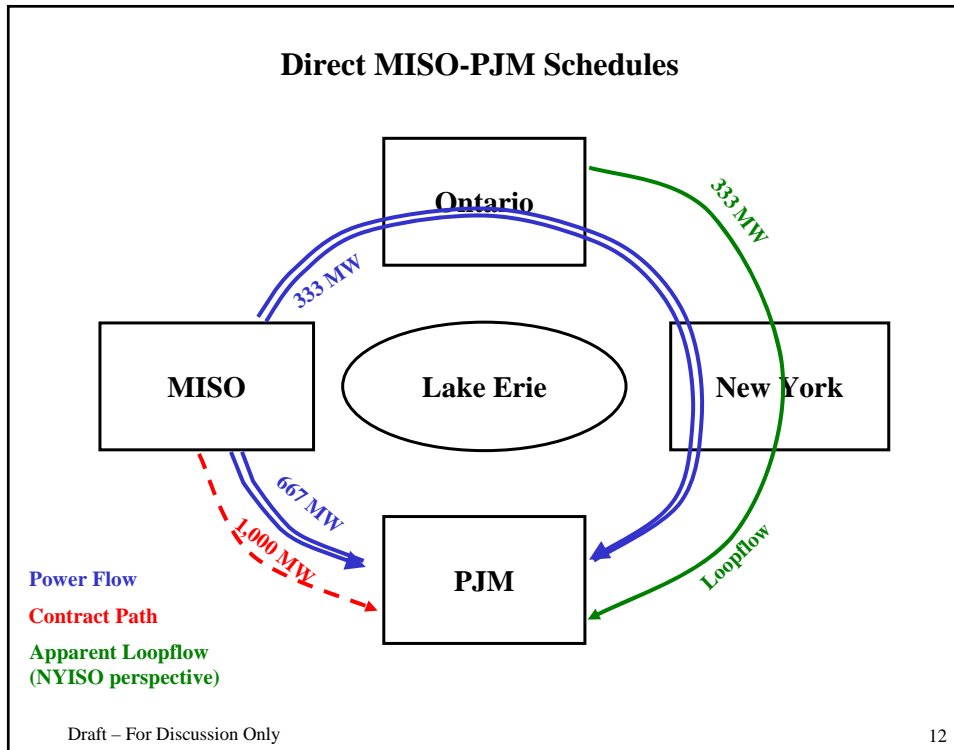
Direct and Indirect NYISO-PJM Schedules

Direct Path

Indirect/circuitous
Path
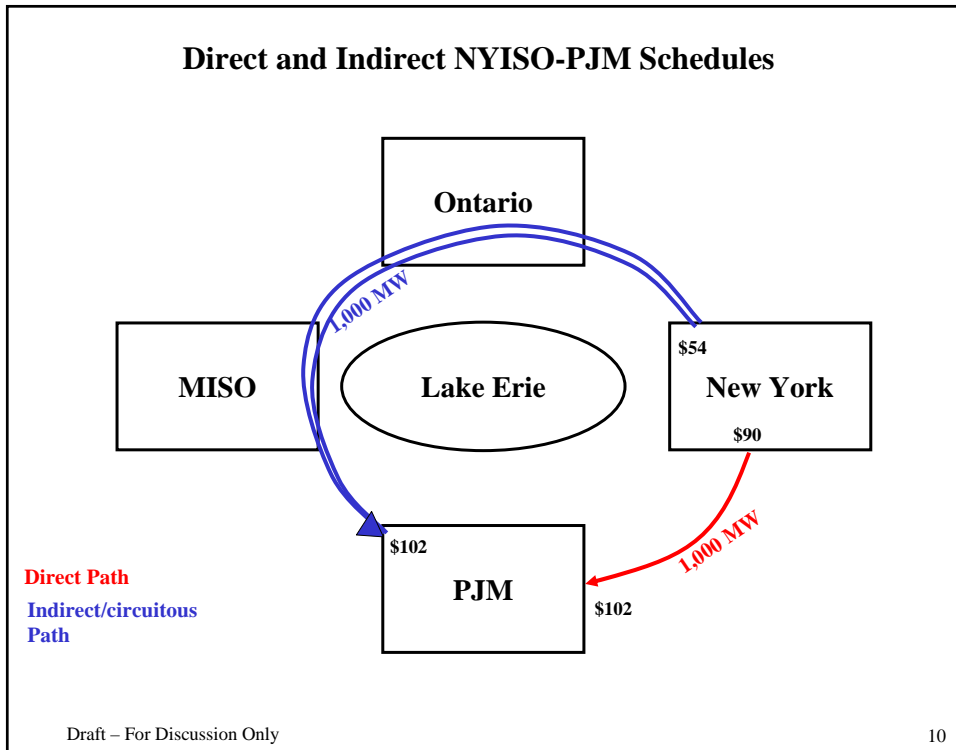
NYISO-PJM SCHEDULES

Marketers presumably scheduled transactions via an indirect
scheduling path because the NYISO-Ontario proxy bus price
was generally lower than the NYISO-PJM proxy bus, while
PJM priced the transaction based on its contract source (New
York)

- While the spread between the NYISO-PJM price and the
  PJM-NYISO price for a transaction on the direct path
  averaged only $10 on a representative day, the margin on
  the indirectly scheduled transactions averaged $48.

