NEW YORK INDEPENDENT SYSTEM OPERATOR

Building The Energy Markets of Tomorrow . . . Today

NYISO's Demand Response Programs

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Reduce Energy and Get Paid 2005
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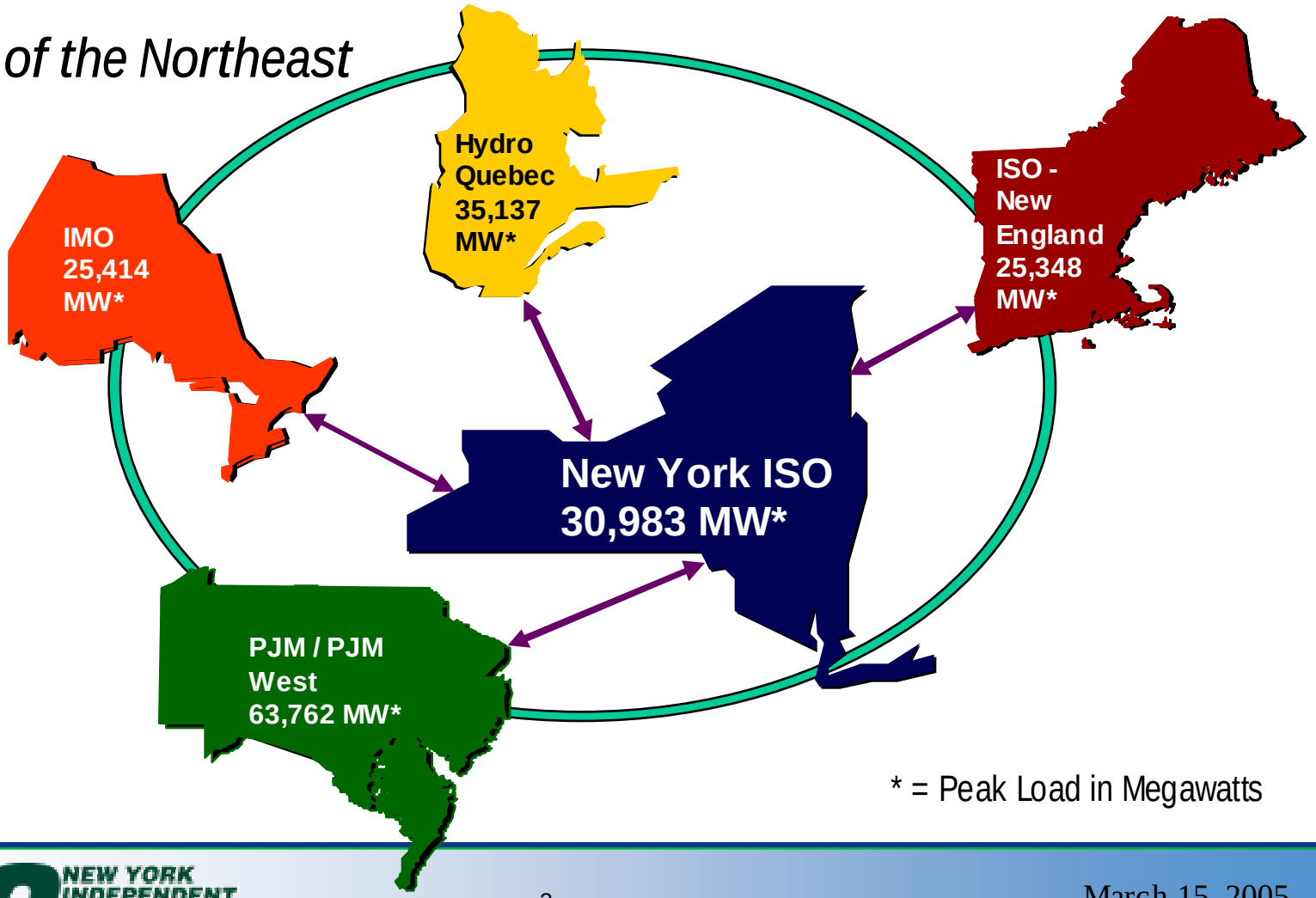
What is the NYISO?

