WICHITA STATE UNIVERSITY
HUGO WALL SCHOOL OF PUBLIC AFFAIRS
Environmental Finance Center

GOVERNMENTAL UTILITIES: ASSET MANAGEMENT, FINANCIAL SUSTAINABILITY & LONG-TERM FINANCE

Association of Governmental Accountants, KC Chapter

November 7, 2019

Nicholas Willis

Program Manager

Wichita State University

Hugo Wall School of Public Affairs

Environmental Finance Center

Our Mission

*To be a **collaborative resource**, creating **solutions to environmental challenges** to improve **quality of life in communities**.*

OUR STAFF

Melissa
interim director

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program manager

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program manager

Our Services

applied research

professional training

technical assistance

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INFRASTRUCTURE COST DRIVERS & ASSET MANAGEMENT BASICS

LONG-TERM COST DRIVERS

- Drinking Water
  - Maintenance of source of supply & treatment
  - Line replacements
  - Lead & Copper Rule Changes?
  - Rebuilds and Rehabilitation
  - Emerging contaminants (PFAS, PFOS, endocrine disruptors, medicine)

- Sewer
  - Nitrogen, ammonia & phosphorus compliance
  - Inflow & infiltration
  - Emerging contaminants
  - Rebuild/replacement of 40-70 year old treatment facilities

HOW BAD IS IT?

- Depends
- Site specific
- Community wealth
- Environment
- Climate
- Water quality
- Etc., etc., etc.

WHAT DO THE EXPERTS SAY?

American Society of Civil Engineers (2018)

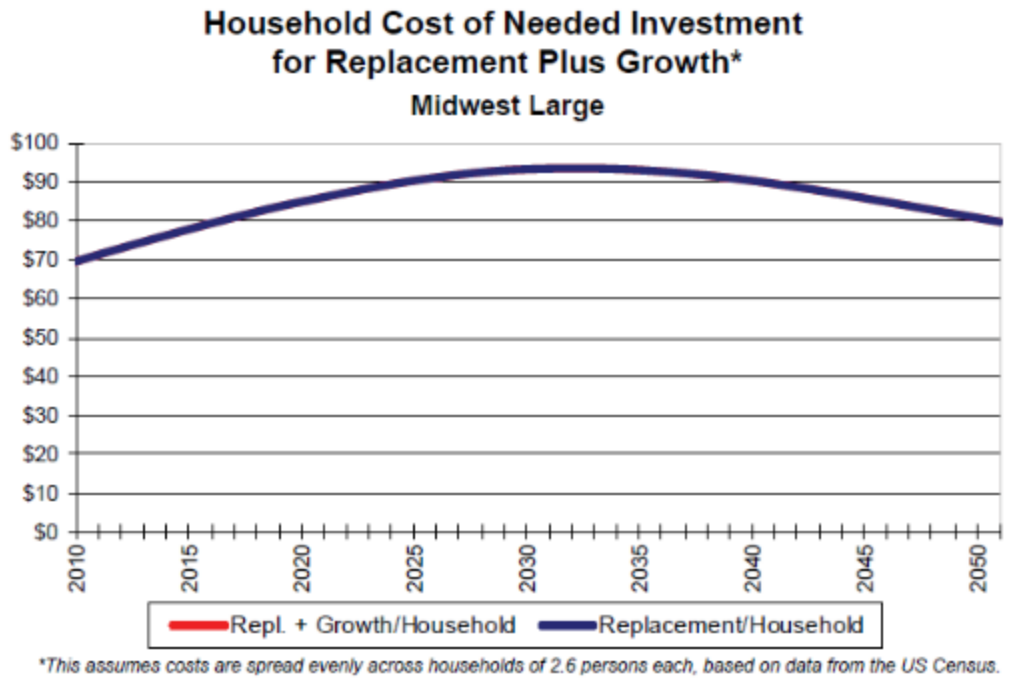
Kansas

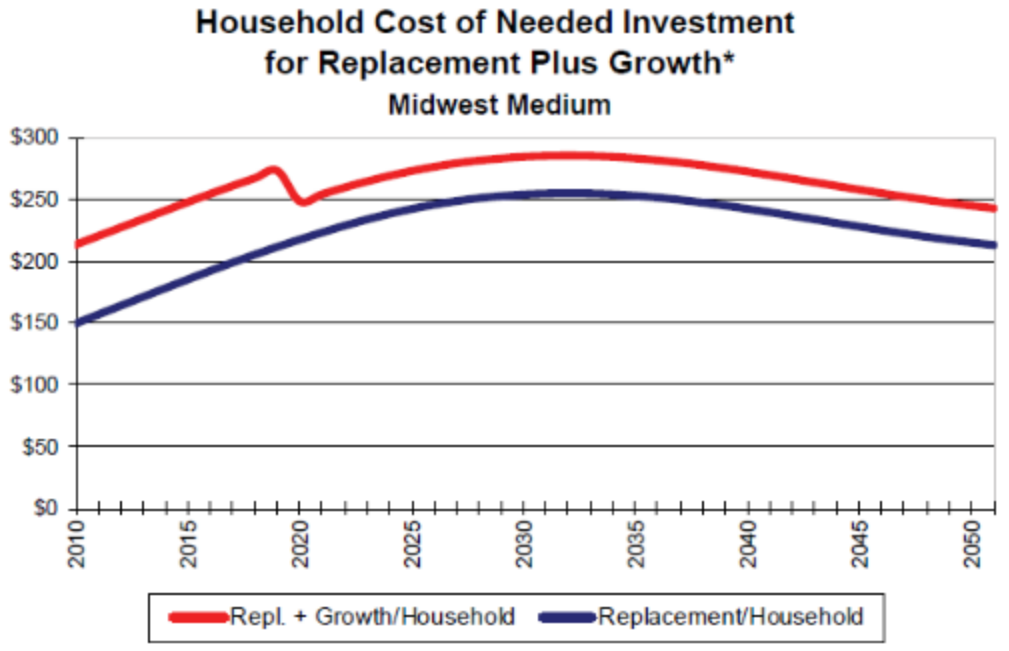
- Water = “C”
  - $4.2 billion need in 20 years
- Sewer = “D”
  - $3.2 Billion in KS (2013)
- Levees = “C”
  - 1412 miles in KS
- Stormwater = C-
- Dams = “C-”
  - 457 “High Hazard” & “Significant Hazard” in KS

Missouri

- Water = “C-”
  - $8.5 billion through 2030
- Stormwater/Sewer = “C-”
  - $9.6 Billion over 20 years
- Levees = “D+”
  - 2729 miles in MO
- Dams = “D-”
  - 1457 “High Hazard” in MO

From the American Water Works Association's Report on aging water infrastructure, "Buried no Longer"





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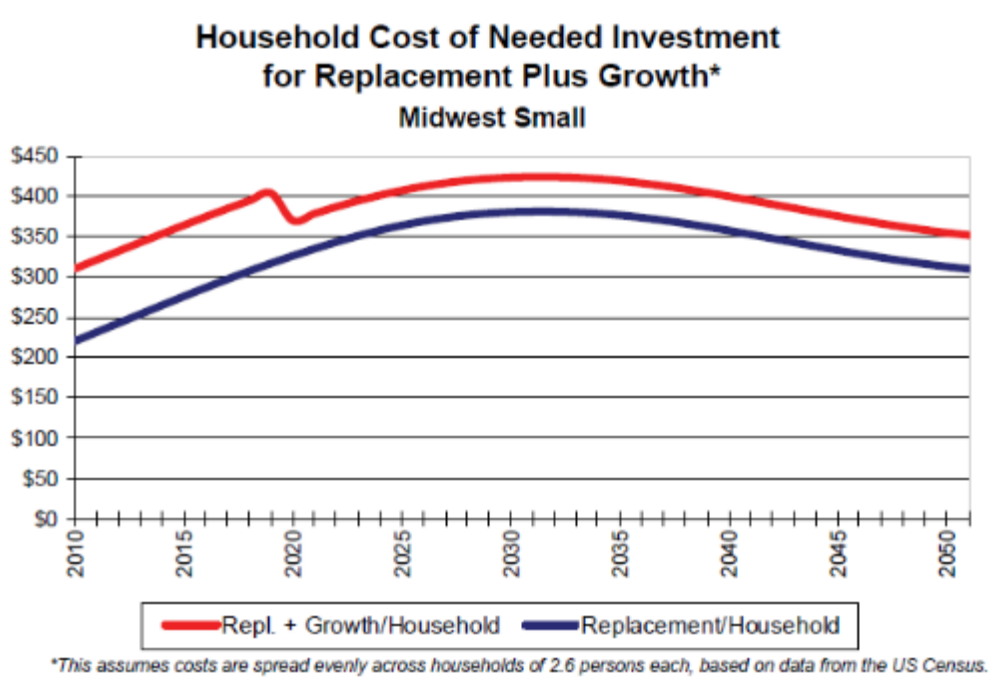
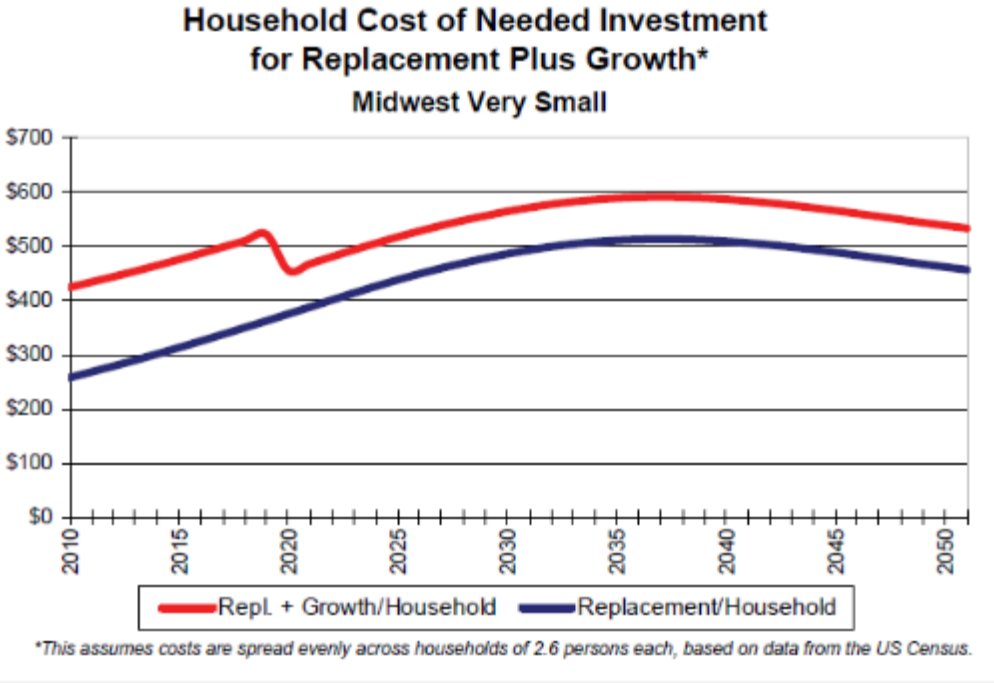




MATERIALS – COMPOUNDING THE PROBLEM

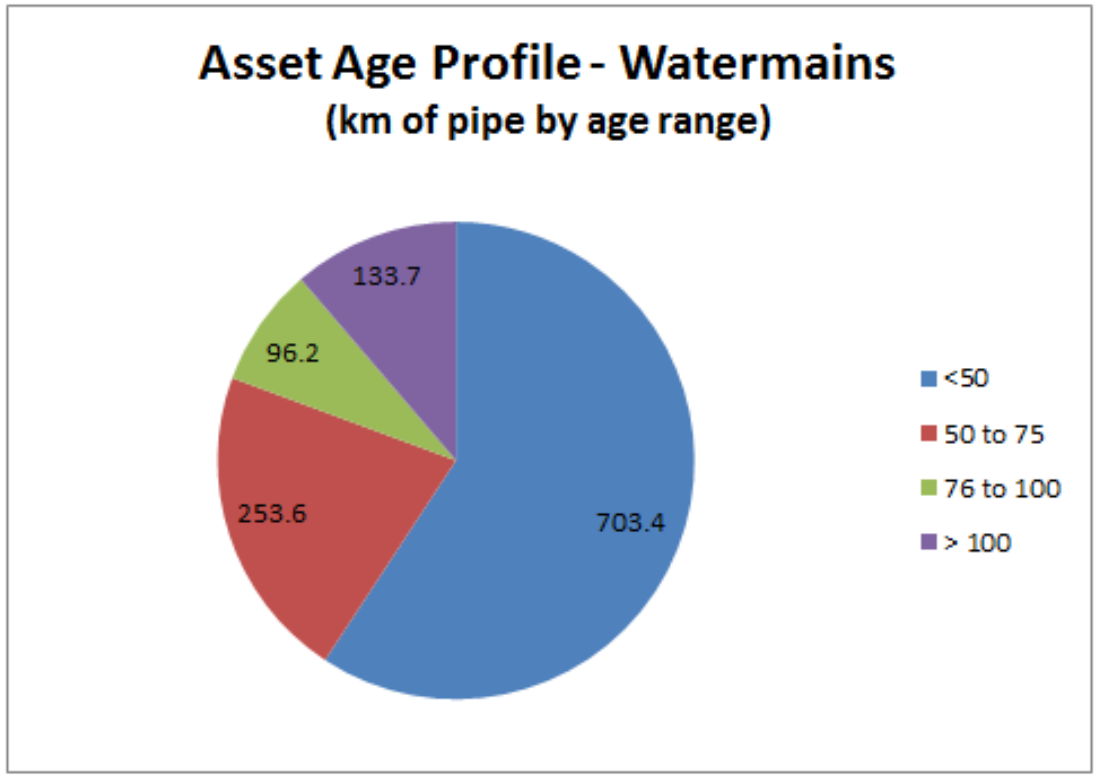
Figure 5: Average Estimated Service Lives by Pipe Materials (average years of service)

