Metro Nashville District Energy System

District Energy System
Program Options Report

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Submitted to:

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1 Executive Summary

1.1 Report Outline and Key Financial Metrics

FVB Energy Inc. (FVB) has prepared this comprehensive recommendation report for The Metropolitan Government of Nashville and Davidson County ("Metro") to summarize the in-depth assessment of the economic viability of the Metro Nashville District Energy System (Metro DES), and provide recommendations pertaining to different scenarios for the future of the system. The general intent is to determine the best economic and technically feasible future for the Metro DES.

A District Energy System (DES) can deliver hot water, steam, or chilled water (CHW) from a central plant for distribution to multiple buildings, thus eliminating the need for individual boilers and chillers and providing a platform for incorporation of multiple energy supply options. Benefits include reduced greenhouse gas emissions and point-use pollution, stable energy prices, and greater operational synergies.

FVB analyzed four primary scenarios for Metro DES and calculated the Net Present Value (NPV), Internal Rate of Return (IRR), Enterprise Value (EV), and an Enterprise Value (EV)/Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) valuation for the four scenarios. The *Business Exit* case also considers the NPV of avoided future Metro Funding Amount (MFA) subsidies. This information is summarized in the table below.

Table 1: Key Financial Metrics of the Four Primary Scenarios[1]

	***NO GROWTH* SCENARIO**	***GROWTH* SCENARIO**	**INTERNAL MANAGEMENT AND OPERATIONS OPTION[2]**	***BUSINESS EXIT* CASE[3]**
NPV	$36.2 MM	$40.1 MM	$50.4 MM	NA
IRR	8.3%	7.3%	9.6%	NA
EV	$95.5 MM	$99.3 MM	$109.7 MM	NA
NET SALE VALUE	NA	NA	NA	$4.5 MM
NPV OF MFA COST AVOIDANCE	NA	NA	NA	$10.4 MM

The key financial metrics shown in Table 1: Key Financial Metrics of the Four Primary Scenarios are mainly determined by capital expenditures (CAPEX), operations & maintenance (O&M) costs, and revenue. The figure below illuminates the discounted present values of these inputs for the three scenarios involving maintaining Metro ownership of Metro DES.

[1] Valuations with a 10% reduction in System Operator (SO) costs beginning in Fiscal Year 2019 are used for the *No Growth* and *Growth* scenarios. Details regarding the methodology behind this assumption are given in 7.1.2 Metro DES SO Costs.

[2] The results shown for the internal management and operations option use the *No Growth* scenario as a base, and apply the cost savings explained in 5.2 Annual Operating Budget.

[3] An EV/EBITDA multiple of 12 based off financial models that incorporate a 10% reduction in SO costs and expansion possibilities is used to determine the given valuation.

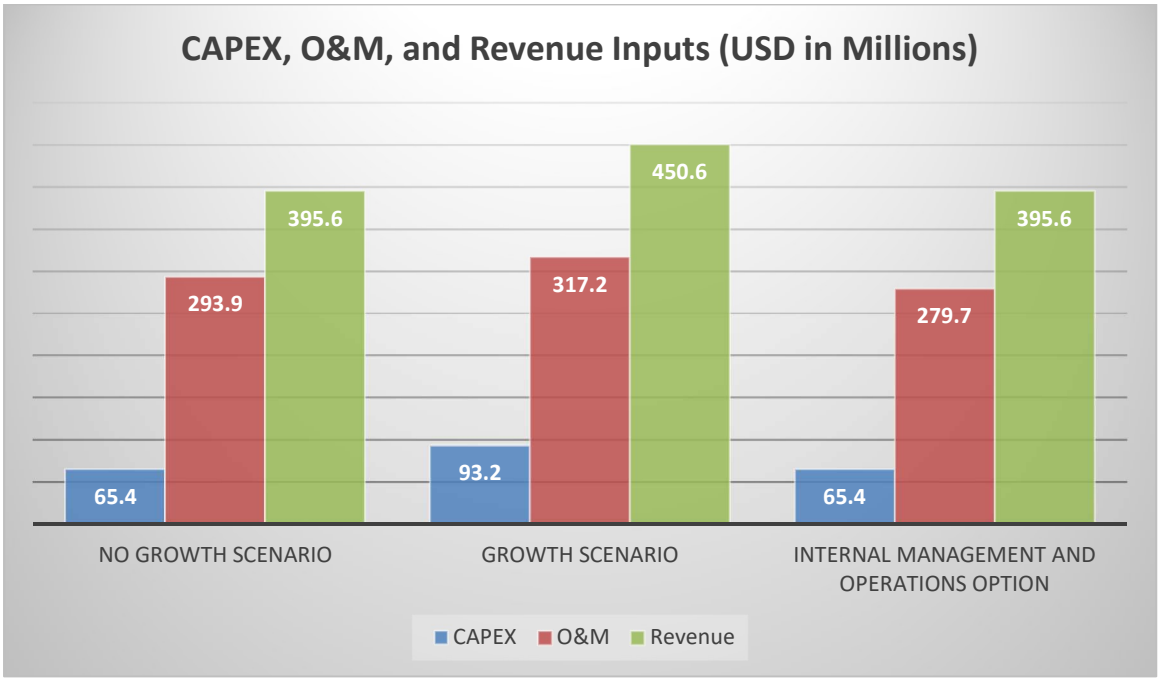

Figure 1: CAPEX, O&M, and Revenue Inputs[45]

The CAPEX, O&M, and revenue inputs highlighted in Figure 1: CAPEX, O&M, and Revenue Inputs explain the higher NPVs seen in the *Growth* scenario and the internal management and operations option. The *Growth* scenario witnesses higher CAPEX and O&M than the *No Growth* scenario yet has substantially higher revenue. On the other hand, the internal management and operations option has the same CAPEX and revenue as the *No Growth* scenario but noticeably lower O&M.

The NPVs of the three different scenarios in which Metro retains ownership of the Metro DES result in the MFA declining at different rates. If the assumptions made in the construction of Table 1 and Figure 1 are maintained and CAPEX is not accounted for in determining the MFA, the MFA ceases to be necessary for the *No Growth* scenario in 2022 and is no longer necessary for the internal management and operations option in 2020. The *Growth* scenario generates a sustained cash surplus starting in 2031, and as such does not contribute to a more rapid decline of the MFA, but rather contributes to the value of the Metro DES in the long run and demonstrates promise to a potential acquirer.

[4] Valuations with a 10% reduction in System Operator (SO) costs beginning in Fiscal Year 2019 are used for the *No Growth* and *Growth* scenarios. Details regarding the methodology behind this assumption are given in 7.1.2 Metro DES SO Costs.

[5] The results shown for the internal management and operations option use the *No Growth* scenario as a base, and apply the cost savings explained in 5.2 Annual Operating Budget.

1.2 Report Processes and Analysis

This study began by evaluating the current state of the Metro DES – a "Status Quo" analysis. Maintaining operations, customer contracts, the management structure, and ownership as they currently exist is an undesirable state of affairs for the following reasons:

- Energy Generation Facility (EGF) equipment will age and require additional CAPEX although the current rate structure does not recognize this need.
- Customer contracts will move closer to their expiration and without new growth this will reduce the future market value of the Metro DES.
- Potential new growth opportunities already have been missed and this will continue without a dedicated marketing effort.[6]

Following completion of the "Status Quo" analysis, FVB assessed options to grow the DES to serve new customers via expansion of the EGF or the construction of a Thermal Energy Storage (TES) tank. The growth options assessed are not mutually exclusive, however the TES tank is the most economically viable option and is modeled to determine the key financial metrics in the *Growth* scenario in Table 1: Key Financial Metrics of the Four Primary Scenarios. Using conservative estimates for the required CAPEX and maintaining assumptions about the existing operations and management structure yields an IRR of 5.2% for the TES Expansion, and 3.0% for the EGF Expansion.

Growth of the Metro DES is a necessary and promising option, yet it will require a substantial upfront capital investment – $52.7 MM for the EGF Expansion and $38.5 MM for the TES Expansion.[7] If Metro chooses to retain ownership of the Metro DES, it will need to put Capital at Risk (CaR) to achieve growth.

FVB explored the option of internal management and operations being performed by Metro while retaining ownership. Based on FVB industry knowledge and benchmarking against similar systems, the possible cost savings and operational efficiencies to be gained could yield a 19% reduction in the annual O&M costs of the Metro DES. To achieve these cost savings, a well-defined transition plan, management structure, and capital plan need to be implemented. How these savings would be allocated under the current customer contracts will need to be investigated further.

Regardless of the ownership of Metro DES, an active management structure that takes ownership, has accountability, and encourages growth will need to be put in place. It will be necessary to incorporate an effective marketing scheme into the management structure to successfully capture growth opportunities. New customers should sign contracts that do not tie debt service to customer revenues, and existing customer contracts need to be revisited and

[6] Previous growth opportunities may have been missed because of system capacity issues or hydraulic concerns in the Energy Distribution System.

[7] Present day capital costs given.

restructured to allow additional capital to flow to the Metro DES. This will allow for system growth, EGF maintenance and improvements, and additional CAPEX needs.

FVB also analyzed the market value of the Metro DES to a potential acquirer. Typical sales prices for DES sales use an EV/EBITDA multiple, and have ranged from a multiple of 10 to 14. Valuation criteria encompass potential growth, CAPEX requirements, customer contracts, and commodity risk. Based on these criteria, the possible Metro DES valuation ranges from $39.7 MM to $55.6 MM. This valuation ranges from $46.7 MM to $65.4 MM if the TES Expansion option for growth is pursued and a reduction of 10% in System Operator (SO) costs – an attainable amount in FVB's opinion – is included in the valuation.

In addition to the sales price, sale of the Metro DES would alleviate the need for future MFA subsidies from Metro – no further capital infusions, bond financing, or subsidies would be required of Metro. If the "Status Quo" is maintained with projected CAPEX needs accounted for, the NPV of future MFAs discounted at 4.33% is $10.4 MM. Aggregating a possible sales price of $56.1 MM with the NPV of future MFAs results in a value to Metro of $66.5 MM; however, Metro DES net debt as of the end of Fiscal Year (FY) 2017 stood at $51.6 MM, thus Metro could potentially see a net value of $14.9 MM from the sale of the Metro DES.

A sale of Metro DES would likely result in the acquirer seeking to aggressively grow the system. In addition, FVB's experience indicates that current contracts will be honored.

The work presented in this document clearly displays the fundamental principles, technical concepts, and business cases available to Metro.

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Glossary

ARMA	Amended and Restated Contract for the Design and Construction of an Energy Generation Facility, Improvement of an Energy Generation Facility, Improvement of an Energy Distribution System, and Long Term Operation and Management of the Nashville District Energy System
CAPEX	Capital Expenditures
CaR	Capital at Risk
CHW	Chilled Water
Constellation	Constellation Energy Projects & Services Group, Inc.
DCF	Discounted Cash Flow
DES	District Energy System
EBT	Earnings Before Tax
EBIT	Earnings Before Interest & Tax
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
EDS	Energy Distribution System
$EFLH_C$	Effective Full-Load Cooling Hours
EGF	Energy Generation Facility
ETS	Energy Transfer Station
EUI	Energy Use Intensity
EV	Enterprise Value
FCF	Free Cash Flow
FOC	Fixed Operating and Maintenance Component
FVB	FVB Energy Inc.
FY	Fiscal Year
G&A	General & Administrative
GP	Gross Profit
ISC	Initial System Customer
IRR	Internal Rate of Return
LNG	Liquefied Natural Gas
Metro	The Metropolitan Government of Nashville and Davidson County
MWS	Metro Water Services
MFA	Metro Funding Amount
Metro DES	Metro Nashville District Energy System
NPV	Net Present Value
O&M	Operations & Maintenance
PSD	Performance Start Date
P3	Public-Private Partnership
RT	Refrigeration Ton
SF	Square Foot

SO	System Operator
TE	Thermal Engineering Group, Inc.
TES	Thermal Energy Storage
TMSP	Tennessee Stormwater Multi-Sector General Permit
WACC	Weighted Average Cost of Capital

2 Introduction

FVB has prepared this comprehensive recommendation report for Metro to summarize the in-depth assessment of the economic viability of the Metro DES, and provide recommendations pertaining to different scenarios for the future of the system. FVB worked with Gershman, Brickner & Bratton, Inc. and LG Environmental Engineering to form a team of consultants able to advise Metro on all aspects of the Metro DES.

