Improving technology decisions

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Excipio Consulting

Has Prepared This Document For:

Stream Data Centers

Data Center Cost Modeling

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Executive Summary

Project Objectives

Stream Data Centers (Stream) built a large data center in Chaska, MN that qualifies for State of Minnesota tax benefits. Stream engaged Excipio Consulting to help evaluate the financial impact of those tax benefits on its future customers.

Methodology and Assumptions

Excipio assumed the following to determine the eligibility and value of the tax benefits for customers of a qualified data center.

- IT hardware, IT hardware maintenance, and IT software purchases are exempt from sales tax relief. The customer must first pay the sales tax and then seek a refund.
- IT software maintenance and implementation labor are not tax exempt.
- The use of electricity in a qualified data center is tax exempt. Customers should receive tax exemption upon the purchase of electricity, so they will not need to file for a refund.

Using its extensive database of client engagement data, Excipio developed three unique case studies to profile the potential value to the customer of the sales tax relief. Excipio developed the following for each case study:

- Inventory of current IT hardware and future software purchases, including estimated capital costs and IT critical power load
- Estimate of on-going IT hardware maintenance cost
- Estimate of electricity cost, factoring in the overhead for cooling using a PUE factor
- Estimate of the future colocation cost to be used as a reference point for the tax savings

Excipio used a five-year life to mirror the typical refresh cycle for IT hardware. While many customers may move existing IT hardware into the data center, they will likely replace it within five years. To model Stream's typical customer contract period of 10 years, Excipio doubled the IT hardware capital cost to reflect the initial purchase and one refresh cycle. For software and data center assets, Excipio included the capital cost once to reflect the initial purchase and no refresh within the 10-year period.

Summary Analysis

Figure ES – 1 provides a summary of the three case studies.

ES – 1: Case Study Summary Analysis

Metric	Customer 1	Customer 2	Customer 3	Average
IT Critical Load (kW)	100	250	500	283
Total Contracted Power (kW) (Critical Load + 40% for headroom/growth)	140	350	700	397
Number of Racks	30	50	140	79
Floor Space	1,200	2,000	5,600	3,173
Industry	Retail/ E-Commerce	SW and Services	Health Care	Blended
Significant IT Spend Areas	IBM iSeries, Extensive retail network	Blade servers, some Unix	Extensive Tier I Storage	Blended
One-time IT Capital	$16,385,488	$20,991,950	$55,619,368	
Other IT Operating Costs	$2,008,347	$1,495,000	$1,775,232	
Electricity Consumption	$876,876	$2,192,190	$4,384,380	
Total IT Cost	$19,270,711	$24,679,140	$61,778,980	$39,192,709
Tax Benefit	$1,324,861	$1,696,691	$4,247,305	$2,694,499
10 Year IT Cost Per kW of Critical Power	$192,707	$98,717	$123,558	$138,327
Monthly Savings per kW of Contracted Power	$79	$40	$51	$57

Notes:

- The range of outcomes for the ten year IT cost per kW of critical power were between $98,717 and $192,707. This demonstrates that the types of hardware and software customers use can have a significant impact on the density of IT spending per kW of critical power (and the associated tax savings).
- Excipio noted the following types of IT infrastructure contributed to higher IT costs per kW of critical power:
    - Servers – customers using blade servers or higher end UNIX or mainframe computers
    - Storage – customers with more overall storage or those using high-end tier 1 storage
    - Backup – although it wasn't a factor in these case studies, customers using more disk based backup technologies, versus tape based backup, will have higher IT cost per kW of critical power
    - Network – customers with sophisticated and/or elaborate wide area networks
    - Software – any customers deploying new software or applications
- This analysis shows that using colocation services in Stream's qualified data center would save customers between $40 and $79 per contracted kW of power per month.

Excipio extrapolated the findings from the three case studies to develop the three potential customer scenarios Stream wanted to evaluate. Figure ES – 2 below shows the results for the three scenarios.

Figure ES - 2: Three Potential Customer Scenarios

Metric	Tier	10 Year IT Cost Per kW of Critical Power	500 kW	1200 kW	2400 kW
IT Critical Load			357	857	1714
Additional Contracted Power			40%	40%	40%
Total Contracted Power (IT Critical Load + Additional Contracted Power)			500	1200	2400
Estimated 10 Year Tax Benefit	Low	$98,717	$2,423,855	$5,817,252	$11,634,504
	Average	$123,558	$3,033,790	$7,281,096	$14,562,193
	High	$192,707	$4,731,645	$11,355,948	$22,711,896
Tax Benefit Per Monthly kW of Contracted Power	Low		$40.40	$40.40	$40.40
	Average		$50.56	$50.56	$50.56
	High		$78.86	$78.86	$78.86

Notes:

- To calculate the estimated ten-year tax benefit, Excipio used the following formula:

Estimated 10 Year Tax Benefit =
10 year IT cost per kW of critical IT power * IT Critical Load * Tax Rate

- Excipio used the low, average, and high IT cost per kW of critical power to show the potential range of savings, since it is impossible to know the type of IT environment a prospective customer would have.