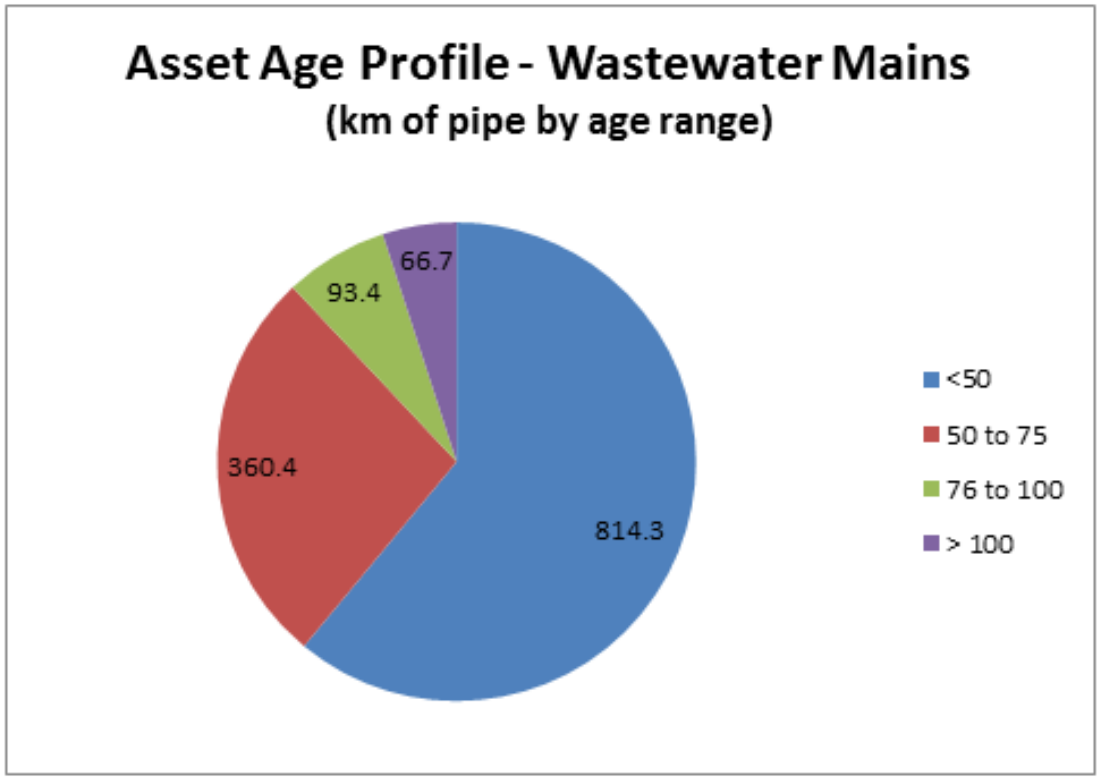
Derived Current Service Lives (Years)	CI	CICL (LSL)	CICL (SSL)	DI (LSL)	DI (SSL)	AC (LSL)	AC (SSL)	PVC	Steel	Conc & PCCP
Northeast Large	130	120	100	110	50	80	80	100	100	100
Midwest Large	125	120	85	110	50	100	85	55	80	105
South Large	110	100	100	105	55	100	80	55	70	105
West Large	115	100	75	110	60	105	75	70	95	75
Northeast Medium & Small	115	120	100	110	55	100	85	100	100	100
Midwest Medium & Small	125	120	85	110	50	70	70	55	80	105
South Medium & Small	105	100	100	105	55	100	80	55	70	105
West Medium & Small	105	100	75	110	60	105	75	70	95	75
Northeast Very Small	115	120	100	120	60	100	85	100	100	100
Midwest Very Small	135	120	85	110	60	80	75	55	80	105
South Very Small	130	110	100	105	55	100	80	55	70	105
West Very Small	130	100	75	110	60	105	65	70	95	75

LSL indicates a relatively long service life for the material resulting from some combination of benign ground conditions and evolved laying practices etc.
SSL indicates a relatively short service life for the material resulting from some combination of harsh ground conditions and early laying practices, etc.

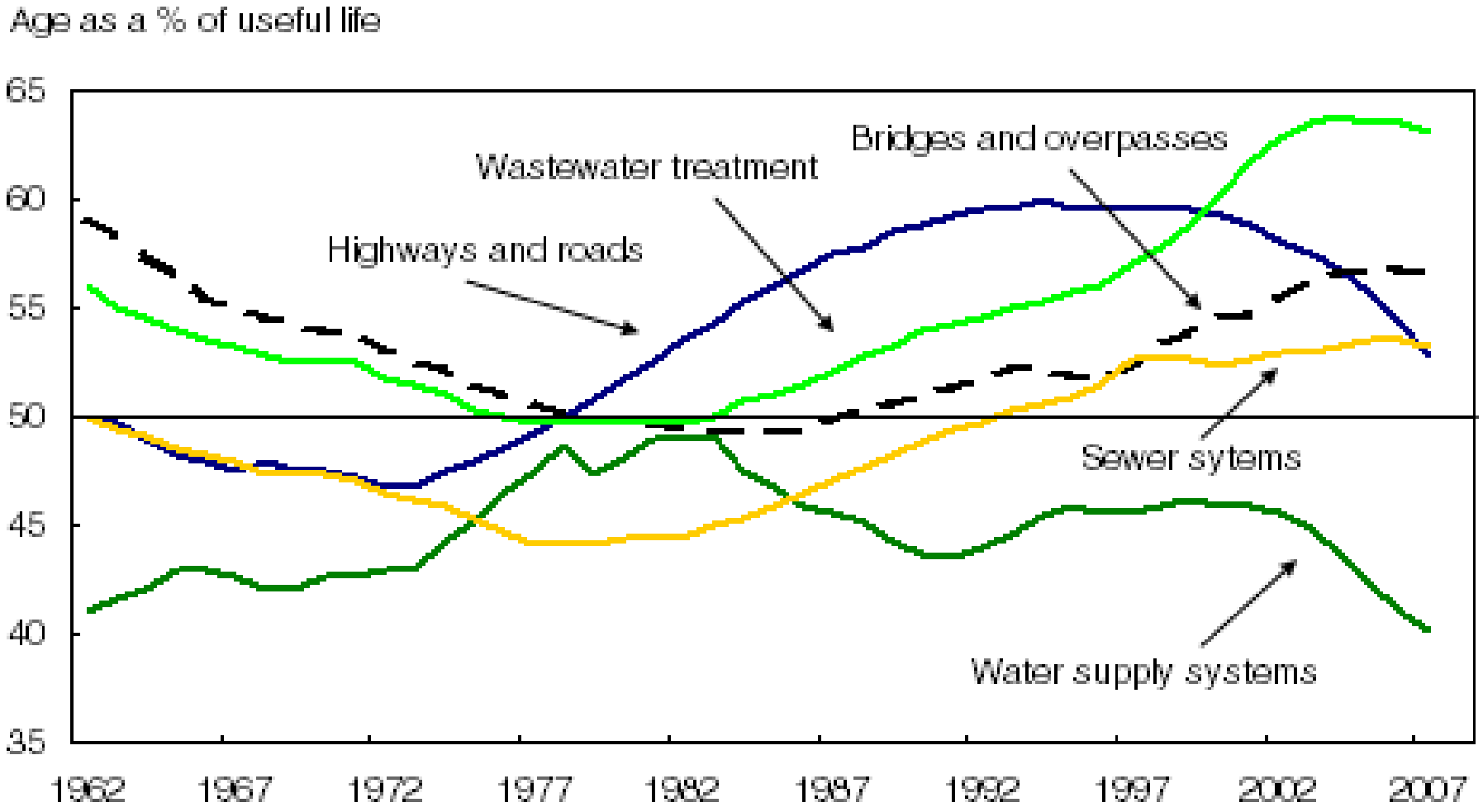
INFRASTRUCTURE DEMOGRAPHICS

- Utilities are local (see data from Halifax graphs)





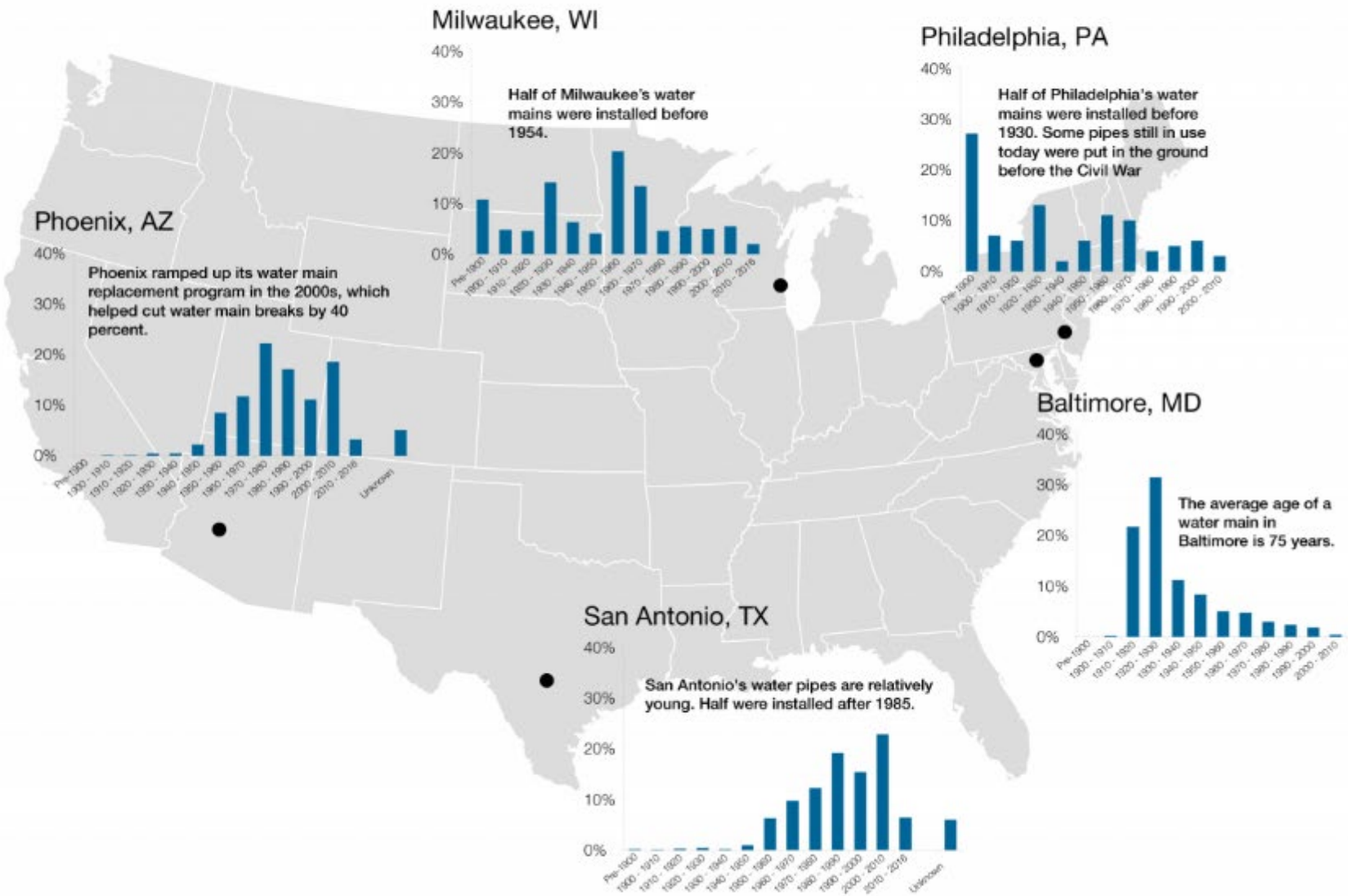
ANOTHER WAY TO VIEW INFRASTRUCTURE STOCK



Source: Statistics Canada, special tabulation, Investment and Capital Stock Division.

The Age of U.S. Water Pipes

From pre-Civil War to Civil Rights era, U.S. water systems reflect a range of ages.



Each year about **240,000 water main breaks** result in lost water and disruptions to daily life.
(U.S. Environmental Protection Agency)

America's municipal water systems are responsible for more than **1.2 million miles** of water mains.
(Utah State University)

Repairing and replacing old water pipes could cost more than **$US 1 trillion** over the next two decades.
(American Water Works Association)

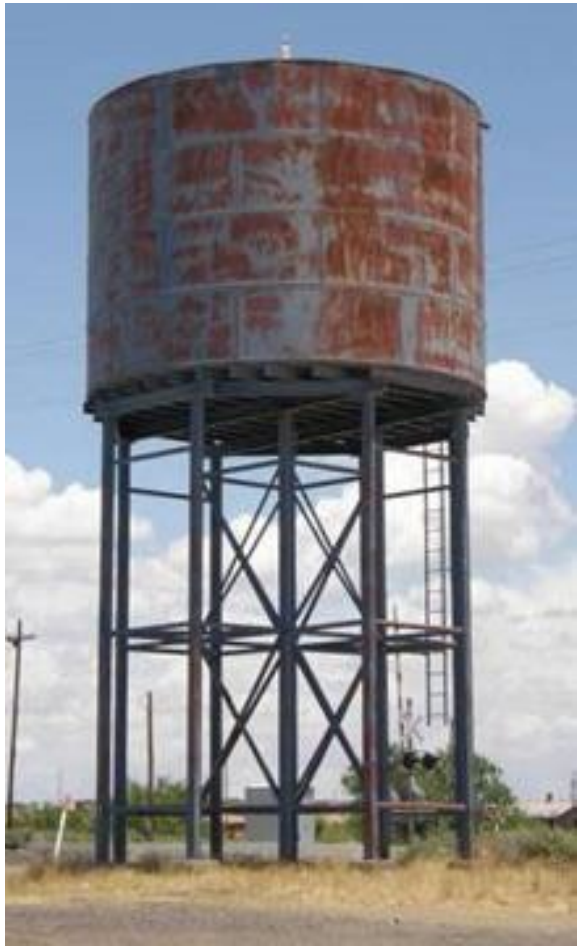
Pipe age data requested by Circle of Blue from Baltimore Department of Public Works, Milwaukee Water Works, Philadelphia Water, Phoenix Water Services Department, and San Antonio Water System.

circle of blue


WHAT CAN BE DONE?