- A not-for-profit corporation established in December 1999 to administer the state's wholesale energy markets and operate the state's high voltage electric transmission system.
- Highly divested and complex marketplace featuring co-optimized market clearing systems.
- 91% utility divestiture rate makes it most divested market in nation.
- The NYISO's market volume was nearly $7.2 billion in 2004.
- Unique challenge: New York City is one of the world's biggest and most complex load pocket. World finance and communications capital.

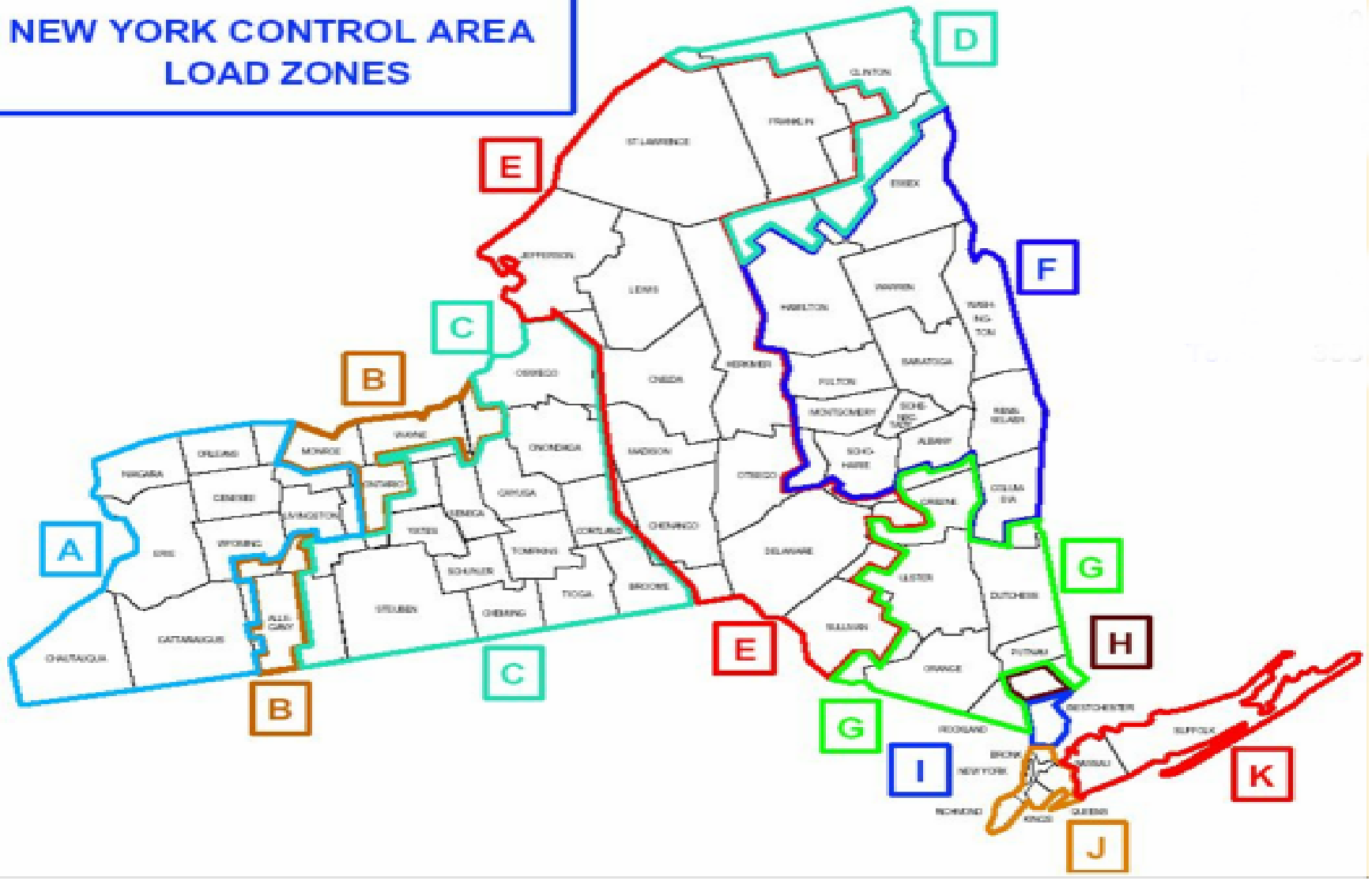
Introduction

Hub of the Northeast



* = Peak Load in Megawatts

NEW YORK CONTROL AREA LOAD ZONES



NYISO's Demand Response Programs

Two Reliability Programs – Controlled by NYISO

- **Emergency Demand Response Program**
- **ICAP Special Case Resources Program**

