The Impact of Burgess BioPower's Annual Operations on Berlin, Coos County, and The State of New Hampshire

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polecon research

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Executive Summary

Since beginning operation in 2014, Burgess BioPower (BBP or Burgess) in Berlin, New Hampshire has had a significant, positive impact on the economic and fiscal health of its host community according to local officials and businesses in the region. Prior studies of the construction impacts of BBP included prospective estimates of the impact that annual operation of Burgess would have on the State's economy. However, these estimates did not have the benefit of using actual operating data from the facility. Since it began operating, no systematic or empirical analysis of BBP's economic and fiscal impacts has been undertaken, nor has any assessment been conducted of Burgess' potential impacts on socioeconomic conditions in a region that has long struggled economically and demographically. Moreover, despite increasing media attention and its importance in energy policy debates in New Hampshire, Burgess BioPower's impacts on electricity prices and customers in New Hampshire are not well documented and do not appear to be well understood by the public, media, and lawmakers.

A more complete understanding of the costs, benefits, and net impacts of Burgess BioPower's operations on important economic, social, and electricity market metrics is especially important as the evolution of New Hampshire's electricity market continues and as the State looks to craft energy policies that balance sometimes conflicting economic and environmental objectives.

This report examines empirical evidence of Burgess' impacts on the local, regional and state economies. The report was paid for, but prepared independently of, Burgess BioPower; it takes no position on matters of policy and PolEcon holds no conflicts of interest that prevent it from providing objective analysis to Burgess BioPower, policymakers, or the citizens of New Hampshire. The purpose of the report is to provide an independent analysis of data that will inform elected and appointed officials and members of the public who are interested in the benefits and costs of the annual operation of the facility. All analyses in this study employ standard economic methods and models widely used by economists and extensively reviewed in academic journals. All data used in the construction of models and in calculating impacts (except for facility operating data) is publicly available from state, federal or local government agencies. Burgess BioPower supplied proprietary data on operation and maintenance expenditures, as well as the labor required to operate the facility on an annual basis. Burgess BioPower was given the opportunity to review the findings and to correct errors of fact in the description of the project and its operations and to correct any errors in the details of project expenditures, facility operations, or

contractual arrangements; however, the company had no role in calculating economic impacts outlined in the report and was not given an opportunity to edit any of the results of the impact analyses.

The principal finding of this report is that the economic and fiscal benefits of the Burgess BioPower facility to the City of Berlin, the County of Coos, and the State of New Hampshire significantly exceed costs associated with the facility's impact on electricity prices in New Hampshire. The report also finds that forecasts of New England energy market and fossil fuel prices indicate that the risks that Burgess BioPower's electricity prices will exceed market prices by levels similar to 2015 and 2016 diminish in future years.

Key Job and Income Impacts

- The annual economic impact of Burgess BioPower throughout the State of New Hampshire in 2016 was 221 jobs, $13.9 million in labor income, and $63.4 million in output of goods and services[1].

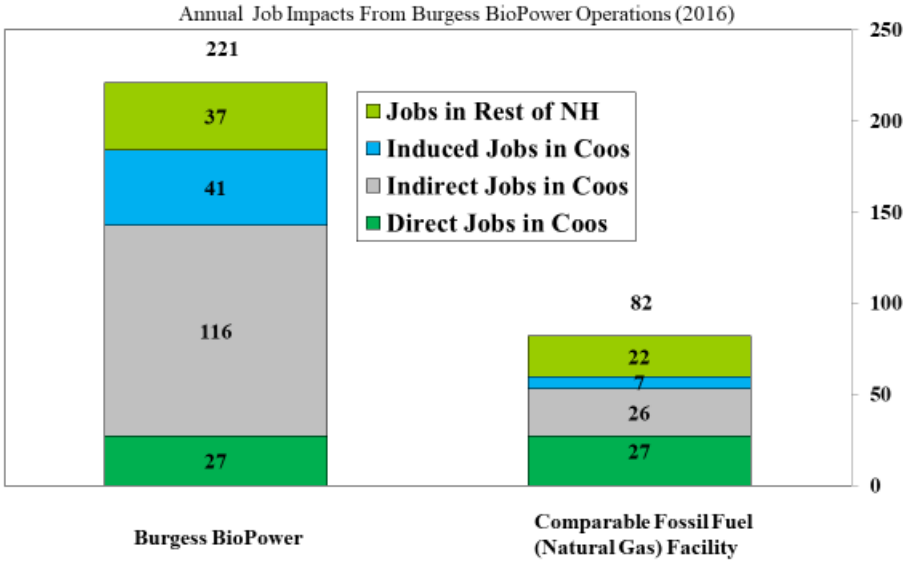
Annual Impact of Burgess BioPower Operations (2016 Dollars)				
	Impact Type	**Employment**	**Labor Income**	**Output**
Coos County	Direct Effect	27	$2,563,475	$37,258,597
	Indirect Effect	116	$7,406,400	$15,742,745
	Induced Effect	41	$1,518,778	$4,658,229
	Total Effect	**184**	**$11,488,653**	**$57,659,571**
Remainder of NH	Indirect & Induced	**37**	**$2,428,189**	**$5,786,399**
Total Impacts in NH	Direct + Indirect + Induced	**221**	**$13,916,842**	**$63,445,969**

- The economic impacts of Burgess BioPower are greatest in Coos County where 184 jobs are supported resulting in $11.49 million in labor income. The facility's annual operations also support another 37 jobs and $2.43 million of labor income in other regions of New Hampshire.

- For comparison purposes, job impacts of an equivalently staffed fossil fuel (natural gas) generation facility in Berlin would support just 60 jobs in Coos County and another 22 throughout New Hampshire. Job impacts of Burgess are much larger because its fuel (biomass) is primarily sourced locally, while natural gas must be imported. In addition, the biomass that fuels Burgess is trucked by local firms while natural gas is transported via pipelines that require little local labor.

1 This assumes that 55 percent of the biomass fuel used for electricity generation is from sources in New Hampshire. If more or less biomass is sourced from NH then indirect and induced jobs impacts will respond accordingly.

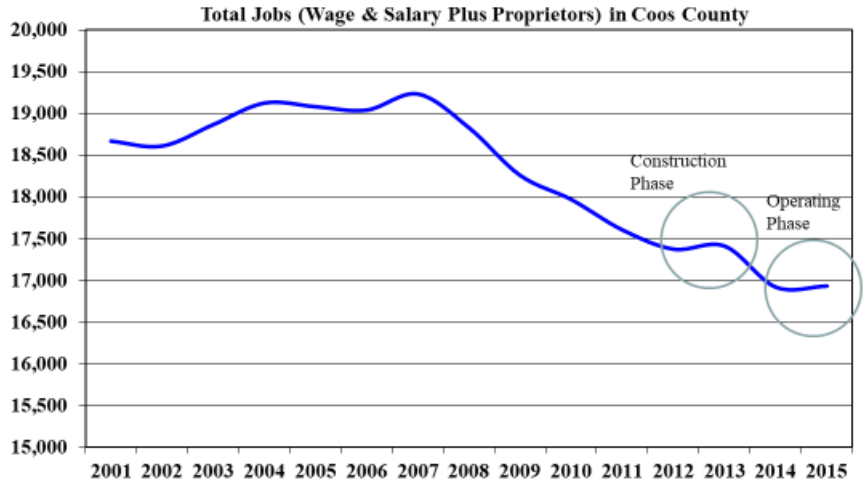
Burgess' Operations Support 184 Jobs in Coos County and Another 37 Jobs in Other Regions of New Hampshire – Nearly Three Times the Impact of a Comparable Fossil Fuel (Natural Gas) Fired Generator



- Logging and sawmill jobs account for 79 of the 184 jobs supported by Burgess in Coos County and 93 of the 221 jobs supported by Burgess throughout New Hampshire.