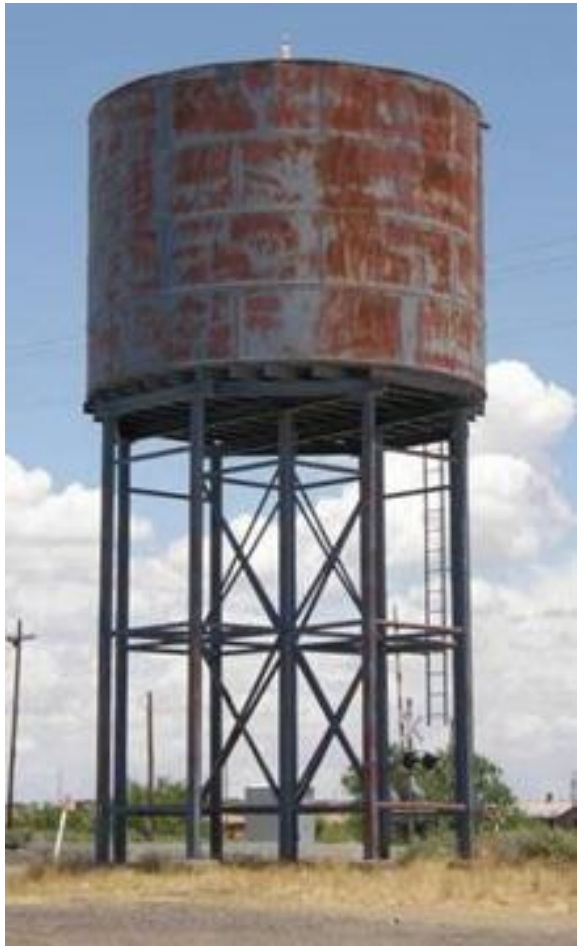
UNDERSTAND THE LOCAL PROBLEM

- Surprisingly little is known about:
  - Assets under control
  - Asset condition
  - Location of assets
  - Material of construction
  - Criticality of assets
  - Lifespan remaining



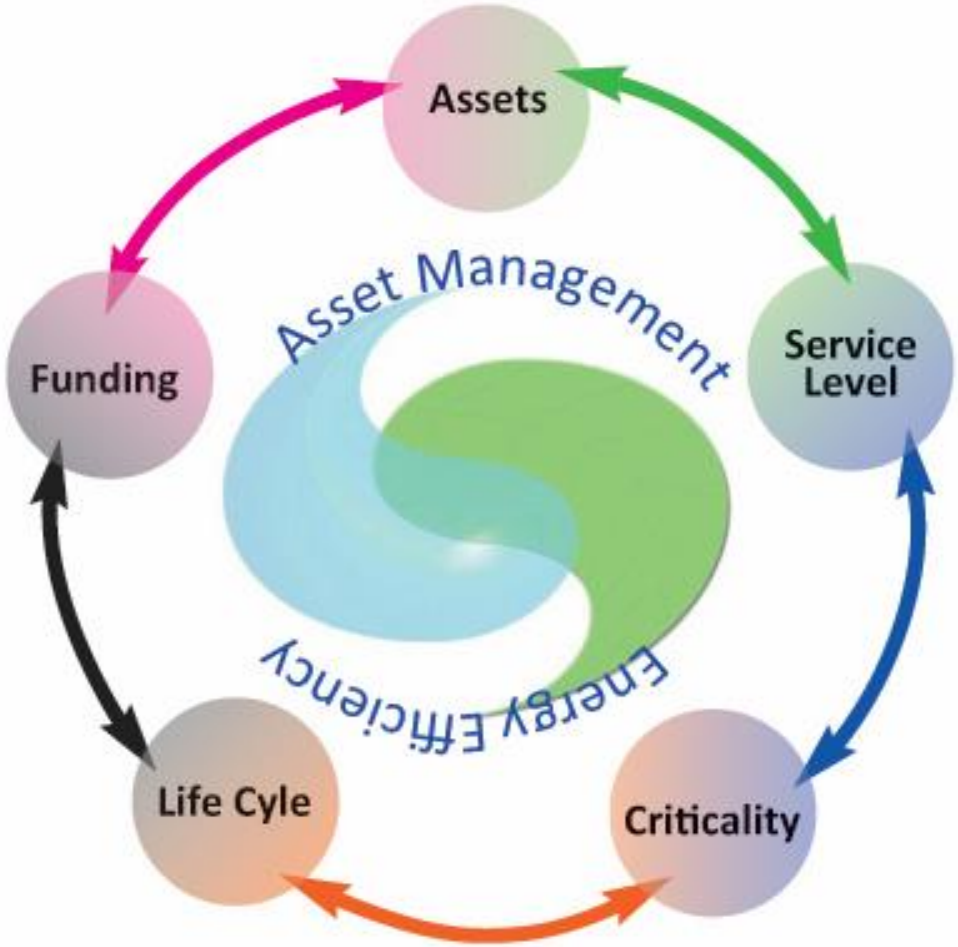
IMPLEMENT ASSET MANAGEMENT

- Asset management is maintaining a desired level of service for what you want your assets to provide at the lowest life-cycle cost. Lowest life-cycle cost refers to the best appropriate cost for rehabilitating, repairing or replacing an asset. – US EPA



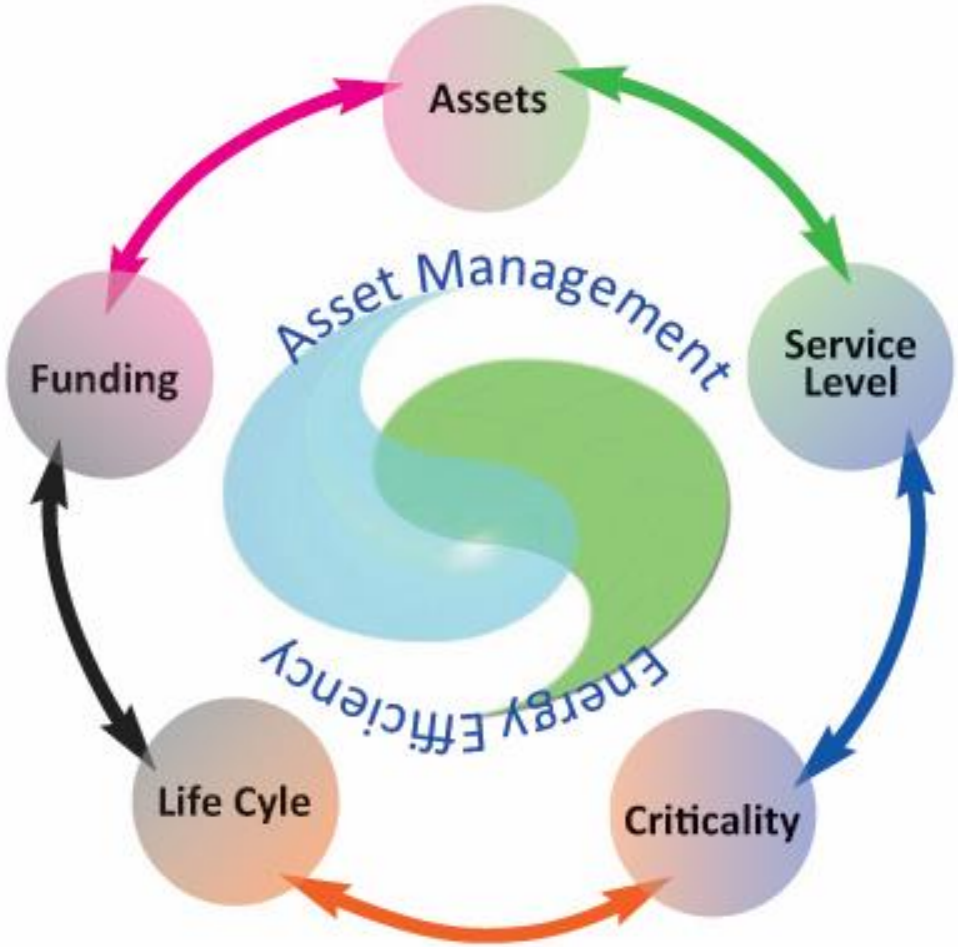
ASSET MANAGEMENT OVERVIEW

- Do your utility practice asset management?
- Is your Capital Improvement Plan informed by asset management?
- Managing utility assets
  - Lowest lifecycle costs
  - Minimization of risks
  - Maintenance of Level of Service



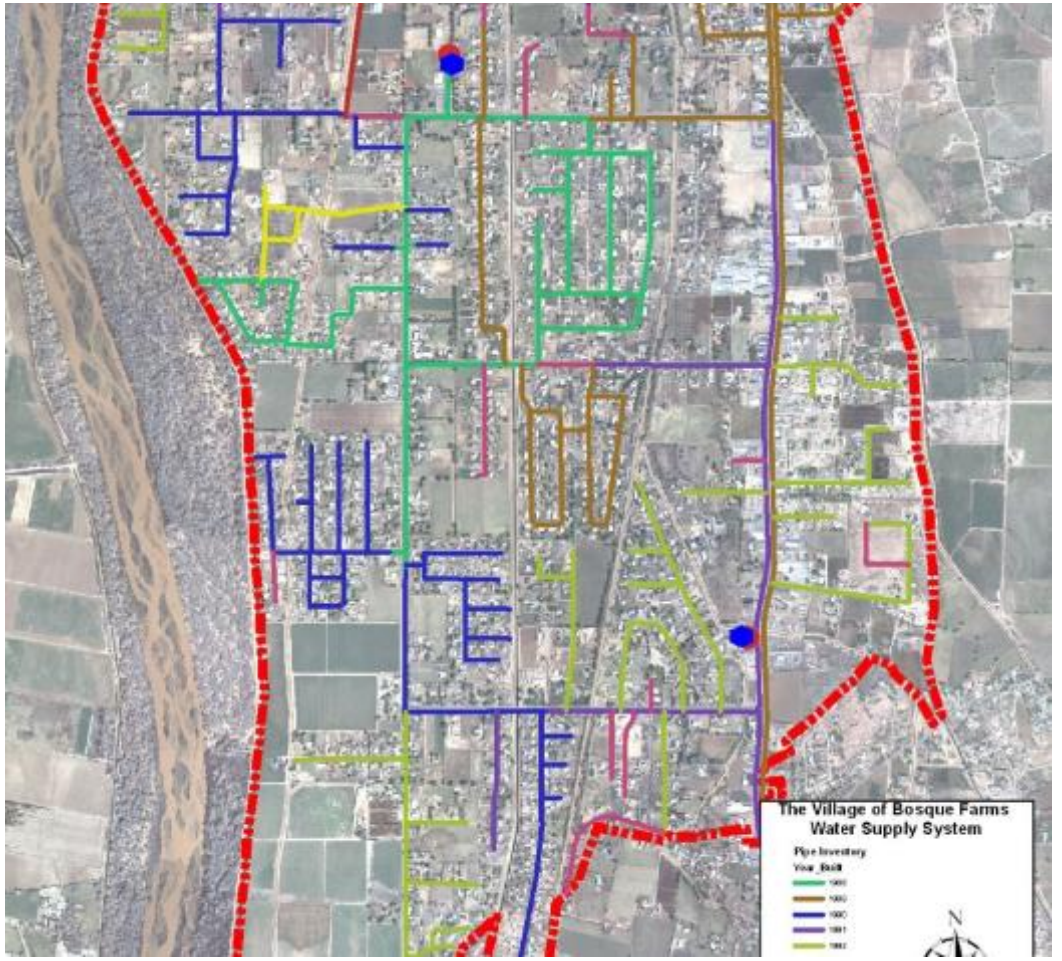
ASSET MANAGEMENT OVERVIEW

- Five Core Components
  - **Inventory & Condition**
    - **What, where, how much?**
  - Level of Service
    - What assets do, customer service?
  - **Criticality**
    - **Risk – probability X consequences**
  - **Lifecycle Costing**
    - **All costs, acquisition, O&M, rebuilds, disposal**
  - Long-term Funding
    - Functional budgets, Capital Improvement Plans, cash/debt financing



INVENTORY & CONDITION ASSESSMENT

- What does utility own?
- Where is it?
- What will it cost to replace/rehab?



