Northern California Power Agency

August 2017

Finance Committee Materials

PFM Financial Advisors LLC

601 S. Figueroa Street
Suite 4500
Los Angeles, CA 90017

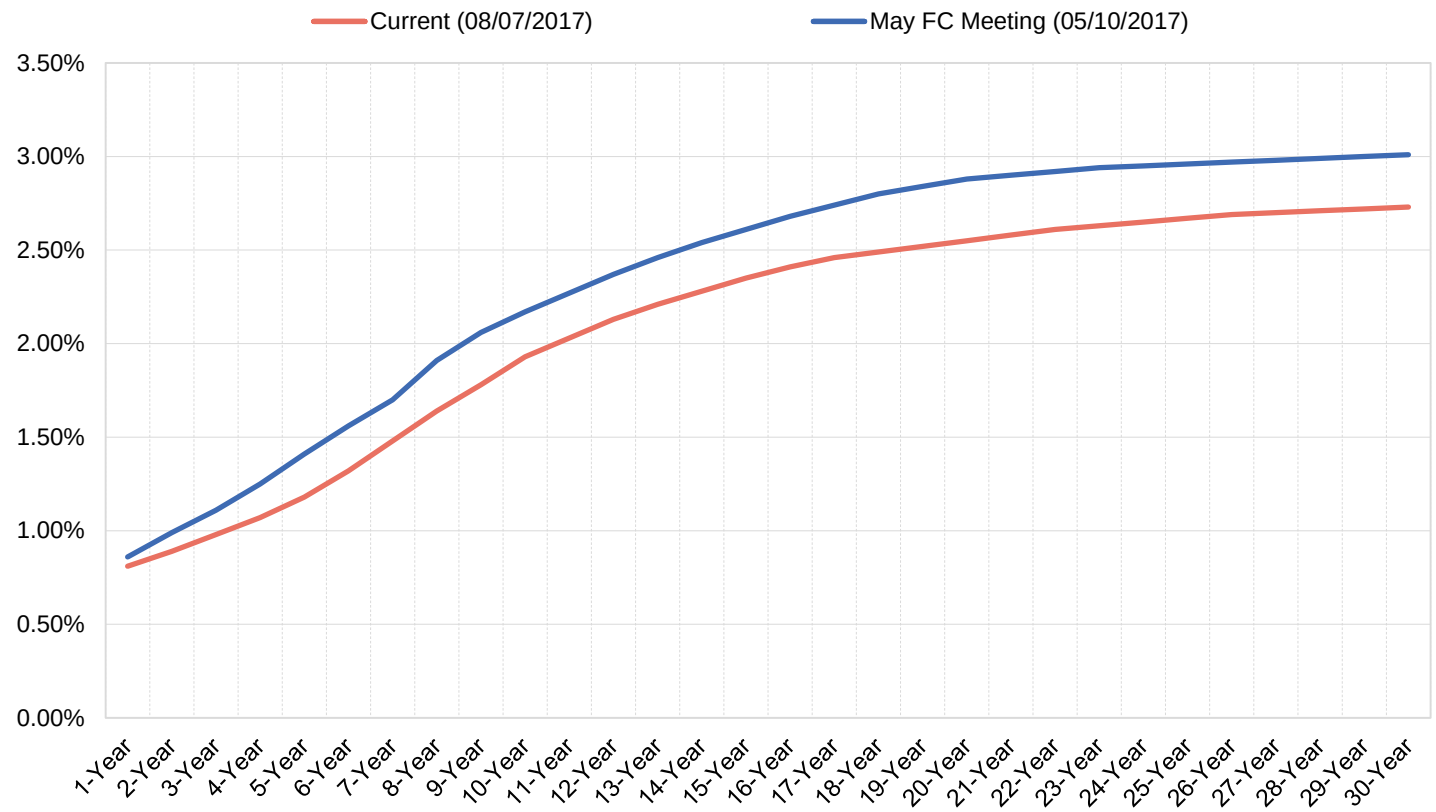
213.489.4075

Report on Current Financial Market Conditions or Issues

Data, rates, and related statistics and charts are as of August 7, 2017, unless otherwise indicated

Recent Tax-Exempt Benchmark Yield Curve Movement

AAA MMD Yield Curve Movement



Maturity	Δ Since 05/10/17
1-Year	-0.05%
2-Year	-0.10%
3-Year	-0.13%
4-Year	-0.18%
5-Year	-0.23%
6-Year	-0.24%
7-Year	-0.22%
8-Year	-0.27%
9-Year	-0.28%
10-Year	-0.24%
11-Year	-0.24%
12-Year	-0.24%
13-Year	-0.25%
14-Year	-0.26%
15-Year	-0.26%
16-Year	-0.27%
17-Year	-0.28%
18-Year	-0.31%
19-Year	-0.32%
20-Year	-0.33%
21-Year	-0.32%
22-Year	-0.31%
23-Year	-0.31%
24-Year	-0.30%
25-Year	-0.29%
26-Year	-0.28%
27-Year	-0.28%
28-Year	-0.28%
29-Year	-0.28%
30-Year	-0.28%

Key Takeaway: ***Interest rates are lower than a few months ago***

Source: Thomson Reuters

Current Interest Rate Snapshot

August 7, 2017															
Year	Maturity	UST	AAA MMD	AA MMD	AA Spread	A MMD	A Spread	Year	Maturity	UST	AAA MMD	AA MMD	AA Spread	A MMD	A Spread
1-Year	2018	0.76%	0.81%	0.83%	0.02%	1.01%	0.20%	16-Year	2033	-	2.41%	2.63%	0.22%	2.95%	0.54%
2-Year	2019	1.20%	0.89%	0.92%	0.03%	1.14%	0.25%	17-Year	2034	-	2.46%	2.68%	0.22%	3.00%	0.54%
3-Year	2020	1.46%	0.98%	1.03%	0.05%	1.28%	0.30%	18-Year	2035	-	2.49%	2.71%	0.22%	3.02%	0.53%
4-Year	2021	-	1.07%	1.14%	0.07%	1.42%	0.35%	19-Year	2036	-	2.52%	2.74%	0.22%	3.05%	0.53%
5-Year	2022	1.91%	1.18%	1.26%	0.08%	1.56%	0.38%	20-Year	2037	2.90%	2.55%	2.77%	0.22%	3.08%	0.53%
6-Year	2023	-	1.32%	1.43%	0.11%	1.74%	0.42%	21-Year	2038	-	2.58%	2.80%	0.22%	3.11%	0.53%
7-Year	2024	-	1.48%	1.61%	0.13%	1.93%	0.45%	22-Year	2039	-	2.61%	2.83%	0.22%	3.14%	0.53%
8-Year	2025	-	1.64%	1.80%	0.16%	2.12%	0.48%	23-Year	2040	-	2.63%	2.85%	0.22%	3.16%	0.53%
9-Year	2026	-	1.78%	1.96%	0.18%	2.28%	0.50%	24-Year	2041	-	2.65%	2.87%	0.22%	3.18%	0.53%
10-Year	2027	2.45%	1.93%	2.12%	0.19%	2.45%	0.52%	25-Year	2042	-	2.67%	2.89%	0.22%	3.20%	0.53%
11-Year	2028	-	2.03%	2.24%	0.21%	2.57%	0.54%	26-Year	2043	-	2.69%	2.91%	0.22%	3.22%	0.53%
12-Year	2029	-	2.13%	2.35%	0.22%	2.67%	0.54%	27-Year	2044	-	2.70%	2.92%	0.22%	3.23%	0.53%
13-Year	2030	-	2.21%	2.43%	0.22%	2.75%	0.54%	28-Year	2045	-	2.71%	2.93%	0.22%	3.24%	0.53%
14-Year	2031	-	2.28%	2.50%	0.22%	2.82%	0.54%	29-Year	2046	-	2.72%	2.94%	0.22%	3.25%	0.53%
15-Year	2032	2.75%	2.35%	2.57%	0.22%	2.89%	0.54%	30-Year	2047	3.05%	2.73%	2.95%	0.22%	3.26%	0.53%

Key Takeaway: ***Interest rates and spreads remain attractive***

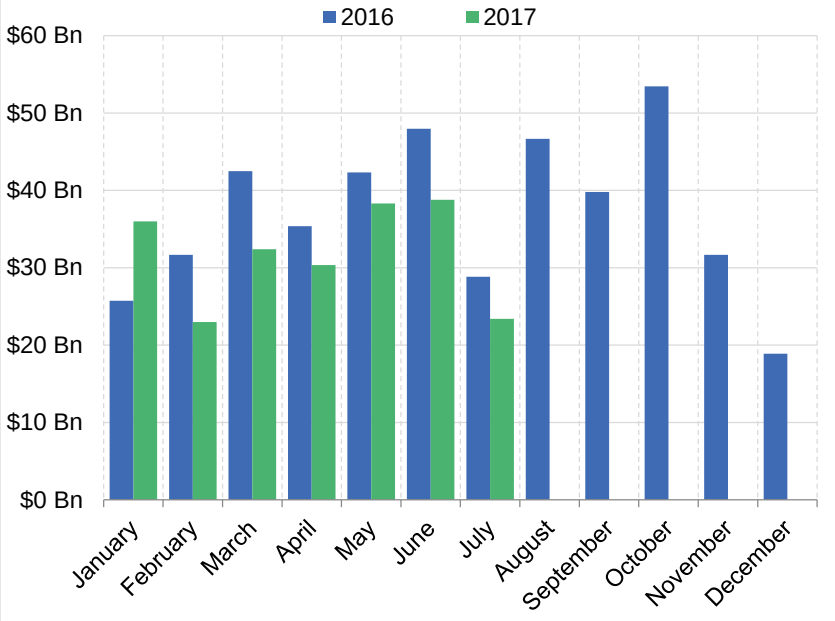
Source: Thomson Reuters

Municipal Market Supply and Demand

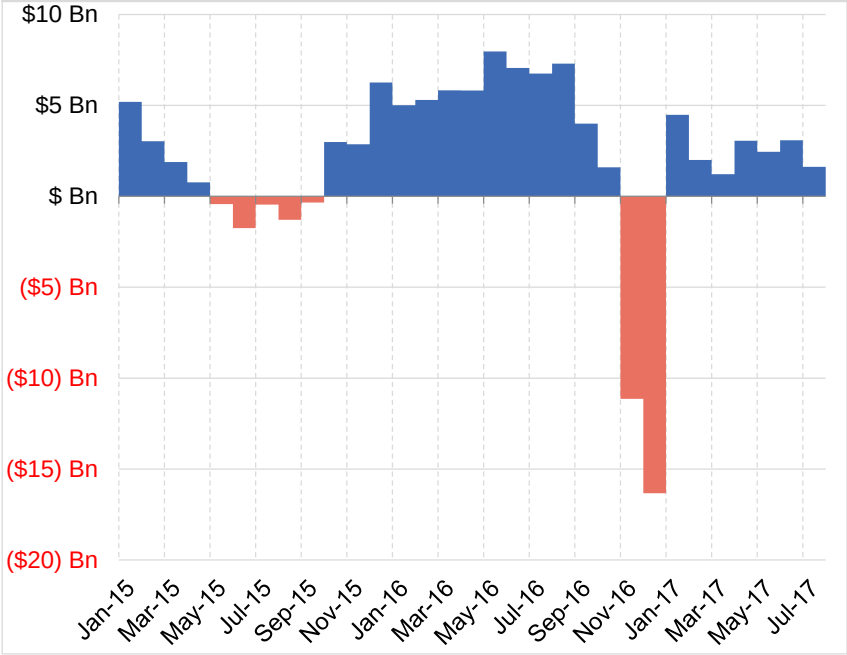
- After record issuance in 2016, YTD issuance has fallen ~13% with supply in July ~19% lower. Municipal bond funds have continued to report net cash inflows

Recent Issuance Volume and Municipal Fund Flows

Overall Municipal Market Volume



Municipal Fund Flows

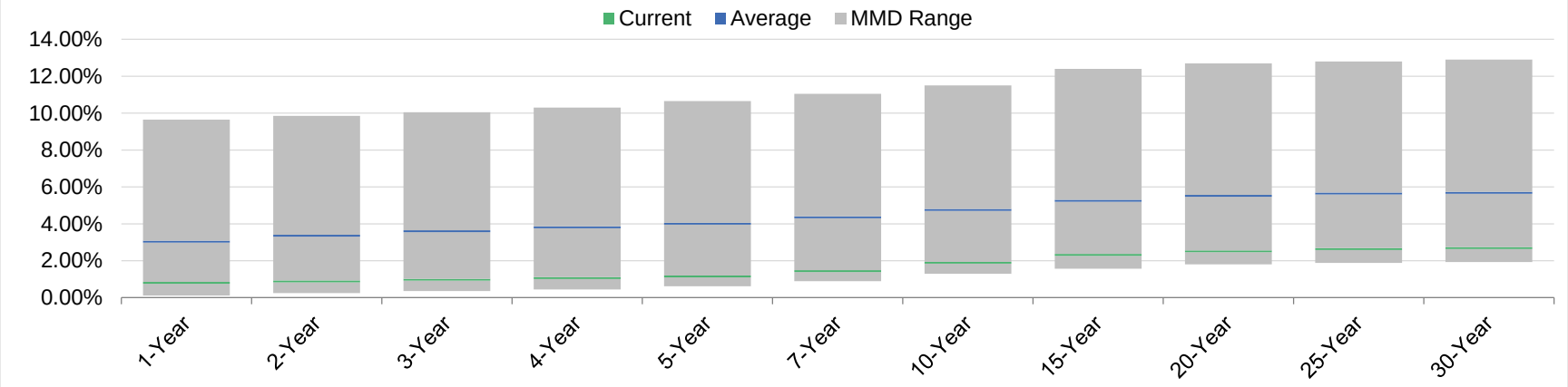


Key Takeaway: ***Lack of supply is keeping rates low***

Source: Bond Buyer; Investment Company Institute

AAA MMD Position (Since Inception)

AAA MMD Rate Position
(June 1, 1981, Inception to August 7, 2017)



