ENVIRONMENTAL FINANCE CENTER AT THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL SCHOOL OF GOVERNMENT

REPORT 4

Using the Utility Financial Data Compiled by the LGC to Assess Infrastructure Condition, Needs, and Reinvestment

March 2017

Report to the North Carolina State Water Infrastructure Authority and the North Carolina Department of Environmental Quality Division of Water Infrastructure

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Executive Summary

Every year, nearly all of the local governments in North Carolina, including special units of government, report financial data from their audited financial statements to the Local Government Commission. Financial data on the local government water and/or wastewater Proprietary Funds are compiled by the LGC in a database. In this report, we explore the centralized data in an attempt to answer the following questions:

1) How much are utilities spending on infrastructure rehabilitation and replacement?
2) What is the condition of the physical assets of local government utilities?
3) Are utilities investing fast enough to maintain the condition of their physical assets?

We find that the financial data compiled by the LGC cannot directly answer any of these questions, but can be used to partially answer similar questions. There are some limitations to using the data, which is not comprehensive of *all* utilities in the state, in assessing the conditions of all water and wastewater systems statewide, and, because it does not provide sufficient granularity in the data, to answer questions on specific types of investments in assets.

However, the financial data can be used to answer similar questions that overlap with the ones listed above, and with careful data manipulations. While data on specific purposes of utility spending are not available, capital outlays can help indicate whether utilities are generally spending more or less on infrastructure over time. Similarly, depreciation (both as an annual expense and as cumulatively as a percentage of gross values of depreciable assets) is an imperfect measure of the physical wear and tear on the infrastructure, but changes to depreciation over time can be indicative of trends in the physical condition of assets.

In response to the first question, the audited financial statement data can build a broad overview of the state of infrastructure spending (actually capital outlays) in the state. Capital outlays includes investments made in acquiring new and replacing old assets, as well as construction costs, and various other capital project-related expenses. Capital outlays can tell us how much was spent in the previous year on capital projects and how much gross value was changed as a result. For example, in FY2015, at least $911 million was spent on capital outlays in the state, and that capital outlays declined after FY2010, coinciding with the end of the ARRA stimulus funds.

In response to the second question, the audited financial statement data can be used to compute the percentage of depreciable assets that have already been depreciated, or “used up”, as measured through depreciation. While this indicator is only loosely correlated with the actual physical depreciation of the assets, trends in this ratio over time can be a helpful indication of general trends in physical condition of the assets as well. As of FY2015, NC utilities’ assets had lost about 36.6% of their total gross value, after having risen steadily since FY2011. This could be cause for concern unless utilities begin to invest more rapidly in infrastructure to slow this trend in the future.

In response to the third question: despite capital outlays increasing or holding steady over time, the percent of assets depreciated increased in recent years, implying that utilities are, on average statewide, not spending enough on infrastructure to maintain their existing infrastructure's condition. However, there may be multiple extraneous factors at play. We identified that about a quarter of the state's local government utilities already have aged infrastructure and whose infrastructure continues to age further, providing a strong signal that capital reinvestment levels are inadequate for these utilities. These utilities happen to be small and medium in size, and are generally less likely to have the highest rates in the state.

In summary, the audited financial statement data that the LGC compiles every year can be used to very roughly assess the current condition of assets and capital outlay trends across the state, and at a utility level. The financial data, however, cannot indicate the comprehensive infrastructure needs for the entire state—particularly forward-looking projections—in a manner that SWIA can use for comprehensive planning purposes. At best, the financial data can be useful as a *supplemental* data source to reveal trends in capital expenditures and maintenance of depreciation in the recent past, which could be useful for SWIA as it seeks information about the state of infrastructure and the funding levels required to maintain the infrastructure.

Contents

Acronyms

ARRA	American Recovery and Reinvestment Act of 2009
CCI	Construction Cost Index
CIP	Capital Improvement Plan
DWI	Division of Water Infrastructure, North Carolina Department of Environmental Quality
EFC	The Environmental Finance Center at the University of North Carolina, Chapel Hill
FY	Fiscal Year
GASB	Governmental Accounting Standards Board
LGC	Local Government Commission, State and Local Government Division, NC Department of State Treasurer
NCLM	North Carolina League of Municipalities
SWIA	State Water Infrastructure Authority

Introduction to the Audited Financial Statement Data and Questions

All local governments in North Carolina, regardless of size, must conduct annual audits of their funds, including their water/wastewater Proprietary Fund. They must submit audited financial statements to the Local Government Commission (LGC) in the NC Department of State Treasurer's State and Local Government Division. The LGC compiles data from the financial statements in a database in order to monitor the fiscal health of local governments across the state.

Most, if not all, local governments in North Carolina prepare their audited financial statements under GASB reporting standards. This creates accounting and reporting practices that are mostly consistent across local governments, although there are a few differences in how some local governments report their financial data. Nevertheless, the majority of the data in the LGC's database are consistent across local governments and across time.

Each year, approximately 480-500 local governments (municipalities, counties, districts, authorities, sanitary districts, metropolitan water or sewerage districts, etc.) report their financial data to the LGC, which is nearly a complete census of local governments that own water and/or wastewater systems in the state. Given the prevalence of centralized data on the financial practices and conditions of nearly all local government utilities in the state, there may be an opportunity to assess the infrastructure needs of those utilities, or at least closely related indicators. In this report, we explore the audited financial statement data compiled by the LGC in an attempt to answer the following questions:

1) How much are utilities spending on infrastructure rehabilitation and replacement?
2) What is the condition of the physical assets of local government utilities?
3) Are utilities investing fast enough to maintain the condition of their physical assets?

Combining these questions yields additional pertinent questions, such "what is the difference between how much utilities *are* spending on infrastructure rehabilitation and replacement and how much they *should be* spending to maintain the condition of their assets?"

Excluded from this analysis are:

- Information on non-government water/wastewater utilities, since they do not report their financial data to the LGC,
- Information on local governments that did not submit their audited financial statements to the LGC, which are more commonly smaller local governments. In particular, FY2016 financial data for approximately 50 local governments with utilities had not yet been compiled by the LGC by the time the data was shared with the EFC for analysis for this report. Thus, the total statewide values for FY2016 are underreporting relative to other years. We indicate this anomaly on the graphs below.
- Detailed data on the long-term debt patterns of local governments. Although debt data are available and have been analyzed by the EFC in the past, debt represents only a portion of the total

capital expenditures of utilities and does not comprehensively answer any of the questions listed above.

