# Credit Coverage Policies for Financial Transmission Rights

**Scott M. Harvey**

**EUCI**
**Unsecured Credit Conference**

April 29, 2009

LECG

Scott Harvey is or has been a consultant on electricity market design, transmission pricing, market power and/or on credit issues for Allegheny Energy Global Markets; American Electric Power Service; American National Power; California ISO; Calpine Corporation; Centerpoint Energy; Commonwealth Edison; Competitive Power Ventures, Conectiv, Constellation Power Source; Coral Power; Dayton Power and Light, Duke Energy, Dynegy; Edison Electric Institute; Edison Mission; ERCOT, Exelon Generation; General Electric Capital; GPU; GPU Power Net Pty Ltd; GWF Energy; Independent Energy Producers Association; ISO New England; Longview Power; Midwest ISO; Morgan Stanley Capital Group; New England Power; New York Energy Association; New York ISO; New York Power Pool; Ontario IMO/IESO; PJM; PJM Supporting Companies; Progress Energy, Reliant Energy; San Diego Gas & Electric; Sempra Energy; Mirant/Southern Energy; Texas Utilities; Transpower of New Zealand Ltd; Westbook Power; Williams Energy Group; and Wisconsin Electric Power Company.

The views presented here are not necessarily attributable to any of those mentioned, and any errors are solely the responsibility of the author.

# TOPICS

- Financial Transmission Rights
- Hedging and Risk
- FTR Credit Coverage
- Assessing FTR Risk
- FTR Mark-to-Market Valuation and Default Risk

# FINANCIAL TRANSMISSION RIGHTS

What is a financial transmission right in the electric power industry?

- In LMP markets, a financial transmission right (FTR, TCC or CRR) entitles the holder to be paid the difference in the congestion component of the LMP price at two specified locations on the transmission grid for each hour over the term of the FTR.
- FTRs are generally settled based on prices in the day-ahead market.
- LMP markets with financial transmission rights currently operate in PJM, New York (NYISO), New England (ISO-New England), the Midwest (MISO) and California (CAISO). They are scheduled for implementation in Texas (ERCOT) in 2010.

# FINANCIAL RIGHTS

Because the payment of transmission congestion rents to FTR holders is independent of the holder's transmission use, FTRs are a financial instrument.

- Market participants do not have to hold FTRs in order to schedule use of the transmission system.
- Market participants with FTRs are paid the market value of their FTRs in the day-ahead market even if they do not undertake a corresponding energy transaction.

Market participants may therefore hold FTRs to hedge congestion charges associated with their physical use of the transmission system to meet load serving or contractual obligations (in which case the market participant is holding the FTR to reduce risk) or as a purely financial instrument (in which case the market participant is taking on risk by holding the FTR).

# HEDGING AND RISK

If the source of an FTR is the same as the location of a generating resource used to meet a load-serving entity's load and the FTR sinks at the location of the load-serving entity's load, then the payments to or from the LSE as an FTR holder will offset the payments due to or from the LSE for its day-ahead transmission usage.

- In this circumstance, changes in the market value of the FTR are offset by changes in the present value of congestion charges.
- The FTR holding hedges congestion charges, reduces the LSE's risk, and reduces the likelihood of energy market default by the LSE.

# Negatively priced Annual TCCs Purchased in the NYISO Fall 2006 Capability Period Auction

| Source | Sink | Owner | MW | Price ($/MW) |
|---|---|---|---|---|
| NYPA_POUCH1_____GT | N.Y.C. | J_P_Morgan_Ventures_Energy_Corporation | 2 | $ (104,052.10) |
| NYPA_VERNON_____GT2 | RAVENSWOOD_GT_4 | DC_Energy_New_York_LLC | 1 | $ (51,518.12) |
| NYPA_POUCH1_____GT | NARROWS_GT2_2 | DC_Energy_LLC | 1 | $ (49,423.09) |
| NYPA_VERNON_____GT2 | RAVENSWOOD_GT_6 | DC_Energy_New_York_LLC | 1 | $ (48,837.06) |
| NYPA_VERNON_____GT3 | RAVENSWOOD_GT_7 | DC_Energy_New_York_LLC | 1 | $ (30,080.80) |
| NYPA___ASTORIA_CC1 | RAVENSWOOD___3 | DC_Energy_New_York_LLC | 18 | $ (26,457.27) |
| PLEASANTVLY___LBMP | HUD VL | J_P_Morgan_Ventures_Energy_Corporation | 1 | $ (21,721.08) |
| N.Y.C. | ARTHUR_KILL_3 | BJ_Energy_LLC | 2 | $ (17,214.00) |
| NYPA_GOWANUS_____GT6 | N.Y.C. | 330_Fund_I_LP | 1 | $ (12,536.36) |
| CAPITL | ATHENS_STG_3 | Susquehanna_Energy_Products_LLC | 3 | $ (9,700.87) |
| LOVETT___4 | HUD VL | PP_L_EnergyPlus_Co_(EPLUS) | 9 | $ (7,231.63) |
| ASTORIA_GT_7 | KIAC_JFK_GT2 | DC_Energy_New_York_LLC | 1 | $ (5,501.55) |
| ASTORIA_GT_1 | N.Y.C. | 330_Fund_I_LP | 1 | $ (4,212.51) |
| HUD VL | MONGAUP___HYD | 330_Fund_I_LP | 1 | $ (1,487.70) |
| NYISO_LBMP_REFERENCE | H Q | Edison_Mission_Marketing___Trading_Inc | 15 | $ (972.69) |
| STATION 5_MISC_HYD | GENESE | Sempra_Energy_Trading_Corp | 1 | $ (750.00) |
| WEST | NORTH | 330_Fund_I_LP | 1 | $ (567.62) |
| E_FISHKILL___LBMP | MILLWD | Coral_Power_LLC | 1 | $ (277.59) |
| BROOKLYN_NAVY_YARD | POLETTI____ | Coral_Power_LLC | 2 | $ (226.79) |
| E_FISHKILL___LBMP | MILLWD | BJ_Energy_LLC | 5 | $ (87.27) |
| ASTORIA_GT_7 | NYPA_____HELLGATE_GT2 | DC_Energy_New_York_LLC | 1 | $ (24.73) |
| GENESE | RUSSELL___3 | J_P_Morgan_Ventures_Energy_Corporation | 5 | $ (6.13) |
| RAVENSWOOD_GT_4 | POLETTI____ | Edison_Mission_Marketing___Trading_Inc | 2 | $ (3.78) |

*Source: http://www.nyiso.com/public/webdocs/products/tcc/general_info/tcc_summary_05-31-07.CSV*

# HEDGING AND RISK

FTRs may also be purchased by entities that do not hold the FTRs to hedge energy market congestion risk, instead hold the FTRs because they expect the payments to the FTRs to be greater (a larger positive number or smaller negative number) than the auction price.

- These entities are accepting risk in exchange for an expected return.
- The participation of these entities in FTR markets can be desirable from a public policy standpoint, allowing the shifting of congestion risk from load-serving entities to entities better able to bear that risk.
- This not riskless arbitrage; risk has been taken on.
- It is essential that those taking on this risk be able to bear it.