- Detailed economic data at the city and county level is reported with a long lag (the most recent being 2015) but the data indicate substantial positive economic impacts resulting from the construction and operation of Burgess.

Burgess BioPower has Helped Slow (and Reverse) the Flow of Jobs From Coos County. Impacts From Annual Operations are Just Beginning to Appear in the Lagged Employment Data



Source: U.S. Bureau of Economic Analysis, "Local Area Personal Income and Employment," file CA25N, PolEcon

Key Fiscal Impacts

- In fiscal year 2016, Burgess BioPower made payments in lieu of taxes to the City of Berlin of $750,000. In the absence of BBP payments the tax rate in Berlin (at $39.19 the second highest in NH in 2016) would have risen by $1.90 or 4.8 percent, to $41.09.

- In 2016, payments in lieu of taxes by BBP saved Berlin homeowners with a home at the median value approximately $168 in property tax payments. From 2019 on, savings to homeowners with a home valued at the median should reach $300 and increase annually.

- Burgess BioPower paid $1.08 million in water and sewer fees to the City of Berlin in 2016. Without these payments, water and sewer rates in Berlin would increase by approximately 15 percent.

2016 Berlin Property Taxes and Rates
With and Without Burgess BioPower PILOT

Tax	Total Property Valuation	Tax Rate With Burgess' PILOT	Taxes Raised With Burgess' PILOT	% of Local Tax Obligation	Required Taxes Without Burgess' PILOT	Required Tax Rate Without Burgess' PILOT
Municipal	$395,480,779	$17.74	$7,020,048	48.4%	$7,382,776	$18.67
County	$395,480,779	$4.17	$1,647,881	11.4%	$1,733,027	$4.38
Local education	$395,480,779	$14.79	$5,847,186	40.3%	$6,149,312	$15.55
State Education	$253,158,879	$2.49	$629,396		$629,396	$2.49
		$39.19	**$15,144,511**		**$15,894,511**	**$41.09**

Impact of Burgess' PILOT on Berlin's Tax Rate	**-$1.90**
% of 2016 Rate	**4.8%**
Median Home Value in Berlin	**$88,400**
Change in Property Tax Payment for Home at Median Value	**-$167.86**

- In 2016 the economic activity in Berlin, Coos County and the State of New Hampshire resulting from operations at Burgess BioPower produced an estimated $3.94 million in taxes, fees, and charges paid to the state and its local governments, including over $1 million in State of New Hampshire utility taxes and $1.4 million in local property taxes, including the $750,000 payment in lieu of taxes by Burgess BioPower.

Key Socioeconomic Impacts

- The most recent socioeconomic and demographic data available for the region and the state is from 2015, meaning that Burgess BioPower will have had only two years to impact the data. Still, the data suggest positive changes in the troubling trends that have plagued Berlin and the larger Coos County region over much of the last two decades. While Burgess BioPower is not solely responsible for recent encouraging trends, local

and regional officials are clear in their belief that Burgess BioPower has played a catalytic role.

Change in Key Socioeconomic Indicators During and Following Recession

	% Change 2007-2011			% Change 2011-2015	
	Coos	**NH**		**Coos**	**NH**
Per capita Personal Income[1]	8.0%	9.7%		15.7%	12.8%
Per capita Net Earnings[1]	1.8%	6.4%		8.8%	8.3%
Per Capita Income Maint. Payments[1]	154.7%	165.3%		-49.7%	-50.2%
Per Capita Unemployment Ins.[1]	194.1%	118.2%		-66.8%	-60.1%
Mean Household earnings**[2]	N/A	N/A		6.7%	5.6%
% HHs w/Cash Public Assistance[2]	N/A	N/A		7.4%	8.1%
Avg. Wage & Salary/Job[1]	6.3%	7.7%		12.0%	11.4%
Medicaid Payments[1]	-2.1%	-2.5%		43.4%	45.8%

** Families with earnings

[1] Source: U.S. Bureau of Economic Analysis

[2] Source: U.S. Census Bureau, *American Community Survey*, 5 year estimates 2011-2015

- Per capita personal income in Coos County grew faster than in NH from 2011 to 2015. Had it grown at the same rate as in NH overall, per capita income in Coos County would be lower by $1,039.

- If average wages and salaries had grown at the same rate in Coos County as they did in NH overall between 2011 and 2015, average wage and salaries would be lower in Coos County by $222.

- If Medicaid payments to residents had increased at the same rate between 2011 and 2015 in Coos County as they did in NH overall, Medicaid payments would have been $1.8 million higher in the County in 2015 than they actually were.

Key Demographic Impacts

- Between 2011 and 2015, the City of Berlin experienced encouraging demographic trends. Most significantly, the median age of City residents declined from 45.2 years to 44.5 years, compared to an increase throughout New Hampshire from 40.7 years to 42.2 years. Few communities in New Hampshire experienced a decline in median age during the 2011 to 2015 period.

- The number of residents in their early and prime working years (ages 20-44) increased in Berlin between 2011 and 2015 by 2.0 percent, nearly 5 percentage points better than the decline throughout New Hampshire of -2.9 percent.

- Although still well below the educational attainment levels of NH residents overall, the percentage of Berlin residents with an associate's degree or higher increased more in Berlin between 2011 and 2015 than it did in NH overall (2.2% to 1.8%).

Key Impacts on Electricity Prices and Consumers

- Despite historically low natural gas prices that have reduced average annual wholesale electricity prices in New England and New Hampshire in recent years, unexpectedly raising the price of Burgess' electricity relative to New England market prices, the impact on NH electricity customers of Burgess' above market electricity prices has been minimal.

- In 2015 NH's residential, commercial, and industrial electricity consumers paid $1.76 billion dollars for electricity. Of that amount, $16.5 million or less than one percent (0.94%) is attributable to the above market prices Eversource paid to Burgess BioPower for electricity under the Power Purchase Agreement (PPA) between the two companies.

- Considered alone, the $16.5 million in above market prices resulted in an average monthly increase in electricity bills for Eversource's residential customers of $2.51 ($30.13/year or 2.30%), $8.58 for commercial customers ($103/year or 2.34%), and $37.13 for industrial customers ($445.6/year or 1.76%).

- Along with the above market price impacts, the PPA includes some provisions that had a favorable impact on Eversource ratepayers. These include so called capacity payments as well as the sale of renewable energy certificates (RECs) at rates that were well below market prices.[2] Combined, these PPA provisions that benefited ratepayers offset over one-half ($8.86 million) of the above market price Eversource paid Burgess for electricity in 2015.

- Factoring PPA provisions that reduced costs for Eversource customers (capacity payments and below market price RECs), the actual impact of Burgess on residential customers was $13.98/year in 2015, $47.81/year on commercial customers, and $206.80/year on industrial customers.

- Preliminary data for 2016 (subject to revision by the U.S. Energy Information Agency), suggests that Burgess' impact on Eversource's average residential customer in 2016 was $3.75/month or approximately $45/year when capacity payments and REC sales are not included. The impact on commercial customers was $10.29/month or approximately $124/year, and the impact on industrial customers was $31.63/month or approximate $380/year. When capacity payments and REC sales are included, the impact on Eversource's average residential customer was $44/year, $122/year on commercial customers, and $374/year on industrial customers.

- Forecasts of higher natural gas prices will likely reduce any above market electricity costs associated with Burgess' PPA in the future. In combination with changes in the way any costs are allocated to electricity customers when Eversource divests its generating assets, the result will be a reduction in above market price electricity costs to a majority of Eversource customers.

[2] Note that in 2016 the market for RECs changed and the price paid by Eversource for RECs was above the market rate.

