THE ECONOMIC AND RATE IMPLICATIONS FROM AN ELECTRIC UTILITY'S LOSS OF LARGE-LOAD CUSTOMERS

REPORT PREPARED FOR:

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EXECUTIVE SUMMARY

The commercial and industrial electric consumer sectors are by and large the primary non-governmental economic engine of the US and the Carolinas, providing and supporting the predominance of employment and trade in the country and all the attenuating economic activity associated with these activities. Consequently, an important issue for policymakers to fully understand is the economic and rate implications should a large commercial or industrial customer either shut down or otherwise leave a region and a utility's service area.

Intuitively, if electricity is a major cost to a large electric load customer, the price of electricity can play a role in a firm's decision about a facility's location, expansion, or closing. Electric demand studies of industrial customers' price elasticity have indicated these type customers have a limited ability to respond to electric price changes in the short-run (less than 2-3 years). This means that in the short-run increased electricity costs, absent reductions in other costs, will likely have a very direct impact on these customers' profitability. From a longer-term perspective, price elasticity studies indicate that the industrial class of customers will respond very dramatically, as compared to some other customer classes, to changes in electricity prices up to and including the closing of a facility.

This report also confirmed the importance of reliable and favorably priced electricity to economic development and that the Carolinas are experiencing a transition in their economy, generally to more energy-intensive types of industries and facilities. However, another related finding in this research was that both states have been experiencing a decade long decline in the number of industrial customers with a related decline in employment in that sector of the economy. While some of these declines could be attributed to the recent recession, the industrial job losses and declining electric usage in the industrial class began well prior (at least as early as 2001) to the current recession (2007-08). This trend indicates that the loss of these type customers is due to more systemic based problems with impacts beyond the normal business cycle. For example, Duke Energy Carolina's ("Duke") 2011 IRP indicates that from 2001 up through 2010 it has lost approximately 1000 customers from its industrial class, while gaining customers in every other customer classification. During that same time period, while all other classes saw growth in energy sales, Duke's Industrial class saw a decline from 26,902 GWh to 20,618 GWH, a decline of 23.3%. Over a similar time period, according to the Progress Energy Carolina's ("PEC") 2011 IRP, PEC's Industrial Class of customers' sales over that time period declined by 15.9%.

To address these issues will likely require efforts aimed at reducing the underlying costs related to a particular industry – such as efforts aimed at lowering labor costs, regulatory costs, or input costs including electricity. All these strategies could be productive attempts for helping reinvigorate industrial growth. Consequently, electric policy decisions specifically as it relates to rates are likely important issues for both states with respect to large customer retention and economic development.

To demonstrate the importance of large electric customers to a region or state, this report utilized an input-output econometric model to quantify the economic impact on the Charlotte, NC metropolitan region from the expansion or closing of four different large electric customer facilities. The specific facilities examined were an AT&T data center, a Caterpillar heavy equipment manufacturing facility, a surgical products manufacturing facility, and a plastic products manufacturing facility. Note that the analysis was performed using Duke data and economic information regarding the Charlotte, NC region. However, as the report states, the basic economic analysis and results would be expected to be generally similar for PEC.

The results of this analysis indicated that for every new (or lost) employee at the specified facility:

- There are from 1-3 additional new jobs created (lost) in the region,
- There is a region-wide increase (loss) of approximately $500K per year in additional economic output, and
- There is a region-wide increase (loss) of $200K-$350K in employee earnings.

Beyond these more region-wide economic impacts there could be an effect on the remaining customers' rates when large electric users depart any regulated electric utility's system. When electric load is lost from customers severely cutting back on load; moving out of an electric utility's service territory; or by going out of business entirely, the remaining customers will theoretically have to pay the fixed costs (non-energy related) portion of revenues no longer being recovered from the "lost" customer. A portion of the "lost' revenues are directly due to the change in electricity sales to the lost customer. However, there are additional changes in electricity usage in that customer's geographic region and these changes are related to the economic multiplier effects discussed above. Theoretically, the lost fixed costs attributed to the change in electricity usage related to this multiplier effect will also have to be recovered from the remaining customers.

Based on these assumptions about fixed cost recovery, publicly available data from the FERC, Duke's and PEC's North Carolina SCP cost of service study,[1] the BEA, and from the EIA was used to develop models to calculate

[1] Docket No. E-7, Sub 989 and Docket No. E-2, Sub 1023.

the dollar amounts of "lost" fixed costs and the resulting rate impacts, both related to the specific customer's electricity usage and the usage related to the economic multiplier effect. Again note that the analysis, while performed using Duke data and economic information regarding the Charlotte, NC region, would be expected to produce generally similar rate impacts for PEC..

Assuming varying percentages of load lost in Duke's "I" and "OPT" customer classes, these "lost" fixed costs were then re-allocated to the remaining classes of customers consistent with Duke's 2011 cost of service studies in order to estimate the rate impact on the remaining customer classes. The resulting analysis indicated that for a 1% loss of load in the I customer class, the Residential customers would theoretically experience an increase in their rates of $450,000 or 0.0212% due directly to the departing facility's lost load. The economic multiplier effect increased this rate impact to 0.0647%. A 5% Industrial class load loss resulted in a Residential rate increase of $2.249 million or 0.106% due directly to the departing facility's lost load. The economic multiplier effect increased this rate impact to 0.323%. A similar analysis estimated that the Residential Class of customers would experience a rate increase of approximately $3.9 million or 0.184% for the loss of 1% of the load in the OPT class due directly to the departing facility's lost load. The economic multiplier effect increased this rate impact to 0.561%. The allocation of fixed costs resulting from as much as a 5% loss in load from the OPT customer class would result in a 0.919% increase in the remaining customers' rates due directly to the departing facility's lost load. The economic multiplier effect increased this rate impact to 2.804%.

For PEC, the loss of large load customers in PEC's LGS class has generally similar rate impacts. For example, a 5% loss of PEC's LGS load would theoretically mean that Residential customers would experience a 0.40% increase in their electric rates due to the recovery related to the departing customer's lost fixed costs. In addition, the economic multiplier effect increases this Residential rate impact to an increase of 1.23%. PEC's small general service customers would be similarly affected.

The overall results from this economic and rate analysis yield three basic conclusions. First, that the economic multiplier effect on a region's electricity consumption (and revenues) are expected to be larger than are the changes in electricity consumption resulting directly from a large customer's usage when that customer exits or expands into a utilitiy's system. Second, that the loss (or gain) of a larger customer (assume 3% to 5% of Duke's OPT load or PEC's LGS load) would theoretically result in Residential (and also General Service) customers experiencing rate increases (or decrease) ranging from approximately 1% to 3%.

The third and likely most important conclusion from this economic analysis is that a comparison of the rate and economic impacts that accrue from the attraction of new, expanded, or retained large load customers are likely far larger in economic value than the negative rate impacts should these customers leave Duke's or PEC's system. Consequently, to the extent that electric rate setting decisions have the potential for retaining or attracting large customers to a region, it would seem appropriate for policy makers to consider both the rate impacts and the economic impacts resulting from such decisions. In so doing, when establishing electric pricing terms and conditions electric rate-setting policy makers may find it reasonable and in the public interest to depart from historical or strictly applied rate-setting methodologies and rules if larger customers' retention hangs in the balance.

Further research in this report supported this conclusion by finding that a number of states and electric utilities have developed tariffs with discounted pricing options with the objective of both large customer retention and economic development and in some cases states have used these terms and resulting tariffs interchangeably. There are usually several criteria that these types of retention, special contract, or economic development tariffs adhere to including:

- Rate concessions vary, sometimes stated in the tariff, other times the tariff indicates rates will be negotiated
- Some tariffs state the minimum rate will be the utility's marginal cost plus some contribution
- A customer's minimum peak demand varies from as low as 150 kW to as high as 1500 kW
- Some utilities require that the company receiving the new rate participate in an energy audit or in other energy conservation measures
- In some cases, the customer receiving the new rate must provide an affidavit affirming the need for the rate to remain viable. In other cases the company receiving the new rate must provide documentation the utility considers sufficient to affirm that the rate is justified for that particular customer, and in some states no affidavit or documentation from the customer is required
- Sometimes there is a contract limit, and if so, it is usually no more than 5 year contract limit

Given these various considerations, it would not be unwarranted should Duke or PEC seek to obtain a tariff focusing on retaining jobs with the additional benefit of aiding in keeping customers on the Company's system and in the State. The analysis in this report indicates that such a tariff, to the extent large electric loads were retained on the system, provides substantial positive economic benefits to a region with potentially minor increases in the remaining customers' rates.

CHAPTER 1: INTRODUCTION

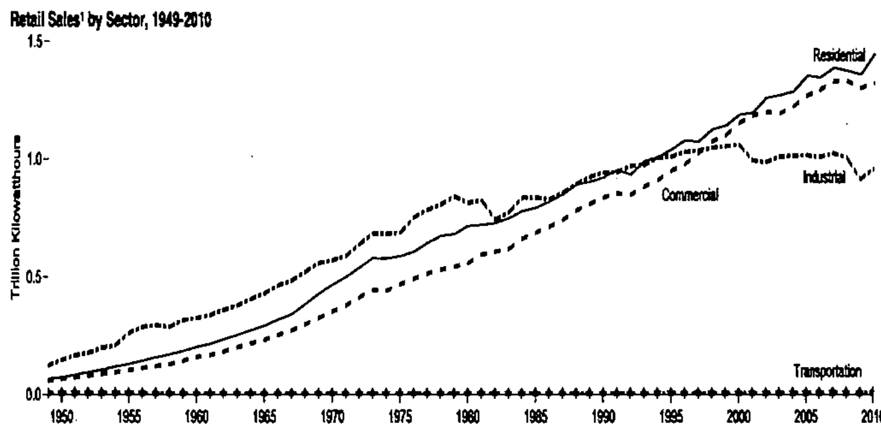
1.0 INTRODUCTION AND PURPOSE

According to the Energy Information Administration ("EIA"), in the United Sates ("US"), from 1950 to 2000, industrial and commercial customers used approximately two-thirds of the electricity consumed in the country (see **Chart 1.1** below). Since 2000, that figure has declined slightly, but nevertheless, the commercial and industrial electricity consumer sectors continue to use the majority of the electric power consumed in the US.[2] In North Carolina and South Carolina, ("Carolinas" collectively) the percentage of statewide total electric sales by kWh to the commercial and industrial sectors, according to the EIA, was 46% and 51%, respectively, of total kWh electric sales in 2011.[3] For Duke Energy Carolinas ("Duke") specifically, the percentage of energy sales to its commercial and industrial customers represents 58% of the Company's total energy sales.[4] For Progress Energy Carolinas ("PEC") the percentage of energy sales to its commercial and industrial customers represents 56% of the Company's total energy sales.[5] Moreover, the commercial and industrial electric consumer sectors are a significant economic engine for the entire US and the Carolinas' economy, providing and supporting a large portion of non-government employment and trade in the country and all the attenuating economic activity associated with these activities.

Given the importance of these industrial electric consumers to a region and to the US economy, it is important for policy makers to fully understand the economic and rate implications should a large industrial customer either shut-down or otherwise leave a region and a utility's service area. To study this question Duke Energy and Progress Energy Carolinas engaged J. A. Wright & Associates ("JAW") and this report is the result of that research. This issue is particularly important not only from the perspective of retention but also at the state and smaller-region level where there is intensive competition for and recruiting of large-employee enterprises, such as a big manufacturing facility. A necessary component of that recruiting effort is often a region's availability of reliable and affordable electric power.

2 See EIA, 2011 data tables for electricity at: http://www.eia.gov/electricity/data.cfm#sales.
3 IBID.
4 Duke Carolinas IRP, Annual Report, Sept. 2011, p. 18.
5 Progress Energy Carolinas IRP, Sept. 1, 2011.

CHART 1.1



[1] Electricity retail sales to ultimate customers reported by electric utilities and, beginning in 1996, other energy service providers.
[2] Use of electricity that is 1) self-generated, 2) produced by either the same entity that consumes the power or an affiliate, and 3) used in direct support of a service or industrial process located within the same facility or group of facilities that house the generating equipment. Direct use is exclusive of station use.
Source: Table 8.9.

At the outset, this study segregated the impacts resulting from a large electric customer leaving a region and a utility's, in this case Duke's or PEC's, service territory into two distinct categories.

The first category of impacts, discussed in **Chapter 3**, considered the basic economic effects on a region should a large electric customer depart that region. To study this question this research employed a literature review and a quantitative analysis that utilized econometric-modeling techniques supported by the US Department of Commerce Bureau of Economic Analysis.[6] The second category of impacts, discussed in **Chapter 4**, examined the rate-related impacts on the remaining customers should a large customer depart Duke's or PEC's service territory. This research used these two utilities publicly available accounting and customer data and employed basic regulatory ratemaking accounting in estimating these impacts. Finally, **Chapter 5** reviews a number of tariffs that are currently being used in the electric industry to promote large customer attraction and retention. Before

[6] Called RIMS II input-output modeling, further described and employed in **Chapter 3**.

proceeding with the findings from this analysis of the economic and rate impacts resulting from a large electric customer departing a region and electric system, the following Chapter reviews some relevant economic theory and data related to this analysis.

CHAPTER 2: BACKGROUND: THE ROLE OF ELECTRICITY IN ECONOMIC DEVELOPMENT

2.0 INTRODUCTION

The purpose of this Chapter is to provide some basic economic underpinnings and background with respect to the two major issues that are the subject of this research: the economic implications and rate impacts when a large electric customer either shuts down or leaves a utility's service area. More specifically, before investigating what happens when the aforementioned large customer "leaves" an electric system and region, it is beneficial to understand the importance of electricity within a firm (whether commercial or industrial).

It is widely understood that electricity plays a vital role in both the production and consumption of goods and services within an economy.[7] In fact, a study of the US economy from 1950-1984 indicated "Growth in electric power consumption accounts for 79% of the growth of manufacturing value-added [during this period of time]."[8] Another more recent study of 99% of the world's global economy found a highly statistically-significant correlation between electricity consumption per capita and GDP per capita.[9] These various findings indicating the importance of electricity to economic growth and assures us that historically reliable and affordable US electric supplies have played a key, even predominate, role in the ongoing operations of most large commercial and industrial customers in the US.

However, over the past two decades many firms, particularly large manufacturing firms, have closed facilities in the US and North Carolina to establish foreign operations, while other firms have relocated from one region to another within the US. With this being the case, this Chapter provides a basic review of electricity's current role with respect to a firm's location/relocation decision and a review of the recent trends related to electric demand particularly commercial and industrial in North Carolina.

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7 Payne, James, "A Survey of the Electricity Consumption-Growth Literature," Applied Energy 87, 2010, 723–731.

8 Beaudreau, Bernard, "The Impact of Electric Power on productivity," Energy Economics, Vol. 17, No. 3, 1995, pp. 231-236.

9 Ferguson, Ross, et. al. "Electricity Use and Economic Development," Energy Policy, 28, (2000), pp. 923-934.

2.1 THE ROLE OF ELECTRICITY IN LARGE CUSTOMER OPERATIONS

2.1.1 BASIC ECONOMIC CONSIDERATIONS

In basic economic terms, electricity is an input, also called a factor of production, which is used in a firm's operations, be it a manufacturing facility, restaurant, or whatever type of business. Other factors of production include raw materials, employees, capital, and other resources. All factors of production have costs and in the case of electricity these costs are determined by the rates of the utility. Historically this was input cost or technology driven, firms had some ability to substitute some factors of production for other factors, e.g. more labor for less capital equipment. Consequently, as one factor of production's costs increased firms could historically respond by substituting other lower cost inputs while maintaining consistent levels of production. Intuitively, it would seem that there is limited substitutability of any other resource for electricity, particularly as firms have become more automated and computer reliant. Whether this intuitive belief is correct is an important consideration in understanding and predicting how US industrial customers will respond to changing electricity rates.

From an economic perspective, the ability for a consumer, in this case an industrial customer, to respond to changes in electric rates is called the price elasticity of demand. This is an important concept for policymakers to understand because it illustrates to policymakers the capability of an industrial customer to respond to changing electric rates. This price-response capability can play an important role in those customers' ability to remain competitive, profitable, and to maintain ongoing operations. There have been a number of studies that have investigated this question, several of which are reviewed below.

COMMERCIAL CUSTOMER PRICE ELASTICITY OF DEMAND

A 1982 study sponsored by the Electric Power Research Institute ("EPRI") reviewed the price elasticity data available at that time.[10] While this review cited concerns with much of the available modeling data and the aggregation of the commercial class as a whole,[11] it did conclude that the short-run[12] price elasticity of demand for the commercial class of customers averaged -0.20, while the long-run averaged -1.0. A later (1984) review by Bohi and Zimmerman that included additional elasticity studies found similar results for short-run elasticity but evidence of higher long-run elasticity.[13] A more recent (2010) review of commercial customer electric price elasticity cited by EPRI[14] found short- and long-run elasticities of -0.21 and -0.97 respectively with some slight variance to these numbers based on US regional differences.

In straightforward terms, the data indicates that if a commercial customer's electric rates increased by 10%, then that customer would generally reduce electric usage by around 2% in the short-run (less than 3 years). In the long-run (2+ years), this data indicates that a commercial customer has a slightly greater response to changes in electricity prices, indicating a 10% electric rate increase could result in as much as a 10% long-run reduction in the commercial customer's electric usage.

Industrial Customer Price Elasticity of Demand

The 1982 EPRI study cited above[15] also found the industrial class of customers had short-run price elasticity of demand that averaged approximately -0.15,

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[10] Prepared by Resources for the Future, "Price Elasticities of Demand for Energy – Evaluating the Estimates," EPRI, EA-2612, project 1220-1, Final Report, Sept. 1982, Chapter 3.

[11] The concern in aggregating the commercial class of customers in some modeling efforts is that this inherently assumes this class of customers to be homogeneous in their response to electricity price changes. This is an oversimplification in that different types of commercial customers can assuredly respond in a different way than other commercial class customers. Nevertheless, the overall conclusions in the EPRI Report about this customer class are generally valid.

[12] The short-run is a term defined by economists as a period of time in which it is impractical for a consumer or firm to make capital-requiring or similar types of changes. Generally speaking, this should be 1-3 years for most commercial or industrial types of customers. The long-run is defined as the period of time in which the firm can vary all inputs or make capital-requiring modifications.

[13] Bohi, Douglas and Zimmerman, Mary, "An Update on Econometric Studies of Energy demand Behavior," Annual Review of Energy, No. 9, 1984, pp. 105-156.

[14] Niemeyer, V., "Trends in Regional US Electricity and Natural Gas Price Elasticity," Project No. 1022196, EPRI, 2010, p. A-1.

[15] Prepared by Resources for the Future, "Price Elasticities of Demand for Energy – Evaluating the Estimates," EPRI, EA-2612, project 1220-1, Final Report, Sept. 1982, Chapter 3.

while the long-run price elasticity of demand generally ranged -1.3 to as high as -3.5. The Bohi and Zimmerman study (sited above), found similar short-run elasticity and also higher long-run elasticity, generally ranging from -1.0 to -1.7. A 2004 study by Kamerschen and Porter[16] found that industrial customers had a short-run price elasticity of demand (they examined annual data) ranging from -0.34 to -0.55. Interestingly, they also found that residential customers are more price sensitive, or rather can respond faster and more aggressively to electricity price changes, than can industrial customers.