Descriptions of Relevant Financial Data Variables

Capital Outlays – from the Statement of Cash Flows: the total capital outlay (amount paid on capital during the fiscal year) including acquisition and construction of capital assets, construction labor costs, and other costs related to capital projects. Although a large, or majority, of capital outlays are spent on the acquisition of capital assets, a significant portion may be for other costs. Unfortunately, it is not possible to distinguish in the data between the types of capital outlays. Also, it is not possible to distinguish between capital outlays on rehabilitation, refurbishment, replacement, or addition of new assets.

Total Depreciable Capital Assets – gross value of all assets that can be depreciated: buildings, plants, distribution water lines, sewer collection lines, infrastructure, and other depreciable assets. The value of depreciable assets is set at the time of construction and is not adjusted for inflation.

Depreciation – the reduction in value of depreciable assets during the fiscal year, net of any increase in value due to rehabilitation or refurbishment of the asset. Depreciation is usually calculated on a straight line (equal yearly depreciation value of an asset) calculated from the gross value of the depreciable asset. Depreciation is not adjusted for inflation.

Accumulated Depreciation – the cumulative of all depreciation values of the asset from the time of construction through the current fiscal year. At the end of the depreciation schedule of an asset, without rehabilitation or refurbishment projects along the way, the accumulated depreciation will equal the gross value of the asset, leaving a book value of $0. Accumulated depreciation is not adjusted for inflation.

Performance of All Local Governments (Statewide Totals)

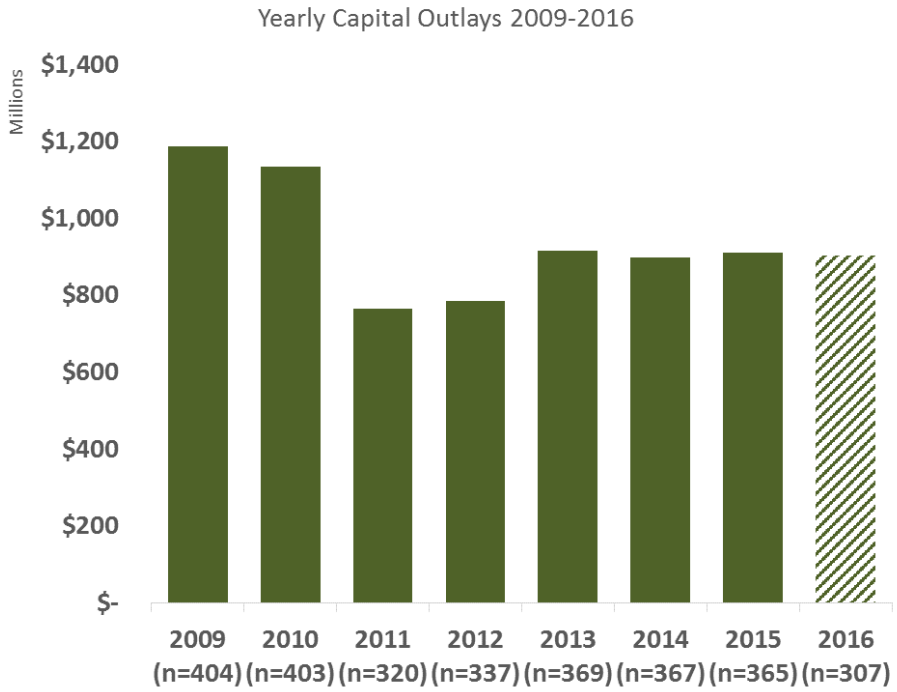
As stated above, every fiscal year, data for some local governments with active water/wastewater utilities are missing. The missing utilities, and the number of missing utilities, differ from year to year. Thus, comparing statewide totals across fiscal years may be slightly misleading. To compare changes from year-to-year, please read the section of the report titled “Change in Conditions from Year-to-Year”, which tracks a cohort of 298 utilities that had reported financial data every single year from FY2008 through FY2016.

Nevertheless, calculating the statewide totals of some of the financial data provides a general assessment of the scale of conditions statewide, given that only a small number of utilities (that are more often small local governments with low capital outlays and depreciation values) are missing. The

number of utilities with data in each fiscal year are shown in the axes labels in the graphs of this section of the report. Note in particular that the number of utilities included in FY2016 is significantly lower than all other years, and are thus hatched in the graphs. The statewide totals of FY2015 is more representative of current statewide conditions than the FY2016 totals, due to the larger inclusion rate in FY2015.

Statewide Capital Outlays

It is not possible to answer the question about how much utilities are spending on infrastructure *rehabilitation and replacement* specifically. It is also not possible to answer the similar question about how much utilities are spending on capital assets (in terms of acquisition of assets) specifically. The closest financial indicator from the LGC-compiled data is total capital outlays, which includes expenditures on a wide range of capital projects, including construction costs.



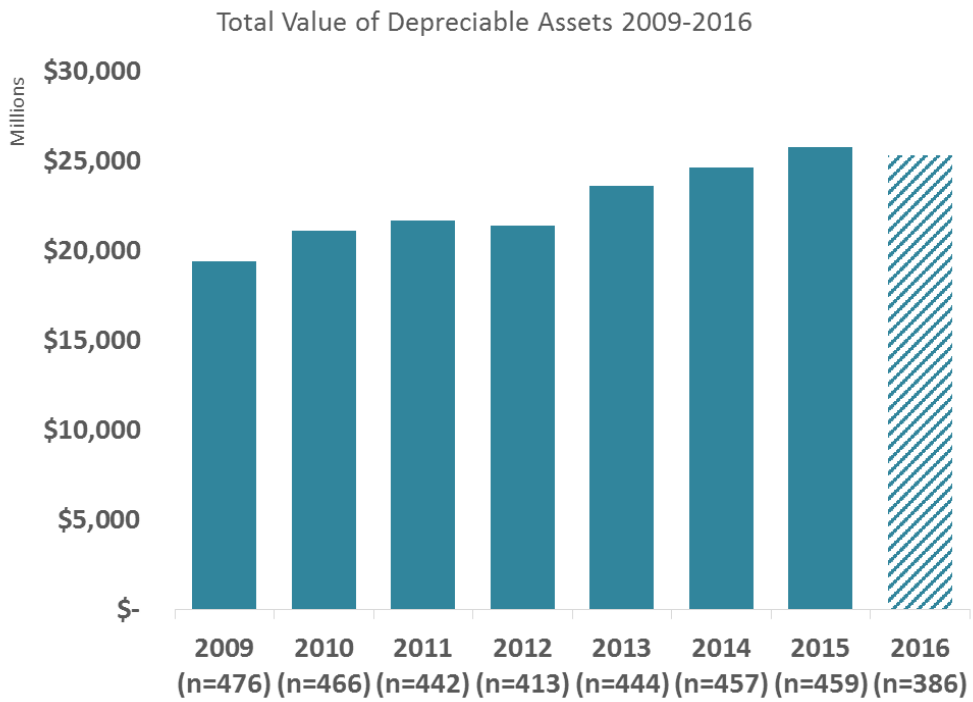
In FY2015, 365 local governments had reported non-zero capital outlays, totaling $911 million statewide. The largest spender was Charlotte Water with $95,208,000, and the smallest was Stanfield at $700.