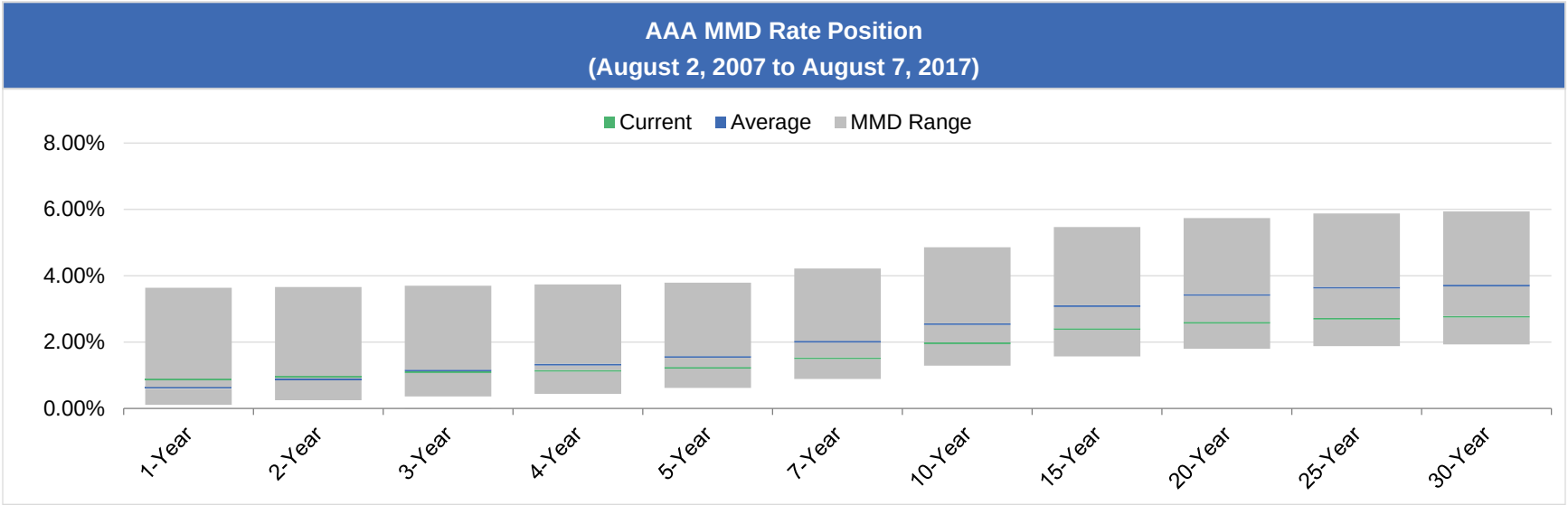
Summary of August 7, 2017 vs. Historical (since Inception) AAA MMD Rates

Statistic	1-Year	2-Year	3-Year	4-Year	5-Year	7-Year	10-Year	15-Year	20-Year	25-Year	30-Year
August 7, 2017	0.85%	0.93%	1.02%	1.11%	1.20%	1.49%	1.94%	2.37%	2.56%	2.68%	2.74%
Historical Average	3.08%	3.41%	3.65%	3.86%	4.05%	4.40%	4.81%	5.30%	5.57%	5.69%	5.73%
Minimum	0.11%	0.25%	0.36%	0.44%	0.62%	0.89%	1.29%	1.57%	1.80%	1.88%	1.93%
Maximum	9.65%	9.85%	10.05%	10.30%	10.65%	11.05%	11.50%	12.40%	12.70%	12.80%	12.90%
% of Time Lower	22.28%	20.65%	18.69%	15.37%	10.61%	7.01%	6.56%	5.74%	4.30%	2.80%	2.79%

Key Takeaway: ***Rates continue to be in a good position for NCPA's borrowing needs and refinancing opportunities***

Source: Thomson Reuters

AAA MMD Position (Past Ten Years)



Summary of August 7, 2017 vs. Rates since August 2, 2007 AAA MMD Rates

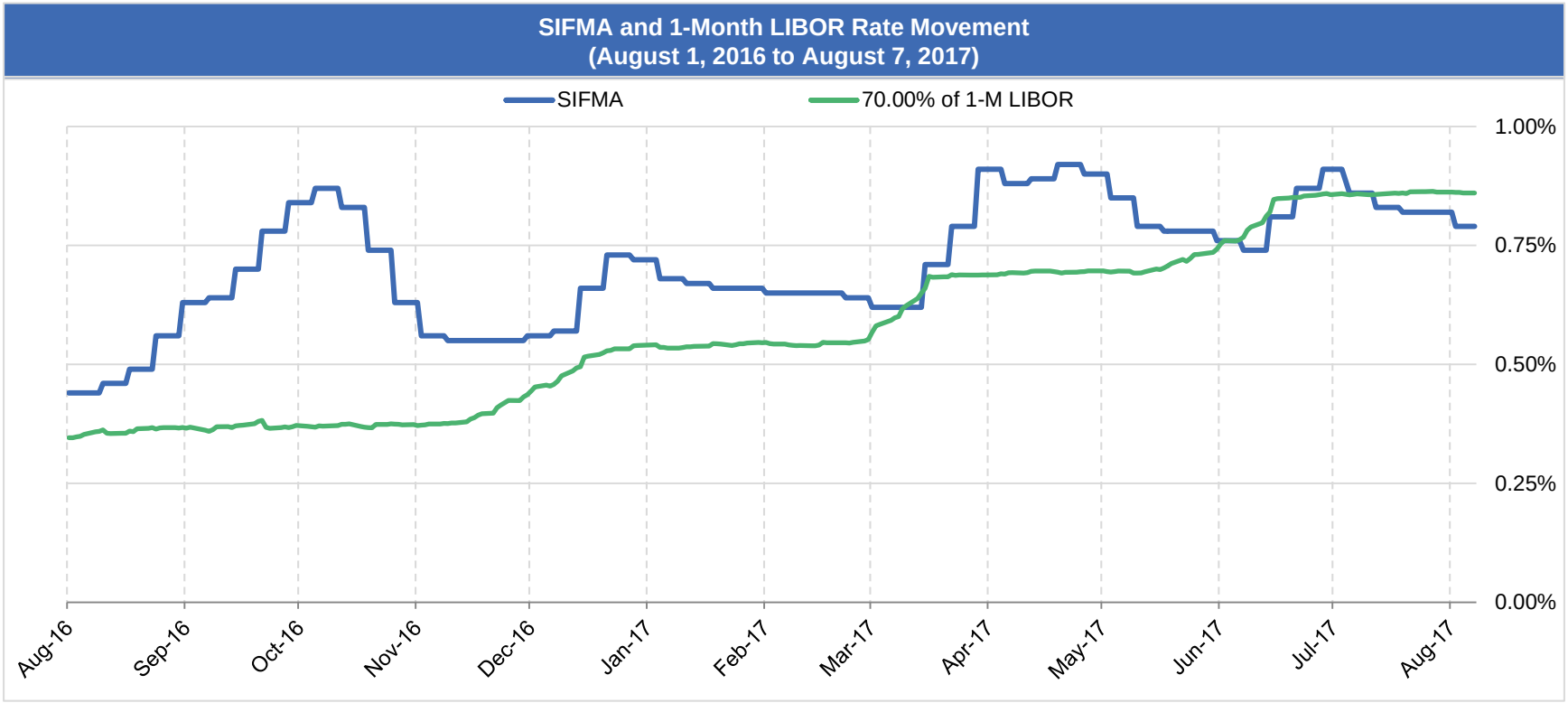
Statistic	1-Year	2-Year	3-Year	4-Year	5-Year	7-Year	10-Year	15-Year	20-Year	25-Year	30-Year
August 7, 2017	0.85%	0.93%	1.02%	1.11%	1.20%	1.49%	1.94%	2.37%	2.56%	2.68%	2.74%
Historical Average	0.59%	0.85%	1.07%	1.30%	1.53%	1.99%	2.52%	3.06%	3.40%	3.62%	3.68%
Minimum	0.11%	0.25%	0.36%	0.44%	0.62%	0.89%	1.29%	1.57%	1.80%	1.88%	1.93%
Maximum	3.64%	3.66%	3.70%	3.74%	3.79%	4.22%	4.86%	5.47%	5.74%	5.88%	5.94%
% of Time Lower	80.77%	75.16%	68.03%	55.93%	38.62%	25.52%	23.88%	20.87%	15.67%	10.18%	10.14%

***Key Takeaway:* Rates continue to be in a good position for NCPA's borrowing needs and refinancing opportunities**

Source: Thomson Reuters

SIFMA and 1-Month LIBOR Rate Movement

- SIFMA and LIBOR remained relatively flat throughout July



***Key Takeaway:* NCPA's variable rate portfolio continues to benefit from these low rates**

Source: Bloomberg

Interest Rate Forecasts

- Market participants continue to call for an increase in interest rates as shown in the data compiled by Bloomberg below

The Street's Interest Rate Forecast (As of August 7, 2017)							
Average Forecasts	**Current**	**Q3 17**	**Q4 17**	**Q1 18**	**Q2 18**	**Q3 18**	**Q4 18**
30-Year UST	2.83%	3.00%	3.17%	3.30%	3.41%	3.51%	3.61%
10-Year UST	2.26%	2.42%	2.58%	2.71%	2.82%	2.93%	3.09%
2-Year UST	1.35%	1.52%	1.70%	1.84%	2.02%	2.16%	2.33%
3M LIBOR	1.31%	1.40%	1.58%	1.76%	1.96%	2.12%	2.29%
Fed Funds Target Rate (Upper)	1.25%	1.25%	1.50%	1.65%	1.85%	2.00%	2.15%
Fed Funds Target Rate (Lower)	1.00%	1.01%	1.24%	1.38%	1.61%	1.74%	1.90%

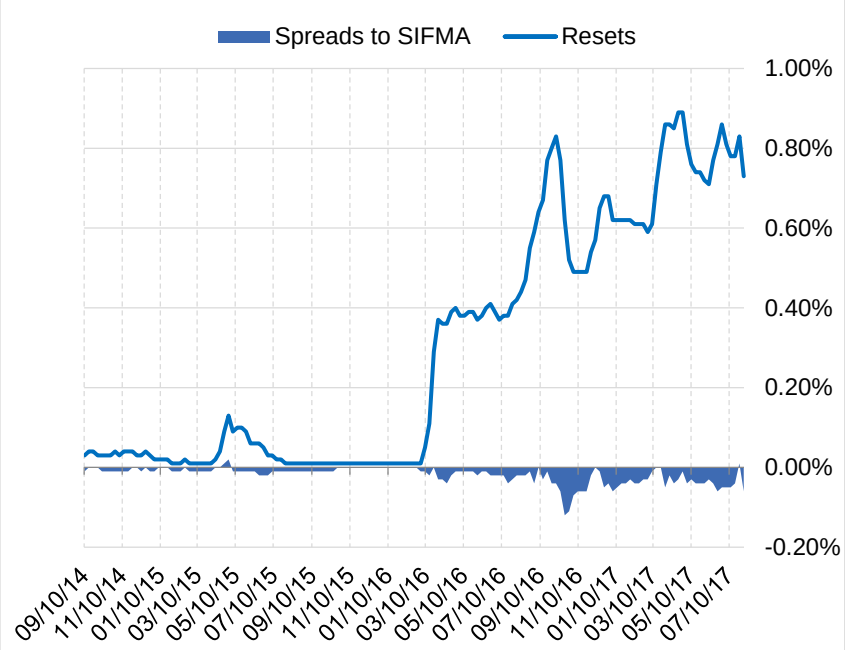
Key Takeaway: ***Wall Street expects one more rate hike this year***

Source: Bloomberg

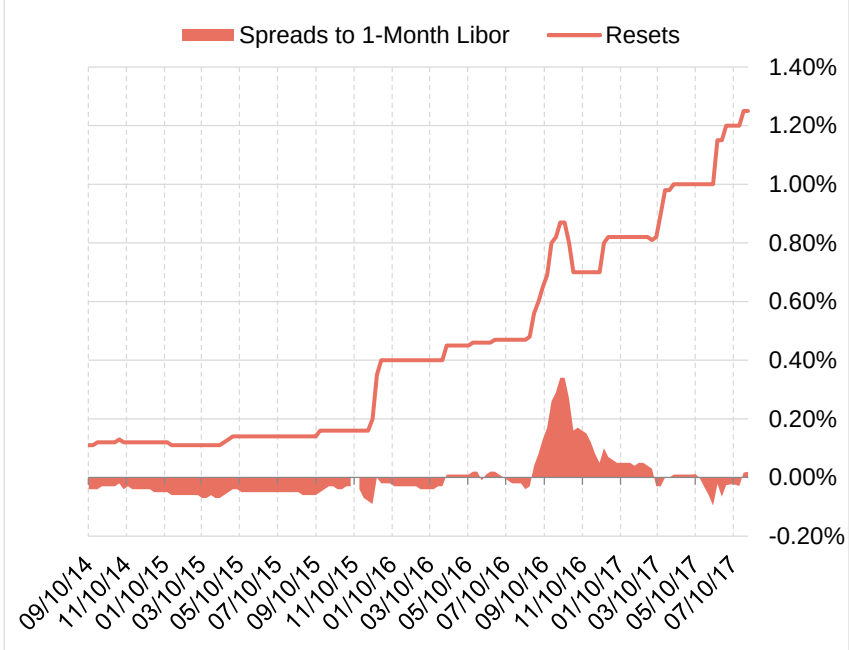
Resets on NCPA's Hydroelectric Project 2008 Series A & B Bonds

- As a result of the increase in short-term rates, NCPA's Hydroelectric 2008 Series A and B Bonds have also been resetting higher; however, they continue to trade well versus benchmarks and have been hedged with interest rate swaps

NCPA Hydro 2008 Series A (Tax-Exempt)
(09/10/2014 to 08/02/2017)



NCPA Hydro 2008 Series B (Taxable)
(09/10/2014 to 08/02/2017)



Key Takeaway: ***NCPA variable rate bonds have been resetting at or better than benchmark rates***

Source: Thomson Reuters, EMMA

LIBOR Phase-Out

- The U.K. Financial Conduct Authority (FCA) recently announced its intention to phase-out LIBOR by the end of 2021
  - There will be ongoing support for LIBOR through this deadline to allow for an orderly transition to alternative reference rates
- The International Swaps and Derivatives Association (ISDA) has yet to make a formal announcement regarding any alternative reference rates
  - There is some speculation an alternative rate to LIBOR could be based on the U.S. Treasury repurchase ("repo") market, called the "Broad Treasuries Repo Financing Rate"
  - This rate would be based on the borrowing of short-term cash (overnight) with U.S. Treasury bonds serving as collateral, and would be published by the U.S. Federal Reserve
  - Any speculation regarding alternative reference rates are merely preliminary
- It remains unclear whether current swap and loan contracts that utilize LIBOR as the reference rate will be amended or allowed to mature
- Some market analysts anticipate that LIBOR will continue to be used alongside the new benchmark, even after the supposed 2021 phase-out
- At the moment, the only known fact is that nothing is definitive

Key Takeaway: ***LIBOR to be phased out by 2021. No action required currently.***

Plan for LIBOR Phase Out Announced by U.K.'s Top Financial Regulator

Market, Regulators Seek Transaction-based Alternatives

Issuer Insight August 2017

Drama-Rich, Data-Poor LIBOR Benchmark Planned to Expire in 2021

In a speech at Bloomberg's London office, Andrew Bailey, the head of the U.K. Financial Conduct Authority (FCA), a regulator of financial services firms and financial markets in the U.K., stated that the FCA will plan for the phase out of LIBOR with a target end to the index in 2021.[1] He concluded his speech with ongoing support for LIBOR through 2021 to allow for an orderly transition to alternative reference rates that are firmly based on market transactions.[2] The benchmark, also known as the London interbank offered rate, is used for interest rate calculations for approximately $350 trillion in securities worldwide.[3] The global financial markets' reliance on LIBOR is widespread, and includes securities, products and instruments such as mortgages, derivative contracts, car, student and consumer loans, credit cards and a subset of municipal debt, to name just a few.