Economic Impact of Above Market Prices

Any negative economic impacts related to increases in electricity prices in 2015 associated with Burgess BioPower can be estimated and must be netted-out from economic benefits associated with the project. Impacts in this report were modeled using a procedure that maximizes potential negative impacts.

- In the worst-case scenario, the 2015 above market electricity payments associated with Burgess BioPower lowered NH's job growth of over 15,700 jobs in 2015 by an estimated 85 jobs across NH, or by approximately 1/100th of a percent, and $4 million in labor income. A more appropriate scenario indicates that above market electricity prices lowered job growth in the state by 44 jobs, with $2.08 less in labor income growth.

- Under any scenario, netting out negative economic impacts associated with higher electricity prices still results in positive overall net job impacts resulting from Burgess BioPower in 2015 of between 137 and 177 jobs, and positive income impacts of between $9.9 million and $11.8 million.

- The economic, socioeconomic, and demographic benefits of Burgess significantly exceed the costs associated with Burgess' above market electricity prices. However, the distribution of benefits and costs is uneven throughout the state, with a majority of benefits occurring in the Coos County region, while electricity costs associated with Burgess are spread over a majority of the state (including Coos County).[3]

I. Introduction

It has been six years since the Burgess BioPower electricity generating facility was approved by the State of New Hampshire. Burgess began generating electricity at near its capacity in 2014. In the time since Burgess was approved and began operating, energy markets have experienced dramatic and unexpected changes. The most significant has been the large, unexpected decline in the price of natural gas that determines the price of wholesale electricity 75 percent of the time in New England.[4] The drop in natural gas prices occurred as New Hampshire and the New England region were looking to increase the capacity of renewable energy sources in an effort to reduce the region's reliance on fossil fuels for electricity generation. Volatility in the availability and price of fossil fuels (primarily natural gas) periodically leads to spikes in the price of wholesale electricity in New Hampshire and New England and increases calls within the region to increase generation capacity from locally available fuels (wind, biomass, water, solar). At the same time, environmental concerns have resulted in public policies in the region and nationally

[3] Regions of New Hampshire not served by Eversource would not bear any costs associated with Eversource.
[4] Robert Ethier, "*New England's Natural Gas Electric Interdependencies*," presentation to the U.S. Department of Energy's Electricity Advisory Committee, June 17, 2017. Accessed August 15, 2017 via the Internet at: https://energy.gov/sites/prod/files/2017/06/f34/3_Gas%20Electric%20Integration%20Panel%20-%20Bob%20Ethier%2C%20ISONE_1.pdf

that encourage the development of renewable sources of electricity.

The sharp drop in the price of natural gas this decade has had two primary impacts on regional renewable energy policies and projects: 1.) it has, at least temporarily, made electricity generated from renewable sources appear less cost competitive in the region; 2.) it has prompted some policymakers to question the need for, value, and cost of existing renewable energy policies, goals and projects. In this energy and policy environment it is especially important for the public and policymakers to have a thorough understanding of the benefits and costs of renewable energy projects such as Burgess BioPower over both the short- and longer-term. According to U.S. Energy Information Agency forecasts, the historically low price of natural gas in recent years is likely a temporary phenomenon, as low prices lead to reduced production, as production becomes more costly, and as U.S. production is increasingly sold and exported to world markets. In addition, regardless of the price of natural gas, New Hampshire and New England face pipeline constraints that limit the region's access to natural gas and which do not appear to be remedied in the near future. The New England region has lost or is at risk of losing 4,050 MW of coal, oil and nuclear fueled electricity generation. The 3,000 MW of new gas-fired generating capacity that has recently come on line in the region increases New England's reliance on natural gas and exacerbates concerns that pipeline constraints risk natural gas supplies and create price spikes during periods of peak natural gas demand.[5] Understanding the benefits and costs of local, renewable sources of electricity thus may become even more important over the next several years.

This report documents the economic impacts of the Burgess BioPower facility on Coos County, the City of Berlin, and the State of New Hampshire. It calculates fiscal impacts on the State of New Hampshire and City of Berlin, and assesses early evidence of the impact that the facility is having on important socioeconomic and demographic indicators in the region. Finally, the report calculates costs related to Burgess BioPower in terms of its impact on the prices paid by electricity customers in the state, as well as the economic implications for NH of above market electricity prices.

The principal finding of this report is that the economic and fiscal benefits of the Burgess BioPower facility to the City of Berlin, the County of Coos, and the State of New Hampshire significantly exceed costs associated with achieving environmental and renewable energy portfolio policies and goals established by the New Hampshire legislature. In addition, unlike

[5] Ibid, Ethier, 2017.

2015 and 2016 when natural gas prices were at 20-year lows, forecasts of natural gas prices made by the U.S. Energy Information Agency imply that the risks (as well as the costs) of the power generated by Burgess BioPower being purchased at above market prices is diminished in future years.

II. Regional Economic Performance

Evaluating the annual impacts of Burgess BioPower requires not only documenting the economic, fiscal, and socioeconomic impacts of facility operations, but also placing those impacts within the context of the performance of the local and regional economies. The Berlin and Coos County regional economy has been characterized by weaker population, job growth, and income growth compared to other regions in New Hampshire.

With few exceptions, the most recent economic data available for sub-state areas such as Coos County and the City of Berlin is from 2015, meaning that the annual operations of Burgess BioPower will have had only two years to influence reported economic and demographic trends in the City and the County. Still, along with the construction phase of the project (during 2012 and 2013), early impacts of Burgess BioPower can be seen in much of the data.

Burgess BioPower cannot claim full responsibility for improving regional trends but it has made significant contributions to several key local and regional economic and demographic trends. Even as lags in reported socioeconomic data limit our ability to assess the impact of Burgess' annual operations over more than two years, local officials in Berlin and Coos County evaluate Burgess impacts with the benefit of an additional two years (2016 and 2017) beyond the most recent officially reported 2015 economic and demographic data. Interviews with local and regional officials and businesses reveal a belief that Burgess is helping to lift a community and region that has been in a downward economic, fiscal, and demographic spiral, and noting that Burgess has played a catalytic role in beginning to reverse the worst of the trends.

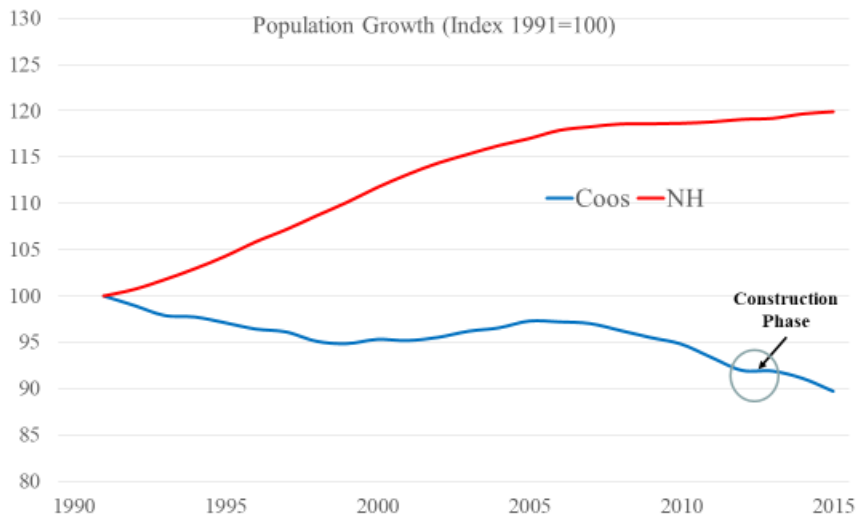
Population Trends

The most difficult regional trends to alter are demographic, especially a declining population. Labor mobility is the principal mechanism of adjustment to changes in regional economic conditions. When, as was the case in Coos County for many years, regional economic conditions deteriorate, there is a slowing of population growth or a decline via net out-migration of individuals from a region. When economic conditions are stronger, a region can experience net in-migration and more rapid population growth as individuals seeking greater economic opportunities re-locate into the region. Improved economic conditions also reduce out-migration

from a region. It can take several years of sustained increases in employment opportunities to change perceptions of employment opportunities in a region that lead to a situation where more individuals are moving into a region than are moving out of a region. In contrast, out-migration from a region typically occurs more quickly in response to declines in regional employment opportunities as the urgency to find replacement employment prompts movement of individuals to regions with greater opportunities.