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Direct MISO-PJM Schedules

Ontario

MISO

Lake Erie

New York

PJM

333 MW

333 MW

667 MW

1,000 MW

Loopflow

Power Flow
Contract Path
Apparent Loopflow
(NYISO perspective)

MISO-PJM SCHEDULES

The direct contract path for power exported from MISO to PJM is over the MISO-PJM interface.

- Since the NYISO control area is not on the contract path for this transaction, there is no NYISO schedule and the transaction is not directly visible to the NYISO (signified by the dashed line).

- Most of the power would flow directly from MISO to PJM over the MISO-PJM interface but a portion would flow around Lake Erie through the NYISO, producing clockwise loopflows.

MISO-PJM Offsetting Schedules

Power Flow
Contract Path
Apparent Loopflow
(NYISO perspective)
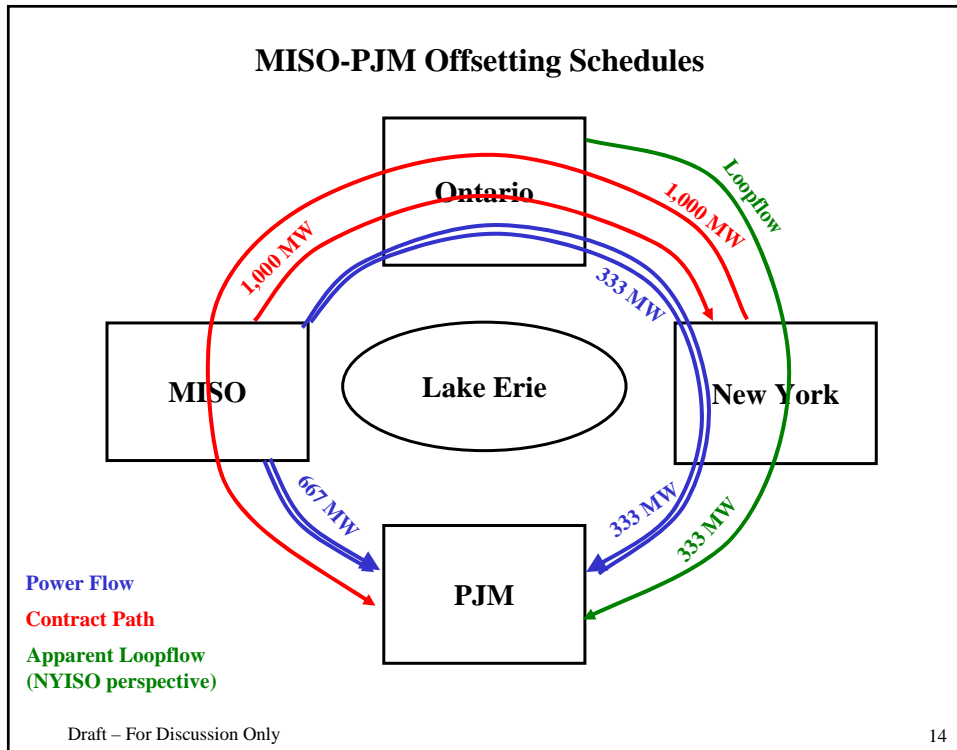
MISO-PJM SCHEDULES

Recently, some entities have scheduled exports of power from MISO to PJM using two schedules.

- One schedule has a MISO to NYISO contract path through Ontario.

- The other schedule has a NYISO to PJM contract path through Ontario.

- These transactions cancel out for NYISO modeling purposes.

- They produce exactly the same power flows and clockwise loopflows through the NYISO as a direct MISO-PJM transaction.