The District Energy System Program Recommendations are targeted towards four primary scenarios. The first scenario is the *No Growth* scenario – alternatively referred to as a scenario that maintains a "Status Quo" position. The second scenario is the *Growth* scenario, which explores the expansion of existing system capabilities to serve new customers; capacity growth is explored via expansion of the EGF or the construction of a TES tank. The third scenario is the internal management and operations option, an option that evaluates the benefits and challenges of Metro retaining ownership, managing, and operating the Metro DES. The final scenario is the *Business Exit* case, a scenario that analyzes different methods of financial valuation and outlines implications and projections for Metro DES rates and debt.

In each of the four scenarios, current and projected revenue streams and DES CAPEX, O&M costs, and financing structures and costs are considered. Subsequently, financial valuations are developed for the *No Growth* and *Growth* scenarios as well as the internal management and operations option that comprise book value, market value, and discounted cash value valuations. In the *Business Exit* case, these valuations are incorporated into a broader study of the DES that provides input to FVB's recommendations.

Following the development of the four scenarios, FVB provides recommendations that provide direction regarding the following questions:

1. How does the Metro DES compare to its peers utilizing common industry metrics?
2. What benefits does Metro ownership of the Metro DES convey, financial or other?
3. How would potential acquirers value Metro DES today and in the future?
4. What would a simple sale scenario look like?

The deliverables are expected to provide a comprehensive evaluation of business case viability and, assuming viability, a strong foundation and good direction leading into the next steps to maintain, expand, or sell the Metro DES.

2.1 Objectives

After the approval of the "Clean, Green, Lean" Waste Management Plan, Metro DES become operational in mid-December 2003 with the capability to provide reliable, cost-effective, and environmentally sound energy services. Metro signed an operation and management contract with Constellation Energy Projects & Services Group, Inc. ("Constellation") that commenced on December 17th, 2003 and will end on the fifteenth anniversary of that date (December 17th, 2018). Metro's FY 2019 will begin on July 1st, 2018, and as such Metro seeks guidance

regarding the future of the contract. Metro can extend its current contract with Constellation for up to three additional terms consisting of five years each; nevertheless, regardless of the decision to contract out operations to Constellation or to another operator, Metro should rebid its existing contract per the reasons explained in 7.1.2 Metro DES SO Costs.

Prompted by the impetus to evaluate the future of the relationship between Metro and Constellation, Metro expressed interest in recommendations for the entirety of the Metro DES. Options for growth, sale of the DES, internal management and operation, and other alternatives are explored, and recommendations given.

2.2 Acknowledgements

FVB would like to acknowledge the assistance and guidance from the following people:

- Talia Lomax O'dneal – Metro Finance Department
- Kim McDoniel – Metro Finance Department
- Bob Lackey – Metro Finance Department
- Scott Potter – Metro Water Services
- Daniel Coyle – Thermal Engineering Group, Inc.
- Kevin Jacobs – Thermal Engineering Group, Inc.
- Alan Robertson – Assistant State Architect & DES Board Member – State of Tennessee
- Andrew Collins – Metropolitan Planning Department – Metro
- Tim Hestle – General Manager – Constellation

2.3 General

A district energy system can produce and deliver hot water, steam, or CHW from a central plant for distribution to many buildings. Metro DES produces and distributes steam and chilled water through underground pipes to buildings connected to the EGF.

Each building connected to the system receives energy through an energy transfer station (ETS). Having centrally produced steam and CHW sources eliminates the need for individual boilers, chillers, or cooling towers at each building.

The CHW returns to the EGF to be re-cooled and re-distributed. This closed-loop system allows for efficient production and distribution of energy.

In addition to providing thermal energy the Metro DES provides the opportunity to have a positive impact on the city's electrical production and distribution system. Two of the positive impacts are:

- Competitive cooling and heating prices from the Metro DES reduce the reliance on electricity-based cooling and heating systems
- Reduces the need for additional and/or upgraded electrical distribution infrastructure that would be necessary for electricity-based cooling and heating systems

Additional DES benefits can include:

- Reduction in fossil fuel use and reduced reliance on non-local fuel sources
- Use of local fuel resources providing a positive impact on the local/regional energy economy, and greater energy security
- Reduced need for boilers or fuel storage facilities within individual buildings, thus freeing up additional space for sale or rent
- Stable energy prices
- Substantial reduction in greenhouse gas emissions which allows business owners to inexpensively “green” their building
- Improved air quality and reduced point-use pollution
- Cost-effective means to implement the highest standards in emission reduction equipment
- Future flexibility - the cooling and heating energy source can be changed if a better option exists in the future

The DES connects to customers in areas throughout Nashville, typically connecting to buildings that represent the largest cooling and heat requirements in the city.

Currently, customer contracts are typically signed for a period of thirty years, with an option to renew the contract and extend it for a period of five years – renewal of the contract is the default option unless either party to a customer contract gives notice of cancellation at least one year prior to the last day of the initial contract. Initial System Customers (ISCs) will have their initial contracts expire on or about FY 2034.

2.4 District Energy System Program Recommendations Outline

There are four main sections in the body of the report:

- *No Growth* scenario, which includes:
  - Results Summary
  - Analysis of the Existing Operating Revenues & Costs
  - Identification of Trends and Outlying Revenues & Costs
  - DES Rates, Customer Contracts, Debt Service, & System Operator (SO) Costs

- *Growth* scenario, which includes:
  - Scenario Approach
  - Building Load & Energy Analysis – identifies the potential customers and their respective thermal loads
  - Growth Option Rationale and Associated Load Clusters
  - Load Phasing and Capital Costs
  - Model Assumptions
  - Environmental and Other Permitting Needs
  - Results Summary
  - Sensitivity Analyzes

- Internal Management and Operations option, which includes:
  - Management and Personnel Requirements
  - Annual Operating Budget
  - Challenges and Key Takeaways

- *Business Exit* case

- Recommendations, which address the following questions:
  - How does the Metro DES compare to its peers utilizing common industry metrics?
  - What benefits does Metro ownership of the Metro DES convey, financial or other?
  - How would potential acquirers value Metro DES today and in the future?
  - What would a simple sale scenario look like?

The Appendices of the report contain supporting details referenced within the body of the report.

3 *No Growth* Scenario

The *No Growth* scenario represents a "Status Quo" or business as usual approach to the current and future operations of the Metro DES. This approach assumes a continuation of current revenue, cost, and growth rates and trends. Additionally, existing debt payment schedules and excess cash are incorporated into this scenario. Further details of the results are found in Appendix A – *No Growth* Scenario.

3.1 Results Summary

3.1.1 Key Financial Terms

- NPV (Net Present Value) is the difference between the present value of the benefits of a project and its costs.
- IRR (Internal Rate of Return) is defined as the interest rate that sets the NPV of the cash flows of a project to zero.
- WACC (Weighted Average Cost of Capital) is the average cost of capital an entity must pay to all its investors, both debt and equity holders.
- FCF (Free Cash Flow) is the incremental effect of a project on the available cash of an entity.
- EV (Enterprise Value) is the present value of the FCF that an entity has available to pay all investors, both debt and equity holders. It can be interpreted as the net cost of acquiring an entity's equity, takings its cash, and paying off all debt.
- DCF (Discounted Cash Flow) is a valuation method that estimates the EV of an entity by computing the present value of the FCF of an entity.

3.1.2 Key Takeaways

Table 2: *No Growth* Scenario Key Takeaways

Year	2018[1]	2028	2038	2042
EBITDA (USD in 000's)	$3,784	$5,979	$9,125	$10,729
FCFs (USD in 000's)	$3,206	$5,343	$8,327	$25,327*
FCFs after Debt Servicing	-$2,268	$1,078	$8,327	$25,327*

Key Assumptions:

- WACC is 4.33%[8]
- Revenue grows at 2.8%
- Costs grow at 2.3%

1 2018 numbers are derived from the Thermal Engineering Group, Inc. DES FY18 Budget

* Includes Net Investment value (CAPEX – Depreciation)

The NPV of the *No Growth* scenario is $27.8 MM, and this scenario has an IRR of 7.4%. Using the DCF method leads to an EV of $87.0 MM if all the key assumptions used in Table 2: *No Growth* Scenario Key Takeaways are maintained. These financial metrics are different than the metrics found in Table 1: Key Financial Metrics of the Four Primary Scenarios due to the application of lower SO costs to the metrics in Table 1.

3.2 Analysis of the Existing Operating Revenues & Costs

Existing operating revenues exceed operating costs; however, a substantial amount of yearly debt service requires Metro to subsidize the Metro DES on a yearly basis via the MFA, as is illustrated by the fact that 59% of Metro DES's underlying business activity is financed via debt (Debt to EV Ratio). This scenario assumes minimal revenue growth (0.5%) above and beyond inflationary amounts since a minimal amount of new service connections are encompassed in the DES FY18 Budget – Attachment C – Five-Year Capital Plan (Thermal Engineering Group, Inc. (TE), June 23, 2017).

The Five-Year Capital Plan for the Metro DES outlines an estimated baseline CAPEX of $495,000 per year over the next five years, with specific years requiring greater CAPEX because of new service connections.[9] The required CAPEX amounts to the difference between the EBITDA and the FCFs in any given year.

[8] Details regarding the use of 4.33% as the WACC are given in 7.1.1.1 Cost of Capital.

[9] All the existing capital funds available at the beginning of FY18 have been committed and are expected to be spent during FY18.

3.3 Identification of Trends and Outlying Revenues & Costs

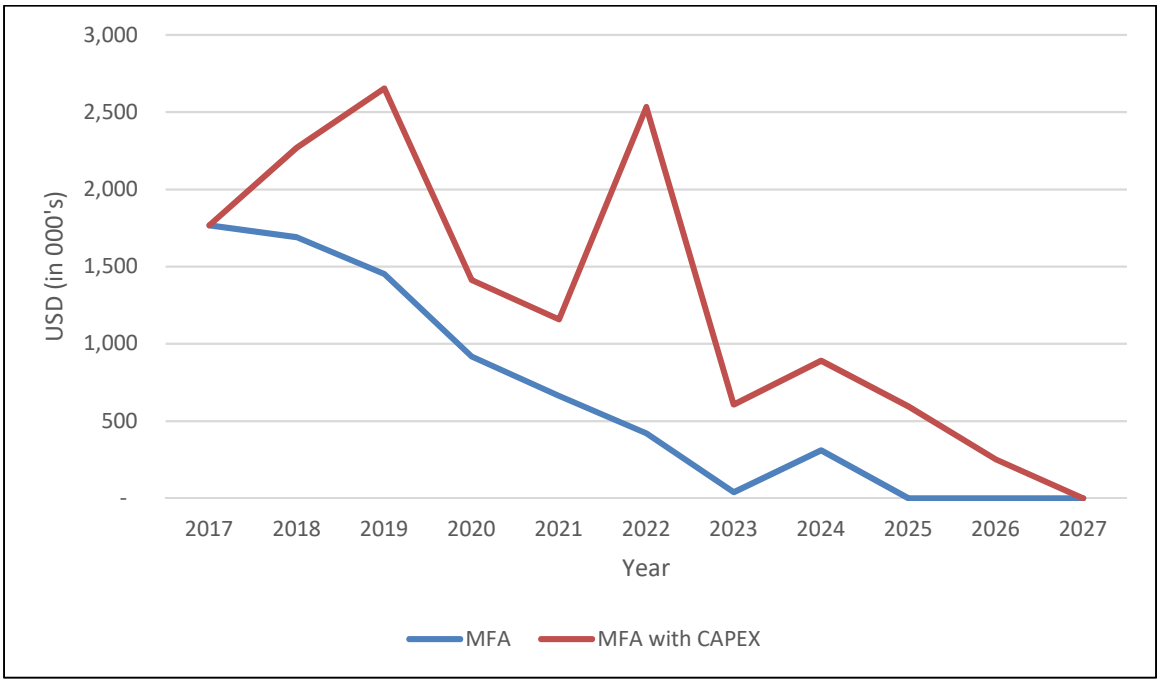

Figure 2: Metro Funding Amounts over Time[10]

As Figure 2: Metro Funding Amounts over Time shows, the MFA will slowly decline over time; however, this decline does not account for needed infusions of capital that will need to be financed or subsidized by Metro, nor does it address access to capital issues that Metro DES may have. These concerns will be addressed in the Recommendations.