Condition of Depreciable Physical Assets

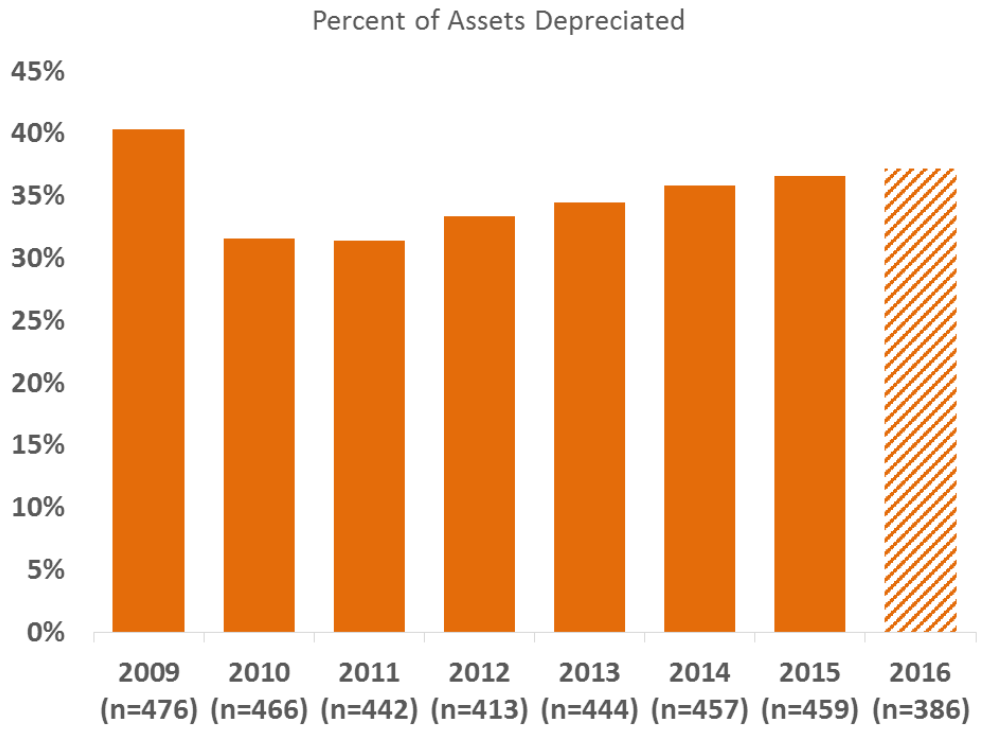
Theoretically, financial depreciation of assets could track their physical depreciation closely, if the asset physically depreciates steadily every year during the depreciation schedule period. However, this rarely happens. Often, accountants set depreciation schedules that may be too aggressive, depreciating the book value of the asset faster than it is physically depreciating. In this circumstance, an asset might end up with a book value of $0 at the end of its depreciation schedule, but might still be in operable

condition for a few more years. Conversely, some assets might physically wear out more quickly than the fixed depreciation schedule, based on use and conditions. Thus, it is never accurate to use the financial values of depreciation and book values to measure the physical conditions of the assets.

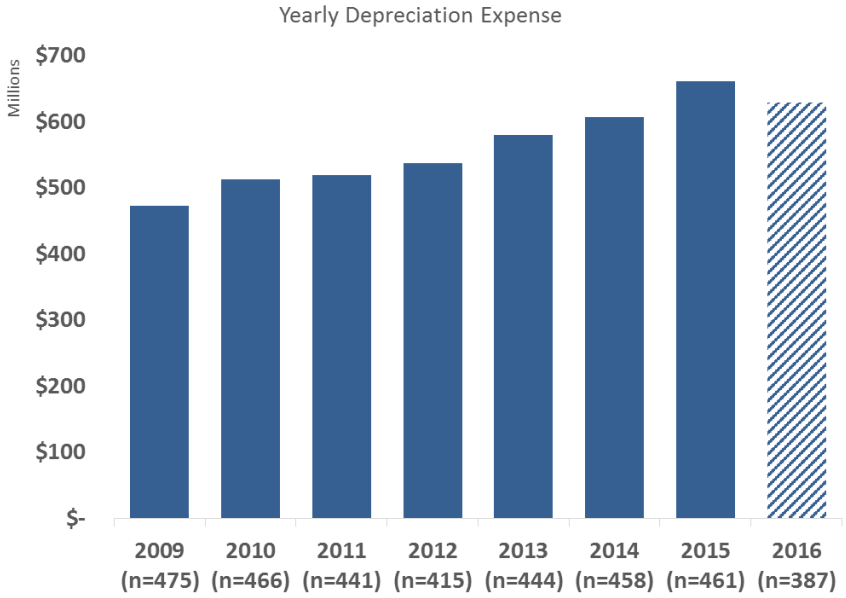
Nonetheless, depreciation allows us to very roughly estimate how long assets have generally been in operation without major rehabilitation or refurbishment. If reinvestment in assets (existing or new) does not occur swiftly enough, the book value of the utility's depreciable assets should steadily decline, and the total value of depreciable assets should remain steady or only rise slowly. Utilities that are constantly spending on their existing and new assets should see a rapid increase in the total value of depreciable assets as old assets are replaced with newer assets at higher costs.



In FY2015, the total gross value of depreciable assets of 459 local government utilities was about $25.8 billion. The rise from year-to-year since 2013 is confirmed in the cohort analysis later in this report, indicating that utilities in North Carolina have been spending and acquiring capital assets for the past few years.

