

The financial modeling guidelines were developed to ensure that all financial models developed by and for Washington University in St. Louis use the same set of defensible assumptions. Use of these guidelines by staff and consultants is mandatory. Should a project manager or consultant feel that a specific project warrants an adjustment to the financial modeling assumptions, the change must be approved by the AVC for Finance & Director Financial Planning and well-documented within the model.

The guidelines will be reviewed and updated annually by a committee consisting of finance, facilities, operations and sustainability staff from both campuses and approved by the Executive Vice Chancellor for Administration.

All financials models will include both Complex Payback¹ and Net Present Value analyses.

Cost of Capital

- Assume 6% over the life of a project

NPV Duration

- The number of years used for NPV calculations will be based on the useful life of the equipment as defined by a recognized industry standard. For HVAC equipment, refer to the latest edition of the ASHRAE Applications Handbook, Chapter 37, *Owning and Operating Costs*.

Life Cycle Cost Analysis

- Use total project cost for the incremental first cost by applying a 1.3 multiplier to construction costs to cover all soft costs, including design fees, contingencies, etc.
- Include labor and maintenance cost savings/increases in projections, assuming 3% annual increase for inflation
- Include water and sewer savings/increases in projections

Carbon Reduction and Cost of Carbon

- Include the estimated annual carbon reduction in metric tons of CO₂-equivalent
- Calculate NPV without and with the Social Cost of Carbon (SCC) as a decision-making tool: use \$39/MTCO₂e beginning in 2015 with a 3% annual increase²
- Use the following carbon emission factors: 0.000834 MTCO₂e per kwh of purchased electricity and 0.0529 MTCO₂e per MMBTU of combusted natural gas
- Calculate the carbon reduction per dollar spent as (annual kg CO₂ Reduction)*(Useful Life)/(Project Cost)

Utility Projections

- Utility rate projections will be reviewed and updated annually in October or when rate increases go into effect.
- Cap projected annual utility rate increase at 8% Maximum.

Natural gas

- Natural gas prices are highly volatile. The goal is defensible logic.
- Use the actual December New York Mercantile Exchange (NYMEX) gas cost projections for each year out 10 years **at the time of analysis**. For years beyond Y10, calculate the trend line of Y1-10 and apply that annual percent change to the years beyond Y10. Data is available on the following website from the CME Group, the owner and operator of NYMEX:
<http://www.cmegroup.com/trading/energy/natural-gas/natural-gas.html>
- In addition to the commodity costs from NYMEX, add \$0.087/Therm for transportation costs.

¹ Complex Payback includes 1) costs/savings for all utilities impacted by a project calculated using the utility escalators outlined in this document, 2) 3% annual inflation and 3) maintenance costs/savings.

² Source: *Fact Sheet: Social Cost of Carbon*, published by the EPA, dated November 2013.

<http://www.epa.gov/climatechange/Downloads/EPAactivities/scc-fact-sheet.pdf>

Electric

- Base the Y1 rate on the actual rate for the specific electric account. The following is a list of the all-in blended rate for WUSTL’s main accounts, updated November 2017. For rate data for other WUSTL accounts, contact either the Danforth or School of Medicine Facilities Department.

Accounts	Street	Account Type	Blended Rate (\$/kWh)
Danforth Campus	Forest Park Pkwy	11M	\$0.06444
South Forty	Wydown Blvd	4M	\$0.07079
West Campus	Forsyth Blvd	4M	\$0.06744
North Campus	Rosedale Ave	3M	\$0.08557
Medical School	Childrens Place	11M	\$0.06946
Medical School	S Euclid Ave	11M	\$0.06974
Medical School	McKinley Ave	11M	\$0.07009
Medical School	Forest Park Ave	4M	\$0.06960

- Use a 10-year look-back on the percent rate change for the specific electric account type (e.g., Large Primary) to get an average annual change to apply to future years.
- 10 yr. avg. annual change to be updated annually and when rate changes go into effect.
- The actual Ameren rate history is shown below by account type. The average annual rate increase projection is shown in the last row. As a result of the 10-year look-back approach, the April 2004 and July 2007 increases are excluded from the 10-year average increase calculation, yet retained in the table for historical record.