3.4 DES Rates, Customer Contracts, Debt Service, & System Operator (SO) Costs

Metro DES has a unique rate structure that contractually links some customer energy rates to Metro debt service. ISC contracts have their capital cost allocation tied to the debt service payment for the District Energy System Revenue and Tax Refunding Bonds, Series 2012A. The 2012A Bonds are retired in FY 2034, and then Metro DES will need to negotiate new contracts to maintain their operating revenue at a steady level, as is outlined in the Recommendations. For the purposes of the *No Growth* scenario, it is assumed that current customers will remain customers of Metro DES and will continue to pay a capital cost allocation that is not tied to the debt service of Metro DES – it is FVB's experience that customers satisfied with the service a DES gives will not seek to install self-generating energy services.

SO costs totalled $4.6 MM in FY 2017 and escalate with inflation. This is a high Fixed Operating and Maintenance Component (FOC), and reflects the fact that the contract in place articulated

[10] Historically, MFAs have ranged from $1.7 MM to $2.4 MM per year over the past five FYs (median amount is $1.9 MM).

design and construction of an EGF as well as long term operation and maintenance. Based on FVB experience, this FOC can be lowered and this will be addressed in Recommendations.

4 Growth Scenario

The *Growth* scenario analyzes an approach to the current and future operations of the Metro DES that aggressively seeks to grow the DES. This approach identifies and assesses potential new energy loads, evaluates opportunities for expanding system capabilities, estimates the load phasing and CAPEX required for increasing generation and distribution capabilities, and illuminates associated environmental and other permitting needs. Further details of the results are found in Appendix B – Growth Scenario.

4.1 Scenario Approach

For the purposes of modeling growth scenarios for the Metro DES, FVB looked exclusively at the potential acquisition of customers demanding only CHW. Incremental growth related to steam demands is not explicitly addressed in the financial models and statements.

The FVB team worked with the Metro Nashville Planning Department and utilized additional information sources to identify proposed developments that comprise promising candidates for future connections to the Metro DES. After a review of the data and following valuable discourse with TE, FVB identified two different and not mutually exclusive growth options to serve the identified developments:

- EGF Expansion
- TES Expansion

4.2 Building Load & Energy Analysis – identifies the potential customers and their respective thermal loads

4.2.1 Customer Identification

To identify potential new customers for the Metro DES, the FVB team worked with the Metro Nashville Planning Department Urban Core Development Listing 2011-2016, a database of completed, under construction and proposed projects in the Nashville downtown area, which roughly corresponds to the reach of the Metro DES. The development projects under consideration are in an area bounded by the Cumberland River on the east, Interstate 40 to the south and west, and Garfield Street to the north. This database was supplemented by the Nashville Crane Watch (Nashville Business Journal, August 2017), which included some more recent proposed developments, and served to update those projects that were listed as proposed by the Metro Planning database that are now under construction or abandoned since the last update of the Metro Planning database.

The FVB team identified commercial, mixed-use, office and hotel projects. For the most part, residential projects were excluded, because the experience of Metro DES indicated that residential developers are primarily concerned with first cost rather than life-cycle cost, making it difficult to compete with the less expensive self-cooling alternatives for apartments and condos. Proposed residential developments of over 100 units were included, however, because it is felt that at that scale Metro DES would be competitive for developers.

The resulting database of proposed developments that comprise promising candidates for future connections to the Metro DES consists of 31 projects. Depending on economic and market conditions, this set of projects may change over time, but it is representative of the current potential that exists for Metro DES expansion and growth. A map showing the location of the candidates is shown in the figure below followed by a table of a selection of the candidates.

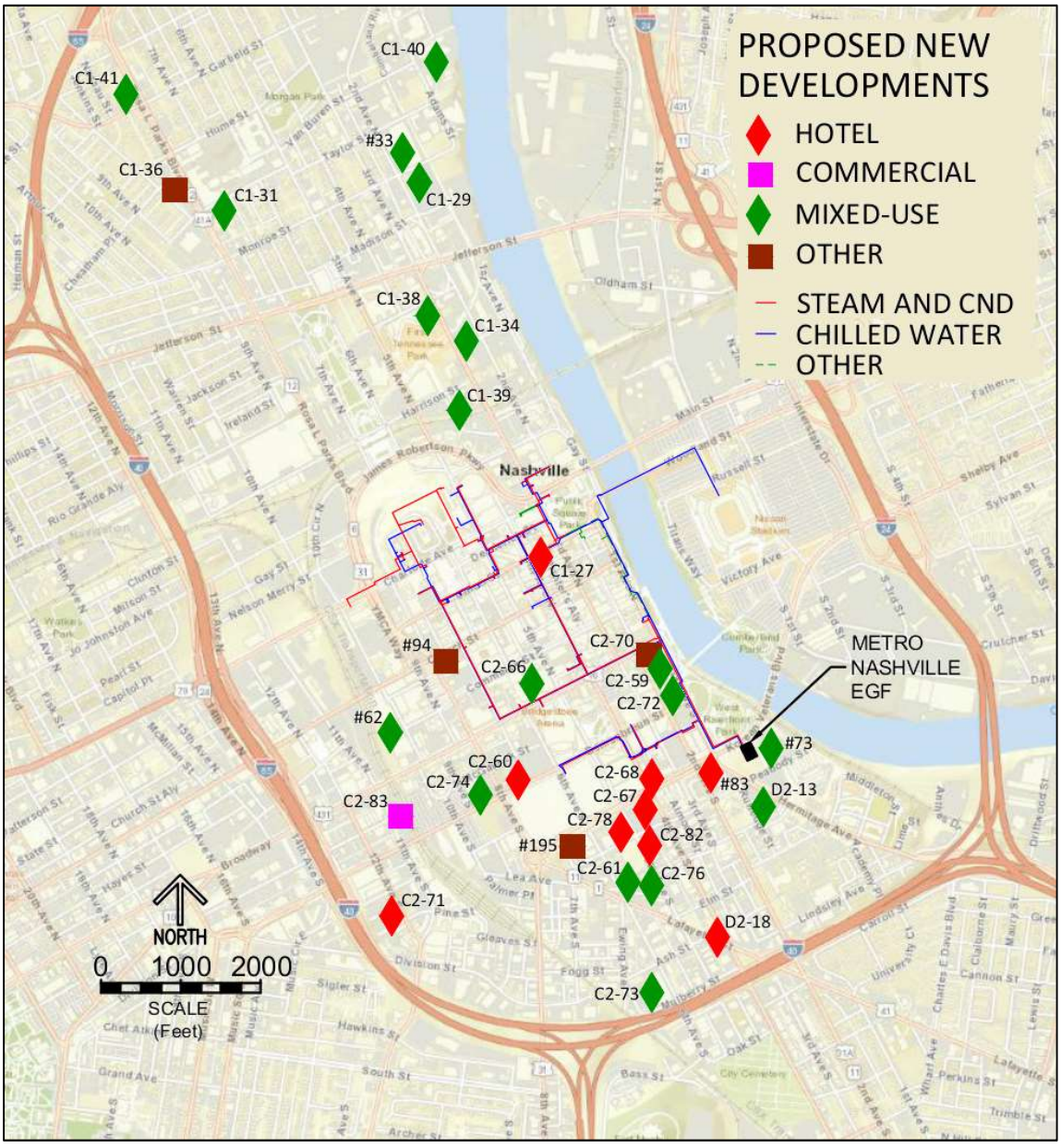

Figure 3: Proposed New Developments

Table 3: Sample Selection of Proposed New Developments

Map	Status	Name	Location	Use	Developer	Total Floors	Commercial Sqft	Office Sqft	Total # of Units	# Parking Spaces	Notes
Projects Proximate to the Distribution System:											
North of Broadway; the 1st/2nd Avenue Corridor - (LOAD CLUSTER#01) - Green on Load Clusters Figure											
C2-59	Proposed	The Bridge (Lark Hotels)	120 2nd Ave S	Mixed-use	Frank May	6		NA	40		
C2-66	Proposed	Fifth + Broadway	500 Broadway	Mixed-use	OliverMcMillan, Spectrum/ Emery Inc	34	250000	425000	325	2400	
C2-70	Proposed	The National Underground (Basin Alley Bldg)	105 Broadway	Commercial	MJM Real Estate LLC	5	37000	NA	NA		
C2-72	Proposed	151 1st Ave	151 1st Ave S	Mixed-use	Northern Capital Investments, Second Avenue Partners LLC, The Congress Group	40		NA	497	730	280 residential, 217 hotel
#94	Proposed	Federal Courthouse	719 Church Street	Office	U.S. GSA	6		?			
#62	Proposed	Nashville Yards	Commerce & 10th Ave. N	Mixed-use	Southwest Value Parners; Lincoln Property		15 acres - Former LifeWay Christian Resources				

4.2.2 Energy Analysis

Following the identification of potential new customers for the Metro DES, FVB assigned square footage estimates per unit to residential and hotel developments based off US Census Bureau data and prior FVB experience, respectively. Subsequently, FVB drew from its experience to assign inputs for Energy Use Intensity (EUI) in terms of Square Foot (SF)/Refrigeration Ton (RT), as shown in the table below.

Table 4: Cooling Load Estimates (Based on Area)

	Residential	Office	Commercial	Hotel	Mixed Use
SF/RT	400	500	417	455	476

After performing an energy analysis for all proposed new developments, FVB projected the total cooling load of all identified developments to be 19,409 RT.

4.3 Growth Option Rationale and Associated Load Clusters

Based off the proposed new developments identified in Figure 3: Proposed New Developments, FVB defined five load clusters according to assumed Energy Distribution System (EDS) piping routes. The assumed piping routes and associated load clusters are visible in the figure below. The actual piping routes may differ depending on site conditions and preferences.