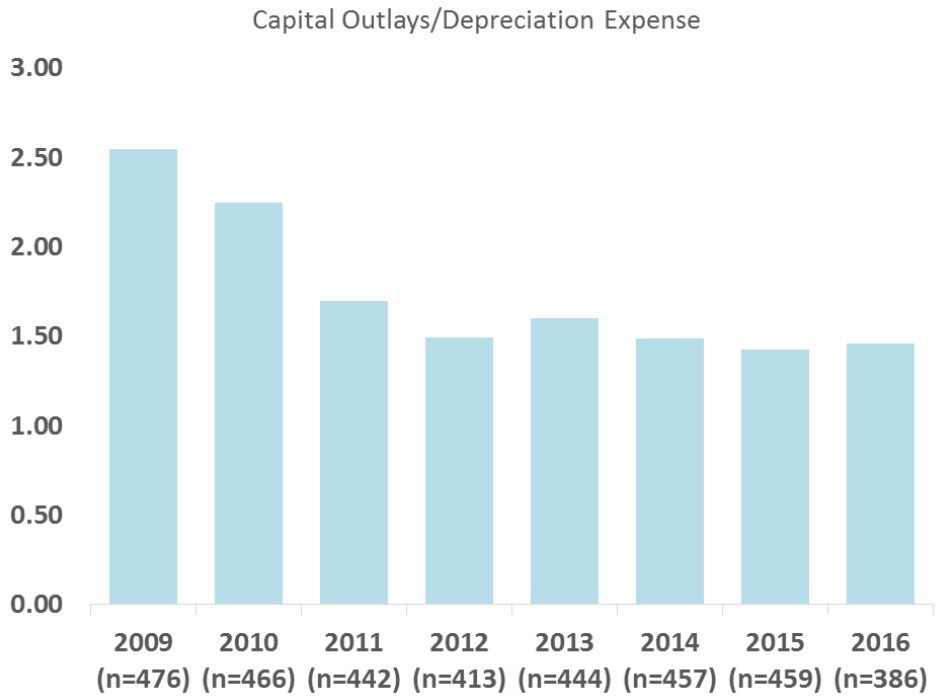


With $9.4 billion of accumulated depreciation in FY2015, those 459 local governments have lost about 36.6% of the gross value of their $25.8 billion in investments. In other words, on average, the depreciable assets in the state have used up more than a third of their average expected life (as determined by the depreciation schedule, which might be more or less than the actual physical expected life). Year-to-year comparisons is reserved for the next section.



As a point of reference, 461 local governments had a total depreciation expense of about $660 million in FY2015. If the goal is to spend enough on capital every year to simply maintain the condition of the physical assets (as determined by the financial depreciation schedule), these utilities should spend about $660 million collectively on rehabilitation of existing assets. The actual number will vary, because depreciation expense increases when new assets are added and depreciation expense is eliminated when assets run past their depreciation schedule periods, making the comparison of calculated depreciation expense and the actual expense that is needed to maintain infrastructure less than perfect.

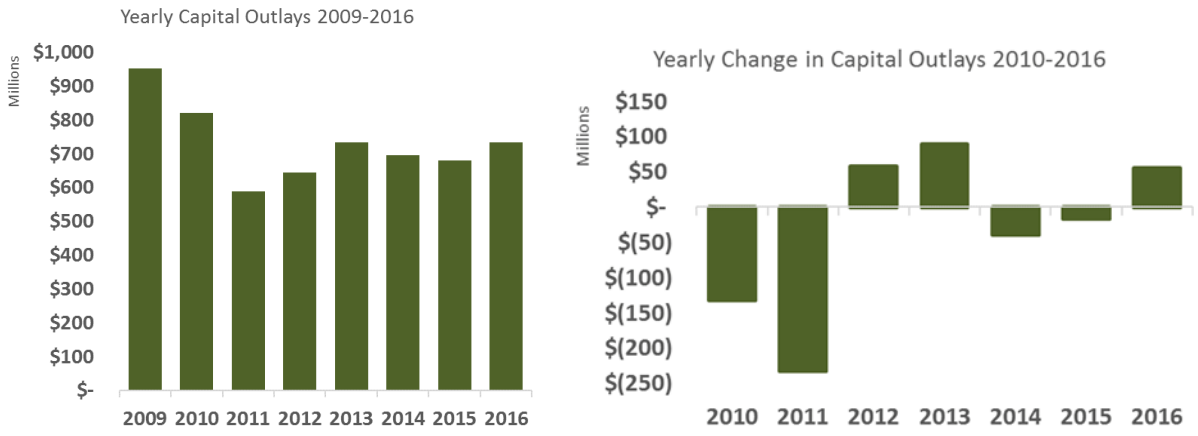
Capital outlays in FY2015 was $911 million, far exceeding the total depreciation expense as a statewide aggregate, even though 96 local governments did not report any capital outlays in FY2015. As a ratio, capital outlays were 1.42 times the total depreciation expense among 459 utilities across the state in FY2015. On the aggregate, this appears to be encouraging, implying that the utilities are spending more (on the aggregate statewide) on capital than their assets are being depreciated. It is difficult, however, to tell how much of the "extra" capital outlays was used to acquire new assets and pay for construction and other costs, rather than to invest in the upkeep of existing infrastructure that is being depreciated.



Change in Conditions from Year-to-Year (Cohort Analysis)

To assess trends over time, we tracked and analyzed the sub-group of 298 utilities that reported financial data to the LGC every single year between FY2008 and FY2016. In this way, we are assessing changes to the financial condition for the same cohort of utilities every year. The 298 utilities (64% of utilities reporting data in FY2015) accounted for more than 78% of total operating revenues of all 463 utilities reporting in FY2015. Thus, the cohort of 298 utilities represent the largest utilities, and changes from year-to-year that affect this cohort is largely indicative of overall changes to the state's total statistics.

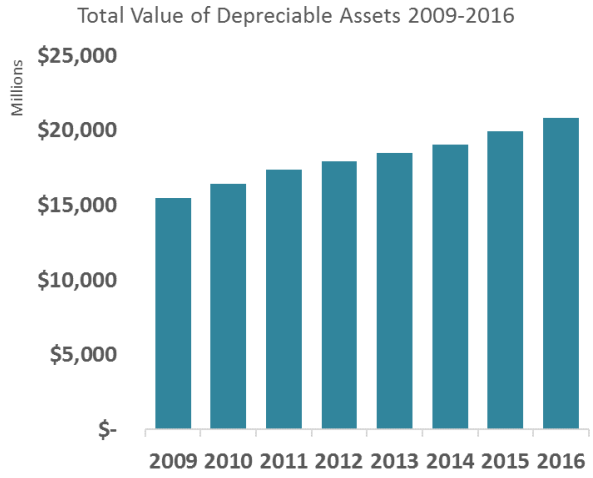
Changes to Capital Outlays

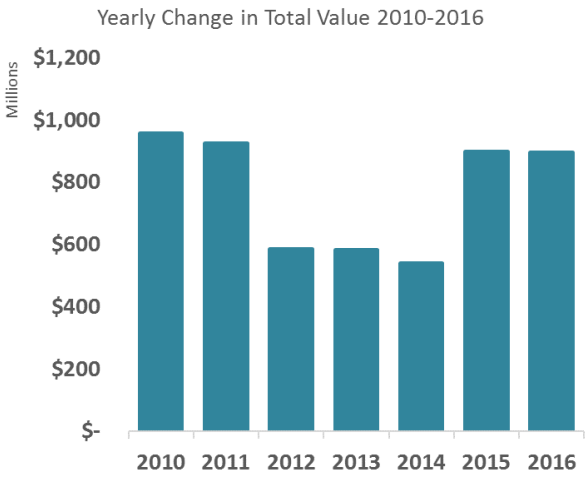


From FY2009 to FY2016, this cohort spent a total of $5.8 billion on capital outlays, with an average of $730 million spent each year. The money spent on capital outlays has decreased by about $31 million per year, though much of that is due to the ARRA post-stimulus decline after FY2010. Since FY2011, capital outlays have increased by an average of $29 million/year.