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MISO-PJM Chain Schedules

Power Flow
Contract Path
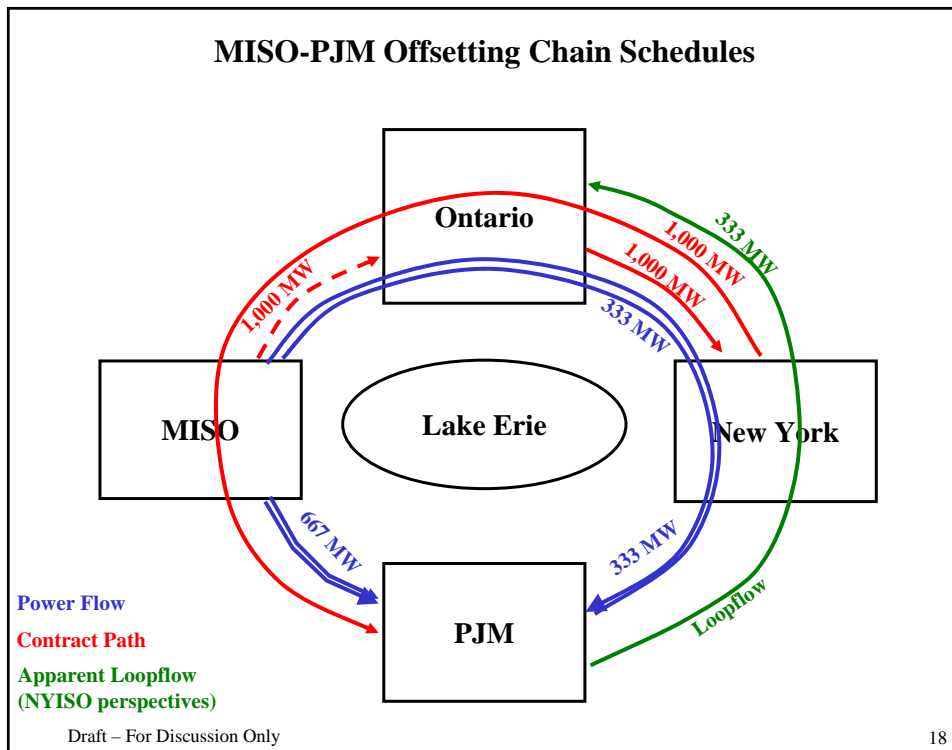Apparent Loopflow
(NYISO perspective)
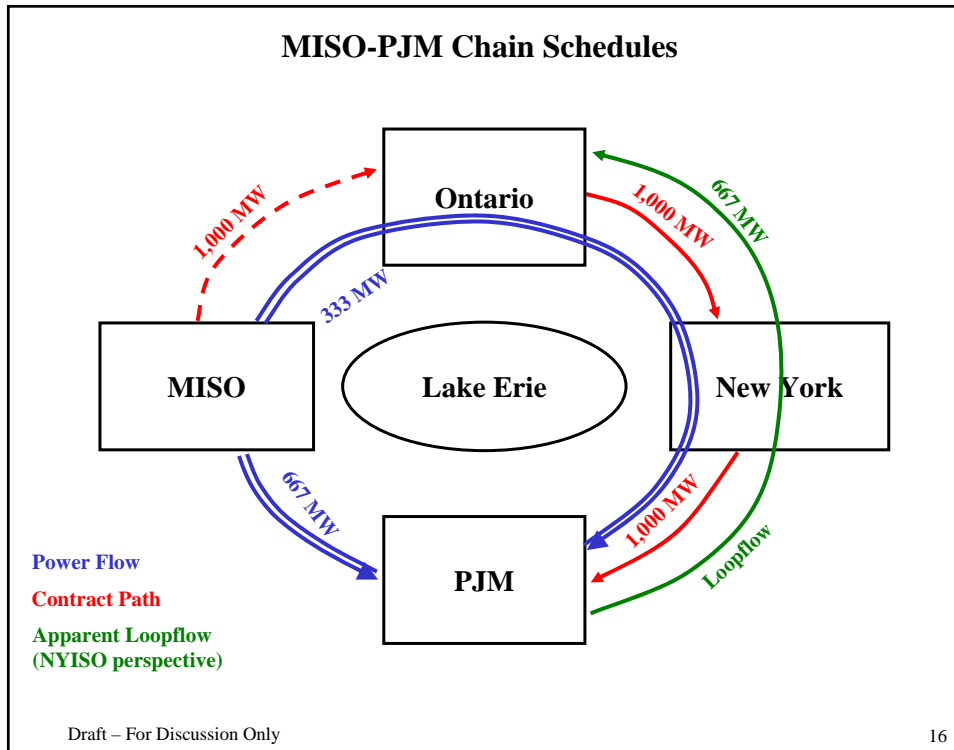
MISO-PJM SCHEDULES

Another method used to schedule power from MISO to PJM was through three nominally separate chain schedules: MISO-Ontario, Ontario-NYISO, and NYISO-PJM.

- The NYISO would model both the Ontario-NYISO and NYISO-PJM flows.

- The MISO-Ontario schedule would not be modeled or priced by the NYISO.