Figure 1 shows population growth trends in Coos County and the State of New Hampshire between 1991 and 2015. The chart shows how much slower Coos County's population growth has been compared to growth in the State of New Hampshire. Since the last recession, however, the only time period in which Coos County did not experience annual population decline was during the construction of the Burgess BioPower facility (2012-2013). A large body of research

Figure 1
Since the Last Recession, Population Growth in Coos County Declined Steadily, Except During the Construction Phase of Burgess BioPower



has examined the impacts of labor demand shocks (typically defined as a minimum of a one percent increase in employment in a short period of time on a region.[6]) The total employment impact of Burgess BioPower during the construction phase of the project was equal to over two

[6] Bartik,Timothy J. 2014."*How Effects of Local Labor Demand Shocks Vary with Local Labor Market Conditions*." Upjohn Institute Working Paper 14-202. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. Notowidigdo, Matthew J. 2013. "*The Incidence of Local Labor Demand Shocks*." Working paper. Booth School of Business, University of Chicago. Bound, John and Holzer, Harry J. 2000 "*Demand Shifts, Population Adjustments, and Labor Market Outcomes during the 1980s*," Journal of Labor Economics, 18(1), 20-54. Monte, F., Redding, Stephen J., and Rossi-Hansberg, E. 2016. "*Commuting, Migration and Local Employment Elasticities*" National Bureau of Economic Research, Working Paper No. 21706.

percent of Coos County employment and over 10 percent of employment in the City of Berlin. Construction of Burgess BioPower provided an employment shock to the region that research suggests could be expected to influence population trends. While creating a large employment shock to the region, construction of Burgess did not, however, create a sustained employment increase that would produce long-term population and labor force growth.[7]

The annual operations of Burgess BioPower result in direct, indirect and induced employment impacts that equal a smaller, just over 1 percent, impact on County employment. Data from 2015 may not capture any population impacts related to Burgess' economic impacts because the population data only incorporates a limited period (two years) of Burgess' operations. Burgess' impact on population growth in the region is just one factor that influences regional population growth and Burgess' economic impacts may not be enough to overcome the negative population impacts from other forces, even as Burgess mitigates some of the County's trend of population decline.

Income Trends

Total personal income in the Coos County region grew more slowly than in NH overall between 1991 and 2015. Slower population growth and population decline in Coos County primarily accounts for this trend, as a declining population also implies a shrinking labor force and lower total earnings, as well as other components of personal income. However, between the time Burgess began construction and 2015 (the most recent time period for which data is available), which incorporates just two years of Burgess' operations, Coos County improved its personal income growth rate despite experiencing no population growth. After ranking 10th among NH's 10 counties on annual personal income growth for the time period 1991 to 2011, Coos County improved to rank 9th among all NH counties between 2011 and 2015 (Table 1).

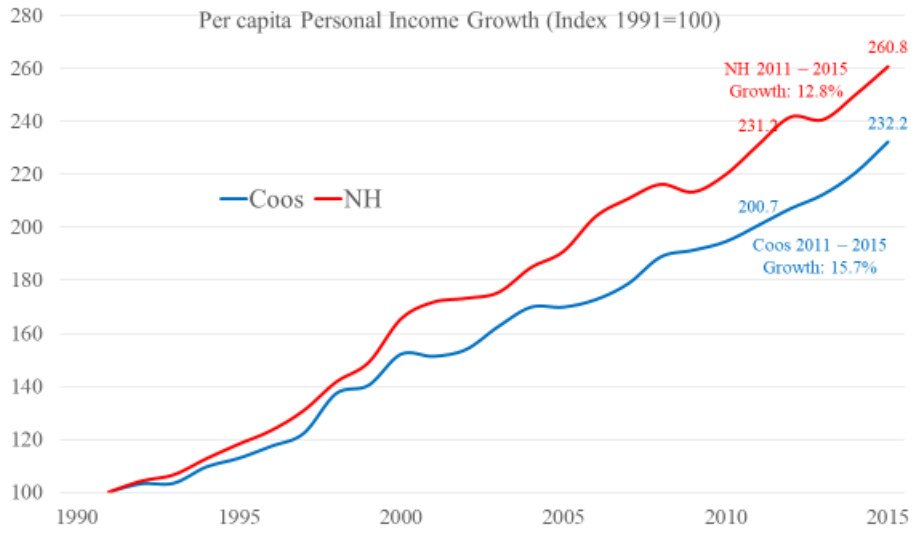
Table 1
Compound Annual Growth Rates and Coos County Rank Among NH Counties

	1991-2011			2011-2015		
	Coos County	Coos Rank	NH	Coos County	Coos Rank	NH
Population Growth	-0.3%	10	0.9%	-1.0%	10	0.2%
Personal Income Growth	3.2%	10	5.2%	2.7%	9	3.3%
Per capita Personal Income Growth	3.5%	10	4.3%	3.7%	5	3.1%

[7] PolEcon did not analyze the economic impacts of the construction of Burgess BioPower and did not rely on any prior studies of Burgess' impacts for any of the analyses in this report.

More illustrative of Burgess' impact on income in the region (because it controls for differences in growth of each county's population), is the change in per capita income growth rates in Coos County since Burgess began construction and operation. The large employment impacts during construction and the significant impact that annual operations of Burgess has had on employment and income in the county, combined to increase per capita personal income in the County at a faster rate than in New Hampshire overall. After ranking 10th among NH's 10 counties on annual per capita income growth for the time period between 1991 and 2011, Coos County jumped to having the 5th highest annual growth rate among NH counties between 2011 and 2015. Figure 2 shows that per capita income in Coos County increased by 15.7 percent between 2011 and 2015, compared to growth in NH overall of 12.8 percent.

Figure 2
Per capita Personal Income Has Grown More Slowly in Coos Over the Long-Term But Faster Than NH Overall Since 2011

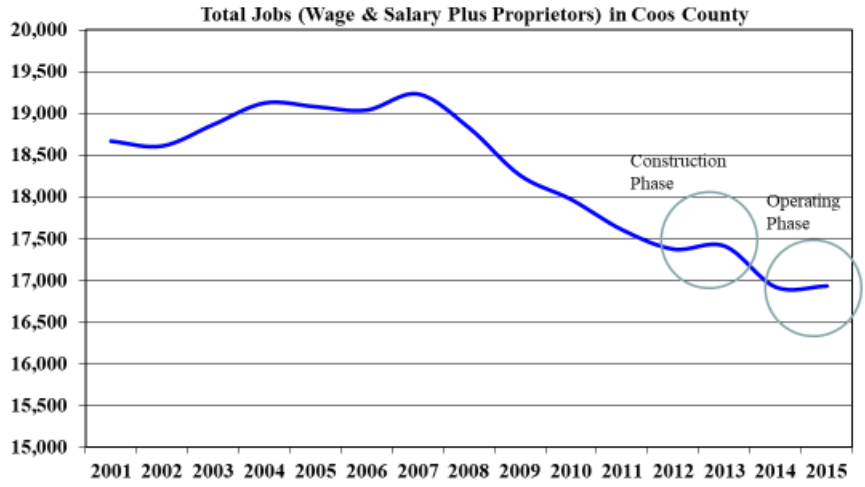


Employment Trends

Total employment (wage and salary plus proprietor employment) declined by 12 percent in Coos County between its pre-recession level in 2007 and 2015. The impact of Burgess' construction and annual operations are apparent in employment data for Coos County as both the construction phase of the project and the operating phase are associated with time periods where the total number of jobs in Coos County did not decline (Figure 3). Details on the annual job impacts from Burgess' annual operations are presented in the next section of this report.