Numerically, the data simply indicates that industrial customers have, like commercial customers, very limited ability to respond to electricity price changes in the short-term. However, in the long-run the data indicates that industrial customers have the ability and will radically alter their electricity consumption, as much as 30% to 40%, in response to a 10% increase in electric rates – a much more aggressive response to electric price changes than is exhibited by the commercial class of customers. From an electric rate policy-maker perspective, this latter finding is quite instructive in that it indicates a willingness and capability of industrial customers, who are usually much larger electric consumers than the average commercial customer, to respond more dramatically to changes in electricity prices than the commercial class of customers as a whole. It is important to note that the studies only indicated a more aggressive long-run response to electric price changes by industrial customers, the studies did not indicate whether these responses were capital investments, relocating, or closing the facility - all of which appear possible given the high level of long-run price elasticity of demand.

SUMMARY OF PRICE ELASTICITY CONSIDERATIONS

These various studies and analysis demonstrates that historically industrial and commercial customers either cannot or do not change their electricity consumption dramatically in the short-run when electricity prices change. However, over a longer period of time (estimate of 2-3 years plus) the industrial class of customer will respond in a far more aggressive fashion to electric rate changes. That response could be as straightforward as implementing energy conservation measures or as encompassing as the closing or relocating of a facility. While the cited studies in the discussion above do not provide information sufficient to explore these alternative responses, it is sufficient for policy makers to recognize that industrial customers will, over time, respond rather dramatically to changes in electricity prices in the US, and it is likely that the larger electric customers will

[16] Kamerschen, David and Porter, David, "The Demand for Residential, Industrial, and Total Electricity, 1973-1998," Energy economics, 26, 2004, pp. 87-100.

be the most responsive. To explore this assumption further, the next section examines the evidence related to the importance of electricity in terms of economic development and firm location decisions.

2.1.2 ELECTRICITY RATES AND ECONOMIC DEVELOPMENT

Intuitively, one assumes that reliable, comparatively lower-cost electricity would be a prime factor in economic development. This was confirmed in various studies cited in Section 2.0. A related but different way to consider this question is to examine the importance of electricity in terms of determining a particular facility's location. This is more localized focus and it invokes a crucial question to consider that relates very specifically to this study's primary objective of analyzing the impact on regional economy and remaining customers' electric rates should a large firm choose to enter/leave a utility's service area. While the foregoing Section discussed price elasticity and the fact that industrial customers would dramatically alter their electric usage over time in response to electricity rate changes, it raised but did not provide empirical or research-based evidence supporting the assumed importance of electricity rates in the location, or re-location, of a firm or facility.

There are numerous survey-based and other more analytical econometric-based studies dealing with a firm's site-selection process and the primary factors motivating that process. For example, an early econometric-based study by Carlton (1983)[17] employed Dunn and Bradstreet data to examine the facility location determinants of three industrial SIC codes (fabricated plastic products, communication equipment, and electronic components). The results indicated that "energy costs, especially electricity price, exert a large effect" on the decision of where to locate these facilities. Another, more broad based economic analysis of this issue, reviewed the literature and found the cost of electric power was one of several critical factors in facility site location.[18]

More generic survey-based analyses of the factors that impact the location decision of a facility are numerous. For example, a recent (2009) study by the State of New York specifically mentioned the importance of energy costs to facility location decisions and made explicit comparisons of that state's electricity costs to other states.[19] In this comparison the states of North

[17] Carlton, Dennis, "The Location and Employment Choices of New Firms: An Econometric Model With Discrete and Continuous Endogenous Variables," The Review of Economics and Statistics, Vol. 65, No. 3, August,1983, pp. 440-449.

[18] Badri, Massod, "Dimensions of Industrial Location Factors: Review and Exploration," Journal of Business and Public Affairs, Vol. 1, Issue 2, 2007, pp. 1-26.

[19] New York State Energy Plan, December 2009, pp. 11-13.

Carolina were both used as examples of low electric cost states as compared to New York when it came to facility recruiting factors. In addition, numerous site selection firms list the availability and the price of electricity as key factors in site selection.[20] In the last 18 months Area Development Online cited energy availability and costs as one of the top ten site selection criteria and for some industries like data centers as a more important criteria.[21] In state-run economic development activities (such as through a state's department of Commerce), many states, and particularly Southeastern states including North Carolina,[22] South Carolina,[23] and Mississippi,[24] promote their state's below national average electricity prices as a factor that should be a consideration for firms contemplating locating large facilities in their states.

As might be expected, the importance of electricity costs as a criterion for the site selection of a commercial or industrial consumer is largely dependent upon the facilities electricity usage and/or the type of facility. In an econometric analysis of this issue Lescaroux (2008)[25] found that "*energy price rises also seem to affect the industrial structure in the long-run: high energy prices do not only induce a shift from manufacturing activities to services but also induce a permanent shift inside the manufacturing sector from energy intensive industries to non-intensive ones.*" Another recent study examined manufacturing employment levels in different industries in different counties across the US[26] confirmed that the location of energy intensive industries was highly correlated with the price of electricity. While this would not seem to be a surprising result, in those states where manufacturing facilities were historically dominated by labor-intensive facilities with electricity costs being a small portion of total production costs, the price of electricity may have been considered relatively inconsequential in terms of those types of large customers' site location decisions. However, as evidenced by this recent research, in the US and in North Carolina today, as labor-intensive facilities

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20 For example KPMG at: http://www.mmkconsulting.com/media/businessfacilities_may2004.shtml; The Boyd Company at: http://www.siouxfallsdevelopment.com/publications/BoydExecSummaries/Executive.Summary.Mail.Order.pdf; Ginovus at: http://www.insideindianabusiness.com/contributors.asp?id=1230; Rath Consulting at: http://rath-family.com/rc/DC_Site_Selection.pdf.

21 *Area Development Online* at www.areadevelopment.com, Nov. 2011.

22 See: http://thrivenc.com/sites/default/files/uploads/NC_Fact_Sheet.pdf.

23 See: http://www.masc.sc/SiteCollectionDocuments/Utilities%20and%20Public%20Works/electric_utilities_econ_development.pdf.

24 See: http://www.advancemississippi.com/documents/ratesib.pdf.

25 Lescaroux, Francous, "Decomposition of US Manufacturing Intensity and Elasticities of Components With Respect To Energy Prices," Energy Economics, 30, 2008, pp. 1068-1080.

26 Kahn, Matthew and Mansur, Robert, "Do Local Energy Prices and Regulation Affect the Geographic Concentration of Employment? A Border Pairs Approach," at: http://www.dartmouth.edu/~mansur/papers/kahn_mansur_manufacturing.pdf; and also see National Bureau of Economic Research, Cambridge, MA., Working Paper 16538, Nov. 2010.

have moved offshore and more energy intensive, automated, and data-intensive industries emerge, reliable and favorably-priced electricity has become a more important factor in these types of industries' site location decisions.

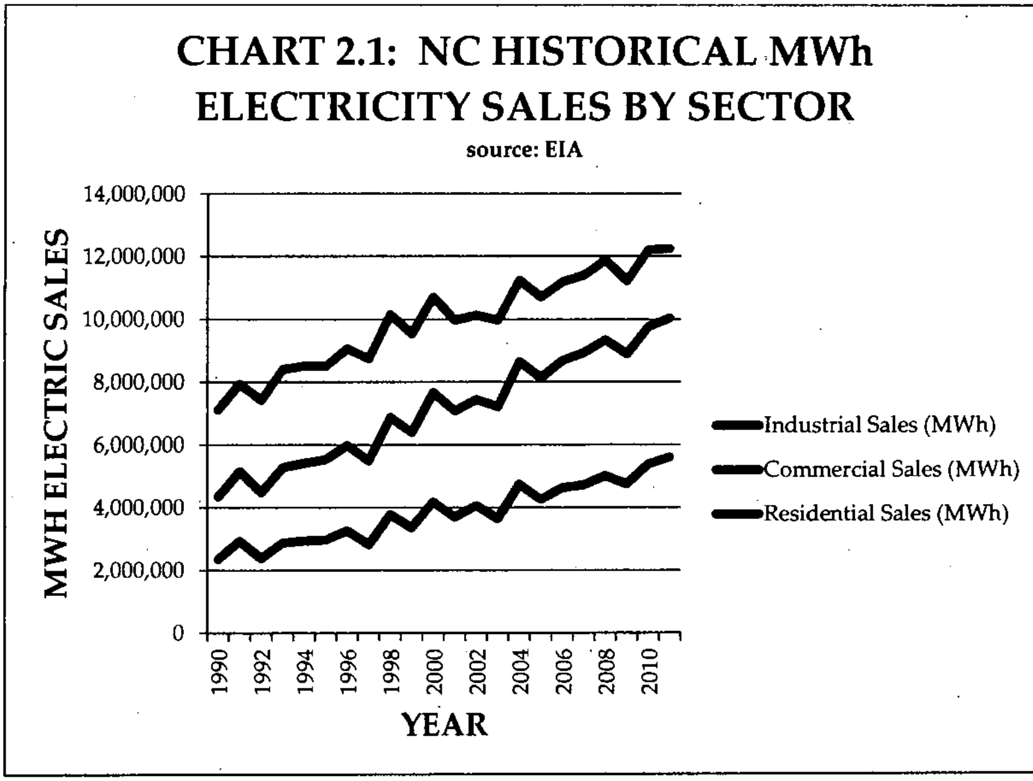
2.2 CURRENT TRENDS IN ELECTRICITY DEMAND

2.2.1 INTRODUCTION

The preceding sections have developed two basic but very important points. First, that firms, particularly larger size firms or facilities, have the ability and will in the long run dramatically alter their electricity consumption as electricity prices change. Second, that reliable and favorably priced electricity is a key factor in firm site selection and operational decisions, and that this importance is growing as economies move from labor-intensive to more energy-intensive operations. Given these overall facts, it will be instructive to relate these findings to the electricity customer usage and future electric demand trends in North Carolina. The following sections provide this review.

2.2.2 NORTH CAROLINA ECONOMY AND ELECTRIC DEMAND TRENDS

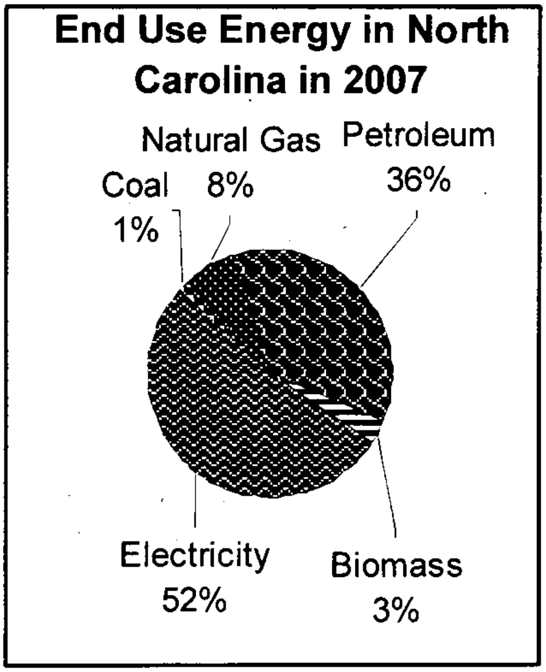
As illustrated in **Chart 2.1** below, for the last two decades the demand for electricity continues to grow in North Carolina. Even considering the severe 2008 recession and the loss of manufacturing facilities to off-shore operations, based on data from the EIA, statewide electricity demand has reached pre-recession levels in virtually every sector of the economy.



Moreover, according to the North Carolina State Energy Report[27] electricity continues to be the dominant source of energy for North Carolina's economy. This is shown in **Chart 2.2** below..

[27] "North Carolina State Energy Report, March 2010," North Carolina Energy Policy Council and the North Carolina Energy Office, March, 2010, p. 3.

CHART 2.2:



With respect to current trends and projected future electric consumption by larger electric consumers, the 2011 North Carolina Economic Index28 indicated that "*North Carolina's economy is transitioning from traditional labor-intensive industries (e.g. textiles, furniture, etc.) to knowledge-based or service-related industries.*" This same report (page 2) indicated that the movement of industrial and other facilities around the globe, referred to as globalization, will continue meaning that North Carolina's "*ability to compete for national and international export markets is critical for the retention and growth of [the State's] employment opportunities.*" Of particular importance to this study was this report's conclusion that (page 30) "*New economic development projects and the expansion of existing businesses are impacted*

[28] "2011 North Carolina Economic Index," North Carolina Department of Commerce, Energy Policy Council and the North Carolina Energy Office, June, 2011, p. 1.

by the cost, availability, and reliability of energy. North Carolina's inexpensive and reliable electricity has historically been ***a competitive advantage*** *for economic development prospects* [emphasis added]."

Consequently, as the North Carolina economy continues to develop, the price, reliability, and availability of electricity is considered by State economic development experts as being an even more important factor in future economic development, especially as the State's economy expands from its historical labor-intensive manufacturing base into more high-tech types of industries. To illustrate this trend, while North Carolina has lost significant numbers of textile facilities over the past decade,29 in the past four years North Carolina has been chosen as the location for major data centers for Google, Apple, and Facebook. A key factor mentioned in these Companies' choice of North Carolina over many other states was "affordable power."30 Other well-known corporations who have recently sited data centers in North Carolina include American Express, AT&T, and the Walt Disney Co. The Business Expansion Journal cited the State's electric reliability as a key to these Companies' location choice of North Carolina.[31] [32] Furthermore, data centers and their use of electricity is increasing, with electricity used by data centers in the US having increased by about 36% from 2005 to 2010.[33]

Moreover, it should be noted that notwithstanding the apparent statewide small gain in industrial electric sales illustrated in **Chart 2.1**, for Duke the industrial class does not appear to be expanding. Based on Duke's 2011 IRP (p..18), since 2001 up through 2010 the Company has lost approximately 1000 customers from its industrial class, while gaining customers in every other customer classification. During that same time period, while all other classes saw growth in energy sales, Duke's Industrial class saw a decline from 26,902 GWh to 20,618 GWH, a decline of 23.3%. Over a similar time period, according to the PEC 2011 IRP, PEC's Industrial class of customers declined from 4,655 in 2001 to 4,241 (some customer losses due to reclassification, see footnote)[34] in 2008, while that Company's industrial sales over that time period declined from 13,332 GWh to 11,215 GWH, a decline of 15.9%.

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[29] See Duke Annual IRP studies from the year 2000-2011.

[30] See: http://www.datacenterknowledge.com/archives/2010/11/17/north-carolina-emerges-as-data-center-hub/.

[31] See: www.bjxmag.com/bjx/article.asp/magarticle_id=1664.

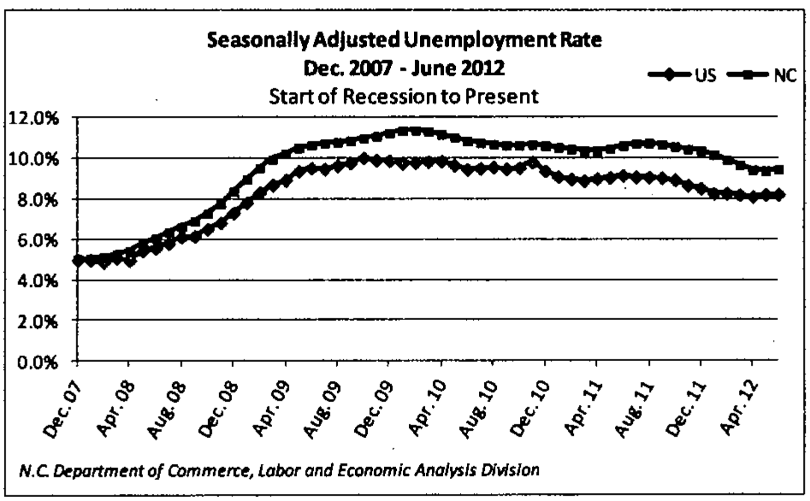
[32] It should be noted that Duke Energy actually maintains a "Data Center Site Selection" page as part of the Company's economic development web site, see: http://www.duke-energy.com/economic-development/data-centers-site-selection.asp.

[33] Koomey, Johnathan, "Worldwide Electricity Used In Data centers," Environmental Research Letters, 3, 20008, pp. 1-7 and an update found at http://www.analyticspress.com/datacenters.html.

[34] Per discussion with PEC representatives, the decline in the PEC customer count is somewhat overstated because PEC reclassified numerous industrial accounts to be commercial as part of a record clean-up to ensure correct application of the new 2007 Renewable Portfolio Standard (REPS) rate

From a more general statewide perspective, the lingering economic recession continues to impact the state of North Carolina's employment levels. As shown in **Chart 2.3** below, the State's unemployment levels have remained higher than the national average since the beginning of the current recession and remain higher today. Furthermore, as shown in **Table 2.1**, since the start of the current recession manufacturing, logging, and construction jobs have declined by 17.9%, 20.3 %, and 32.6% respectively.

CHART 2.3: NORTH CAROLINA UNEMPLOYMENT LEVELS



which differs by customer class. However, this reclassification had a minimal impact on sales/revenue.

TABLE 2.1: NORTH CAROLINA JOB LOSSES BY CLASSIFICATION

North Carolina Seasonally Adjusted Nonfarm Employment Trends by Supersector

Sector	May-12 *(revised)*	Jun-12 *(preliminary)*	Previous Month (6/12 compared to 5/12)		Last Year - Same Month (6/12 compared to 6/11)		Start of Recession (6/12 compared to 12/07)	
			Change	% Change	Change	% Change	Change	% Change
Mining & Logging	5,500	5,500	0	0.0%	(200)	-3.5%	(1,400)	-20.3%
Construction	168,700	170,100	1,400	0.8%	(4,600)	-2.6%	(82,200)	-32.6%
Manufacturing	436,000	437,500	1,500	0.3%	3,200	0.7%	(95,300)	-17.9%
Trade, Transportation, & Utilities	736,400	737,600	1,200	0.2%	9,400	1.3%	(43,000)	-5.5%
Information	68,500	68,700	200	0.3%	200	0.3%	(3,500)	-4.8%
Financial Activities	205,200	205,800	600	0.3%	1,500	0.7%	(10,200)	-4.7%
Professional & Business Services	515,300	521,700	6,400	1.2%	7,200	1.4%	15,500	3.1%
Education & Health Services	555,200	557,200	2,000	0.4%	12,100	2.2%	24,200	4.5%
Leisure & Hospitality	399,700	399,000	(700)	-0.2%	(2,500)	-0.6%	(6,900)	-1.7%
Other Services	153,700	152,800	(900)	-0.6%	(2,300)	-1.5%	(23,300)	-13.2%
Government	702,000	707,200	5,200	0.7%	13,000	1.9%	12,500	1.8%
Total Nonfarm Employment	3,946,200	3,963,100	16,900	0.4%	37,000	0.9%	(213,600)	-5.1%

U.S. Bureau of Labor Statistics, Economy at a Glance Data, Nonfarm Wage and Salary Employment

What can be concluded from this brief summary of electricity demands and economic growth in North Carolina is that reliable and lower cost electricity will likely play an increasingly important role in maintaining and expanding the State's economy. However, from a more micro-perspective, what is more evident is that the state is suffering severe job losses in the industrial sector and in related sectors like logging and construction. While one can attribute some of this decline to the recent recession, the fact that industrial job losses and declining electric usage in the industrial class began well prior (at least as early as 2001) to the current recession (2007-08) point to the loss of these type customers being due to more systemic problems, and ones that simply won't go away when the economy recovers. One way to potentially help address these types of systemic problems is to institute efforts aimed at reducing the underlying costs related to a particular industry – whether that effort is aimed at lowering labor costs, regulatory costs, or input costs, such as the cost of electricity, all of these efforts should be positive factors in attempts at reinvigorating industrial growth.