While the planned phase out of LIBOR was clearly stated in Bailey's speech, the financial governing bodies which ultimately drive such decisions, such as the FCA in the U.K. and the International Swaps and Derivatives Association (ISDA), have not issued formal directives or plans. LIBOR's current administrator, the Intercontinental Exchange (ICE), intends to continue publishing LIBOR rates, while acknowledging that Bailey's comments will promote a transition from the current LIBOR to an "evolving, ...long-term sustainable future" for LIBOR.[4] Despite the uncertainty surrounding a specific timeline or how markets will handle the implementation of a replacement, many regulators are well underway considering replacements. In the U.S., the Alternative Reference Rates Committee (ARRC) recommended in June an alternative rate to LIBOR that would be based on the U.S. Treasury repurchase ("repo") market – called the "broad Treasuries repo financing rate." This rate would be based on the borrowing of short-term cash (overnight) with U.S. Treasury bonds serving as collateral, and would be published by the U.S. Federal Reserve.

The move away from the current reliance on LIBOR seems to be motivated by a desire for rates grounded in an index based on actual transactions executed in the market and not prone to manipulation by participants, as has been the case for LIBOR. Investigators and regulators found that leading up to and during the 2008 financial crisis a small number of banks and bankers involved in setting the daily LIBOR rate were colluding on the daily indications for LIBOR's reset to specifically benefit their positions and holdings. These findings resulted in several convictions and over $9 billion in fines paid by the banks involved.

---

1 Ring, Suzi. "Libor Funeral Set for 2021 as FCA Abandons Scandal-Tarred Rate." *Bloomberg Markets*, July 27, 2017. Accessed August 1, 2017. https://www.bloomberg.com/news/articles/2017-07-27/libor-to-end-in-2021-as-fca-says-bank-benchmark-is-untenable-j5m5fepe.

2 Bailey, Andrew "The Future of Libor." Speech given to Bloomberg, London, July 27, 2017. Accessed August 2, 2017. https://www.fca.org.uk/news/speeches/the-future-of-libor.

3 Ring, Suzi. "Libor Funeral Set for 2021 as FCA Abandons Scandal-Tarred Rate." *Bloomberg Markets*, July 27, 2017. Accessed August 1, 2017. https://www.bloomberg.com/news/articles/2017-07-27/libor-to-end-in-2021-as-fca-says-bank-benchmark-is-untenable-j5m5fepe.

4 Arnold, Martin, Emily Dunkley, and Paul McClean. "Regulator calls on banks to replace Libor by 2022." *Financial Times,* July 27, 2017. Accessed August 3, 2017. https://www.ft.com/content/04dd3316-72ab-11e7-aca6-c6bd07df1a3c.

While LIBOR rates represent a taxable rate index, it is also widely used in the tax-exempt market. In the municipal market, LIBOR is most commonly used in interest-rate swaps and floating-rate, both publically issued and privately placed bonds, notes and loans. Often times, the LIBOR rate is modified to approximate a tax-exempt proxy (e.g., utilizing a percentage of the resetting LIBOR rate) and/or used as a base rate with a credit spread added to it, to represent the credit quality of borrowers and lender costs of capital.

U.S. Fed Still Configuring a Replacement

Both the pervasive nature of LIBOR and its use in swaps meant as interest rate hedges complicates a speedy replacement. The Federal Reserve-sponsored ARRC has been considering the issue since 2014. Their directive is to "identify a set of alternative reference interest rates that are more firmly based on transactions from a robust underlying market and that comply with emerging standards such as the International Organization of Securities Commissions (IOSCO) Principles for Financial Benchmarks and to identify an adoption plan with means to facilitate the acceptance and use of these alternative reference rates."[5]

Based on a June 22, 2017 press release,[6] the ARRC is further along on the first half of its mission than the second. They have selected a preferred replacement – named Broad Treasuries Repo Financing Rate.[7] It would be based on the cost of overnight loans that use U.S. government debt as collateral. Since publishing that report, and in light of the FCA's planned phase out of LIBOR, the ARRC plans to refine its proposed transition plan and publish a final report before the end of the year.

At the moment, the only known fact is that nothing is definitive. The ARRC is fielding comments from the public on the planned U.S. replacement rate for LIBOR. Analysts and market participants still have questions on whether and how a new benchmark could be effectively utilized and transitioned to in the broad universe of products and securities that currently rely on LIBOR. How current contracts and products will address future changes to LIBOR or competing benchmarks with the LIBOR index remains to be seen.

Municipal Issuers Should Plan for Alternatives

Should LIBOR cease to exist or cease to be used as a reliable rate index, all products that use the index (including derivatives and swaps, bonds, notes and loans) will need to address the transition to an alternative rate. Issuers should work with their financial advisors, legal counsel and related parties with which they have outstanding contracts (e.g., swap counterparties, loan providers, etc.) to prepare for an orderly transition and settle on terms for this transition that are the least onerous and costly. Issuers should pay special attention to changes to referenced indexes that trigger events, such as a reissuance, in which terminations and potential payments could be involved. While direct action is not necessitated at the current time — LIBOR has not yet been discontinued — issuers should begin to put a team in place to discuss risks, options and solutions.

---

5 Alternative Reference Rates Committee - Federal Reserve Bank of New York. Accessed August 03, 2017. https://www.newyorkfed.org/arrc.

6 Alternative Reference Rates Committee. "The ARRC Selects a Broad Repo Rate as its Preferred Alternative Reference Rate." News release, June 22, 2017. Accessed August 3, 2017. https://www.newyorkfed.org/medialibrary/microsites/arrc/files/2017/ARRC-press-release-Jun-22-2017.pdf.

7 Alternative Reference Rates Committee. "The ARRC Selects a Broad Repo Rate as its Preferred Alternative Reference Rate." News release, June 22, 2017. Accessed August 3, 2017. https://www.newyorkfed.org/medialibrary/microsites/arrc/files/2017/ARRC-press-release-Jun-22-2017.pdf.

Additionally, issuers in the process of finalizing transactions that use LIBOR in any fashion should structure the related terms and agreements to allow for an orderly and flexible transition to an alternate rate, minimizing disruption and potential negative impacts to the issuer itself. While the market's eventual transition away from LIBOR is uncertain, issuers should work with their financing team to build in the flexibility to address future changes and potential replacements related to this index.

PFM's Financial Advisory business is the nation's leading independent municipal advisor.[8] We are prepared to assist our clients in their navigation of this market change with fiduciary advice that places our client's interests above all others.

8 Based on par amount and number of transactions according to Thomson Reuters.

FY2018 Update: Effect of Sequestration on State & Local Government Filers of Form 8038-CP

Pursuant to the requirements of the Balanced Budget and Emergency Deficit Control Act of 1985, as amended, refund payments to certain state and local government filers claiming refundable credits under section 6431 of the Internal Revenue Code applicable to certain qualified bonds are subject to sequestration.

Refund payments processed on or after October 1, 2017 and on or before September 30, 2018 are reduced by the fiscal year 2018 sequestration rate of 6.6 percent, regardless of when the amounts claimed by an issuer on any Form 8038-CP was filed with the IRS. The sequestration reduction rate will be applied until a law is enacted that cancels or otherwise impacts sequestration.

These reductions apply to Build America Bonds, Qualified School Construction Bonds, Qualified Zone Academy Bonds, New Clean Renewable Energy Bonds, and Qualified Energy Conservation Bonds for which the issuer elected to receive a direct credit subsidy pursuant to section 6431.

Issuers should complete Form 8038-CP in the manner provided by the Form 8038-CP Instructions, and will be notified through correspondence that a portion of their requested payment was subject to the sequester reduction.

Issuers with any questions about the status of refunds claimed on Form 8038-CP, including any sequester reduction, should contact IRS Customer Account Services at 1-877-829-5500.

Yearly Sequestration Rate Reduction

Fiscal Year (October 1 thru September 30)	Sequestration Rate Reduction
2018	6.6%
2017	6.9%
2016	6.8%
2015	7.3%
2014	7.2%
2013	8.7%

Page Last Reviewed or Updated: 02-Aug-2017

NCPA Refunding Opportunities

Hydroelectric Project | Refunding Overview

- Hydroelectric Project Number One Revenue Bonds, 2008 Refunding Series C
  - Callable at par on July 1, 2018
  - Majority not advance refundable with tax-exempt bonds (only ~13% advance refundable)
  - Bonds can be refunded with tax-exempt bonds on a forward delivery basis or advance refunded with taxable bonds

- Refunded bonds secured by debt service reserve funded with a surety
  - Procuring a new reserve fund surety for the refunding bonds is likely problematic
    - If a cash funded reserve is required, it will impact the annual cash flow savings of the refunding
    - It may be possible to issue the bonds without a debt service reserve

- A forward refunding would have a significant amount of additional administrative and execution requirements that a traditional refunding would not
  - Sophisticated investor letters
  - Larger lot sizes – minimum of $100,000
  - Two “closings” with associated documentation and administration
  - Estimated forward premiums of 15 to 30 bps

- The 2008 Series C bonds can be current refunded as early as April 3, 2018

Key Takeaway: ***NCPA should begin the process to current refund the Series 2008C Bonds***

Hydroelectric Project | Refunding Overview (Cont'd)

- Comparison of expected results for tax-exempt forward and taxable advance refundings with no debt service reserve and with debt service reserve at 25% of maximum annual debt service, given current market rates
  - Maturities providing a minimum present value savings of 5% of refunded par

	Tax-Exempt Forward Refunding		Taxable Advance Refunding	
Debt Service Reserve	**25% of MADS**	**None**	**25% of MADS**	**None**
Par Amount of Refunded Bonds	$65,920,000	$65,920,000	$54,115,000	$54,115,000
Present Value Savings	$ 7,347,000	$ 7,348,000	$ 4,576,000	$ 4,566,000
PV Savings as a Pct of Ref'd Par	11.15%	11.15%	8.46%	8.44%
Average Annual Cash Flow Savings	$ 606,000	$ 1,285,000	$ 77,000	$ 749,000

Note: rounded to nearest $1,000

Hydroelectric Project | Forward Refunding Candidates

Northern California Power Agency – Hydroelectric Project Revenue Bonds – Forward Maturity-by-Maturity Refunding Analysis														
Current Market Rates											Curr. Mkt. + 25 bps		Curr. Mkt. – 25 bps	
Series	Maturity	Coupon	Refunded Par ($)	Call Date	Call Price	New Yield	Negative Arb ($)	Escrow Efficiency	PV Savings ($)	% PV Savings	PV Savings ($)	% PV Savings	PV Savings ($)	% PV Savings
HE2008C	07/01/2019	5.000%	11,210,000	07/01/2018	100.000	1.434%	10,686	96.17%	268,524	2.40%	234,362	2.09%	302,895	2.70%
HE2008C	07/01/2020	5.000%	11,805,000	07/01/2018	100.000	1.512%	13,538	98.01%	667,958	5.66%	603,474	5.11%	732,983	6.21%
HE2008C	07/01/2021	5.000%	12,435,000	07/01/2018	100.000	1.622%	17,636	98.38%	1,069,672	8.60%	972,472	7.82%	1,167,901	9.39%
HE2008C	07/01/2022	5.000%	13,035,000	07/01/2018	100.000	1.711%	21,380	98.58%	1,479,718	11.35%	1,347,909	10.34%	1,613,203	12.38%
HE2008C	07/01/2023	5.000%	13,095,000	07/01/2018	100.000	1.851%	26,002	98.56%	1,779,448	13.59%	1,618,127	12.36%	1,943,155	14.84%
HE2008C	07/01/2024	5.000%	15,550,000	07/01/2018	100.000	2.041%	38,171	98.41%	2,357,604	15.16%	2,133,488	13.72%	2,585,494	16.63%
Total			**65,920,000**				**116,727**	**98.44%**	**7,354,399**	**11.16%**	**6,675,471**	**10.13%**	**8,042,736**	**12.20%**

Note: Refunding targets exceeding 5.00% present value savings as a percentage of refunded par and Escrow Efficiency exceeding 80.00% highlighted in yellow.

Assumed rates as of 07/31/2017; Delivery of 04/03/2018; Forward Pricing Date of 11/01/2017; COI: $5/bond; UD $5/bond

Hydroelectric Project | Forward Refunding Summary (25% MADS DSRF)

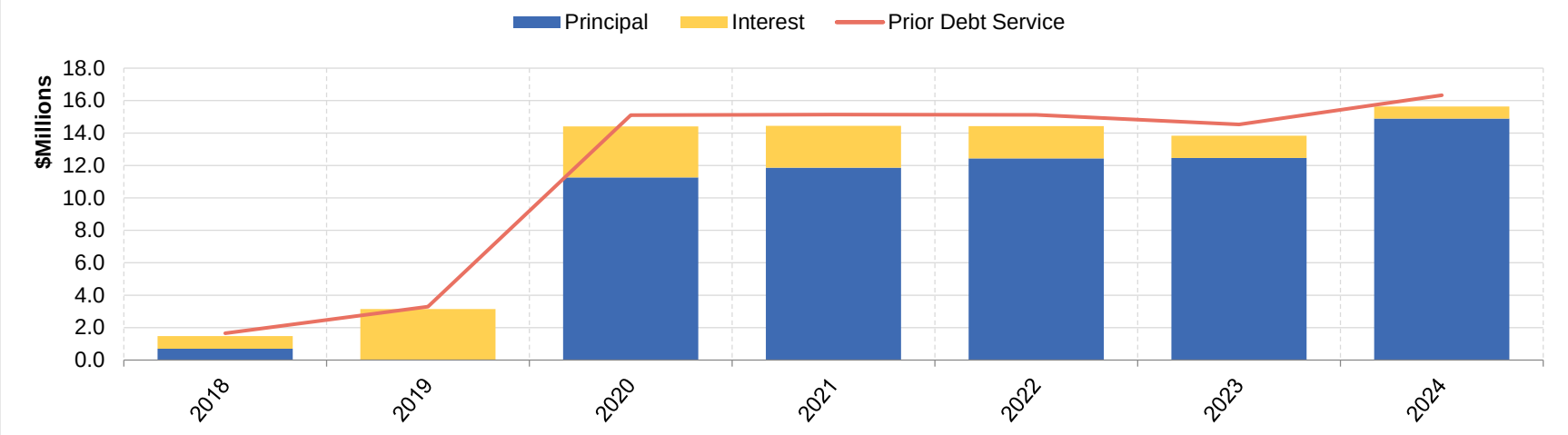
Sources and Uses	
Sources	
Par Amount	$63,620,000
Premium	8,325,213
Total Sources	**$71,945,213**
Uses	
Refunding Escrow Deposits	$67,395,449
Debt Service Reserve Fund*	3,908,625
Delivery Date Expenses	641,138
Total Uses	**$71,945,213**