Figure 3

Burgess BioPower has Helped Slow (and Reverse) the Flow of Jobs From Coos County. Impacts From Annual Operations are Just Beginning to Appear in the Lagged Employment Data



Source: U.S. Bureau of Economic Analysis, "Local Area Personal Income and Employment," file CA25N, PolEcon

III. Economic Impacts of Burgess BioPower's Annual Operations

Burgess BioPower operating data for 2016, including expenditures, revenues, employment and electricity production was used along with economic models of both Coos County and the State of New Hampshire to estimate the economic impacts of the annual operations of Burgess BioPower.

A. Output Impacts

This analysis of economic impacts depicts the direct spending effects and "multiplier" effects associated with annual, ongoing operation and maintenance (O&M) associated with Burgess BioPower. Three types of effects will result from the annual operations of Burgess: 1.) effects resulting from hiring and spending by Burgess BioPower itself (direct effects); 2.) purchases by Burgess of fuel, materials and supplies (business-to-business spending) needed to operate the facility (indirect effects); and 3.) spending resulting from the wages and salaries earned by those working at the facility and by those working at suppliers to the facility (induced effects). Total economic impacts are the combined direct, indirect, and induced effects and are typically stated in terms of dollars of output, dollars of labor income, and employment.

Direct spending effects are identified from Burgess' annual operating expenditures. The

indirect and induced effects are estimated using IMPLAN[8] input-output models of both Coos County and the State of New Hampshire. The models are calibrated to depict region-specific industry-by-industry purchasing patterns (for the indirect effects) and consumer purchasing patterns (for the induced effects). The indirect and induced multipliers for each industry estimate how much additional activity is created through the portion of the direct spending by Burgess BioPower within NH.

It is crucial to this assessment that supplies and labor needed to operate Burgess on an annual basis are distinguished by those that would come directly from the Coos County region, as well as the larger State of New Hampshire economy, and those that "leak" to regions outside of the State of New Hampshire. Burgess' impacts on Coos County are derived from local purchases in the county and the multiplier effects in the Coos regional economy, while the impacts for the State of New Hampshire are derived from the sum of impacts in Coos County and the impacts resulting from purchases in the remainder of New Hampshire. The key to gauging the overall impact of Burgess is to identify how much of expenditures by the facility will be from local sources. A list of suppliers, contractors and expenditures by Burgess was provided to PolEcon to help determine the local percentage of Burgess' expenditures. In addition, where local content is unclear, the IMPLAN model uses historical trade flow data to calculate the percentage of each industry's expenditures that are likely to be supplied by local businesses.

The biomass purchased to fuel electricity generation is the largest single expenditure by Burgess and the local content may vary somewhat from year-to-year. For this analysis, we assume that 55 percent of the biomass purchased by Burgess is sourced from NH (from Coos County as well as other regions). This percentage represents the middle range of annual biomass purchases from NH sources, as our review showed a range of 48.5 to 61 percent. To the extent that the percentage varies, annual impacts in Coos County and the region will also vary. However, while biomass is the largest expenditure category of Burgess, it does not represent a majority of all expenditures made by the facility. Thus, a five percent change (either way) in the percentage of biomass sourced from within NH would only influence economic impact results by about two percent (+/- .05 biomass sourced in NH times .40 percent of all expenditures that are biomass equals +/- .02).

[8] IMPLAN is heavily reviewed and extensively used by government agencies and private companies for economic impact modeling. Information about IMPLAN models is available at www.implan.com.

To estimate the annual impact that Burgess BioPower has on the total dollar value of goods and services (output or sales) produced in Coos County and the State of New Hampshire we entered the dollar value of the electricity produced by Burgess BioPower in 2016 into economic models of Coos County and the State of New Hampshire.[9] To determine Burgess' impact on other industries in the region and statewide we modeled impacts by modifying the production function (spending pattern) of the economic model's predetermined electricity generation industry sector to reflect the actual industry and commodity spending pattern of Burgess BioPower.[10]

Table 2
Annual Impact on Output of Burgess BioPower Operations
(Millions of 2016 Dollars)

Coos County	Total
Direct (by Burgess)	$37.3
Indirect	$15.7
Induced	$4.7
Total	**$57.7**
Other NH Regions	**$5.8**
Total Impacts in New Hampshire	**$63.5**

In 2016 Burgess' direct sales of over $37 million of electricity resulted in another $20 million in sales by other businesses in Coos County, as well as $5.8 million in other regions of New Hampshire. In total, the annual operations of Burgess in 2016 increased output in the State of New Hampshire by $63.5 million (Table 2).

B. Job Impacts

Burgess BioPower provided data on the average number of employees working at the facility in 2016 and these 27 jobs represent the direct employment impacts of Burgess. In addition to the 27 direct jobs at the facility, the expenditures by Burgess on goods and services in the Coos County region supports another 116 jobs in the County as well as 41 induced jobs that result from the spending by Burgess workers and the workers in industries that supply goods and services to Burgess. The total annual employment impact of Burgess in Coos County was 184 jobs in 2016. Another 37 jobs were supported in other

Table 3
Annual Employment Impacts of Burgess BioPower Operations

Coos County	Total
Direct (at Burgess)	27
Indirect	116
Induced	41
Total	**184**
Other NH Regions	**37**
Total Impacts in New Hampshire	**221**

[9] Only the value of electricity production was used in calculating economic impacts. Revenues earned by Burgess such as capacity payments and sale of renewable energy credits do not require additional labor or materials and thus do not result in economic impacts beyond the impacts resulting from electricity generation.

[10] The most significant modification reflected the use of biomass as a fuel for generating electricity rather than fossil fuel. Other modifications include adjusting the portion of spending and method of transporting fuel to reflect truck transportation rather than pipeline (for natural gas fuel power plants) or rail (for coal fired generation.

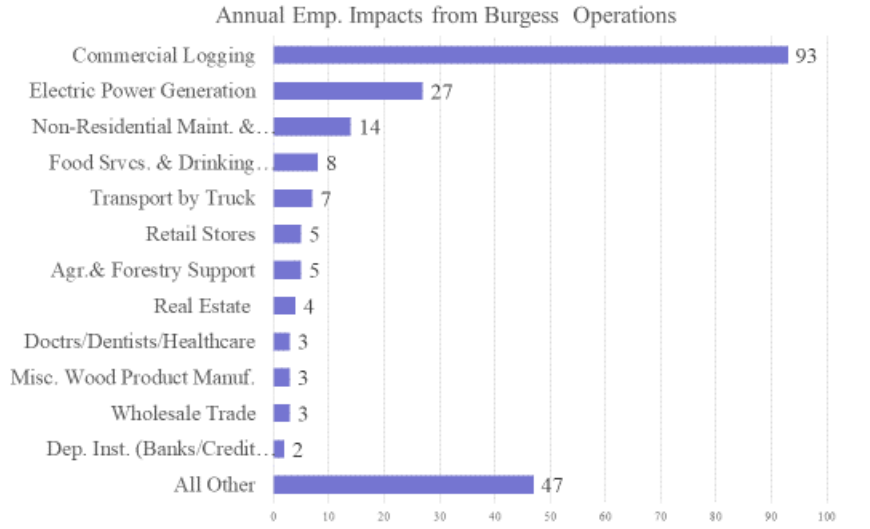
areas of New Hampshire as a result of expenditures by Burgess that occurred in other regions of the state.