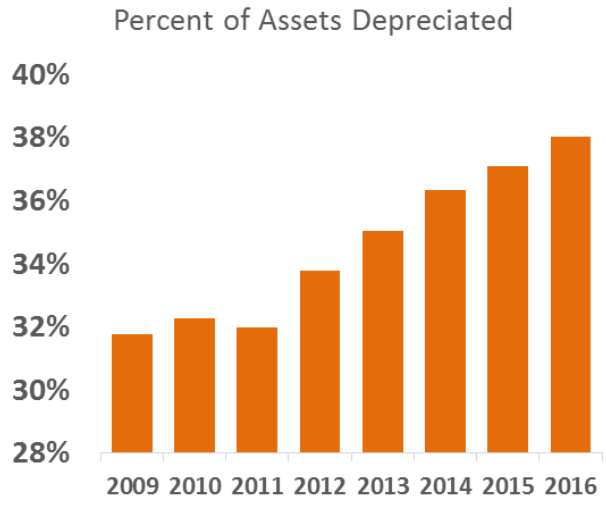
Considering the data differently, the FY2011 was a low point in capital outlays, after at least two very high capital outlay years due to the ARRA. One potential explanation for the lower outlays in 2011 is that some work planned for that year may have been accelerated to FY2009 and/or FY2010. Ignoring FY2011, it appears that yearly capital outlays have remained steady around $645 million - $735 million. Capital outlays are not adjusted for inflation, and so there may be a slight decline in capital outlays when adjusting for CCI-inflation. Overall, however, it appears that this cohort of utilities that represents nearly four-fifths of the local government water and wastewater industry in North Carolina are spending a relatively consistent amount each year on capital outlays.

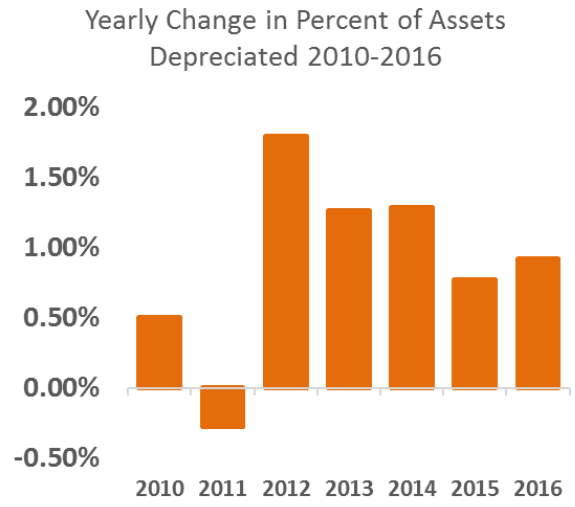
Changes to Condition of Depreciable Physical Assets



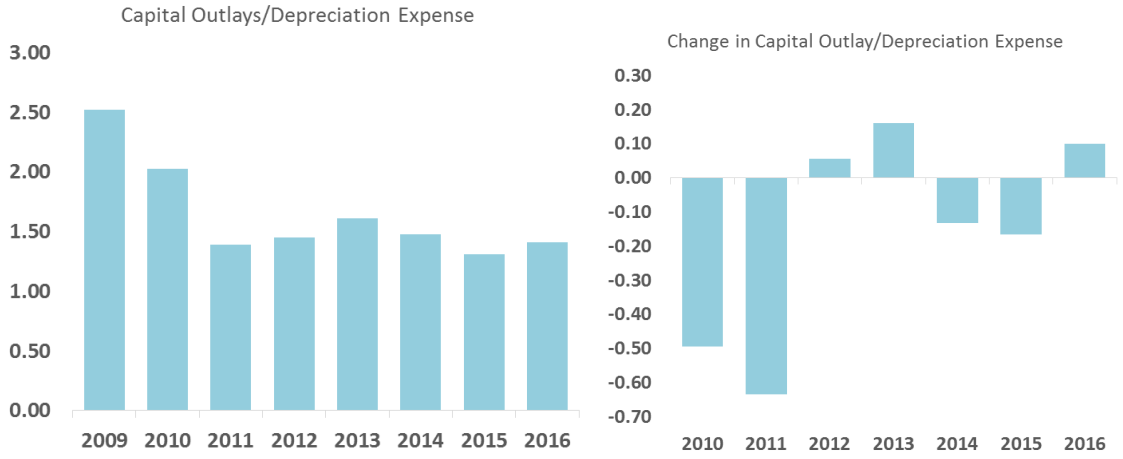


The gross value of depreciable assets has steadily grown since FY2009, indicating that utilities are adding more assets or replacing assets faster than they are being retired. The approximately $710 million in yearly capital outlays since FY2013 has led to an average increase in total value of about $728 million each year. One might expect capital outlays to be less than the increase in total gross value; however, the relationship between the two is not that simple. Capital outlays used to replace existing assets would increase gross value by the amount of the new assets, but would simultaneously decrease the gross value by the amount of the existing asset that is being retired. Additionally, there is sometimes a lag between capital outlays on any project and the associated increase in depreciable value. This is because Construction In Progress is not considered a depreciable asset. In essence, the money from capital outlays goes into a non-depreciable asset for a while before ending as a depreciable asset. This process can take several years, depending on the construction time of the project.





The capital outlays have also not been enough to keep the percent of assets depreciated from rising. The percent of assets depreciated has climbed from 32% in FY2009 to 38% in FY2016; an average increase of about 0.9 percentage points a year. From 2009 through 2011, the ratio hovered around 32%. However, since then it has risen by about 1.21 percentage points each year. Thus, despite significant capital outlays, existing assets continue to depreciate faster than they are being rehabilitated or refurbished. This may be an artifact of how aggressive depreciation schedules are set relative to the slower pace of physical deterioration. Typically, utilities will invest in an asset when it wears down, as opposed to simply to avoid further financial depreciation.