# FTR CREDIT COVERAGE

Why are FTR credit policies necessary?

- To ensure that FTR buyers have the ability to pay for FTRs purchased in auctions.
- To ensure that FTR holders have the ability to make future payments for long-term FTRs.
- To ensure that FTR holders, particularly those holding counterflow (negatively valued) FTRs, have the ability to make required congestion payments.

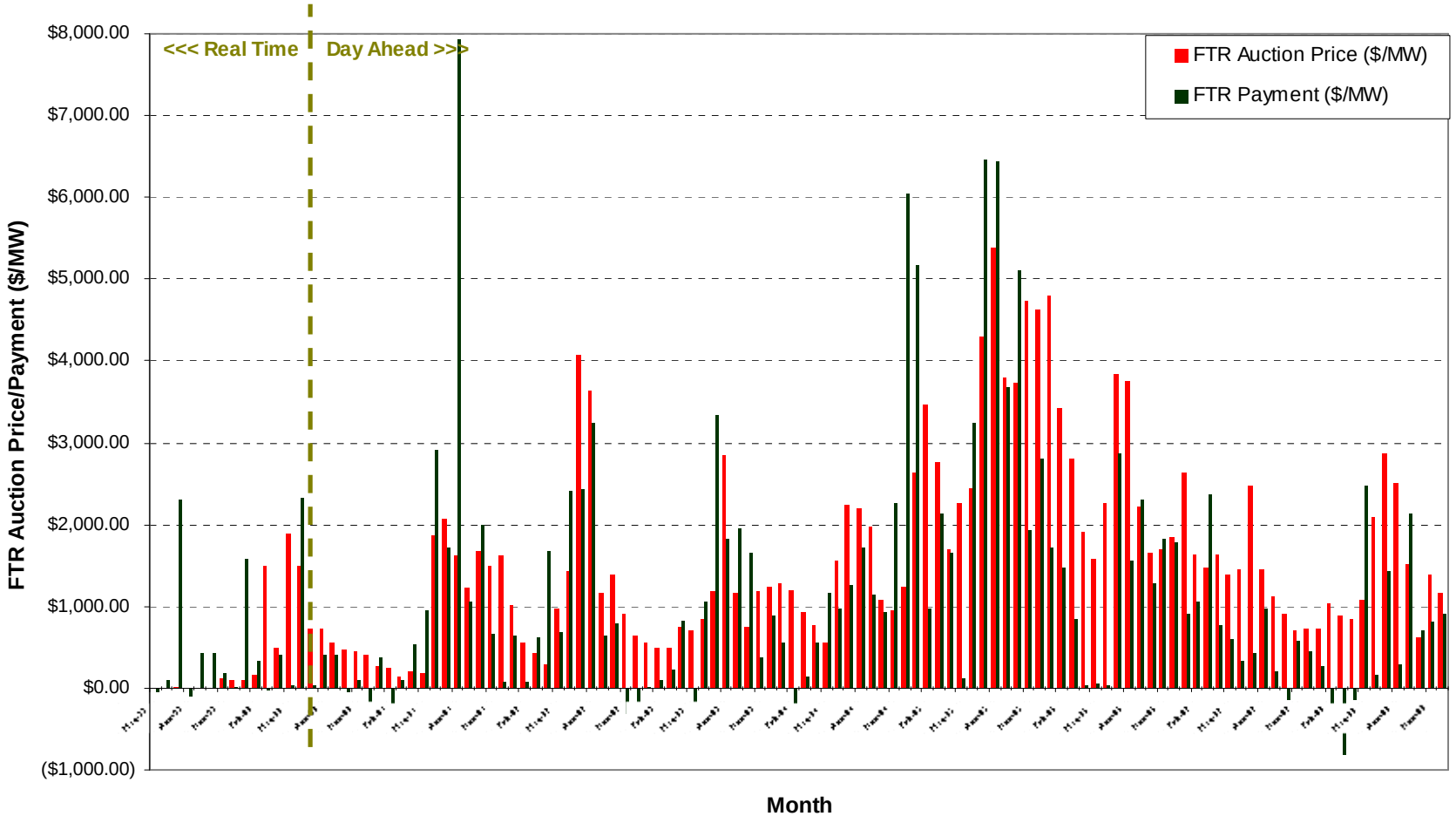
The first two credit policy issues potentially exist for future payments for conventional long-term firm transmission service as well as for FTRs.

The first two credit issues are also relatively straightforward to address because the future payments are well defined.