One Economic Program – Controlled by Customer

- **Day-Ahead Demand Response Program**

NYISO's Demand Response Programs are aimed at wholesale electricity Market Participants, Aggregators and NYISO Direct Customers

Demand Response Highlights

- Peak load reduced by as much as 800 MW during reserve shortages
- Key to NYC meeting reserve requirements in 2001
- More than 2,300 large commercial and industrial customers have participated
- Approximately $15 million in incentives paid out 2001-2005
- Demand Response providers have received approximately $75 million in capacity revenues between 2001-2005

Who Can Participate?

- If you have interruptible load, you can participate in:
  - ✓ The Emergency Demand Response (EDRP) program
  - ✓ ICAP Special Case Resources (SCR) program
  - ✓ The Day-Ahead Demand Response (DADRP) program
- If you have standby generators, you can participate in:
  - ✓ The EDRP program
  - ✓ The SCR program
- NYISO is exploring the development of protocols that would facilitate participation of aggregated DG units in the NYISO energy, capacity and ancillary services markets outside its demand response programs.

EDRP

The Emergency Demand Response Program

- **Reliability Program**
- **Minimum Resource Size: 100 kW, may aggregate within Zones to reach threshold**
- **Activated in Response to forecast or actual Operating Reserve Deficiency**
- **Payment for Energy (kWh) Reduction**
- **Provider notified of activation 2 hours ahead, if possible**
  - ✓ *Paid the greater of real-time marginal price or $500/MWh & guaranteed 4 hour minimum*
  - ✓ *May set real-time market price at $500*
- **Available to interruptible load & emergency backup generation (including generation in excess of host load)**
- **Open to Load Serving Entities (LSEs), Direct Customers, and Aggregators (Curtailment Service Providers - CSPs)**
- **Activated after ICAP SCR resources if deemed necessary by Operators**
- **Voluntary Response – No Penalties for Non-Performance**
- **Credit Requirements: None**
- **Fee to become CSP: None**

EDRP Benefits

- Performance is entirely voluntary, if you can't perform, "No Harm, No Foul"
- Significant payment (50 cents/kWh) for performance provided
- Advance notice of system problems that could lead to voltage fluctuations/reductions – allows customers to take actions to protect sensitive processes
- Participants can genuinely claim: "We helped keep the lights on"

EDRP – DR Training Ground

- EDRP prepares customers for ICAP/SCR
  - ✓ Experience w/ EDRP curtailments provides basis for accurate and achievable ICAP/SCR capacity nomination

- EDRP prepares customers for DADRP
  - ✓ Experience w/ EDRP curtailments provides:
    - Basis for consistently achievable DADRP MW curtailment offers
    - Basis for required payment to offset costs of curtailment

ICAP/SCR

The ICAP Special Case Resources Program

- **Reliability Program**
- **Minimum Resource Size: 100 kW, may aggregate within Zones to reach threshold**
- **Activated in Response to forecast or actual Operating Reserve Deficiency**
- **Payment for Capacity (kW) Reduction plus Payment for Energy (kWh)**
- **Provider advised 21 hours ahead with 2 hour in-day notification during Operating Reserve deficiency**
  - ✓ *Paid for energy reduction: real-time market price or Strike Price (maximum $500/MWh), whichever is greater & guaranteed 4 hour minimum*
  - ✓ *May set real time market price under scarcity pricing rules*
- **Available to interruptible load & emergency backup generation (including generation in excess of host load)**
- **Open to Load Serving Entities (LSEs), Direct Customers, and Aggregators (Responsible Interface Providers – RIPs)**
- **Activated prior to Emergency Demand Response resources**
- **Mandatory Response – Resources Derated for Non-Compliance**
- **Credit Requirements: None**
- **Fee to become RIP: None**