Cost Modeling Tools

Since the tax savings for each customer could vary significantly, Excipio expects Stream's customers will want to understand the potential savings for their specific environment. Excipio developed a high-level modeling tool and a more detailed modeling tool to facilitate this specific customer analysis. Excipio developed these modeling tools in Excel, so that they would be flexible to adapt to future changes, and so that Stream and its potential customers could easily use them.

Conclusions

Based on the three case studies Excipio conducted, the sales tax exemption provides a substantial savings opportunity for Stream's customers. The degree of savings within the three case studies varied widely ($40 to $78/contracted kW per month) based on the type of IT hardware used by each customer. Customers with higher IT cost per kW of critical IT load are the best targets for the Stream data center, as they will derive the highest value from the tax benefits.

Excipio did not include a case study involving a customer pursuing a new ERP system or other large and expensive software platform. The cost of these software packages typically dwarfs the cost of the underlying IT hardware. For this reason, companies implementing new ERP systems or other large software platforms will gain the most from the tax exemption and represent Stream's best opportunity to attract future customers.

Per Stream, Stream data center customers are exempt from personal property tax. Depending on where each customer is currently hosting their IT infrastructure, Excipio estimates this could save Stream customers property taxes worth an additional 2% to 6% of the value of their IT asset base each year. This is a substantial savings on top of the other sales tax benefits outlined above.

Project Background

Project Objectives

Stream built a large data center in Chaska, MN that qualifies for State of Minnesota tax benefits. Stream engaged Excipio Consulting to help evaluate the financial impact of those tax benefits on its future customers.

Project Scope

In Scope

The project scope includes modeling the potential tax benefits for customers related to housing their IT infrastructure in the new Stream data center, including the following IT related infrastructure:

- Mainframe, midrange, and x86 based servers
- Storage and backup infrastructure
- Network infrastructure
- Customer provided data center infrastructure

Excipio developed financial models that address the potential tax benefits associated with the following scenarios:

- Client power consumption of .5 MW
- Client power consumption of 1.2 MW
- Client power consumption of 2.4 MW

Out of Scope

The following are examples of areas or requests not within the scope of this project:

- Technical review of security implementation, configuration, or penetration testing
- Technical review of network or data circuit bandwidth and utilization
- Creation of technical plans and implementation strategies
- Design of marketing plans and target client strategies
- Technical support and fit of current technologies
- Troubleshooting of applications and infrastructure issues
- Physical proof of concept

Methodology and Assumptions

Overview

To understand the potential tax benefit to Stream customers, Excipio developed multiple case studies using actual IT infrastructure from different Excipio customers. Each customer is from a different industry and has a different mix of IT that resulted in a range of potential tax benefits. Excipio used the methodology and assumptions outlined in this section to develop the estimated benefits for each case study. All case study customers used in this analysis are commercial enterprises that currently pay sales tax (not tax exempt).

Tax Benefits

The Minnesota Statute sections 297A.68 (new subdivision 42), and 297A.75, subdivisions 1 (new clause (16)), 2 and 3 established the new rules providing sales tax relief for customers of a qualified data center. Per previous Stream analysis and assessment, the Stream data center is a qualified data center.

The Minnesota Department of Revenue, Revenue Notice # 12-11: Sales Tax – Exemptions – Qualified Data Centers provides the following clarifications and guidance on the potential tax benefits to customers using Qualified Data Centers.

Purchases of "enterprise information technology equipment and computer software for use in a qualified data center" including "enterprise information technology equipment and computer software that is purchased to replace or upgrade enterprise information technology equipment and computer software for use in a qualified data center," are exempt. However, the purchaser must first pay the sales tax on the equipment and software and then, after June 30, 2013, the "owner of the business" may apply for a refund of the sales tax paid on the purchase. To be exempt, the sale and purchases of the equipment and software must be made after June 30, 2012. The exemption ends either 20 years from the date of the first purchase of "enterprise information technology equipment and computer software for use in a qualified data center" or by July 1, 2042, whichever is earlier.

Electricity used or consumed in the operation of the qualified data center also is

exempt, but as an upfront exemption. To be exempt, the sales and purchases of the electricity must be made after June 30, 2012, and by July 1, 2042.

Regarding computer software, the Revenue Notice # 12-11: Sales Tax – Exemptions – Qualified Data Centers provides the following clarification under Section V.B. Software Maintenance Contracts:

The exemption for purchases of computer software, including software that replaces or upgrades computer software in a qualifying data center, does not include purchases of maintenance contracts sold in connection with the sale of prewritten computer software, even if the contract provides that the purchaser will be entitled to receive "upgrades or enhancements" as that term is defined in Minnesota Rules, Part 8130.9910, subpart 1, item G.

Using the statutes and the Revenue Notice referenced above, Excipio assumed the following to determine the eligibility and value of the tax benefits for customers of a qualified data center.