2.3 SUMMARY

This Chapter began by providing a brief review of studies indicating the importance of electricity to economic development in the US. Given this significant relationship, the link between changing electric rates and economic development was considered examining closely the responses of commercial and industrial customers to changes in electric rates. This analysis indicated that commercial and industrial customers would have limited ability, over the short-run, to modify their electric consumption in response to changes in electric rates. However, over the long-run, the industrial class of customers would alter their electric consumption dramatically, and much more so than commercial customers, in response to changes in electric rates. Based on the industrial customers' numerically large long-run price elasticity, it could be assumed that the industrial customer response likely included not only significant alteration of electricity usage but potentially facility closures.

Next, data was presented that confirmed the importance of reliable and favorably priced electricity to economic development efforts across the US and the Carolinas. Finally, there was a brief analysis of the current and expected future trends in the demand for electricity in North Carolina. A conclusion from this latter analysis was the finding that the State is experiencing a transition in its economy, generally to more energy-intensive types of industries and facilities. A second conclusion was that the state has been experiencing a decade long decline in the number of industrial customers and a decline in employment in that sector of the economy. While some of these declines could be attributed to the recent recession, the fact that industrial job losses and declining electric usage in the industrial class began well prior (at least as early as 2001) to the current recession (2007-08) point to the loss of these type customers is likely due to more systemic problems. To address these systemic problems will likely require efforts aimed at reducing the underlying costs related to a particular industry – such as efforts aimed at lowering labor costs, regulatory costs, or input costs, like the cost of electricity. All of these efforts should be positive factors in attempts at reinvigorating industrial growth.

In sum, this Chapter has provided the fundamental economic principles and electric demand data necessary to establish the basic premise that reliable and comparatively favorably priced electricity is a key consideration in economic development and likely a critical element in large customer retention in the US and in North Carolina. Consequently, as electric policy decisions are contemplated policy makers should have a clear understanding that these decisions, specifically as it relates to rates, are becoming increasingly important in today's and future firms' ongoing operation and locational decisions. Given these basic conclusions, the following two chapters provide an explicit analysis of the impact of electricity pricing decisions that result in a large customer either moving to or leaving Duke's or PEC's North Carolina system.

3.0 QUANTIFYING THE ECONOMIC IMPACT OF LARGE ELECTRIC CUSTOMERS ON REGIONAL ECONOMIES

3.1 INTRODUCTION

Having established the importance of reliable and lower cost electricity in economic development generally and specifically to North Carolina, the next task of this report is to examine the economic consequences resulting from the closing of a large electric-consuming facility. The primary quantitative technique used to estimate the economic benefits of a proposed development project, or conversely, an estimate of the economic impact should a facility close, is called an economic impact analysis. These analyses estimate the changes in economic activity resulting from a firm locating to or leaving a community.

For example, a new facility can have positive economic impacts in a region related to both construction and ongoing operations. Once a new facility is operational, a business will spend money directly on certain items such as payroll and purchases of other goods and services. These initial expenditures set in motion additional spending creating a ripple effect through a region's economy (called multiplier effect). These effects are generally categorized as direct, indirect, or induced effects. Increased demand for a product leads to a direct effect on the economy when a firm increases its output. Increased output by that same firm requires more inputs, which leads to an indirect effect on the economy. As a result of the direct and indirect effects on the economy, the level of household income throughout the economy increases, resulting in more spending, and this is the induced effect.

An impact analysis seeks to quantify the direct, indirect, and induced effects on the economy from a firm's expansion (or contraction). This Chapter applies an input-output model to estimate the economic impact from a specific facility's expansion or contraction (such as relocating the facility or closing a facility) in Duke's service territory using the Charlotte RIMS II metropolitan area multipliers. It should be noted that the use of Charlotte and Duke's service territory was simply based on the fact that the Charlotte metropolitan area covers a large area of North Carolina, and that the RIMS II multipliers in other areas of the state would be generally similar to the Charlotte area multipliers. Therefore, while the economic analysis was developed using the Charlotte metropolitan area input-output economic multipliers, the estimates of economic impacts would be similar for essentially any location in Duke's or PEC's Carolinas based electric utility service territory.

3.2 QUANTIFYING THE IMPACT OF AN ECONOMIC STIMULUS: INPUT-OUTPUT MODELS

An economic impact analysis often employees input-output models to quantify the effects of a factory or other facility either locating to or leaving a region. These input-output models are based on the principle that new spending and/or employment by a firm will stimulate additional economic activity that can be quantified and forecast. Econometric input-output models simply make use of accounting data to develop mathematical relationships to estimate this type of economic stimulus, usually for a community or state. This is accomplished by developing what are called regional multipliers for numerous business enterprises, which are simply mathematical measures that estimate the changes in output, income and employment resulting from an initial change in spending by a firm.

For example, assume that a particular industry located in the Charlotte, NC metropolitan area has a regional output multiplier of 2.5. If a facility in that industry located in Charlotte were to increase its level of services or products purchased locally by $10 million, the resulting total economic output resulting from this would be a $25 million increase in total final demand for the Charlotte metropolitan area. These models also have indices to predict the change in employment levels from various economic stimulants, such as a new industry moving into or leaving a region.

Probably the most widely used input-output model, (or actually a set of economic multipliers) is called "RIMS II" which was developed and is kept current by the US Bureau of Economic Analysis (BEA).[35] RIMS II is based on accounting data collected by the BEA from approximately 500 U.S. industries. Using RIMS II for an impact analysis has several advantages. RIMS II multipliers can be estimated for any region composed of one or more counties and for any industry, or group of industries, in the national I-O table. Empirical tests show that estimates based using other data and RIMS II-based estimates are similar in magnitude. In terms of the reliability aspect of the RIMS II model, it should be noted that it is widely used in both the public and private sector, including by the Department of Defense, State transportation Departments and numerous private-sector analysts.

35 See Appendix A for a more thorough description of RIMS II provided by the BEA. Other similar type models include IMPLAN.

The RIMS II economic multipliers utilization requires the following steps. First, an appropriate geographic region of study must be identified and the appropriate data package for the identified region must be purchased from the US BEA. Next, the industry or industry group that is to be studied must be identified. In other words, if a facility is moving to Charlotte, NC, or closing down, the exact type of facility must be identified, such as a plastic manufacturing plant. This is necessary in order to identify the exact RIMS II multipliers specific to that industry. Finally, some detailed information about what is happening to the identified facility is required, for example, a plastic factory is hiring 300 additional workers, or the factory has a $10 M expansion. Consequently, to proceed with a reasonable estimate of the economic consequences related to a utility retaining, adding, or losing a large electric customer, it is first necessary to identify a likely customer and some related employment and economic output specific data about that particular customer. The following section provides this information.

As stated previously, while this analysis employed Duke and Charlotte, NC data, the overall economic results would be expected to be similar for the PEC service territory..

3.3 IDENTIFYING CUSTOMERS FOR RIMS II ANALYSIS

3.3.1 LARGE CUSTOMER GENERAL INFORMATION[36]

The following **Tables 3.1** and **3.2**, reprinted from Duke's IRP dated Sept. 1, 2011, provides some general data about the number and types of Duke's customers. These tables illustrate the general trend of increasing number and increasing level of kWh sales to both residential and commercial customers over the past decade, even through the 2008 recession. The tables also illustrate the declining electricity usage and declining number of industrial customers, which started before the 2008 recession. It is important that electricity policy makers recognize this latter trend, for if it continues, as the following sections of this report prove, it could eventually have significant negative economic as well as rate impacts on the remaining Duke (or similarly PEC) customers.

[36] As noted earlier, while the economic analysis was developed using the Charlotte metropolitan area input-output economic multipliers and customers in Duke's North Carolina service area, the estimates of economic impacts would be similar for essentially any location and any electric utility service territory in either State.

TABLE 3.1

Retail Customers (1000s, Annual Average)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Residential	1,814	1,840	1,872	1,901	1,935	1,972	2,016	2,052	2,059	2,072
Commercial	295	300	307	313	319	325	331	334	333	334
Industrial	8	8	8	8	7	7	7	7	7	7
Other	11	11	11	12	13	13	13	14	14	14
Total	2,128	2,159	2,198	2,234	2,275	2,317	2,368	2,407	2,413	2,427

TABLE 3.2

Electricity Sales (GWh Sold - Years Ended December 31)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Residential	23,272	24,466	23,947	25,150	26,108	25,816	27,459	27,335	27,273	30,049
Commercial	23,666	24,242	24,355	25,204	25,679	26,030	27,433	27,288	26,977	27,968
Industrial	26,902	26,259	24,764	25,209	25,495	24,535	23,948	22,634	19,204	20,618
Other	281	271	270	269	269	271	278	284	287	287
Total Retail	74,121	75,238	73,336	75,833	77,550	76,653	79,118	77,541	73,741	78,922
Wholesale	1,484	1,530	1,448	1,542	1,580	1,694	2,454	3,525	3,788	5,166
Total GWH	75,605	76,769	74,784	77,374	79,130	78,347	81,572	81,066	77,528	84,088

Note: Wholesale sales will vary over time due to new contract agreements.

To gain a more detailed picture of Duke's larger customer data, refer to **TABLE 3.3**, which provides data extracted from the Company's most recent FERC Form 1.

TABLE 3.3: DUKE LARGE CUSTOMER DATA		
Rate Schedule	**Average Number of Customers**	**kWh of Sales per Customer per year**
RS - Residential	1,198,597	13,796
OPT- General Service	20,310	795,837
LG- (Gen)General Service	21	647,476
LGS - General Service	9,833	528,934
LG-(IND) - Large General Service	1	5,272,000
I - Industrial Service	5,377	460,830
IT - Industrial Service	1	176,000
ITN - Industrial Service	1	3,854,000
OPT - Industrial Service	1,743	10,401,230
Source: FERC Form 1, Q4, 2010, p. 304		

Table 3.3 illustrates the the variation in the per-customer electricity consumption between the residential customers and the larger industrial customers. While not surprising, the average OPT industrial customers uses, on average, approximately the same kWh of electricity per year as 750 households and are almost twenty times larger than large general service customers (LGS). Moreover, between 2010-2030 the Company's non-textile commercial and industrial base is expected to grow at an annual rate of 2.0% and 1.1% respectively.[37] This data helps put into focus the importance of maintaining these larger customers on the system. Simply put, if one of the average size OPT industrial customers shuts down or otherwise leaves, it is roughly equivalent to the loss of energy sales to 750 homes. While not an economic analysis, this comparison does provide a perspective as to the significance of these larger customers from an economic perspective.

3.3.2 INPUT-OUTPUT MODELING DATA

In order to use an input-output model like RIMS II to more precisely estimate the economic impact of a large customer either building or shutting a facility

[37] Duke Energy Carolinas IRP, Sept. 2011, p. 17.

down more specific information about the proposed facility is required. However, trying to define a specific facility that may either open or shut down is problematic simply due to the fact that customers' names and customer-specific data is confidential. Moreover, it is impossible to get publicly available, plant specific, electricity consumption data that could be used to identify the electricity usage and load characteristics of a particular facility, and thereby know precisely if that facility is an average size industrial customer, larger than average, or smaller. In addition, many larger facilities have multiple meters and firms will often combine their bills into one bill, making it difficult, if not impossible, to find site-specific publicly available electric usage data.

A related data issue to overcome is the fact that a private industry manufacturing facility that is currently operating may not publicize the facilities dollar level output figures or the number of employees currently working at the facility – data necessary for the RIMS II modeling analysis. To overcome this issue, there are numerous facilities that do use public forums to announce their firm's opening (or closing) activities and this is usually a part of a region's economic development public relations activities. Moreover, often in these announcements a firm's estimated overall development or expansion costs and proposed future employment levels are also announced. While these public announcements do not represent what may be called accounting-based data, it should nevertheless be sufficient for this study's purposes by providing a reasonably accurate source of public data sufficient for this modeling effort. Furthermore, to provide a clearer understanding as to how the expansion or contraction of different types of industries might impact the economy, several different types of facilities were studied.

In all cases, the facilities studied were assumed to be located, or locating to, the Charlotte, NC greater metropolitan area.[38] While it is true that a facility located in another area may have regional economic impacts that differ from the same facility in Charlotte, Charlotte was chosen for several reasons. First, it is a large, major metropolitan region.. Second, it is an area in the Carolinas that has generally been a focal point for growth and new facility relocation. Third, it is a region served by Duke making the appropriate modeling data publically available. And fourth, using a single regional model on several types of firms is sufficient to provide a range of results that will provide reliable information for the questions being studied in this research.

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38 In several cases this was true. Also, it is interesting to note that the on the Charlotte Chamber of Commerce's economic development web site it specifically mentions the region's reliable and reasonably priced electricity provided by Duke.

The specific facilities examined in this study are listed in **Table 3.4** below. Note that the sample contains both new facilities that are expanding operations and facilities that are closing.

TABLE 3.4

FACILITIES CHOSEN TO ESTIMATE ECONOMIC IMPACT

FACILITY CHOSEN	LOCATION	TYPE INDUSTRY	ECONOMIC DATA AVAILABLE	REASON FOR SELECTING
AT&T	Kings Mountain, NC, opening 2014	Data Center	*CREATING:* 100 FT jobs, construction to cost $200 million	This is a data center which is a focus of the economic development activity in the Carolinas, as discussed in Section 2.2.
Caterpillar	Johnston County, expansion of facility	Manufacture of Building Construction Heavy equipment	*CREATING:* 199 FT jobs, $33 million construction expansion	Heavy equipment manufacturing, Carolinas has attracted vehicle and airplane manufacturing in recent past
Zimmer Holdings	Statesville, NC, closing Qtr. 1, 2012	Surgical products	*LOSING:* 124 FT jobs	Manufacturing customer
Berry Plastics Corp.	Charlotte, NC plant closing	Plastic films, plastic products	*LOSING:* 314 FT jobs statewide	Manufacturing customer

3.4 ESTIMATION OF ECONOMIC IMPACTS RELATED TO A FIRM'S EXPANSION OR CONTRACTION

Because the focus of this study is customer retention, the economic stimulus estimates presented in this section only relates to anticipated changes in employment levels for the particular facility being examined. Furthermore, it is assumed that these levels of employment would be maintained on an annual basis, thus the estimated economic data is presented as annual estimates (in $2008). Any economic stimulus related to a new facility's construction was not included in these estimate. The complete data tables are provided in **Appendix C**, with the overall results summarized below.

Table 3.5 provides the estimated _direct and indirect_ economic impacts should a facility like the ones in this study be opened or closed in the Charlotte metropolitan area. Recall the direct effects are the economic effects related to the purchase of additional inputs (both labor and material inputs) to meet the proposed increased level of operations. The indirect effect is when other local firms increase their purchase of inputs and increase hiring to provide goods and services to a new facility. The resulting direct and indirect economic results are expressed in several ways in **Table 3.5** and these results are summarized below:

- The dollar value each new employee adds to the region's economy (if the employee is laid off, it's a decrease) is approximately $200K - $350K annually, depending on the type of industry. This dollar amount consists of the employee's salary and benefits, the other goods and services the firm purchases per employee locally, and the other annual capital and ongoing expenses and investments the firm makes per employee.
- The total dollar value in demand for the entire facility is simply the dollar value per employee times the number of new employees. For AT&T's facility, this is approximately $35 million, for Caterpillar approximately $56 million.
- The direct and indirect multiplier effect, that is the increase (decrease) in regional employment and dollars in regional output due to increases (decreases) in employment and spending by the new (or closing) facility. For example, the AT&T and Caterpillar facilities result in an additional 272 and 386 new jobs in the region, respectively.
- And finally, the estimated regional direct and indirect increase (decrease) in employee earnings. For the AT&T facility, this is approximately $20M in new payroll region-wide for the 272 additional jobs (including AT&T's 100 jobs) that were a direct and indirect result of the AT&T expansion.

TABLE 3.5: ESTIMATED ANNUAL DIRECT AND INDIRECT ECONOMIC IMPACT

FACILITY	CHANGE IN NUMBER OF EMPLOYEES FOR NEW (CLOSED) FACILITY	INCREASE (OR DECREASE) IN FINAL $ DEMAND PER EMPLOYEE FOR NEW (CLOSED) FACILITY	INCREASE (OR DECREASE) IN $ OUTPUT FOR ALL NEW (OR DECREASED) # OF EMPLOYEES	INCREASE (OR DECREASE) # OF JOBS FOR ALL INDUSTRIES	INCREASE (OR DECREASE) IN ALL INDUSTRIES FINAL REGIONAL OUTPUT IN $	(INCREASE OR DECREASE) IN $ IN EMPLOYEE EARNINGS FOR ALL INDUSTRIES
AT&T	100	$351,219	$35,121,869	272	$55,699,773	$20,057,488
Caterpillar	199	$282,972	$56,311,493	386	$88,099,331	$29,328,267
Zimmer Holdings*	124	$179,795	$22,294,629	192	$33,346,077	$12,007,922
Berry Plastic	314	$339,716	$106,670,886	592	$160,518,349	$40,723,505

*note that Zimmer is designated a "misc." manufacturer.

There are additional induced effects that must be added to the **Table 3.5** direct and indirect effects, **Table 3.6**. Recall that induced effects are related to the increase in local employment due to direct and indirect effects that result in increases in the incomes of non-facility related households in the region. These households, in turn, spend a portion of this additional income in the local area (on groceries, dry cleaning, gasoline, etc.). Their spending stimulates even more demand for output and creates additional employment opportunities in the region. This regional increase in household spending by non-facility employees is an increase in economic activity is called the induced effect, shown below in **Table 3.6**.

TABLE 3.6: TOTAL ESTIMATED ANNUAL INDUCED ECONOMIC IMPACT				
FACILITY	CHANGE IN NUMBER OF EMPLOYEES	INDUCED EFFECT ON THE INCREASE OR DECREASE IN FINAL # OF JOBS	INCREASE (OR DECREASE) IN ALL INDUSTRIES FINAL REGIONAL OUTPUT IN $	INCREASE (OR DECREASE) IN $ IN EMPLOYEE EARNINGS FOR ALL INDUSTRIES
AT&T	100	141	$15,734,899	$14,381,167
Caterpillar	199	208	$23,318,607	$20,319,566
Zimmer Holdings	124	.89	$9,987,550	$8,878,886
Berry Plastic	314	301	$33,672,579	$25,223,734

The sum of the direct, indirect, and induced effects yields the total economic changes in terms of employment and output from establishing (or closing) a manufacturing type facility (or large electric consumer) within a community. These total impacts are shown in **Table 3.7**.