The large indirect employment (much larger than if Burgess burned fossil fuels which are not produced within NH) impacts of Burgess are the result of the approximately one-half of more than $20 million dollars in biomass purchases that occur in NH (in Coos and other NH counties).

Employment Impacts by Industry

Aside from the employees of Burgess BioPower, the largest employment impacts from spending by the facility occur in the commercial logging industry (93 jobs) and maintenance and repair of non-residential facilities industries (14 jobs). Many industries in Coos County and other areas of New Hampshire benefit from the expenditures of Burgess BioPower and the expenditures of its employees and the employees of industries that supply goods and services to Burgess. Figure 4 presents employment impacts in industries with the largest employment gains. The "all other" category represents all industries with less than three jobs supported by Burgess BioPower.

Figure 4
Logging and Maintenance and Repair Industries Experience the Largest Employment Gains From Burgess' Expenditures

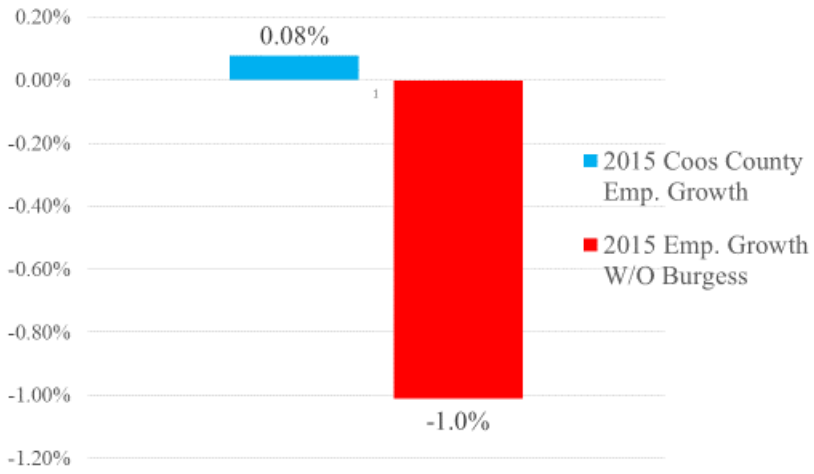


Impact on Employment Growth Rate

Total wage and salary and proprietor employment in Coos County for 2016 is not available from the U.S. Bureau of Economic Analysis as of the writing of this report. The annual operations (expenditures and employment) of Burgess were similar in 2015 to 2016 and will have similar job impacts each year as those reported above. In 2015 Coos County added just 28 jobs (losing wage and salary but adding jobs among proprietors), for a percentage gain of just eight-

tenths of one percent (0.08%). Thus, without the impact of the 184 direct, indirect and induced job resulting from Burgess, Coos County would have lost a total of 156 wage and salary and proprietor jobs, or about one percent of employment in the County.

Figure 5
Without Employment Impacts From Burgess, 2015 Emp. Growth Would Have Been Negative



C. Labor Income Impacts

The annual labor income impacts of Burgess BioPower (direct, indirect, and induced) account for just under two percent (2.0%) of all the labor income earned by wage and salary employees and proprietors in Coos County. Labor income impacts include wages, salaries, proprietor's income, as well as supplements to wages and salaries (benefits). The total direct, indirect, and induced income impacts (including all non-wage salary and benefits) in the Coos County region are estimated to be $11.5 million per year, with another $2.4 million per year of labor income increases occurring in other regions of New Hampshire, for a total impact of $13.9 million per year in 2016 dollars (Table 4).

Table 4
Annual Labor Income Impact of Burgess BioPower Operations
(Millions of 2016 Dollars)

Coos County	**Total**
Direct (at Burgess)	$2.6
Indirect	$7.4
Induced	$1.5
Total	$11.5
Other NH Regions	$2.4
Total Impacts in New Hampshire	$13.9

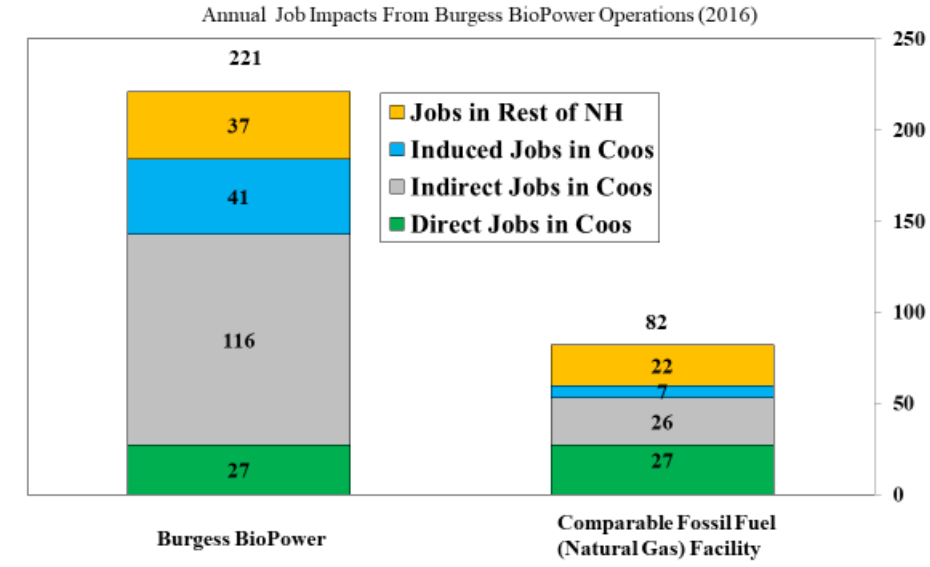
IV. Comparison with Fossil Fuel Generation Impacts

Burgess BioPower has an outsized impact on the Coos County and New Hampshire economies compared to electric power generation facilities in the state that burn fossil fuels. This occurs because, unlike fossil fuel generation facilities, the fuel used by Burgess to generate electricity (biomass) is primarily sourced from within the State of New Hampshire. In addition, biomass is transported primarily by in-state trucking companies. In contrast, fossil fuel burning power plants use fuels that are not produced or sourced locally and that are transported primarily by pipelines or rail lines that are not based in New Hampshire and that require little labor content from companies and workers in New Hampshire.

To compare the economic impacts of Burgess BioPower to an equivalent fossil fuel burning power plant we used the IMPLAN economic model of Coos County and entered identical operating expenditures for the gas-fired facility as was used to model Burgess' impacts. The only changes that were made to the model were to the spending pattern of the electricity generation industry. The spending pattern was changed to reflect expenditures on natural gas rather than on biomass, and changes in the mode of transportation to reflect transportation of natural gas by the pipeline industry rather than the trucking industry that was used in modeling Burgess impacts.

Figure 6 compares the job impacts of Burgess BioPower's annual operations with the job impacts that would result from an equivalent natural gas-fired power plant. As the figure shows,

Figure 6
Burgess' Operations Support 184 Jobs in Coos County and Another 37 Jobs in Other Regions of New Hampshire – Nearly Three Times the Impact of a Comparable Fossil Fuel (Natural Gas) Fired Generator



while direct employment impacts of 27 employees are identical, the greater use of locally sourced fuel (biomass rather than natural gas) and labor, results in a total job impact in Coos County of 184 jobs for Burgess and just 60 jobs for an equivalent natural gas facility. Total job impacts throughout NH are 221 jobs for Burgess compared to just 82 jobs for a natural gas fueled facility.