# FTR Auction Prices and Payments: Western Hub - PECO

## May 1999 - Dec 2008

## ON-Peak

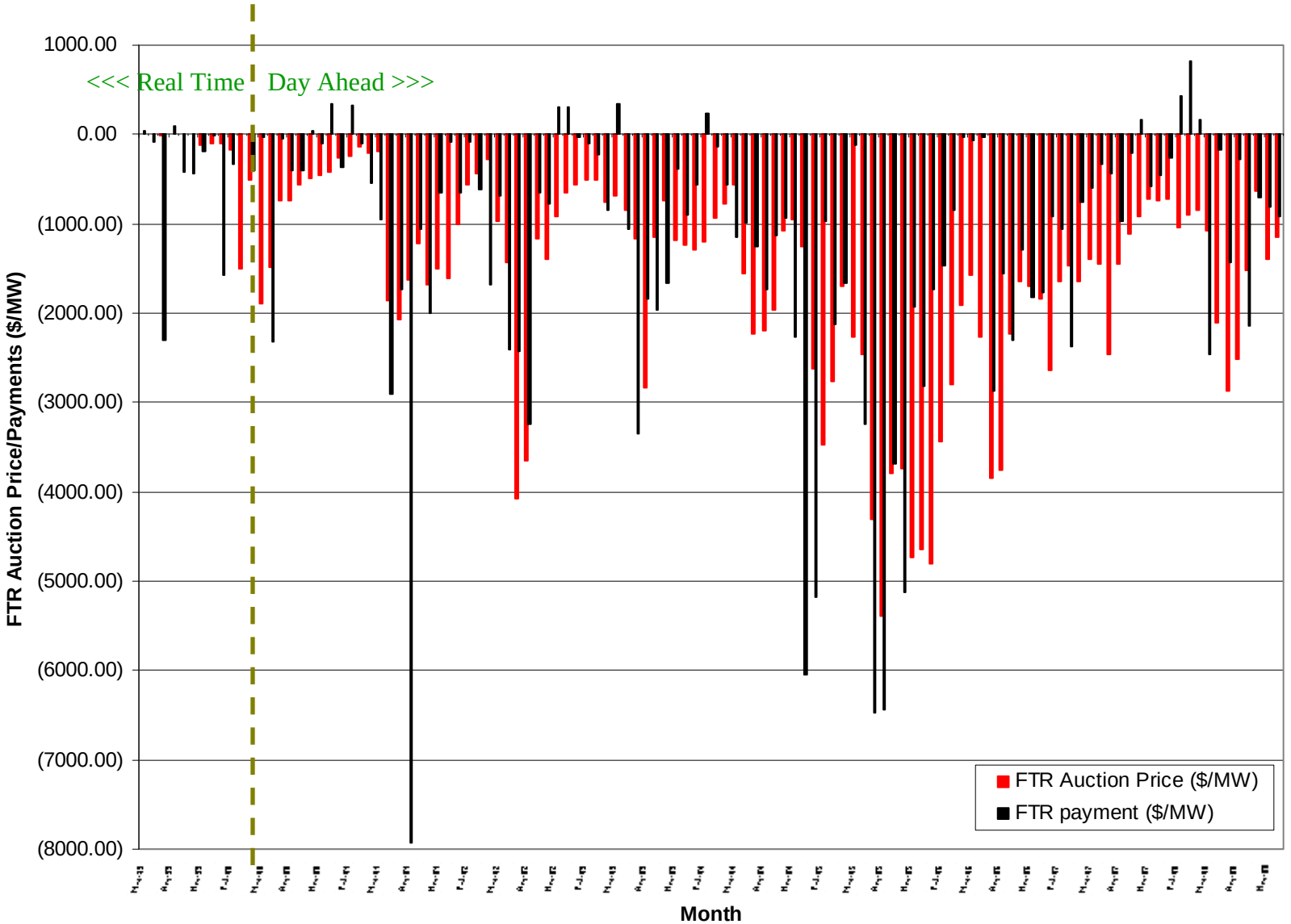


# FTR CREDIT COVERAGE

The third credit coverage issue is unique to financial rights defined as obligations.

- It is the most difficult to address because the future payments due on FTRs are not known and can be highly variable.
- The auction price reflects the expected level of payments, but actual payments can differ from the expected payments, by a lot.

# Auction Prices and FTR Payments: PECO - Western Hub
## May 1999 – Dec 2008
## ON-Peak



# FTR CREDIT COVERAGE

A critical credit policy issue is to ensure that FTR holders have the financial capability to make required payments to the ISO/ RTO if the congestion charges associated with the FTRs they hold are negative.

- This issue is particularly important for counterflow, negatively priced FTRs.
- Entities buying negatively priced FTRs are paid to provide financial counterflow (i.e., they take over the payment risk from the LSE that buys the positively priced FTR made feasible by the counterflow FTR.) This means that the buyer of the negatively priced FTR will likely be obligated to make congestion payments to the ISO/RTO.
- Any negatively priced FTR that is awarded is providing counterflow that makes feasible some positively priced FTR awarded in the auction.

# FTR CREDIT COVERAGE

FTR credit policies would not be necessary if FTRs were held only by LSE's who held them to hedge the congestion charges on their load serving obligations.

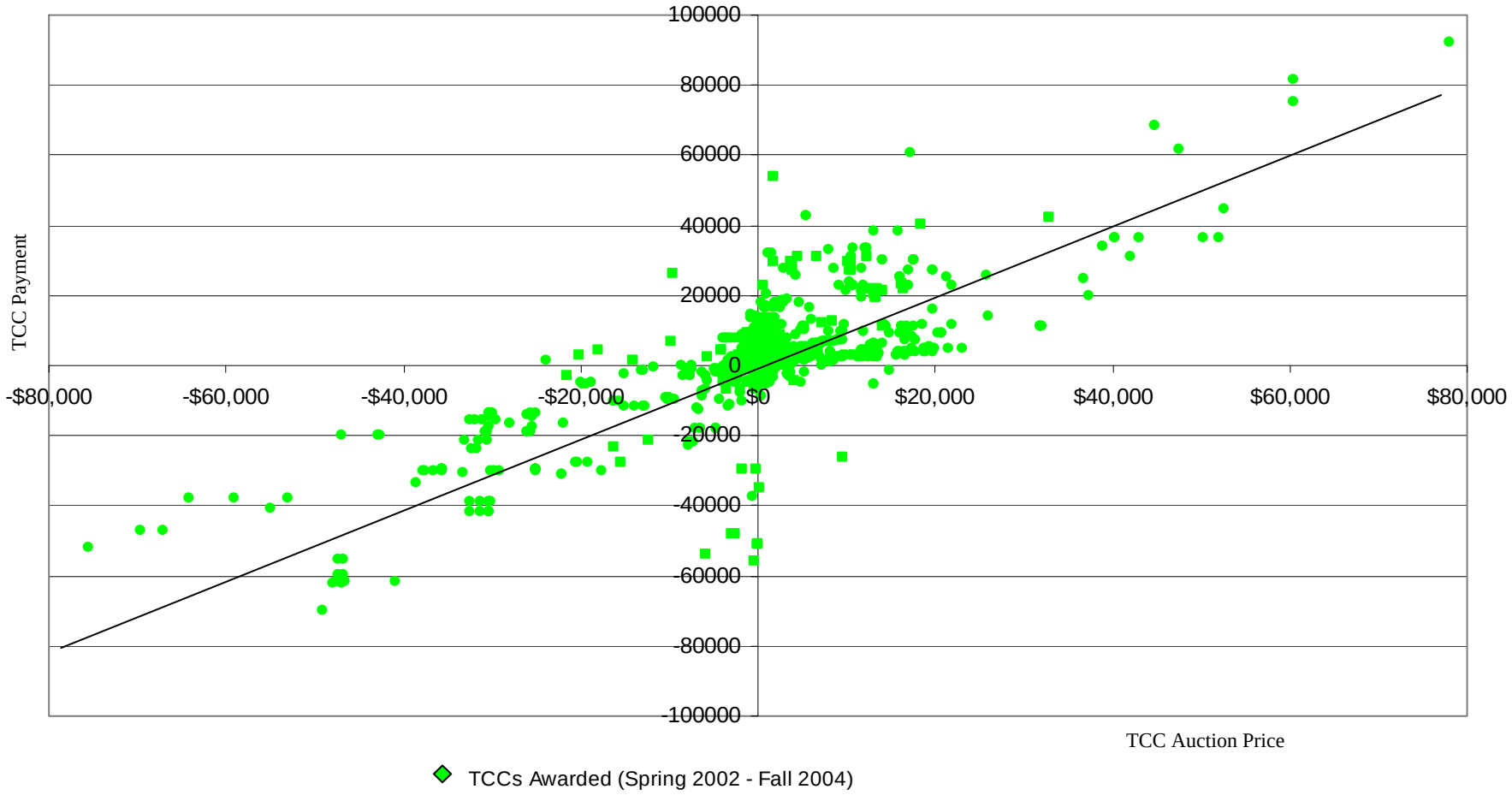
- The willingness of financial market participants that are better able to bear risk, to take on congestion risk at a price that is lower than the price LSE's are willing to pay to avoid congestion risk is a good thing, reducing LSE costs and risks.
- It is essential, however, that the ISO credit policy ensure that the financial market participants taking on such risk bearing positions, are, in fact, better able to bear risk.

