dcenergy

CRR Future Credit Exposure Improvements

February 2019

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Agenda

- **Treatment of CRR Options in the Future Credit Exposure calculation**
- **Including the impact of time diversification in the Future Credit Exposure calculation**

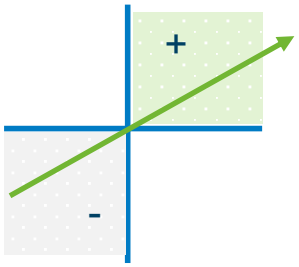
The treatment of CRR Options and CRR Obligations within forward exposure calculation are not equitable

Forward Exposure Example

-Illustrative example of risk exposure for opposite path positions-

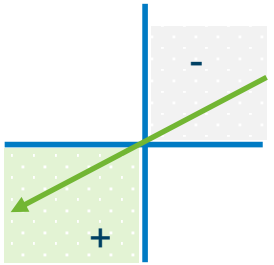
Portfolio XY

Obligation A-B



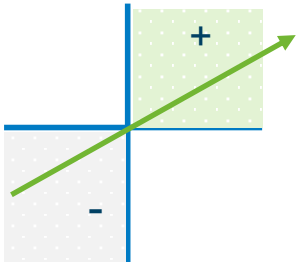
Positions cancel out both the downside and upside exposure

Obligation B-A



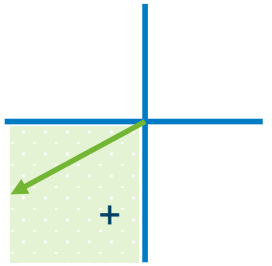
Portfolio ZY

Obligation A-B



Downside risk is eliminated and upside remains, but yet calculated exposure is negative (liability)

Option B-A



Both portfolios have no downside risk, however Portfolio ZY is treated as a liability despite being exposed to positive settlement only. This inequality is due to option and obligation exposures being aggregated together after the worst case is determined (i.e. each have a separate Portfolio Weighted Adder)

 |

CRR options and obligation positions on opposite paths perfectly offset, which reflects actual risk

Offsetting Obligation Example

- Risk exposure for opposite path positions with equal volume-

	5x16 SETTLED DAM PRICES	
	OBL Path 1	OBL Path 2
Day 1	$ 0.19	$ (0.19)
Day 2	$ 0.09	$ (0.09)
Day 3	$ (0.51)	$ 0.51
Day 4	$ (0.02)	$ 0.02
Day 5	$ 0.01	$ (0.01)
Day 6	$ (0.05)	$ 0.05
Day 7	$ (0.07)	$ 0.07
Day 8	$ (0.07)	$ 0.07
Day 9	$ (0.39)	$ 0.39
Day 10	$ (0.29)	$ 0.29
Day 11	$ (0.01)	$ 0.01
Day 12	$ (0.17)	$ 0.17
Day 13	$ 0.02	$ (0.02)
Day 14	$ (0.02)	$ 0.02
Day 15	$ (0.04)	$ 0.04
Day 16	$ 0.03	$ (0.03)
Day 17	$ 0.00	$ (0.00)
Day 18	$ 0.05	$ (0.05)
Day 19	$ 0.21	$ (0.21)
Day 20	$ (0.00)	$ 0.00
Day 21	$ (0.04)	$ 0.04
Day 22	$ (0.03)	$ 0.03
Day 23	$ 0.06	$ (0.06)
Day 24	$ (0.01)	$ 0.01
Day 25	$ 0.00	$ 0.00
Day 26	$ (0.03)	$ 0.03
Day 27	$ (0.03)	$ 0.03
Day 28	$ (0.02)	$ 0.02
Day 29	$ 0.15	$ (0.15)
Day 30	$ 0.22	$ (0.22)

1

DAM Prices used to calculate a rolling average price data series

	5x16 ROLLING AVERAGE (18 Days)	
	Path 1	Path 2
Rolling Avg. 1	$ (0.07)	$ 0.07
Rolling Avg. 2	$ (0.07)	$ 0.07
Rolling Avg. 3	$ (0.07)	$ 0.07
Rolling Avg. 4	$ (0.05)	$ 0.05
Rolling Avg. 5	$ (0.05)	$ 0.05
Rolling Avg. 6	$ (0.05)	$ 0.05
Rolling Avg. 7	$ (0.04)	$ 0.04
Rolling Avg. 8 *	$ (0.04)	$ 0.04

2

Calculate the volume weighted rolling average price for total portfolio by month and TOU