V. Fiscal Impacts

In 2016 the economic activity in Berlin, Coos County, and the State of New Hampshire resulting from the annual operations at Burgess BioPower produced an estimated $3.94 million taxes, fees, and charges paid to the state and its local governments. Burgess made $750,000 in payments in lieu of property taxes to the City of Berlin, representing just under five percent (4.8%) of the City's tax revenue.[11] Burgess also paid just over $1 million in State of New Hampshire utility tax payments.[12] In total, the economic activity resulting from Burgess resulted in over $1.4 million in local property taxes in Berlin and elsewhere in NH, including the $750,000 payment in lieu of taxes by Burgess BioPower.

In addition, Burgess BioPower paid $1.08 million in water and sewer usage fees to the City of Berlin. City officials indicate that without Burgess BioPower's payment sewer and water usage fees for property owners would increase by a minimum of 15 percent.[13]

Finally, the economic activity (direct, indirect, and induced) resulting from Burgess BioPower produced another $440,000 in combined business taxes, meals and rooms taxes, user fees, permits, vehicle registrations and other taxes and charges, for a grand total of $3.94 million in state and local government revenue in 2016.

A. Impacts on Local Property Owners

In 2016 the City of Berlin's tax rate, at $39.19 per $1,000 of valuation, was the second highest among all NH communities. Burgess BioPower's 2016 payment in lieu of property taxes (PILOT) of $750,000 made to the City of Berlin represented 4.8 percent of the property taxes collected by the City that year. Burgess' PILOT agreement calls for escalating payments through the year 2033 and payments for 2017 ($1.05 million on a calendar year basis) and 2018 ($1.125 Million on a calendar year basis) are higher than those for 2016 used in this analysis. The impact of Burgess' PILOT agreement on the City's tax rate as well as on individual property owners is significant and will grow over time. Table 5 shows the impact that Burgess' PILOT had on the

[11] Author's calculations based on City of Berlin financial reports.
[12] From detailed financial reports provided by Burgess BioPower.
[13] Discussion with the mayor of the City of Berlin, August 30, 2017.

City of Berlin's finances in 2016, as well as the impact on homeowners with a home at the City's median value.

Table 5
2016 Berlin Property Taxes and Rates
With and Without Burgess BioPower PILOT

Tax	Total Property Valuation	Tax Rate With Burgess' PILOT	Taxes Raised With Burgess' PILOT	% of Local Tax Obligation	Required Taxes Without Burgess' PILOT	Required Tax Rate Without Burgess' PILOT
Municipal	$395,480,779	$17.74	$7,020,048	48.4%	$7,382,776	$18.67
County	$395,480,779	$4.17	$1,647,881	11.4%	$1,733,027	$4.38
Local education	$395,480,779	$14.79	$5,847,186	40.3%	$6,149,312	$15.55
State Education	$253,158,879	$2.49	$629,396		$629,396	$2.49
		$39.19	**$15,144,511**		**$15,894,511**	**$41.09**
				Impact of Burgess' PILOT on Berlin's Tax Rate		**-$1.90**
				% of 2016 Rate		**4.8%**
					Median Home Value in Berlin	**$88,400**
					Change in Property Tax Payment for Home at Median Value	**-$167.86**

The table shows that without the Burgess BioPower PILOT, the additional $750,000 that would need to be raised from remaining property taxpayers would raise the City's tax rate by $1.90 per $1,000 of valuation or 4.8 percent. A homeowner with a home at the median value[14] in the City of $88,400 received a benefit of $168 in 2016 in the form of avoided property tax payments as a result of Burgess BioPower. By 2019 Burgess' PILOT agreement calls for a payment to the City of $1.2 million, 60 percent higher than the $750,000 payment for 2016 and analyzed here. The larger PILOT payment implies an impact on Berlin's tax rate of between $3.50 and $4.00 per $1,000 of valuation and an annual saving in tax payment to homeowners with a median value home of approximately $300.

VI. Socioeconomic and Demographic Impacts

The monetary and job impacts of Burgess BioPower documented in this report will have the greatest impact to the extent that they help improve the longer-term performance of the City of Berlin and Coos County on key socioeconomic and demographic metrics. The most recent

[14] Median value was determined from the U.S. Census Bureau's *American Community Survey* 5-year estimates 2011-2015. A review of current homes for sale in Berlin listed on the real estate website MOVOTO (http://www.movoto.com/nh/market-trends/) indicates a median list price of $85,400.

socioeconomic and demographic data available for the region and the state is from 2015, meaning that Burgess BioPower operations will have had approximately two years to impact the data, and four years when combined with the construction phase of the project. Still, the data show improvements in troubling trends that have plagued Berlin and the larger Coos County region over much of the last two decades. Burgess BioPower is not solely responsible for the recent encouraging trends but local and regional officials are clear in their belief that Burgess BioPower has played a catalytic role.

A. Socioeconomic Impacts

Table 6 presents growth rates and changes in several key socioeconomic metrics and compares the performance of Coos County with the overall NH economy both before construction and operation of Burgess BioPower and after.

Table 6
Change in Key Socioeconomic Indicators
During and Following Recession

	% Change 2007-2011			% Change 2011-2015	
	Coos	**NH**		**Coos**	**NH**
Per capita Personal Income[1]	8.0%	9.7%		15.7%	12.8%
Per capita Net Earnings[1]	1.8%	6.4%		8.8%	8.3%
Per capita Income Maint. Payments[1]	154.7%	165.3%		-49.7%	-50.2%
Per capita Unemployment Ins.[1]	194.1%	118.2%		-66.8%	-60.1%
Mean Household Earnings**[2]	N/A	N/A		6.7%	5.6%
% HH's w/Cash Public Assistance[2]	N/A	N/A		7.4%	8.1%
Avg. Wage & Salary/Job[1]	6.3%	7.7%		12.0%	11.4%
Medicaid Payments[1]	-2.1%	-2.5%		43.4%	45.8%

** Families with earnings

[1] Source: U.S. Bureau of Economic Analysis

[2] Source: U.S. Census Bureau, *American Community Survey*, 5-year estimates 2011-2015

The table reveals that on several key socioeconomic measures Coos County's performance relative to the State of New Hampshire as a whole has improved since construction of Burgess BioPower began. On several metrics Coos County out-performed the state of New Hampshire as a whole during the five-year period from 2011 to 2015, after lagging the state during the prior five-year period. Per capita personal income, per capita net earnings, average wages per job, and mean household earnings all grew more in Coos County from 2011 to 2015 than they did in the State of New Hampshire overall. Still, it must be noted that on each of these measures of earnings and income, Coos County income and earnings remains well below New Hampshire averages. Nevertheless, the county has experienced a much stronger performance relative to the

state since construction and operation of Burgess BioPower. Mean earnings of households with at least one employed individual increased by 6.7 percent in Coos County between 2011 and 2015 compared to 5.6 percent in NH overall. At the same time, payments for unemployment compensation declined more in Coos County between 2011 and 2015 than they did overall in New Hampshire, and the percentage of households in the county who received cash public assistance (although still growing) grew more slowly in Coos County than in NH overall (by 7.4% in Coos County compared to 8.1% in NH), although per capita income maintenance payments[15] to county residents declined by a slightly smaller rate.

For perspective on what some of the differences in growth rates between Coos County and the State of New Hampshire on key socioeconomic metrics mean in dollar terms, had Coos County's per capita income grown at the same rate as NH's per capita income, per capita personal income in the county would have been $1,039 dollars less in 2015 than it was (or $40,164 instead of the $41,203 it actually was). Medicaid expenditures increased in Coos County and the State of New Hampshire between 2011 and 2015 largely as a result of the expansion of eligibility for the state's Medicaid program. But Medicaid payments grew more slowly in Coos County than they did in New Hampshire overall and if they had grown at the same rate in Coos County then Medicaid program expenditures would have been $1.8 million more in Coos County than they actually were. Average annual wage and salary earnings per job in Coos County would have been $222 lower in 2015 if growth had been the same in Coos County as the state overall, and mean earnings of households with at least one employed individual would have been lower by $565 in 2015 if median household earnings in Coos County had not grown faster than earnings in NH.