TABLE 3.7: TOTAL ESTIMATED ANNUAL ECONOMIC IMPACT (DIRECT, INDIRECT, INDUCED)

FACILITY	CHANGE IN NUMBER OF EMPLOYEES FOR NEW (CLOSED) FACILITY	INCREASE (OR DECREASE) IN FINAL $ DEMAND PER EMPLOYEE FOR NEW (CLOSED) FACILITY	INCREASE (OR DECREASE) IN $ OUTPUT FOR ALL NEW (OR DECREASED) # OF EMPLOYEES	INCREASE (OR DECREASE) # OF JOBS FOR ALL INDUSTRIES	INCREASE (OR DECREASE) IN ALL INDUSTRIES FINAL REGIONAL OUTPUT IN $	INCREASE OR DECREASE) IN $ IN EMPLOYEE EARNINGS FOR ALL INDUSTRIES
AT&T	100	$351,220	$35,122,018	412	$71,434,672	$34,438,655
Caterpillar	199	$282,972	$56,311,502	594	$111,417,938	$49,647,833
Zimmer Holdings	124	$179,794	$22,294,401	281	$43,333,627	$20,886,808
Berry Plastic	314	$339,729	$106,674,867	892	$194,190,928	$65,947,239

Table 3.8 summarizes the overall impact on a per job basis for the four different facilities examined in this analysis. As this table shows, depending on the type of facility, on an annual basis within the Charlotte region, for each new (lost) employee there are generally 1-2 (sometimes more with high tech jobs like the AT&T data center) additional new jobs created usually in excess of $500K in total additional regional dollars output and around $200K-$350K in region-wide new employee earnings. These levels of employment and dollar impacts serve to illustrate the importance to a region's economy of attracting and maintaining its larger employment facilities. These results also support the proposition that customer retention and customer growth should be important considerations in policy makers various deliberations regarding the provision of electric service to these larger customers.

TABLE 3.8: SUMMARY OF THE TOTAL ESTIMATED ANNUAL ECONOMIC IMPACT

FACILITY	CHANGE IN NUMBER OF EMPLOYEES	FINAL $ DEMAND PER EMPLOYEE	NUMBER OF JOBS GREATED (LOST) IN REGION PER NEW (LOST) JOB	$ INCREASE (DECREASE) IN TOTAL OUTPUT IN REGION PER NEW (LOST) EMPLOYEE	$ INCREASE (DECREASE) IN EARNINGS IN REGION PER NEW (LOST) EMPLOYEE
AT&T	100	$351,220	3	$714,347	$344,387
Caterpillar	199	$282,972	2	$559,889	$249,487
Zimmer Holdings	124	$179,794	1	$349,465	$168,442
Berry Plastic	314	$339,729	2	$618,442	$210,023

3.5 ADDITIONAL ECONOMIC IMPACTS

There are additional economic impacts, both positive and negative related to the development of new large employment facilities within a region. For example, there can be an increased demand for local government services which result in higher local government costs. These increased services are usually offset by increases in local taxes and fees. The RIM II model used in this analysis does not provide an analytical framework to estimate these tax affects. However, the data from the RIMS II analysis can provide some estimates of regional tax impacts. For example, assuming total regional earnings increase approximately $300K per new AT&T employee shown in **Table 3.8**, this would translate into both local sales and state income taxes of approximately $30K (assume 5% average sales and 5% state income tax rates on the total increase in earnings per employee). This estimate does not include any estimate of increased property taxes, fees such as auto fees, nor is it offset by any increases in local services cost.

However, this simple tax revenue calculation again demonstrates the multiplier effect on the local economy from the creation or retention of a large employer facility. Conversely, absent the retention of such a facility and its employees, any government services that had been provided to this particular facility and its employees may no longer be needed, yet many of these services and their ongoing expenses will remain even after the large employee facility is closed and/or moved. The remaining costs would theoretically be recovered in taxes and fees from the regions remaining population base. Therefore, retaining a large employee type firm not only provides tangible and quantifiable economic benefits to a region, but it also helps prevent adverse economic consequences to the region's taxpayers should the facility close or move.

3.5 SUMMARY

This Chapter applied an econometric input-output model using BEA RIMS II Charlotte regional multipliers to estimate the quantitative economic impact resulting from the closing (or opening) of a large employee electric-consuming facility. In this analysis, the following four different types of facilities were examined:

- AT&T Data Center
- Caterpillar Heavy Equipment factory
- Zimmer Surgical Products manufacturer
- Berry Plastics manufacturer

All four companies had either announced the opening or closing of a facility in North Carolina. Also, while the economic analysis was developed using the Charlotte metropolitan area input-output economic multipliers, the estimates of economic impacts would be similar for essentially any location and any electric utility service territory in North Carolina.

As the analysis indicated, once a new facility is operational, a business will spend money directly on certain items such as payroll and purchases of other goods and services. These various initial expenditures set in motion additional spending creating a ripple effect through a region's economy (called multiplier effect). As a consequence, this study indicated that for every new (or lost) employee at the targeted facility, an additional 1-3 employees are created in the region along with increased economic activity and payrolls.

In **Chapter 2** this study found that electric prices had a strong influence, over the long-run, on large customer behavior, up to and including the closing of a facility. This earlier finding, along with the substantial economic benefits that arise from retaining or attracting large employee facilities to a region, should provide electric rate-setting policy-makers sufficient justification to strongly consider the economic consequences of their rate-setting decisions on larger customers. In so doing, when establishing electric pricing terms and conditions electric rate-setting policy makers may find it reasonable and in the public interest to depart from historical, formulaic, or strictly applied rate-setting methodologies and rules if retaining larger customers hangs in the balance.

4.0 THE IMPACT ON REMAINING CUSTOMERS' ELECTRIC RATES FROM THE LOSS OF LARGE ELECTRIC CUSTOMERS

4.1 INTRODUCTION

The preceding Chapter provided an analysis of the region-wide economic impacts of a large electric customer either expanding or leaving the Duke (or similarly PEC) service territory, specifically in the Charlotte, NC metropolitan area. These economic impacts included estimates of the regional effects on employment levels, dollars in economic output, payroll earnings, and taxes. Beyond these more region-wide effects there could also be an impact on the remaining customers' rates when large electric users depart a regulated electric utility's system.

A regulated utility's rates are established based on what is termed a revenue requirement. The revenue requirement is essentially the annual revenues that a particular regulated utility needs to recover from its customers in order for that utility to recover its costs (which includes a regulated level of profits). Just and reasonable ratemaking principles require that a utility's rates are established for each of the utility's customer classes in such a manner as to "mathematically" allow the utility to recover its total revenue requirement.

This revenue requirement, therefore the rates, can be segregated into two distinct components. One component is termed "fixed costs." These are costs that do not vary in the short run regardless of the amount of electricity used on the system or regardless of whether a customer uses less electricity or even leaves the system. Examples would be existing investments in generating stations, distribution systems, and transmission lines. The second component is termed "variable costs," which are costs that do vary in the short run as the amount of electricity sold varies. An example would be fuel costs.

These two cost categories influence fair and equitable rate pricing in a straightforward fashion. If a customer leaves a utility's system, because the "fixed costs" do not vanish when that customer leaves, the fixed costs no longer being recovered from the departing customers would theoretically be recovered from the remaining customers through higher rates. This is the basic financial impact on remaining customers' rates should a large customer leave a regulated electric utility's system. The purpose of this chapter is to model and estimate the impact on rates from such an event. For purposes of this study it is assumed the customer or customers that leave the system are North Carolina based customers, that the rate impacts are reflected in North Carolina in either Duke' Industrial or OPT class of customers or in PEC's LGS class of customers.

4.2 METHODOLOGY

As discussed in the introduction, in order to estimate the impact on rates should a large electric customer leave a utility's system an initial requirement is to segregate that utility's rates, also called costs in this report, into fixed and variable cost categories. To evaluate which of Duke's costs are variable in the short run, this study relied upon the Summer Coincident Peak ("SCP") cost-of-service study that was submitted in Docket No. E-7, Sub 989.[39] For segregation of PEC's cost a similar SCP cost-of-service study was used from Docket No. E-2, Sub 1023. The cost-of-service studies are attached in **Appendix D**. This study relied upon the SCP cost-of-service study because the North Carolina Utility Commission has allowed that methodology in the [Duke] proceeding as a means "*for allocation among jurisdictions and among customer classes under the provisions of the Stipulation and that this methodology is just and reasonable to all parties.*"[40] Note in the Duke proceeding the final revenue requirement approved by the North Carolina Utility Commission differed from the originally filed SCP cost-of-service study, because the parties stipulated to a lesser amount.

In addition, because public information was not available identifying the exact electric usage of large customers, this study examined the impact on remaining customers for a range of potential load losses. This included load losses ranging from the loss of an average customer size in each class up to a 5.0% loss in each large customer class. The study examined load losses for Duke classes I (Industrial), and OPT (both Industrial and General OPT combined)[41] and PEC's LGS.[42] In order to establish the estimated impact on rates from these load losses, the projected lost non-energy related revenue was spread to all classes in proportion to the total fixed cost percentages the original SCP cost-of-service study determined. The results from this analysis are discussed in the following sections.

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[39] Item 45 in Duke's Form E-1 data.

[40] Order Granting General Rate Increase and Approving Amended Stipulation. Page 10, paragraph 14, Docket E-7, Sub 989.

[42] All calculations using data from the filed cost-of-service contained in the work papers in APPENDIX D.

4.3 ESTIMATED RATE IMPACTS FROM THE LOSS OF A LARGE LOAD CUSTOMER

4.3.1 "LOST" FIXED REVENUE ESTIMATE

The following **Table 4.1** shows the total retail "fixed" revenue loss for varying amounts (percentages) of Duke's Industrial (I) class load. As this table indicates, a loss of 5% of the load in the "I" customer class will result in a $4.383 million loss in fixed cost revenues. This loss in fixed cost revenues would theoretically be recovered from Duke's remaining customers. Similarly, a 3% load loss will result in $2.63 million in "unrecovered" fixed cost that would be recovered from the remaining customers.

TABLE 4.1: FIXED REVENUE LOSS FROM "I" CLASS CUSTOMER LOAD LOSS

Lost Industrial (I) Load (%)	$ Fixed Revenue Loss ($1000)
1%	$ 877
3%	$ 2,630
5%	$ 4,383

A similar analysis was developed from the Duke SCP cost-of-service data for loss of load in the OPT classes (both industrial and general service). The results are shown in **Table 4.2** below. As this table illustrates, a loss of 5% of the load in the OPT classes will result in a fixed cost revenue loss of $38 million, which theoretically should be recovered from Duke's remaining customers. A 3% loss of load would result in $22.8 million to be recovered from the remaining customers.

TABLE 4.2: FIXED REVENUE LOSS FROM "OPT" CLASS CUSTOMER LOAD LOSS	
Lost of OPT Load (%)	Fixed Revenue Loss ($1000)
1%	$ 7,606
3%	$ 22,817
5%	$ 38,029

For PEC this study analyzed the large customer class, LGS. The fixed revenue loss from various percentage losses of customer load in that class are shown in **Table 4.3**, below.

TABLE 4.3: FIXED REVENUE LOSS FROM PEC "LGS" CLASS CUSTOMER LOAD LOSS	
Lost of LGS Load (%)	**Fixed Revenue Loss ($1000)**
1%	**$ 2,345**
3%	**$ 7,035**
5%	**$ 11,274**

4.3.2 ALLOCATION OF LOST FIXED REVENUE TO REMAINING CUSTOMERS

The lost fixed cost revenues developed in **Table 4.1** through **Table 4.3** assume that the loss of a customer only results in the loss of that particular customer's load. However, as discussed in **Chapter 3**, the closing (or expanding) of a large customer has other impacts on a region's economy referred to as "multiplier" effects. These multiplier effects and how these can translate into rate impacts on other customers will be further discussed in **Section 4.3.3**. For the remainder of this section, assume the rate impacts are only those resulting from the loss of a large customer which theoretically results in the non-energy related costs (also called fixed costs), formerly recovered from that particular lost customer, being re-allocated and recovered from a utility's remaining customers. For this analysis, this allocation of costs was carried out in accordance with the percentages of fixed costs developed in the SCP cost of service study. **Table 4.4** indicates how the SCP cost-of-service study allocated the fixed costs to the various Duke customer classes.

TABLE 4.4: ALLOCATION OF FIXED COSTS PER DUKE SCP – NORTH CAROLINA	
Retail Class	**Percentage of Fixed Costs Allocated**
Residential	51 %
General Service	18 %
Lighting	3 %
Industrial (I)	3 %
OPT (Industrial and General Service)	25 %

Table 4.5 shows the allocation of fixed costs derived from the PEC SCP cost-of-service study for North Carolina.

TABLE 4.5: ALLOCATION OF FIXED COSTS PER PEC SCP – NORTH CAROLINA	
Retail Class	**Percentage of Fixed Costs Allocated**
Residential	53%
Small and Medium General Service	30%
Lighting	4%
Large General Service	13%

Applying the percentage of fixed costs allocated to the various customer classes by the SCP cost of service study, coupled with the amounts of fixed cost lost revenue developed for rate class "I" in **Table 4.1**, provides sufficient data to estimate the rate impact on remaining customers should a larger customer leave (absent consideration of the multiplier effect, which is estimated in **Section 4.3.3**). **Table 4.6** indicates these rate impact estimates for various percentages of Duke's Industrial (I) load losses. This table indicates that for a 1% loss in the Duke Industrial Class (I) load, the Residential customers would theoretically experience an increase in their rates of $450,000 or 0.012%, while the OPT class would experience an increase of $219,000 or 0.0164%. For a 5% load loss in the Duke Industrial class, the resulting rate increase would be $2.249 million or 0.1059%, and $1.095 million or 0.0821%, respectively.

Table 4.6 also illustrates the level of rate increase with the loss of one average size Duke industrial customer. In this situation the increase in Residential rates would be $11,000 or 0.0005%. Obviously, if the Industrial customer were much larger than average size or the cost allocation were different then the resulting increase in the remaining customers' rates would be different. However, the more interesting point of this exercise is the simple fact that the allocation of fixed costs resulting from as much as a 5% loss in Industrial Class load results in less than a 1% increase in the remaining customers' rates.

TABLE 4.6: RATE INCREASE RESULTING FROM FIXED COST ALLOCATED TO REMAINING DUKE CLASSES FOR INDUSTRIAL (I) LOAD LOSS (NORTH CAROLINA)

		1% Lost Load	3% Lost Load	5% Lost Load	Loss of One Average Size Customer in Industrial (I) Class
Residential	**$ Increase in rates ($1000)**	$450	$1,349	$2,249	$11
	% Increase in rates	0.0212%	0.0636%	0.1059%	0.0005%
General Service	**$ Increase in rates ($1000)**	$154	$461	$768	$4
	% Increase in rates	0.0206%	0.0618%	0.1031%	0.0005%
Lighting	**$ Increase in rates ($1000)**	$29	$87	$145	$1
	% Increase in rates	0.0244%	0.0732%	0.1219%	0.0006%
Industrial (I)	**$ Increase in rates ($1000)**	$25	$76	$126	$1
	% Increase in rates	0.0191%	0.0573%	0.0954%	0.0005%
OPT (I & GS)	**$ Increase in rates ($1000)**	$219	$657	$1095	$5
	% Increase in rates	0.0164%	0.0493%	0.0821%	0.0004%

Similarly, using the percentage of fixed costs allocated to the various customer classes by the SCP cost of service study, coupled with the amounts of fixed cost lost revenue developed for Duke's rate class "OPT" in **Table 4.2**, **Table 4.7** indicates the estimated revenues, or rate impacts, on the remaining customers for various percentages of Duke OPT load losses. For example, this table indicates that the Residential Class would have a rate increase of approximately $3.9 million or 0.1838% for the loss of 1% of the load in the OPT class, while the remaining OPT customers would have rate increases of approximately $1.9 million or 0.1425%. This table also illustrates the level of rate increase with the loss of one average size OPT Class customer. In this situation the increase in Residential rates would be $23,000 or 0.0011%. Obviously, if the Industrial customer were much larger than average size, or if the lost fixed cost revenues were allocated in a different manner, the estimated rate impacts on each customer class would change.

Again, as with the Industrial Class Customer analysis presented in **Table 4.6**, the more interesting point of this exercise is the simple fact that the allocation of fixed costs resulting from as much as a 5% loss in Duke's OPT Class load results in less than a 1.1% increase in the remaining customers' rates. Another way to consider this analysis is to assume that a large customer was given a discount in order to retain that customer on the system. To the extent that this discount was less than that customer's SCP cost-of-service estimated fixed costs (usually a customer must always pay their marginal cost plus some contribution to fixed costs), then the rate impacts on the remaining ratepayers would be slightly less than the rate impacts indicated in either **Tables 4.6** or **4.7**.

TABLE 4.7: FIXED COST ALLOCATED TO REMAINING DUKE CLASSES FOR OPT LOAD LOSS ($1000 AND % RATE INCREASE)

		1% Lost Load	3% Lost Load	5% Lost Load	Loss of One Average Size Customer in OPT Class
Residential	**$ Increase in rates ($1000)**	$3,903	$11,708	$19,514	$23
	% Increase in rates	0.1838%	0.5515%	0.9192%	0.0011%
General Service	**$ Increase in rates ($1000)**	$1,332	$3,996	$6,660	$18
	% Increase in rates	0.1789%	0.5366%	0.8943%	0.0010%
Lighting	**$ Increase in rates ($1000)**	$251	$754	$1,257	$1
	% Increase in rates	0.0212%	0.6349%	1.0581%	0.0012%
Industrial (I)	**$ Increase in rates ($1000)**	$219	$657	$1,095	$1
	% Increase in rates	0.1656%	0.4968%	0.828%	0.0010%
OPT (I & GS)	**$ Increase in rates ($1000)**	$1,900	$5,701	$9,502	$11
	% Increase in rates	0.1425%	0.4276%	0.7126%	0.0008%

The corresponding results for PEC for a loss of large customers in the LGS class are shown below in **Table 4.8**. Using the percentage of fixed costs allocated to the various customer classes by the SCP cost of service study, coupled with the amounts of fixed cost lost revenue developed for rate class "LGS" in **Table 4.3, Table 4.8** indicates the estimated revenues, or rate impacts, on the remaining customers for various percentages of PEC LGS load losses. For example, this table indicates that the Residential Class would have a rate increase of approximately $ 1.242 million or 0.08% for the loss of 1% of the load in the LGS class, while the remaining LGS customers would have rate increases of approximately $300,000 or .054%. This table also illustrates the level of rate increase with the loss of one average size LGS Class customer. In this situation the increase in Residential rates would be $453,000 or 0.00003%. Obviously, if the Industrial customer were much larger than average size, or if the lost fixed cost revenues were allocated in a different manner, the estimated rate impacts on each customer class would change.