# FTR CREDIT COVERAGE

ISOs must hold adequate secured credit for FTRs held by financial participants taking on risk to earn expected returns.

- The FTRs could be held by an LLC that has no hard assets and only contains cash when the owner wants it to.
- If these entities incur losses on their FTR holdings that are materially in excess of their cash collateral, they are probably going to default.

# Non-Zone J Annual TCC Payments and Auction Prices
# 2000-2004



# FTR CREDIT COVERAGE

If the holders of counterflow FTRs default on their obligation to make payments to the ISO, the congestion charges collected by the ISO may not be sufficient to cover payments due to the remaining FTR holders.

- This shortfall will be borne, directly or indirectly, by other market participants.
- Absent effective FTR credit policies, the potential for ISO revenue inadequacy would be greatest for defaults on FTRs having low or negative prices in the FTR auction.

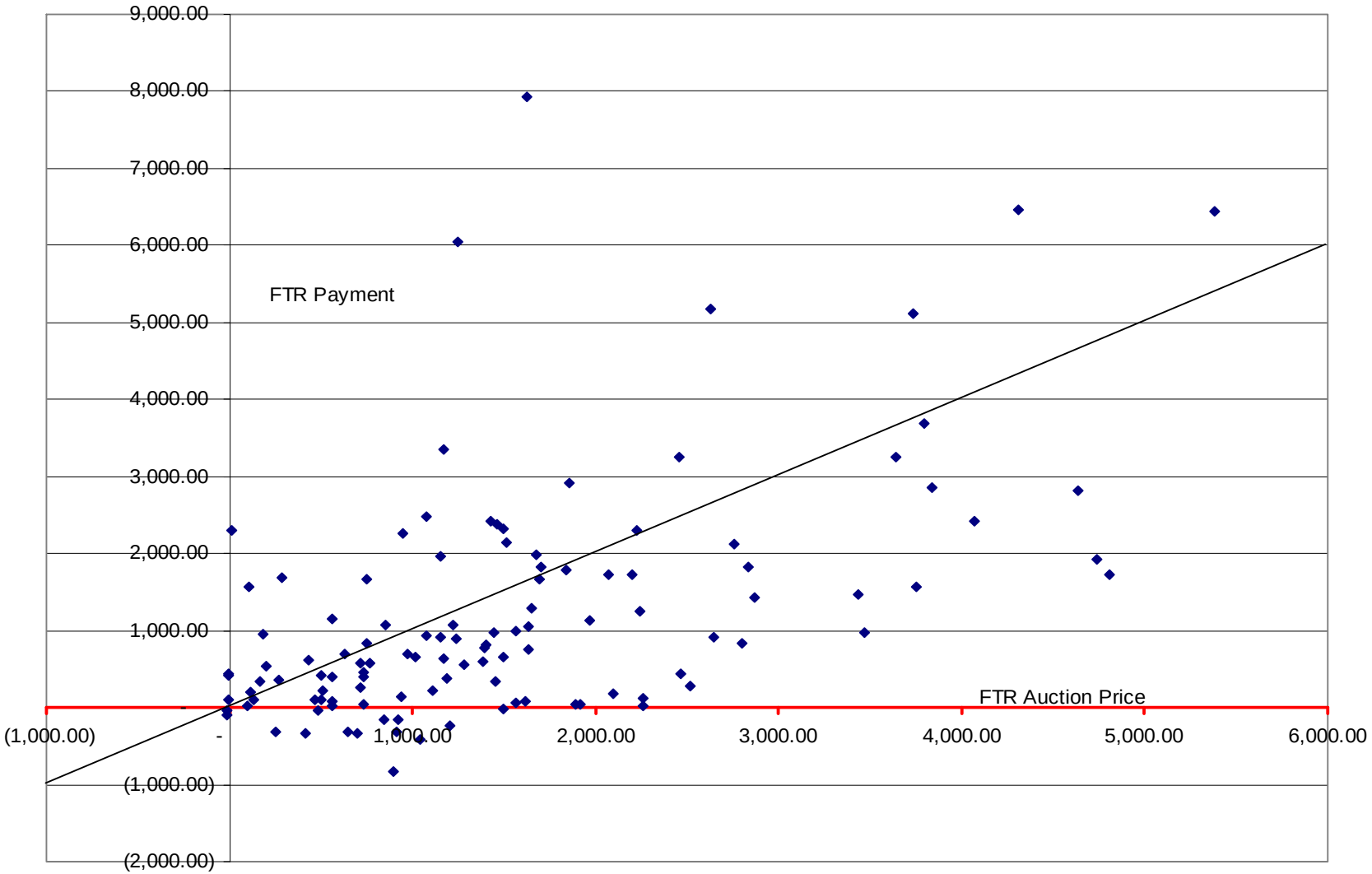
# TCC Payments and Auction Prices
## Negatively Priced NYISO Annual TCCs
## 2002-2004

# FTR CREDIT COVERAGE

Credit policy for potential counterflow FTRs needs to ensure a reasonable likelihood that the FTR holder will be able to cover:

- The expected value of payments due on the FTR (approximated by the auction price); and
- Potential payments in excess of the expected value.