	Month 1
Rolling Avg. 1	$ 0
Rolling Avg. 2	$ 0
Rolling Avg. 3	$ 0
Rolling Avg. 4	$ 0
Rolling Avg. 5	$ 0
Rolling Avg. 6	$ 0
Rolling Avg. 7	$ 0
Rolling Avg. 8*	$ 0

* Stopped rolling avg. period at 8 to conserve space

One-to-one offset reflects actual exposure

3

Obl Portfolio Adder = $0

OBL portfolio adder is the 100th percentile of the volume weighted rolling average portfolio price series over a month for each TOU

CRR obligation and option positions on opposite paths can lead to a credit liability, however the settlement exposure only has upside

Obligation with Offsetting Option Example

- Risk exposure for opposite path positions with equal volume-

	5x16 SETTLED DAM PRICES	
	Obl Path 1	Opt Path 2
Day 1	$ 0.19	$ (0.19)
Day 2	$ 0.09	$ (0.09)
Day 3	$ (0.51)	$ 0.51
Day 4	$ (0.02)	$ 0.02
Day 5	$ 0.01	$ (0.01)
Day 6	$ (0.05)	$ 0.05
Day 7	$ (0.07)	$ 0.07
Day 8	$ (0.07)	$ 0.07
Day 9	$ (0.39)	$ 0.39
Day 10	$ (0.29)	$ 0.29
Day 11	$ (0.01)	$ 0.01
Day 12	$ (0.17)	$ 0.17
Day 13	$ 0.02	$ (0.02)
Day 14	$ (0.02)	$ 0.02
Day 15	$ (0.04)	$ 0.04
Day 16	$ 0.03	$ (0.03)
Day 17	$ 0.00	$ (0.00)
Day 18	$ 0.05	$ (0.05)
Day 19	$ 0.21	$ (0.21)
Day 20	$ (0.00)	$ 0.00
Day 21	$ (0.04)	$ 0.04
Day 22	$ (0.03)	$ 0.03
Day 23	$ 0.06	$ (0.06)
Day 24	$ (0.01)	$ 0.01
Day 25	$ 0.00	$ 0.00
Day 26	$ (0.03)	$ 0.03
Day 27	$ (0.03)	$ 0.03
Day 28	$ (0.02)	$ 0.02
Day 29	$ 0.15	$ (0.15)
Day 30	$ 0.22	$ (0.22)

1

DAM Prices used to calculate a rolling average price data series

	5x16 ROLLING AVERAGE (18 Days)	
	Obl Path 1	Opt Path 2
Rolling Avg. 1	$ (0.07)	$ 0.07
Rolling Avg. 2	$ (0.07)	$ 0.07
Rolling Avg. 3	$ (0.07)	$ 0.07
Rolling Avg. 4	$ (0.05)	$ 0.05
Rolling Avg. 5	$ (0.05)	$ 0.05
Rolling Avg. 6	$ (0.05)	$ 0.05
Rolling Avg. 7	$ (0.04)	$ 0.04
Rolling Avg. 8	$ (0.04)	$ 0.04

2

Rolling average price for the volume weighted OBL portfolio is <u>separate</u> from the option position

	5x16 ROLLING AVERAGE (18 Days)	
	Obl Month 1	Opt Month 1
Rolling Avg. 1	$ (0.07)	$ 0.07
Rolling Avg. 2	$ (0.07)	$ 0.07
Rolling Avg. 3	$ (0.07)	$ 0.07
Rolling Avg. 4	$ (0.05)	$ 0.05
Rolling Avg. 5	$ (0.05)	$ 0.05
Rolling Avg. 6	$ (0.05)	$ 0.05
Rolling Avg. 7	$ (0.04)	$ 0.04
Rolling Avg. 8	$ (0.04)	$ 0.04

3

Obl Portfolio Adder = $(.07)

Opt Portfolio Adder = $0.04

OPT adder is the 99th percentile of the rolling average portfolio price series over a month for each TOU

Option provides partial offset, but yet the settlement only has upside

DC energy's recommendation combines the portfolio adders into one, which reflects the offsetting value of the option while keeping the credit requirements in a conservative state