- IT hardware, IT hardware maintenance, and IT software purchases are exempt from sales tax relief. The customer must first pay the sales tax and then seek a refund.
- IT software maintenance and implementation labor are not tax exempt.
- The use of electricity in a qualified data center is tax exempt. Customers should receive tax exemption upon the purchase of electricity, so they will not need to file for a refund.
- Purchases must be made after June 30, 2012 and may be made for 20 years from the first purchase, or by July 1, 2042, whichever is earlier
- The Minnesota sales tax rate is $0.06875

Stream indicated that their customers are also exempt from personal property taxes. Excipio did not quantify the benefits for this tax exemption; because it would vary depending on which state the customer currently hosts their IT equipment. However, Excipio believes this could save Stream clients property taxes worth an additional 2% to 6% of the value of their IT asset base each year.

Capital Cost Assumptions

Excipio used the following assumptions in developing the IT capital estimates for the case studies.

- As part of Stream's service, Stream provides:
    - All power to the PDU
    - All cooling and fire system components
    - General data center facility security
- Stream customers are expected to provide:
    - Racks and any rack related monitoring
    - All power related infrastructure from the PDU to the IT device within the rack
    - All cabling infrastructure within the customer space

  - Cages (if applicable)
  - Any security within the customer space

- To develop the expected IT critical power consumption, Excipio used 50% of the nameplate power rating for the various customer IT hardware. This represents the average power consumption of IT devices.
- Excipio used a ten-year life to evaluate the tax benefits, which represents Stream's typical contract period. Excipio initially modeled each of the case studies using a five-year period. Five years represents the average life of the IT equipment that clients would host in the data center. Even if the customer moved its current IT hardware into the Stream data center, the customer would likely replace the IT hardware within five years. To model the expected 10-year contract life, Excipio doubled the IT hardware capital costs.
- Stream provided the estimated cost to implement a client with 250 kW of critical load, 50 cabinets, and 2000 square feet of floor space (Customer 2). Excipio extrapolated from this estimate to derive the cost for the other two customers.
- Software purchase costs vary significantly from customer to customer. Most Stream customers will move existing IT infrastructure to the Stream data center, so Excipio expects minimal to no tax benefits associated with software cost. However, for those customers who are implementing new systems and software, the tax benefits associated with moving to the Stream data center could be substantial depending on the nature and scope of the software purchased.

IT Operating Cost Assumptions

Hardware maintenance is the primary consideration for IT operating costs. Most of Excipio's customers purchase hardware maintenance when they buy IT hardware. Some customers purchase one or three years of IT hardware maintenance at the time of purchase and then buy extended maintenance from a different third party.

The one exception to this general assumption is Cisco Smartnet network hardware maintenance. Most Excipio customers purchase Cisco Smartnet hardware maintenance on an annual basis. The cost is typically 15% of the hardware cost, but many customers only buy maintenance support on critical network hardware components. Based on this, Excipio assumed Cisco Smartnet maintenance cost would be 10% of the network capital cost. Excipio based the maintenance assumptions for other IT hardware costs on the specific customer situation for each case study.

IT Electricity Cost

The Stream data center charges electricity cost based on actual metered power to the customer pod plus a Power Usage Effectiveness (PUE) factor that accounts for the additional power to cool the data center. Stream provided Excipio a PUE factor of 1.3 to use for the power calculation. The rate for electricity is $0.077 per kilowatt-hour (KWH). Therefore, Excipio developed the customers' estimated electricity cost using the following formula:

Customer Electricity Cost =
IT Critical Load (KW) * 1.3 (PUE factor) * 8760 hours per year * $0.077/KWH

Case Study 1

Excipio used a customer in the retail and e-commerce industry for the first case study. Figure CS – 1 provides a profile of this customer and its IT environment.

Figure CS – 1: Case Study 1 Profile

Component	Customer Profile
x86 Servers	Uses blade servers extensively
Non x86 Servers	Uses 3 large IBM iSeries platforms
Storage	Uses Tier II SAN storage
Backup	Tape backup
Cages	Included
System Software Profile	Purchase server, monitoring, and DCIM software
Hardware Maintenance	Network maintenance only
Power	100 kW of critical load
Number of racks	Estimate 30 racks at 3.33 kW per rack
Estimated Square Feet	Estimate of ~1200 square feet of data center space

Figure CS – 2 Capital Cost Model

Component	Sub Component	Quantity	Unit Cost	Total Cost (10 Year)
Servers	x86 Servers (Blade)	134	varies	$2,476,000
	x86 Rack Mount Server	16	$6,000	$224,000
	iSeries Computer	3	$1,000,000	$6,000,000
Subtotal Servers				$8,700,000
Storage	Tier 2	372,736	$4	$2,981,888
Subtotal Storage				$2,981,888
Backup	Tape based Systems	3	varies	$450,000
Subtotal Backup				$450,000
Network	WAN	41	varies	$1,472,000
	LAN	131	varies	$1,704,000
Subtotal Network				$3,176,000
Data Center Related	Cage build out		varies	$12,350
	Bio Reader		varies	$5,750
	Cabinets		varies	$42,000
	RPP's		varies	$17,500
	Whips		varies	$20,000
	Rack mount PDUs		varies	$36,000
	Copper and Fiber Demarc from Telco Room		varies	$4,500
	Ladder Rack System		varies	$12,500
	Copper Distribution with 24 Port top of rack patch panel		varies	$75,000
	Camera System	1,200	$10	$12,000
Subtotal DC Related				$237,600
Software	Server operating systems	125	$600	$75,000
	Virtualization software	25	$6,000	$150,000
	DCIM tool	30	$2,500	$75,000
	Monitoring tool(s)		varies	$540,000
Subtotal Software				$840,000
Total Capital				$16,385,488