* Assumed to be 25% of MADS

Summary Statistics	
Delivery Date	04/03/2018
Forward Pricing Date	11/01/2017
Par Amount of Bonds Refunded	$65,920,000
Refunded Maturities	2020 – 2024
Par Amount of Refunding Bonds	$63,620,000
Average Annual Savings	$ 606,000
Present Value Savings	$ 7,347,000
PV Savings as Pct. of Refunded Par	11.15%
All-In True Interest Cost	2.05%
Average Life of Refunded Bonds	4.3 Years
Maximum Annual Debt Service	$15,635,000

Cash Flow Savings	
Year	**Savings**
07/01/2018	$ 170,000
07/01/2019	150,000
07/01/2020	690,000
07/01/2021	693,000
07/01/2022	695,000
07/01/2023	695,000
07/01/2024	693,000
Total	$ 3,785,000

Debt Service Schedule



Assumed rates as of 07/31/2017; Delivery of 04/03/2018; Forward Pricing Date of 11/01/2017; COI: $5/bond; UD $5/bond

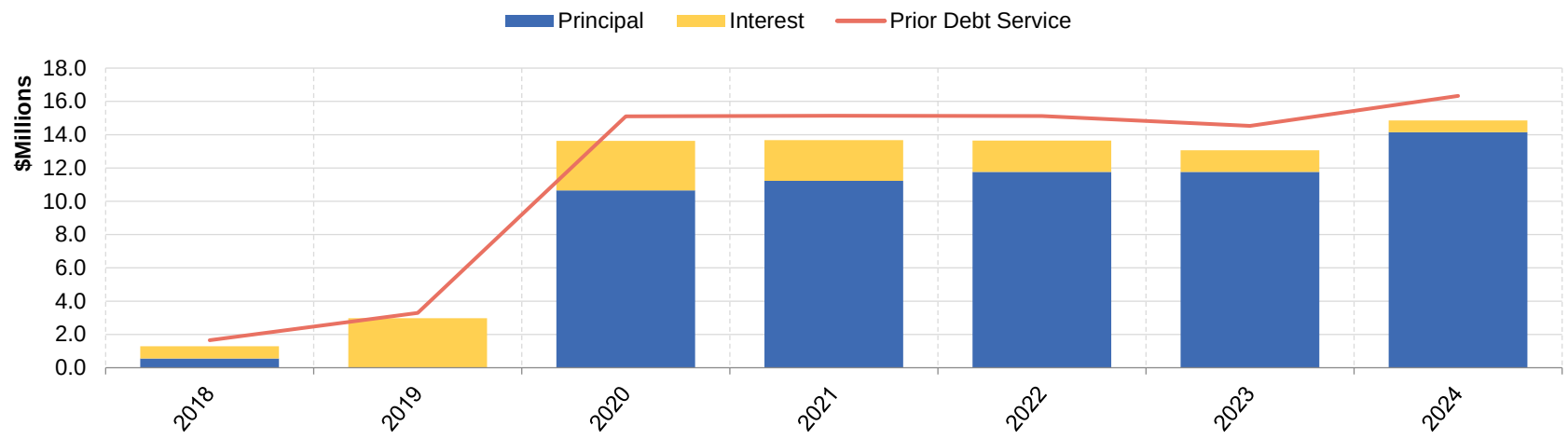
Hydroelectric Project | Forward Refunding Summary (No DSRF)

Sources and Uses	
Sources	
Par Amount	$60,115,000
Premium	7,881,673
Total Sources	**$67,996,673**
Uses	
Refunding Escrow Deposits	$67,395,449
Debt Service Reserve Fund	0
Delivery Date Expenses	601,224
Total Uses	**$67,996,673**

Summary Statistics	
Delivery Date	04/03/2018
Forward Pricing Date	11/01/2017
Par Amount of Bonds Refunded	$65,920,000
Refunded Maturities	2020 – 2024
Par Amount of Refunding Bonds	$60,115,000
Average Annual Savings	$ 1,285,000
Present Value Savings	$ 7,348,000
PV Savings as Pct. of Refunded Par	11.15%
All-In True Interest Cost	2.05%
Average Life of Refunded Bonds	4.3 Years
Maximum Annual Debt Service	$14,858,000

Cash Flow Savings	
Year	**Savings**
07/01/2018	$ 358,000
07/01/2019	318,000
07/01/2020	1,468,000
07/01/2021	1,471,000
07/01/2022	1,470,000
07/01/2023	1,467,000
07/01/2024	1,470,000
Total	$ 8,021,000

Debt Service Schedule



Assumed rates as of 07/31/2017; Delivery of 04/03/2018; Forward Pricing Date of 11/01/2017; COI: $5/bond; UD $5/bond

Hydroelectric Project | Taxable Refunding Candidates

Northern California Power Agency – Hydroelectric Project Revenue Bonds – Taxable Maturity-by-Maturity Refunding Analysis														
Current Market Rates											Curr. Mkt. + 25 bps		Curr. Mkt. – 25 bps	
Series	Maturity	Coupon	Refunded Par ($)	Call Date	Call Price	New Yield	Negative Arb ($)	Escrow Efficiency	PV Savings ($)	% PV Savings	PV Savings ($)	% PV Savings	PV Savings ($)	% PV Savings
HE2008C	07/01/2019	5.000%	11,210,000	07/01/2018	100.000	1.670%	37,941	84.72%	210,380	1.88%	163,229	1.46%	257,778	2.30%
HE2008C	07/01/2020	5.000%	11,805,000	07/01/2018	100.000	1.880%	56,644	90.35%	530,101	4.49%	450,679	3.82%	610,135	5.17%
HE2008C	07/01/2021	5.000%	12,435,000	07/01/2018	100.000	2.180%	84,718	90.23%	782,034	6.29%	667,933	5.37%	897,285	7.22%
HE2008C	07/01/2022	5.000%	13,035,000	07/01/2018	100.000	2.460%	113,234	89.66%	981,524	7.53%	831,259	6.38%	1,133,656	8.70%
HE2008C	07/01/2023	5.000%	13,095,000	07/01/2018	100.000	2.540%	120,748	90.97%	1,216,996	9.29%	1,034,892	7.90%	1,401,783	10.70%
HE2008C	07/01/2024	5.000%	15,550,000	07/01/2018	100.000	2.740%	164,124	90.51%	1,565,400	10.07%	1,315,096	8.46%	1,819,961	11.70%
Total*			**54,115,000**				**482,823**	**90.40%**	**4,545,954**	**8.40%**	**3,849,181**	**7.11%**	**5,252,685**	**9.71%**

Note: Refunding targets exceeding 5.00% present value savings as a percentage of refunded par and Escrow Efficiency exceeding 80.00% highlighted in yellow.

Assumed rates as of 07/31/2017; Delivery of 11/01/2017; COI: $5/bond; UD $5/bond

Hydroelectric Project | Taxable Refunding Summary (25% MADS DSRF)

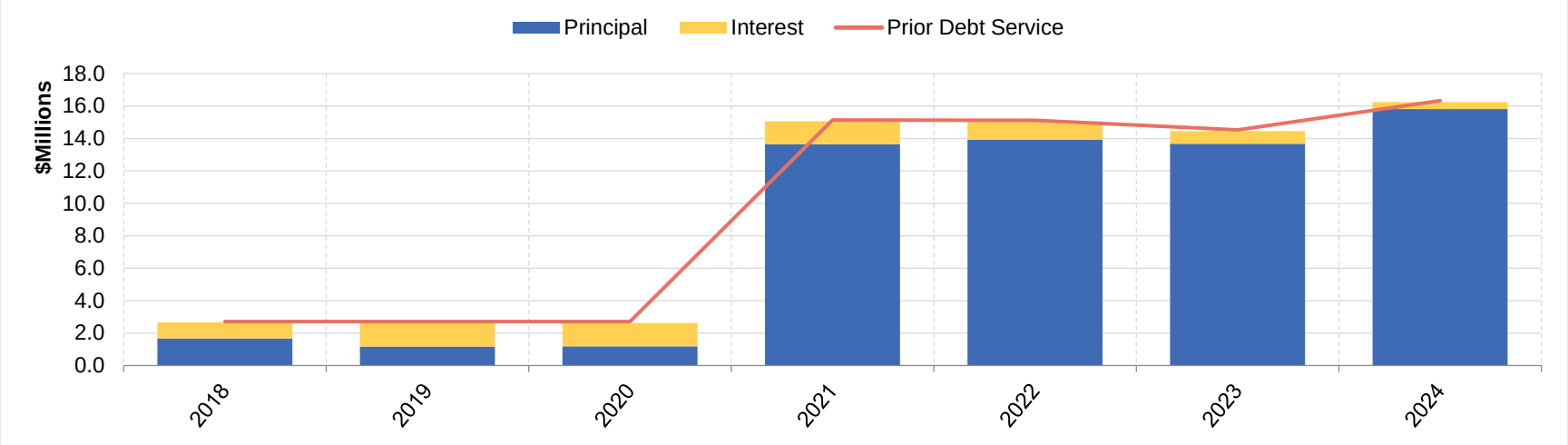
Sources and Uses	
Sources	
Par Amount	$61,065,000
Total Sources	**$61,065,000**
Uses	
Refunding Escrow Deposits	$56,391,413
Debt Service Reserve Fund*	4,062,083
Delivery Date Expenses	611,504
Total Uses	**$61,065,000**

* Assumed to be 25% of MADS

Summary Statistics	
Delivery Date	11/01/2017
Par Amount of Bonds Refunded	$54,115,000
Refunded Maturities	2021 – 2024
Par Amount of Refunding Bonds	$61,065,000
Average Annual Savings	$ 77,000
Present Value Savings	$ 4,576,000
PV Savings as Pct. of Refunded Par	8.46%
All-In True Interest Cost	2.73%
Average Life of Refunded Bonds	5.0 Years
Maximum Annual Debt Service	$16,248,000

Cash Flow Savings	
Year	**Savings**
07/01/2018	$ 49,000
07/01/2019	79,000
07/01/2020	78,000
07/01/2021	75,000
07/01/2022	76,000
07/01/2023	77,000
07/01/2024	79,000
Total	$ 513,000

Debt Service Schedule



Assumed rates as of 07/31/2017; Delivery of 11/01/2017; COI: $5/bond; UD $5/bond

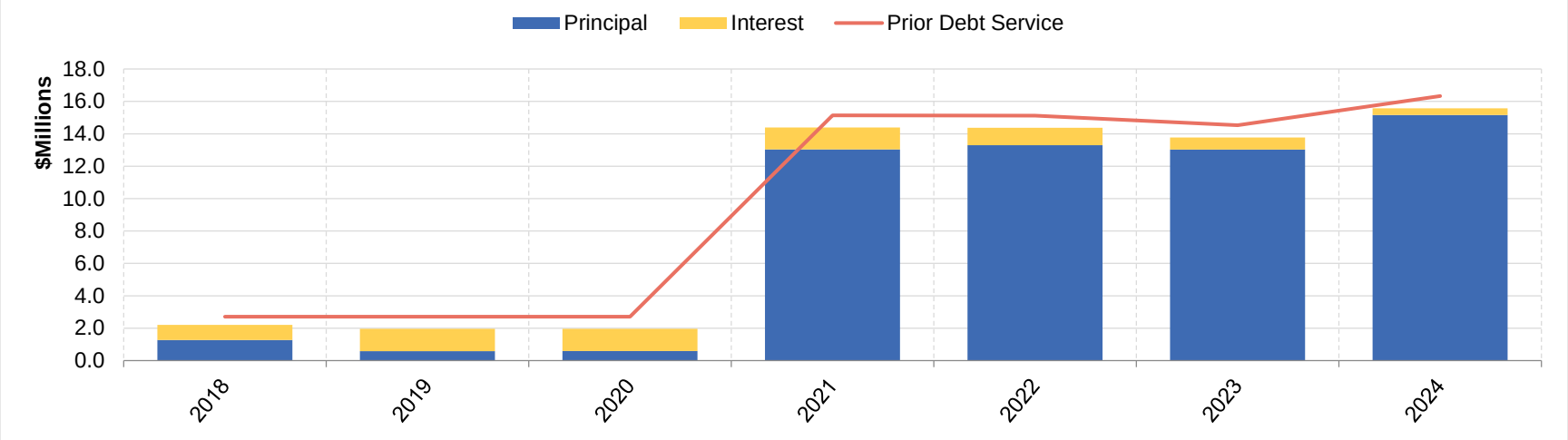
Hydroelectric Project | Taxable Refunding Summary (No DSRF)

Sources and Uses	
Sources	
Par Amount	$56,965,000
Total Sources	**$56,965,000**
Uses	
Refunding Escrow Deposits	$56,391,413
Debt Service Reserve Fund	0
Delivery Date Expenses	573,587
Total Uses	**$56,965,000**

Summary Statistics	
Delivery Date	11/01/2017
Par Amount of Bonds Refunded	$54,115,000
Refunded Maturities	2021 – 2024
Par Amount of Refunding Bonds	$56,965,000
Average Annual Savings	$ 749,000
Present Value Savings	$ 4,566,000
PV Savings as Pct. of Refunded Par	8.44%
All-In True Interest Cost	2.73%
Average Life of Refunded Bonds	5.1 Years
Maximum Annual Debt Service	$15,575,000

Cash Flow Savings	
Year	**Savings**
07/01/2018	$ 499,000
07/01/2019	747,000
07/01/2020	747,000
07/01/2021	748,000
07/01/2022	751,000
07/01/2023	751,000
07/01/2024	752,000
Total	$ 4,995,000

Debt Service Schedule



Assumed rates as of 07/31/2017; Delivery of 11/01/2017; COI: $5/bond; UD $5/bond

Lodi Energy Center, Issue One | Refunding Overview

- Lodi Energy Center Revenue Bonds, Issue One, 2010 Series A
  - Callable June 1, 2020
  - Originally issued to fund new capital projects and are advance refundable with tax-exempt bonds
  - Refunded bonds are secured with a cash funded debt service reserve

- Using a 5% present values savings threshold, $29.5 million bonds meet the savings target in the current market
  - Expected present value savings is $2.4 million, or 8.01% of refunded par
  - Average expected annual cash flow savings is $325,000

Key Takeaway: ***Series 2010A Bonds would generate decent refunding savings, however, long escrow and small size warrant considering Direct Purchase options and/or waiting***

Lodi Energy Center, Issue One | Refunding Candidates

Northern California Power Agency – Lodi Energy Center Revenue Bonds, Issue One – Maturity-by-Maturity Refunding Analysis														
Current Market Rates											Curr. Mkt. + 25 bps		Curr. Mkt. – 25 bps	
Series	Maturity	Coupon	Refunded Par ($)	Call Date	Call Price	New Yield	Negative Arb ($)	Escrow Efficiency	PV Savings ($)	% PV Savings	PV Savings ($)	% PV Savings	PV Savings ($)	% PV Savings
L1_2010A	06/01/2021	5.000%	6,520,000	06/01/2020	100.000	1.441%	1,876	98.80%	154,112	2.36%	97,924	1.50%	172,015	2.64%
L1_2010A	06/01/2022	5.000%	6,845,000	06/01/2020	100.000	1.561%	23,810	93.65%	351,325	5.13%	276,707	4.04%	408,611	5.97%
L1_2010A	06/01/2023	5.000%	7,185,000	06/01/2020	100.000	1.721%	55,425	90.52%	529,058	7.36%	434,916	6.05%	624,485	8.69%
L1_2010A	06/01/2024	5.000%	7,545,000	06/01/2020	100.000	1.921%	97,941	87.31%	674,151	8.94%	559,471	7.42%	790,631	10.48%
L1_2010A	06/01/2025	5.000%	7,925,000	06/01/2020	100.000	2.101%	140,227	85.22%	808,729	10.20%	672,365	8.48%	947,509	11.96%
Total*			**29,500,000**				**317,404**	**88.16%**	**2,363,262**	**8.01%**	**1,943,458**	**6.59%**	**2,771,235**	**9.39%**

Note: Refunding targets exceeding 5.00% present value savings as a percentage of refunded par and Escrow Efficiency exceeding 80.00% highlighted in yellow.