ICAP/SCR – Transition from EDRP

- Program Similarities
  - ✓ Events called during identical system conditions (forecast or actual reserve deficiencies)
  - ✓ Energy payment provided
  - ✓ 2-Hour In-Day Notice

- Program Differences
  - ✓ ICAP/SCR invoked before EDRP
  - ✓ Up-Front capacity payment for SCR
  - ✓ Day-Ahead Warning the Program may be Activated
  - ✓ Dispatch based, in part, on customer terms (strike price)
  - ✓ Penalties for non-compliance

ICAP/SCR Benefits

- Customers can dictate terms of UCAP sale
  - ✓ Negotiate price UCAP to be sold at through a bilateral agreement
  - ✓ Submit offer (incl. MWs and offer price) to sell capacity into any of the NYISO auctions
- Real-Time energy reductions during declared events results in additional energy payment
- Notified day-ahead of potential system problems

ICAP/SCR Penalties

- **Deficiency Penalty**: Retroactive penalty assessed if customer unable to verify contracted demand reduction (CDR) during contract period
  - ✓ Metered load at or below CDR during any single hour of an event or verification test nullifies any exposure to "Deficiency Penalty"
  - ✓ This penalty is difficult to get hit with. Would have to fail to provide full performance for <u>any</u> hour during <u>all</u> tests and mandatory events
- **Derating**: Avg. event performance over previous 12 months used to recalculate UCAP. Less than full performance limits amount of capacity that can be sold in future capability periods.

DADRP

The Day-Ahead Demand Response Program

- **Economic Program**
- **Minimum Resource Size: 1 MW, may aggregate within Zones**
- **Load bids interruption in Day-Ahead Market just like a generator - if chosen, can set marginal price. $75/MWh minimum bid.**
- **Payment for Energy (kWh) Reduction**
- **Parties submitting accepted bids get:**
  - ✓ *Notified by 11:00 a.m. of schedule for the next day (starting at midnight)*
  - ✓ *incentive credit (fixed load bid reduced by amount of curtailment provided)*
  - ✓ *paid greater of marginal price or bid for actual interruption*
- **Available to interruptible load only (generation excluded)**
- **Open to Load Serving Entities (LSEs), Direct Customers, and Aggregators (Demand Reduction Providers – DRPs)**
- **Activated prior to Emergency Demand Response resources**
- **Mandatory Response – Penalties Assessed for Non-Compliance**
  - ✓ *penalized for buy-through at Day-Ahead or Real-Time marginal price, whichever is greater*
- **Credit Requirements: Relaxed from Generator Levels**
- **Fee to become DRP: None**

DADRP – Progressing from EDRP and SCR

- **Program Similarities**
  - ✓ Guaranteed minimum energy payment rate as specified in bid submission
  - ✓ Performance calculation methodology identical to emergency programs (baseline load minus metered load equals measured performance)

- **Program Differences**
  - ✓ Curtailment opportunities derived based on customer bid ***not*** system conditions. Your bid, relative to market prices, determines whether your load is curtailed
  - ✓ Customer better able to identify risk and indicate relevant payment required for undertaking risk

DADRP Curtailment Opportunities

- Customer dictates terms of curtailment via bid:
  - ✓ Strike Price ($/MW)
  - ✓ Curtailment Amount (MWs)
  - ✓ Start Time
  - ✓ Duration
- If bid is scheduled, Day-Ahead notice given
- Bids not required every day ➔ Increased Flexibility

DADRP Benefits

- **<u>Guaranteed Min. Payment</u>**
- Bid Price * Curtailment Amount * Duration
- Customer uses bid price to ensure sufficient payment is received to offset outage costs and acceptance of additional risk
- Paid at LBMP – supplemental payment made if guaranteed minimum payment not achieved

Performance Measurement

- **Customer Baseline Load approach**
  - ✓ *Out of last 10 days, average of 5 highest energy consumption blocks corresponding to load reduction period*

- **Optional weather-sensitive CBL**
  - ✓ *Shifts CBL upwards or downwards ± 20% so as to line up CBL and actual load in hours just prior to event*
  - ✓ *Proxy for weather variables*