Notes:

- Server, Storage, Backup, and Network costs were doubled for the ten-year period, assuming the customer would refresh this technology every 5 years. Data center related costs and software costs were only included once.
- Servers – This customer has optimized its x86 server infrastructure using blade servers. Using blade servers creates a high server and power density per rack, depending on how many blade chassis' are housed in a single rack. The customer also uses three large IBM iSeries computers to host its e-commerce platforms. Both of these server technologies create a significant IT capital cost relative to the amount of data center power and space they consume.

- Tier 2 storage – This customer uses a medium grade SAN using slower and denser disk arrays than typically used in Tier 1 SAN equipment.
- Network Hardware – the network hardware cost for this customer is higher than normal for customers of this size. This is due to the extensive network in place to support its extensive retail store operations.
- Server Software - For this case study, Excipio assumed the customer was purchasing new servers and operating systems for the data center. As mentioned earlier, most customers will be transferring existing workloads.
- DCIM tool – Excipio estimates a robust Data Center Information Software (DCIM) tool costs approximately $2500 per rack.
- Camera System - Excipio estimates the cost of camera systems based on the square footage of the space to be monitored. For this customer, the estimate is 1,200 square feet at a cost of $10/square foot.
- Excipio extrapolated the other data center related costs from the estimate Stream provided for Case Study 2 based on the relative number of racks and space.

Figure CS – 3: Operating Cost Model

Component	Sub Component	Comments	Estimated Annual Cost
Server	Hardware Maintenance	Purchase with 5 year HW maintenance	$0
Storage	Hardware maintenance	Extended maintenance on 25% of $373/TB	$25,160
Backup	Hardware maintenance	Extended maintenance on 50% of backup devices @ 15% of hardware cost	$16,875
Network	Hardware maintenance	Assume Cisco Smartnet. Customers usually cover critical DC infrastructure. Assume 10% of network capital cost.	$158,800
Data Center Related	Hardware Maintenance	DC hardware is provided by colocation provider and/or does not require hardware maintenance	$0
Total Operating Cost			$200,835

Notes:

- Server – This customer buys servers with five years of hardware maintenance
- Storage – This customer has multiple storage frames of different ages. They purchase the storage with three years of maintenance upfront, so they have to buy extended hardware maintenance for the storage after three years. In this case, the maintenance cost was approximately 15% of the original cost of storage for the oldest storage frame.
- Backup - This customer has two tape systems and one of the tape systems is on extended third party maintenance at an annual cost of ~15% of the cost of the tape device.

Figure CS – 4: Electricity Cost Model

Component	Amount
Estimate kW	100
Annual hours	8,760
Estimated KWH (from IT Load)	876,000
PUE Factor	1.3
Total Power	1,138,800
Rate Per KWH	$0.077
Total Power Cost	$87,688
Tax Rate	$0.06875
Estimated Annual Tax Savings	$6,029

Figure CS – 5: Summary Cost Model

Component	Total	Tax Rate	Tax Benefit
One-time Capital	$16,385,488	$0.06875	$1,126,502
Total Operating Costs - 10 years	$2,008,347	$0.06875	$138,074
Electricity Cost - 10 years	$876,876	$0.06875	$60,285
Total (10 Years)	$19,270,711		$1,324,861

Notes:
An IT critical load of 100 kW over 10 years cost the client $19,270,711 and generates a tax benefit of $1,324,861

Case Study 2

Excipio used a customer that provides software and hosting/cloud services to the financial services industry for case study 2. Figure CS – 6 provides a profile of this customer and its IT environment.

Figure CS – 6: Case Study 2 Profile

Component	Customer Profile
x86 Servers	Majority are rack mount servers
Non x86 Servers	Has small number of IBM iSeries and pSeries servers
Storage	Uses Tier I SAN storage
Backup	Uses combination of tape and disk backup
Cages	Include cage
System Software Profile	Purchase server and DCIM software
Hardware Maintenance	Hardware maintenance for network hardware only
Power	250 kW of critical load
Number of racks	Estimate 50 racks
Estimated Square Feet	Estimate of ~2,000 square feet of data center space