TABLE 4.8: FIXED COST ALLOCATED TO REMAINING PEC LGS CLASSES FOR LOAD LOSS ($1000 AND % RATE INCREASE)

		1% Lost Load	3% Lost Load	5% Lost Load	Loss of One Average Size Customer in LGS Class
Residential	$ Increase in rates ($1000)	$ 1,242	$ 3,726	$ 6,209	$ 453
	% Increase in rates	0.0804%	0.2413%	0.4022%	0.00003%
Small General Service	$ Increase in rates ($1000)	$ 192	$ 576	$ 961	$ 70
	% Increase in rates	0.0771%	0.2313%	0.3854%	0.00003%
Medium General Service	$ Increase in rates ($1000)	$ 505	$ 1,514	$ 2,523	$ 184
	% Increase in rates	0.0649%	0.1948%	0.3247%	0.00002%
Large General Service (LGS)	$ Increase in rates ($1000)	$ 300	$ 902	$ 1,503	$ 110
	% Increase in rates	0.0544%	0.1633%	.272%	0.00002%

4.3.3 ALLOCATION OF MULTIPLIER EFFECT LOST FIXED REVENUE TO REMAINING CUSTOMERS

The forgoing exercise (Section 4.3.2) indicated the rate impact on remaining customers that would result directly from the loss of load in the Industrial and OPT classes of Duke's customers or the LGS class of PEC customers. However, as discussed in **Chapter 3**, there is what may be termed "indirect" rate impacts that result from the economic multiplier effect should a large load customer leave with the resulting region-wide economic losses that result from the changes in the lost customer's economic output and employment. This Section estimates these indirect, or economic multiplier rate impacts on remaining customers resulting from the loss of a large load customer.

Recall that **Chapter 3** developed estimates of the total economic impacts resulting from the closing (or expanding) of four different large load customers. Reproduced below is **Table 3.7** from **Chapter 3** that provides these economic impact estimates in terms of employment, employee earnings, and output from closing (or expanding) four specific facilities in the Charlotte metropolitan area. Based on this economic data the task at hand is to determine the fixed costs related to the multiplier effect that is associated with the loss (or gain) of load from these four facilities. Once these multiplier effect related fixed costs are determined it will be possible to estimate the electric rate impact resulting from this economic multiplier effect on other customers' rates, assuming that any "lost" fixed cost revenues will be recoverable from remaining customers. To estimate the fixed cost related to the multiplier effect requires knowledge or estimates of both the electric rates, the level of fixed costs associated with the electric rates, and usage levels related to each of these four facilities and any other regional entities that are effected by the closing (or expansion) of these specific facilities. While it can be assumed that these four facilities would likely be served under the I or OPT schedules, these facilities electric usage, and the related electric usage of other impacted regional entities, must be estimated using the data available in **Table 3.7**.

TABLE 3.7: TOTAL ESTIMATED ANNUAL ECONOMIC IMPACT

FACILITY	CHANGE IN NUMBER OF EMPLOYEES FOR NEW (CLOSED) FACILITY	INCREASE (OR DECREASE) IN FINAL $ DEMAND PER EMPLOYEE FOR NEW (CLOSED) FACILITY	INCREASE (OR DECREASE) IN $ OUTPUT FOR ALL NEW (OR DECREASED) # OF EMPLOYEES	INCREASE (OR DECREASE) # OF JOBS FOR ALL INDUSTRIES	INCREASE (OR DECREASE) IN ALL INDUSTRIES FINAL REGIONAL OUTPUT IN $	INCREASE OR DECREASE) IN $ IN EMPLOYEE EARNINGS FOR ALL INDUSTRIES
AT&T	100	$351,220	$35,122,018	412	$71,434,672	$34,438,655
Caterpillar	199	$282,972	$56,311,502	594	$111,417,938	$49,647,833
Zimmer Holdings	124	$179,794	$22,294,401	281	$43,333,627	$20,886,808
Berry Plastic	314	$339,729	$106,674,867	892	$194,190,928	$65,947,239

Estimating electric usage or revenues associated with the four facilities identified in **Table 3.7** requires some means of associating this table's economic impact data with electricity usage. The economic data from **Table 3.7** that is available to use in developing such an estimate is:

- Change in the number of facility specific and region-wide employment levels
- Change in employee earnings levels
- Change in total economic output

Generally, electricity usage by a facility is estimated based on appliance load and other engineering and demographic data. This is not available in this case, but it is reasonable to assume that there could be a valid and measureable relationship between economic activity and electricity usage levels. For example, as discussed in **Chapter 2**, a study of the US economy from 1950-1984 indicated "Growth in electric power consumption accounts for 79% of the growth of manufacturing value-added [during this period of time]"[43] and a more recent study of 99% of the world's global economy

[43] Beaudreau, Bernard, "The Impact of Electric Power on productivity," Energy Economics, Vol. 17, No. 3, 1995, pp. 231-236.

found a highly statistically-significant correlation between electricity consumption per capita and GDP per capita.[44] These findings provide validation of the assumption that the impact on the direct and indirect level of electricity usage should be related in a statistically measureable way to the economic changes identified in **Table 3.7**.

To analyze this relationship several linear and non-linear regression models were developed using North Carolina retail electric sales (in MWh)[45] regressed against North Carolina total wages.[46] The results from two of these, a straight line and a log-linear model are found in **Appendix E, Table A**. The results in this table indicate that a linear regression model using MWh usage as the independent variable and wages as the dependent variable resulted in a linear regression model with an r^2 value of 0.948, indicating a very positive correlation. Further analysis indicated this model had an average prediction error of $\pm$ 6.36%. This model provides sufficient evidence to assume that a reasonable estimate of North Carolina's or a particular facility's electric usage can be estimated using state-level or facility-level employee wage data. Note that this is not meant to imply that there is any causational relationship (such as end-use load forecasting models) nor significant ability to use this relationship in any load forecasting technique, but rather that the relationship between wage data and electricity usage is sufficient to provide reasonable estimates of electricity consumption for the facilities examined in this study. Based on this analysis, a model was developed to use the facility employee wage economic impact data, shown in **Table 3.7**, to predict the level of electric sales associated with these wage-level changes.

Specifically, **Table 4.9** illustrates the relationship, used in this analysis, between MWh sales and total wages (note: a more detailed table is found in **Appendix E**). As this table indicates, the ratio of MWh sales to wage income in North Carolina has been decreasing gradually since 1990, but over the past five years of available data (2006-2010) this ratio has only varied slightly, from 0.00059 – 0.00063, with an average of .00061.

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[44] Ferguson, Ross, et. al. "Electricity Use and Economic Development," Energy Policy, 28, (2000), pp. 923-934.
[45] Source: Energy Information Administration.
[46] Source: US Bureau of Economic Analysis.

TABLE 4.9: DATA USED TO PROVIDE METHOD FOR ESTIMATING ELECTRICITY USAGE TO EMPLOYEE WAGES			
YEAR	Total Wages $000s*	Total Electric Sales MWh **	MWh Sales/$ per Wage Income
1990	81,836,057	89,924,487	0.00110
1991	84,713,599	92,316,483	0.00109
1992	92,692,160	94,195,331	0.00102
1993	97,999,331	99,777,554	0.00102
1994	104,482,055	99,789,182	0.00096
1995	110,820,401	104,672,756	0.00094
1996	117,035,500	108,296,394	0.00093
1997	125,695,985	109,050,025	0.00087
1998	135,307,744	113,596,306	0.00084
1999	144,907,973	115,015,125	0.00079
2000	155,160,985	119,855,456	0.00077
2001	159,495,682	119,026,943	0.00075
2002	163,348,035	122,686,468	0.00075
2003	169,602,852	121,335,121	0.00072
2004	179,222,933	125,656,807	0.00070
2005	189,451,825	128,335,377	0.00068
2006	202,140,469	126,698,979	0.00063
2007	215,144,707	131,880,754	0.00061
2008[r]	221,590,306	130,054,113	0.00059
2009[r]	213,910,915	127,657,979	0.00060
2010[r]	219,208,239	136,414,947	0.00062
2011[P]	227,400,854	NA	NA

Using this ratio of 0.00061 MWh sales per wage income dollars (000s) provides a reasonable mathematical relationship between wage income and electricity sales, which can be used as a methodology to translate the wage impacts shown in **Table 3.7** to impacts on electricity usage and eventually, electricity rates. For the four facilities listed in **Tables 3.7**, this calculation of energy usage based on wage changes is shown in **Table 4.10** below (a more detailed table of these calculations and results is shown in **Appendix E**). For example, for the AT&T facility, the analysis of economic impacts (**Chapter 3**) using an input-output model indicated the change in total regional wages would be $34.4 million. As shown in **Table 4.10**, this translates to a change in the region's MWh sales of 21,008 MWhs. To determine how much of this change in MWHs is related directly to the AT&T expanded facility's electricity usage or related to impacts on non-AT&T region-wide entities, the multiplier effect, the ratio of new AT&T jobs to new total regional jobs (from **Table 3.7**) is multiplied by the estimated total change in MWhs. The results are shown in **Table 4.10**, which indicates that for the AT&T facility, of the 21,008 change in MWhs usage, 15,909 is due to the multiplier effect on the regions economy and not to AT&T's change in electricity usage.

Once the change in electricity MWhs usage has been determined for the specific facility and the region-wide multiplier effect, these MWhs are converted to dollars using Duke's average electric costs (7.51 cents/kWHr s reported by the EIA, 2011, also note the ATT facility is in Duke's service territory, thus using Duke's rates). The reason the average electric costs, and not specific Duke Tariff rates are used, is simply due to the fact that it is not possible to determine either AT&T's tariffed rate nor the rates paid by various entities whose electricity usage is affected by the region-wide multiplier effects. The estimated changes in revenues are then converted to non-energy (or fixed costs) using the fixed costs ratio (68.4%) from Duke's 2011 Cost of Service Study. The results, shown in **Table 4.7**, indicate that the non-energy indirect (or multiplier related) costs that could impact other customers' rates from the AT&T facility are some 312% larger than the rate impacts resulting from changes in electricity usage directly due to the AT&T facility's electricity usage.

Table 410 shows the results of the foregoing analysis on all four of the facilities studied in **Chapter 3**. Several points about these results need to be emphasized:

1. Based on Duke's 2011 Cost of Service Study, the average I, OPT-G, and OPT-I customers' annual bills are $31,987 and $49,780 and $443,521 respectively. This translates into annual non-energy costs of $21,879 and $34,049 and $303,368 respectively. The direct non-energy costs attributable to the four facilities in this study (see **Table 4.10**) range from a low of $261,926 to a high of $727,421. This indicates two things. First, this study's estimates of these four facilities' electricity costs is generally consistent with average size OPT-I customer's annual electric bills, therefore these estimates seem reasonable. Second, that the facilities examined, (with direct total new employees numbering from 100 to 314) are larger load customers.
2. The multiplier effect non-energy related rate impacts range from 1.27 to 3.12 times as large as the rate impacts directly resulting from a new or closed facility's energy usage. The average multiplier effect rate impact was 2.05 times as large as the direct impact.
3. Assuming the four facilities in **Table 3.7** are generally representative of the large customer classes of Duke, then the average large customer

rate impacted related to the multiplier effect would be approximately 2.05 times as large as the direct impact.

TABLE 4.10: ESTIMATE OF CHANGE IN DUKE'S "NON-ENERGY" RELATED REVENUES AS A RESULT OF THE MULTIPLIER EFFECT

TARGET COMPANY	DECREASE OR INCREASE IN TOTAL EMPLOYEE EARNINGS ($ 000)	DECREASE OR INCREASE IN TOTAL EMPLOYEE EARNINGS RELATED TO MULTIPLIER EFFECT ($ 000)	TOTAL CHANGE MWh ELECTRIC SALES FOR CHANGE IN EMPLOYEE EARNINGS	CHANGE MWh ELECTRIC SALES DUE TO MULTIPLIER EFFECT	$ IN DUKE FIXED ELECTRIC REVENUES RELATED TO TARGET COMPANY	$ IN DUKE FIXED ELECTRIC REVENUES RELATED TO RELATED TO MULTIPIER	ESTIMATED REVENUE IMPACT ON REMAINING CUSTOMERS FROM MULTIPLIER EFFECT
AT&T	$34,439	$26,080	21,008	15,909	$261,926	$817,210	312%
Caterpillar	$49,648	$33,015	30,285	20,139	$521,188	$1,034,519	198%
Zimmer Holdings	$20,887	$11,670	12,741	7,119	$288,813	$365,675	127%
Berry Plastic	$65,947	$42,732	40,228	26,067	$727,421	$1,339,010	184%
						Average	205%

Point numbers two and three can be used to further develop the analysis illustrate in **Tables 4.6, 4.7** and **4.8.** These tables illustrated the estimated rate impacts on remaining customers assuming the loss of load from Duke's I or OPT classes or PEC's LGS class, and that the fixed (or non-energy) costs from this loss of load would be spread to the remaining customers. However, the analysis shown in these tables did not assume any additional rate impact resulting from related changes in the regions economy via the multiplier effect.

Tables 4.11 and **4.12** below, illustrate the estimated rate impacts resulting from the loss of Duke's I or OPT customers of varying sizes, and these tables include the rate impacts related to multiplier effect (the multiplier effect rate impacts were estimated to be on average 205% of the direct, facility-related estimated rate impacts).

TABLE 4.11: RATE INCREASE RESULTING FROM BOTH DIRECT AND INDIRECT (MULTIPLIER EFFECT) FIXED COST ALLOCATED TO REMAINING DUKE CLASSES FOR INDUSTRIAL (I) LOAD LOSS (NORTH CAROLINA)

		1% Lost Load	3% Lost Load	5% Lost Load	Loss of One Average Size Customer in Industrial (I) Class
Residential	FACILITY specific % increase in rates (direct costs)	0.0212%	0.0636%	0.1059%	0.0005%
	NON-FACILITY % increase in costs from multiplier effect	0.0435%	0.1304%	0.2171%	0.0010%
	TOTAL rate impacts from direct plus multiplier effect	**0.0647%**	**0.1940%**	**0.3230%**	**0.0015%**
General Service	FACILITY specific % increase in rates (direct costs)	0.0206%	0.0618%	0.1031%	0.0005%
	NON-FACILITY % increase in costs from multiplier effect	0.0422%	0.1267%	0.2114%	0.0010%
	TOTAL rate impacts from direct plus multiplier effect	**0.0628%**	**0.1885%**	**0.3145%**	**0.0015%**
Lighting	FACILITY specific % increase in rates (direct costs)	0.0244%	0.0732%	0.1219%	0.0006%
	NON-FACILITY % increase in costs from multiplier effect	0.0500%	0.1501%	0.2499%	0.0012%
	TOTAL rate impacts from direct plus multiplier effect	**0.0744%**	**0.2233%**	**0.3718%**	**0.0018%**
Industrial (I)	FACILITY specific % increase in rates (direct costs)	0.0191%	0.0573%	0.0954%	0.0005%
	NON-FACILITY % increase in costs from multiplier effect	0.0392%	0.1175%	0.1956%	0.0010%
	TOTAL rate impacts from direct plus multiplier effect	**0.0583%**	**0.1748%**	**0.2910%**	**0.0015%**
OPT (I & GS)	FACILITY specific % increase in rates (direct costs)	0.0164%	0.0493%	0.0821%	0.0004%
	NON-FACILITY % increase in costs from multiplier effect	0.0336%	0.1011%	0.1683%	0.0008%
	TOTAL rate impacts from direct plus multiplier effect	**0.0500%**	**0.1504%**	**0.2504%**	**0.0012%**

The estimated rate impacts shown in **Table 4.11** indicate that the loss of 1% of the Industrial load would theoretically result in an increase in Residential rates of 0.0212% via fixed cost recovery that was directly attributable to the industrial facility's 1% lost load. In addition, there would be other electric revenues that declined due to the economic multiplier effect from the 1% lost industrial load and this would translate into additional fixed costs being theoretically recovered from other customer classes yielding an additional residential rate increase of 0.0435%. The total estimated impact from the loss of 1% of the Duke Industrial load would be an average estimated residential rate increase of 0.0647%. As **Table 4.11** indicates, the loss of 5% of the industrial load or the loss of an average size industrial customer results in an estimated total residential rate increase of 0.32% and .0015% respectively, with fully two thirds of this rate impact due to the multiplier effect.

In a similar analysis shown in **Table 4.12**, the loss of 1% of the Duke OPT load would theoretically result in an increase in Residential rates of 0.18% from fixed costs that were directly attributable to the OPT facility's 1% lost load. In addition, there would be other electric revenues that declined due to the economic multiplier effect from the 1% lost OPT load and this would translate into additional fixed costs being theoretically recovered from other customer classes yielding an additional residential rate increase of 0.38%. The total estimated impact from the loss of 1% of the OPT load would be an average estimated residential rate increase of 0.56%. As **Table 4.12** indicates, the loss of 5% of the OPT load results in an estimated residential rate increase of 2.8%, while the residential rate impact from the loss of one average size OPT customer is only 0.34%. Again, 2/3 of these residential rate impacts are due to the multiplier effect.

TABLE 4.12: RATE INCREASE RESULTING FROM BOTH DIRECT AND INDIRECT (MULTIPLIER EFFECT) FIXED COST ALLOCATED TO REMAINING CLASSES FOR DUKE OPT LOAD LOSS (NORTH CAROLINA)

		1% Lost Load	3% Lost Load	5% Lost Load	Loss of One Average Size Customer in OPT Class
Residential	FACILITY specific % increase in rates (direct costs)	0.1838%	0.5515%	0.9192%	0.0011%
	FACILITY % increase in costs from multiplier effect	0.3768%	1.1306%	1.8844%	0.0023%
	TOTAL rate impacts from direct plus multiplier effect	**0.5606%**	**1.6821%**	**2.8036%**	**0.0034%**
General Service	FACILITY specific % increase in rates (direct costs)	0.1789%	0.5366%	0.8943%	0.0010%
	NON-FACILITY % increase in costs from multiplier effect	0.3667%	1.1000%	1.8333%	0.0021%
	TOTAL rate impacts from direct plus multiplier effect	**0.5456%**	**1.6366%**	**2.7276%**	**0.0031%**
Lighting	FACILITY specific % increase in rates (direct costs)	0.0212%	0.6349%	1.0581%	0.0012%
	NON-FACILITY % increase in costs from multiplier effect	0.0435%	1.3015%	2.1691%	0.0025%
	TOTAL rate impacts from direct plus multiplier effect	**0.0647%**	**1.9364%**	**3.2272%**	**0.0037%**
Industrial (I)	FACILITY specific % increase in rates (direct costs)	0.1656%	0.4968%	0.8280%	0.0010%
	NON-FACILITY % increase in costs from multiplier effect	0.3395%	1.0184%	1.6974%	0.0021%
	TOTAL rate impacts from direct plus multiplier effect	**0.5051%**	**1.5152%**	**2.5254%**	**0.0031%**
OPT (I & GS)	FACILITY specific % increase in rates (direct costs)	0.1425%	0.4276%	0.7126%	0.0008%
	NON-FACILITY % increase in costs from multiplier effect	0.2921%	0.8766%	1.4608%	0.0016%
	TOTAL rate impacts from direct plus multiplier effect	**0.4346%**	**1.3042%**	**2.1734%**	**0.0024%**

Table 4.13 shows the impact on electric rates resulting from the economic multiplier effect for the loss of large load customers in PEC's LGS class. The rate impacts are generally similar in magnitude to the rate impacts estimated in the foregoing analysis of the rate impacts from losses of Duke's large

customers. For example, a 5% loss of PEC's LGS load translates, using this analysis, into an overall estimated Residential rate increase of 1.23%.