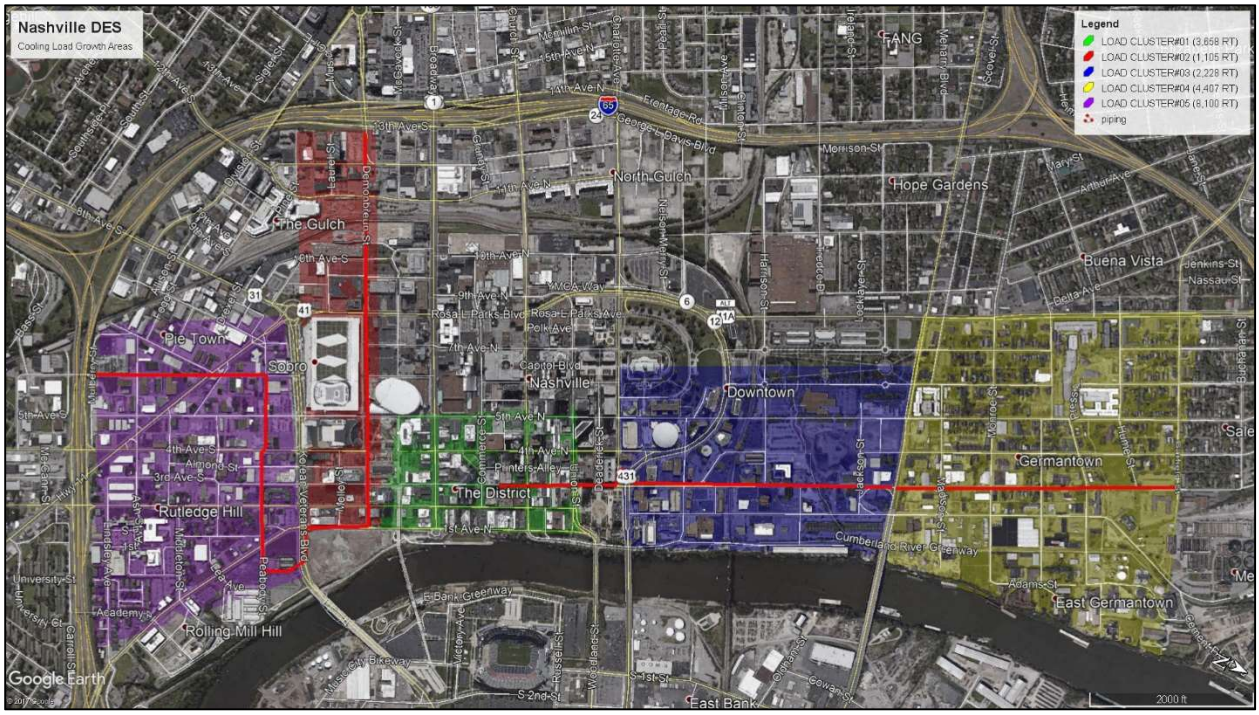

Figure 4: Load Clusters and EDS Expansion

The five load clusters identified in Figure 4 serve the following areas:

- Load Cluster #01 is north of Broadway; the 1st/2nd Avenue Corridor.
- Load Cluster #02 is between Broadway and Korean Veterans Boulevard, between the River and I-40.
- Load Cluster #03 is between Main and Jefferson, east of Bicentennial Mall.
- Load Cluster #04 is north of Bicentennial Mall, River to Rosa Parks Boulevard.
- Load Cluster #05 is between Korean Veterans Boulevard and I-40, River to the Circle.

Clusters #01, #03, & #04 are assumed to be supplied by a TES during peak load hours. The TES will have a pump room attached to it, and pumps will supply the required flow at peak times. The TES will supply CHW from the far end of the EDS, thus relieving the EDS's bottleneck and freeing up distribution capacity in the downtown area. The TES will be charged during off-peak periods by the EGF.

Clusters #02 & #05 are assumed to be supplied by the EGF Expansion due to the proximity of the EGF to those load clusters.

After dividing the geographical expansion areas into five potential load clusters and identifying the energy generation option best suited to each load cluster, potential new developments were segmented by their assigned load cluster and the RT per load cluster determined, as is illustrated in the table below.

Table 5: RT Per Load Cluster

Load Cluster	#01	#02	#03	#04	#05
Total RT	3,570	1,105	2,228	4,407	8,100

Aggregating the total RT in the EGF Expansion option (load clusters #01, #03, & #04) together yields 9,205 RT of potential load, and a similar aggregation for the TES Expansion option (load clusters #02 & #05) yields 10,205 RT of potential load. As a result, FVB sized both the EGF Expansion option and the TES Expansion option to have 5,000 RT installed capacities.

4.4 Load Phasing and Capital Costs

4.4.1 Capital Costs for EDS Expansion

A dollar figure of $4,127 per linear foot is used to determine the CAPEX required to expand the EDS. This figure is arrived at by using the $3,303 per linear foot cost incurred during the construction of the EDS expansion to the Hyatt Place Nashville in 2013, adding a 20% contingency for engineering and rock excavation, and adjusting for inflation using CPI-South inflation rates.

4.4.2 Capital Costs for ETS Additions

A fixed cost of $50,000 per each additional connected building, plus a dollar figure of $100 per RT is used to determine the CAPEX required for ETS additions. These numbers account for the costs associated with instrumentation and meter sizing, and are arrived at following discussion and advisement from TE.

4.4.3 EGF Expansion Phasing and Associated CAPEX

In the EGF Expansion model it is assumed that there are five phases, and that 2,500 tons of CHW capacity will be constructed in the initial phase of the expansion, and an additional 2,500 tons of capacity will be constructed in phase three. Customer acquisition and subsequent contractual capacity growth is spread out over the five phases in even increments of 1,450 tons. The costs incurred during each phase are adjusted for inflation using inflation expectations released in September 2017 from the Federal Reserve Bank of Cleveland. The following table illustrates the timing of each phase and the associated overall CAPEX to include EDS expansion CAPEX, and additional ETS CAPEX.

Table 6: EGF Expansion Model Phasing and Associated CAPEX

Capacity & Commissioning	Capacity (tons)		Construction Start Date			Commissioning Date			Capital Cost	
	Installed	Contracted	Month (1-12)	Year (xxxx)		Month (1-12)	Year (xxxx)		$ mn	$ per ton
Phase 1	2,500	1,450	7	2018	Jul-18	7	2019	Jul-19	28.0	11,184
Phase 2	0	1,450	7	2020	Jul-20	7	2021	Jul-21	0.3	N/A
Phase 3	2,500	1,450	7	2022	Jul-22	7	2023	Jul-23	26.9	10,757
Phase 4	0	1,450	7	2024	Jul-24	7	2025	Jul-25	0.3	N/A
Phase 5	0	1,450	7	2026	Jul-26	7	2027	Jul-27	0.3	N/A
Total	5,000	7,248							55.7	11,137

4.4.3.1 EGF Expansion CAPEX

A total present-day cost of $16.2 MM is assumed for a 5,000-ton expansion of the EGF. This assumption is based off estimates presented to TE and further modified based on feedback received. Furthermore, 59% of the CAPEX is incurred during Phase 1 and 41% of the CAPEX is incurred during Phase 3.

4.4.3.2 EDS Expansion CAPEX

A total present-day cost of $44.8 MM for EDS expansion is assumed for the EGF Expansion model. This assumption calculates the total linear feet required for the expansion of the EDS to Load Clusters 2 (red cluster on Figure 4: Load Clusters and EDS Expansion) and 5 (purple cluster on Figure 4), and assumes that 7,248 tons of this load will become contracted capacity. Subsequently, 79% - the proportional percentage of the overall contractual load potential – of the total EDS expansion CAPEX is incorporated into the financial model. Half of this CAPEX is incurred during Phase 1 and the other half during Phase 3.

4.4.3.3 Additional ETS CAPEX

A total present-day cost of $1.6 MM for additional ETS CAPEX is assumed for the EGF Expansion model. Based on the fixed costs per connected building and the ETS CAPEX per RT, 7,248 RT is assumed to become contracted capacity and $1.2 MM is the resulting CAPEX. This CAPEX is spread out evenly over the five phases.

4.4.4 TES Expansion Phasing and Associated CAPEX

In the TES Expansion model it is assumed that there are five phases, and that 5,000 tons of CHW capacity will be constructed in the initial phase of the expansion. Customer acquisition and subsequent contractual capacity growth is spread out over the five phases in even increments of 1,450 tons. The costs incurred during each phase are adjusted for inflation using inflation expectations released in September 2017 from the Federal Reserve Bank of Cleveland. The following table illustrates the timing of each phase and the associated overall CAPEX to include EDS expansion CAPEX, and additional ETS CAPEX.

Table 7: TES Expansion Model Phasing and Associated CAPEX

Capacity & Commissioning	Capacity (tons)		Construction Start Date			Commissioning Date			Capital Cost	
	Installed	Contracted	Month (1-12)	Year (xxxx)		Month (1-12)	Year (xxxx)		$ mn	$ per ton
Phase 1	2,500	1,450	7	2018	Jul-18	7	2019	Jul-19	18.3	7,302
Phase 2	0	1,450	7	2020	Jul-20	7	2021	Jul-21	5.4	N/A
Phase 3	2,500	1,450	7	2022	Jul-22	7	2023	Jul-23	5.6	2,255
Phase 4	0	1,450	7	2024	Jul-24	7	2025	Jul-25	5.8	N/A
Phase 5	0	1,450	7	2026	Jul-26	7	2027	Jul-27	6.1	N/A
Total	5,000	7,248							41.2	8,249

4.4.4.1 TES Construction CAPEX and Location

A total present-day cost of $11.8 MM is assumed for a 5,000-ton TES tank. This assumption is based off estimates presented to TE and further modified based on feedback received. Additional land acquisition costs of $1.0 MM are assumed. [11] This assumption is premised off an evaluation of the amount of land required for construction of the TES tank and pumping station, and publicly available information regarding the price per square foot of land in locations technically capable of supporting the required infrastructure. For the purposes of FVB's financial models, the TES location is assumed to be proximate to the downtown core.[12] Land acquisition costs of $1 MM are assumed.

4.4.4.2 EDS Expansion CAPEX

A total present-day cost of $34.6 MM for EDS expansion is assumed for the TES Expansion model. This assumption calculates the total linear feet required for the expansion of the EDS to Load Clusters 1 (green cluster on Figure 4: Load Clusters and EDS Expansion), 3 (blue cluster on Figure 4), and 4 (yellow cluster on Figure 4), and assumes that 7,248 tons of this load will become contracted capacity. Subsequently, 71% - the proportional percentage of the overall contractual load potential – of the total EDS expansion CAPEX is incorporated into the financial model. This CAPEX is spread out evenly over the five phases.

4.4.4.3 Additional ETS CAPEX

A total present-day cost of $1.7 MM for additional ETS CAPEX is assumed for the TES Expansion model. Based on the fixed costs per connected building and the ETS CAPEX per RT, 7,248 RT is assumed to become contracted capacity and $1.2 MM is the resulting CAPEX. This CAPEX is spread out evenly over the five phases.

4.5 Model Assumptions

4.5.1 Capacity Charge

A capacity charge of $24.31 USD/RT/Month is used in the growth models for the purposes of determining projected revenue. This capacity charge is derived by calculating the monthly

[11] A possible DES rate structure negotiation with the State may be proposed in return for land owned by the State of Tennessee if such a technically feasible parcel of land is able to be identified.

[12] Increased proximity of the TES location to potential new loads will drive down EDS costs.

capacity charge from the projected yearly capacity charge proposed to the LifeWay building in 2015. The LifeWay building did not become a customer of Metro DES for internal reasons; however, the experience of FVB with other district energy systems indicates that this capacity charge is readily attainable for new customers, and thus is incorporated into the growth models.

4.5.2 Consumption Charge

A consumption charge of $0.1097/ton-hour is used in the models for the purposes of determining projected revenue and costs. This charge matches the projected pass-through costs per ton-hour contained in the EGF Expansion model.

4.5.3 Equivalent Full-Load Cooling Hours ($EFLH_C$)

The $EFLH_C$ used in the models for the purposes of determining projected revenue and costs is 2,119 hours. This determination is made by dividing the total CHW consumption in FY 2017 (64,115,837 ton-hrs/year) by the contracted capacity in FY 2017 (30,259 tons).

4.5.4 Diversity Factor

The diversity factor assumed in the models is 69%. This percentage is calculated by averaging the diversity factors witnessed from 2012-2016. This diversity factor is used in determining contractual load capacity resulting from installed load capacity.

4.5.5 Financing Costs

The growth models assume that financing for CAPEX is obtained at an effective interest rate of 4.33%, and is borrowed and repaid over the course of 25 years with 4% of the principal repaid each year. An effective interest rate of 4.33% is used since this is the average of the coupon rates on remaining 2012A debt service payments.

4.5.6 Additional Model Assumptions

Additional model assumptions are listed and explained in Appendix B – Growth Scenario.