Obligation with Offsetting Option Example

- Risk exposure for opposite path positions with equal volume-

	5x16 SETTLED DAM PRICES	
	Obl Path 1	Opt Path 2
Day 1	$ 0.19	$ (0.19)
Day 2	$ 0.09	$ (0.09)
Day 3	$ (0.51)	$ 0.51
Day 4	$ (0.02)	$ 0.02
Day 5	$ 0.01	$ (0.01)
Day 6	$ (0.05)	$ 0.05
Day 7	$ (0.07)	$ 0.07
Day 8	$ (0.07)	$ 0.07
Day 9	$ (0.39)	$ 0.39
Day 10	$ (0.29)	$ 0.29
Day 11	$ (0.01)	$ 0.01
Day 12	$ (0.17)	$ 0.17
Day 13	$ 0.02	$ (0.02)
Day 14	$ (0.02)	$ 0.02
Day 15	$ (0.04)	$ 0.04
Day 16	$ 0.03	$ (0.03)
Day 17	$ 0.00	$ (0.00)
Day 18	$ 0.05	$ (0.05)
Day 19	$ 0.21	$ (0.21)
Day 20	$ (0.00)	$ 0.00
Day 21	$ (0.04)	$ 0.04
Day 22	$ (0.03)	$ 0.03
Day 23	$ 0.06	$ (0.06)
Day 24	$ (0.01)	$ 0.01
Day 25	$ 0.80	$ (0.80)
Day 26	$ (0.03)	$ 0.03
Day 27	$ (0.03)	$ 0.03
Day 28	$ (0.02)	$ 0.02
Day 29	$ 0.15	$ (0.15)
Day 30	$ 0.22	$ (0.22)

1

DAM prices used to calculate a rolling average price data series

	5x16 ROLLING AVERAGE (18 Days)	
	Obl Path 1	Opt Path 2
Rolling Avg. 1	$ (0.07)	$ 0.07
Rolling Avg. 2	$ (0.07)	$ 0.07
Rolling Avg. 3	$ (0.07)	$ 0.07
Rolling Avg. 4	$ (0.05)	$ 0.05
Rolling Avg. 5	$ (0.05)	$ 0.05
Rolling Avg. 6	$ (0.05)	$ 0.05
Rolling Avg. 7	$ (0.04)	$ 0.04
Rolling Avg. 8	$ (0.04)	$ 0.04

2

Volume weighted rolling average price for portfolio by month and TOU is **combined** ***for options and obligations***

	Month 1
Rolling Avg. 1	$ 0
Rolling Avg. 2	$ 0
Rolling Avg. 3	$ 0
Rolling Avg. 4	$ 0
Rolling Avg. 5	$ 0
Rolling Avg. 6	$ 0
Rolling Avg. 7	$ 0
Rolling Avg. 8	$ 0

Option provides one-to-one offset. Note, again settlement exposure only has upside

3

Combined Portfolio Adder = $0

Combined portfolio adders calculated at the nth percentile

DC Energy's recommendation would bring symmetry to the credit rules and better reflect actual risk

DC Energy's Recommendation

- **Our recommendation is to calculate one portfolio adder that includes options and obligations together**
- **This modification brings symmetry to the portfolio adder by appropriately accounting for the impact of options and obligations in portfolio before determining its worst case**
- **The change would reflect the risk reducing value of the option product and the actual risk of a portfolio**

Agenda

- Treatment of CRR Options in the Future Credit Exposure calculation
- Including the impact of time diversification in the Future Credit Exposure calculation

Considering Risk Over Time

- **Today the historical worst case month is determined at the portfolio level and is aggregated linearly across months**
  - This assumes the probability of the worst case occurring for a single month is the same as it is for all months
- **Portfolios spanning different durations do not exhibit the same risk profile**
  - The risk of worst case congestion occurring each month for up to 36 months is lower than it is for any given month
  - Drivers of congestion are generally uncorrelated between seasons
    - Outage driven congestion is concentrated in the shoulder seasons
    - Load driven congestion is concentrated in the peak season (e.g. winter LRGV congestion)

DC Energy's Reccommendation

- **Include the value of time diversification in the Future Credit Exposure by aggregating exposure for each season in quadrature (i.e. square root of sum of squares)* instead of aggregating linearly across months**
  - This method accounts for the reduced probability of the worst case occurring for every month in a portfolio

Month	~Net Awarded PTPs*(-Min(0, PWA, PWACP)
Mth 1	$60,000
Mth 2	$150,000
Mth 3	$60,000
Mth 4	$150,000
Mth 5	$55,000
Mth 6	$150,000
Mth 7	$60,000
Mth 8	$45,00
Mth 9	$30,000
Mth 10	$60,000
Mth 11	$150,000
Mth 12	$30,000
	Status quo = 1M$ DC Energy proposal =.524M$

* $\delta Q = \sqrt{(\delta a)^2 + (\delta b)^2 + \cdots + (\delta c)^2 + (\delta x)^2 + (\delta y)^2 + \cdots + (\delta z)^2}.$