Metering Requirements

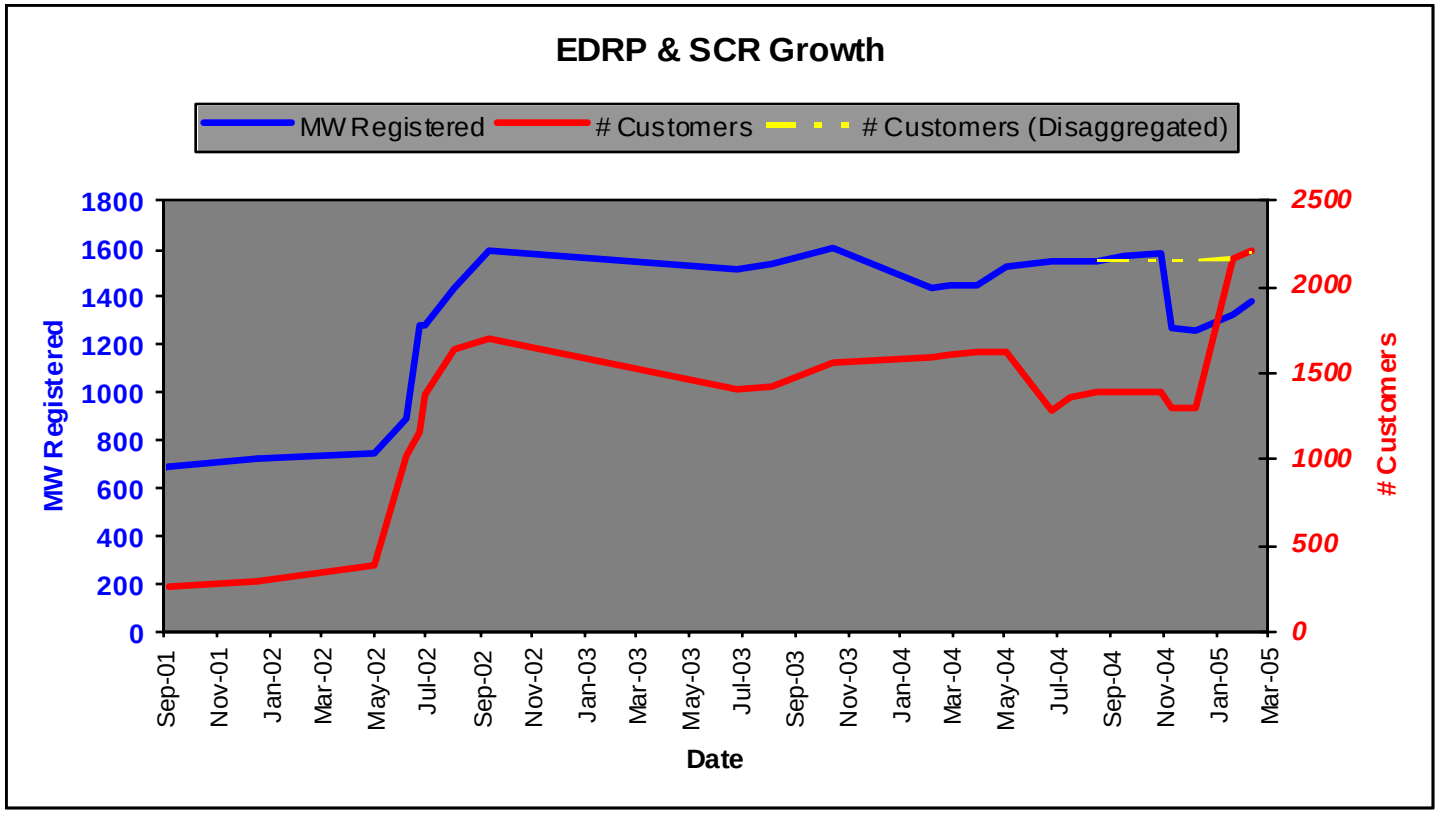
- Hourly interval meters required
- Reduced accuracy metering (2% or better) allowed – takes advantage of Energy Management System opportunities
- Small customer aggregation program allows other validation methods (e.g., statistical sampling)

