To: NEPOOL Market Committee / NY Market Issues Working Group

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Subject: IRIS Alternatives Information

The Joint ISO White Paper on Inter-Regional Interchange Scheduling (IRIS) presents two conceptual design options, Tie Optimization and Coordinated Transaction Scheduling (CTS). The NYISO and ISO-NE jointly recommend the Tie Optimization design option because it is the most efficient solution approach for real-time scheduling at the NY/NE external interface.

Improving external interface scheduling requires a common approach. The purpose of the joint stakeholder process is to set a direction so that each ISO can develop details within its own stakeholder process.

Individual stakeholders have recently asked us about several alternative approaches to inter-regional energy coordination between New York and New England. These alternative approaches can be generally characterized as relying on the same external transaction rules and scheduling process as today, but with some changes such as (a) increasing scheduling frequency to 15 minutes from one hour today, and (b) eliminating transaction fees and uplift charge allocations to external transactions.

The ISOs examined five alternative approaches along these lines in the course of developing the White Paper. The table on the following pages summarizes these five approaches. The ISOs offer this summary to facilitate stakeholders' understanding of the ISOs' concerns with these alternatives, which the ISOs do not support.

The ISOs concluded that none of these five non-supported alternatives will fix the inefficiencies at the external interface as well as the recommended Tie Optimization solution, or the CTS solution. In addition, we found that each of these five non-supported alternatives presents (1) significant operational problems, (2) material economic inefficiencies, or (3) both. Our technical concerns are noted in the table below.

The ISOs welcome the opportunity to discuss our concerns regarding any of these alternatives in greater detail with interested stakeholders.

Five Non-Supported Alternatives: A Summary

- **Terms and Abbreviations:** RT = Real-Time ET = External Transaction
    - **15m Clearing**: RT Interface schedule is determined by the ISOs at 15 minutes before the power flows

	Alternative	Features / Notes	Problems / Issues / Inefficiencies
A	CURRENT SYSTEM with 15m Clearing: • Same RT ET rules and checkout procedures as today except: • NY, NE clear RT ET every 15 min (instead of hourly today) • See below for summary of key rules & procedures used today	• NE: fixed bid RT ET offers due 60m before power flows, priced offers due noon day-before. • NY: RT ET offers due 75m ahead • Assume: Almost all RT ET in NE remain fixed bid (little incentive for participants to change) • Current NE RT checkout process iterates between control areas from 45m out to 15m out, must be accelerated or cut short to implement this alternative.	1. Counter-intuitive flows: NE LMP is ignored in evaluation/clearing (if all fixed bids on NE side), which will perpetuate counter-intuitive flows. 2. Under-utilization: NE current checkout process cannot iterate between NE/NY interface and neighboring control area interfaces to 'fill' the interties in a 15min timeframe, which produces under-utilization. 3. Inefficient dispatch: With separate RT ET offers into each ISO's RTM, an ISO cannot do efficient multi-period internal dispatch without estimating which RT ET will clear the <u>other</u> ISO's RTM over the next 60 min. a. Each ISO must predict what RT ETs will clear in the other ISO's RTM to make efficient dispatch decisions when: i. dispatching 30m+ turbines in RT operations; ii. planning generator ramps for next 60m b. Results in inefficient dispatch outcomes relative to the ISOs having full information 60m forward on the RT ET offers expected to clear both ISO RT markets 4. Failure to price congestion efficiently: Current process cannot calculate correct congestion price at interface. Results in inefficient interface LMPs, and NE DA "in lieu of congestion" NCPC continues.

	Alternative	Features / Notes	Problems / Issues / Inefficiencies
B	75m SUBMIT LEAD TIME w/ 15m CLEARING • Same as Alternative A above, except: • NE allow fixed <u>and</u> priced RT ET offers due anytime up to 75 minutes out	• Assume: many/most RT ET in NE would become priced ET offers (already required in NY) • 60m submission lead time, ISOs can do existing multi-period internal dispatch with full information on RT ET offer portfolio for next 60 m • If both ISO's have priced RT ET, economic scheduling requires iteration between NY & NE, or joint and simultaneous clearing -- RT LMPs change with each accepted RT offer on each side	1. Operational requirements: Cannot be done correctly with priced offers on both sides of the interface using current checkout process. Simultaneous, coordinated clearing system (like CTS) by both ISOs would be required to implement this on a 15m timeframe. 2. Inefficient risks for participants: a. Participant's RT ET may clear/settle in one ISO but not in the other. Poses RT balancing charge risk for MP (can't lock in spread) b. Predicting each ISO's external node RT LMP is harder for participants than predicting higher-price region (for interface bidding), resulting in inefficient schedules c. Still can have participant check-out failures, resulting in inefficient scheduling 3. Under-utilization: RT ET will have bid-ask spreads, which will tend to produce under-utilization of interface 4. Likely cost same for ISOs to implement as CTS 5. This alternative is like CTS, but without interface bids; no identifiable benefit relative to the CTS design option