TABLE 4.13: Rate Increase Resulting From Both Direct and Indirect (multiplier effect) Fixed Cost Allocated to Remaining Classes for PEC LGS Load Loss (North Carolina)

		1% Load Loss	3% Load Loss	5% Load Loss	Loss of One Average Size Customer in LGS Class
Residential	FACILITY specific % increase in rates (direct costs)	.0804%	.2413%	.4022%	.02936%
	FACILITY % increase in costs from multiplier effect	.1648%	0.4900%	.8245%	.0602%
	TOTAL rate impacts from direct plus multiplier effect	**.2452%**	**0.7313%**	**1.2267%**	**.0895%**
Small General Service	FACILITY specific % increase in rates (direct costs)	.0771%	.2313%	.3854%	.02813%
	NON-FACILITY % increase in costs from multiplier effect	.1581%	.4742%	.790%	.0577%
	TOTAL rate impacts from direct plus multiplier effect	**.2352%**	**.7055%**	**1.175%**	**.0858%**
Medium General Service	FACILITY specific % increase in rates (direct costs)	.0649%	.1948%	.3247%	.0237%
	NON-FACILITY % increase in costs from multiplier effect	.1330%	.399%	.6656%	.0486%
	TOTAL rate impacts from direct plus multiplier effect	**.1979%**	**.5938%**	**.9903%**	**.0723%**
Large General Service (LGS	FACILITY specific % increase in rates (direct costs)	.0544%	.1633%	.2721%	.01986%
	NON-FACILITY % increase in costs from multiplier effect	.1115%	.3348%	.5578%	.0407%
	TOTAL rate impacts from direct plus multiplier effect	**.1659%**	**.4980%**	**.8299%**	**.0606%**

4.4 CONCLUSIONS

When electric load is lost from customers severely cutting back on load, moving out of an electric utility's service territory, or by going out of business entirely, the remaining customers will theoretically have to pay the fixed costs portion of revenues no longer being recovered from the "lost" customer. These "lost" customer revenues were considered what this report termed "direct" lost revenues, or revenues that were directly due to the change in electricity sales to the lost customer. However, not only is there a change in electric usage directly related to a large customer closing (or expanding) into a region, but there are additional changes in electricity usage in other areas of that customer's geographic region, and these changes are related to the economic multiplier effects discussed in **Chapter 3**. Theoretically, the lost fixed costs attributed to the change in electricity usage related to this multiplier effect will also have to be recovered from the remaining customers when a large load customer leaves an electric system. Based on these premises, data from North Carolina SCP cost-service-studies,[47] from the BEA, and from the EIA was used to analyze and calculate the dollar amounts of fixed costs that would be recoverable from the remaining classes of customers assuming varying percentages of load lost in Duke's "I" and "OPT" customer classes and PEC's LGS customer class.

The overall results from this analysis indicated several things. First, that the economic multiplier effect on a region's electricity consumption (and revenues) are larger than are the changes in electricity consumption resulting directly from a large customer's usage when that customer exits or expands. The results also indicated that the loss of an average size Duke OPT class of customer would result, theoretically, in residential rate increases of less than 1%. On the other hand, the loss (or gain) of a larger or several Duke OPT customers (assume 3% to 5% of the OPT load), would theoretically result in Residential and General Service rate increases (or decrease) ranging from as high as 2% to 3% (when the economic multiplier effect is included). This latter finding also illustrates how the loss, or attrition over time, of very large, or several large customers, such as the loss of textile manufacturers over the last score of years, can begin to have significant rate and economic impacts on the remaining customers.

For PEC Energy, we see slightly smaller rate increases on residential customers resulting from the loss of their large customer class, LGS. The theoretical residential rate increases range 0.24% to 1.2% as a result of LGS losses of 1% and 5%, respectively.

Overall, the results from this Chapter's analysis of rate impacts, coupled with the regional economic impacts developed in **Chapter 3**, indicates that the

[47] Duke and PEC NCUC filings.

positive economic impacts that accrue from the attraction of new, expanded, or just retained large load customers are likely far larger in economic value than the negative rate impacts should these customers leave Duke's or PEC's system. Consequently, to the extent electric rate setting decisions have the potential for retaining or attracting large customers to a region, it would seem appropriate for policy makers to consider both the rate impacts and the economic consequences resulting from such decisions.

CHAPTER 5: RETENTION RATES

5.1 INTRODUCTION

This report has focused on three specific issues dealing with large electric customers: the impact that electric pricing can have on these customers relative to these customers' pricing elasticity, the regional economic impacts related to retaining or attracting a large electric customer to a region, and the impact on other customers' rates should Duke or PEC experience the loss of one or several of its larger electric customers. While several conclusions could be drawn from these earlier chapters, the single most obvious conclusion is that the ability to attract and retain large electric customers provides significant economic benefits to a region while the loss of these type customers could result in some level of rate increases for the remaining customers.

Given these conclusions and acknowledging the fact that a number of large electric load customers have either closed or left the US and the Duke and PEC service territories (particularly textile plants), a reasonable question to consider is whether policy makers and electric utilities have routinely adjusted their electric rates to respond to the potential loss of large customers and the subsequent loss of load? Generally speaking, the answer is yes, electric utilities have responded to the potential loss of large loads with what is termed retention, economic development, or special contract rates.[48] [49] As will be explained in the following section, though retention or special contracts would generally be the type of tariff adopted to retain large customers, many states have combined these type tariffs with economic development tariffs or they have used the terms interchangeably. This chapter investigates these types of rates, providing samples of the terms and conditions imposed on these rates and examples of where these rates are currently being applied.

[48] State regulators have allowed these types of discount rates to attract and/or retain customers since as early as 1937. See footnote 1, Goodman, Saul, "The Process of Ratemaking," Public Utilities Reports," Vienna, VA, 1998, p. 110.

[49] It should also be noted that it has been a common practice for natural gas utilities and pipelines to offer discount rates to large customers to avoid "bypass."

5.2 DEFINITION OF RETENTION AND ECONOMIC DEVELOPMENT RATES

First, it should be made clear that retention rates (also called tariffs) should be defined differently from economic development rates, although some states have treated the two as essentially the same. Specifically, a "retention rate" would be a rate lower than a customer's normal tariff-based rate, with the retention rate being set at a price that provides an economic incentive to a large commercial or industrial customer to maintain a facility within a utility's service territory. Usually, the economic incentive is a discount from the utility's standard tariff rate. Consequently, retention rates are used to keep existing companies in business or from moving out of the utility's service area.

Some states apply the terms retention and economic development rates in the same tariff. However, a strict definition would indicate that "economic development rates" are rates designed with a discount from the standard tariff rate and are used to induce firms to locate new or expanded businesses within a utility's service area. Therefore, economic development rates would generally be related to a new customer, while a retention rate would be related to an existing customer.

There are also "special" or "experimental contract rates." These are discounted rates generally used by policy makers and utilities for a particular customer, such as a car manufacturing facility. Often the terms and conditions of these special contracts are not public information.

With respect to all three types of discounted rates, retention, economic development, and special contracts, theoretically there are several criteria that each rate would generally have to meet to obtain regulatory approval. These criteria include:

- The proposed discount is believed to be important in the retention or attraction of the targeted customers,
- Any associated lost revenues or cost recovery will generally be adjudicated in a rate case, assuming the special tariff is adopted outside of a general rate case, and
- The proposed discount is expected to provide overall economic benefits to the general public.

While it seems almost self evident that the various discounted rate options discussed above would have universal economic appeal, these types of rates have met opposition from several parties. For example, some residential ratepayer advocates have claimed that such discounts merely raise residential customers' rates without clear evidence that the discounted rate was necessary to retain or attract the targeted customer. This argument is offered notwithstanding the basic ratemaking paradigm that should a large customer leave an electric utility's system, eventually the fixed costs formerly paid by that customer will eventually be paid by the remaining ratepayers. In addition, so long as the retained customer pays their marginal energy costs, plus some portion of fixed costs, every other customers' rates are lower than they would be if the customer left.

Conservation groups and renewable energy proponents have also sometimes opposed these discounted rates claiming that such rates promote the generation of more expensive and more polluting generation resources. Independent power generators ("IPPs") have opposed such rates based on the argument that such rates may prevent the sale of their electricity to potential end users and they claim that their generation resource is less costly and less polluting than the generation resources that the electric utility would use to serve the targeted load. Other groups may oppose these types of discounted rates on the grounds that such rates result in smaller customers subsidizing larger customers, regardless of the usual condition that such rates must cover their marginal costs plus a contribution towards fixed costs. Consequently, while basic economic implications would often support retention and economic development rates, the proposed adoption of such rates should not be expected to be universally supported.

5.3 SAMPLES OF CUSTOMER RETENTION AND ECONOMIC DEVELOPMENT RATES

A nationwide survey and a literature search was conducted to determine which states and which utilities currently have retention, economic development, and special contract tariffs. Of the respondents to date, almost every state allows some type of special contracts for the retention or attraction of large customers. The terms and conditions of these special contracts are usually established for a single customer and are not public information. Beyond these special contracts, a number of states have both Retention and Economic Development tariffs, and, as stated earlier, some states addressed these two seemingly different customers in the same tariff. Given these findings, **Tables 5.1** and **5.2** provide a listing of some of the states and utilities (including some municipal utilities) that offer retention (**Table 5.1**) and economic development (**Table 5.2**) tariffs. These tables also provide some conditions required of customers in order for that customer to be placed on the particular tariff.

Referring to **Table 5.1**, Retention Tariffs, common requirements in these tariffs include:

- Available to an existing or new customer (it would seem a contradiction that a retention tariff would be considered for a new customer, but this is simply reflective of the fact that some utilities have combined a retention and an economic development tariff),
- Rate concessions vary, sometimes stated in the tariff, other times the tariff indicates rates will be negotiated,
- Some tariffs state the minimum rate will be the utility's marginal cost plus some contribution,
- A customer's minimum peak demand varies from as low as 150 kW to as high as 1500 kW,
- Some utilities require that the company receiving the new rate participate in an energy audit or in other energy conservation measures,
- In some cases, the customer receiving the new rate must provide an affidavit affirming the need for the rate to remain viable. In other cases the company receiving the new rate must provide documentation the utility considers sufficient to affirm that the rate is justified for that particular customer, and in some states no affidavit or documentation from the customer is required, and
- Sometimes there is a contract limit, and if so, it is usually no more than 5 year contract limit.

Table 5.2 provides a listing of states and utilities that offer an economic development tariff. Referring to **Table 5.2**, common requirements in these Economic Development tariffs include:

- It must be a new customer or in some cases new incremental load,
- Rate concessions vary, many are stated in the tariff as discounts usually ranging from 15- 25% the first year and declining after that time,
- Some tariffs state the minimum rate is marginal cost plus some contribution,
- Peak demand varies from as low as 200 kW to as high as 1000 kW.
- Often there is a minimum number of full time employees,
- Some utilities require that the company receiving the new rate participate in an energy audit or in other energy conservation measures,
- In some cases, the customer receiving the new rate must provide an affidavit affirming the need for the rate to remain viable. In other cases the company receiving the new rate must provide documentation the utility considers sufficient to affirm that the rate is justified or simply affirm employment levels for that particular customer, and in some states no affidavit or documentation from the customer is required, and
- Usually there is a 5 year contract limit.

TABLE 5.1: SAMPLES OF RETENTION RATES

State	Company	Must customer be an existing customer?	Load factor	Peak size?	Is an affidavit required stating customer financial condition and option to leave?	Maximum term	Maximum discount	Is Some Type of Energy Audit or Energy Conservation Required	Other Terms & Conditions	Tariff #
California	So. Cal. Edison	Yes		200 kw	Yes			Yes		EDR-R
California	Sacremento muni.	No		299 kw	Yes	5 yrs				GS-TDP
California	Riverside muni.	Yes		150 kw	Yes	2 yrs	25% yr 1, 15% yr 2			BR
California	PG&E	No		200 kw	Yes	5 yrs		Yes		79-1122
Colorado	PSC of CO	No			No				Special railroad contract	SCS-7
Florida	Gulf Power	No		500 kw	Documents sufficient to satisfy utility		negotiated	Yes		CIS
Florida	Progress	No		500 kw	Yes		negotiated			CISR-1

	Energy									
Georgia	GA Power	Yes			No	none	varies			ILR-4
Hawaii	No similar rates									
Maine	Allow individual negotiated special use contracts to retain existing customers									
Mass	Western Mass. Elec. Co.	Yes			Documents sufficient to satisfy utility			Yes		MDTE No. 1021B
Mississippi	Entergy & MPCo	No	Utilities can negotiate special use contracts to retain or attract customers							
Missouri	Ameren	No	>55%	500 kw	Documents sufficient to satisfy utility	5 yrs	15%			122.6
Missouri	Union Electric	No	>55%	500 kw	Documents sufficient to satisfy utility	5 yrs	15%			EDRR
New Hampshire	Had retention tariffs prior to deregulation in 1990s									
New York	NYSE&G	Yes		1000 kw	Yes		Minimum rate is Mar. cost plus contribution	Yes		13

New York	Rochester G&E	Yes			Yes	5 yrs	Minimum rate is Mar. cost plus contribution			Class 10, leaf 215
Ohio	No retention rates but do allow special contracts, no tariff									
SD	No retention tariffs									
Texas	El Paso muni	Yes		1500 kw	Yes					Rate 30
Texas	Austin	No	No	1000 ke	No	5 yrs		Yes		Econ Dev
Utah	No retention rates but do allow special contracts, no tariff									
Wisconsin	Alliant Energy	Must be new or new increm. load			Yes	5 yrs	Rate = 105% of mar. cost	Yes	For both new or incrementa l load only	CP-ED

TABLE 5.2: ECONOMIC DEVELOPMENT RATES

State	Company	Must customer be a new customer?	Load factor requiremen t	Peak size	Is an affidavit required stating customer qualifications, need for this special rate, or stating customer option to leave?	Maximu m term	Maximum discount?	Is Some Type of Energy Audit or Energy Conservation Required	Other Terms & Conditions	Tariff #
Alabama	Alabama Power	Varies, can be new or new incremental load		Varies, depends on tariff	Not always	Minimum 5 yrs	Varies, up to 15%			CRI, CTD, EDI
California	So. Cal. Edison	Yes		200 kw	Yes			Yes		EDR-A
California	PG&E	no, but must at least be new incremental load		200 kw	Yes	5 yrs		Yes		Form 79-1122
California	Sacreme nto muni.	No		299 kw	Yes	5 yrs				GS-TDP

Florida	Gulf Power	No		500 kw	Yes		negotiated	Yes		CIS
Florida	FP&L	Yes, or new incremental load		350 kw	Documents sufficient to satisfy utility	5 yrs	20% 1st yr, then declining		Only for new load with employment of 25 FTEs per 350 kw	EDR, EFERD
Indiana	Duke Energy	Yes		500 kw	Documents sufficient to satisfy utility	5 yrs	50% load charge reduction yr 1, then declining		Only for new load with employment of 25 FTEs per 1000 kw	Rider 59
Indiana	Vectrin	No; but must at least be new incremental load			Yes					
Kansas	Westar	No, but must at least be new incremental load		200 kw		5 yrs	25% 1st yr, then declining			EDR
Maine	Allow individual negotiated special use contracts to attract new customers									ED, AD
Mississippi	MPCo	Yes			No – but must provide	3 yrs	20% 1st yr, then		Employment minimum of	LBR

					Company employment verification		declining		20 ftes	
Mississippi	Entergy	No, but must at least be new incremental load	50%		No – but must provide Company employment verification	5 yrs	$0.005/kWh		Employment minimum of 20 ftes	ED-2
Missouri	Ameren	No, but must at least be incremental load	>55%	500 kw	Documents sufficient to satisfy utility	5 yrs	15%			122.6
New York	NYSE&G	No		Max load 750 kw	Yes		Minimum rate is Mar. cost plus	Yes		Rider J
New York	Com Ed	Yes				15 yrs max	32-40% off delivery fees	Yes		BIR
North Carolina	Duke Energy	No, but must at least be new incremental load		1000 kw, 500 KW	Yes	4 yrs	20% yr 1, declining		Only for new load with employment of 75 FTEs per 1000 kw	EC, ER
North Carolina	Progress Energy	No, but must at least be incremental	>40%	1000 kw	Yes	5 yrs (minimum			Only for new load with employment	ED-9

		load				)			of 75 FTEs	
South Carolina	Progress Energy	No, but must at least be incremental load	>40%	1000 kw	No – but must affirm to utility that rate was a factor in location decision	5 yrs (minimum)			Only for new load with employment of 75 FTEs	ED-10
South Carolina	Duke Energy	No, but must at least be new incremental load		1000 kw, 500 KW	Yes	4 yrs	20% yr 1, declining		Only for new load with employment of 75 FTEs per 1000 kw	EC, ER
Wisconsin	Alliant Energy	No, but must at least be incremental load			Yes	5 yrs	Rate = 105% of mar. cost		For both new and incremental load only	CP-ED
Austin, TX	City muni.	No, but must be new or incremental load		3000 kw	No	5 yrs			Only for new load with employment of 300 FTEs	Econ. Dev.

5.3 SUMMARY

This Chapter reviewed current electric utility tariffs designed to respond to the potential loss of large load customers. Based on the research conducted in this study there are a number of states and utilities which offer tariffs whose goal is to either help keep or attract large customers to a particular electric service territory. Technically, these types of tariffs would be called retention tariffs, however many states have combined such tariffs with economic development tariffs. In either case, both tariffs, along with special use contracts, provide the customer a discounted rate off the utility's standard tariff rate. To qualify for these rates customers are usually required to file an affidavit with proof of economic hardship or an intention to leave the utility's serve, or both. In addition, these tariffs often have minimum load demand requirements, employment level criteria, limits on the number of years the tariff is available, and other conditions.

Notwithstanding the substantial economic benefits (identified in **Chapter 3**) from attracting or retaining larger customers on an electric system, there has been opposition to the establishment of customer retention and economic development tariffs. Specifically, various groups have claimed these types of tariffs increase residential rates, provide subsidies from smaller customers to larger customers, and hinder the development of renewable and/or less expensive non-utility-owned resources. Given these various considerations, it would not be precedential should PEC or Duke seek to obtain a Customer Retention Tariff. While such a tariff could face some opposition, the analysis in this report indicated that such a tariff, to the extent large electric loads were retained on the system, provides substantial positive economic benefits to a region with potentially minor increases in remaining customers' rates.

APPENDIX

APPENDIX A:
RIMS II
BACKGROUND

ABOUT BUREAU OF ECONOMIC ANALYSIS RIMS II MODELING

(REPRINTED FROM RIMS II ELECTRONIC HANDBOOK)

Effective planning for public- and private-sector projects and programs at the State and local levels requires a systematic analysis of the economic impacts of these projects and programs on affected regions. In turn, systematic analysis of economic impacts must account for the interindustry relationships within regions because these relationships largely determine how regional economies are likely to respond to project and program changes. Thus, regional input-output (I-O) multipliers, which account for interindustry relationships within regions, are useful tools for conducting regional economic impact analysis.

In the 1970s, the Bureau of Economic Analysis (BEA) developed a method for estimating regional I-O multipliers known as RIMS (Regional Industrial Multiplier System), which was based on the work of Garnick and Drake. 1 In the 1980s, BEA completed an enhancement of RIMS, known as RIMS II (Regional Input-Output Modeling System), and published a handbook for RIMS II users. 2 1992, BEA published a second edition of the handbook in which the multipliers were based on more recent data and improved methodology. In 1997, BEA published a third edition of the handbook (PDF • 677 KB) that provides more detail on the use of the multipliers and the data sources and methods for estimating them.