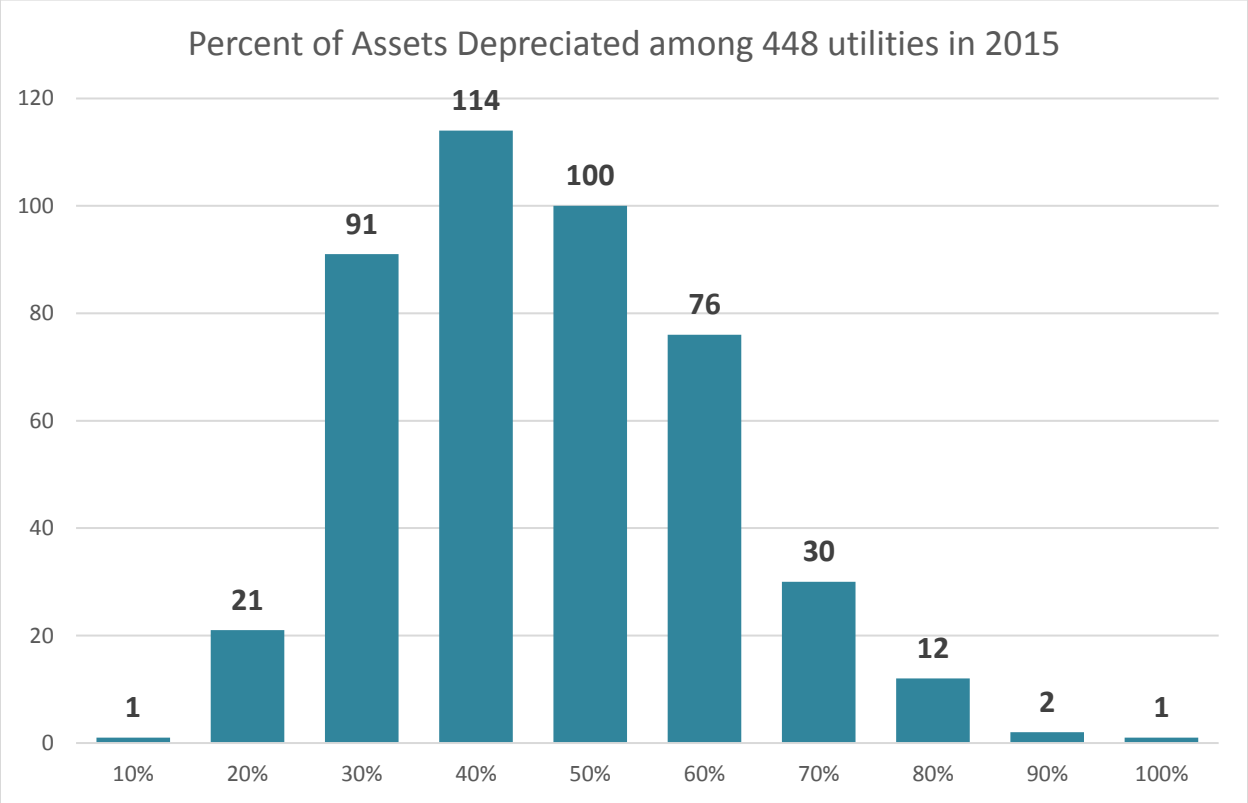
From FY2009 to FY2011, the ratio of capital outlays to depreciation expense fell from 2.52 to 1.39. Since FY2011, the ratio has hovered around an average of 1.44, with a value of 1.41 in FY2016. Interestingly, this value is almost identical to the value for the state as whole as stated previously. This is an indicator that the cohort is a good representative of the state as a whole. Since the ratio hovers around 1.44, it shows that utilities are spending about 40% more in capital outlays each year than the value of the assets being depreciated during that year, which is a positive sign.

Of note is the fact that keeping the ratio above 2.0 seems to have kept the Percent of Assets Depreciated from increasing (giving a lag time of about one year for Construction In Progress). In FY2009 and FY2010, the ratio was greater than 2.0, leading to less than 0.5 percentage point changes in the Percent of Assets Depreciated in FY2010 and FY2011 respectively. As soon as the capital outlay to depreciation expense dropped below 1.5 in FY2011, the Percent of Assets Depreciated increased by more than 1.8 percentage points in FY2012. Thus, a very tentative rule of thumb could be that a statewide capital outlays to depreciation expense ratio of 2.0 is perhaps necessary for utilities to maintain a steady level of asset condition. This speculative claim would require additional research to substantiate. Applying this rule of thumb ratio back to the statewide totals: in FY2015, there was a total statewide depreciation expense of $660 million, and capital outlays of $911 million. A ratio of 2.0 would require capital outlays of $1.32 billion, or $409 million more than was actually spent. However,

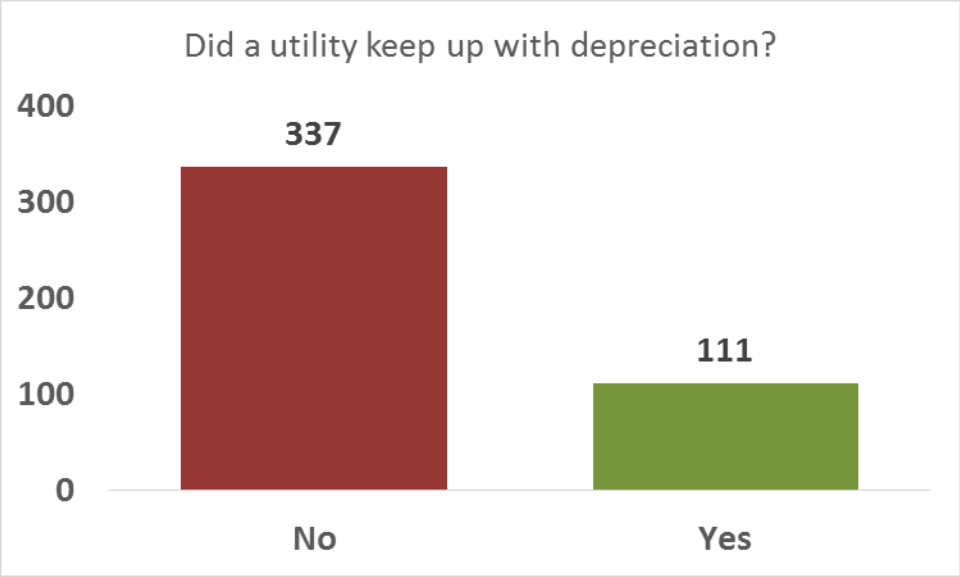
this is speculative, as the evidence for the 2.0 ratio comes from just a three-year span (2009-2011), during which many other variables could have affected the change in asset condition.