- The actual power flow would be the same as a MISO-PJM schedule, leading to apparent counterclockwise loopflows through New York.
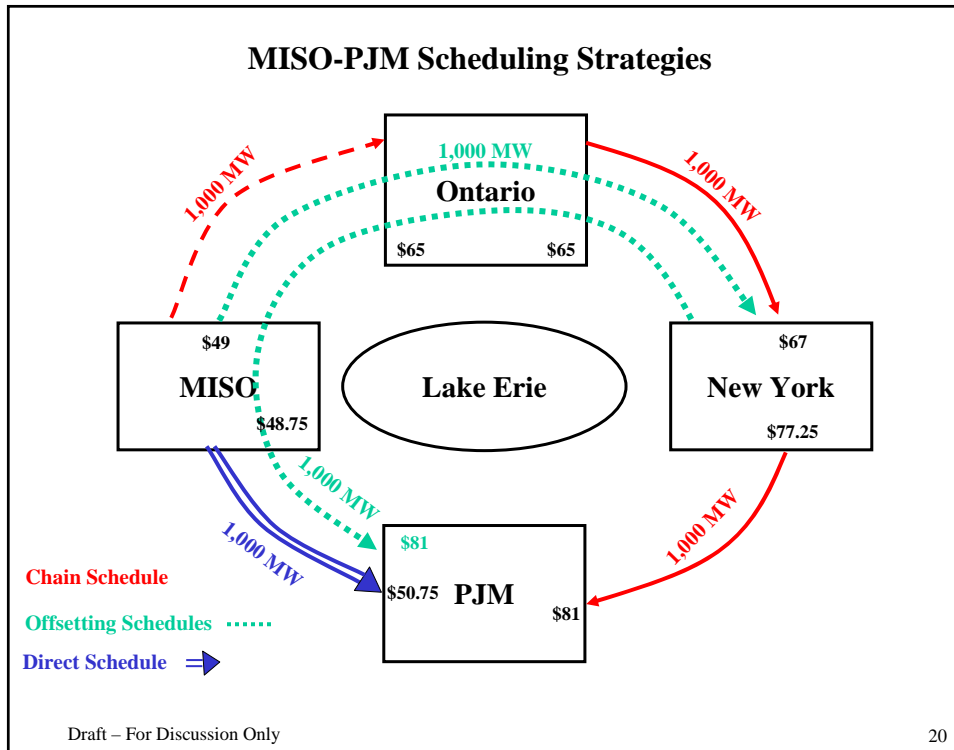
MISO-PJM Offsetting Chain Schedules

Ontario

Lake Erie

MISO

New York

PJM

1,000 MW

333 MW

1,000 MW

1,000 MW

333 MW

333 MW

667 MW

333 MW

Loopflow

Power Flow
Contract Path
Apparent Loopflow
(NYISO perspectives)

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MISO-PJM SCHEDULES

A third method apparently used to deliver power for MISO to PJM was a combination of these approaches involving both chain transactions and offsetting transactions.

- The Ontario-NYISO and NYISO-OH-MISO-PJM transactions cancel out for NYISO modeling purposes.

- These transactions produce the same power flows and loop flows through the NYISO as a direct MISO-PJM transaction.

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MISO-PJM Scheduling Strategies

INCENTIVES

At times when scheduling exports from MISO to PJM along the direct contract path would have been unprofitable due to west to east congestion in PJM (low MISO proxy bus price), both the offsetting schedules and chain schedules were extremely profitable, although they resulted in the same actual power flow, because they enabled the seller to receive PJM's NYISO price.

- Offsetting schedules incurred additional export charges in Ontario and MISO, but had less risk of creating congestion on the Ontario interfaces, or encountering ramp constraints on the MISO-OH interface.

- Chain schedules incurred congestion charges across New York, and the cost associated with scheduling power from New York to PJM.

- Offsetting schedules (and offsetting chain schedules) would have purchased power from MISO for $49/MWh and sold it to PJM for $81/MWh.

- Chain schedules would have purchased power from MISO for $49/MWh, paid transmission charges through New York of $10.25/MWh, and sold power to PJM for $81/MWh.

