Inter-ISO Coordination of Regulation and Reserve

The participants of the Northeast ISO MOU have long term objectives of establishing inter-regional regulation and reserve markets. These markets would operate on a day-ahead basis at first; however; these could be extended into real time markets. The technical and market developments will require extensive procedural, software, and information infrastructure development. Once developed, these enhanced ancillary services markets will allow for more efficient use of resources throughout the Northeast.

In order to develop these complex markets across the several ISO seams, NYSIO and the other ISO MOU participants are working on a staged approach. In both the regulation and reserve services interim approaches are being developed. Each stage builds on the previous stage with the objective of evolving into full featured Regional regulation and reserve markets. Ultimately the markets could be merged into a single market.

Regulation Services

Inter-ISO regulation services will be coordinated in three stages:

- ACE Diversity Interchange
- Establish Master/Satellite Control
- Establish Wide-Area Control System

Each stage will add complexity will require increased investments in telecommunications infrastructure and software development,

Ace Diversity Interchange

ADI is a method to take advantage of Area Control Error (ACE) diversity among several Areas to reduce regulation requirements (AGC) in each participating area. In real-time, ACE values are netted out, exploiting the diversity in sign of the ACE values. Thus, participants reduce their regulation burdens.
Initially this approach will reduce regulation requirements in the region while retaining each areas market design.

Master/Satellite Control

This method is similar to the Master/Satellite arrangement employed by the tight Power Pools in the Northeast until the late 1990's. With this arrangement, a Master Control Area would determine the ACE, and parcel it out to Satellite Control Areas. The Master Control Area would consider the response rates and ranges of each generator providing AGC within each Satellite in determining Satellite Control Errors.

This approach will require complex AGC selection logic to ensure that sub-optimal choices are not made. The differences in the regulation markets add to the complexity of implementing this approach. However, this approach can be implemented within the context of the existing individual ISO regulation markets and control schemes to make efficient use of regulation resources on a wide-area basis.

Wide-Area Control System

In this method, a single site that would perform AGC for the Region would replace the Automatic Generation Control (AGC) software in each Control Area. This central controller would communicate with all of the generators via direct generation control. In broad conceptual terms, generators would bid available regulation into the central controller. The central controller would then accept and apportion the regulation such that regional regulation

requirements were met, with due consideration to any local requirements. This effort will require significant resource and investment in telecommunications, software development, and hardware.

ADI Development Status

NPCC's Control Performance Working Group has completed a feasibility assessment. The results look very promising with possible regulation reductions of 30% to 50%. The ADI plans and study results were presented to and approved by the NERC Resources Subcommittee in late October. The NPCC Task Force on Coordination of Operation (TFCO) endorsed this approach of implementation in November. Plans are to prepare specifications and implement software and hardware requirements in the first half of 2001.

Regulation Market Design and Development Targets

- ADI Implementation
  - Develop Specifications - Winter 2001
  - Implement Software and Hardware - Spring 2001
  - ADI in effect - Summer 2001

- Master/Satellite Implementation
  - Develop methodology and Feasibility assessment - Winter 2002
  - Develop Specifications - Spring 2002
  - Prepare Inter-Area Agreements - Summer 2002
  - Implement Software and Hardware - Fall 2002
  - Regional Master/Satellite Control in effect - Winter 2003

- Regional Control Market Implementation
  - Develop methodology and Feasibility assessment - Fall 2002
  - Develop Specifications - Winter 2003
  - Tariff Filings and Inter-Area Agreements - Summer 2003
  - Implement Software and Hardware - Fall 2003
  - Regional Control in effect - Summer 2004

Reserve Coordination

Inter-ISO reserves are being coordinated in three stages:

- Enhanced Shared Activation of Reserve (SAR)
- Establish Reserve Sharing Group
- Establish inter-ISO Reserve Market

These procedures are envisioned to help expand the commercial market opportunities within the region. Each stage will add complexity will require increased investments in telecommunications infrastructure and software development,

Enhanced Shared Activation of Reserve

In May 2000, NYISO in conjunction with PJM and NPCC developed a procedure for the special handling of large contingencies on radial tie lines crossing interconnection boundaries, such as Hydro-Quebec (HQ) to NYISO, when the flow is greater than an Area's normal largest contingency. At times, these flows may be composed of simultaneous energy deliveries to the directly connected Area and one or more other Areas. This special handling allows for the use of the existing NPCC SAR procedure to allocate the portion of energy not designated for the directly connected receiving Area to all other recipients.

The NPCC SAR Procedure is being revised to cover all such large contingencies in the NPCC Region and to modify the allocation method. The new method is expected to be applicable in the reserve sharing group method.

Reserve Sharing Group

In a Reserve Sharing Group several Control Areas share operating reserve resources and coordinate activation of those resources in response to contingencies. The shared reserve resources will potentially reduce operating reserve requirements to a level that is less than the sum of the group members alone.

Reserve Sharing Group Development Status

The NPCC Control Performance Working Group is working on the following technical issues:

- Determine acceptable operating reserve
- Transmission limitation/deliverability issues
- Probability of simultaneous outages
- Development of analytical tools
  - Real time and day-ahead
  - Determine distribution and deployment of reserves
- Develop operating procedures for reserve activation
- Develop energy accounting and balancing procedures

Inter-ISO Reserve Market

A fully integrated inter-regional Reserve Market will require the design and development of a new market structure including reserve products, Bidding mechanisms, Compensation for reserve service, and compensation for energy from activated reserve. A regional reserve market coordinator would communicate with all of the generators in the region. Generators would bid available reserve products into the regional coordinator. The regional coordinator would then accept and apportion the regulation such that regional reserve requirements were met, with due consideration to any locational reserve requirements. This effort will require significant resource and investment in telecommunications, software development, and hardware.

Regional Reserve Market Design and Development Targets

- Enhanced SAR Implementation
  - Develop new Procedures - Winter 2001
  - Implement Software enhancements - Spring 2001
  - Enhanced SAR in effect - Summer 2001

- Reserve Share Group Implementation
  - Develop methodology and Feasibility assessment - Spring 2001
  - Develop Specifications - Summer 2001
  - Prepare Inter-Area Agreements and Procedures - Summer 2001
  - Implement Software and Hardware - Winter 2002
  - Reserve Share Group activated - Summer 2002

- Regional Reserve Market Implementation
  - Develop methodology and Feasibility assessment - Winter 2003
  - Develop Specifications - Summer 2003
  - Tariff Filings and Inter-Area Agreements - Summer 2003
  - Implement Software and Hardware - Fall 2003
  - Regional Reserve Market in effect - Summer 2004