Tracking on a Utility-by-Utility Basis

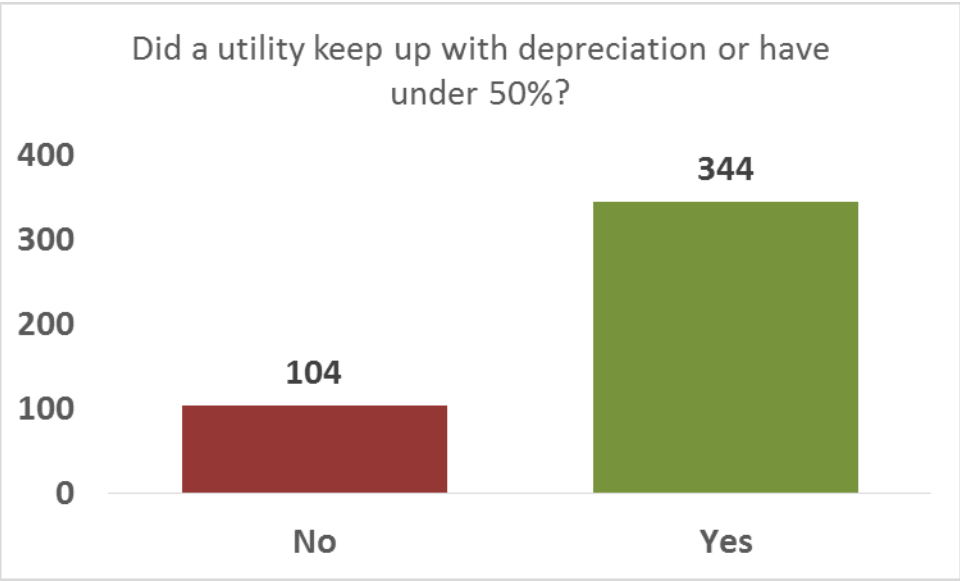
The information above has been helpful in partially answering the questions of how much have utilities been spending on capital and what the overall condition of assets may be (with many caveats). To answer the question about whether utilities are spending enough on capital to maintain their infrastructure condition requires more in-depth analysis than comparing statewide or cohort-wide aggregated statistics on percent of assets depreciated and capital outlays. Overall, it appears that the answer is that utilities may not be spending enough to maintain infrastructure condition, but additional analysis is warranted to determine the shortfall between what capital outlays are and what they should be. For this analysis, tracking each individual utility and comparing its capital outlays to its depreciation information is important. In this section, we analyze data from 448 local government utilities that had reported financial data to the LGC in both FY2009 and in FY2015.



The majority of those utilities, in FY2015, had between 30% and 50% of assets already depreciated, with a significant additional group in the 50%-60% range. This is an indication that while most utilities have used up less than half of the useful life of their assets, as measured by the financial depreciation schedules, there is still some level of significant aging in North Carolina utilities if physical assets wear out close to as quickly as their financial values depreciate.



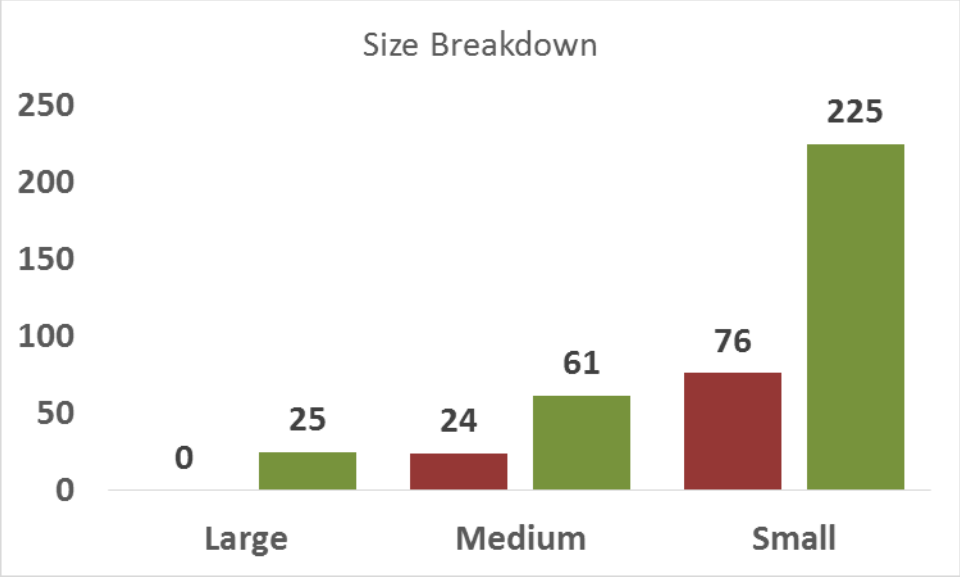
Within this group of 448 utilities, we isolated the utilities that were spending enough on capital outlays to keep the percent of assets depreciated level or reduced from FY2009 to FY2015. 111 utilities—or just under 25%—avoided an increase in their percent of assets depreciated from 2009 to 2015. However, this is not, by itself, useful information. If a utility had 20% of its assets depreciated in FY2009 and that percentage rose to 22% in FY2015, it would register as a utility with increased percent of assets depreciated, even though it is of much lower concern than a utility that had a 60% depreciation in FY2009, and remained at 60% in FY2015. Using >50% of assets depreciated as a new threshold of utilities of concern, we sorted the same 448 utilities into two groups: one group for the utilities that saw an increase in percent of assets depreciated and had over 50% depreciation by FY2015 (utilities of concern), and one group for all other utilities.



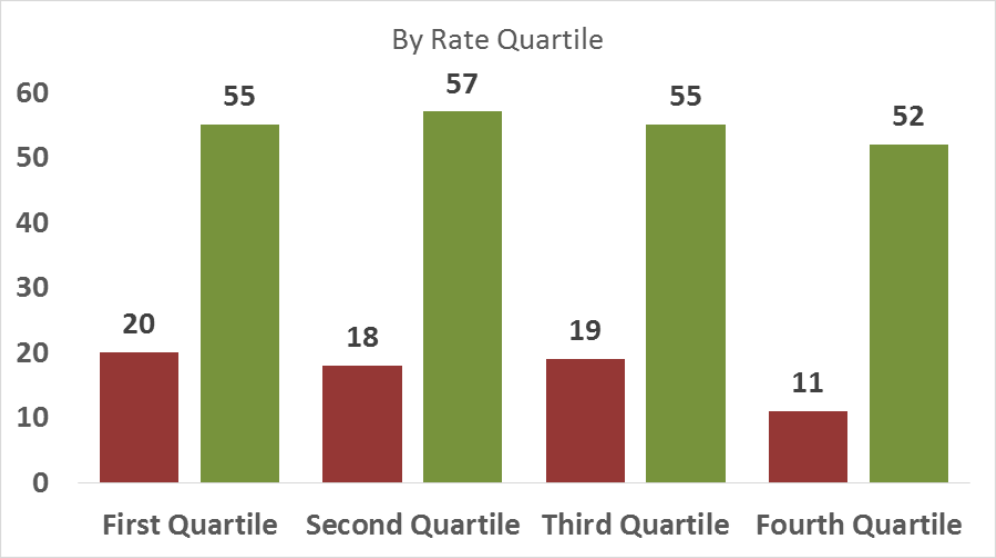
Only about 25% of utilities are in the group of utilities of concern: they had increasing percentage of assets depreciating, and over 50% depreciation by FY2015. In other words, a quarter of the utilities are clearly not spending enough on capital to avoid depreciating their already-aging infrastructure past its halfway point.