Assumed rates as of 07/31/2017; Delivery of 11/01/2017; COI: $5/bond; UD $5/bond

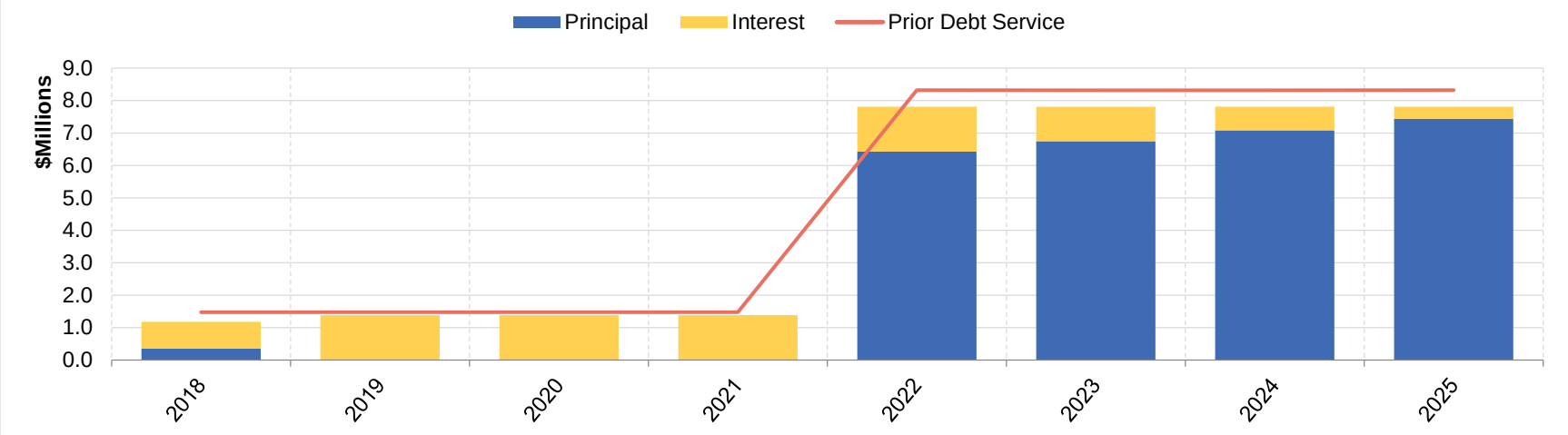
Lodi Energy Center, Issue One | Refunding Summary

Sources and Uses	
Sources	
Par Amount	$28,060,000
Premium	5,004,131
Total Sources	**$33,064,131**
Uses	
Refunding Escrow Deposits	$32,780,643
Delivery Date Expenses	283,488
Total Uses	**$33,064,131**

Summary Statistics	
Delivery Date	11/01/2017
Par Amount of Bonds Refunded	$29,500,000
Refunded Maturities	2022 – 2025
Par Amount of Refunding Bonds	$28,060,000
Average Annual Savings	$ 339,000
Present Value Savings	$ 2,357,000
PV Savings as Pct. of Refunded Par	7.99%
All-In True Interest Cost	2.03%
Average Life of Refunded Bonds	6.1 Years
Maximum Annual Debt Service	$ 7,815,000

Cash Flow Savings	
Year	**Savings**
07/01/2018	$ 297,000
07/01/2019	90,000
07/01/2020	90,000
07/01/2021	90,000
07/01/2022	505,000
07/01/2023	509,000
07/01/2024	507,000
07/01/2025	509,000
Total	$ 2,597,000

Debt Service Schedule



Assumed rates as of 07/31/2017; Delivery of 11/01/2017; COI: $5/bond; UD $5/bond

Report on NCPA’s Debt Portfolio

NCPA Member Ratings

NCPA Member Ratings			
Member	**Ratings**		
	Moody's	**S&P**	**Fitch**
Alameda Municipal Power	-	A+ / Stable	A+ / Stable
Bay Area Rapid Transit District [1]	Aa2 / Stable	AA+ / Stable	AA+ / Stable
City of Biggs	-	-	-
City of Gridley	-	-	-
City of Healdsburg (Wastewater)	-	AA / Stable	-
Lodi Electric Utility	A2 / Stable	A- / Stable	A- / Stable
City of Lompoc (Water and Wastewater)	A2 / No Outlook	-	-
City of Palo Alto (Combined Utility) [2]	Aa2 / No Outlook	AAA / Stable	-
Port of Oakland [3]	A2 / Stable	A+ / Stable	A+ / Stable
Redding Electric Utility	A2 / No Outlook	-	A+ / Stable
Roseville Electric	A2 / Positive	AA- / Stable	AA- / Stable
Silicon Valley Power	-	A+ / Negative	A+ / Positive
Truckee Donner PUD (Water)	-	AA- / Stable	-
City of Ukiah (Wastewater)	Baa2 / No Outlook	-	-
City of Shasta Lake	-	-	-
Associate Members			
Plumas-Sierra REC	-	-	-
Non NCPA LEC/Geothermal Members			
City of Azusa (Electric) [4]	-	A / Stable	-
California Department of Water Resources (Power and Water) [4]	Aa1 / Stable Aa1 / Stable	AA / Stable AAA / Stable	AA+ / Stable -
Modesto Irrigation District [4]	A2 / Stable	A+ / Stable	A+ / Stable
PWRPA [4]	-	-	-
TID [5]	A2 / Stable	AA- / Stable	A+ / Stable

[1] Sales tax revenue backed; [2] Len securing the Aa1 rated 1995 bonds has been closed; [3] Senior most; [4] LEC project participant; [5]Geothermal project participant; Senior most

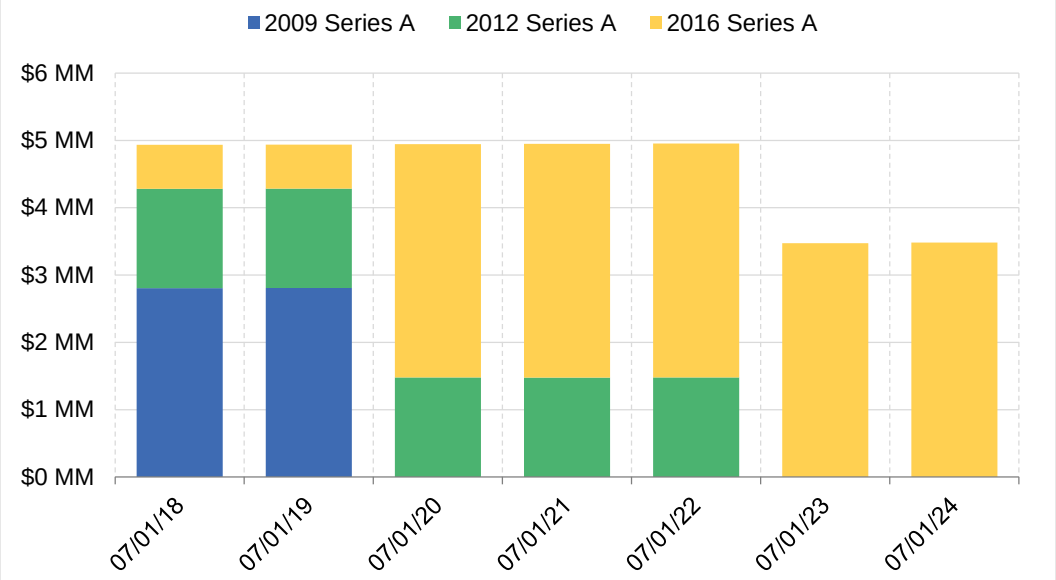
Geothermal Project Descriptive Overview

Descriptive Overview of Geothermal Project	
Description	Geothermal power plant
Location	Geysers, Sonoma & Lake County, near Middletown, CA
Type	Base load renewable energy
Fuel	Geothermal steam
Generation Capacity	• Plant 1: 2 units at 110 MW nameplate – currently producing 55 MW • Plant 2: 1 unit at 55 MW nameplate – currently producing 45 MW
Other Facilities	• 67 production wells and ten injection wells • 102 miles of underground well pipe • Eight miles of steam gathering pipe • Effluent Pipeline Project – 6,400 gpm • Three pump stations, five miles of injection pipe, horizontal injection well
First Year in Operation	Plant 1: 1983; Plant 2: 1985
Highlights	• Provides baseload, reliable, renewable energy • Expected life extended well past life of debt due to Effluent Pipeline Project and recent system replacement and modernization • Majority of debt now paid in full – small amount remaining for recent system upgrades • AB32 emission requirements do not apply

Geothermal Project Debt Overview

Geothermal Project Participation Percentages		
Member	**Entitlement Share (%)**	**Beneficiary Share (%)**
Alameda	16.8825	16.8825
Biggs	0.2270	0.2270
Gridley	0.3950	0.3360
Healdsburg	3.6740	3.6740
Lodi	10.2800	10.2800
Lompoc	3.6810	3.6810
Palo Alto	6.1580	0.0000
Plumas-Sierra	0.8145	0.7010
Roseville	7.8830	7.8830
Santa Clara	44.3905	44.3905
TID	0.0000	6.3305
Ukiah	5.6145	5.6145

Geothermal Project Debt Service



Summary of Outstanding Geothermal Project Debt							
Ratings (M/S/F): A1/A-/A+, Stable Outlooks							
Series	**Tax Status**	**Coupon Type**	**Issue Size**	**Outstanding Par**	**Coupon Range**	**Call Date**	**Final Maturity**
2009 Series A	Tax-Exempt	Fixed-Rate	$35,610,000	$5,220,000	5.000%	-	7/1/2019
2012 Series A	Tax-Exempt	Fixed-Rate	$12,910,000	$6,945,000	2.289%	7/1/2017	7/1/2022
2016 Series A	Tax-Exempt	Fixed-Rate	$17,530,000	$17,265,000	1.670%	-	7/1/2024

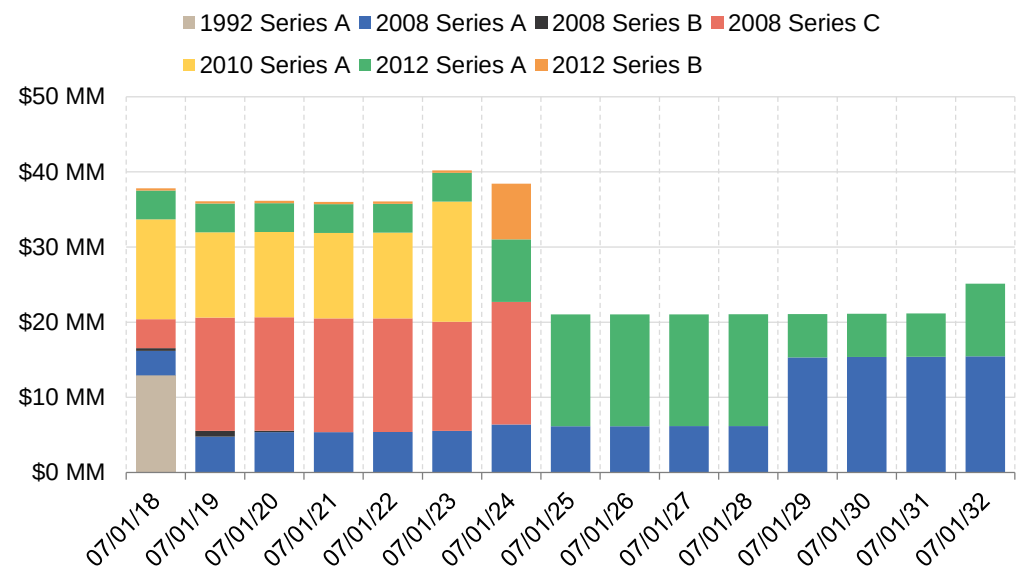
Hydroelectric Project Descriptive Overview

Descriptive Overview of Hydroelectric Project	
Description	Series of five Hydroelectric Generating Stations on the North Fork of the Stanislaus River
Location	Murphys, CA
Type	Base load and peaking capacity
Fuel	Water
Generation Capacity	• Collierville: 253 MW (2 @ 126.5 MW) • Spicer: 6 MW (2 @ 2.75 MW, 1 @ 0.5 MW)
Other Facilities	• Collierville: 40 miles of Transmission Line, 2,065 Acre Feet of storage at McKays Reservoir • Spicer: 189,000 Acre Feet of storage at Spicer
First Year in Operation	1990
License	Through 2032 with option to extend
Highlights	• Offers firm, renewable, emission free source of power to help stabilize other intermittent renewable sources such as solar and wind, and integrate all into a more effective resource mix • Zero Carbon Energy Credit for entire output • AB32 emission requirements do not apply • 6 MWs of CEC Qualified Renewable Energy

Hydroelectric Project Debt Overview

Hydroelectric Project Participation Percentages	
Member	**Entitlement Share (%)**
Alameda	10.000
Biggs	0.100
Gridley	1.060
Healdsburg	1.660
Lodi	10.370
Lompoc	2.300
Palo Alto	22.920
Roseville	12.000
Santa Clara	35.860
Ukiah	2.040
Plumas-Sierra	1.690