4.6 Environmental and Other Permitting Needs

The environmental and fire safety permitting options for the two growth scenarios are as follows:

4.6.1 EGF Expansion Scenario

The installation of two 2,500-ton chillers will result in a major modification of industrial activities at the existing facility. Under current environmental regulations, major modification of industrial plant operations shall require submittal of air, wastewater and stormwater discharge permit applications and updating the Air Risk Management Plan, SARA Tier I and Tier II reports and emergency response to incident plans.

The submittal of the county's industrial wastewater discharge application and the state's stormwater discharge from industrial activity (TMSP) permit application can be submitted with no timing issues or possible regulatory objections. In addition, the existing water related permits do not expire until 2020 making the submittal of the modification applications a separate regulatory process.

The air permit application to make a major modification to current operations may occur during the same timeframe the application to renew the current air permit is under review. The renewal application is due to the Metro Public Health Department between December 31, 2017 and November 30, 2018. Some permit writers allow a major modification to be included in the renewal application. This creates a more efficient administrative process and prevents confusion on what process is to be evaluated.

Other permit writers require two permit applications to proceed at the same time or require a new permit application to be submitted if the permit holder only wants to manage one permit application at a time. It will up to the permit writer's decision on which option is preferred.

In addition to modifying the existing air permit, the facility will need to update its Risk Management Plan (40 CFR 68) to include the addition of two new chillers and the potential risks from a worst case and typical case release scenario.

The location of the new chillers will determine the type of additional safety reviews. Installing them adjacent to the existing chillers will require a registered engineer to certify the current building can safety accept the weight without causing damage to the structural integrity of the building. It also will cause the Fire Department to review compliance with the current certificate of occupancy requirements to determine if additional fire safety requirements are needed.

4.6.2 TES Expansion Scenario

The installation of one 5.2 million-gallon CHW storage tank will result in a major implementation of industrial activities at this location. The initial environmental permitting will be related to water issues.

The location will need to submit the county's industrial wastewater discharge application and the state's stormwater discharge from industrial activity (TMSP) permit application to manage possible loss of treated chilled water from possible system blow down, leaks, quality control processes and failure of the recycling process. It will also cover the worst-case scenario of complete tank failure with loss of all chilled water into the surrounding area.

An air permit exemption application will need to be submitted to document that the breathing and fugitive chlorine emissions will be below 10 tons per year. This application is required since the tank will be installed on property that is unable to be included in the current air permit.

Due to the size of the tank, there will be significant safety reviews with the local fire marshal and other local officials. Preparing an emergency plan similar in format and requirements as required by 40 CFR 112 would aid in obtaining the building permits and certificate of occupancy.

4.7 Results Summary

Growth is an attractive and vital option for Metro DES. The newest customer of the Metro DES is the Hyatt Place Nashville (Service Agreement executed in 2013), and their capacity payments provide revenue that is not directly offset by operating costs. Currently, these capacity payments directly reduce the MFA, but looking toward the future, these payments and those of other new

customers can serve to provide crucial capital infusions to maintain, improve, and expand the Metro DES.

In FVB's experience, the Metro DES has a non-standard historical rate structure. This rate structure is designed to be largely based on cost recovery. New customers have been added but their rates tend to be influenced by the existing market rates by comparison. This underpricing of the market value of district energy has benefited all customers including Metro (as the largest customer of the Metro DES) and especially ISCs; however, underpricing has resulted in poor economic performance by the Metro DES, and the necessity of subsidization of the Metro DES by Metro through the MFA.

FVB believes that with a strong marketing program, new customers can be added at a higher rate closer to the market value of DES services. Of course, the establishment of a strong marketing program will require investment.

Taking into consideration all the modeling assumptions, the EGF Expansion scenario has an IRR of 3.0% while the TES Expansion scenario has an IRR of 5.2%. The EGF Expansion scenario does not see a cash surplus (the difference between revenues and all costs to include operating costs, CAPEX, and debt repayment) until 2037. The TES Expansion scenario has an IRR of 5.2%, a NPV of $3.8 MM, and a sustained cash surplus beginning in 2031.

4.8 Sensitivity Analyzes

To explore the effects of variation or errors in capital budgeting estimates and determine the importance of different assumptions on the viability of the growth scenarios, FVB conducted a sensitivity analysis. This analysis is graphically demonstrated in the figures below.

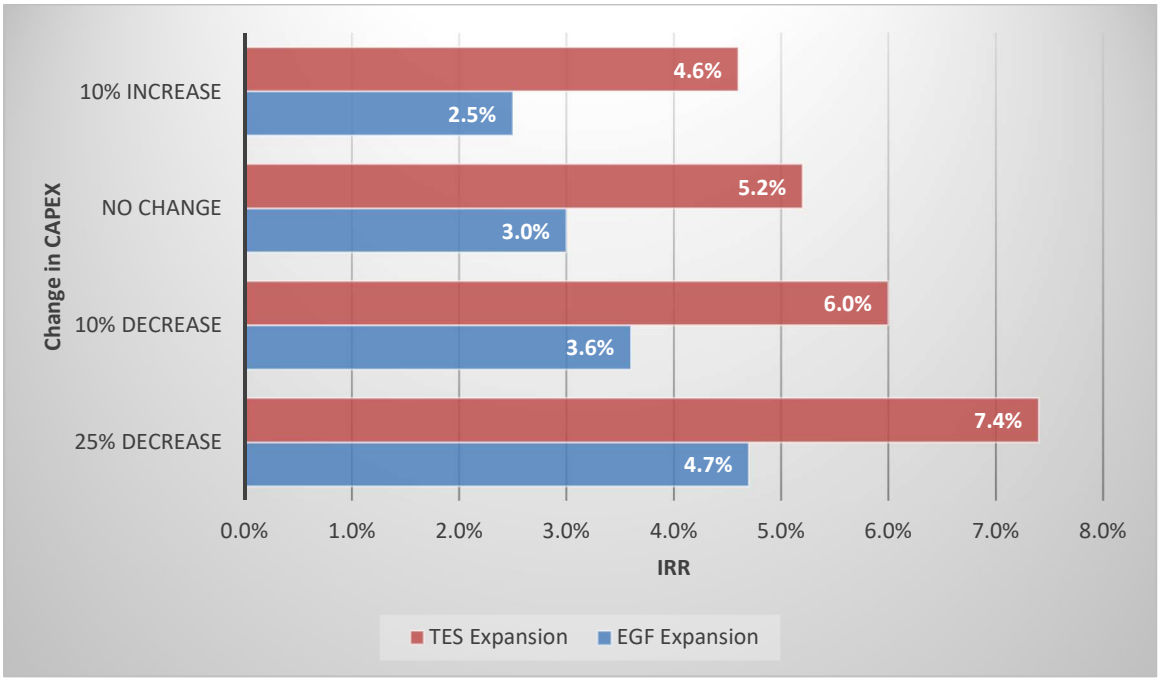

Figure 5: Metro DES IRR Under Different CAPEX Assumptions

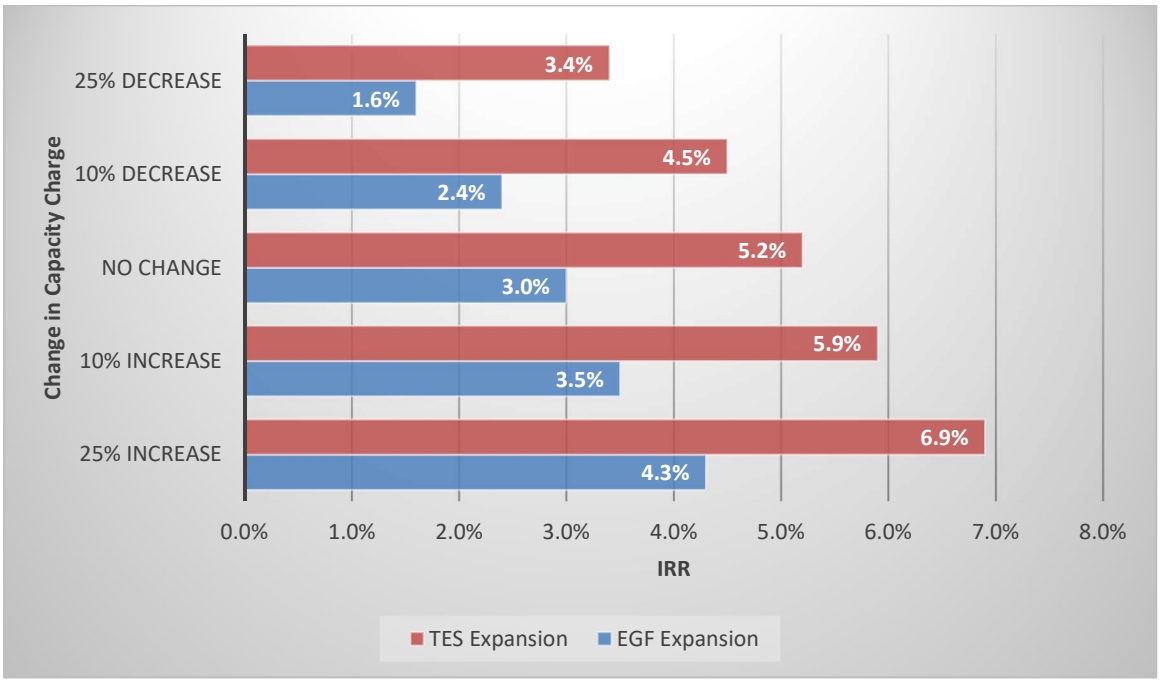

Figure 6: IRR Under Different Capacity Charge Assumptions

Some of the key outputs from the sensitivities performed are:

- The two different growth scenarios are comparable in their sensitivities to both changes in CAPEX and capacity charge changes.

- Reducing the CAPEX required for growth greatly increases the IRR for both growth scenarios, and increases their viability.
- Current estimates for CAPEX are conservative, and a reduction in CAPEX is attainable.
- Based on FVB's experience, it is possible to acquire DES customers with higher capacity charges and/or a connection charge.

5 Internal Management and Operations Option

5.1 Management and Personnel Requirements

The internal management and operations option analyzes the cost savings and assesses the operational efficiencies that are achievable via direct management of Metro DES by Metro. Metro Water Services (MWS) has been identified as the department that would assume management, operations, and budgetary control of Metro DES. In addition to determining potential cost savings and operational efficiencies, an outline of how to transition to internal management is given.

5.1.1 Recommended Management Structure and Personnel Requirements

Based on FVB's industry knowledge and benchmarking against similar district energy systems, a total of seventeen operations personnel is recommended. Notably, a General Manager, Marketing Director, and Marketing Assistant are needed to manage and grow Metro DES. In addition to these personnel, it is expected that back office needs such as accounting, human resources, billing, and other administrative tasks would be provided by existing personnel within Metro. There would be associated transfer costs, but these costs would be carried by Metro DES customers. The chart below identifies the suggested managerial structure and key personnel.