Combining the results above, we find that:

- about one quarter of utilities spent enough capital to keep their assets in the same or better condition by FY2015 than in FY2009, as measured by depreciation,
- about one quarter of utilities has aged infrastructure and is not spending enough capital to avoid aging the infrastructure further, and
- the remaining half of the utilities is not spending enough capital to keep their assets in the same condition, but their infrastructure has not aged beyond the halfway point yet. If utilities in this group have comprehensive CIPs and a clear plan for making investments over the next few years, then there will not be much concern over these utilities' maintaining their infrastructure. However, if many of the utilities in this group do not have plans for making investments in their systems, then their assets will continue to depreciate faster than they are being replaced, and eventually they will be added to the group of utilities with aged and still-aging infrastructure.



Not entirely surprisingly, this is an issue that is particularly relevant for small utilities. All 25 large utilities serving 50,000 or more people either saw their percent of assets depreciated decrease, or they did not have more than 50% depreciation. Medium utilities, serving 10,000-50,000 people, and small utilities, serving fewer than 10,000 people, had about a quarter of their systems in the aged and still-aging group of utilities of concern.



Finally, using the EFC-NCLM water and wastewater rates survey data, we determined that there was no significant difference between utilities that charge in the lowest 75% of rates – they were equally likely to be in group of utilities of concern. The only difference is that utilities charging in the highest quartile of water and wastewater rates are less likely to be included in the group of utilities of concern. This implies that utilities with high rates, for one reason or another, are less likely to not be spending enough on capital outlays to ward off further depreciating aged infrastructure.

Conclusions

In the introduction, we outlined three main questions of interest:

1) How much are utilities spending on infrastructure rehabilitation and replacement?
2) What is the condition of the physical assets of local government utilities?
3) Are utilities investing fast enough to maintain the condition of their physical assets?

The audited financial statement data compiled by the LGC can only partially answer these questions—and not comprehensively. There are some limitations, including only being able to use the data to assess local government utilities but not non-governmental utilities or local government utilities that fail to provide their financial data to the LGC in a given year. Some of the key data, such as gross value of depreciable assets, were only tracked starting in FY2008, making long-term trends analysis difficult and the data could not be converted to Net Present Value. Without knowing when capital outlays occurred, or when assets were added to a utility, it is not accurate to convert historical gross values to present value. Finally, but importantly, there are no data that directly answer the questions above, as they are stated.

However, the financial data can be used to answer similar questions that overlap with the ones listed above, and with careful data manipulations. In assessing trends over time, it is important to study a cohort of utilities that have provided complete data in all of the years in the study period. While data on specific purposes of utility spending are not available, capital outlays can help indicate whether utilities are spending more or less on infrastructure, recognizing, however, that capital outlays also include non-infrastructure expenditures. Similarly, depreciation (both as an annual expense and as cumulatively as a percentage of gross values of depreciable assets) is an imperfect measure of the physical wear and tear on the infrastructure. Unless the assets physically wear down evenly every year, and have a real expected lifetime that is equal to the depreciation schedule set by the accountants (both very rare occurrences), it is unlikely that depreciation accurately measures the physical condition of the assets. Nevertheless, it can act as a surrogate that is at least weakly correlated with physical condition. Trends in depreciation over time can be indicative of trends in the physical condition of assets.

In response to the first question, the audited financial statement data can build a broad overview of the state of infrastructure spending (actually capital outlays) in the state. It can tell us how much was spent in the previous year on capital projects and how much gross value was changed as a result. For example, in FY2015, at least $911 million was spent on capital outlays in the state, and that capital outlays declined after FY2010, coinciding with the end of the ARRA stimulus funds.

In response to the second question, the audited financial statement data can be used to compute two ratios: Percent of Assets Depreciated, and Average Age of Assets. This report utilized the former, because that ratio more intuitively shows how much assets have been “used up.” Users must recognize the potential difference between financial depreciation and physical wear and tear when computing

these ratios to estimate the condition of physical assets. But, as stated earlier, trends in these ratios over time can be helpful indications of trends in physical condition of the assets as well. As of FY2015, NC utilities' assets had lost about 36.6% of their total gross value. The cohort of utilities indicated that the percent of assets depreciated has steadily risen since FY2011, which could be cause for concern unless utilities invest more rapidly in infrastructure to slow this trend in the future.

This partially answers the third question as well. Despite capital outlays increasing or holding steady over time for the cohort of utilities, the percent of assets depreciated increased. Even when utilities are spending 40% more on capital outlays than their depreciation expense, the percent of assets depreciated continue to rise. This implies that utilities are, on average statewide, not spending enough on infrastructure to maintain infrastructure condition; however, there may be multiple extraneous factors at play. Utility-level analysis helps hone in on a group of utilities (about a quarter of the state's local government utilities) that already have aged infrastructure and whose infrastructure continues to age further, providing a strong signal that capital reinvestment levels are inadequate for these utilities. These utilities happen to be small and medium in size, and are generally less likely to have the highest rates in the state.

In summary, the audited financial statement data that the LGC compiles every year can be used to very roughly assess the current condition of assets and capital outlay trends across the state, and at a utility level. The data are easily accessible and fairly comprehensive of local governments, but are limited only to local governments (excluding those who fail to report their data), requires data cleaning and manipulation, and careful consideration of the nuances between financial data and physical condition information. The financial data, however, cannot indicate the comprehensive infrastructure needs for the entire state—particularly forward-looking projections—in a manner that SWIA can use for comprehensive planning purposes. At best, the financial data can be useful as a *supplemental* data source to reveal trends in capital expenditures and maintenance of depreciation in the recent past, which could be useful for SWIA as it seeks information about the state of infrastructure and the funding levels required to maintain the infrastructure.