Figure CS – 7 Capital Cost Model

Component	Sub Component	Quantity	Unit Cost	Total Cost (10 Year)
Server	x86 Servers (Blade)	55	$10,000	$1,100,000
	x86 Rack Mount Server	410	$6,000	$4,920,000
	IBM (pSeries)	9	varies	$310,494
	Oracle/Sun	32	varies	$1,638,006
Subtotal Servers				$7,968,500
Storage	SAN Storage (Gb)	600,000	$6	$7,200,000
	SAN Switches	10	$3,500	$70,000
Subtotal Storage				$7,270,000
Backup	Disk based systems		varies	$950,000
	Tape based Systems		varies	$700,000
Subtotal Backup				$1,650,000
Network	VPN termination	2	varies	$140,000
	WAN Router	8	varies	$320,000
	Load Balancer	4	varies	$530,000
	Firewall	4	varies	$1,400,000
	Switches	30	varies	$600,000
Subtotal Network				$2,990,000
Data Center Related	Cage build out		varies	$24,700
	Bio Reader		varies	$5,750
	Cabinets		varies	$70,000
	RPP's		varies	$35,000
	Whips		varies	$40,000
	Rack mount PDUs		varies	$60,000
	Copper and Fiber Demarc from Telco Room		varies	$9,000
	Ladder Rack System		varies	$25,000
	Copper Distribution with 24 Port top of rack patch panel		varies	$150,000
	Camera System	2,000	$10	$20,000
Subtotal DC Related				$439,450
Software	x86 Server operating systems	415	$600	$249,000
	Virtualization software	50	$6,000	$300,000
	DCIM tool	50	varies	$125,000
Subtotal Software				$674,000
Total Capital				$20,991,950

Notes:

- Server, Storage, Backup, and Network costs were doubled for the ten-year period, assuming the customer would refresh this technology every 5 years. Data center related costs and software costs were only included once.
- Servers – This customer uses a variety of server platforms to support the needs of a diverse customer base. They have not embraced blade servers in a significant way.
- Storage – This customer uses high end Tier 1 SAN storage.

Figure CS – 8: Operating Cost Model

Component	Sub Component	Comments	Estimated Annual Cost
Server	Hardware Maintenance	Typically purchase with HW maintenance	$0
Storage	Hardware maintenance	Typically purchase with HW maintenance	$0
Backup	Hardware maintenance	Typically purchase with HW maintenance	$0
Network	Hardware maintenance	Assume Cisco Smartnet. Customers usually cover critical DC infrastructure. Assume 10% of network capital cost.	$149,500
Data Center Related	Hardware Maintenance	Hardware is provided by colocation provider	$0
Total Operating Cost			$149,500

Notes:

- This customer buys hardware maintenance at the time of purchase (embedded upfront capital cost) for the full expected life of the asset.
- The customer does buy annual Cisco Smartnet maintenance for its network infrastructure.

Figure CS – 9: Electricity Cost Model

Component	Amount
Estimate kW	250
Annual hours	8,760
Estimated kWH (from IT Load)	2,190,000
PUE Factor	1.3
Total Power	2,847,000
Rate Per kWH	$0.077
Total Power Cost	$219,219
Tax Rate	$0.06875
Estimated Annual Tax Savings	$15,071

Figure CS – 10: Summary Cost Model

Component	Total	Tax Rate	Tax Benefit
One-time Capital	$20,991,950	$0.06875	$1,443,197
Total Operating Costs - 10 years	$1,495,000	$0.06875	$102,781
Electricity Cost - 10 years	$2,192,190	$0.06875	$150,713
Total (10 Years)	$24,679,140		$1,696,691

Notes:
An IT critical load of 250 kW over 10 years cost Client 2 $24,679,140 and generates a tax benefit of $1,696,691

Case Study 3

Excipio used a large hospital system for case study 3. Figure CS – 11 provides a profile of this customer and its IT environment.

Figure CS – 11: Case Study 3 Profile

Component	Customer Profile
x86 Servers	Uses blend of blades and rack mount servers
Non x86 Servers	Uses IBM iSeries and pSeries platforms
Storage	Uses 3 tiers of storage
Backup	Uses tape backup
Cages	Include cage
System Software Profile	Purchase DCIM software only
Hardware Maintenance	Hardware maintenance for network hardware only
Power	500 kW of critical load
Number of racks	Estimate 140 racks
Estimated Square Feet	Estimate of ~5,600 square feet of data center space

Figure CS – 12 Capital Cost Model

Component	Sub Component	Quantity	Unit Cost	Total Cost (10 Year)
Servers	x86 Servers (Blade)	464	varies	$8,328,000
	x86 Rack Mount Server	256	varies	$2,899,200
	IBM (pSeries)	60	varies	$4,152,000
	IBM (iSeries)	22	varies	$1,290,000
	Other	4	varies	$36,000
Subtotal Servers		806		$16,705,200
Storage	Tier 1 (Gb)	1,426,560	$6	$17,118,720
	Tier 2 (Gb)	2,315,369	$3	$13,892,213
	Tier 3 (Gb)	55,186	$1	$110,371
	SAN Switch	30	$3,500	$210,000
Subtotal Storage		3,797,114		$31,121,304
	Tape based systems	5	varies	$3,000,000
Subtotal Backup				$3,000,000
Network	DC Edge Switches	240	varies	$1,897,920
	Routers/L3 Switches	22	varies	$436,320
	Load Balancer	8	varies	$518,400
	Firewall/IDS/IPS/VPN	22	varies	$697,824
Subtotal Network				$3,550,464
Data Center Related	Cage build out		varies	$49,400
	Bio Reader		varies	$11,500
	Cabinets		varies	$175,000
	RPP's		varies	$70,000
	Whips		varies	$80,000
	Rack mount PDUs		varies	$120,000
	Copper and Fiber Demarc from Telco Room		varies	$18,000
	Ladder Rack System		varies	$50,000
	Copper Distribution with 24 Port top of rack patch panel		varies	$300,000
	Camera System	5,600	$10	$56,000
Subtotal DC Related				$929,900
Software	DCIM tool (Per Rack)	125	$2,500	$312,500
Subtotal Software				$312,500
Total Capital				$55,619,368