Chain Schedules PJM
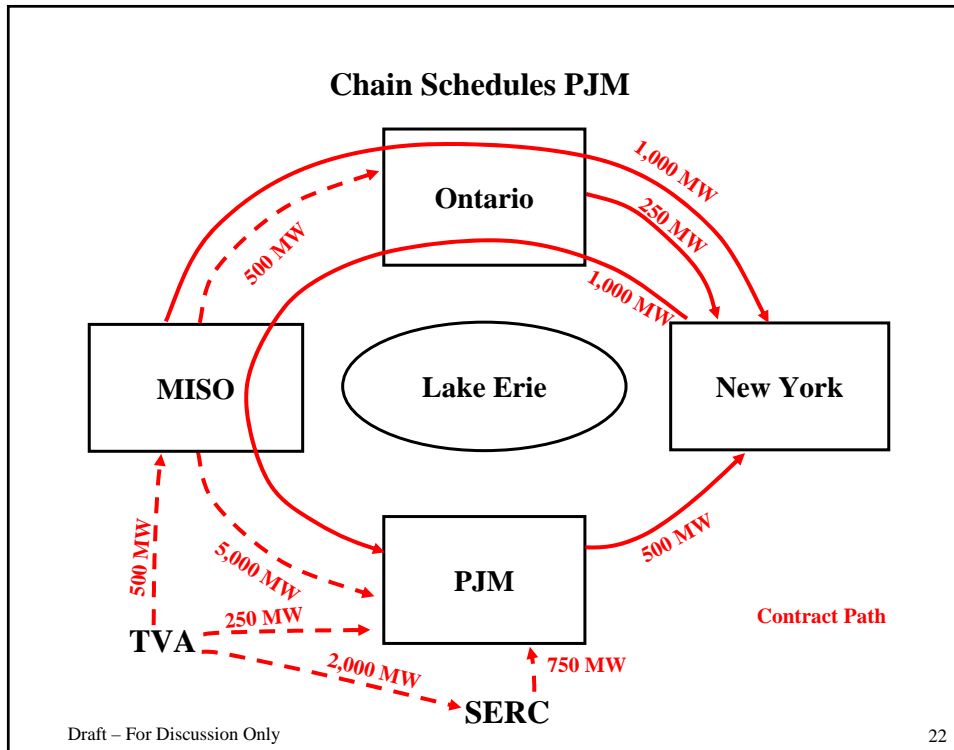
SUMMARY

In the examples above, we have portrayed each schedule, and the associated powerflows and loopflows, in isolation, which makes the effects easy to visualize.

- In practice, all of these kinds of transactions may be scheduled at the same time by various entities, and they will be on top of the powerflows associated with normal MISO to PJM, OH to New York and PJM to New York transaction schedules.

- Moreover, flows on the New York transmission will also be impacted by transaction schedules beyond MISO and PJM. Transactions between TVA and MISO, TVA and SERC, SERC and PJM can all produce flows on the New York transmission system.

NYISO Loopflow

Scheduling Path	Current NYISO Pricing Model
NY-PJM	
Direct	167 Counterclockwise
Indirect	833 Clockwise
MISO-PJM	
Normal	333 Clockwise
Offsetting Schedules	333 Clockwise
Chain Schedules	667 Counterclockwise
Offsetting Chain Schedules	333 Clockwise

SUMMARY

The use of indirect/circuitous schedules for NYISO to PJM transactions produced higher values of clockwise loopflows through the NYISO.
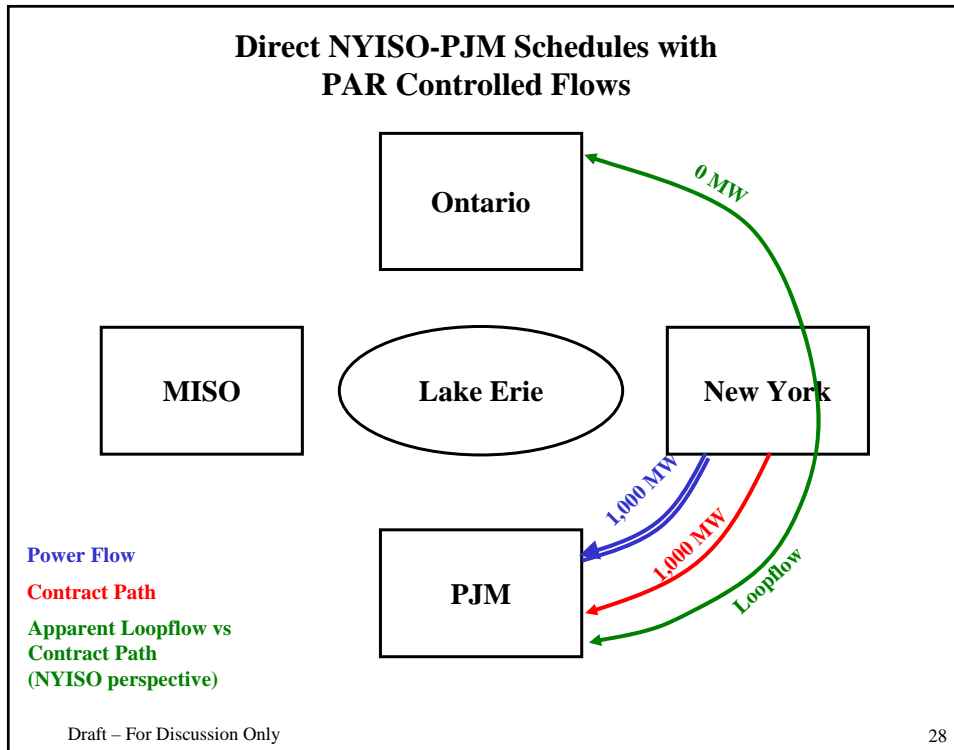
- The use of offsetting schedules for MISO-PJM transactions produced exactly the same flows and loopflows as a MISO-PJM direct schedule.