# Western Hub to PECO FTR Auction Prices and Target Payments

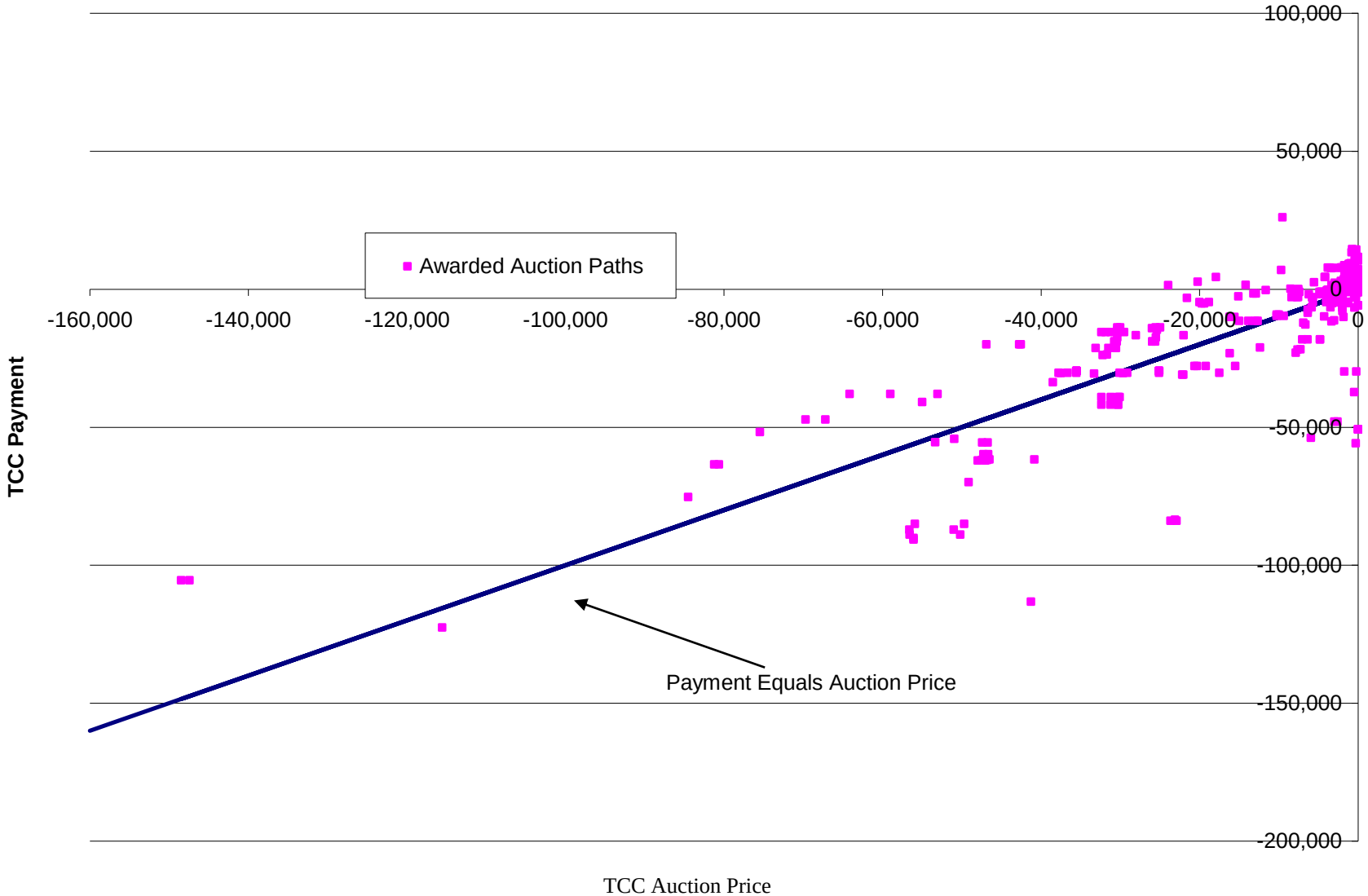


# FTR CREDIT COVERAGE

Credit coverage for payments in excess of the expected value is essential because payments in excess of the expected value are a frequent outcome.

- LSEs hold FTRs to hedge congestion charges that differ from the expected value. There is expected to be variation in congestion charges around the mean. Over any year, 2 years or 3 years, actual congestion payments may differ from the expected level, possibly by a lot.
- This variability is the reason for LSEs to hold FTRs. If FTR payments always averaged out to the expected level over a year, why would LSEs buy FTRs?

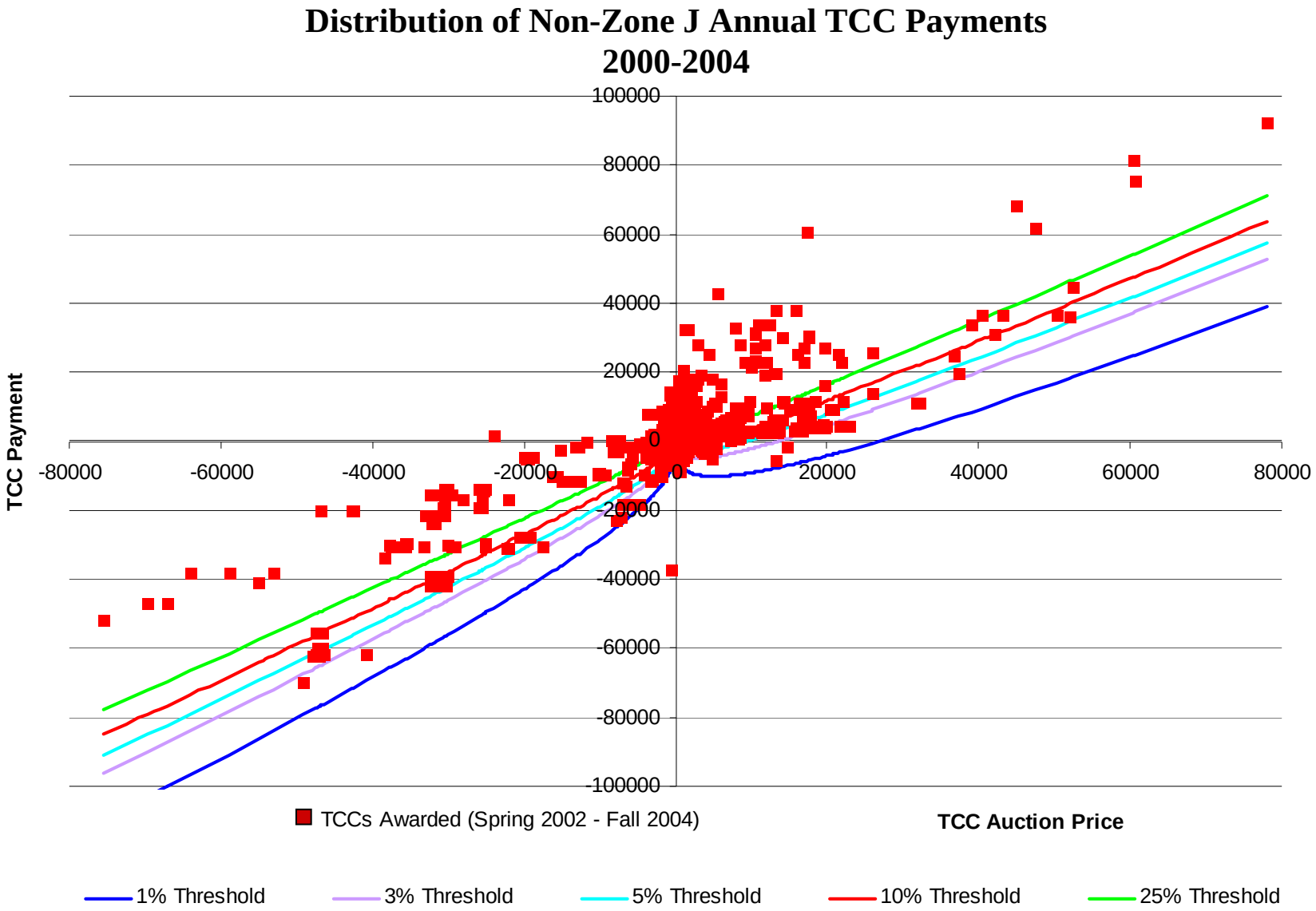
## TCC Payments and Auction Prices
## Negatively Priced NYISO Annual TCCs
## 2002-2004



# ASSESSING RISK

FTRs are held to hedge congestion risk because congestion charges are unpredictable.

- The level of congestion charges and FTR payments can vary with short-term fluctuations in weather, transmission outages and generation outages.
- FTR payments and congestion charges can also vary with longer-term changes in the level of economic activity and changes in relative fuel prices.
- Differences between actual and expected payments do not average out, even over periods as long as a year.