INVENTORY & CONDITION ASSESSMENT WINS

- Reduction of liabilities
  - Sewer camera identifies future backup cause
    - City can better fight damage claims for sewer backups with data
  - Water valve assessment identifies non-functioning valves
    - City replaces – now in event of water main break 12 customers lose service instead of 80

INVENTORY & CONDITION ASSESSMENT WINS

- Analysis of main breaks shows most are limited to:
  - Acid soils
  - Near truck routes
  - Little correlation with age
- Inspection reveals limited repair needed – not full replacement
  - Sewer mains
    - Mainly camera
  - Large diameter water mains
    - Various newer technologies
      - WaterOne is testing

CRITICALITY

- Some utility assets are riskier than others
- Largest risk may be to customers or society – not utility
  - Emporia main break 2017
    - 20 inch main
  - Boil orders in town & purchasing systems (12 total)
  - Businesses close
    - Obvious ones – car washes, laundromats
    - Less obvious – manufacturing sends shift home
    - Emporia State closed
    - Child care closed
    - Tyson sends workers home
    - Restaurants closed
    - Elective surgeries rescheduled
    - Hospital hauls water for cooling towers

THE EMPORIA GAZETTE

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FEATURED

Water main break causes city-wide outage

The Emporia Gazette Jul 20, 2017 4

1 of 14

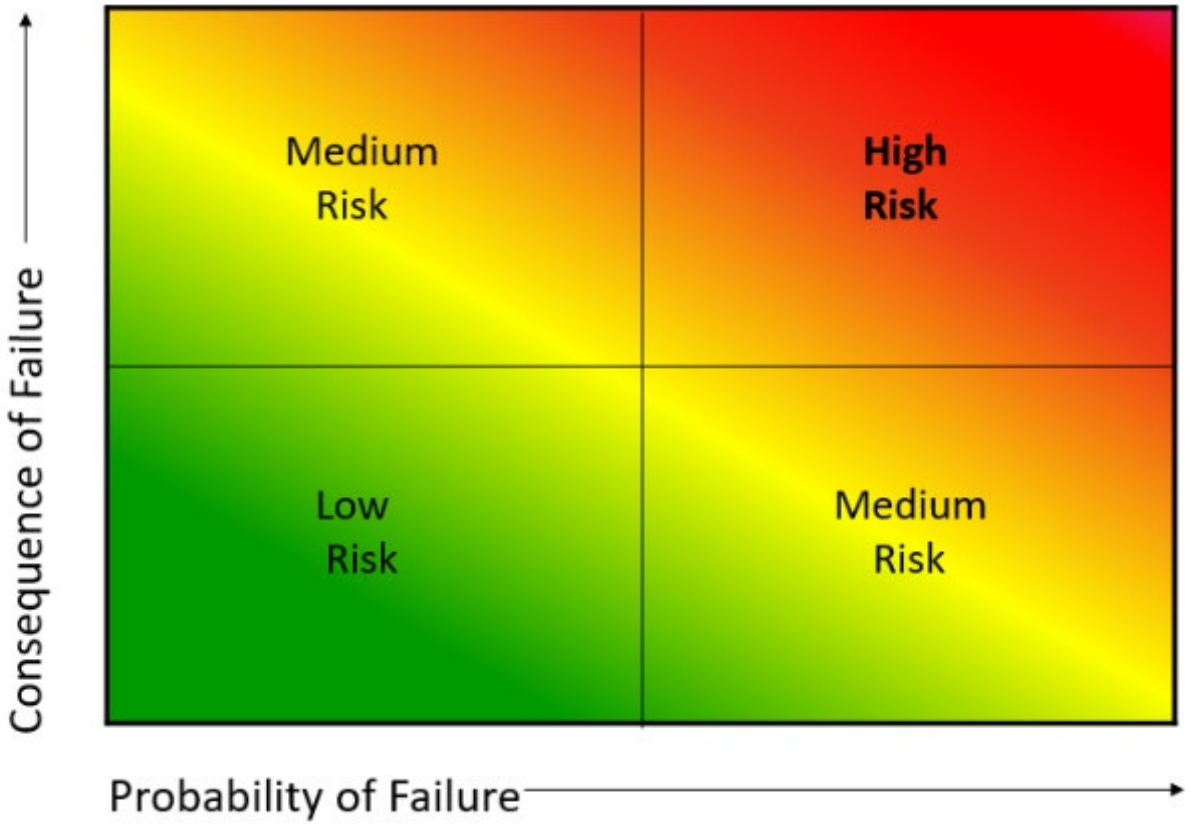
Most Emporians woke up to an unpleasant surprise today: no water. According to a city individual at the after-hours number, a break at 15th and Prairie has reduced or eliminated water pressure through "most

CRITICALITY

- Risk = probability X consequences
- Probability = judgement call, past experience, other's experience, maintenance, rebuilds, etc.
- Consequences = direct costs to utility, risks of costs to utility through non-compliance, costs to the public at large and specific customers

CRITICALITY IN PRACTICE

- Ranking asset criticality
  - Long-term cost savings
  - Long-term risk reduction
- Ranking assets allows for:
  - Prioritization in CIP
  - Change in maintenance
  - Changes in operation



CRITICALITY – FINANCIAL WINS

- Optimizing outsourcing
  - Are your skilled operators driving mowers around?
  - Can their time and skills spent mowing lead to greater maintenance, reliability and lower risk?

- Optimization of valve exercising
  - Ensure critical valves operate by more frequent exercising/maintenance
  - Less risky valves exercised less frequently

- Optimization of sewer cleaning
  - Utilities moving away from 1/4th of town to risk-based cleaning/camera work
  - New residential lines unlikely to have problems
  - Visit likely/known problem areas more frequently

LIFECYCLE COSTING

- Operate assets at lowest lifecycle costs
  - Acquisition
  - Operation & Maintenance
  - Repairs
  - Rebuilds and Rehabilitation
  - Disposal/sale

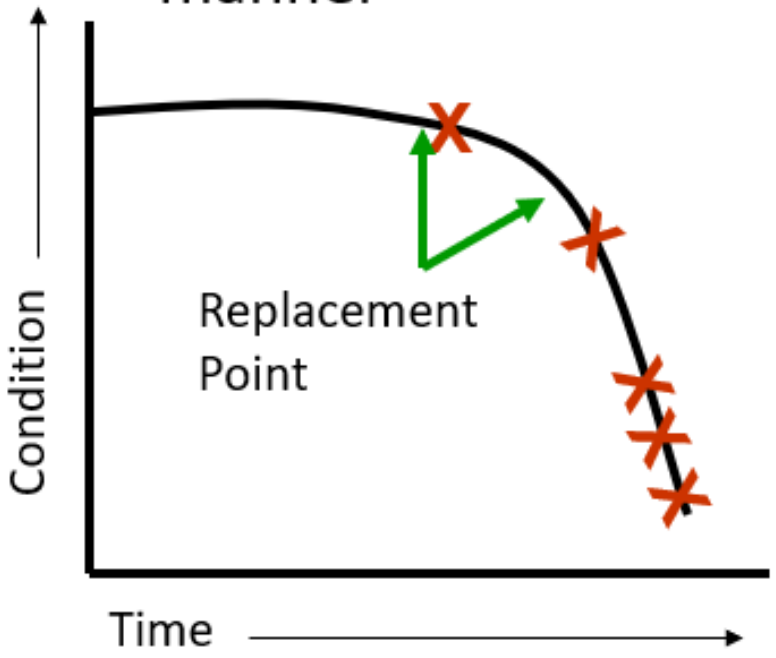
About 90% of an electric motor's lifecycle cost is electricity

- Requires:
  - Attempt to calculate lifecycle costs
  - Willingness to (maybe) throw out low-bid sourcing
  - Willingness to operate in grey areas of accounting
    - Is it maintenance or capital expense?
      - i.e. cement manhole lining, cured-in-place sewer pipe, metal refinishing at treatment plant

LIFECYCLE – BETTER TIMED REPLACEMENTS

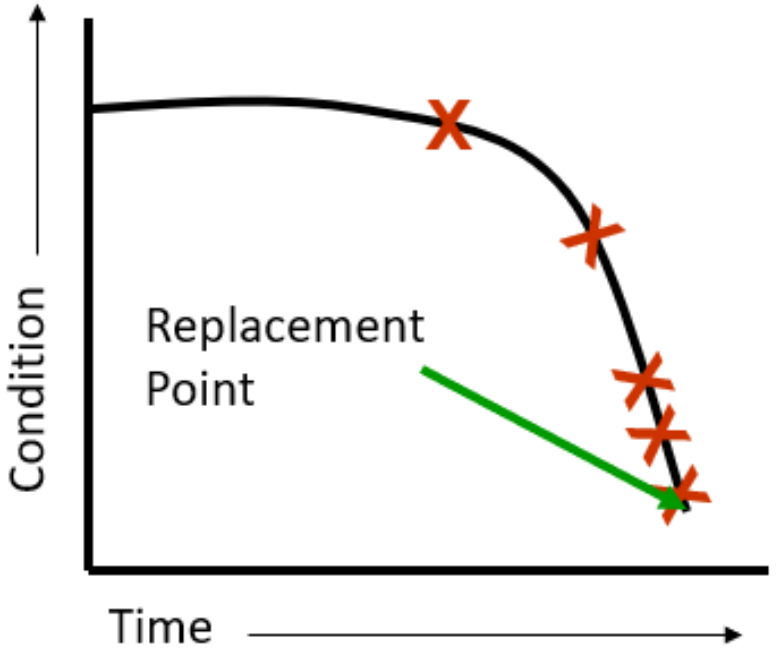
High risk assets: err on the side of replacing too soon, before failure

- Replaced in a planned manner



Low risk assets: allow them to run to failure and replace afterwards

- Managed failures



LIFECYCLE COSTING – BEST BETS

- Sensors & controls for wastewater plants
  - Better treatment quality, significant reduction in electric consumption
- Variable frequency drives on water & wastewater pumps
  - Minimize pipe breaks through “soft start”
  - Significant reduction in electrical consumption
  - Better wastewater treatment
- Lining of sanitary sewer pipe
  - 1/10th to 1/5th the cost, 40-50 year life, little disruption, reduce excess flows
- Manhole rehabilitation
  - Half to greater life expectancy – 1/3 to 1/2 cost, little disruption, reduce sewer flows
- Painting of steel tanks

TAKEAWAYS

- Problems slow to arise, slow to solve
- Utilities will ALWAYS need reinvestment
- Problems are solvable
- Great need to understand true costs
- **Know your utility**

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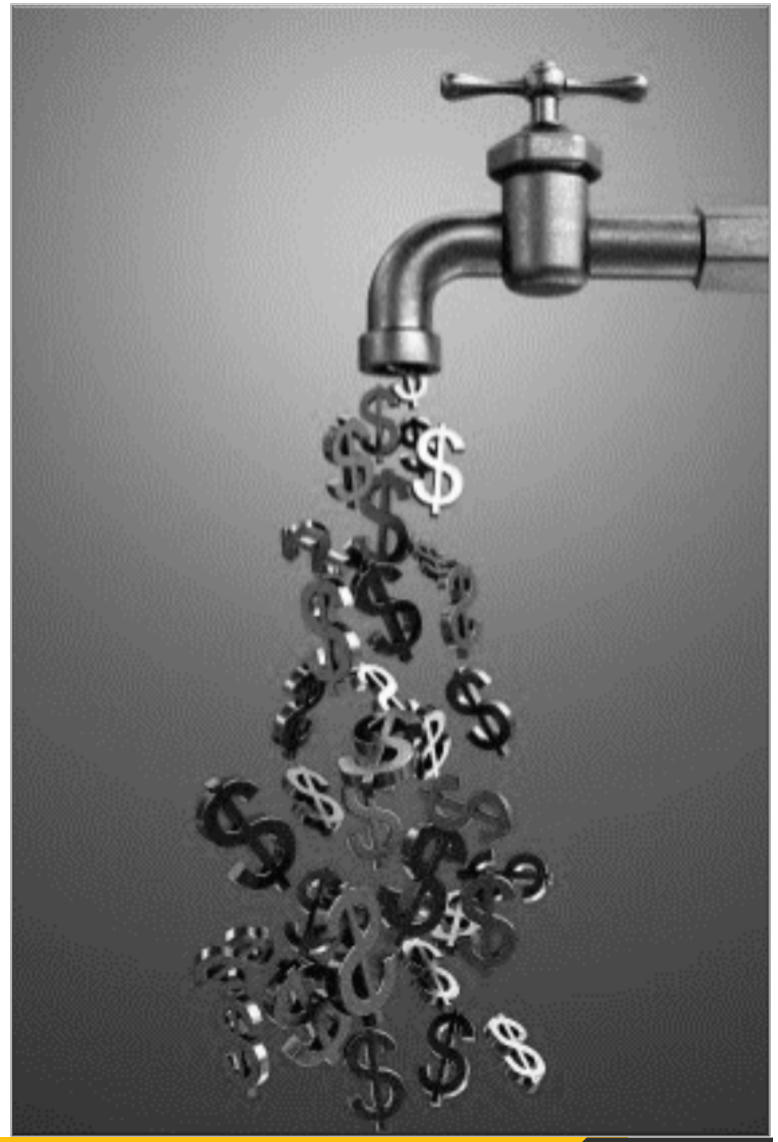
CAPITAL FINANCING - UTILITIES

FINANCIAL CAPACITY

- US Environmental Protection Agency uses "capacity" to gauge the ability of water utilities to sustainably provide safe water into the future.