Effective Change Date	Overall Change	Residential 1(M)	Small GS 2(M)	Large GS 3(M)	Small Primary 4(M)	Large Primary 11(M)	Large Transm. 12(M)
Apr-04	-1.60%	-1.60%	-2.00%	-1.50%	-1.50%	-3.20%	
Jul-07	2.10%	3.20%	2.80%	1.20%	3.10%	2.70%	-5.40%
Mar-09	7.80%	8.10%	7.70%	7.70%	7.70%	7.90%	6.10%
Jun-10	10.40%	11.90%	12.10%	9.90%	9.90%	11.90%	0.10%
Jul-11	7.11%	9.25%	5.20%	5.20%	5.20%	5.20%	5.20%
Jan-13	10.10%	10.90%	8.80%	9.90%	10.50%	9.80%	6.60%
Jun-15	4.5%	5.6%	4.5%	4.4%	4.4%	5.1%	-5.1%
Apr-17	3.5%	3.7%	3.7%	3.0%	3.2%	3.8%	n/a
10 yr. Avg.	4.34%	4.95%	4.20%	4.01%	4.09%	4.37%	1.29%

- When conducting a detailed electrical savings analysis that is time-of-day/time-of-year kW demand sensitive, discuss with Washington University staff for guidance. In these cases, it may be prudent to apply the actual electrical rate tariff to the savings model, using actual energy and demand charges independently in the calculations, rather than using the all-in blended rates shown above.

Sewer

- Metropolitan Sewer District (MSD) is in the middle of major infrastructure investments due to regulatory requirements, resulting in significant rate increases.
- Build to a 10-year look-back on rates changes to get an average annual change to apply to future years.
- The actual MSD rate history is shown below for the years that data is available. For this period, the average annual rate increase projection would be as follows:
 - **MSD – 8.00% (due to cap)**

Effective Date	Raw Rate (\$/CCF metered water use)	% INC
7/1/2008	\$1.88	--
7/1/2009	\$1.92	2.13%
7/1/2010	\$2.02	5.21%
7/1/2011	\$2.11	4.46%
4/1/2012	\$2.28	8.06%
5/1/2013	\$2.50	9.65%
7/1/2014	\$2.82	12.80%
7/1/2015	\$3.21	13.80%
9/1/2016	\$3.59	11.84%
Average Rate Increase over available data period -----		8.49%

- Major university MSD accounts.

Location	Account Number
Danforth Campus, West of Hoyt	****010-4
Danforth Campus, East of Hoyt	****655-5
South Forty #1	****011-3
South Forty #2	****568-5
Medical School	****

Water:

- The University’s two water providers, St. Louis City and Missouri American, present a noticeable difference in unit cost. Calculations shall use the rate projections from the applicable provider.
- Build to a 10-year look-back on rates to get an average annual rate change to apply to future years.
- The billed water rate history is shown below for the years that data is available. For this period, the average annual rate increase projection would be as follows:
 - **St. Louis City Water – 0.60%**
 - **MO American Water – 2.64%**

St. Louis City Water:

Date	Billed Rate (\$/CCF)	% INC
7/1/2010	\$1.4656	--
7/1/2011	\$1.4369	-1.96%
7/1/2012	\$1.4387	0.13%
7/1/2013	\$1.5138	5.22%
7/1/2014	\$1.4983	-1.02%
7/1/2015	\$1.5453	3.14%
7/1/2016	\$1.5161	-1.89%
Average Rate Increase over available data period -----		0.60%

MO American Water:

Date	Billed Rate (\$/CCF)	% INC
7/1/2010	\$1.1876	--
7/1/2011	\$1.2863	8.31%
7/1/2012	\$1.2877	0.11%
7/1/2013	\$1.3000	0.96%
7/1/2014	\$1.3014	0.11%
7/1/2015	\$1.2636	-2.90%
7/1/2016	\$1.3809	9.28%
Average Rate Increase over available data period -----		2.64%

- Major university potable water accounts:

Location	Water Provider	Account Number
Danforth Campus, West of Hoyt	MO American Water	1017-****1662
Danforth Campus, East of Hoyt	St. Louis City Water	4283-****4736
South Forty – Domestic Water #1	MO American Water	1017-****9213
South Forty – Domestic Water #2	MO American Water	1017-****9728
South Forty – Fire Water #1	MO American Water	1017-****9268
South Forty – Fire Water #2	MO American Water	1017-****9797
Medical School	St. Louis City Water	Various - Inquire for details