Hydroelectric Project Debt Service



Summary of Outstanding Hydroelectric Project Debt

Ratings (M/S/F): A1/A+/A+, Stable Outlooks

Series	Tax Status	Coupon Type	Issue Size	Outstanding Par	Coupon Range	Call Date	Final Maturity
1992 Series A	Tax-Exempt	Fixed-Rate	$195,610,000	$12,155,000	6.300%	Non-Callable	7/1/2018
2008 Series A	Tax-Exempt	Variable-Rate	$85,160,000	$85,160,000	Var. (3.819%) (S)	Current	7/1/2032
2008 Series B	Taxable	Variable-Rate	$3,165,000	$1,235,000	Variable (V)	Current	7/1/2020
2008 Series C	Tax-Exempt	Fixed-Rate	$128,005,000	$77,130,000	5.000%	7/1/2018	7/1/2024
2010 Series A	Tax-Exempt	Fixed-Rate	$101,260,000	$62,975,000	5.000%	7/1/2019	7/1/2023
2012 Series A	Tax-Exempt	Fixed-Rate	$76,665,000	$76,665,000	5.000%	7/1/2022	7/1/2032
2012 Series B	Taxable	Fixed-Rate	$7,120,000	$7,120,000	4.320%	Make-Whole	7/1/2024

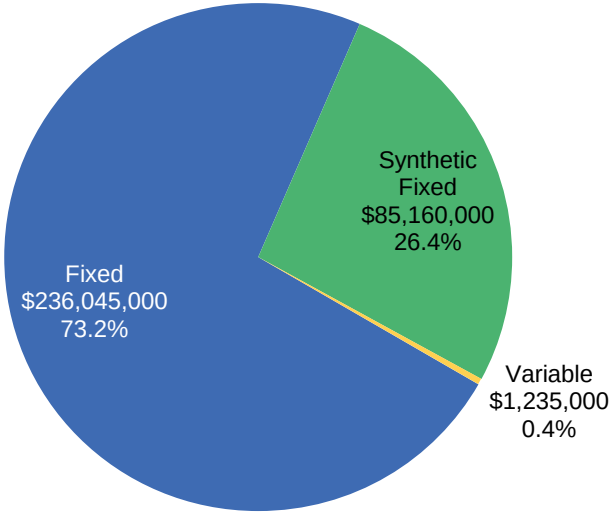
(S) Swapped; Please see next page for details, (V) 4% variable rate assumed for debt service chart

Hydroelectric Project Debt Overview (Cont'd)

Hydroelectric Project Swap Summary									
Series	**NCPA Pays**	**NCPA Receives**	**Trade Date**	**Effective Date**	**Maturity Date**	**MTM Value *(As of 08/07/17)***	**Initial Notional**	**Current Notional**	**Bank Counterparty**
2008 Series A	3.8190%	54% of USD-LIBOR + 0.54%	11/24/04	11/24/04	7/1/32	($17,788,297)	$85,160,000	$85,160,000	Citibank, N.A., New York (A1/A+/A+)
2008 Series B	USD-LIBOR	5.2910%	11/24/04	11/24/04	7/1/32	$228,180	$1,574,000	$1,108,537	Citibank, N.A., New York (A1/A+/A+)

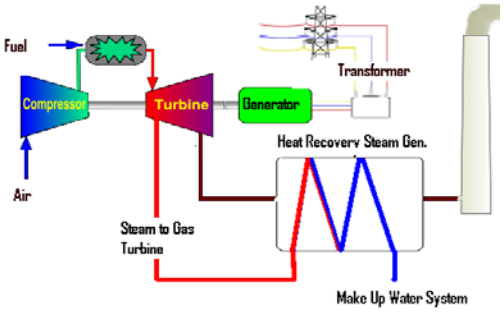
Hydroelectric Project Liquidity Summary			
Series	**LOC Provider**	**LOC Expiry**	**Last Reset**
2008 Series A	Bank of Montreal (Aa3/A+/AA-)	September 09, 2019	0.73%
2008 Series B	Bank of Montreal (Aa3/A+/AA-)	September 09, 2019	1.25%

Breakdown of Hydroelectric Project Debt Type



Capital Facilities Project Descriptive Overview

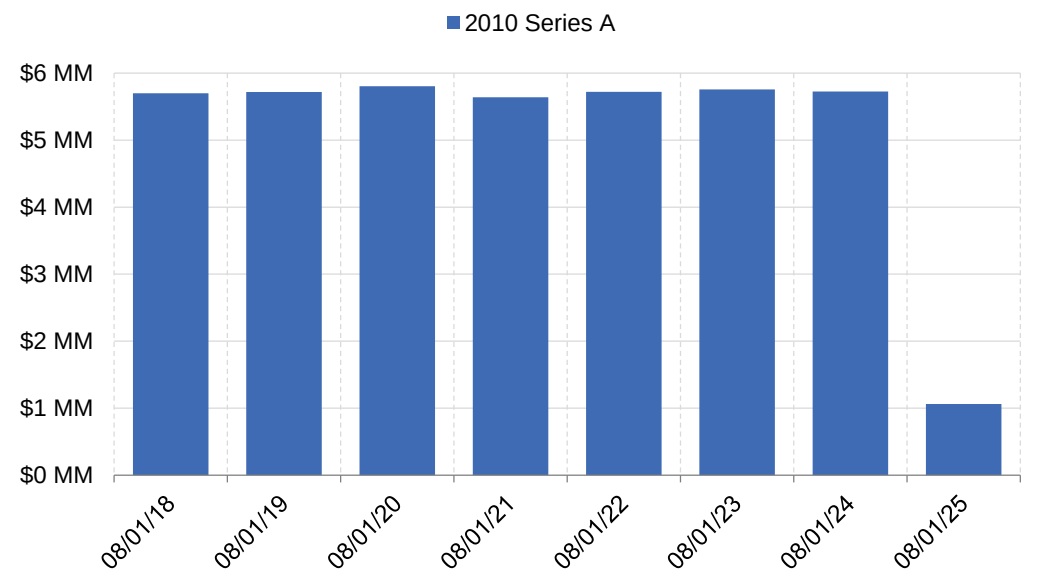
Descriptive Overview of Capital Facilities Project	
Description	Summer peaking energy and capacity, 1 – LM5000 Aeroderivative, steam-injected gas turbine with HRSG
Location	Next to Interstate 5 near Lodi, CA
Type	Peaking
Fuel	Natural Gas
Plant Net Capability	49.9 MW
Average Heat Rate	9,000
Project Completed	1996
Expected Life	2026
Highlights	• STIG cycle plant which has the advantage of lower capital costs than a combined cycle plant, but very high efficiency • Makes use of a collaborative partnership with Lodi for wastewater reclamation • Qualifies as "Local" Capacity for CAISO Resource Adequacy Program; proximity to participants facilitates low transmission costs and increased reliability



Capital Facilities Debt Overview

Capital Facilities Participation Percentages	
Member	**Entitlement Share (%)**
Alameda	19.00
Lodi	39.50
Lompoc	5.00
Roseville	36.50

Capital Facilities Debt Service



Summary of Outstanding Capital Facilities Debt

Ratings (M/S/F): A2/A-/ , Stable Outlooks

Series	Tax Status	Coupon Type	Issue Size	Outstanding Par	Coupon Range	Call Date	Final Maturity
2010 Series A	Tax-Exempt	Fixed-Rate	$55,120,000	$33,640,000	4.000% - 5.250%	2/1/2020	8/1/2025

Lodi Energy Center Project Descriptive Overview

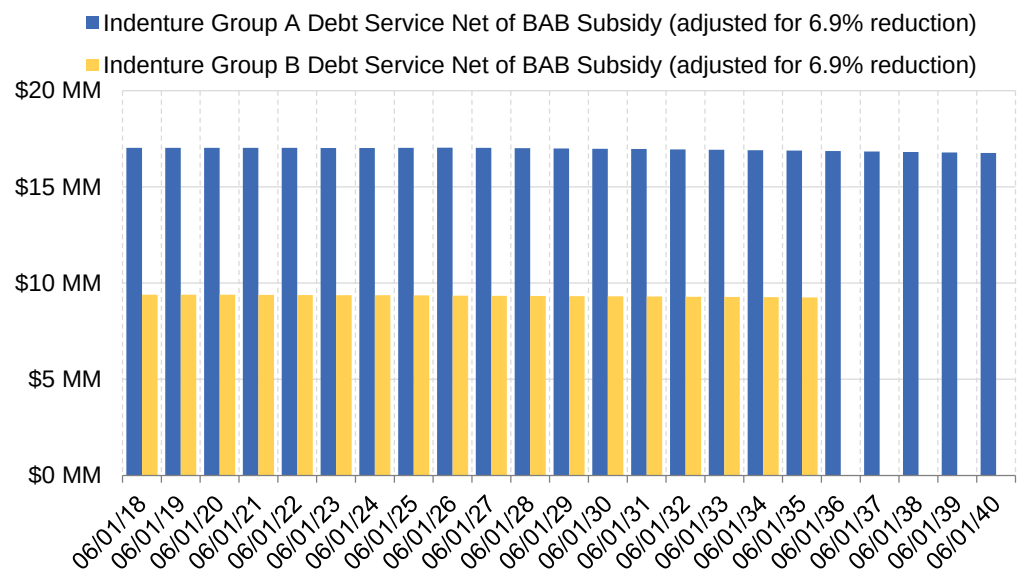
Descriptive Overview of Lodi Energy Center Project	
Description	Combined Cycle
Location	Next to Interstate 5 near Lodi, CA
Type	Base load and peaking capacity
Fuel	Natural Gas
Generation Capacity	304 MW rating
Average Heat Rate	6,824
Other Facilities	2.7 miles of Gas Transmission Line
First Year in Operation	2012
Highlights	• Offers state of the art "fast start" technology • Facilitates integration of California renewables • Most efficient heat rate in northern California • Low emissions; net carbon reducing (20 – 70%) • Ideal location; partnership with City of Lodi; proximity to participants facilitates low transmission costs and increased reliability

Lodi Energy Center Debt Overview

LEC Participation Percentages

Member	Entitlement Share (%)	Ind. Group A Cost Share (%)
CDWR	33.5000	-
Azusa	2.7857	4.9936
Biggs	0.2679	0.4802
Gridley	1.9643	3.5212
Healdsburg	1.6428	2.9448
Lodi	9.5000	17.0295
Lompoc	2.0357	3.6491
Santa Clara	25.7500	46.1588
Ukiah	1.7857	3.2010
MID	10.7143	-
Plumas-Sierra	0.7857	1.4084
PWRPA	2.6679	4.7824
SFBART	6.6000	11.8310

Lodi Energy Center Debt Service



Summary of Outstanding Lodi Energy Center Debt

Series	Tax Status	Coupon Type	Issue Size	Outstanding Par	Coupon Range	Next Call	Final Maturity
Indenture Group A | Ratings (M/S/F): A2/A-/A, Stable Outlooks							
2010 Series A	Tax-Exempt	Fixed-Rate	$78,330,000	$53,775,000	5.000%	6/1/2020	6/1/2025
2010 Series B	Taxable BABs	Fixed-Rate	$176,625,000	$176,625,000	7.311% (T)	Make-Whole	6/1/2040
Indenture Group B—CADWR | Ratings (M/SF): Aa2/AAA/ , Stable Outlooks							
2010 Series A	Tax-Exempt	Fixed-Rate	$30,540,000	$9,685,000	5.000%	Non-Callable	6/1/2019
2010 Series B	Taxable BABs	Fixed-Rate	$110,225,000	$110,225,000	4.630%-5.679% (T)	Make-Whole	6/1/2035

(T) Taxable Build America Bonds; Interest rate gross of BAB subsidy

Appendix: Unsolicited Proposals

Northern California Power Agency

Refunding Update & New Money Analysis

June 16, 2017

STRICTLY PRIVATE AND CONFIDENTIAL

A PUBLIC AGENCY
NCPA
NORTHERN CALIFORNIA POWER AGENCY

RBC Capital Markets

Disclaimer

RBC Capital Markets, LLC ("RBCCM"), seeks to serve as an underwriter on a future transaction and not as a financial advisor or municipal advisor. The information provided is for discussion purposes only in anticipation of being engaged to serve as an underwriter. The primary role of an underwriter is to purchase securities with a view to distribution in an arm's-length commercial transaction with the issuer. The underwriter has financial and other interests that differ from those of the Issuer. RBC CM is not recommending an action to you as the municipal entity or obligated person. RBCCM is not acting as an advisor to you and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to you with respect to the information and material contained in this communication. RBCCM is acting for its own interests. You should discuss any information and material contained in this communication with any and all internal or external advisors and experts that you deem appropriate before acting on this information or material.

This presentation was prepared exclusively for the benefit of and internal use by the recipient for the purpose of considering the transaction or transactions contemplated herein. This presentation is confidential and proprietary to RBCCM and may not be disclosed, reproduced, distributed or used for any other purpose by the recipient without RBCCM's express written consent.

By acceptance of these materials, and notwithstanding any other express or implied agreement, arrangement, or understanding to the contrary, RBCCM, its affiliates and the recipient agree that the recipient (and its employees, representatives, and other agents) may disclose to any and all persons, without limitation of any kind from the commencement of discussions, the tax treatment, structure or strategy of the transaction and any fact that may be relevant to understanding such treatment, structure or strategy, and all materials of any kind (including opinions or other tax analyses) that are provided to the recipient relating to such tax treatment, structure, or strategy.

The information and any analyses contained in this presentation are taken from, or based upon, information obtained from the recipient or from publicly available sources, the completeness and accuracy of which has not been independently verified, and cannot be assured by RBCCM. The information and any analyses in these materials reflect prevailing conditions and RBCCM's views as of this date, all of which are subject to change.

To the extent projections and financial analyses are set forth herein, they may be based on estimated financial performance prepared by or in consultation with the recipient and are intended only to suggest reasonable ranges of results. The printed presentation is incomplete without reference to the oral presentation or other written materials that supplement it.

IRS Circular 230 Disclosure: RBC CM and its affiliates do not provide tax advice and nothing contained herein should be construed as tax advice. Any discussion of U.S. tax matters contained herein (including any attachments) (i) was not intended or written to be used, and cannot be used, by you for the purpose of avoiding tax penalties; and (ii) was written in connection with the promotion or marketing of the matters addressed herein. Accordingly, you should seek advice based upon your particular circumstances from an independent tax advisor.