- Revenue Sufficiency
- Credit Worthiness
- Fiscal Management & Controls



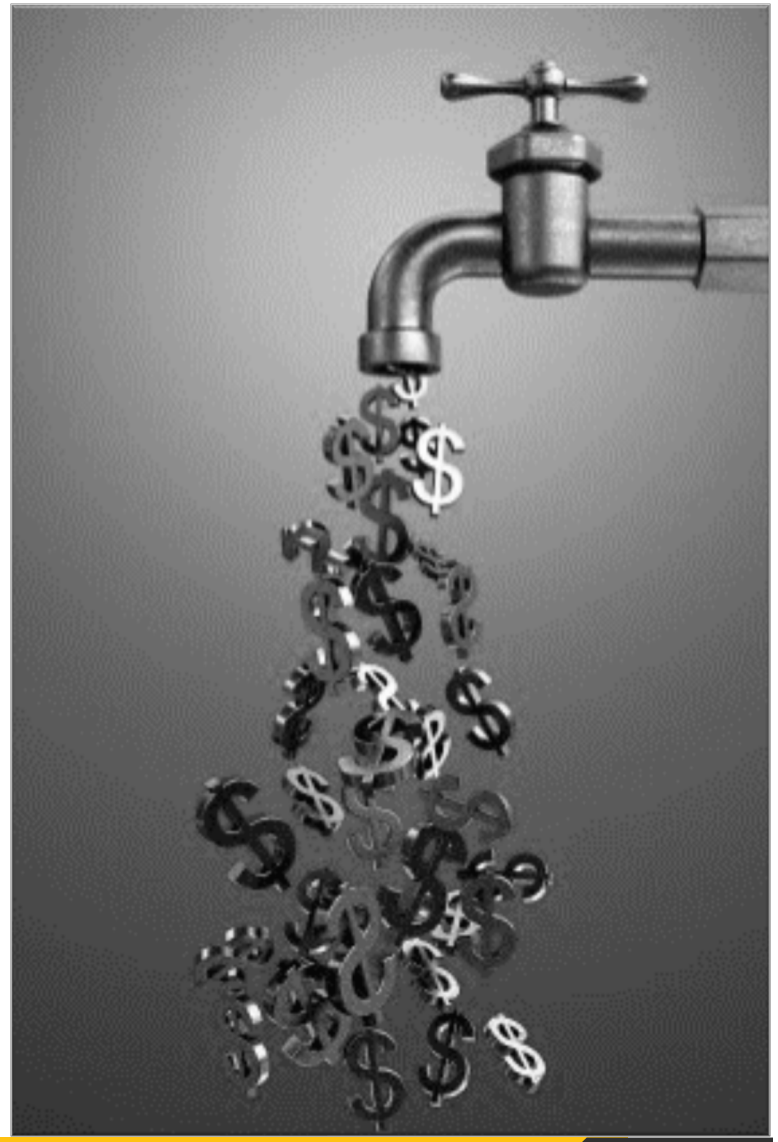
FOUNDATIONS OF FINANCIAL CAPACITY

- Recovers all expenses
- Savings for the unforeseen
- Plans into the future
- Proactively replaces assets
- Practices asset management
- Uses debt wisely
- Uses best practices to secure finances
  - Accounting!

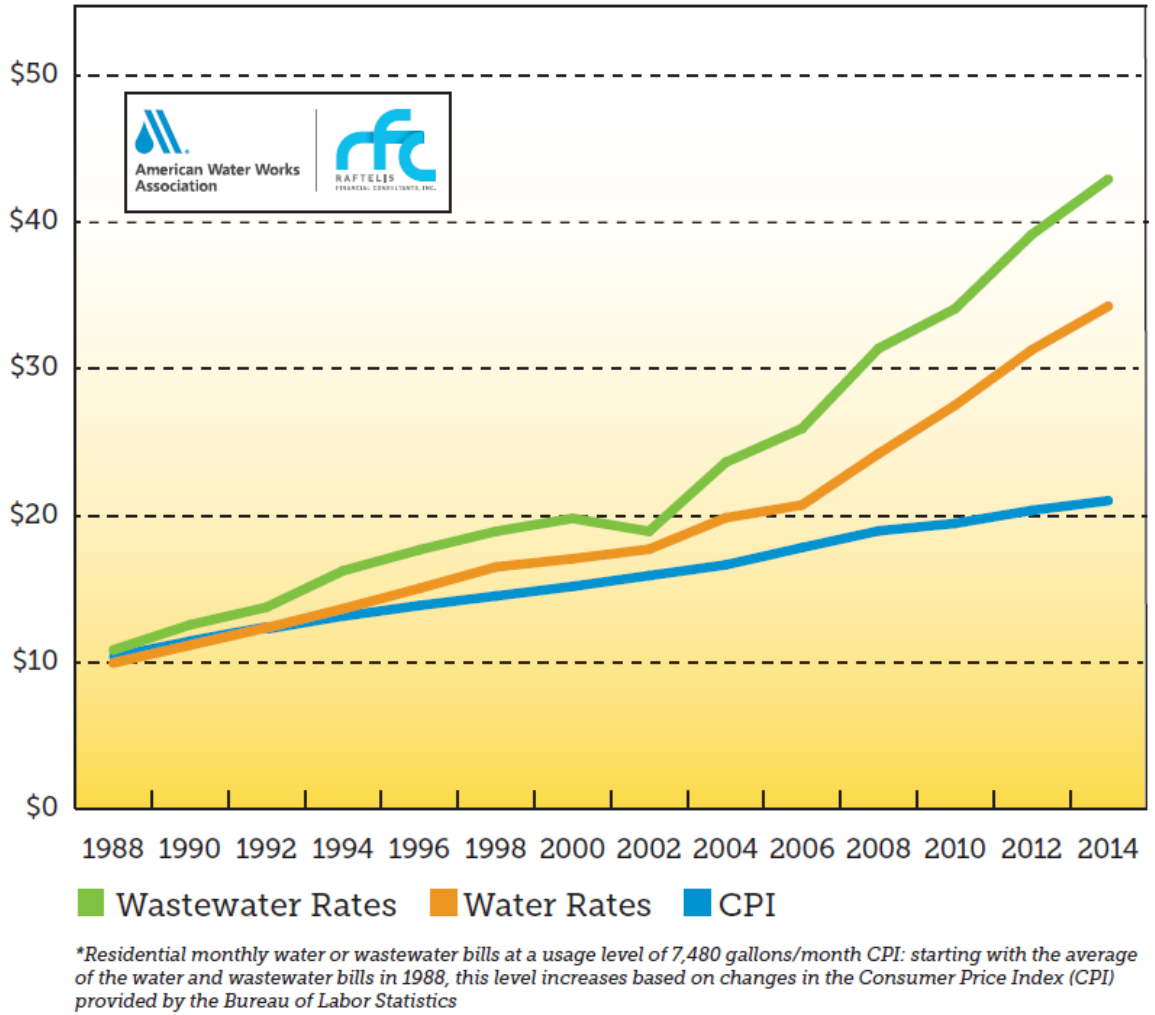
HOW ARE MOST UTILITIES FUNDED?

- **Operational Expenditures**
  - Rates & fees from customers (year to year)
  - Pays: Labor, chemicals, repairs, consumables, energy, short-lived equipment

- **Capital Expenditures**
  - Rates & fees from customers (over time)
  - Pays: Infrastructure principal & interest



WATER AND SEWER RATE TRENDS



Residential monthly water or wastewater bills at a usage level of 7,480 gallons/month CPI: starting with the average of the water and wastewater bills in 1988, this level increases based on changes in the Consumer Price Index (CPI) provided by the Bureau of Labor Statistics

From 2014 Water and Wastewater Rate Survey. AWWA, 2015

GRANT & LOAN FORGIVENESS FUNDING

- Generally limited & competitive
- Community Development Block Grants
- Principal Forgiveness within State Revolving Loan Funds
- United States Dept. of Agriculture grants

Contact funders to see if a project may be viable.

Do not plan a mission-critical project on assumption of someone else paying for it.

DEBT CAPITAL FUNDING FOR UTILITIES

GOVERNMENT & PRIVATE

Generally, water, sewer and stormwater projects can be funded with these instruments. Contact funders for more information – remember their job is to fund projects! (and get their money back…)

Governmental

State Revolving Loan Funds

USDA Rural Development

WIFIA

Private

G.O. Bonds

Revenue Bonds

Lease/purchases

QUICK CREDIT TIPS

- Lenders want sufficient income over expenses
- Management, policies, budgeting all matter
- Good governance gives good credit risk
- State & Federal sources becoming more stringent on management
- Actions of others may/will impact your credit worthiness
  - i.e. Platte County, Missouri revenue bond default

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Community Sustainability Tool

Association of Governmental Accountants, KC Chapter

November 7, 2019

COMMUNITY SUSTAINABILITY TOOL

- Enhanced tool to assess the affordability of water and wastewater infrastructure investments.
- Potential users include communities, government agencies, tribes, and others.
- Project funding provided by EPA for Region 7 (KS, MO, IA, TX).
- Expanding to Texas

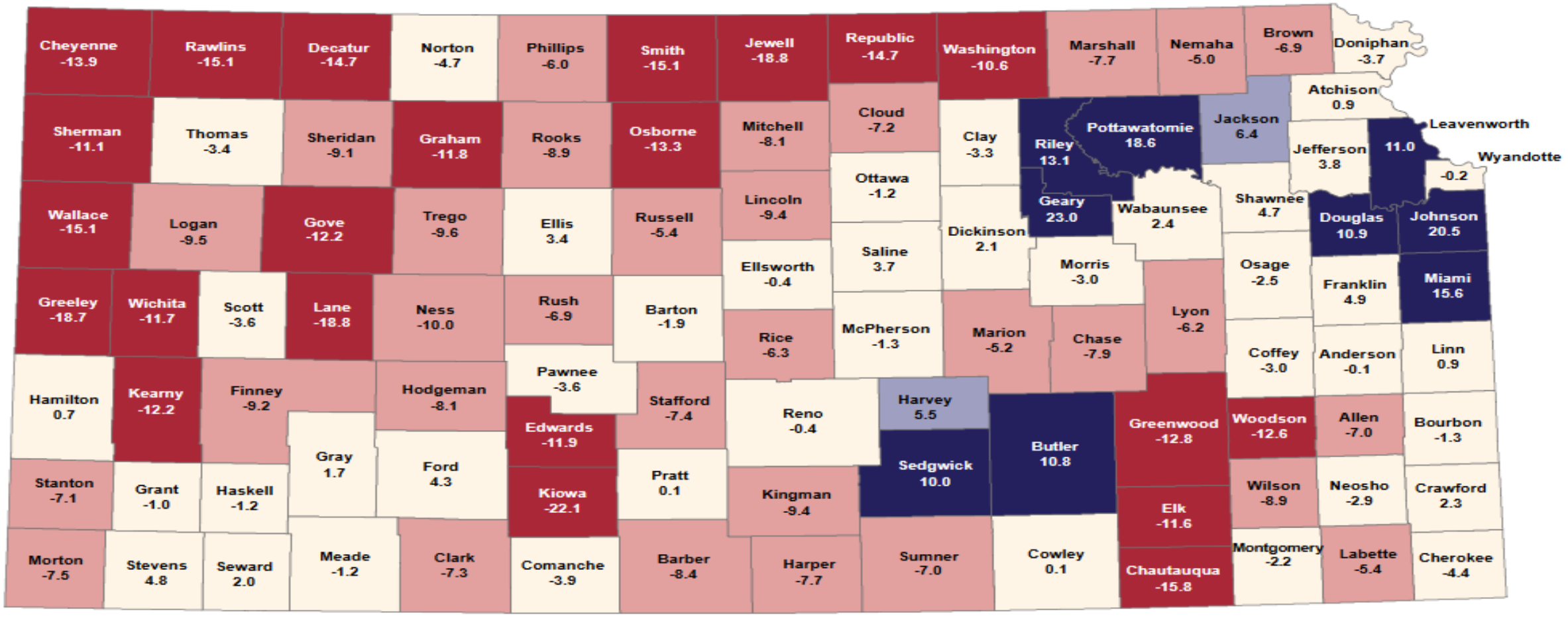
INFRASTRUCTURE NEEDS

There are an estimated 27,000 very small communities (population < 500 people) with water systems nationwide.

Very small communities often have limited financial resources.

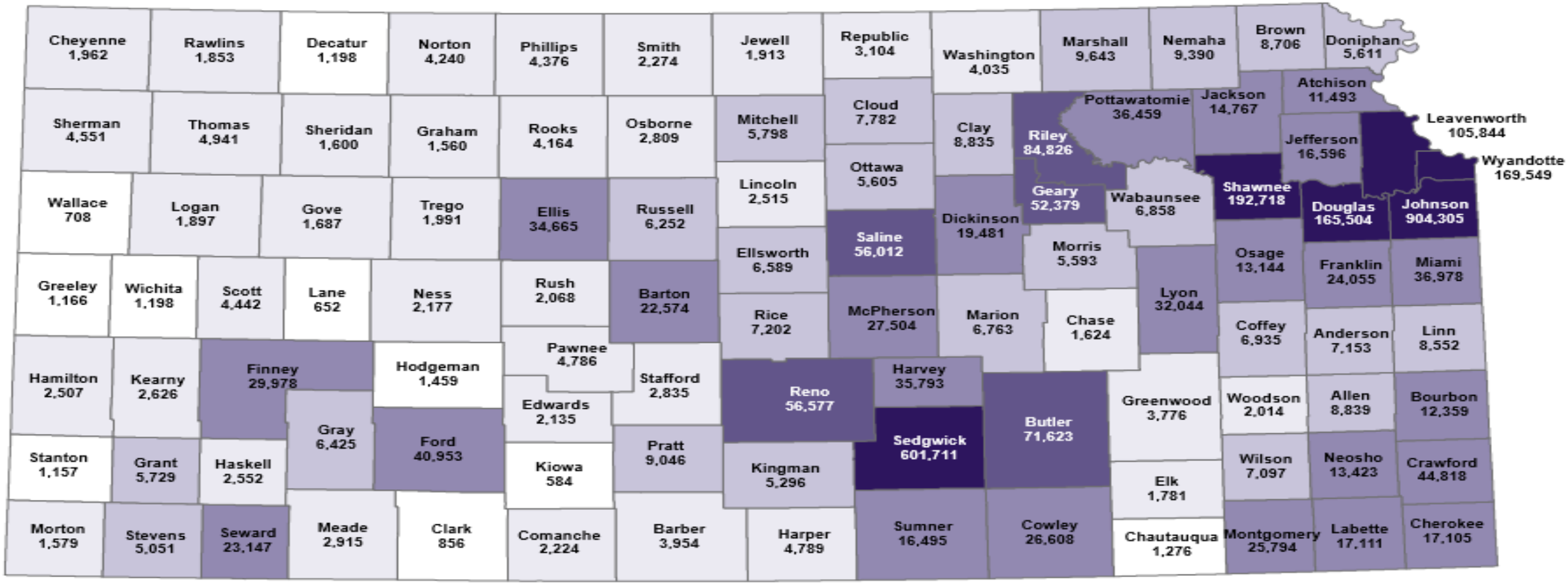
Challenges

Percent Population Change in Kansas, by County
2000 - 2010



Source: Institute for Policy & Social Research, The University of Kansas; data from U.S. Census Bureau.