Distribution of Non-Zone J Annual TCC Payments
2000-2004
TCC Payment
100000
80000
60000
40000
20000
0
-20000
-40000
-60000
-80000
-100000
-80000
-60000
-40000
-20000
0
20000
40000
60000
80000
TCCs Awarded (Spring 2002 - Fall 2004)
TCC Auction Price
1% Threshold
3% Threshold
5% Threshold
10% Threshold
25% Threshold

# ASSESSING RISK

The historic variability of FTR prices and payments can, in principle, be used to assess the level of credit coverage required to hold counterflow FTRs. However:

- Very little historic data will be available for regions that have recently implemented LMP or have not yet implemented LMP.
- Even in regions that have several years of experience with LMP, the number of realizations for FTR prices and payments is very small.

**TCC Payments and Auction Prices**
**Negatively Priced NYISO Annual TCCs**
**2002-2004**

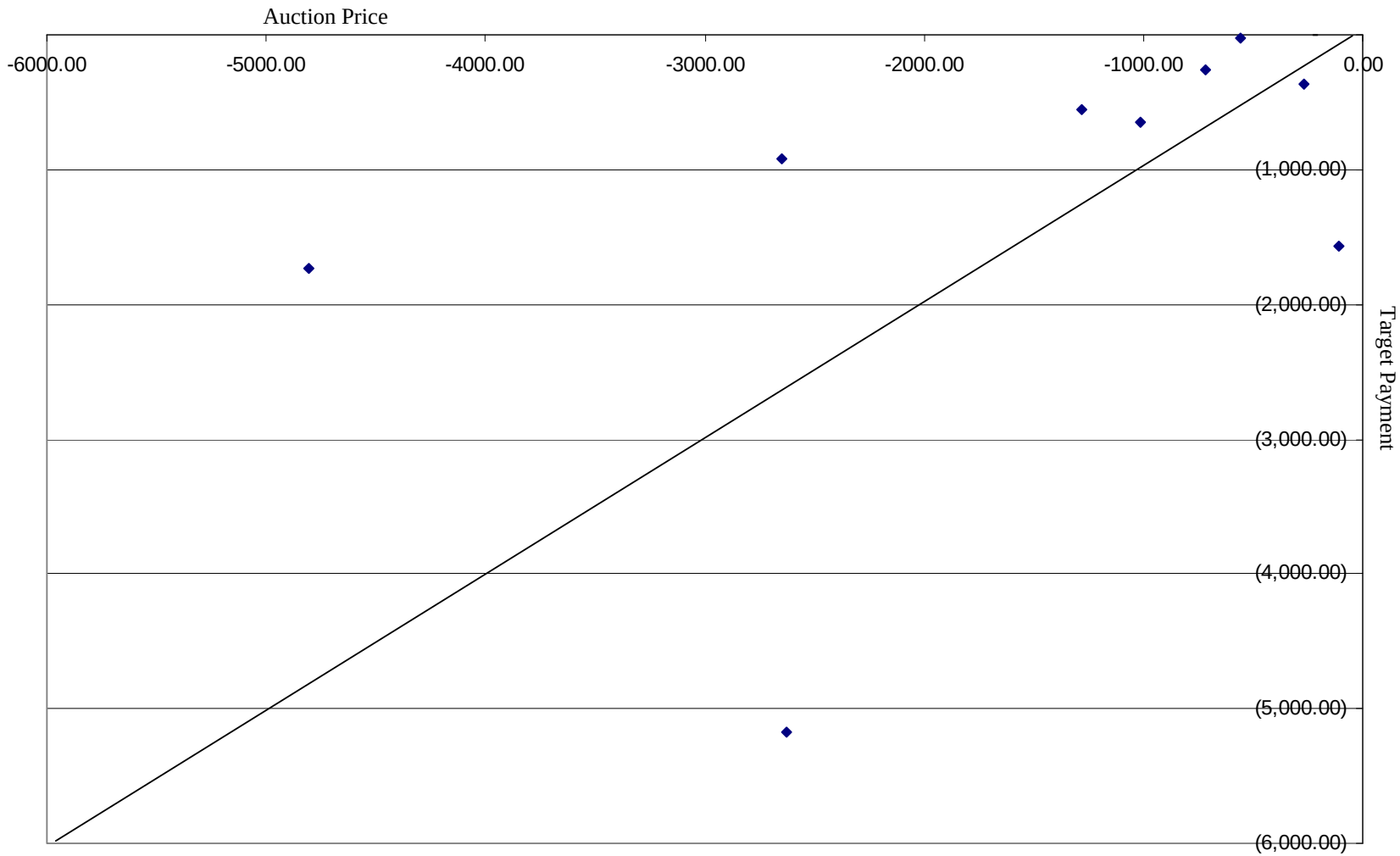
# ASSESSING RISK

It might seem that with 8,760 draws each year from a probability distribution of FTR payments, the payments to annual FTRs on a given path (source sink combination) should converge to the expected value, even if the distribution is not exactly normal. However:

- If shocks (unanticipated events) occur, their effects do not necessarily affect payments over only a single hour; their effects can persist for days, months or years.
- Weather, fuel prices, outages and economic conditions do not vary randomly from hour to hour.
- The hourly returns to annual FTRs are not independently distributed random variables, and their empirical distribution can be more than a little non-normal.