Notes:

- Server, Storage, Backup, and Network costs were doubled for the ten-year period, assuming the customer would refresh this technology every 5 years. Data center related costs and software costs were only included once.
- Storage – This customer uses a significant volume of storage relative to the overall size of the overall IT environment. With this volume of storage, they have implemented three different storage tiers that provide a balance between cost and performance. Excipio expects most healthcare related organizations will use a significant amount of storage.

Figure CS – 13: Operating Cost Model

Component	Sub Component	Comments	Estimated Annual Cost
Server	Hardware Maintenance	Typically purchase with HW maintenance	$0
Storage	Hardware maintenance	Typically purchase with HW maintenance	$0
Backup	Hardware maintenance	Typically purchase with HW maintenance	$0
Network	Hardware maintenance	Assume Cisco Smartnet. Customers usually cover critical DC infrastructure. Assume 10% of network capital cost.	$177,523
Data Center Related	Hardware Maintenance	Hardware is provided by colocation provider	$0
Total Operating Cost			$177,523

Notes:

- This customer buys hardware maintenance at the time of purchase (embedded upfront capital cost) for the full expected life of the asset.
- The customer does buy annual Cisco Smartnet maintenance for its network infrastructure.

Figure CS – 14: Electricity Cost Model

Component	Amount
Estimate kW	500
Annual hours	8,760
Estimated kWH (from IT Load)	4,380,000
PUE Factor	1.3
Total Power	5,694,000
Rate Per kWH	$0.077
Total Power Cost	$438,438
Tax Rate	$0.06875
Estimated Annual Tax Savings	$30,143

Figure CS – 15: Summary Cost Model

Component	Total	Tax Rate	Tax Benefit
One-time Capital	$55,619,368	$0.06875	$3,823,832
Total Operating Costs - 10 years	$1,775,232	$0.06875	$122,047
Electricity Cost - 10 years	$4,384,380	$0.06875	$301,426
Total (10 Years)	$61,778,980		$4,247,305

Notes:

An IT client with a critical load of 500 kW over 10 years costs the client $61,778,980 and generates a tax benefit of $1,696,691.

Summary Analysis

Case Study Summary

The case studies outlined above demonstrate that the value of the tax benefits can vary significantly from customer to customer based on the types of IT hardware and software deployed in the qualified data center. Since future Stream customers will bring different size environments to Stream's data center, Excipio calculated a ten year IT cost per kW of critical power for each customer as a mechanism to normalize the data and to provide a basis for extrapolating to customers of all sizes. Figure SA – 1 below shows the range of outcomes for this metric from the three case studies above.

Figure SA – 1: Ten Year IT Cost Per kW of Critical Power

Metric	Customer 1	Customer 2	Customer 3	Average
IT Critical Load (kW)	100	250	500	283
Total Contracted Power (kW) (Critical Load + 40% for headroom/growth)	140	350	700	397
Number of Racks	30	50	140	79
Floor Space	1,200	2,000	5,600	3,173
Industry	Retail/ E-Commerce	SW and Services	Health Care	Blended
Significant IT Spend Areas	IBM iSeries, Extensive retail network	Blade servers, some Unix	Extensive Tier I Storage	Blended
One-time IT Capital	$16,385,488	$20,991,950	$55,619,368	
Other IT Operating Costs	$2,008,347	$1,495,000	$1,775,232	
Electricity Consumption	$876,876	$2,192,190	$4,384,380	
Total IT Cost	$19,270,711	$24,679,140	$61,778,980	$39,192,709
Tax Benefit	$1,324,861	$1,696,691	$4,247,305	$2,694,499
10 Year IT Cost Per kW of Critical Power	$192,707	$98,717	$123,558	$138,327
Monthly Savings per kW of Contracted Power	$79	$40	$51	$57

Notes:

- The range of outcomes for the ten year IT cost per kW of critical power were between $98,717 and $192,707. This demonstrates that the types of hardware and software customers use can have a significant impact on the density of IT spending per kW of critical power.

- Excipio noted the following types of IT infrastructure contributed to higher IT costs per kW of critical power:
    - Servers – customers using blade servers or higher end UNIX or mainframe computers
    - Storage – customers with more overall storage or those using high-end tier 1 storage
    - Backup – although it wasn't a factor in these case studies, customers using more disk based backup technologies, versus tape based backup, will have higher IT cost per kW of critical power
    - Network – customers with sophisticated and/or elaborate wide area networks
    - Software – any customers deploying new software or applications

Value of a Qualified Data Center

Being a qualified data center with the potential for sales tax savings differentiates the Stream data center from other data center market alternatives. The analysis above shows that a customer could save between $40 and $79 per contracted kW of power per month by using Stream's qualified data center depending on the type of IT hardware and software deployed.