Projected Population in Kansas, by County, 2044



Source: Institute for Policy & Social Research, The University of Kansas;
data from Wichita State University, Center for Economic Development and Business Research.

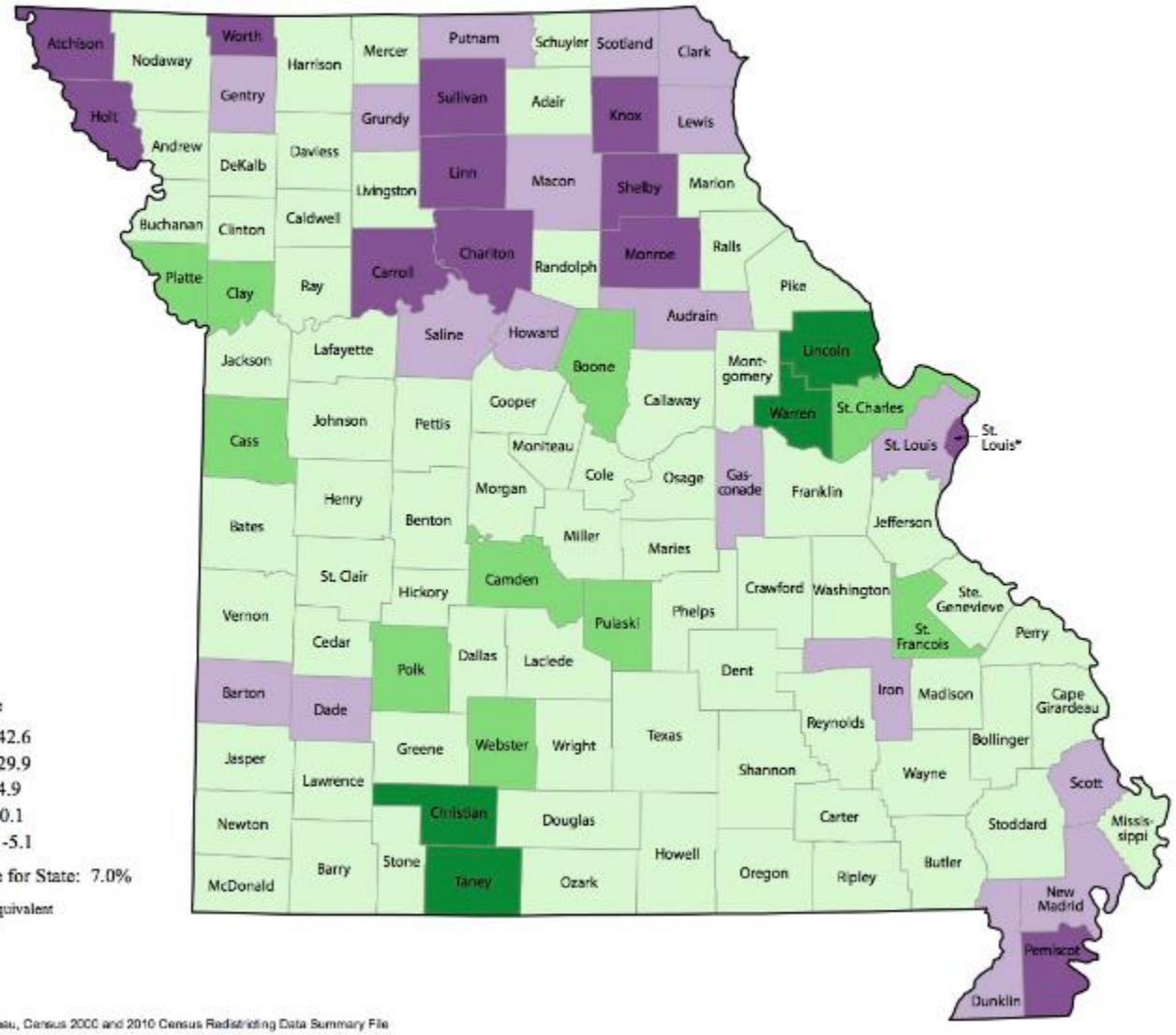
Projected Population

- 584 - 1,500
- 1,501 - 5,000
- 5,001 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 904,305

State: 3,240,702

MISSOURI - 2010 Census Results

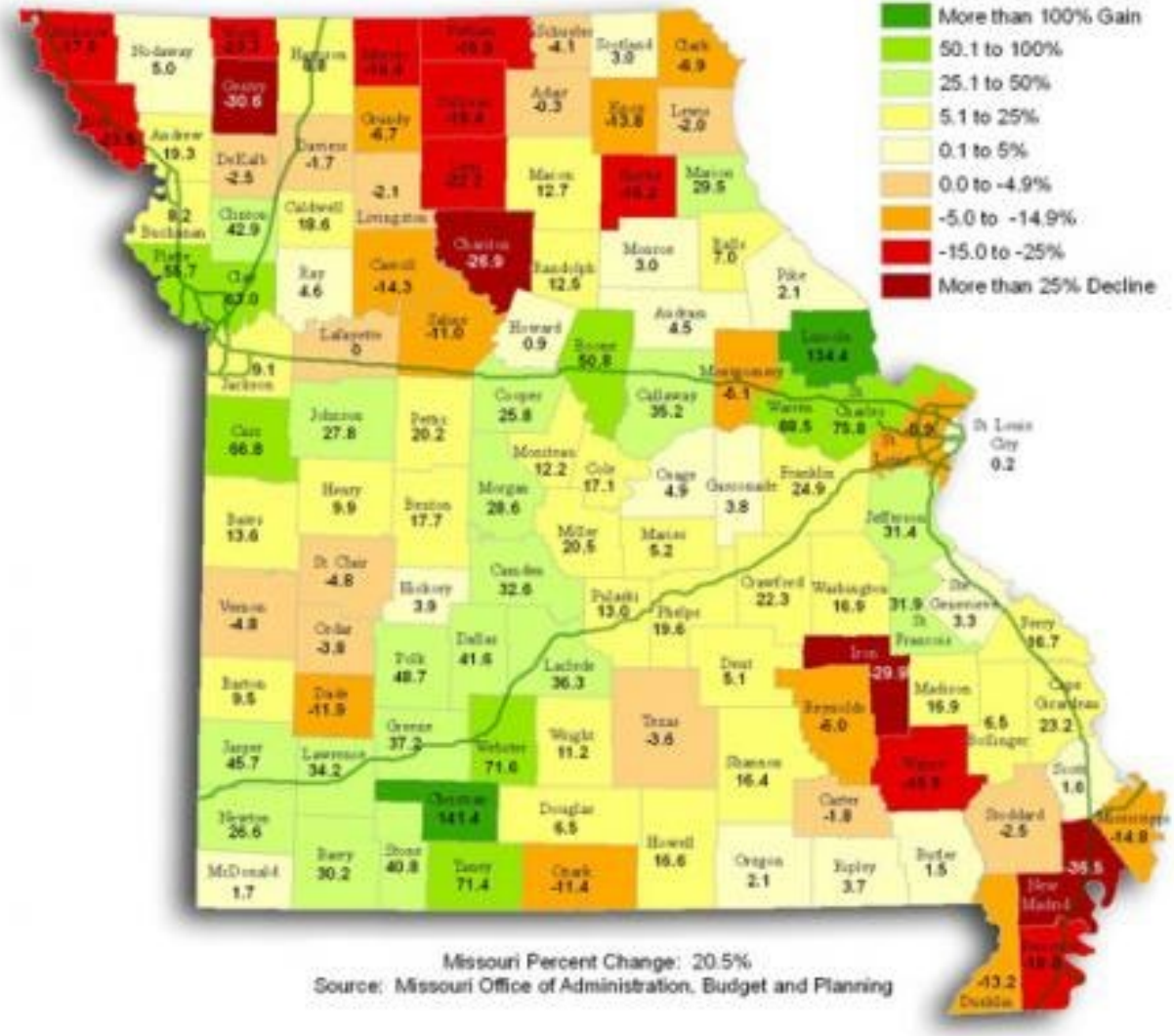
Percent Change in Population by County: 2000 to 2010



Source: U.S. Census Bureau, Census 2000 and 2010 Census Redistricting Data Summary File
For more information visit www.census.gov.