- The use of chain schedules for MISO-PJM transactions produces counterclockwise loopflows through New York.

- Aside from financial impacts, larger loopflows can have an adverse reliability impact by introducing additional error in forecasting and managing power flows on potentially constrained lines or interfaces.

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Current NYISO Pricing Model

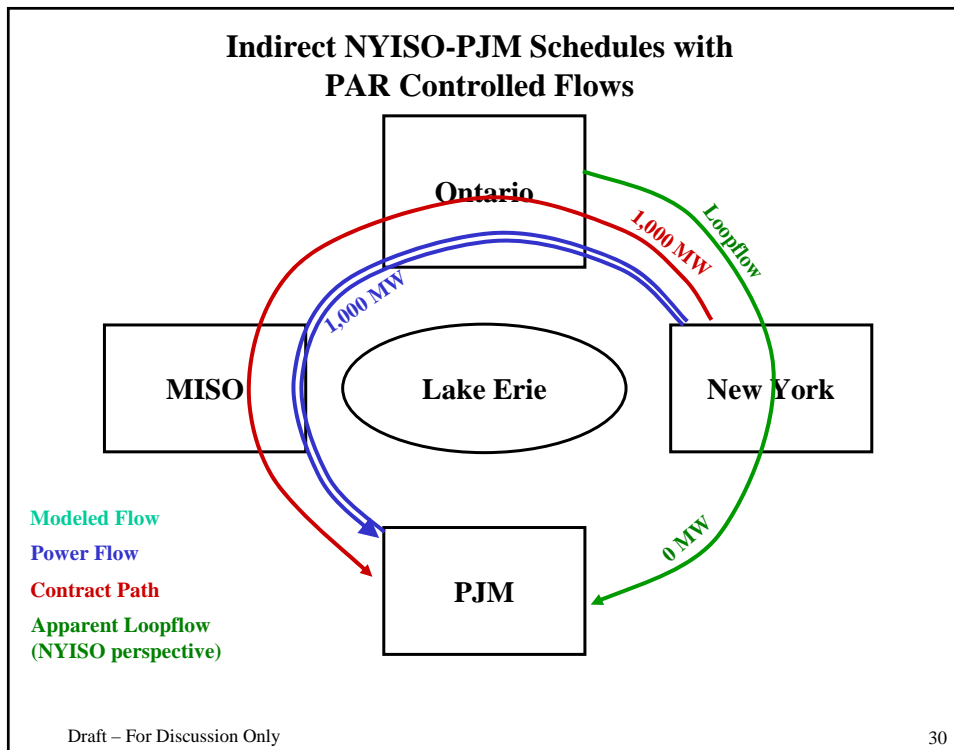**with PAR Controlled Flows**

PAR CONTROLLED FLOWS

A prospective and expected change in 2009 that will alter the impact of these transaction scheduling practices will be the use of PARs to better conform flows and schedules at the MISO-Ontario interface.

- If the PARs are operated to flows to schedules and are able to do so, the majority of the described loopflow impacts will be eliminated.

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Direct NYISO-PJM Schedules with PAR Controlled Flows

Power Flow
Contract Path
Apparent Loopflow vs
Contract Path
(NYISO perspective)

Ontario — 0 MW — New York
MISO | Lake Erie | New York
1,000 MW
1,000 MW
Loopflow
PJM

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NYISO-PJM

With the Ontario MISO PARs closely conforming flows to schedules at the MISO Ontario interface, the flows modeled by the NYISO for a direct NYISO-PJM transaction would closely match the actual flows, so there would be little or no apparent loopflow through the NYCA produced by these indirect/circuitous transactions.