Table of Contents

Refunding Update & New Money Analysis

Section 1

RBC Capital Markets

Debt Overview

With 14 series of bonds outstanding, the bond portfolio is highly optimized with limited refunding candidates

- The Hydroelectric Project 2008 Refunding Series C Bonds have a call date in 2018
- The Geothermal Project Series 2009 A Bonds are advance refundable at any time and are first callable July 1, 2020
- The Lodi Energy Center 2010 Series A Issue One are callable on June 1, 2020, and are advance refundable at any time

Summary of Bonds Outstanding

Issue	Program	Date of Issue	Final Maturity	Coupon Type	Call Date	Original Par	Par Outstanding
2009 Series A	Geothermal Project	03/24/2009	07/01/2024	Fixed	07/01/2020	$35,610,000	$23,345,000
2012 Series A	Geothermal Project	09/01/2012	07/01/2022	Fixed	TBD	12,910,000	8,875,000
1992 Refunding Series A	Hydroelectric Project	06/01/1992	07/01/2023	Fixed	Non-Callable	195,610,000	23,595,000
2008 Refunding Series A	Hydroelectric Project	04/02/2008	07/01/2032	Variable	Current	85,160,000	85,160,000
2008 Refunding Series B	Hydroelectric Project	04/02/2008	07/01/2020	Variable	Current	3,165,000	1,540,000
2008 Refunding Series C	Hydroelectric Project	07/24/2008	07/01/2024	Fixed	07/01/2018	128,005,000	77,130,000
2010 Refunding Series A	Hydroelectric Project	04/05/2010	07/01/2023	Fixed	07/01/2020	101,260,000	72,615,000
2012 Refunding Series A	Hydroelectric Project	04/05/2010	07/01/2032	Fixed	07/01/2022	76,665,000	76,665,000
2012 Refunding Series B	Hydroelectric Project	04/05/2010	07/01/2024	Fixed	Make-Whole	7,120,000	7,120,000
2010 Refunding Series A	Capital Facilities Project	01/29/2010	08/01/2025	Fixed	08/01/2020	55,120,000	37,400,000
2010 Series A Issue One	Lodi Energy Center	06/24/2010	06/01/2025	Fixed	06/01/2020	78,330,000	53,775,000
2010 Series B Issue One (BABs)	Lodi Energy Center	06/24/2010	06/01/2040	Fixed	Make-Whole	176,625,000	176,625,000
2010 Series A Issue Two	Lodi Energy Center	06/24/2010	06/01/2019	Fixed	Non-Callable	30,540,000	9,685,000
2010 Series B Issue Two (BABs)	Lodi Energy Center	06/24/2010	06/01/2035	Fixed	Make-Whole	110,225,000	110,225,000
Total Fixed Rate						**$1,008,020,000**	**$677,055,000**
Total Variable Rate						**88,325,000**	**86,700,000**
Total Outstanding						**$1,096,345,000**	**$763,755,000**

As of June 16, 2017 (Fiscal Year End: 6/30)

- Both series of VRDBs are supported with credit facilities through 2019
- These bonds have been swapped to a fixed rate through 2032

Hydroelectric Project 2008 Refunding Series C - Refunding Analysis

A forward delivery refunding generates over $7.7 million of present value savings under current market conditions

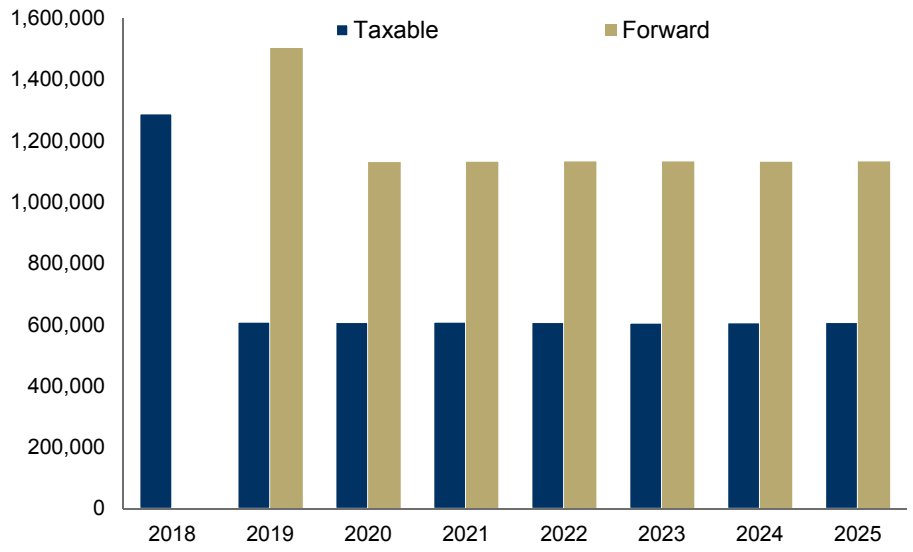
- The 2008 Refunding Series C Bonds are callable on July 1, 2018
  - These bonds are not eligible to be advance refunded on a tax-exempt basis until April 2018
  - They can be refunded on a *forward basis* (tax-exempt) or on a taxable basis at any time
  - Subject to a detailed tax analysis, a small portion of the bonds may be eligible for tax-exempt refunding
- Under current market conditions, a **forward delivery** transaction locks in an attractive interest rate level and eliminates interest rate risk
  - The forward premium is estimated to be 6 basis points per month; the refunding analysis assumes a seven month forward period
  - Savings are shown on a level basis; given that there are principal maturities in 2018 and 2019, savings can be shaped or accelerated to meet specific cash flow targets
- Savings results: the forward refunding generates **$7.7 million or 10% present value savings or $1.3 million annually**

Comparison of Refunding Results

	Forward[1]	Taxable
Delivery Date	04/02/2018	09/01/2017
Call Date	07/01/2018	07/01/2018
Refunded Maturities	2019-2024	2019-2024
Refunded Par Amount	$77,130,000	$77,130,000
Refunding Par Amount	$71,795,000	$80,630,000
Average Coupon	4.683%	2.545%
True Interest Cost	1.945%	2.599%
Escrow Yield	0.939%	1.152%
Negative Arbitrage	$182,439	$899,722
Gross Savings	$8,294,701	$5,547,323
Average Annual Cash Flow Savings ($)	$1,327,742	$811,803
Net PV Savings ($)	**$7,740,905**	**$5,111,908**
Net PV Savings (% of refunded par)	**10.036%**	**6.628%**

1) PV Savings as of 9/1/2017

Annual Cash Flow Savings by Scenario (6/30 Fiscal Year)



Note: Information regarding advance refundability is subject to the opinion of bond counsel. For purposes of our analysis, we assumed that the bonds are not advance refunded on a tax-exempt basis. Assumes refunding with fixed rate bonds issued under market conditions as of June 13, 2017

Geothermal Project 2009 Series A – Tax-Exempt Refunding Analysis

PV Savings of 7.6% of refunded par achievable under current market conditions

- NCPA's Geothermal Project 2009 Series A Bonds will be callable on July 1, 2020
- The Bonds were issued to fund capital improvements related to NCPA's Geothermal Project Number 3 and are advance refundable
- Our analysis assumes that maturities producing 3% savings are refunded (highlighted below)

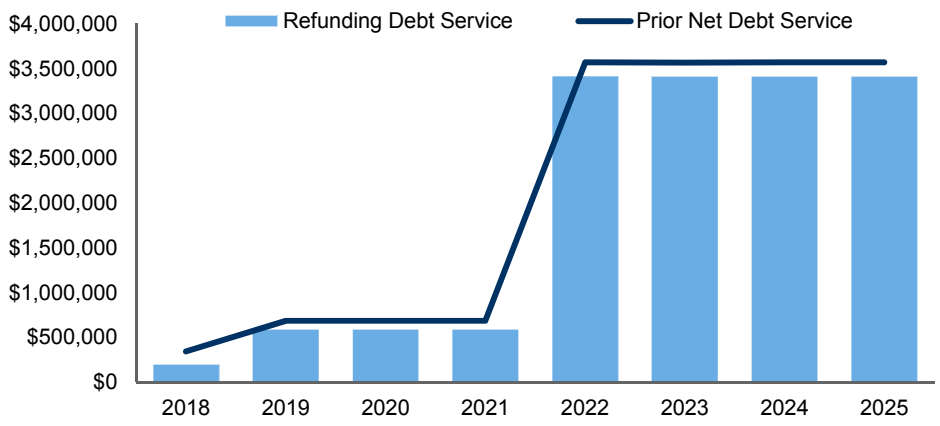
Summary of Refunding Results

Delivery Date	09/01/2017
Call Date	07/01/2020
Refunded Maturities	2021-2024
Refunded Par Amount	$12,890,000
Refunding Par Amount	$12,395,000
True Interest Cost	1.554%
Escrow Yield	1.413%
Negative Arbitrage	$36,733
Gross Savings	$1,048,808
Average Annual Cash Flow Savings ($)	$153,484
Net PV Savings ($)	**$992,333**
Net PV Savings (% of refunded par)	**7.698%**

Individual Maturity Refunding Results

Refunded Maturity	Coupon	Refunded Par	Savings	% Savings
07/01/2018	5.000%	2,545,000	-23,409	-0.84%
07/01/2019	5.000%	2,675,000	-17,433	-0.61%
07/01/2020	5.250%	2,815,000	-9,770	-0.33%
07/01/2021	5.500%	2,970,000	100,062	3.37%
07/01/2022	5.500%	3,135,000	210,483	6.71%
07/01/2023	5.000%	3,305,000	273,572	8.28%
07/01/2024	5.250%	3,480,000	418,561	12.03%
Total (Savings > 0)		**$20,925,000**	**$952,066**	**4.55%**

Annual Cash Flow Savings



Note: Information regarding advance refundability is subject to the opinion of bond counsel. Assumes refunding with fixed rate bonds issued under market conditions as of June 13, 2017

Lodi Energy Center 2010 Series A Issue One – Tax-Exempt Refunding Analysis

PV Savings of 8.16% of refunded par achievable under current market conditions

- NCPA's Lodi Energy Center 2010 Series A Bonds will be callable on June 1, 2020
- The 2010 Series A Bonds were issued concurrently with the 2010 Series B Bonds to fund a portion of the construction costs associated with the Lodi Energy Center and are advance refundable
- Our analysis assumes that maturities highlighted in the table below are refunded

Summary of Refunding Results

Delivery Date	09/01/2017
Call Date	07/01/2020
Refunded Maturities[1]	2021-2025
Refunded Par Amount	$36,020,000
Refunding Par Amount	$34,115,000
True Interest Cost	1.653%
Escrow Yield	1.404%
Negative Arbitrage	$213,311
Gross Savings	$3,152,125
Average Annual Cash Flow Savings ($)	$406,726
Net PV Savings ($)	**$2,941,312**
Net PV Savings (% of refunded par)	**8.166%**

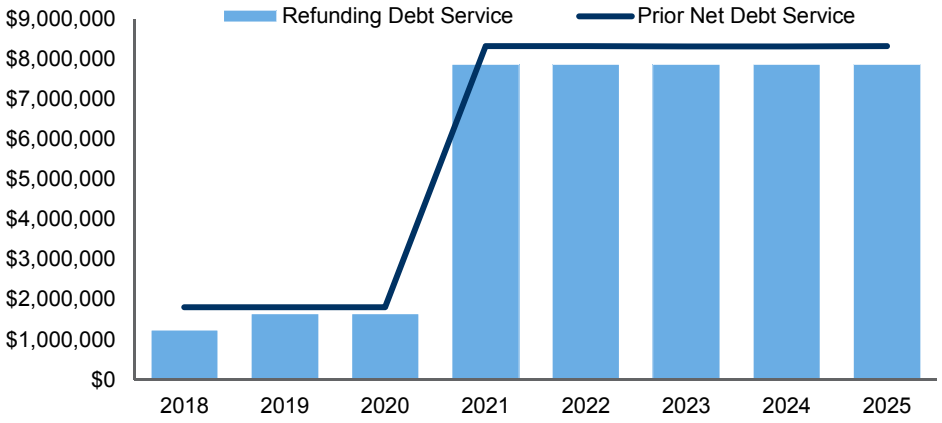
1) Represent Sinking fund maturities of 2025 term bond

Individual Maturity Refunding Results

Refunded Maturity	Coupon	Refunded Par	Savings	% Savings
06/01/2018	5.000%	5,630,000	-47,232	-0.84%
06/01/2019	5.000%	5,915,000	-36,257	-0.61%
06/01/2020	5.000%	6,210,000	-20,337	-0.33%
06/01/2021[1]	5.000%	6,520,000	191,051	2.93%
06/01/2022[1]	5.000%	6,845,000	399,158	5.83%
06/01/2023[1]	5.000%	7,185,000	601,100	8.37%
06/01/2024[1]	5.000%	7,545,000	801,514	10.62%
06/01/2025[1]	5.000%	7,925,000	957,576	12.08%
Total (Savings > 0)		**$53,775,000**	**$2,846,572**	**5.29%**

1) Represent Sinking fund maturities of 2025 term bond

Annual Cash Flow Savings



Note: Information regarding advance refundability is subject to the opinion of bond counsel. Assumes refunding with fixed rate bonds issued under market conditions as of June 13, 2017

New Money Overview

Interest rates continue to be attractive for funding capital projects

- Funding capital expenditures from bond proceeds spreads the costs over the estimated useful life of the assets
- Using bond proceeds to fund capital projects frees cash reserves for other purposes such as pension expenses
- Results:
  - $30 million Project Fund Deposit
  - 10-Year, level debt service structure
  - DSRF Deposit: $1.17 million
  - $3.5 million in annual debt service costs
  - All-in TIC: 1.97%
- Issuing bonds also allows for costs to be allocated levelly across years

Indicative Pricing Levels

Maturity Date	MMD[1]	Coupon	Spread to MMD (bps)	Yield
07/01/2018	0.83%	2.00%	5	0.88%
07/01/2019	0.94%	3.00%	8	1.02%
07/01/2020	1.04%	4.00%	10	1.14%
07/01/2021	1.14%	4.00%	12	1.26%
07/01/2022	1.25%	5.00%	15	1.40%
07/01/2023	1.36%	5.00%	18	1.54%
07/01/2024	1.47%	5.00%	20	1.67%
07/01/2025	1.62%	5.00%	24	1.86%
07/01/2026	1.79%	5.00%	28	2.07%
07/01/2027	1.89%	5.00%	32	2.21%

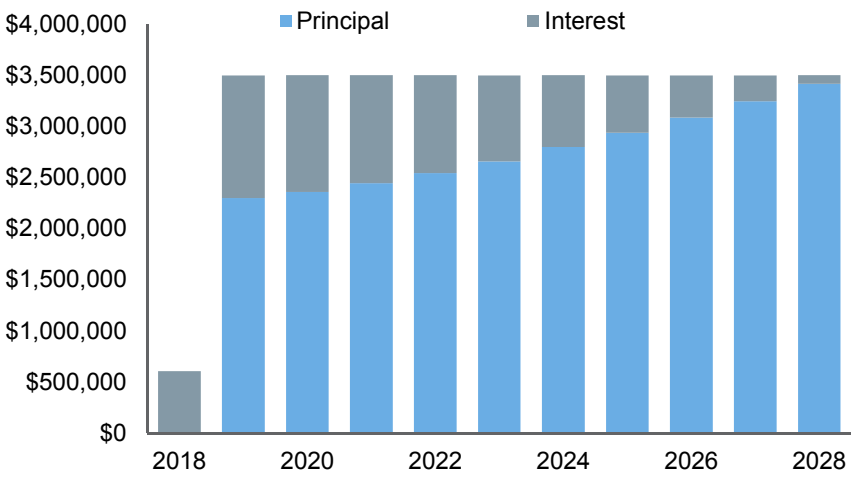
1) Interpolated AAA MMD, as of June 13, 2017