- NYISO does use an automated notification system for communication of emergency/reliability event notifications to program participants
- NYISO does not see the need for near real-time communication of response/metering data and such systems are not required for participation in emergency/reliability programs

Small Customer Aggregation – "DR for the Little Guy"

- Small Customer Aggregation (SCA) Currently Applies to EDRP, SCR, and DADRP
- Allows Participation without Interval Meters
- Proposed Generic Rules Would Guide Proposal-Specific Proposals
- Minimum Aggregation is Program-Specific
  - ✓ DADRP – 1 MW/Zone
  - ✓ SCR/EDRP – 100 kW/Zone
- Each Proposal Reviewed by the NYISO staff, Price Responsive Load Working Group (PRLWG), Must be Approved by a Majority of the Chairs and Vice-Chairs of the MC, BIC, and the Chairman PRLWG. ICAP WG must review if SCR status is sought.

Historic EDRP/SCR Participation



Note: Prior to January 2005 the number of customers shown on the chart did not reflect SCR resources enrolled or sold as part of aggregations. Recent database changes allow presentation of aggregation members. In other words, there was not a step change in the number of participants in January 2005.

Current DR Registration Details

EDRP/SCR Breakdown Effective February 9, 2005

RIP/CSP/DRP Type	*EDRP/SCR MW*	*DADRP MW*
17 Aggregators	406.3 MW	0.0 MW
11 LSEs	250.5 MW	46.5 MW
8 Direct Customers	126.3 MW	8.0 MW
8 Transmission Owners	594.3 MW	322.4 MW

Current DR Registration Details (cont.)

Breakdown Effective February 9, 2005

	EDRP				ICAP/SCR				DADRP			
Zone	Count	Load (MW)	Gen (MW)	Total MW	Count	Load (MW)	Gen (MW)	Total MW	Count	Load (MW)	Gen (MW)	Total MW
A	43	35.15	14.3	49.45	125	293.522	0.906	294.428	3	126	0	126
B	43	25.63	16.5	42.13	26	46.364	6.098	52.462				
C	105	15.68	16.9	32.58	42	91.779	4.403	96.182	2	37.4	0	37.4
D	13	0.93	3.4	4.33	4	44.401	0	44.401	1	100	0	100
E	50	23.3	27.5	50.8	22	18.003	0.924	18.927	1	10	0	10
F	54	35.363	9.2	44.563	17	49.959	0	49.959	8	89	0	89
G	36	23	26.2	49.2	3	2.1	0	2.1				
H	9	1.3	5	6.3								
I	29	7.2	4.86	12.06	5	6.128	0	6.128				
J	151	95.39	55.986	151.376	777	186.67	13.242	199.912	1	2.5	0	2.5
K	607	80.95	69.99	150.94	40	18.487	0.805	19.292	1	12	0	12
	1140	343.9	249.8	593.7	1061	757.4	26.4	783.8	17	376.9	0.0	376.9
							Total Emergency	1377.5			Total Economic	376.9