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Indirect NYISO-PJM Schedules with
PAR Controlled Flows

Ontario

MISO

Lake Erie

New York

1,000 MW

1,000 MW

Loopflow

0 MW

PJM

Modeled Flow
Power Flow
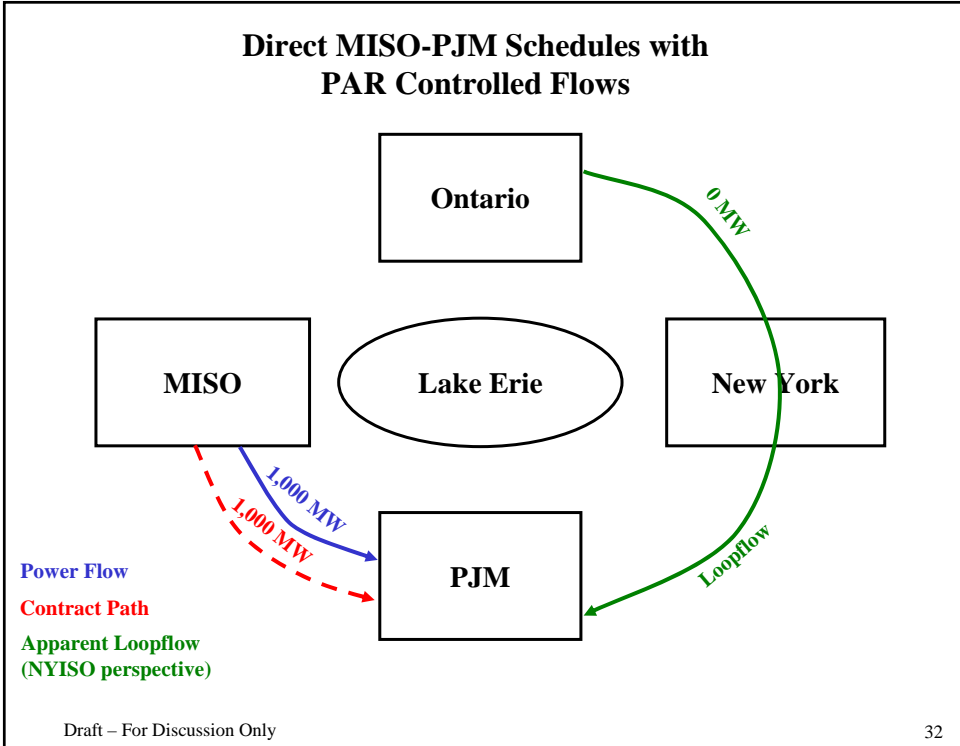Contract Path
Apparent Loopflow
(NYISO perspective)

NYISO-PJM

With the Ontario PARs closely conforming flows to schedules at the MISO Ontario interface, indirect NYISO-PJM schedules through Ontario would no longer produce significant clockwise loopflows.

- Instead, the actual power flows would closely match the contract path schedule.
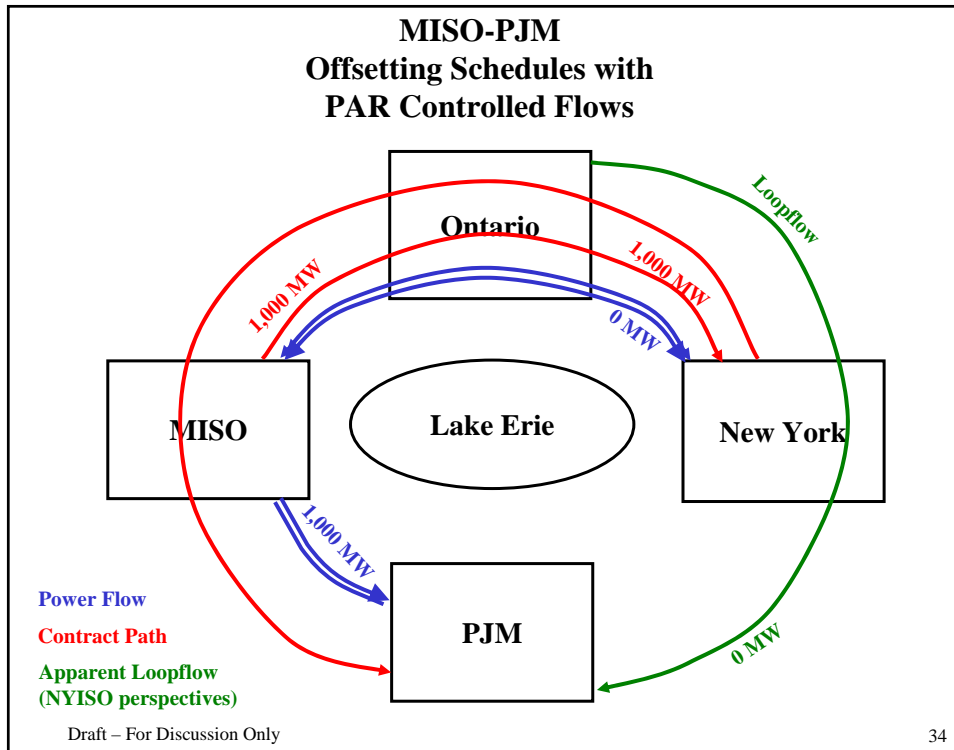
Direct MISO-PJM Schedules with PAR Controlled Flows