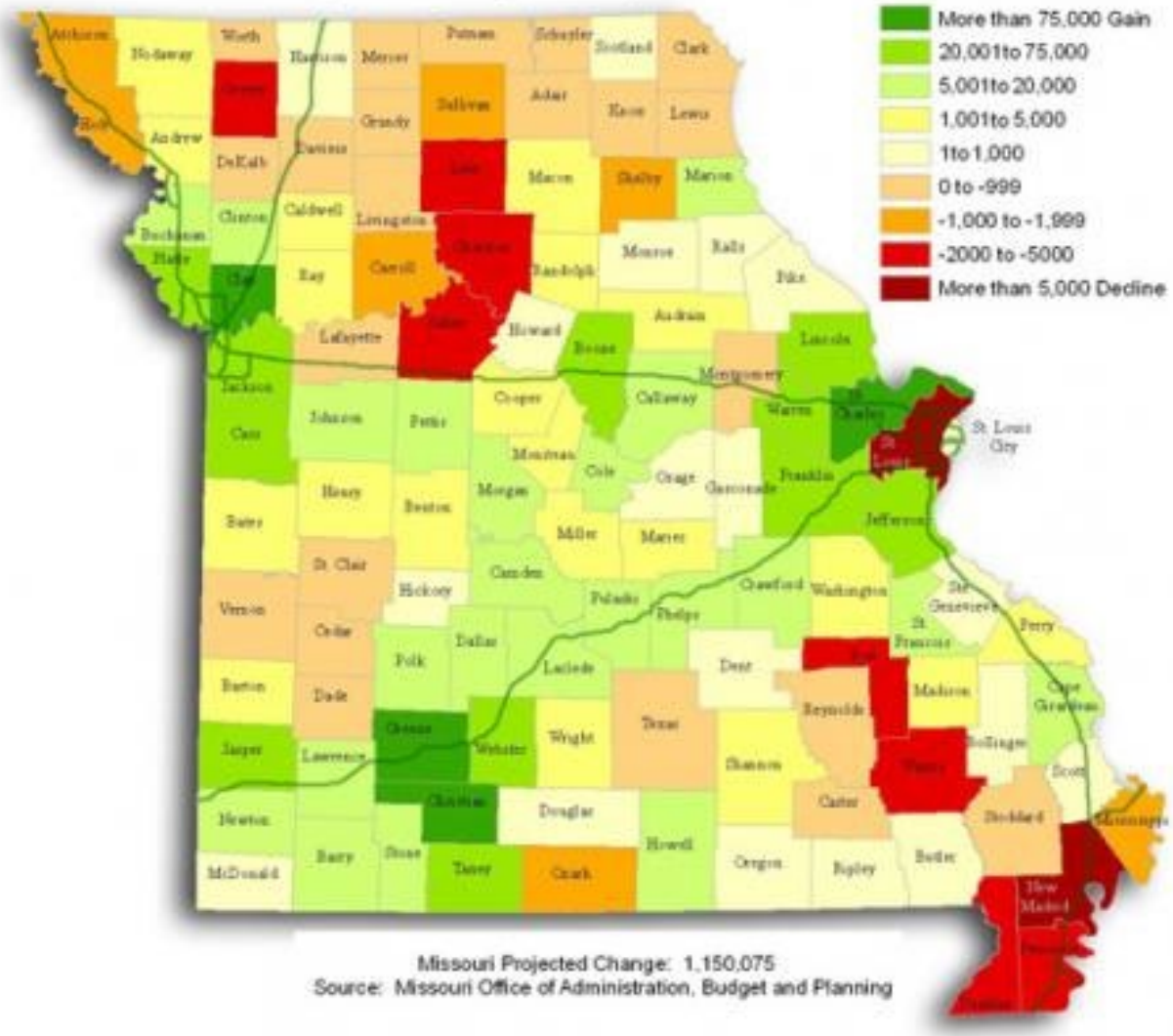
United States Census Bureau

Projected Percent Change in Population, 2000 to 2030



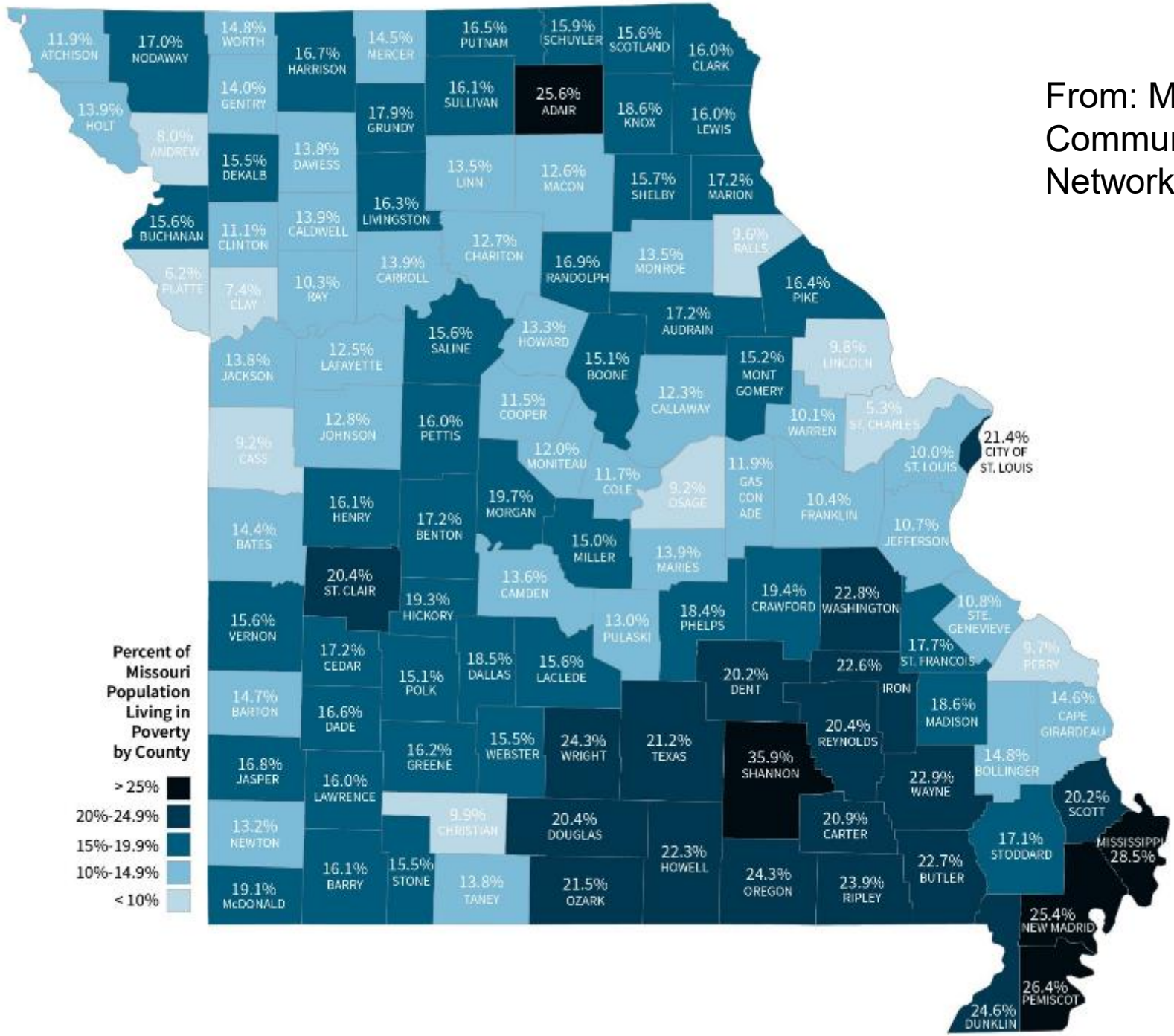
Missouri Percent Change: 20.5%
Source: Missouri Office of Administration, Budget and Planning

Projected Change in Population, 2000 to 2030



Missouri Projected Change: 1,150,075
Source: Missouri Office of Administration, Budget and Planning

From: Missouri Economic Research & Information Center



From: Missouri Community Action Network

SUSTAINABILITY TOOL

COMMUNITY
SUSTAINABILITY TOOL

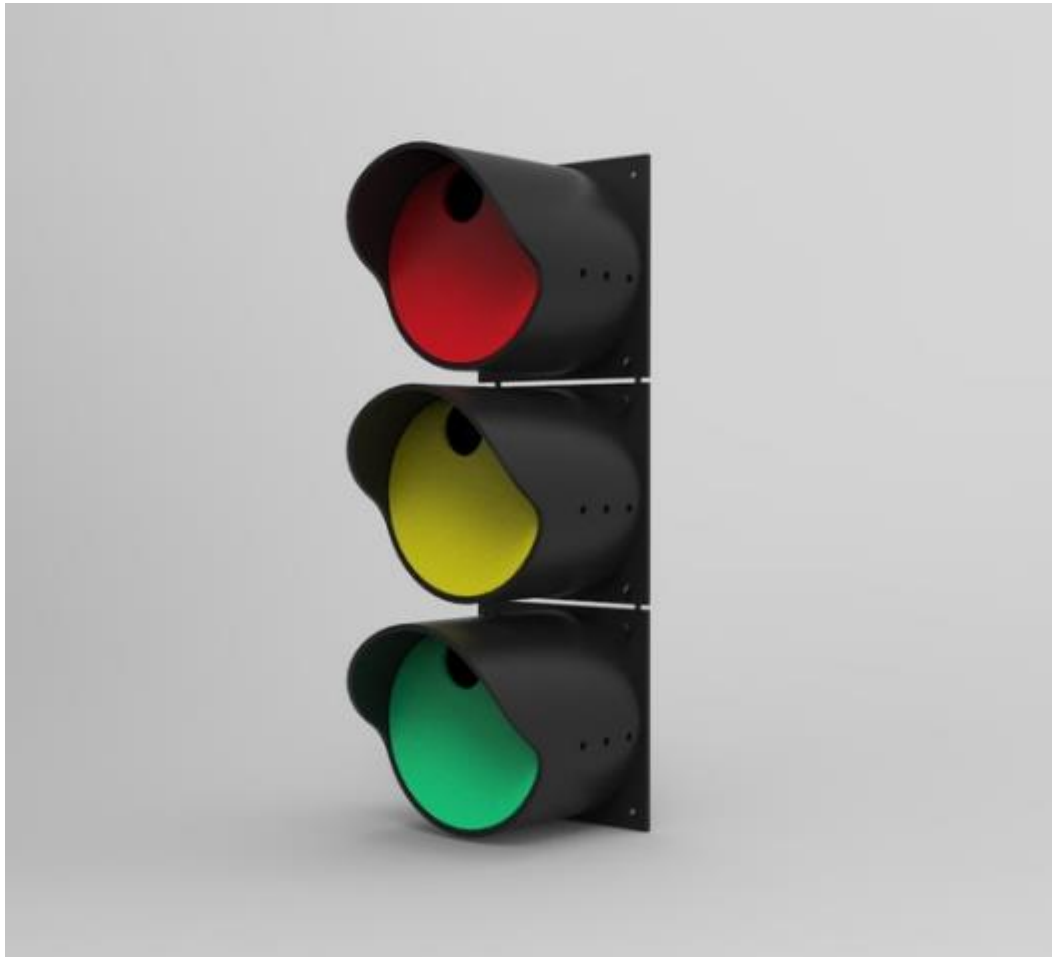
AFFORDABILITY

- Affordability is the relationship between payments for households and their income.
- % of median household income is commonly used as an index.
- Benchmarks for water and wastewater charges are no more than 2.5% and 2.0%, respectively of median household income.

CURRENT SUSTAINABILITY MODELS

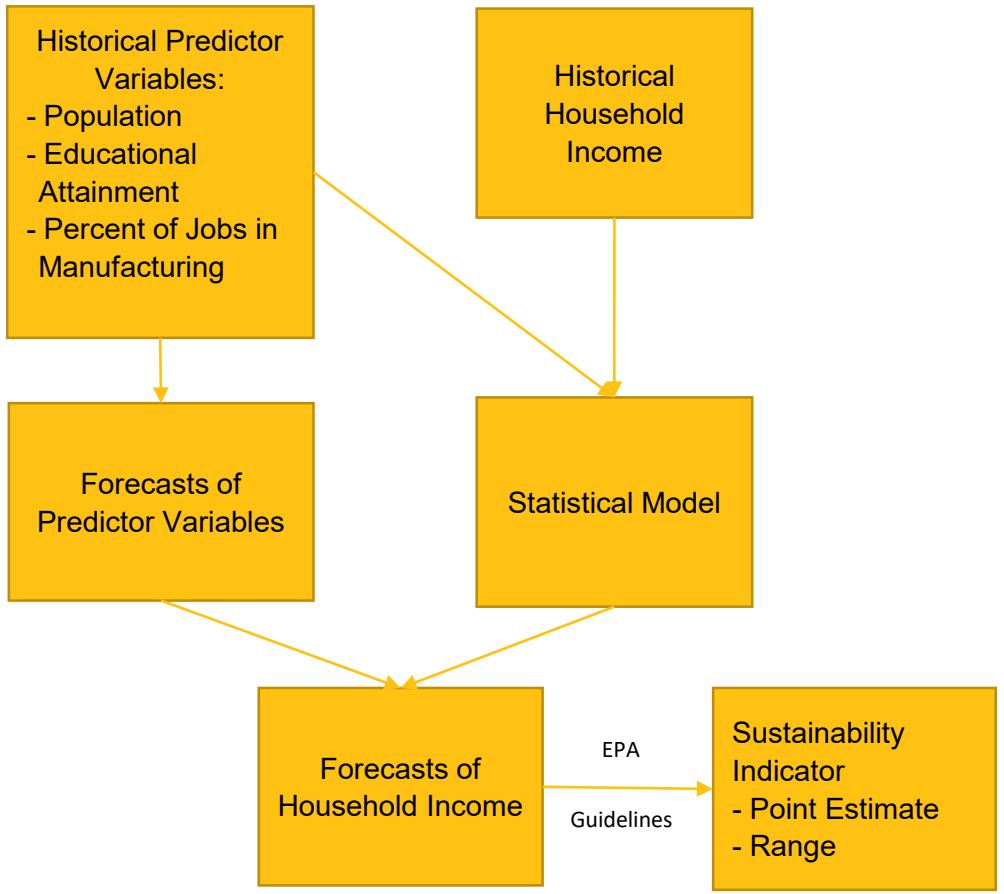
- Many current models use static, point in time measures to determine affordability.

- Static measures limit assessment capabilities for the future.



COMMUNITY SUSTAINABILITY MODEL

- A dynamic model that compares future and predicted future costs to assess sustainability.
- Assesses sustainability based on projected median household income and infrastructure repayment costs.
- Model platform is Excel.



MEDIAN HOUSEHOLD INCOME

- Tool predictor variables for Median Household Income:

  Population

  Educational Attainment

  % of Jobs in Manufacturing

(Data source: U.S. Census Bureau: American Community Survey)

COMMMUNITY MEDIAN HOUSEHOLD INCOME

- Historical data from 2009 to 2016 is used to predict future trends.
- Tool generates 30 year projections.
- Extraneous factors may affect future projections.

Kansas Tool ver 1.8 - Excel

File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do... Bohnsack, Brian Share

Paste Cut Copy Format Painter | Calibri 11 | Wrap Text | General | Conditional Formatting | Format as Table | Cell Styles | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter | Find & Select