# PECO to Western Hub FTR Auction Prices and Target Payments

January 2000 - January 2008

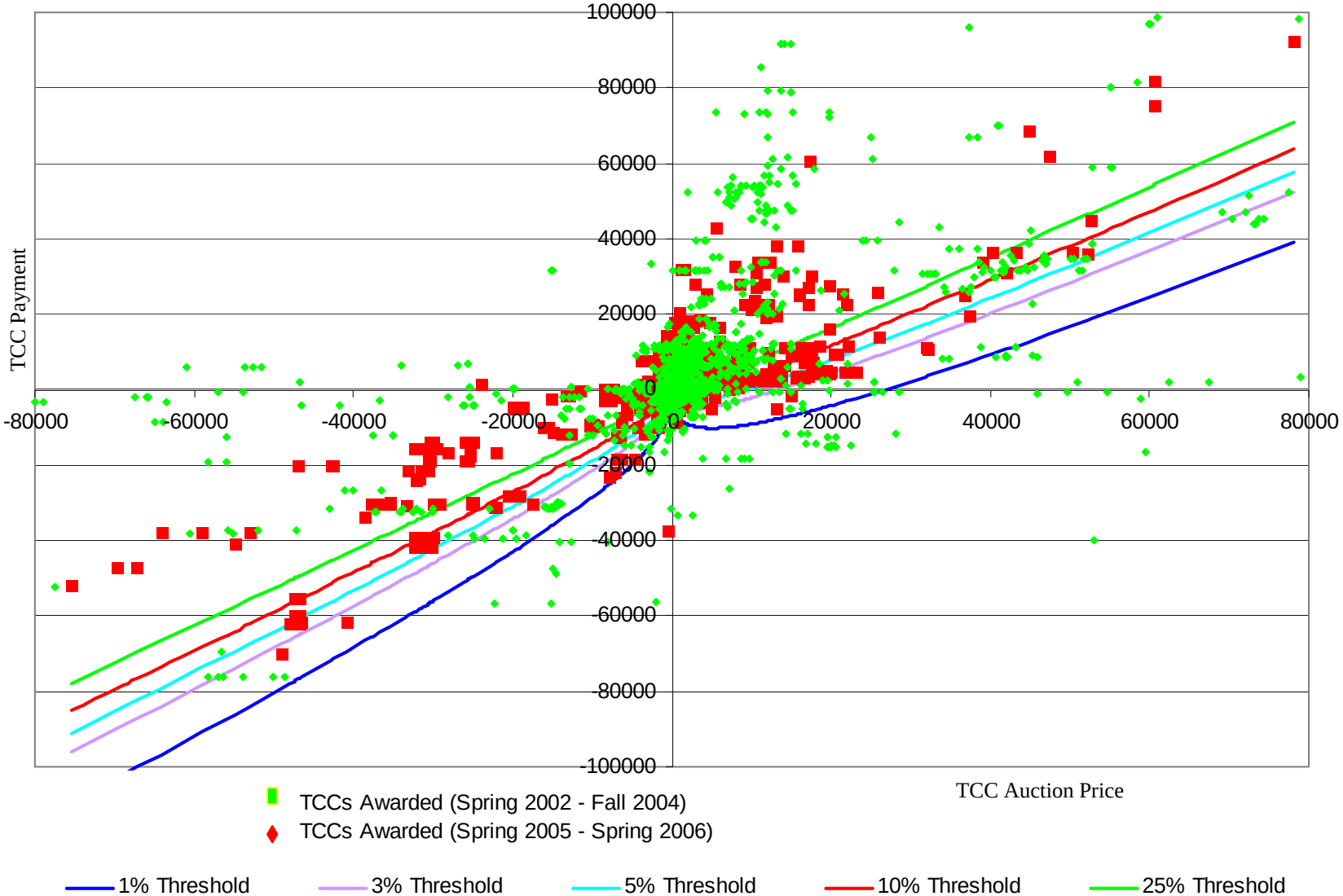


# ASSESSING RISK

Some market participants have suggested that the riskiness of FTR positions be assessed on a path by path basis based on historic payments to FTRs on that specific path. The data available to assess the path specific variability of monthly FTR payments is very limited.

- Later this spring PJM will run its 120$^{th}$ monthly FTR auction.
- The 3% tail of these observations contains only 3 data points.
- Worse, given seasonality, it would be dangerous to assume that the payment distribution is the same over the months of the year, but there would only be ten data points to estimate the distribution for an individual month.
- Estimating the variance of the distribution of payments based on ten data points would be a bad idea even if the distribution were known to be normal. In fact, the distribution is highly non-normal.

# Distribution of Non-Zone J Annual TCC Payments Updated through Spring 2006

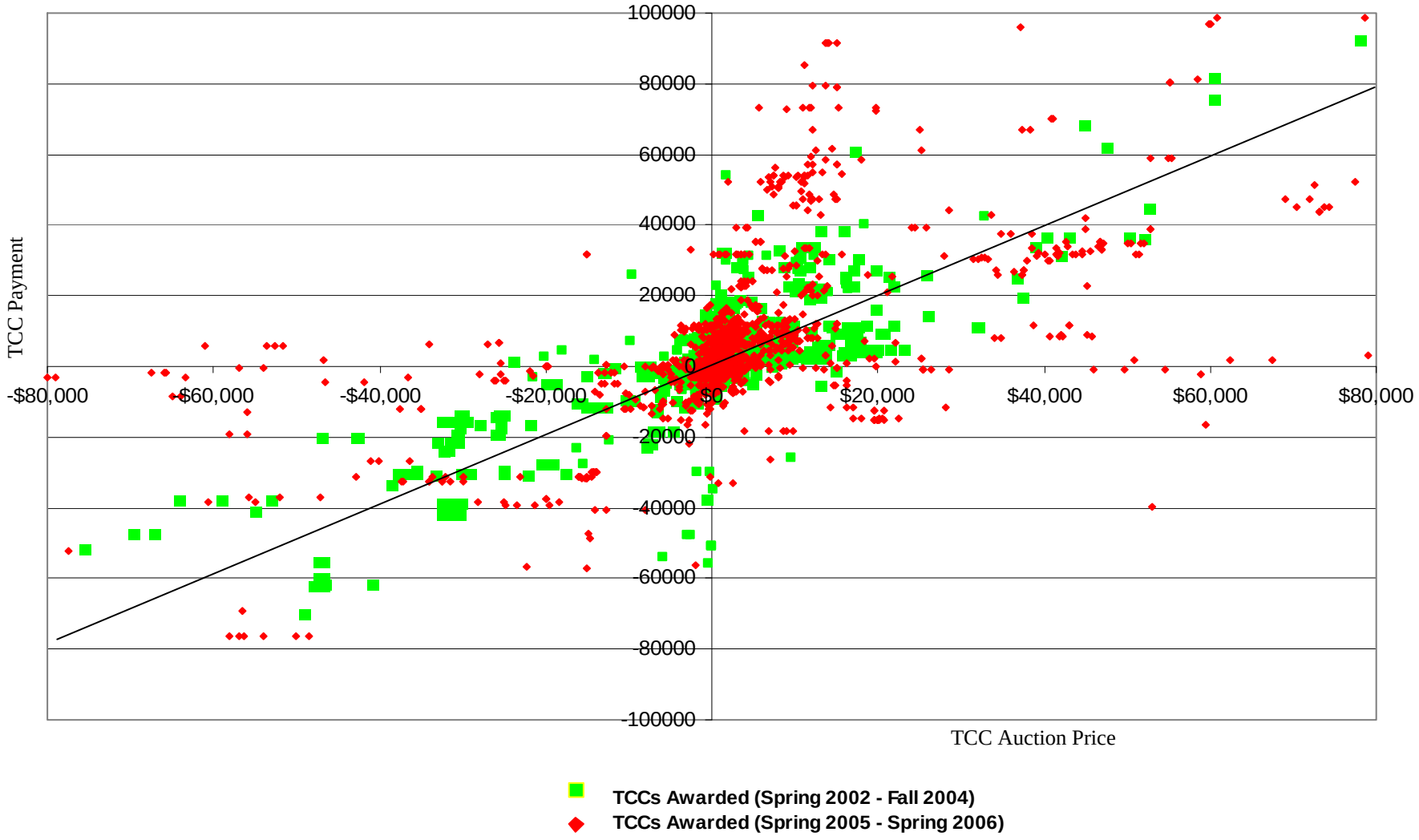


# ASSESSING RISK

If price and payment data are aggregated over paths, there appears to be some stability to distribution of payments relative to auction prices.

- This apparent stability may be an artifact of the kind and degree of historical shocks to congestion patterns.
- Kinds of shocks that have not yet been observed could potentially result in larger changes to the distribution of returns.