Summary Statistics

Dated Date	09/01/2017
Last Maturity	07/01/2027
Par Amount	$27,110,000
Total Proceeds	$31,480,159
True Interest Cost (TIC)	1.845%
All-In TIC	1.970%
Average Coupon	4.80%
Average Life	5.71
Total Debt Service	$34,544,858
Average Annual Debt Service	$3,513,036
DSRF Deposit[1]	$1,171,250

1) Assumes DSRF funded at Maximum Annual Interest

Debt Service (6/30 Fiscal Year)



Market Update

Section 2

RBC Capital Markets

Key Market Themes

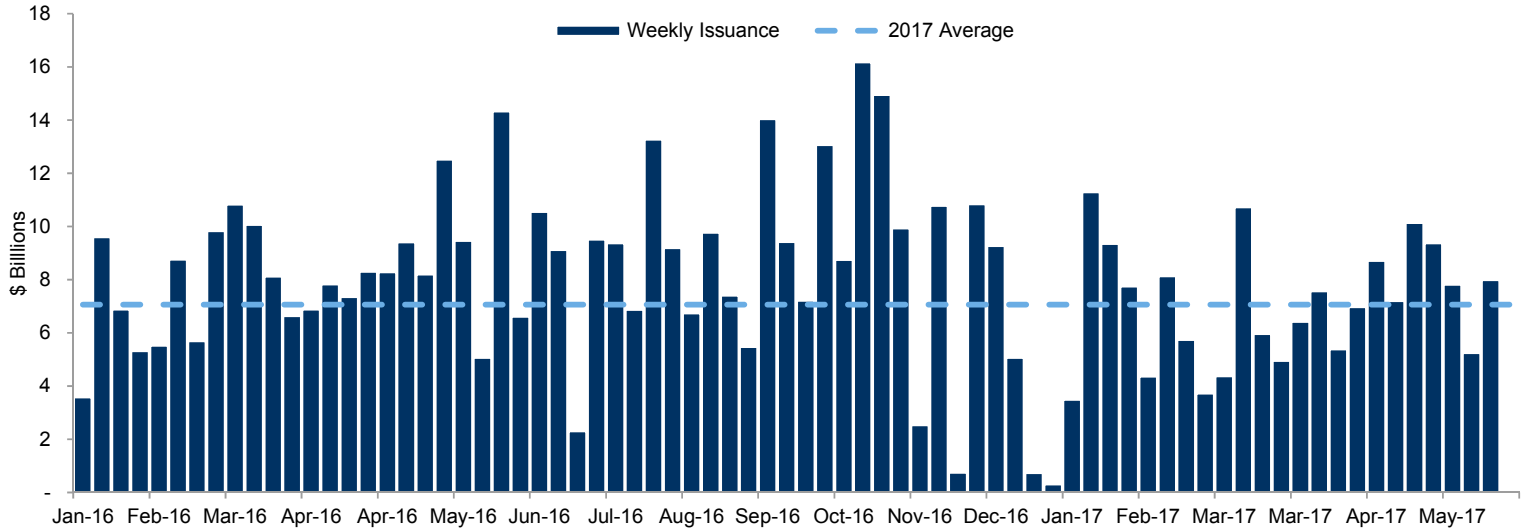
Market Commentary

- After posting historic highs last Thursday, the Nasdaq tumbled 1.8% on Friday, ending the week down 1.6%
- The S&P 500 declined 0.30% last week, while the DJIA advanced 0.31%
- In their Wednesday meeting the FOMC raised the target range for the Federal Funds Rate to 1.00% - 1.25%, and
  - The Fed also maintained its forecast for one additional rate hike in 2017, and the potential for 3 hikes next year
- Retail sales, PPI, and CPI data top this week's economic calendar
  - Additional highlights include Empire/Philly Fed, jobless claims, housing starts, industrial production, U. Mich. sentiment

Municipal Market

- Municipals out-performed Treasuries by one to two ratios last week, and rates drifted modestly higher
- Municipal funds reported healthy inflows of $985 million last week, and June reinvestment cash totals $37.5 billion
- Municipal supply totaled $7.9 billion last week, and average weekly volume stands at $7.0 billion
  - Last week's new issue transactions were generally well-received, with most offerings repricing to lower yields
- Although the technical environment remains positive, low absolute yields and tight ratios pose challenges to investor sentiment
- S&P downgraded the Commonwealth of Massachusetts from AA+ to AA, citing failure to replenish reserve funds

Weekly Supply



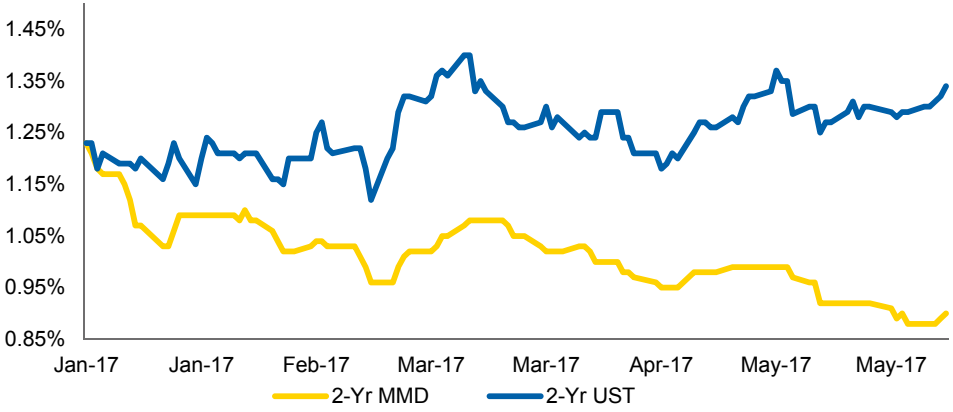
Source: Bloomberg as of June 9, 2017

Weekly Supply

Date	($000s)
03/31/2017	6,408
04/07/2017	7,554
04/14/2017	5,375
04/21/2017	6,964
04/28/2017	8,703
05/05/2017	7,194
05/12/2017	10,120
05/19/2017	9,368
05/26/2017	7,807
06/02/2017	5,241
06/09/2017	7,973
Average	**7,519**

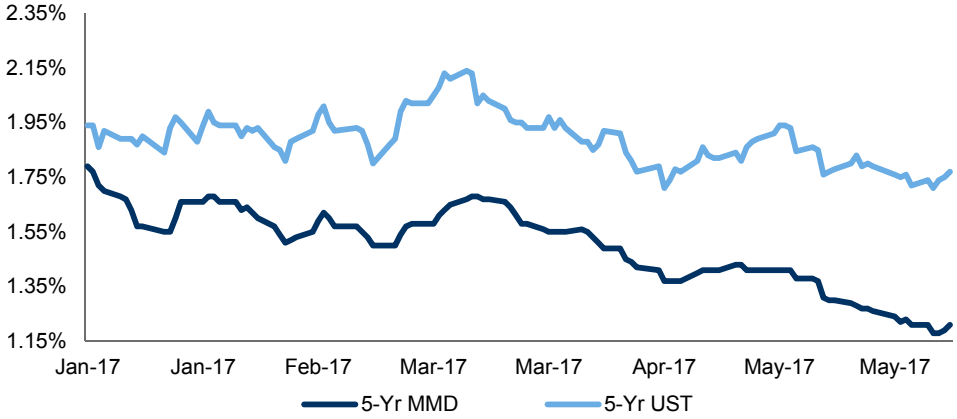
Snapshot of Treasury and Municipal Yields – 2017 YTD

2-Yr MMD vs. 2-Yr UST



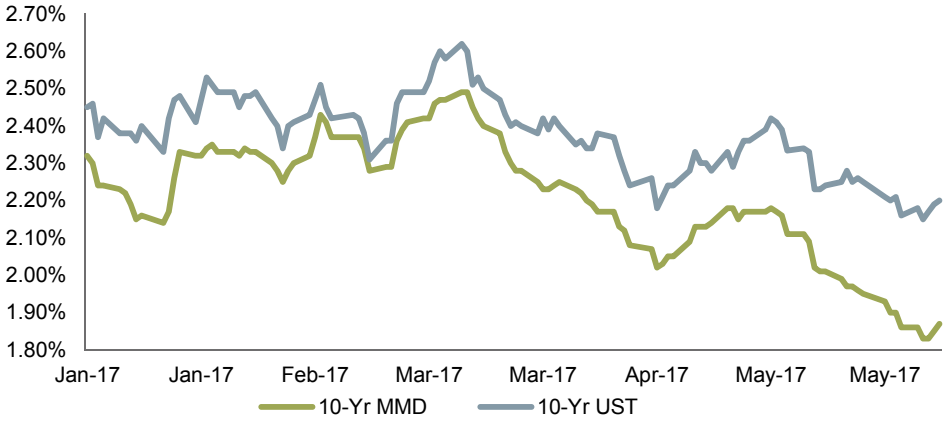
MMD:	Maximum	1.23%	Minimum	0.88%	Average	1.01%	Current	0.90%
UST:	Maximum	1.40%	Minimum	1.12%	Average	1.26%	Current	1.34%

5-Yr MMD vs. 5-Yr UST



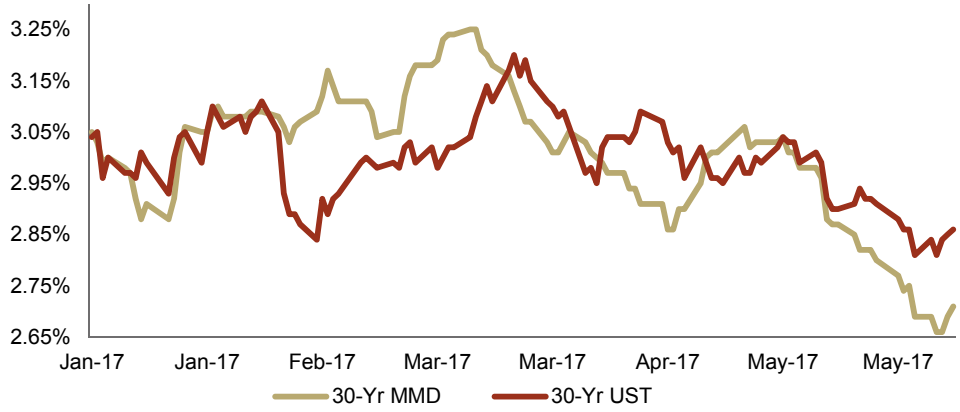
MMD:	Maximum	1.79%	Minimum	1.18%	Average	1.50%	Current	1.21%
UST:	Maximum	2.14%	Minimum	1.71%	Average	1.89%	Current	1.77%

10-Yr MMD vs. 10-Yr UST



MMD:	Maximum	2.49%	Minimum	1.83%	Average	2.21%	Current	1.87%
UST:	Maximum	2.62%	Minimum	2.15%	Average	2.37%	Current	2.20%

30-Yr MMD vs. 30-Yr UST



MMD:	Maximum	3.25%	Minimum	2.66%	Average	3.00%	Current	2.71%
UST:	Maximum	3.20%	Minimum	2.81%	Average	3.00%	Current	2.86%

Source: TM3, Bloomberg. Rates as of June 9, 2017

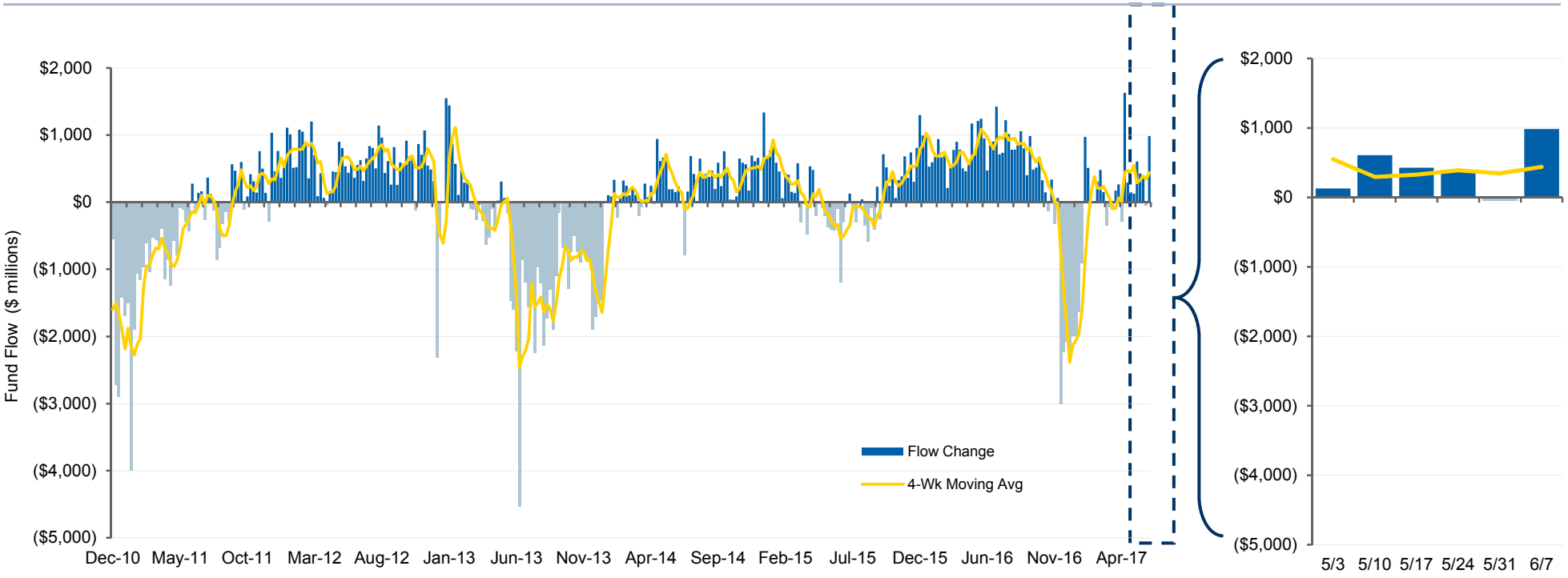
Municipal Market Fund Flows

Municipal bond funds see inflows

According to data from Lipper, for the week ended June 7th, 2017, weekly municipal bond funds reported $985 million of inflows, up from the previous week's $51 million of outflows

- Long-term muni bond funds also experienced inflows, gaining $636 million in the latest week, after outflows of $106 million in the previous week
- Four week moving average is currently positive at $439 million, up from last week's number of $344 million

Lipper Municipal Fund Flows



Period ended June 7, 2017

pfm