Clipboard Font Alignment Number Styles Cells Editing

Office Timeline

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Geography	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
2	Abbyville	89	87	87	88	88	88	88	87	86.72	86.44	86.16	85.877	85.599	85.322	85.04	84.77	84.49	84.221	83.95	83.68	83.4	83.13	82.864
3	Abilene	6826	6853	6817	6763	6620	6577	6554	6469	6420	6370	6322	6273.4	6225.5	6177.9	6131	6084	6037	5991.1	5945	5900	5855	5810	5765.6
4	Admire	158	156	156	155	156	154	155	155	154.6	154.2	153.7	153.31	152.89	152.47	152.1	151.6	151.2	150.81	150.4	150	149.6	149.2	148.76
5	Agenda	69	68	67	66	65	65	64	64	63.32	62.64	61.97	61.307	60.652	60.004	59.36	58.73	58.1	57.479	56.86	56.26	55.66	55.06	54.472
6	Agra	267	266	261	259	258	253	247	244	240.9	237.8	234.8	231.76	228.79	225.87	223	220.1	217.3	214.54	211.8	209.1	206.4	203.8	201.17
7	Albert	174	175	176	175	174	173	172	170	169.4	168.9	168.3	167.76	167.2	166.64	166.1	165.5	165	164.44	163.9	163.4	162.8	162.3	161.74
8	Alden	147	149	148	146	146	146	145	144	143.6	143.2	142.7	142.31	141.89	141.48	141.1	140.6	140.2	139.82	139.4	139	138.6	138.2	137.78
9	Alexander	64	65	63	63	63	63	61	60	59.45	58.9	58.36	57.828	57.297	56.771	56.25	55.73	55.22	54.715	54.21	53.72	53.22	52.73	52.25
10	Allen	179	177	177	176	177	175	175	176	175.6	175.2	174.7	174.31	173.89	173.47	173.1	172.6	172.2	171.8	171.4	171	170.6	170.1	169.74
11	Alma	833	830	826	819	818	808	797	792	786.3	780.7	775.1	769.48	763.96	758.47	753	747.6	742.2	736.9	731.6	726.4	721.1	716	710.81
12	Almena	409	407	409	403	404	395	396	389	386.2	383.5	380.7	378.01	375.32	372.64	370	367.3	364.7	362.11	359.5	357	354.4	351.9	349.37
13	Altamont	1084	1086	1085	1073	1056	1052	1053	1043	1037	1032	1026	1020.3	1014.7	1009.1	1004	998	992.6	987.1	981.7	976.3	970.9	965.6	960.29
14	Alta Vista	445	443	440	437	436	433	426	422	418.8	415.6	412.5	409.39	406.3	403.23	400.2	397.2	394.2	391.19	388.2	385.3	382.4	379.5	376.64
15	Alton	104	102	103	102	102	101	99	98	97.17	96.35	95.54	94.728	93.927	93.133	92.35	91.57	90.79	90.024	89.26	88.51	87.76	87.02	86.283
16	Altoona	420	413	404	398	394	388	381	374	367.9	361.8	355.9	350.01	344.26	338.6	333	327.6	322.2	316.89	311.7	306.6	301.5	296.6	291.69
17	Americus	896	892	891	886	885	877	881	885	883.4	881.9	880.3	878.78	877.23	875.68	874.1	872.6	871.1	869.52	868	866.5	864.9	863.4	861.88
18	Andale	917	935	947	963	965	981	990	993	1004	1016	1027	1039.2	1051.1	1063.1	1075	1088	1100	1112.6	1125	1138	1151	1164	1177.7
19	Andover	11483	11829	11941	12087	12265	12476	12718	12980	13209	13443	13680	13921	14167	14418	14672	14931	15195	15463	15736	16014	16297	16585	16878
20	Anthony	2269	2262	2232	2200	2246	2235	2217	2178	2165	2153	2140	2127.6	2115.2	2102.9	2091	2078	2066	2054.3	2042	2030	2019	2007	1995.1
21	Arcadia	316	310	311	312	311	310	310	311	310.3	309.6	308.9	308.18	307.48	306.78	306.1	305.4	304.7	303.99	303.3	302.6	301.9	301.2	300.55
22	Argonia	501	507	500	499	496	491	488	482	479.3	476.7	474.1	471.47	468.87	466.29	463.7	461.2	458.6	456.1	453.6	451.1	448.6	446.1	443.68
23	Arkansas City	12354	12395	12357	12332	12289	12187	12132	12063	12022	11981	11940	11900	11859	11819	11779	11739	11699	11659	11620	11580	11541	11501	11462
24	Arlington	469	473	470	467	465	458	456	450	447.3	444.7	442.1	439.49	436.9	434.33	431.8	429.2	426.7	424.18	421.7	419.2	416.7	414.3	411.84
25	Arma	1482	1482	1479	1481	1471	1466	1452	1444	1439	1433	1428	1422.7	1417.5	1412.2	1407	1402	1397	1391.4	1386	1381	1376	1371	1365.8
26	Ashland	882	862	835	849	855	825	814	807	796.8	786.8	776.8	767.04	757.37	747.81	738.4	729.1	719.9	710.78	701.8	693	684.2	675.6	667.07
27	Assaria	413	414	413	414	412	410	410	407	406.2	405.3	404.5	403.61	402.77	401.93	401.1	400.2	399.4	398.58	397.7	396.9	396.1	395.3	394.43
28	Atchison	11026	10990	10934	10941	10881	10767	10699	10679	10630	10582	10534	10486	10438	10390	10343	10296	10249	10202	10156	10109	10063	10017	9971.8
29	Athol	44	44	43	43	42	42	42	41	40.59	40.18	39.78	39.378	38.983	38.592	38.2	37.82	37.44	37.066	36.69	36.33	35.96	35.6	35.242
30	Atlanta	199	195	195	195	195	193	193	192	191	190	189.1	188.11	187.15	186.2	185.2	184.3	183.4	182.42	181.5	180.6	179.6	178.7	177.82

Instructions | Inputs | Drinking Water Outputs | Wastewater Outputs | Population

Ready

REQUIRED USER INPUTS

The user provides the following variables:

1) Current average water and wastewater bills. ($)

2) Annual growth rate of these bills. (%)

3) Estimate of planned infrastructure investment(s). ($)

4) Number of years the loan(s) will be financed. (#)

5) Annual interest rate of the loan(s). (%)

Example

Model Inputs

Community	Alma
Current Average Household Monthly Drinking Water Bill ($)	40.00
Current Annual Growth Rate in Drinking Water Bills*	2%
Current Average Household Monthly Wastewater Bill ($)	15.00
Current Annual Growth Rate in Wastewater Bills*	2%
Planned Expenditure on Drinking Water Infrastructure	$1,000,000.00
Number of Years that the Infrastructure Will be Financed	20
Planned Expenditure on Wastewater Infrastructure	$1,000,000.00
Number of Years that the Infrastructure Will be Financed	20
Annual Interest Rate	
Use Default Rate?	Yes
If not, Enter Annual Interest Rate for Financing	

* - Note: The current annual growth rate in bills should incorporate all projected cost increases EXCEPT for those associated with the debt payments on infrastructure.

Run Model

Kansas Tool ver 1.8 - Excel

File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do... Bohnsack, Brian Share

Cut Copy Format Painter | Calibri 11 | Wrap Text | General | Conditional Formatting | Format as Table | Cell Styles | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter | Find & Select

Clipboard Font Alignment Number Styles Cells Editing

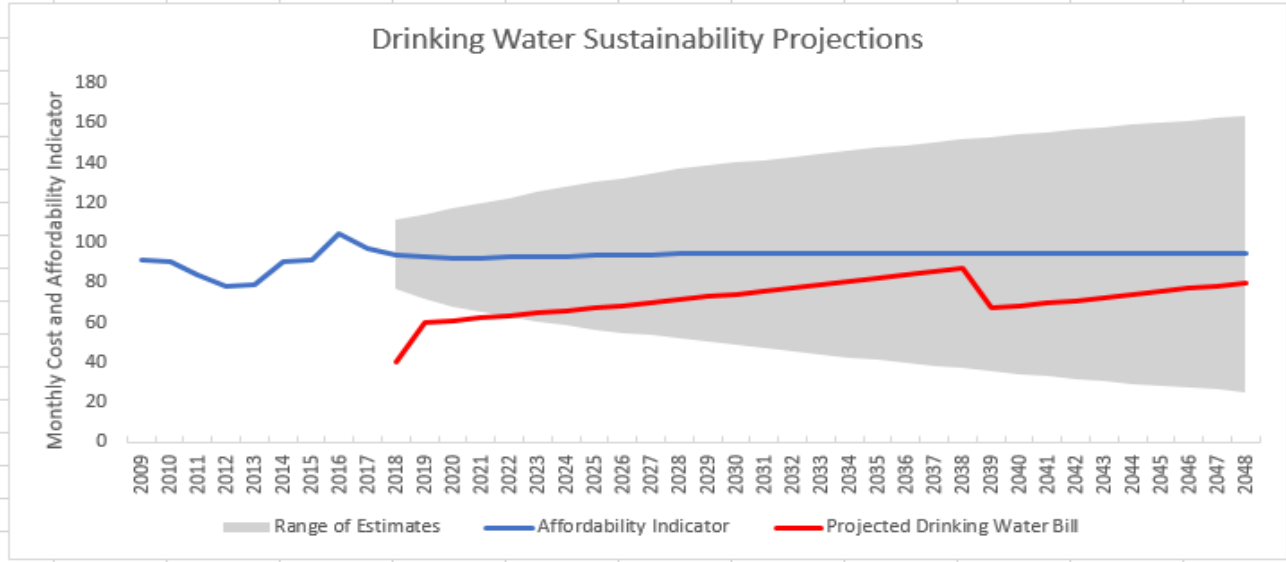
Office Timeline

Model Outputs - Drinking Water

Community	Alma
Community Population (2016)	792
Increase in Average Monthly Drinking Water Bill	$19.00
Probability that Monthly Drinking Water Bill Exceeds 2.5% of Median Household Income	0.4173
Sustainability Risk	Moderate
Current MHI	$ 45,203.30
Curent Drinking Water Bill	$ 40.00
Projected Average Drinking Water Bill	$59.00

Wastewater Outputs | New Model

Note: The graph shows the typical sustainable threshold for the community (blue line), forecast into the future, along with a range of estimates developed in a statistical model. It also shows the projected drinking water bills using the inputs you provided.



Projections	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Median Household Income	45,203	44,621	44,435	44,429	44,504	44,616	44,745	44,882	45,025	45,170	45,317	45,298	45,316
Monthly Drinking Water Bill	40.00	59.80	60.99	62.21	63.46	64.73	66.02	67.34	68.69	70.06	71.46	72.89	74.35
% MHI	1.1%	1.6%	1.6%	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	2.0%

Projections	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Median Household Income	45,332	45,322	45,323	45,323	45,319	45,317	45,315	45,312	45,310	45,307	45,305	45,302	45,300
Monthly Drinking Water Bill	75.84	77.36	78.90	80.48	82.09	83.73	85.41	87.12	67.07	68.41	69.78	71.17	72.60
% MHI	2.0%	2.0%	2.1%	2.1%	2.2%	2.2%	2.3%	2.3%	1.8%	1.8%	1.8%	1.9%	1.9%

Instructions | Inputs | **Drinking Water Outputs** | Wastewater Outputs | Population

Ready 100%

TOOL OUTPUTS

Model Outputs - Drinking Water

Community	Alma
Community Population (2016)	792
Increase in Average Monthly Drinking Water Bill	$19.00
Probability that Monthly Drinking Water Bill Exceeds 2.5% of Median Household Income	0.4173
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Current Drinking Water Bill	$ 40.00
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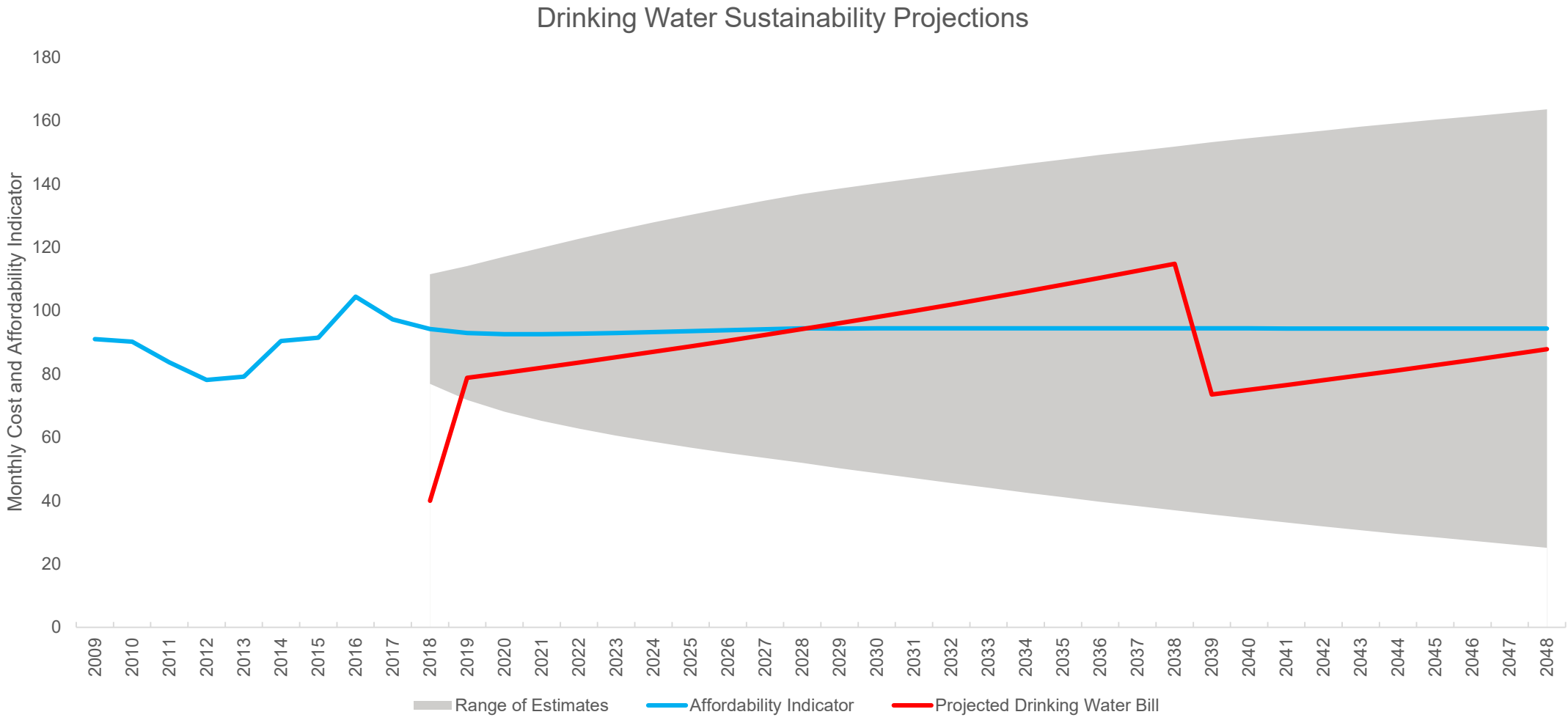
Note: The graph shows the typical sustainable threshold for the community (blue line), forecast into the future, along with a range of estimates developed in a statistical model. It also shows the projected drinking water bills using the inputs you provided.

TOOL OUTPUTS



TOOL OUTPUTS

Projections	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
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Monthly Drinking Water Bill	40.00	59.80	60.99	62.21	63.46	64.73	66.02	67.34	68.69	70.06	71.46	72.89	74.35
% MHI	1.1%	1.6%	1.6%	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	2.0%

Projections	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
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% MHI	2.0%	2.0%	2.1%	2.1%	2.2%	2.2%	2.3%	2.3%	1.8%	1.8%	1.8%	1.9%	1.9%

TECHNICAL ASSISTANCE AVAILABLE

- Free to water utilities serving <10,000 people
- Topics:
  - Asset Management & Capital Improvement Planning
  - Rates and finance
  - Workforce development and planning
  - Customer communication/relations
  - Water loss, water use efficiency & conservation
  - Energy efficiency

Wichita State University
Hugo Wall School of Public Affairs
Environmental Finance Center

Thank you.

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