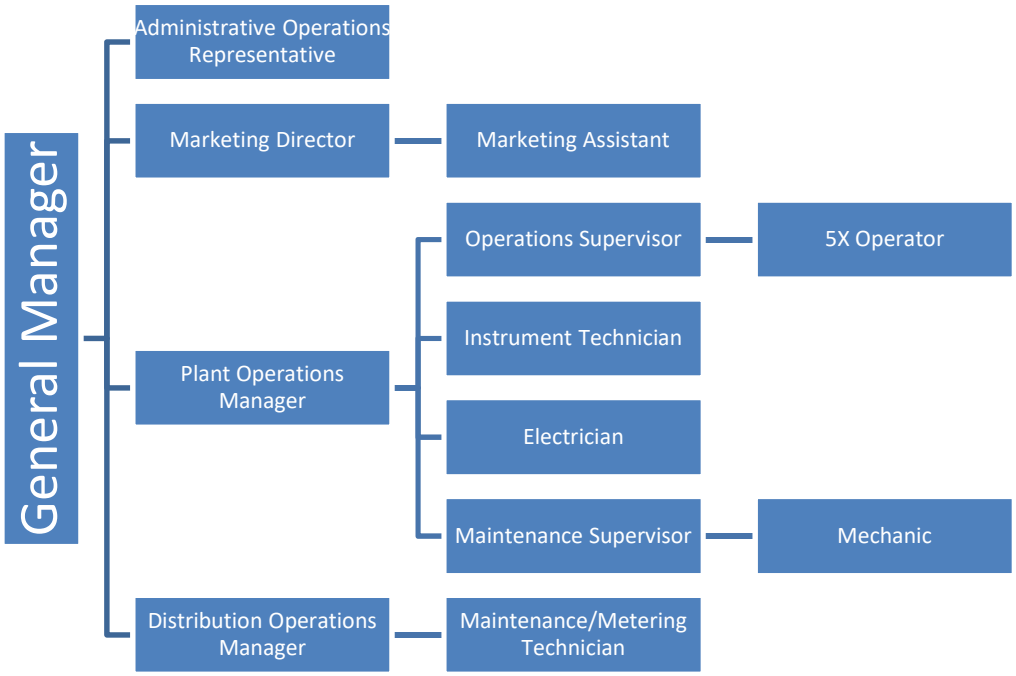

Figure 7: Recommended Organizational Chart

Growth of the DES will require additional personnel depending on whether growth occurs through the EGF Expansion, the TES Expansion, or both. Regardless of the growth methodology, the management structure outlined in Figure 7: Recommended Organizational

Chart is adequate; however, growth through the construction of a TES may require additional personnel contingent upon the operational characteristics of the TES.

5.1.2 Key Steps of a Transition Plan

Crucial to the success of transitioning operations from Constellation to Metro is a transition plan that encompasses all aspects of management and operations, and the transition plan outlined below provides key components of this process. The culminating event of the transition is the Performance Start Date (PSD) – in the case of Metro assuming control, this date would be December 18th, 2018 (the day after the fifteenth anniversary of the commencement date of Constellation's contract).

Ninety days prior to the contract award date the pace of managerial and operational transition events accelerates, but since Metro's FY starts on July 1st budgetary control of Metro DES could be passed to the Metro department that will be assuming control to allow for a smooth budgetary transition. Prior to the beginning of FY19, TE and Constellation should be notified to allow for transparency and a seamless transition.

Table 8: Key Transition Steps

Date	Activity
Performance Start Date (PSD) minus 90 days (PSD 90)	• **Contract Award Date** • Establish Primary Contact Person on Constellation and TE Staffs • Mobilize Transition Team (and Transition Manager) • List of affected incumbent contractor staff from Constellation and TE (10 days after Contract Award Date) • Initial meeting with relevant regulatory agencies (as needed) to discuss scope and transition • Initial Human Resources meeting with affected employees • Begin weekly Transition progress meetings with affected staff • Begin additional due diligence of physical facilities (as necessary) in order to confirm current conditions and develop a list of items to be addressed (maintenance/repair and compliance needs) • Conduct facilities safety audits • Schedule and conduct joint inventory and transfer phases
PSD 90-60	• Interview the affected staff to discuss job opportunities and company benefits • Conclude transfer of manuals and records • Conclude inventory and transfer of facilities and fixed equipment • Conclude inventory and transfer of non-fixed equipment, spare parts and personal property • Identify vendor accounts that need to be set up • Develop environmental sampling plan and contract laboratory services • Begin establishing system performance criteria

Date	Activity
	• Begin shadowing existing employees in performance of facilities systems tasks • Support Constellation and TE in transfer of permits currently held
PSD 60-30	• Order computers, cell phones and field tablets • Order phone and Internet service • Advertise within the company and outside for vacancies if all jobs are not filled by existing employees • Transition training and skill development resources on site • Order uniforms and personal protective equipment • Conduct safety training • Begin implementation of safety programs
PSD 30-14	• Begin regulatory, facilities management, environmental and maintenance programs reporting • Test procedures for service requests and after-hours call-outs • Job offers extended to employees
PSD 14-7	• Supervisors on-site
PSD 7-Performance Start Date	• Complete final inventory of physical facilities and equipment • Present first draft of operations plan • Present first draft of operations improvement plan • Consolidate and account for all operations, equipment and other manuals and operations procedures • Conduct project orientation with transitioning staff and newly-hired employees • Perform joint reading of primary and secondary meters • Notification of commencement of operations
Post PSD	• Continue integration of work force and fill any remaining staffing vacancies • Finalize performance criteria • Refine / finalize operations plan • Finalize and begin implementation of operations improvement plan • Correct deficiencies identified in safety audits

5.2 Annual Operating Budget

FVB used its industry knowledge and benchmarked Metro DES against similar district energy systems to determine appropriate costs for personnel, equipment maintenance, materials, and insurance. This approach is used since Constellation's actual cost structure is confidential and

not available for analysis. These costs are applied to Metro DES to calculate an annual operating budget.

5.2.1 Comparable Utility Costs

FVB analyzed three comparable utilities, and broke their budgets down into variable, O&M, and general and administrative (G&A) costs. The following tables illustrates these costs for the benchmarked utilities and compares them to Metro DES.

Table 9: Comparable Utilities[13]

	#1	%	#2	%	#3	%	Composite	%
Sales	$83,284,601		$20,626,149		$23,428,573		$127,339,323	
Gross Profit (GP)	$52,397,422	62.9%	$13,359,012	64.8%	$13,463,391	57.5%	$79,219,825	
O&M	$16,070,168	19.3%	$4,213,815	20.4%	$4,093,739	17.5%	$24,377,722	19.1%
G&A	$4,084,413	4.9%	$1,927,982	9.3%	$2,647,331	11.3%	$8,659,726	6.8%

Table 10: Comparable Utilities and Metro DES

	Composite	%	Metro DES[14]	%
Sales	$127,339,323		$17,548,518	
Gross Profit (GP)	$79,219,825		$9,454,840	
O&M	$24,377,722	19.1%	$4,559,268	26.0%
G&A	$8,659,726	6.8%	$1,156,982	6.6%

[13] Identifying information for the utilities is removed to protect the confidentiality of the utilities.

[14] Figures are for FY17 from the Thermal Engineering Group, Inc. DES FY13-FY17 spreadsheet.

Personnel costs are distributed between O&A and G&A costs depending upon the role of the personnel being considered. Equipment maintenance is included as part of the O&M cost. Materials are a part of the variable costs, and insurance is a G&A cost (TE budgeted $37,700 for insurance in the DES FY18 Budget).

5.2.2 Annual Operating Budget Methodology

Starting in FY19, FVB applied the composite O&M and G&A percentages from Table 9: Comparable Utilities to the *No Growth* scenario.[15] O&M costs are 19.1% of estimated FY19 Metro DES revenue, which lowers them to $3.9 MM from Constellation's projected FOC of $4.8 MM. G&A is 6.8% of estimated FY19 revenue, which is $1.4 MM. The remaining portion of the estimated operating budget is variable costs; for these costs, FVB used variable cost information for FY17 from the DES Operating Cost FY13-FY17 (Thermal Engineering Group, Inc. (TE), 2017) spreadsheet, and adjusted them for inflation to estimate their cost in FY19.[16]

Additionally, to maintain consistency with the scenarios and cases given in this report, FVB accounted for the difference between budgeted annual operating costs and actual operating costs incurred by adding this difference to the estimated annual operating budget starting in FY19.[17] This is necessary since budgeted annual operating costs for FY17 far exceed actual operating costs and form the basis for future operating cost projections; consequently, not accounting for this difference dramatically overstates the possible reduction in the annual operating budget from the internal management and operations option and distorts potential cost savings estimates.[18]

5.2.3 Results Summary

Based on the methodology detailed in the Annual Operating Budget Methodology, FVB believes Metro can achieve a 19% reduction in O&M costs. This is a substantial reduction in the operating budget and reflects the high FOC currently being incurred by Metro. The table below compares and illuminates current and projected future O&M costs under the status quo in comparison to Metro's estimated annual O&M costs under the internal management and operations option.

[15] O&M costs are inclusive of transitional capital needs to include vehicles and other necessary capital expenditures.

[16] Variable costs do not include the line item for *Chemical Treatment* from the DES Operating Cost FY17 information since this cost includes the subcontractor used by Constellation. Alternatively, the projected chemical costs from the DES FY18 Budget are included and adjusted for inflation.

[17] The difference between the budgeted operating costs and actual operating costs for FY17 is the figure used.

[18] In FY17, the budgeted operational costs exceeded actual operating costs by $1.4 MM.

Table 11: O&M Cost Savings

Year	2017	2019	2028	2038	2042
Status Quo O&M Costs (USD in 000's)	$4,559	$4,771	$5,855	$7,350	$8,050
Metro's Estimated O&M Costs (USD in 000's)	NA	$3,848	$4,722	$5,927	$6,492
Cost Savings (USD in 000's)	NA	$923	$1,133	$1,423	$1,558

If the O&M costs of the Metro DES are lowered by 19%, and if all other assumptions considered in the *No Growth* scenario remain unaltered, the following key takeaways change as indicated in the table below. The figures in the table reflect the assumption that current and projected revenues Metro DES realizes under the *No Growth* scenario are unchanged.

Table 12: Key Financial Metrics Comparison

	***NO GROWTH* SCENARIO**[19]	**INTERNAL MANAGEMENT AND OPERATIONS OPTION**
NPV	$36.2 MM	$50.4 MM
IRR	8.3%	9.6%
EV	$95.5 MM	$109.7 MM

In addition to increasing the NPV, IRR, and EV, lowering O&M costs will likely result in a reduced MFA – under current customer contracts, the exact allocation of savings from lower O&M costs requires further investigation.

[19] Valuation with a 10% reduction in SO costs beginning in FY 2019 is used. Details regarding the methodology behind this assumption are given in 7.1.2 Metro DES SO Costs.

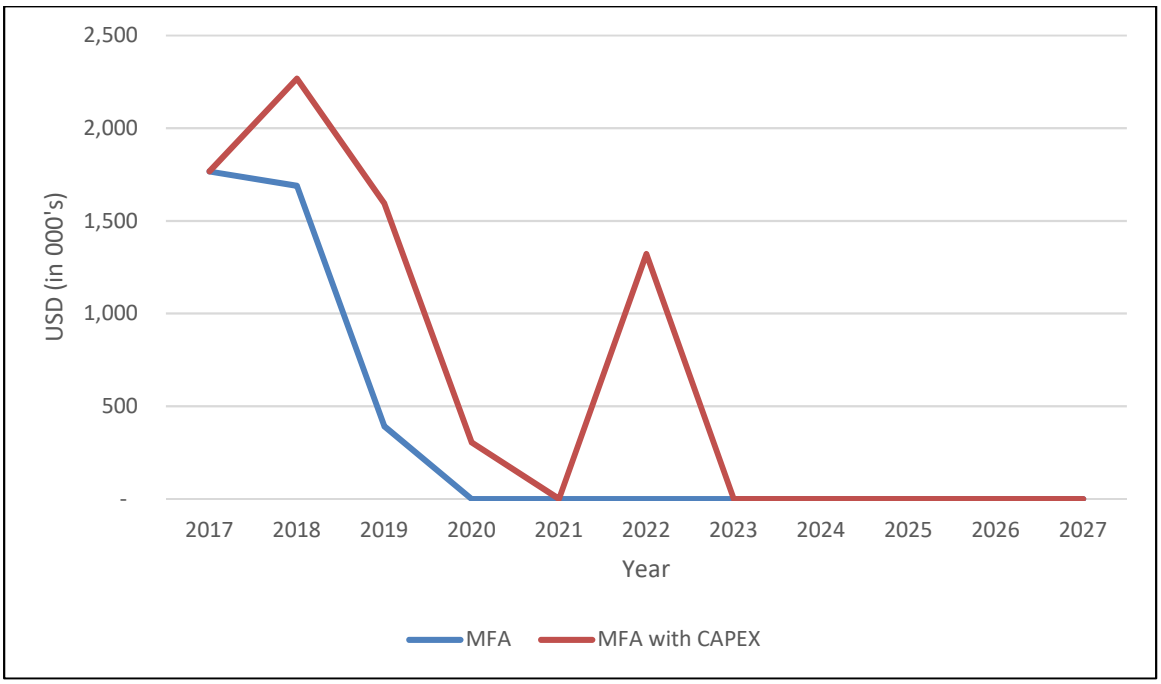

Figure 8: Metro Funding Amounts over Time with 19% O&M Cost Reduction

It is important to note that the estimates and projections in this section are indicative of potential cost savings. If Metro opts to pursue the internal management and operations option, Constellation and TE need to be notified and then salary and operations information can potentially be collected for a more complete picture. At this point, confirmation of potential savings along with a history of operating costs and other metrics can be fully analyzed.