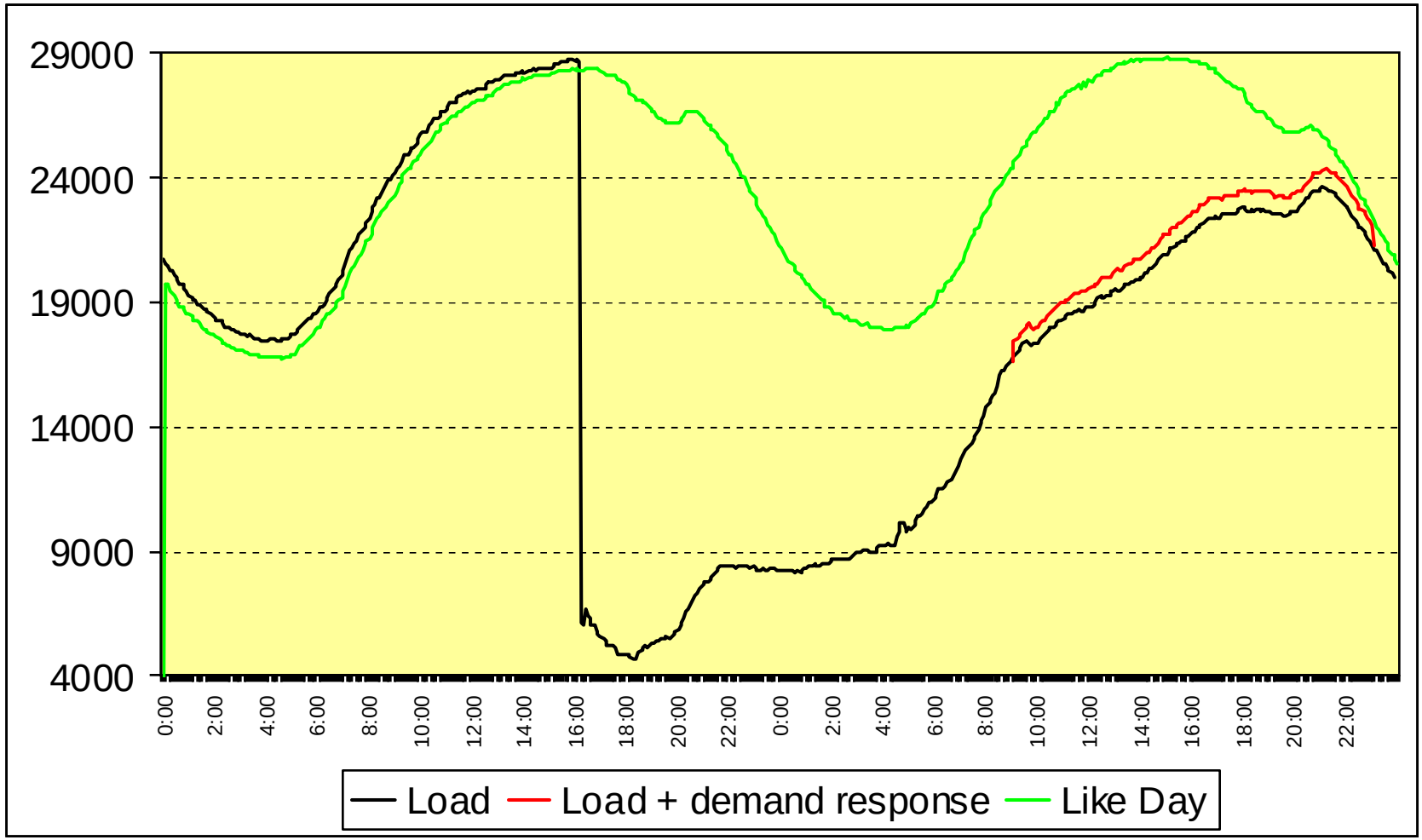
SCR Performance Factors by Zone

SCR Performance Averages Applicable to Winter 2004-2005		
Zone	Weighted Average Performance	Locality
A	97.87	97.62
B	92.06	
C	96.47	
D	99.69	
E	96.81	
F	99.96	
G	100	
H	99.99	
I	99.54	
J	99.25	99.25
K	99.42	99.42
	Statewide	98.11

DR Used During August 14 Blackout Recovery Process

- EDRP and SCR called on August 15th (HB09 – HB22) and August 16th (HB12 – HB19)
- According to system operators, on August 15th every MW of load taken off the system allowed another MW to come up faster during the rebuilding process
- Even with these curtailments, load still had to be shed during some hours on August 15th
- On August 16th, DR served the more typical role of providing additional reserves
- NYISO was praised by FERC for its creative use of demand response in the system recovery process

The Impact of DR on August 15



Past EDRP/SCR

	Participants/ MW	Events	Load Curtailed	Payments
2001	292 712 MW	23 Hours Downstate 17 Hour Upstate	~425 MW	$4.2 Mil
2002	1711 1481 MW	22 Hours Downstate 10 Hour Upstate	~668 MW	$3.3 Mil
2003	1536 1708 MW	22 Hours Upstate and Downstate	~700 MW	$7.2 Mil

Cost/Benefit Ratios for DR Programs

- **Reliability Program Benefits and Costs**
  - ✓ ***From $4.8 million and $3.3 million in 2002 (B/C ratio of 1.5 to 1) to***
  - ✓ ***$54 million and $7.2 million in 2003 (B/C ratio of 7.5 to 1)***