	Alternative	Features / Notes	Problems / Issues / Inefficiencies
C	20m SUBMIT LEAD TIME w/ 15m CLEARING & ALL PRICED-BIDS • Same as Alternative B above, except: • Submit RT ET offers up to 20 min before power flows (on both NY and NE sides)	• Participants still submit separate RT ET offers into each ISO's RTM • If both ISO's have priced RT ET, economic scheduling requires iteration between NY & NE, or joint and simultaneous clearing -- RT LMPs change with each accepted RT offer on each side	1. Operational impediments: Cannot be done correctly with priced offers on both sides of interface using current checkout process. Simultaneous, coordinated clearing system (like CTS) by both ISOs would be required to implement this on a 15min timeframe. 2. Inefficient dispatch: The ISOs cannot do existing multi-period internal dispatch without an estimate of the RT ET offers arriving over next 60 min. a. Each ISO must predict what RT ETs will be submitted and their impact on RT LMP to make efficient dispatch decisions when: i. dispatching 30m+ turbines in RT ii. planning generator ramps over next 60m b. Results in inefficient dispatch relative to having full information 60m forward on the full portfolio of RT ET offers in both ISOs' RTM 3. RT ET could produce large interface swings every 15m opposite ISO expectation, leading to potential large errors in net forecast 20m+ forward that feed dispatch decisions/ramp plans 4. If ISOs under-predict net RT ET export offers that will arrive and clear, it will require use of higher cost 10m GTs to support cleared RT ET exports. 5. If ISOs over-predict net RT ET export offers that will arrive and clear ,it will result in excess uplift costs due to startup of 30m+ turbines and combined cycle units
D	20m SUBMIT LEAD TIME with 15m CLEARING, INTERFACE BIDS FORMAT • Same as Alternative C above, except: • All offers are INTERFACE BIDS	• Same as CTS, except with 20 submission lead time instead of existing 60m (NE) / 75m (NY) lead time • Economic scheduling requires joint and simultaneous clearing by NY & NE; RT LMPs change with each accepted RT offer on each side	1. Same concerns as Alternative C, above. 2. Note: Interface bidding with 75m submission lead time (CTS) mitigates these concerns, and performs resource selection coordinated with economic evaluation of RT interface bids.

	Alternative	Features / Notes	Problems / Issues / Inefficiencies
E	20m SUBMIT LEAD TIME with 15m CLEARING, FIXED-BID ONLY FORMAT • Same as C above, except: • All offers are FIXED BID only (both markets)	• PJM/MISO RT ET rules (today) • RT ET clear in first-come, first-serve order (up to operating constraints) • Technically feasible – could be done with changes to current checkout process	Same concerns as Alternative C above, plus these: 1. Difficult to calculate correct congestion price at interface. Absence of correct congestion prices would result in inefficient interface LMPs. 2. LMP is ignored by ISOs when scheduling RT ETs, which will perpetuate the counter-intuitive flow problem 3. PJM/MISO interface has more counter-intuitive flow than NE/NY interface (per MISO IMM analysis)

- *Note:* The IRIS presentation materials at the March 7, 2011 Joint MC/MIWG Stakeholder Meeting recommended the elimination of various cross-border fees and charges on inter-regional interchange.

- The five non-supported alternatives above also assume the elimination of the same cross-border fees and charges.

Brief Summary of Current RT External Transaction Procedures and Rules

- **General**
  - Matching RT ET offers must be submitted **separately** to each ISO
  - Each ISO **separately** accepts/rejects each RT ET, at slightly different times (see ISO Lead Time, below)

- **RT ET Format**
  - All RT offers have: price, MW, direction (export/import), interface external node
  - NE allows "fixed" bids: Offer price = $1000 ("fixed" export) or $0 ("fixed" import)

- **RT ET Submission Lead Times**
  - NY: RT priced bids due 75m before power flows
  - NE: RT fixed bids due 60m before power flows / RT **priced** bids due 1200 **day before** (like generation offers), price can be modified only during re-offer period (1600-1800 day before)
  - *Note:* >95% of RT ET offered in NE are fixed bid format

- **ISO Clearing/Schedule Updating:** Every 60 min (schedules change at top of the hour)

- **ISO Lead Time for Clearing/Scheduling Process:**
  - NY: Scheduling is performed 60min to 45min before power flows
  - NE: Scheduling is performed from 45min to ~20min before power flows (if all goes well; iterations are required between control areas)

- **ISO Clearing/Evaluation Rules:**
  - Economics (price) first. Note, for NE: Fixed exports = $1000 offer price, fixed imports = $0 offer price
  - NERC and other priority rules, DA clearing status, time-stamps, and other tie breaker rules apply (primarily NE side)

- **RT ET Checkout Process**
  - **ISOs iteratively "check out"** by finding the **intersection** of all accepted RT offers at each interface, subject to various operating limits (pool ramp limits, interface ramp limits (NY only), interface TTC limits, first-contingency single source loss limit (on HQ DC ties))

- **NE checkout is sequential**: ISO must forecast expected checkout MW at interfaces B and C when scheduling A, then 'cut' or 'add' at B after completing A, then 'cut' or 'add' at C after competing A and B, etc.
- **ISO-NE: Checkout takes iterations** as 'cuts' or 'adds' at Interface A changes pool ramp available at Interface B, C, to get more 'adds' or 'cuts' **NYISO:** Checkout takes iterations to rebalance multiple interfaces if transactions fail initial RT checkout.
- ISO-NE: Complex pool ramp allocation rules when pool ramp is binding (approx 1000 hrs/year at NY/NE interface per ISO White Paper)