5.3 Challenges and Key Takeaways

Consolidation of the operations of Metro DES within Metro has strong potential to realize substantive cost savings and streamline reporting and accountability standards. If properly structured and executed, the internal management and operations option can quickly reduce the MFA and begin to provide necessary capital for repairs, upgrades, and expansion of the DES. To realize the benefits of internal management and operations, Metro will need a capital plan in place to be prepared for unexpected costs and system growth. Additionally, due to the current structure of customer contracts, the distribution of the financial benefits of reduced operational costs will require further inquiry.

5.3.1 Need for a Capital Plan

Growth of the Metro DES is an essential and auspicious option, yet it will also require a considerable upfront capital investment – $52.7 MM for the EGF Expansion and $38.5 MM for

the TES Expansion.[20] If Metro chooses to retain ownership of the Metro DES, it will need to put CaR to achieve growth.

In addition to the capital needs necessary to grow Metro DES, capital needs to be available for unforeseen costs and other changes. The recently submitted FY 2019 Capital Budget Rev 1 (Thermal Engineering Group, Inc. (TE), 2017) highlights this well, as the table below demonstrates.

Table 13: Changes in Capital Planning

	Approved FY 2018 Five-Year Capital Plan	*Draft of FY 2019 Five-Year Capital Budget*[21]
2018	$577,500	NA
2019	$1,202,300	$3,292,300
2020	$495,000	$687,500
2021	$495,000	$577,500
2022	$2,115,300	$2,142,800
2023	NA	$495,000
Totals	$4,885,100	$7,195,100

The budgetary changes are due to a host of reasons to include:

- Increased repair & replacement costs.
- General improvements.
- Blasting damage.
- New service connections.
- Uncertain timing of planned new service connections.
- EGF system improvements.
- Lost capacity.

Regardless of the specific reasons, Table 12: Key Financial Metrics Comparison aptly demonstrates the need for a flexible and robust capital plan to accommodate DES growth as well as unanticipated capital needs and changes. In the short term, a small portion of capital can

[20] Present day capital costs given.

[21] The FY 2019 Capital Budget is still a draft, and aspects of this budget will likely change.

be provided from Operating Reserve Fund as required by the Refunded 2012A Bond documents. In the long term, this fund needs to stay at a minimum of 25% of the operating costs of Metro DES and should not be viewed as a capital source.

6 Business Exit Case

The *Business Exit* case evaluates the book value, market value, and discounted cash flow value of Metro DES taking into consideration both the *No Growth* and *Growth* scenarios. This case will be fleshed out and fully explained in the Recommendations section of this report.

7 Recommendations

7.1 How does the Metro DES compare to its peers utilizing common industry metrics?

7.1.1 Cost and Access to Capital

7.1.1.1 Cost of Capital

In comparison to other district energy systems, Metro DES enjoys a low cost of capital because of its advantageous credit rating – Moody's Investor Service assigned an Aa2 rating to Metropolitan Government of Nashville & Davidson County, Tennessee's $500 million General Obligation Improvement Bonds, Series 2017 on January 5th, 2017. Additionally, Metro DES's access to revenue bonds backed by the general obligations of Metro further contributes to a low cost of capital. A comparison to similar industries is seen in the figure below.

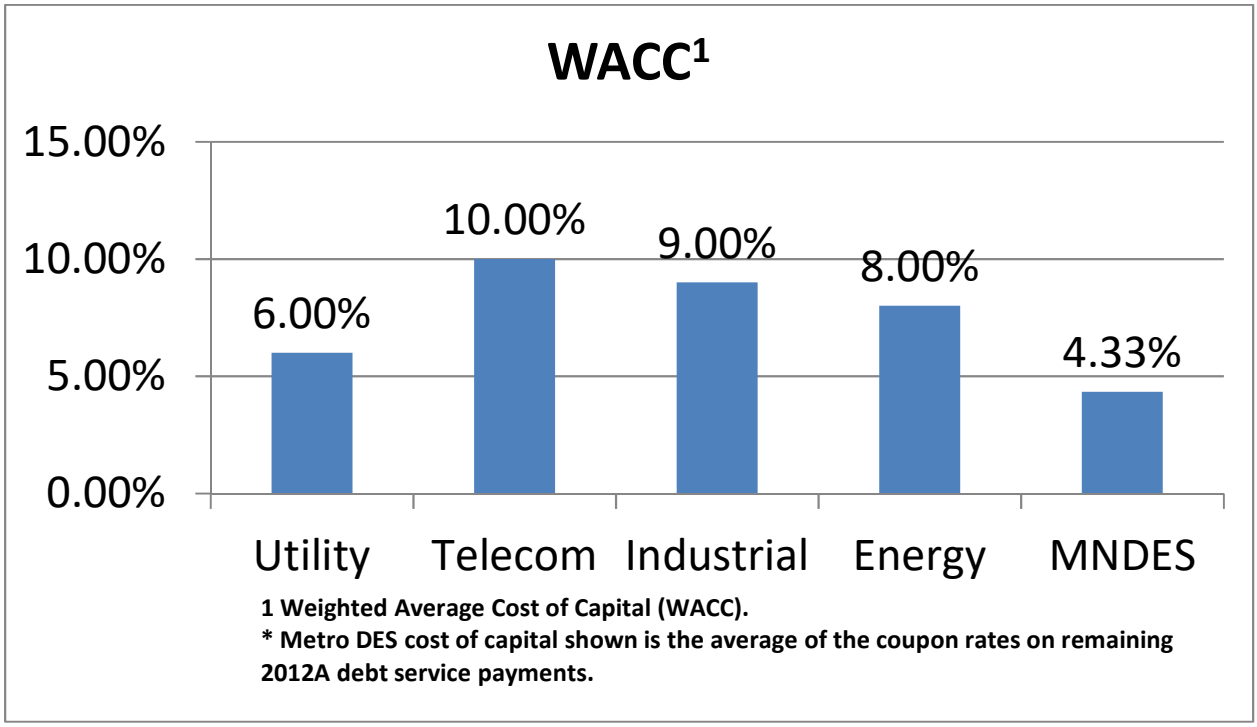

Figure 9: Cost of Capital Comparison

For the purposes of comparison in this study FVB utilized Metro DES's WACC, 4.33%, as the discount rate when determining key financial metrics, however a potential acquirer would likely use a discount rate higher than this.

7.1.1.2 Access to Capital

In comparison to potential acquirers or other non-profit or governmental entities that own comparable district energy systems, Metro DES does not have ready access to capital. Current customer contracts are not structured in a way that provides excess funding that could be used

to finance capital. This capital access difficulty is due in part to regulatory and municipal processes that other entities do not face, and that are needed to issue bonds and distribute the proceeds to Metro DES. Furthermore, since adequate generation of additional capital under current Metro DES customer contracts is not sufficient, accessing capital without first having secured new customers is difficult, while securing new customers without access to capital is also difficult – in other words, the proverbial “chicken and egg situation”.

7.1.2 Metro DES SO Costs

SO costs totalled $4.6 MM in FY 2017 and escalate with inflation. This is a high FOC, and reflects the fact that the contract in place articulated design and construction of an EGF as well as long term operation and maintenance. Based on FVB experience, this FOC can be lowered and this can be pursued by competitively rebidding Constellation’s contract. The risk inherent in pursing a rebidding of the SO contract is the possibility that all bids submitted are higher than the cost of the existing SO contract. FVB’s experience indicates that this is highly unlikely, and in fact a noticeable reduction in SO costs is likely. FVB believes a 5-15% reduction in SO costs is attainable, and modeled a 10% reduction in SO costs beginning in FY 2019. If all other assumptions considered in the *No Growth* Scenario remain unaltered, the following key takeaways change in the following manner:

1. The NPV increases from $27.8 MM to $36.2 MM.
2. The IRR increases from 7.4% to 8.3%.
3. The EV increases from $87.0 MM to $95.5 MM.

In addition to increasing the NPV, IRR, and EV, lowering SO costs will likely result in a reduced MFA.

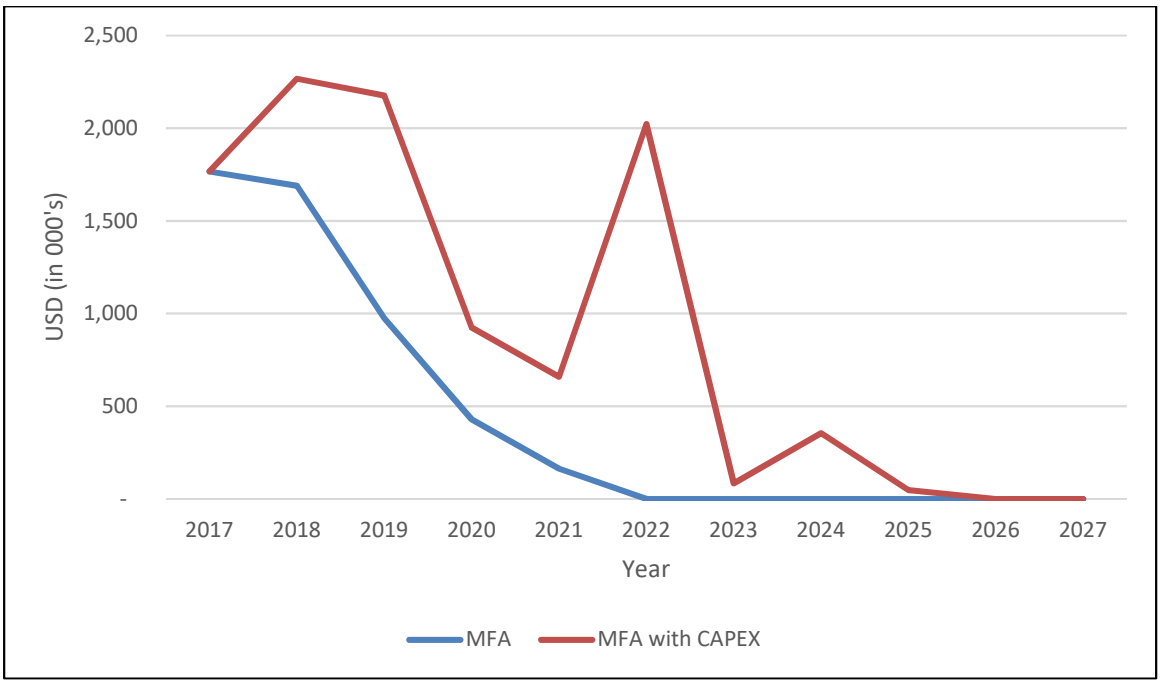

Figure 10: Metro Funding Amounts over Time with 10% SO Cost Reduction

7.2 What benefits does Metro ownership of the Metro DES convey, financial or other?

Metro ownership of Metro DES provides for environmental benefits, city ownership of an integral energy resource, coordination potential with other Metro departments, and reduced energy rates for Metro-owned buildings.

However, maintaining operations, customer contracts, the management structure, and ownership as they currently exist is undesirable for the following reasons:

- EGF equipment will age and require additional CAPEX although the current rate structure does not recognize this need.
- Customer contracts will move closer to their expiration and without new growth this will reduce the future market value of the Metro DES.
- Potential new growth opportunities already have been missed and this will continue without a dedicated marketing effort.