In addition, Stream data center customers are exempt from personal property tax. Depending on where each customer is currently hosting their IT infrastructure, Excipio estimates this could save Stream clients property taxes worth an additional 2% to 6% of the value of their IT asset base each year. This is a substantial savings on top of the other sales tax benefits outlined above.

Potential Customer Scenarios

In the scope of this engagement, Stream requested Excipio model the following three future scenarios.

- Customer with 500 kW of committed kW
- Customer with 1,200 kW of committed kW
- Customer with 2,400 kW of committed kW

Figure SA – 3 below shows the potential savings and relative value of each of these scenarios using the metrics and assumptions developed from the three case studies.

Figure SA – 3: Three Potential Customer Scenarios

Metric	Tier	10 Year IT Cost Per kW of Critical Power	500 kW	1200 kW	2400 kW
IT Critical Load			357	857	1714
Additional Contracted Power			40%	40%	40%
Total Contracted Power (IT Critical Load + Additional Contracted Power)			500	1200	2400
Estimated 10 Year Tax Benefit	Low	$98,717	$2,423,855	$5,817,252	$11,634,504
	Average	$123,558	$3,033,790	$7,281,096	$14,562,193
	High	$192,707	$4,731,645	$11,355,948	$22,711,896
Tax Benefit Per Monthly kW of Contracted Power	Low		$40.40	$40.40	$40.40
	Average		$50.56	$50.56	$50.56
	High		$78.86	$78.86	$78.86

Notes:

- To calculate the estimated ten-year tax benefit, Excipio used the following formula:

Estimated 10 Year Tax Benefit =
10 year IT cost per kW of critical IT power * IT Critical Load * Tax Rate

- Excipio used the low, average, and high IT cost per kW of critical power to show the potential range of savings, since it is impossible to know the type of IT environment a prospective customer would have.

Cost Modeling Tools

Overview

Since the tax savings for each customer could vary significantly, Excipio expects Stream's customers will want to understand the potential savings for their specific environment. Excipio developed a high-level modeling tool and a more detailed modeling tool to facilitate this specific customer analysis. Excipio developed the models in Microsoft Excel, and provided them to Stream as part of the overall deliverable.

High Level Modeling Tool

Excipio developed the high-level modeling tool to provide a very quick and rough estimate of the savings potential to customers. This model uses the metrics from the case studies for the ten year IT cost per kW of critical power to approximate the savings. To simplify the analysis, Excipio extrapolated the data to create the following tiered model.

Figure CMT – 1: High Level Modeling Tool Tiers

Tier	10 Year IT Cost Per kW of Critical Power	Contributing Attributes
Low	$100,000	x86 rack servers, lower tier storage
Medium	$145,000	Presence of only 1 high attribute
High	$190,000	Significant tier I storage Sophisticated or elaborate WAN network Mainframe and/or large Unix computers Significant use of blade servers Large software purchases
Average	$138,327	

Notes:
Excipio rounded each tier to simplify the analysis. The medium tier represents a simple average of the high and low tiers. The average tier is the actual average calculated from the three case studies.

Figure CMT – 2 below shows the high-level cost model.

Figure CMT – 2: High Level Cost Model

Metric	Custom
Customer IT Critical Load	1,000
Additional Contracted Power	40%
Total Contracted Power (IT Critical Load + Additional Contracted Power)	1,400
kW per Rack	5
Number of Racks	200
Square Footage per Rack	32
Additional Space (Percent of Rack Space)	25%
Total Floor Space (Square Feet)	8,000
IT Cost Per kW Tier	Average
IT Cost Per kW	$138,327
Total (10 Years) IT Cost	$138,327,000
Estimated Tax Benefit	$9,509,981

Note: Red font indicates input fields

Notes:

- The cells highlighted with a red font are fields that the user can manipulate to configure the customer's environment as close to the customer's requirements as possible.
- The IT Cost Per kW has a drop down menu that includes the four tiers outlined above. The intent is to determine with the customer if they have some of the types of infrastructure that would drive them to the medium or high tier. Once the other parameters are input into the model, the user can toggle between tiers to understand the different potential tax benefits.

Detailed Modeling Tools

Assuming most customers will be interested in developing a deeper understanding of the potential tax benefits, Excipio built a more detailed set of modeling tools. Excipio based these models on the same approach used to develop the different case studies. The following represents the steps to develop a customer specific model and the modeling tools that support each step.

Step 1 – Estimate Capital Cost and IT Critical Load

Use the Capital Cost Model to develop a detailed inventory of the IT infrastructure that will be moving to the stream data center, including the nameplate power rating and estimated cost of each component.

Using this inventory, calculate the total kW of critical load. As stated above, Excipio uses 50% of the nameplate power rating for each device as the expected IT critical load. The user can input the total number of devices and average power per device, or simply enter the total nameplate power *50%.