Ontario

MISO

Lake Erie

New York

PJM

0 MW

1,000 MW

1,000 MW

Loopflow

Power Flow
Contract Path
Apparent Loopflow
(NYISO perspective)

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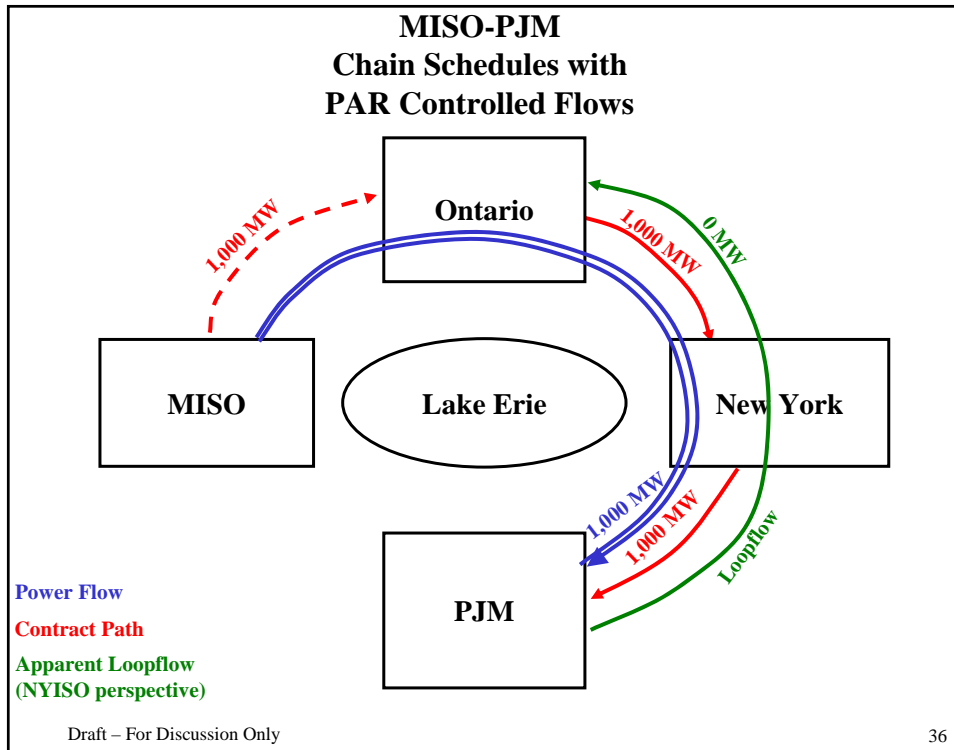
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MISO-PJM

With the Ontario PARs closely conforming flows to schedules at the MISO Ontario interface, MISO-PJM transactions would no longer produce significant loopflows through the NYCA.

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MISO-PJM
Offsetting Schedules with
PAR Controlled Flows

Ontario

Loopflow

1,000 MW

1,000 MW

0 MW

MISO

Lake Erie

New York

1,000 MW

Power Flow

Contract Path

PJM

0 MW

Apparent Loopflow
(NYISO perspectives)

MISO-PJM

With the Ontario PARs closely conforming flows to schedules at
the MISO-Ontario interface, offsetting MISO-PJM schedules
would no longer produce significant clockwise loopflows through
the NYCA.

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MISO-PJM
Chain Schedules with
PAR Controlled Flows

Ontario

1,000 MW

1,000 MW

0 MW

MISO

Lake Erie

New York

1,000 MW

1,000 MW

Loopflow

PJM

Power Flow

Contract Path

Apparent Loopflow
(NYISO perspective)

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MISO-PJM

With the Ontario PARS closely conforming flows to schedules at
the MISO Ontario interface, MISO-PJM chain schedules would
no longer produce significant counterclockwise loopflows through
the NYCA.

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NYISO Loopflows

Scheduling Path	New York Current Model	PAR Controlled Flows
	NYISO Loopflows	NYISO Loopflows
NY-PJM		
Direct	167 Counterclockwise	None
Indirect	833 Clockwise	None
MISO-PJM		
Direct	333 Clockwise	None
Offsetting Schedules	333 Clockwise	None
Chain Schedules	667 Counterclockwise	None
Offsetting Chain Schedules	333 Clockwise	None

SUMMARY

Overall, if the Ontario PARs are able to closely conform flows to schedules at the MISO-Ontario interface so that actual flows match schedules, the loopflows associated with these scheduling practices would not be significant.

As a result, when the Ontario PARs are in place and operated effectively in conforming actual flows to schedules at the MISO-Ontario interface, the NYISO expects that it would allow the scheduling of indirect/circuitous schedules around Lake Erie.

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for the state's bulk electricity system.

www.nyiso.com