It is FVB's opinion that management oversight is unable to be effectively contracted out to third parties. We strongly recommend that if Metro wishes to retain ownership, direct management is critical to success.

While in Nashville, FVB spoke with the Metropolitan Planning Department to gain access to data for the *Growth* scenario. In the process of this data gathering, the potential for increased communication between Metro Departments became clear. In addition to the Metropolitan Planning Department, the Nashville Downtown Partnership and the Metropolitan Development

and Housing Agency stand out as excellent departments that Metro DES can communicate and work with. Continued Metro ownership of the Metro DES provides ample opportunities to facilitate growth of the Metro DES through these government departments, though it is crucial that the dedicated marketing and sales program that FVB recommends be implemented to achieve these results.

In addition to increased departmental harmonisation, current and future Metro-owned buildings potentially gain access to subsidized energy rates. For example, the recently connected Music City Center has a fixed capacity charge that amounts to $11.94 USD/RT/Month and much of this charge will not escalate with inflation.

7.3 How would potential acquirers value Metro DES today and in the future?

7.3.1 Analysis of the Appeal of the Metro DES to Potential Acquirers

The appeal of a DES to potential acquirers is based off four main metrics:

1. Potential growth
    a. Metro DES demonstrates solid potential for growth, especially with an increased focus on marketing and business development.
2. CAPEX requirements (based on the age and condition of the system)
    a. The Metro DES is relatively new and is in excellent condition.
3. Customer contracts (structure and term)
    a. Newer customer contracts such as the contract with the Hyatt Place Nashville are a positive, while ISC contracts and contracts with special provisions such as capacity charges that do not escalate for many years are a negative.
4. Commodity risk (mitigated by pass-through contract provisions)
    a. Commodity risk is well mitigated by current contracts.

Overall, Metro DES is attractive to potential acquirers on most fronts, although specific customer contracts currently in place are viewed as detriments to acquisition.

7.3.2 Valuation Today

7.3.2.1 Book Value

The book value of the assets of Metro DES is equal to the acquisition cost of all its assets less accumulated depreciation. As of the end of FY 2017, the book value of Metro DES is $63.0 MM.

7.3.2.2 DCF Value

Using the DCF method leads to an EV of $87.0 MM if all the key assumptions used in Table 2: *No Growth* Scenario Key Takeaways stay unchanged.

7.3.2.3 Market Value

Typical sales prices for recent DES sales use an EV/EBITDA multiple valuation, and recent sales prices indicate a multiple of 10 to 14, depending on the factors described in 7.3.1 Analysis of the Appeal of the Metro DES to Potential Acquirers. A valuation today using these multiples

and incorporating the assumptions extant in the *No Growth* scenario yields the results seen in the table below.

Table 14: Metro DES Present Day Market Valuation Range

EV/EBITDA Multiple	Valuation*	Valuation Net of Debt**
10	$39.7 MM	-$11.9 MM
12	$47.6 MM	-$4.0 MM
14	$55.6 MM	$4.0 MM

*The EBITDA used is from FY 2019 projections.
**Metro DES net debt as of the end of FY 2017 is $51.6 MM.

7.3.3 Valuation with Lower SO Costs and Expansion Possibilities Incorporated into Financial Models

If the FCFs to Metro DES from the *No Growth* scenario with SO costs reduced by 10% are added to the FCFs from the TES Expansion model, and if all other assumptions considered in the *No Growth* Scenario remain unaltered, the following key takeaways emerge:

1. The NPV is $40.1 MM.
2. The IRR 7.3%.
3. The EV is $99.3 MM.

Expansion possibilities using these assumptions do not augment key valuation metrics, nonetheless they enhance the potential sales price of the Metro DES by raising the valuations under different EV/EBITDA multiples (assuming the projected FY 2019 EBITDA is used – this is when reduced SO costs would take effect). This is illustrated in the table below. Furthermore, discounting future cash flows at a lower rate, increasing capacity charges, or realizing lower CAPEX for expansion rapidly change the prospects for growth.

Table 15: Metro DES Market Valuation Range with Reduced SO Costs and System Growth

EV/EBITDA Multiple	Valuation*	Valuation Net of Debt**
10	$46.7 MM	-$4.9 MM
12	$56.1 MM	$4.5 MM
14	$65.4 MM	$13.8 MM

*The EBITDA used is from FY 2019 projections.
**Metro DES net debt as of the end of FY 2017 is $51.6 MM.

In addition to the sales price, sale of the Metro DES would alleviate the need for future MFA subsidies from Metro – no further capital infusions, bond financing, or subsidies would be

required of Metro. If the "Status Quo" is maintained with projected CAPEX needs accounted for, the NPV of future MFAs discounted at 4.33% is $10.4 MM. Aggregating a possible sales price of $56.1 MM with the NPV of future MFAs results in a value to Metro of $66.5 MM; however, Metro DES net debt as of the end of FY 2017 stood at $51.6 MM, thus Metro could potentially see a net value of $14.9 MM from the sale of the Metro DES.

While further analysis is needed, the factors described in 7.3.1 Analysis of the Appeal of the Metro DES to Potential Acquirers point towards a valuation and potential sales price aligning with an EV/EBITDA multiple leaning towards the higher end of the range typically seen.

7.4 What would a simple sale scenario look like?

7.4.1 Sale Procedures

In undertaking a sale of an asset such as the Metro DES, it would be typical for the offeror to retain three basic advisors; legal, financial and engineering. These advisors would jointly create an information memorandum that would present the legal, financial and engineering story to potential acquirers. Of course, laws and procedures that would impact any Metro Nashville asset sale would be taken into consideration.

The sale process would normally start with a prequalification of bidders through a request for qualifications process. The advisors would review the qualifications submitted and recommend a list of qualified bidders. This would be followed by the issuance of a bid request. The information memorandum would be attached to this bid request. A separate site visit for each bidder would be arranged. It would be typical to set up an on-line data room with pertinent documents available. Following the receipt of the bids, they would be analyzed by the advisors and bid recommendations made to Metro Nashville. Negotiations with the selected bidder would be typical ending with a financial close.

The typical time required from the start of the process to the end would be four to six months.

7.4.2 North American District Energy Market Players

The following entities would most likely be interested in bidding for the Metro DES. However, this should not be viewed as an exclusive list but rather that there would be serious interest.

ENGIE is a French multinational electric utility company, headquartered in La Défense, Courbevoie, which operates in the fields of electricity generation and distribution, natural gas, nuclear and renewable energy.

ENGIE manages a range of energy businesses in the United States and Canada, including retail energy sales and energy services to commercial, industrial and residential customers, natural gas and liquefied natural gas (LNG) distribution and sales, and electricity generation and cogeneration. In 2015, ENGIE recorded €69.97 billion in global revenues ($77.6 billion USD). More than 3,500 employees work in the region, and Houston serves as their corporate headquarters.

Through the integrated facility management and commitment to energy performance improvement of customer facilities, ENGIE offers integrated management solutions—including on-site solar, battery and cogeneration design and installation—that enable clients to focus on their business. The company is a recognized leader in the operation and maintenance of infrastructure including airports, office buildings and industrial sites, as well as a wide range of technical infrastructure. In managing energy expenses and usage, ENGIE has identified more than $4.1 billion in savings for multi-site clients over the last three years and, in working with utilities, delivered nearly $15.4 billion in energy savings for consumers in the last 12 years.

Veolia Environnement S.A., branded as Veolia, is a French transnational company with activities in four main service and utility areas traditionally managed by public authorities – water management, waste management and energy services. In 2012, Veolia employed 318,376 employees in 48 countries. Its revenue in that year was recorded at €29.4 billion. It is quoted on Euronext Paris. It is headquartered in the 16th arrondissement of Paris.

Veolia is a leading operator and developer of energy efficient solutions. As the world's first energy services company, Veolia employs 50,000 personnel in 35 countries who are fully focused on energy efficiency and environmental sustainability.

Veolia manages more than 133,000 installations around the world (including North America), battling constant cold and working day and night to ensure that their customers' facilities can operate at peak efficiency.

Veolia's approach is to combine an array of offers and options to build custom solutions for each customer.

Enwave Energy Corporation, a private corporation owned by Brookfield Asset Management and formerly jointly owned by the City of Toronto municipal government and the Ontario Municipal Employees Retirement System is one of the largest district energy systems in North America. Enwave was formed after the restructuring of the Toronto District Heating Corporation.

Brookfield Infrastructure Partners operates 216 hydroelectric, wind and thermal energy facilities in the United States, Canada and Brazil with assets totaling nearly 116 billion. Parent company Brookfield Asset Management is co-listed on the New York, Toronto and Euronext stock exchanges under the symbols BAM, BAM.A and BAMA, respectively. Thermal systems operated under the Enwave name include Chicago, Houston, Las Vegas, New Orleans and Seattle in the United States and Toronto, Windsor, Prince Edward Island and London in Canada.

Corix is a leader in the implementation of sustainable water, wastewater, and energy utility infrastructure solutions for small to medium-sized communities across North America.

They are a privately held corporation principally owned by the British Columbia Investment Management Corporation (bcIMC) with head offices located in Vancouver, BC, Wauwatosa, WI, and Northbrook, IL.

Corix has the in-house expertise, resources, and operational flexibility to deliver creative, custom, and sustainable energy solutions to infrastructure challenges of all sizes and degrees of complexity. Their expertise encompasses district energy and GeoExchange systems and includes delivering systems to municipalities; resort properties; developers; and institutions, including universities, and military installations, across North America.

They own and operate a number of district energy systems in Canada and Cleveland Thermal in the USA.

Macquarie is a diversified financial group providing clients with asset management and finance, banking, advisory and risk and capital solutions across debt, equity and commodities. Their global operations include offices in the world's major financial centres.

Their view is that infrastructure businesses such as transportation, water and energy utilities and waste management usually provide an essential service, typically involve widespread usage, and are relied upon by the community in which they operate.

They are often difficult to replace or replicate due to size, scale or location which creates a natural barrier to new market entrants. In many cases this means they operate under regulatory or long-term contractual frameworks designed to protect consumers while ensuring ongoing investment and service quality. These frameworks often set prices and revenue through links to inflation or capital expenditure. In addition, these businesses are generally underpinned by a stable operating cost base.

As a result of these characteristics, infrastructure tends to deliver sustainable and predictable cash flows over the long-term, providing long-term yield, lower risk and defensive investment characteristics.

Business Model

The potential market players each have a different approach to their business model. Their approach is summarized in the matrix below.

Table 16: Business Model Matrix

Name	Owner/Investor	Operator	Greenfield Developer	Existing System Acquirer
ENGIE	X	X		X
Veolia		X		X
Enwave	X	X		X
Corix	X	X	X	X
Macquarie	X			X

7.4.3 Regulation Options for a Private Metro DES

In the event of sale to a private entity, concerns may arise about the stability of rates and continuation of the excellent service Metro DES provides. DES is regulated in some jurisdictions. An example that is similar to the Metro DES situation is District Energy St. Paul in St. Paul, Minnesota. The City of St. Paul is a larger customer of this DES, but it also acts as a regulator. Regulation can range from giving customers a third party to register complaints regarding service issues to management review including rate regulation. The regulation responsibility can be assigned to the city management, city government or an independent commission. In St. Paul, the ultimate regulation responsibility resides with the City Council. Financial results are reviewed annually and rate increase requests must be approved by the City Council.

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Appendix A – *No Growth* Scenario

A.1 Metro Nashville 2017 DES Program Recommendations - No Growth Business Case

Appendix B – Growth Scenario

B.1 Metro DES 2017 Program Recommendations - Growth Business Case - EGF Expansion

B.2 Metro DES 2017 Program Recommendations - Growth Business Case - TES Expansion

B.3 Additional Model Assumptions