The customer will need to adjust this model based on the length of the colocation contract and the life of the capital assets being purchased. As previously discussed, the typical life of IT assets is five years. For a ten-year colocation contract, these assets would need to be purchased twice during the life of the contract. The data center and software assets will probably only need to be purchased once over the life of the colocation contract.

Step 2 – Estimate IT Hardware Maintenance

Input the actual or estimated cost for hardware maintenance in the Operating Cost Model. It should be relatively simple to identify these costs and enter into the appropriate field. If not, annual hardware maintenance typically costs between 10% and 15% of the value of the IT hardware.

Step 3 – Estimate Power Usage

Using the Electricity Cost Model, enter the IT critical load into the model. The model will calculate the total electricity cost based on the other assumption. The user can override the PUE factor or electricity cost per KWH if either of these changes over time.

Step 4 – Evaluate the Results

The Summary Financial Model should automatically populate based on the inputs from all the other tabs. The user can override the Additional Power Headroom or the Monthly Colocation cost per kW if the user identifies different assumptions.

The figures on the next couple of pages show the various models referenced above.

Figure CMT – 3: Capital Cost Model

Component	Sub Component	Quantity	Unit Cost	Total	kW Per Device (Nameplate)	IT Critical Load (Nameplate * 50%)	Comments
Servers	x86 Servers (Blade)	0	$0	$0	0	0	$8K to $10K per blade
	x86 Rack Mount Server	0	$0	$0	0	0	$5K to $8K per server
	IBM (pSeries)	0	$0	$0	0	0	Varies
	IBM (iSeries)	0	$0	$0	0	0	Varies
	IBM (zSeries)	0	$0	$0	0	0	Varies
	Oracle/Sun Unix	0	$0	$0	0	0	Varies
	HP Unix	0	$0	$0	0	0	Varies
	Other	0	$0	$0	0	0	Varies
Subtotal Servers				$0	0	0	
Storage	Tier 1 (Gb)	0	$0	$0	0	0	High performance, feature rich SAN (~$6/GB)
	Tier 2 (Gb)	0	$0	$0	0	0	Medium performance SAN/NAS (~$4/GB)
	Tier 3 (Gb)	0	$0	$0	0	0	Low performance SATA/Archive ($1/GB)
	SAN Switch	0	$0	$0	0	0	~$2,500 to $3,500 per 24 port switch
Subtotal Storage				$0	0	0	
Backup	Disk based systems	0	$0	$0	0	0	Varies
	Tape based Systems	0	$0	$0	0	0	Varies
	Other	0	$0	$0	0	0	Varies
Subtotal Backup				$0	0	0	
Network	Edge/Layer 2 Switches	0	$0	$0	0	0	Varies
	Routers/Layer 3 Switches	0	$0	$0	0	0	Varies
	Load Balancers	0	$0	$0	0	0	Varies
	Firewall/IDS/IPS	0	$0	$0	0	0	Varies
	VPN	0	$0	$0	0	0	Varies
	WAN Optimizers	0	$0	$0	0	0	Varies
	Wireless Controllers	0	$0	$0	0	0	Varies
	Other	0	$0	$0	0	0	Varies
Subtotal Network				$0	0	0	
Data Center Related	Cage build out	0	$0	$0	NA		
	Bio Reader	0	$0	$0			~$5,750
	Cabinets	0	$0	$0			~$1,400 per cabinet
	RPP's	0	$0	$0			
	Whips	0	$0	$0			
	Rack mount PDUs	0	$0	$0			
	Copper and Fiber Demarc from Telco Room	0	$0	$0			
	Ladder Rack System	0	$0	$0			
	Security camera/system	0	$0	$0			~$10 Per Square Foot
Subtotal DC Related				$0			
Software Purchases	Server operating systems	0	$0	$0			$4,200 for Windows DC Edition, $600 for Windows Standard Edition
	Virtualization software	0	$0	$0			~$3,000 Per Socket for VMWare
	Business applications	0	$0	$0			Varies ($2000 to $4000 per user for ERP)
	DCIM tool	0	$0	$0			~$1500 to $4000 per rack
	System Monitoring tool(s)	0	$0	$0			Varies
Subtotal Applications				$0			
Total				$0	0	0	

Figure CMT – 4: Operating Cost Model

Component	Comments	Estimated Annual Cost
Server		$0
Storage		$0
Backup		$0
Network		$0
Data Center Related		$0
Total Operating Cost		$0

Figure CMT – 5: Electricity Cost Model

Component	Amount
IT Critical Load (kW)	0
Annual hours	8,760
Estimated kWH (from IT Load)	0
PUE Factor	1.3
Total Power	0
Rate Per kWH	$0.077
Total Power Cost	$0
Tax Rate	$0.06875
Estimated Annual Tax Savings	$0

Figure CMT – 6: Summary Financial Model

Component	Total	Tax Rate	Tax Benefit
One-time Capital	$0	$0.06875	$0
Other Operating Costs - 10 years	$0	$0.06875	$0
Electricity Consumption - 10 years	$0	$0.06875	$0
Total (10 Years)	$0		$0