RIMS II is based on an accounting framework called an I-O table. For each industry, an I-O table shows the industrial distribution of inputs purchased and outputs sold. A typical I-O table in RIMS II is derived mainly from two data sources: BEA's national I-O table (PDF • 824 KB) , which shows the input and output structure of nearly 500 U.S. industries, and BEA's regional economic accounts, which are used to adjust the national I-O table to show a region's industrial structure and trading patterns. 3

Using RIMS II for impact analysis has several advantages. RIMS II multipliers can be estimated for any region composed of one or more counties and for any industry, or group of industries, in the national I-O table. The accessibility of the main data sources for RIMS II keeps the cost of estimating regional multipliers relatively low. Empirical tests show that estimates based on relatively expensive surveys and RIMS II-based estimates are similar in magnitude. 4

BEA's RIMS multipliers can be a cost-effective way for analysts to estimate the economic impacts of changes in a regional economy. However, it is important to keep in mind that, like all economic impact models, RIMS provides approximate order-of-magnitude estimates of impacts. RIMS multipliers are best suited for estimating the impacts of small changes on a regional economy. For some applications, users may want to supplement RIMS estimates with information they gather from the region undergoing the potential change. Examples of case studies where it is appropriate to use RIMS multipliers appear in the RIMS II User Handbook. (PDF • 677 KB)

To effectively use the multipliers for impact analysis, users must provide geographically and industrially detailed information on the initial changes in output, earnings, or employment that are associated with the project or program under study. The multipliers can then be used to estimate the total impact of the project or program on regional output, earnings, and employment.

RIMS II is widely used in both the public and private sector. In the public sector, for example, the Department of Defense uses RIMS II to estimate the regional impacts of military base closings. State transportation departments use RIMS II to estimate the regional impacts of airport construction and expansion. In the private-sector, analysts and consultants use RIMS II to estimate the regional impacts of a variety of projects, such as the development of shopping malls and sports stadiums.

RIMS II Methodology

RIMS II uses BEA's benchmark and annual I-O tables for the nation. Since a particular region may not contain all the industries found at the national level, some direct input requirements cannot be supplied by that region's industries. Input requirements that are not produced in a study region are identified using BEA's regional economic accounts.

The RIMS II method for estimating regional I-O multipliers can be viewed as a three-step process. In the first step, the producer portion of the national I-O table is made region-specific by using six-digit NAICS location quotients (LQs). The LQs estimate the extent to which input requirements are supplied by firms within the region. RIMS II uses LQs based on two types of data: BEA's personal income data (by place of residence) are used to calculate LQs in the service industries; and BEA's wage-and-salary data (by place of work) are used to calculate LQs in the nonservice industries.

In the second step, the household row and the household column from the national I-O table are made region-specific. The household row coefficients, which are derived from the value-added row of the national I-O table, are adjusted to reflect regional earnings leakages resulting from individuals working in the region but residing outside the region. The household column coefficients, which are based on the personal consumption expenditure column of the national I-O table, are adjusted to account for regional consumption leakages stemming from personal taxes and savings.

In the last step, the Leontief inversion approach is used to estimate multipliers. This inversion approach produces output, earnings, and employment multipliers, which can be used to trace the impacts of changes in final demand on directly and indirectly affected industries.

Accuracy of RIMS II

Empirical evidence suggests that RIMS II commonly yields multipliers that are not substantially different in magnitude from those generated by regional I-O models based on relatively expensive surveys. For example, a comparison of 224 industry-specific multipliers from survey-based tables for Texas, Washington, and West Virginia indicates that the RIMS II average multipliers overestimate the average multipliers from the survey-based tables by approximately 5 percent. For the majority of individual industry-specific multipliers within these states, the difference between RIMS II and survey-based multipliers is less than 10 percent. In addition, RIMS II and survey multipliers show statistically similar distributions of affected industries. 4

Advantages of RIMS II

There are numerous advantages to using RIMS II. First, the accessibility of the main data sources makes it possible to estimate regional multipliers without conducting relatively expensive surveys. Second, the level of industrial detail used in RIMS II helps avoid aggregation errors, which often occur when industries are combined. Third, RIMS II multipliers can be compared across areas because they are based on a consistent set of estimating procedures nationwide. Fourth, RIMS II multipliers are updated to reflect the most recent local-area wage-and-salary and personal income data.

Applications of RIMS II

RIMS II multipliers can be used in a wide variety of regional impact studies. For example, the U.S. Nuclear Regulatory Commission has used RIMS II multipliers in environmental impact statements required for licensing nuclear electricity- generating facilities. The U.S. Department of Housing and Urban Development has used RIMS II multipliers to estimate the impacts of various types of urban redevelopment expenditures. RIMS II multipliers have also been used to estimate the regional economic and industrial impacts of: opening or closing military bases, tourist expenditures, new energy facilities, energy conservation, offshore drilling, opening or closing manufacturing plants, shopping malls, new sports stadiums, and new airport or port facilities.

APPENDIX B: RIMS II MULTIPLIER TABLES

RIMS II Multipliers (2008/2008)
Table 2.5 Total Multipliers for Output, Earnings, Employment, and Value Added by Industry Aggregation
Charlotte-Gastonia-Rock Hill, NC-SC Metropolitan Statistical Area (Type I)

INDUSTRY	Multiplier					
	Final Demand				Direct Effect	
	Output/1/ (dollars)	Earnings/2/ (dollars)	Employment/3/ (jobs)	Value-added/4/ (dollars)	Earnings/5/ (dollars)	Employment/6/ (jobs)
1. Crop and animal production	1.4776	0.3106	10.1731	0.6211	1.5131	1.3807
2. Forestry, fishing, and related activities	1.2362	0.3951	14.1929	0.6053	1.2166	1.1661
3. Oil and gas extraction	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4. Mining, except oil and gas	1.6442	0.3019	6.7621	0.8145	1.9510	2.0068
5. Support activities for mining	1.6714	0.4511	11.6563	0.6900	1.7737	1.6557
6. Utilities*	1.1162	0.1640	2.5958	0.6406	1.2667	1.5931
7. Construction	1.5069	0.4848	13.3665	0.7709	1.4366	1.3620
8. Wood product manufacturing	1.6079	0.3271	9.7065	0.5991	1.9767	1.9013
9. Nonmetallic mineral product manufacturing	1.5631	0.3429	7.6814	0.6784	1.7509	1.8532
10. Primary metal manufacturing	1.4365	0.2280	4.7365	0.4594	1.9909	2.3509
11. Fabricated metal product manufacturing	1.5375	0.3489	8.1657	0.6641	1.6265	1.6726
12. Machinery manufacturing	1.5645	0.3329	6.6512	0.6325	1.7624	1.9367
13. Computer and electronic product manufacturing	1.4404	0.3609	5.6892	0.7361	1.4675	1.6347
14. Electrical equipment and appliance manufacturing	1.4011	0.2624	5.7915	0.6297	1.5735	1.6478
15. Motor vehicle, body, trailer, and parts manufacturing	1.6093	0.2672	5.6353	0.6012	2.0132	2.2021
16. Other transportation equipment manufacturing	1.5783	0.2739	5.6470	0.6683	2.6009	2.6917
17. Furniture and related product manufacturing	1.5726	0.3634	10.0668	0.6901	1.6579	1.5613
18. Miscellaneous manufacturing	1.4957	0.3601	8.6022	0.7720	1.5404	1.5466
19. Food, beverage, and tobacco product manufacturing	1.3729	0.1803	4.5217	0.4312	1.9306	1.8114
20. Textile and textile product mills	1.7819	0.3176	7.9736	0.6371	2.0696	1.6955
21. Apparel, leather, and allied product manufacturing	1.6946	0.4041	10.6235	0.7556	1.7436	1.6369
22. Paper manufacturing	1.5869	0.2615	5.3894	0.6606	2.1826	2.7020
23. Printing and related support activities	1.6426	0.4185	10.3848	0.7104	1.6720	1.7069
24. Petroleum and coal products manufacturing	1.0925	0.1265	2.3269	0.2580	1.2439	1.3235
25. Chemical manufacturing	1.4334	0.2398	4.1325	0.5530	1.6336	2.2620
26. Plastics and rubber products manufacturing	1.5048	0.2637	6.5481	0.5678	1.6336	1.6941
27. Wholesale trade	1.3956	0.4272	8.6343	0.8630	1.3942	1.5943
28. Retail trade	1.3798	0.4451	17.2309	0.8933	1.2844	1.1996
29. Air transportation	1.2618	0.2251	5.1936	0.5182	1.5319	1.7119
30. Rail transportation	1.5368	0.3297	6.6486	0.7065	1.9447	2.7190
31. Water transportation	1.3334	0.2606	4.4648	0.5673	1.6154	2.4665
32. Truck transportation	1.4720	0.3954	10.6379	0.7093	1.5626	1.6633
33. Transit and ground passenger transportation*	1.2951	0.5984	20.8469	0.7036	1.1621	1.1096
34. Pipeline transportation	1.4039	0.3425	6.2958	0.7215	1.5713	2.3193
35. Other transportation and support activities*	1.2516	0.4643	12.3552	0.8301	1.1689	1.2263
36. Warehousing and storage	1.3564	0.5060	15.7599	0.9118	1.2374	1.2409
37. Publishing industries, except Internet	1.6147	0.4116	9.5175	0.7896	1.7930	2.1430
38. Motion picture and sound recording industries	1.4216	0.3294	16.2015	0.8451	1.5940	1.3069
39. Broadcasting, except Internet	1.5629	0.5817	9.8925	0.7463	1.5166	2.0644

(Continued)

Region Definition: Anson, NC; Cabarrus, NC; Gaston, NC; Mecklenburg, NC; Union, NC; York, SC
*Includes Government enterprises.
1. Each entry in column 1 represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
2. Each entry in column 2 represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
3. Each entry in column 3 represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry. Because the employment multipliers are based on 2008 data, the output delivered to final demand should be in 2008 dollars.
4. Each entry in column 4 represents the total dollar change in value added that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
5. Each entry in column 5 represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the industry corresponding to the entry.
6. Each entry in column 6 represents the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry.
NOTE.--Multipliers are based on the 2008 Annual Input-Output Table for the Nation and 2008 regional data. Industry List B identifies the industries corresponding to the entries.
SOURCE.--Regional Input-Output Modeling System (RIMS II), Regional Product Division, Bureau of Economic Analysis.

RIMS II Multipliers (2008/2008)
Table 2.5 Total Multipliers for Output, Earnings, Employment, and Value Added by Industry Aggregation
Charlotte-Gastonia-Rock Hill, NC-SC Metropolitan Statistical Area (Type I)

INDUSTRY	Multiplier					
	Final Demand				Direct Effect	
	Output/1/ (dollars)	Earnings/2/ (dollars)	Employment/3/ (jobs)	Value-added/4/ (dollars)	Earnings/5/ (dollars)	Employment/6/ (jobs)
40. Telecommunications	1.4674	0.2506	5.6643	0.8164	1.8603	2.3322
41. Internet and other information services	1.5659	0.3601	7.7419	0.8177	1.8776	2.7191
42. Federal Reserve banks, credit intermediation and related services	1.6586	0.3973	8.7434	0.8664	2.0314	2.7640
43. Securities, commodity contracts, investments	1.6447	0.6479	18.4437	0.8504	1.3320	1.3069
44. Insurance carriers and related activities	1.4267	0.3636	7.5674	0.9338	1.4737	1.5618
45. Funds, trusts, and other financial vehicles	1.6481	0.5067	17.0675	0.9148	2.6455	2.0541
46. Real estate	1.4280	0.1556	6.5365	0.9394	2.6560	1.5187
47. Rental and leasing services and lessors of intangible assets	1.4810	0.3166	6.6587	0.9306	1.7749	1.7180
48. Professional, scientific, and technical services	1.3686	0.6612	12.9299	0.8953	1.2353	1.3464
49. Management of companies and enterprises	1.3966	0.5707	8.7266	0.8801	1.2656	1.5880
50. Administrative and support services	1.3678	0.5481	25.3706	0.8697	1.2766	1.1665
51. Waste management and remediation services	1.4557	0.3569	7.9166	0.7778	1.6694	1.7940
52. Educational services	1.3404	0.5636	20.7426	0.8506	1.1661	1.1379
53. Ambulatory health care services	1.3682	0.5671	12.7681	0.8665	1.2386	1.3533
54. Hospitals	1.5161	0.5177	12.3483	0.8477	1.3308	1.4788
55. Nursing and residential care facilities	1.3542	0.5578	22.1404	0.8838	1.2000	1.1501
56. Social assistance	1.3941	0.5426	27.1796	0.8699	1.2417	1.1392
57. Performing arts, spectator sports, museums, zoos, and parks	1.4684	0.5733	24.2241	0.8724	1.3433	1.2515
58. Amusements, gambling, and recreation	1.3729	0.4343	24.0068	0.8723	1.2637	1.1286
59. Accommodation	1.5036	0.4148	15.6556	0.8432	1.5586	1.3423
60. Food services and drinking places	1.4513	0.4211	23.5405	0.7903	1.3616	1.1457
61. Other services*	1.4791	0.5398	16.6273	0.8360	1.3340	1.3136
62. Households	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Region Definition: Anson, NC; Cabarrus, NC; Gaston, NC; Mecklenburg, NC; Union, NC; York, SC
*Includes Government enterprises.
1. Each entry in column 1 represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
2. Each entry in column 2 represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
3. Each entry in column 3 represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry. Because the employment multipliers are based on 2008 data, the output delivered to final demand should be in 2008 dollars.
4. Each entry in column 4 represents the total dollar change in value added that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
5. Each entry in column 5 represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the industry corresponding to the entry.
6. Each entry in column 6 represents the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry.
NOTE.--Multipliers are based on the 2008 Annual Input-Output Table for the Nation and 2008 regional data. Industry List B identifies the industries corresponding to the entries.
SOURCE.--Regional Input-Output Modeling System (RIMS II), Regional Product Division, Bureau of Economic Analysis.

RIMS II Multipliers (2008/2008)
Table 2.5 Total Multipliers for Output, Earnings, Employment, and Value Added by Industry Aggregation
Charlotte-Gastonia-Rock Hill, NC-SC Metropolitan Statistical Area (Type II)

INDUSTRY	Multiplier					
	Final Demand				Direct Effect	
	Output/1/ (dollars)	Earnings/2/ (dollars)	Employment/3/ (jobs)	Value-added/4/ (dollars)	Earnings/5/ (dollars)	Employment/6/ (jobs)
1. Crop and animal production	1.8638	0.4156	13.6234	0.8516	2.0255	1.8490
2. Forestry, fishing, and related activities	1.7277	0.5269	16.5836	1.0967	1.6266	1.6295
3. Oil and gas extraction	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4. Mining, except oil and gas	1.9198	0.4042	10.1178	1.0387	2.6117	3.0058
5. Support activities for mining	2.2326	0.6039	16.6696	1.0249	2.3743	2.3679
6. Utilities*	1.3202	0.2195	4.4180	0.7623	1.6984	2.7115
7. Construction	2.0869	0.6219	16.5293	1.1158	1.9258	1.9158
8. Wood product manufacturing	2.0148	0.4378	12.3432	0.8419	2.6446	2.6949
9. Nonmetallic mineral product manufacturing	1.9897	0.4590	11.4918	0.9310	2.3439	2.7725
10. Primary metal manufacturing	1.7192	0.3053	7.2738	0.6287	2.6652	3.6079
11. Fabricated metal product manufacturing	1.9716	0.4670	12.0426	0.9231	2.1799	2.4666
12. Machinery manufacturing	1.9786	0.4456	10.5505	0.8797	2.3592	2.9855
13. Computer and electronic product manufacturing	1.6893	0.4631	9.6997	1.0041	1.9644	3.1260
14. Electrical equipment and appliance manufacturing	1.7526	0.3781	8.9302	0.8394	2.1063	2.5406
15. Motor vehicle, body, trailer, and parts manufacturing	1.9667	0.3645	9.0275	0.7145	2.6950	3.4067
16. Other transportation equipment manufacturing	2.0191	0.3667	8.8913	0.8696	3.3471	4.3974
17. Furniture and related product manufacturing	2.0249	0.4864	14.1271	0.9599	2.2193	2.1862
18. Miscellaneous manufacturing	1.9437	0.4820	12.6039	1.0393	2.0620	2.2661
19. Food, beverage, and tobacco product manufacturing	1.5972	0.2413	6.5251	0.5651	2.5846	2.6139
20. Textile and textile product mills	2.1770	0.4251	11.6029	0.8729	2.8106	2.7345
21. Apparel, leather, and allied product manufacturing	2.1873	0.5409	15.3141	1.0556	2.3340	2.3152
22. Paper manufacturing	1.9123	0.3501	8.2957	0.8549	2.9219	4.1592
23. Printing and related support activities	2.1633	0.5603	15.0360	1.0211	2.2382	2.4714
24. Petroleum and coal products manufacturing	1.2524	0.1721	3.7563	0.3514	1.6651	2.1359
25. Chemical manufacturing	1.7318	0.3210	6.7976	0.7311	2.4546	3.7208
26. Plastics and rubber products manufacturing	1.8204	0.3396	8.3652	0.7561	2.4544	2.8419
27. Wholesale trade	1.9271	0.5719	13.3822	1.2002	1.8663	2.4710
28. Retail trade	1.9336	0.5958	22.1772	1.2237	1.7193	1.5440
29. Air transportation	1.5419	0.3014	7.6956	0.6854	2.0507	2.5366
30. Rail transportation	1.9470	0.4413	10.3123	0.9513	2.6033	4.2173
31. Water transportation	1.6579	0.3492	7.3636	0.7610	2.1624	4.0713
32. Truck transportation	1.9639	0.5292	15.0312	1.0028	2.1186	2.3503
33. Transit and ground passenger transportation*	2.0371	0.7983	27.4744	1.1464	1.5556	1.4623
34. Pipeline transportation	1.8299	0.4565	10.1019	0.9756	2.1034	3.7214
35. Other transportation and support activities*	1.8544	0.6484	17.7378	1.1697	1.5916	1.7606
36. Warehousing and storage	1.9684	0.6801	21.4054	1.2890	1.6564	1.6850
37. Publishing industries, except internet	2.1271	0.5513	14.0941	1.0954	2.4002	3.1734
38. Motion picture and sound recording industries	1.8314	0.4410	19.6627	1.0697	2.1338	1.6046
39. Broadcasting, except internet	2.2492	0.7385	16.0238	1.1559	2.0287	3.3763

(Continued)

Region Definition: Anson, NC; Cabarrus, NC; Gaston, NC; Mecklenburg, NC; Union, NC; York, SC

*Includes Government enterprises.

1. Each entry in column 1 represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
2. Each entry in column 2 represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
3. Each entry in column 3 represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry. Because the employment multipliers are based on 2008 data, the output delivered to final demand should be in 2008 dollars.
4. Each entry in column 4 represents the total dollar change in value added that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.
5. Each entry in column 5 represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the industry corresponding to the entry.
6. Each entry in column 6 represents the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry.

NOTE.--Multipliers are based on the 2008 Annual Input-Output Table for the Nation and 2008 regional data. Industry List B identifies the industries corresponding to the entries.

SOURCE.--Regional Input-Output Modeling System (RIMS II), Regional Product Division, Bureau of Economic Analysis.