- **Economic program Benefits and Costs**
  - ✓ ***From $0.2 million and $0.21 million in 2003 (B/C ratio of 1 to 1) to***
  - ✓ ***$2.2 million and $0.2 million in 2001 (B/C ratio of 10 to 1)***

Conclusions

- Emergency/reliability programs (EDRP and SCR) provide valuable reliability insurance for system operators, both to avoid involuntary load shedding and during the system restoration process.
- Economic programs provide valuable insurance against high prices and severe price volatility. When market prices are high and volatile, benefit/cost ratios can be very high and often exceed those of the emergency programs during peak periods.
- EDRP is a voluntary, energy-only program with modest incentives for participation, but no penalties for failure to perform when called. It is a no-lose option for newcomers to the world of demand response to "get their feet wet" and develop experience in estimating load reduction capabilities.
- SCR requires performance when activated by NYISO but provides additional forewarning and flexibility. Energy payments are provided when activated, while the capacity market, especially given NYISO's demand curve, provides significant incentives for participation even if no events are called. Prepares participants for more rigorous requirements of DADRP.
- DADRP and other economic Demand Response programs require the most sophistication due to need to develop and submit bids on a regular basis. DADRP provides participating customers who desire it, the option of real-time pricing. During periods of high and volatile prices, economic programs provide direct monetary benefits to participants and non-participants alike.

DR Service Providers (CSPs/RIPs)

Aggregators	Name		Email	Phone
Advantage Energy, Inc.	Jody	Spaeth	JMSpaeth@AdvantageEnergyUSA.com	716-826-9778
Amerada Hess	Blas	Hernandez	bhernandez@hess.com	732-750-6148
Con Edison Solutions, Inc.	Fred	Ornstein	ornsteina@conedsolutions.com	914-286-7080
Constellation NewEnergy, Inc.	Binh	Le	binh.le@constellation.com	212-883-5880 x6458
Consumerpowerline.org	Ray	Stirbys	rstirbys@consumerpowerline.org	212-361-6300 x100
Day Automation Systems	James	Day	jlday@dayasi.com	585-924-4630 x221
ECONnergy Energy Company, Inc.	Charlene	Herman	hermanc@econnergy.com	845-371-2288 x1100
Electrotek Concepts Inc	Craig	Gruber	cgruber@wptinc.com	732-248-4336
Energy Aggregation Services LLC	Howard	Feibus	howard@energyaggregationservices.com	703-655-7105
Energy Analytics, Inc.	William	Hillis	wjhjr.1@juno.com	914-490-8005
Energy Curtailment Specialists, LLC	Glen	Smith	gesmith.ecs@adelphia.net	877-711-5453
Energy Enterprises Inc.	Glen	Smith	gesmith@adelphia.net	716-523-7254
Energy Investment Systems, Inc.	Lewis	Kwit	LMK@eisincorp.com	212-966-6641
Energy Spectrum, Inc.	Gary	David	gdavid@energyspec.com	718-677-9077
EnerNOC, Inc.	David	Brewster	dbrewster@enernoc.com	617-224-9900
Prenova Inc.	Mark	Breuker	mbreuker@prenova.com	877-882-6883
Select Energy New York, Inc.	Jon	Collins	collijp@selectenergy.com	315-460-3368
Sempra Energy Solutions	Raul	Contreras	rcontreras@semprasolutions.com	619-696-3034
SourceOne	Ken	Rice	krice@s1inc.com	617-399-6129
Strategic Energy, LLC	Chuck	Baird	cbaird@sel.com	412-394-6682
Strategic Power Management	Daniel	Duthie	duthie@strategicpower.com	845-294-7746
WebGen Systems	Paul	Taglianetti	ptaglianetti@webgensystems.com	617-349-0742 x122
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Niagara Mohawk Power Corp.	John	Sierotnik	john.sierotnik@us.ngrid.com	315-428-5022
Orange & Rockland Utilities, Inc.	Tom	Kelly	kellyt@oru.com	845-577-3634
Rochester Gas & Electric Corp.	Frank	Roma	fproma@nyseg.com	607-762-7671

Questions?

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