# Distribution of Non-Zone J Annual TCC Payments Updated through Spring 2006



# MARK-TO-MARKET VALUATION

Losses incurred on multi-period FTRs, such as six month and annual FTRs are not paid out all at once but over a period of time.

- In principle therefore, initial FTR credit coverage does not need to be large enough to cover the dispersion in total payments due over the term of the FTR.
- It is not sufficient, however, to merely hold credit coverage to cover the dispersion in payments in a single month. Credit coverage must cover the change in value in the FTR, even if the resulting change in payments is spread out over another year.

# MARK-TO-MARKET VALUATION

Although FTRs are valued in periodic auctions, they are not continuously traded.

- Mark-to-market valuation is not possible between auctions as there is no contemporaneous market price to use in valuing the rights.
- PJM's balance-of-period auctions now allow monthly updating of FTR values through the end of term for annual FTRs.
- MISO and NYISO have not yet implemented balance-of-period auctions for annual FTRs and no ISO has implemented balance-of-period auctions for long-term FTRs.

# MARK-TO-MARKET VALUATION

If multi-year FTRs were continuously traded financial instruments like gas futures, one could observe the historic variability of FTR prices and project the credit coverage to protect against a given probability of value changes. However:

- One cannot observe changes in FTR or physical right market values on a regular basis.
- In most regions, there is not much history for projecting variations in FTR prices during the term of the FTR.

# MARK-TO-MARKET VALUATION

As multi-year FTR auctions are held, FTRs sold, and subsequent price changes observed, we will gradually build up information on the variability of FTR values.

- This historical data could be used to improve credit coverage policy for such multi-year FTRs.

# CONCLUDING OBSERVATIONS

The industry is evolving toward having the ability to periodically value all FTRs in multi-duration balance-of-period auctions.

- The industry is also moving toward the availability of multi-year FTRs with more durations potentially requiring valuation.
- Changes in the value of multi-year FTRs will reflect the potential for greater variation in economic conditions, transmission upgrades, and generation entry and retirements over the longer time frame.
- Energy markets may be evolving toward greater volatility of congestion charges, making valuation more difficult.

# SCOTT M. HARVEY (617) 761-0106 sharvey@lecg.com


350 Massachusetts Ave.
Suite 300
Cambridge, MA 02139
(617) 252-9994
(617) 621-8018 – fax

33 West Monroe
Suite 1850
Chicago, IL 60603
(312) 267-8200
(312) 267-8220 – fax

2700 Earl Rudder Freeway
South, Suite 4800
College Station, TX 77845
(979) 649-2421
(979) 649-2442 – fax

600 Anton Blvd.
Suite 1350
Costa Mesa, CA 92626
(714) 662-0800
(714) 662-0801 – fax

1000 Powell St.
Suite 600
Emeryville, CA 94608
(510) 985-6700
(510) 653-9898 – fax

1603 Orrington Ave.
Suite 1500
Evanston, IL 60201
(847) 475-1566
(847) 475-1031 – fax

1 Houston Center
1221 McKinney - Suite 2850
Houston, TX 77010
(713) 401.1030
(713) 401-1031 – fax

5005 SW Meadows Rd.
Suite 300
Lake Oswego, OR 97035
(503) 670-7772
(503) 670-0997 – fax

3049 Century Park East
Suite 2300
Los Angeles, CA 90067
(310) 556-0709
(310) 556-0766 – fax

550 S. Hope St.
Suite 2150
Los Angeles, CA 90071
(213) 243-3700
(213) 243-3710 – fax

675 Third Ave.
26th Floor
New York, NY 10017
(212) 468-7878
(212) 468-7979 – fax

1608 Walnut St.
Suite 1200
Philadelphia, PA 19103
(215) 546-4950
(215) 546-3568 – fax

5130 North Central Ave.
Phoenix, AZ 85012

(602) 241-3300
(602) 241-3303 – fax

201 South Main St.
Suite 450
Salt Lake City, UT 84111
(801) 364-6233
(801) 364-6230 – fax

655 West Broadway
Suite 1300
San Diego, CA 92101
(619) 687-0001
(619) 687-0002 – fax

201 Mission St.
Suite 800
San Francisco, CA 94105
(415) 267-0300
(415) 267-0310 – fax

1725 Eye St., NW
Suite 800
Washington, DC 20006
(202) 466-4422
(202) 466-4487 – fax

1255 Drummers Lane
Suite 320
Wayne, PA 19087
(610) 254-4700
(610) 254-1188 – fax

Level 17, West Plaza Bldg.
3-7 Albert St.
Auckland New Zealand
+65 9 913 6240
+65 9 913 6241

No 5 Jianguomennei Dajie
Beijing, 100732
China
+86 10 6522 5034

Park Atrium 11 Rue des
Colonies/11 Koloniënstraat
Brussels, B-1000 Belgium
32 2 788 12 10
32 2 788 12 11 – fax

Cerrito 866, Piso 4
Buenos Aires, C1010 AAR
Argentina
54 11 4816 1001
54 11 4813 4999 – fax

Level 6, 30 London Circuit
PO Box 266
Canberra City, ACT, 2601
Australia
61 2 6263 5941
61 2 6230 5269 – fax

3505-06 Tower Two
Lippo Centre, 89 Queensway
Admiralty Hong Kong
852 2106 3800
852 2106 3999 – fax

Davidson Bldg 4 Southampton St.
London, WC2E 7HA
England
44 020 7632 5000
44 020 7632 5050 – fax

Paseo de Recoletos 7-9
Madrid, 28004
Spain
34 91 594 79 80
34 91 594 79 77 – fax

Level 2, Southbank Blvd,
Southbank
GPO Box 3179
Melbourne, VIC 3001
Australia
+61 3 9626 4333
+61 3 9626 4321 – fax

Magalena 37, #101
Mexico City, DF 03100
Mexico
52 55 1107 7725

Avenida Santa Fe 495, 4th floor
Colonia Cruz Manca
Mexico City 05349
Mexico
52 55 3300 5500

Via Pontaccio, 10
Milan 20121
Italy
39 02 88892 1
39 02 88892 200 – fax

68 rue du Faubourg Saint-Honoré
Paris 75008
France
33 1 53 43 27 30
33 1 53 43 63 31 – fax

Alcantara 200 Piso 6 Las Condes
Santiago Chile
56 2 370 2990
56 2 369 5657 – fax

Level 14, 68 Pitt Street
GPO Box 220
Sydney, NSW, 2001
Australia
61 2 9234 0200
61 2 9234 0201 – fax

55 University Avenue, Suite 1000
Toronto, M5J 2H7
Canada
(416) 364-6400
(416) 364-6900 – fax

8 esplanade Compans Caffarelli
Toulouse, 31000
France
33 0 5 62 30 51 07
33 0 5 62 30 50 00 – fax

Level 9 1 Willeston St., Box 587
Wellington 6140
New Zealand
64 4 472 0590
64 4 472 0596 – fax


LECG Energy Website: *www.lecg.com/Practice Areas/Energy/Research Papers & Testimony*