RIMS II Multipliers (2008/2008)
Table 2.5 Total Multipliers for Output, Earnings, Employment, and Value Added by Industry Aggregation
Charlotte-Gastonia-Rock Hill, NC-SC Metropolitan Statistical Area (Type II)

INDUSTRY	Multiplier					
	Final Demand				Direct Effect	
	Output/1/ (dollars)	Earnings/2/ (dollars)	Employment/3/ (jobs)	Value-added/4/ (dollars)	Earnings/5/ (dollars)	Employment/6/ (jobs)
40. Telecommunications	1.7794	0.3357	8.4517	1.0027	2.6510	3.4799
41. Internet and other information services	2.0339	0.4821	11.7442	1.0851	2.5136	4.1246
42. Federal Reserve banks, credit intermediation and related services	2.1529	0.6316	13.1583	1.1634	2.7193	4.1596
43. Securities, commodity contracts, investments	2.3509	0.9873	25.8441	1.3315	1.7831	1.8199
44. Insurance carriers and related activities	1.8781	0.4867	11.6078	1.2036	1.9728	2.4263
45. Funds, trusts, and other financial vehicles	2.4784	0.6782	22.6981	1.2910	3.5414	2.7316
46. Real estate	1.6219	0.2066	10.2683	1.0551	3.8258	1.8266
47. Rental and leasing services and lessors of intangible assets	1.6748	0.4238	12.1776	1.1656	2.3759	2.4159
48. Professional, scientific, and technical services	2.0917	0.7780	19.3488	1.3269	1.6537	2.0190
49. Management of companies and enterprises	2.1087	0.7839	15.0885	1.3038	1.6940	2.7040
50. Administrative and support services	2.0897	0.7337	31.4816	1.2766	1.7092	1.4491
51. Waste management and remediation services	1.8897	0.4776	11.8833	1.0426	2.1009	2.6929
52. Educational services	2.0416	0.7545	27.0062	1.2892	1.5810	1.4816
53. Ambulatory health care services	2.1186	0.7859	19.2927	1.3025	1.6583	2.0448
54. Hospitals	2.1601	0.6930	18.1013	1.2320	1.7814	2.1678
55. Nursing and residential care facilities	2.0479	0.7464	28.3370	1.2976	1.6064	1.4720
56. Social assistance	2.0891	0.7263	33.2092	1.2729	1.6621	1.3919
57. Performing arts, spectator sports, museums, zoos, and parks	2.1617	0.7675	30.6957	1.2981	1.7962	1.5607
58. Amusements, gambling, and recreation	1.9133	0.5814	26.6336	1.1948	1.7184	1.3556
59. Accommodation	2.0197	0.5563	20.4959	1.1519	2.0864	1.7319
60. Food services and drinking places	1.9763	0.5636	28.2207	1.1030	1.8228	1.3734
61. Other services*	2.1506	0.7225	22.8258	1.2369	1.7857	1.7819
62. Households	1.2441	0.3368	11.1132	0.7425	0.0000	0.0000

Region Definition: Anson, NC; Cabarrus, NC; Gaston, NC; Mecklenburg, NC; Union, NC; York, SC

*Includes Government enterprises.

1. Each entry in column 1 represents the total dollar change in output that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

2. Each entry in column 2 represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

3. Each entry in column 3 represents the total change in number of jobs that occurs in all industries for each additional 1 million dollars of output delivered to final demand by the industry corresponding to the entry. Because the employment multipliers are based on 2008 data, the output delivered to final demand should be in 2008 dollars.

4. Each entry in column 4 represents the total dollar change in value added that occurs in all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

5. Each entry in column 5 represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the industry corresponding to the entry.

6. Each entry in column 6 represents the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry.

NOTE.–Multipliers are based on the 2006 Annual Input-Output Table for the Nation and 2008 regional data. Industry List B identifies the industries corresponding to the entries.

SOURCE.–Regional Input-Output Modeling System (RIMS II), Regional Product Division, Bureau of Economic Analysis.

APPENDIX C:

ECONOMIC MODELING RESULTS

TOTAL ESTIMATED ANNUAL DIRECT AND INDIRECT ECONOMIC IMPACT USING RIMS TYPE I MULTIPLIERS

note: assumes all induced impacts remain regional, all $2008

				Direct Effect	Final Demand							
FACILITY	Employee change	RIMS II INDUSTRY CODE	RIMS II INDUSTRY TYPE	Employment multiplier	Employment multiplier	Final $ Demand Per employee Annually	DIRECT EFFECT FINAL DEMAND OUTPUT	Final Demand Employment Multiplier	INCREASE OR DECREASE IN FINAL JOBS	Final Regional Output Multilier	Final Demand Earnings Multiplier	INCREASE OR DECREASE IN REGIONAL OUTPUT
AT&T	100	41	Internet & other information services	2.7191	7.7419	$351,219	$35,121,869	7.7419	272	1.5859	0.3601	$55,699,773
Caterpillar	199	12	Machinery manuf.	1.9387	6.8512	$282,972	$56,311,493	6.8512	386	1.5645	0.3329	$88,099,331
Zimmer Holdings*	124	25	mfg surgical products	1.5466	8.602	$179,795	$22,294,629	8.602	192	1.4957	0.3601	$33,346,077
Berry Plastic	314	26	Plastic product mfg.	1.8841	5.5461	$339,716	$106,670,886	5.5461	592	1.5048	0.2537	$160,518,349

*note that Zimmer designated a "misc." manufacturer.

TOTAL ESTIMATED ANNUAL ECONOMIC IMPACT USING RIMS TYPE II MULTIPLIERS

note: assumes all induced impacts remain regional, all $2008

				Direct Effect	Final Demand							
FACILITY	Employee change	RIMS II INDUSTRY CODE	RIMS II INDUSTRY TYPE	Employment multiplier	Employment multiplier	Final $ Demand Per employee Annually	**DIRECT EFFECT FINAL DEMAND OUTPUT**	Final Demand Employment Multiplier	**TOTAL INCREASE OR DECREASE IN FINAL JOBS**	Final Regional Output Multilier	Final Demand Earnings Multiplier	**INCREASE OR DECREASE IN REGIONAL OUTPUT**
AT&T	100	41	Internet & other information services	4.1248	11.7442	$351,220	$35,122,018	11.7442	412	2.0339	0.4821	$71,434,672
Caterpillar	199	12	Machinery manuf.	2.9855	10.5505	$282,972	$56,311,502	10.5505	594	1.9786	0.4456	$111,417,938
Zimmer Holdings	124	25	mfg surgical products	2.2661	12.6039	$179,794	$22,294,401	12.6039	281	1.9437	0.482	$43,333,627
Berry Plastic	314	26	Plastic product mfg.	2.8419	8.3652	$339,729	$106,674,867	8.3652	892	1.8204	0.3396	$194,190,928

TOTAL ESTIMATED ANNUAL INDUCED ECONOMIC IMPACT USING RIMS TYPE I & II MULTIPLIERS

note: assumes all induced impacts remain regional, all $2008

				Direct Effect	Final Demand							
FACILITY	Employee change	RIMS II INDUSTRY CODE	RIMS II INDUSTRY TYPE	Employment multiplier	Employment multiplier	Final $ Demand Per employee Annually	**DIRECT EFFECT FINAL DEMAND OUTPUT**	Final Demand Employment Multiplier	**TOTAL INCREASE OR DECREASE IN FINAL JOBS**	Final Regional Output Multilier	Final Demand Earnings Multiplier	**INCREASE OR DECREASE IN REGIONAL OUTPUT**
AT&T	100	41	Internet & other information services	na	na	na	na	na	141	na	na	$15,734,899
Caterpillar	199	12	Machinery manuf.	na	na	na	na	na	208	na	na	$23,318,607
Zimmer Holdings	124	25	mfg surgical products	na	na	na	na	na	89	na	na	$9,987,550
Berry Plastic	314	26	Plastic product mfg.	na	na	na	na	na	301	na	na	$33,672,579

TOTAL ESTIMATED ANNUAL INDUCED ECONOMIC IMPACT USING RIMS TYPE I & II MULTIPLIERS

FACILITY	CHANGE IN NUMBER OF EMPLOYEES	FINAL $ DEMAND PER EMPLOYEE	DIRECT EFFECT FINAL DEMAND OUTPUT	INCREASE OR DECREASE IN FINAL JOBS	INCREASE OR DECREASE IN REGIONAL OUTPUT	INCREASE OR DECREASE IN EARNINGS
AT&T	100	na	na	141	$15,734,899	$14,381,167
Caterpillar	199	na	na	208	$23,318,607	$20,319,566
Zimmer Holdings	124	na	na	89	$9,987,550	$8,878,886
Berry Plastic	314	na	na	301	$33,672,579	$25,223,734

TOTAL ESTIMATED ANNUAL ECONOMIC IMPACT USING RIMS TYPE II MULTIPLIERS

FACILITY	CHANGE IN NUMBER OF EMPLOYEES	FINAL $ DEMAND PER EMPLOYEE	DIRECT EFFECT FINAL DEMAND OUTPUT	INCREASE OR DECREASE IN FINAL JOBS	INCREASE OR DECREASE IN REGIONAL OUTPUT	INCREASE OR DECREASE IN EARNINGS
AT&T	100	$351,220	$35,122,018	412	$71,434,672	$34,438,655
Caterpillar	199	$282,972	$56,311,502	594	$111,417,938	$49,647,833
Zimmer Holdings	124	$179,794	$22,294,401	281	$43,333,627	$20,886,808
Berry Plastic	314	$339,729	$106,674,867	892	$194,190,928	$65,947,239

TOTAL ESTIMATED ANNUAL ECONOMIC IMPACT

FACILITY	CHANGE IN NUMBER OF EMPLOYEES	FINAL $ DEMAND PER EMPLOYEE	NUMBER OF JOBS GREATED (LOST) IN REGION PER NEW (LOST) JOB	$ INCREASE (DECREASE) IN TOTAL OUTPUT IN REGION PER NEW (LOST) EMPLOYEE	$ INCREASE (DECREASE) IN EARNINGS IN REGION PER NEW (LOST) EMPLOYEE
AT&T	100	$351,220	3	$714,347	$344,387
Caterpillar	199	$282,972	2	$559,889	$249,487
Zimmer Holdings	124	$179,794	1	$349,465	$168,442
Berry Plastic	314	$339,729	2	$618,442	$210,023

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APPENDIX D:

COST OF SERVICE STUDY AND LOST CUSTOMER RATE IMPACT TABLES

(to be supplied electronically or thru a PDF on request)

APPENDIX E

APPENDIX E TABLE A: REGRESSION ANALYSIS FOR DEVELOPING RATE IMPACTS FROM LOSS OF LARGE CUSTOMERS: NORTH CAROLINA DATA

.	Wages & Salary $000s	Other Suplements to Income $000s	Total Wages $000s (note 1)	Total Electric Sales MWh (note 2)	ln MWh sales				Estimate of Total Income from Linear Regression Model $ 000s	Error in Estimate VS Actual Total Income $ 000s	% Error in Estimate	% Error Absolute Value
1990	67,737,154	14,098,903	81,836,057	89,924,487	18.314			.	$69,266,119	$12,569,938	15.36%	15.36%
1991	69,752,189	14,961,410	84,713,599	92,316,483	18.341				$77,102,448	$7,611,151	8.98%	8.98%
1992	75,742,205	16,949,955	92,692,160	94,195,331	18.361				$83,257,673	$9,434,487	10.18%	10.18%
1993	79,796,075	18,203,256	97,999,331	99,777,554	18.418		**linear equation**[50]		$101,545,386	-$3,546,055	-3.62%	3.62%
1994	85,208,962	19,273,093	104,482,055	99,789,182	18.419		Slope	3.2760629	$101,583,480	$2,898,575	2.77%	2.77%
1995	91,097,636	19,722,765	110,820,401	104,672,756	18.466		Intercept	- 225332156.5	$117,582,376	-$6,761,975	-6.10%	6.10%
1996	96,687,395	20,348,105	117,035,500	108,296,394	18.500		rsquare	0.948534829	$129,453,642	-$12,418,142	-10.61%	10.61%
1997	104,481,312	21,214,673	125,695,985	109,050,025	18.507		**ln equation**		$131,922,585	-$6,226,600	-4.95%	4.95%
1998	112,589,936	22,717,808	135,307,744	113,596,306	18.548		Slope	361437853.6	$146,816,487	-$11,508,743	-8.51%	8.51%
1999	120,566,354	24,341,619	144,907,973	115,015,125	18.561		Intercept	-6554359611	$151,464,627	-$6,556,654	-4.52%	4.52%
2000	129,050,556	26,110,429	155,160,985	119,855,456	18.602		rsquare	0.930870745	$167,321,856	-$12,160,871	-7.84%	7.84%
2001	131,971,981	27,523,701	159,495,682	119,026,943	18.595				$164,607,596	-$5,111,914	-3.21%	3.21%
2002	133,684,258	29,663,777	163,348,035	122,686,468	18.625				$176,596,430	-$13,248,395	-8.11%	8.11%

[50] Linear equation is of the form:

Total Income ($1000) = Sales (MWh) * 3.2760629 – 225,332,157

2003	136,859,282	32,743,570	169,602,852	121,335,121	18.614				$172,169,332	-$2,566,480	-1.51%	1.51%
2004	144,888,293	34,334,640	179,222,933	125,656,807	18.649				$186,327,447	-$7,104,514	-3.96%	3.96%
2005	152,586,870	36,864,955	189,451,825	128,335,377	18.670				$195,102,611	-$5,650,786	-2.98%	2.98%
2006	163,569,947	38,570,522	202,140,469	126,698,979	18.657				$189,741,668	$12,398,801	6.13%	6.13%
2007	174,483,397	40,661,310	215,144,707	131,880,754	18.697				$206,717,489	$8,427,218	3.92%	3.92%
2008[r]	178,300,526	43,289,780	221,590,306	130,054,113	18.683				$200,733,298	$20,857,008	9.41%	9.41%
2009[r]	170,269,336	43,641,579	213,910,915	127,657,979	18.665				$192,883,412	$21,027,503	9.83%	9.83%
2010[r]	174,550,158	44,658,081	219,208,239	136,414,947	18.731				$221,571,790	-$2,363,551	-1.08%	1.08%
2011[P]	181,584,190	45,816,664	227,400,854	NA	NA							
											Avg % Error	6.36%

1 Total Wage and employee benefits Income ($000s), U. S. and States: 1990 to 2011
Source: U.S. Department of Commerce, Bureau of Economic Analysis. Data released March 2012.

2 Source: EIA

APPENDIX E TABLE B: ESTIMATION FORMULAS FOR DEVELOPING RATE IMPACTS FROM LOSS OF LARGE CUSTOMERS

North Carolina

YEAR	Wages & Salary $000s*	Other Supplements to Income $000s*	Total Wages $000s*	Total Electric Sales MWh **	MWh Sales/$ per Income
1990	67,737,154	14,098,903	81,836,057	89,924,487	0.00110
1991	69,752,189	14,961,410	84,713,599	92,316,483	0.00109
1992	75,742,205	16,949,955	92,692,160	94,195,331	0.00102
1993	79,796,075	18,203,256	97,999,331	99,777,554	0.00102
1994	85,208,962	19,273,093	104,482,055	99,789,182	0.00096
1995	91,097,636	19,722,765	110,820,401	104,672,756	0.00094
1996	96,687,395	20,348,105	117,035,500	108,296,394	0.00093
1997	104,481,312	21,214,673	125,695,985	109,050,025	0.00087
1998	112,589,936	22,717,808	135,307,744	113,596,308	0.00084
1999	120,566,354	24,341,619	144,907,973	115,015,125	0.00079
2000	129,050,556	26,110,429	155,160,985	119,855,456	0.00077
2001	131,971,981	27,523,701	159,495,682	119,026,943	0.00075
2002	133,684,258	29,663,777	163,348,035	122,686,468	0.00075
2003	136,859,282	32,743,570	169,602,852	121,335,121	0.00072
2004	144,888,293	34,334,640	179,222,933	125,656,807	0.00070
2005	152,586,870	36,864,955	189,451,825	128,335,377	0.00068
2006	163,569,947	38,570,522	202,140,469	126,698,979	0.00063
2007	174,483,397	40,661,310	215,144,707	131,880,754	0.00061
2008'	178,300,526	43,289,780	221,590,306	130,054,113	0.00059

2009[r]	170,269,336	43,641,579	213,910,915	127,657,979	0.00060
2010[r]	174,550,158	44,658,081	219,208,239	136,414,947	0.00062
2011[p]	181,584,190	45,816,664	227,400,854	NA	NA

* Total Wage and employee benefits Income ($000s), U. S. and States: 1990 to 2011
**EIA

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APPENDIX E TABLE C: ESTIMATION OF DUKE RESIDENTIAL CUSTOMER LOST REVENUE

TARGET COMPANY	EMPLOYEE CHANGE AT TARGET COMPANY	# of TOTAL JOB LOSSES	INCREASED NUMBER OF EMPLOYEES RELATED TO MULTIPLIER EFFECT	ESTIMATED TOTAL DECREASE IN TOTAL EMPLOYEE EARNINGS ($ 000)	ESTIMATED TOTAL DECREASE IN TOTAL EMPLOYEE EARNINGS RELATED TO MULTIPLIER EFFECT ($ 000)	ESTIMATED TOTAL LOST MWh ELECTRIC SALES FOR CHANGE IN EMPLOYEE EARNINGS (use MWh sales/per $ income)	ESTIMATED LOST MWh ELECTRIC SALES FOR CHANGE IN EMPLOYEE EARNINGS DUE TO MULTIPLIER EFFECT (use MWh sales/per $ income)	TOTAL $ IN DUKE LOST ELECTRIC REVENUES (FIXED AND VARIABLE) USING DUKE AVERAGE RETAIL PRICE (source: EIA 11/3/2011)	$ IN DUKE LOST ELECTRIC REVENUES (FIXED AND VARIABLE) RELATED TO TARGET COMPANY	$ IN DUKE LOST ELECTRIC REVENUES (FIXED AND VARIABLE) RELATED TO MULTIPLIER	$ IN DUKE LOST FIXED ELECTRIC REVENUES	$ IN DUKE LOST FIXED ELECTRIC REVENUES RELATED TO TARGET COMPANY	$ IN DUKE LOST FIXED ELECTRIC REVENUES RELATED TO RELATED TO MULTIPLIER	ESTIMATED INCREASE IN REVENUE IMPACT ON REMAINING CUSTOMERS FROM MULTIPLIER EFFECT
AT&T	100	412	312	$34,439	$26,080	21,008	15,909	[redacted]	[redacted]	$1,194,752	$1,079,137	$261,926	$817,210	312%
Caterpillar	199	594	395	$49,648	$33,015	30,285	20,139	[redacted]	[redacted]	$1,512,454	$1,555,706	$521,188	$1,034,519	198%
Zimmer Holdings	124	281	157	$20,887	$11,670	12,741	7,119	[redacted]	[redacted]	$534,613	$654,488	$288,813	$365,675	127%
Berry Plastic	314	892	578	$65,947	$42,732	40,228	26,067	[redacted]	[redacted]	$1,957,617	$2,066,431	$727,421	$1,339,010	184%

* Using estimation from Appendix E Table B

** Using Duke average retail price (source: EIA 11/3/2011)

*** Based on Duke North Carolina 2010 Cost of Service Study