B. Demographic Impacts

Combined, the construction phase of Burgess BioPower (which began in 2012) and the operating phase (which began in 2014) appear to have influenced 2015 demographic data in the City of Berlin despite having less than four years to influence trends. Although not long enough to assess the full impacts of Burgess on longer-term demographic trends, several key demographic trends in the City of Berlin have out-performed the State of New Hampshire since

Table 7
Change in Key Demographics 2011 to 2015

	Berlin	NH
Median Pop. Age	-.7 yrs.	+1.5 yrs.
% of Pop. Ages 20-44	+2.0%	-2.9%
% of Pop. With AA Degree or Higher	+2.2%	+1.8%

Sources: U.S. Census Bureau, *American Community Survey*

[15] Income maintenance payments includes such items as Temporary Assistance to Needy Families (TANF) payments, food stamps, and other general welfare (not social security or retirement) payments.

Burgess arrived in the City. Specifically:

- The median age of City residents declined from 45.2 years to 44.5 years, compared to an increase in median age throughout New Hampshire from 40.7 years to 42.2 years. Few communities in New Hampshire experienced a decline in median age during the 2011 to 2015-time period.

- The number of residents in their early and prime working years (ages 20-44) increased in Berlin between 2011 and 2015 by 2.0 percent, nearly 5 percentage points better than the decline throughout New Hampshire of -2.9 percent.

- Although still well below the educational attainment levels of NH residents overall, the percentage of Berlin residents with an associate's degree or higher increased more in Berlin between 2011 and 2015 than it did in NH overall (2.2% to 1.8%).

These trends are best evaluated in the context of the historically weak demographic trends in the City of Berlin. Although not an indication of a dramatic turnaround, the data above clearly point to improving demographic trends in the City.

VII. Impact on Electricity Consumers

A complete assessment of the impact of Burgess BioPower must include economic cost as well as benefits. The primary costs associated with Burgess BioPower are the costs and risks associated with the price of power generated by Burgess and sold to NH utilities, and thus electricity customers, at rates above market prices. For some, costs associated with any above market electricity prices are justified by the need to incentivize renewable energy production and the desire to achieve environmental goals in the state, while others view above market energy prices as justification for eliminating the state's renewable energy and related environmental goals. Regardless of how above market energy prices from renewable energy producers such as Burgess BioPower are viewed, they are a cost with economic impacts that affect the net benefit-cost calculus of Burgess BioPower.

In the time since permitting and construction of Burgess BioPower began, energy markets changed dramatically, with the price of fossil fuels (especially natural gas) sharply and unexpectedly falling. Despite increasing media attention and its importance to energy policy debates in New Hampshire, Burgess BioPower's impacts on electricity prices and customers in New Hampshire are not well documented and do not appear to be well understood by the public, media, and lawmakers. This section of the report first examines key changes in energy markets that impact the price of electricity in New Hampshire and then presents calculations of the impact that Burgess BioPower has had on electricity customers in New Hampshire.

A. Historical and Projected Natural Gas Prices

The price of natural gas determines the price of wholesale electricity 75 percent of the time in New England.[16] Figure 7 presents data from the U.S. Energy Information Agency showing the relationship between natural gas prices and electricity prices in New England.

Figure 7
Wholesale Electricity Prices in New England are Determined Largely by Natural Gas Prices

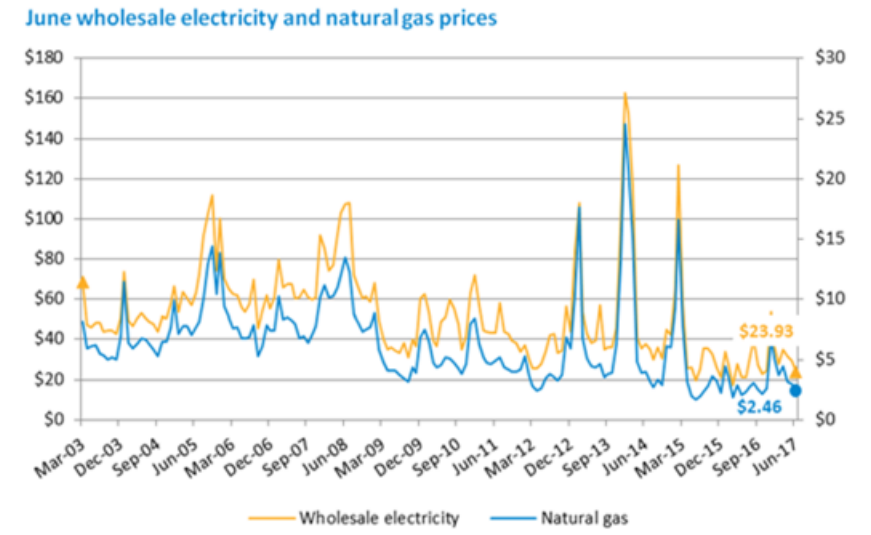
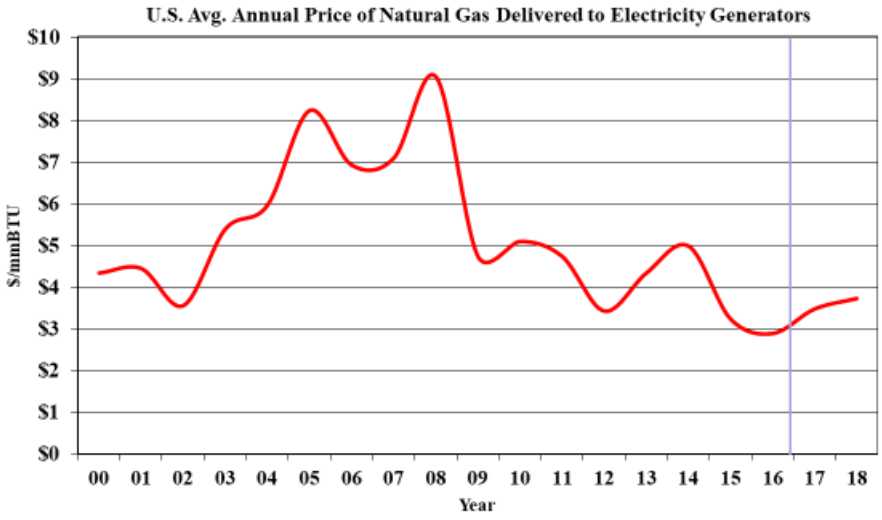


Figure 8 shows that the price of natural gas delivered to electricity generators in the United States was at a 20-year low in 2015 and 2016. The sharp and unexpected drop in natural gas prices sold for electricity generation in New England, rather than any inefficiencies in the operation of Burgess, is responsible for the price of Burgess BioPower's electricity costing more than the price of electricity in the New England market. According to Burgess BioPower and the NH Public Utilities Commission, the price paid by electric utilities in NH for the electricity generated by Burgess was above market prices by $16.5 million in 2015, and by $22.3 million in 2016, the year with the lowest natural gas prices.

[16] Robert Ethier, "*New England's Natural Gas Electric Interdependencies*," presentation to the U.S. Department of Energy's Electricity Advisory Committee, June 17, 2017. Accessed August 15, 2017 via the Internet at: https://energy.gov/sites/prod/files/2017/06/f34/3_Gas%20Electric%20Integration%20Panel%20-%20Bob%20Ethier%2C%20ISONE1.pdf

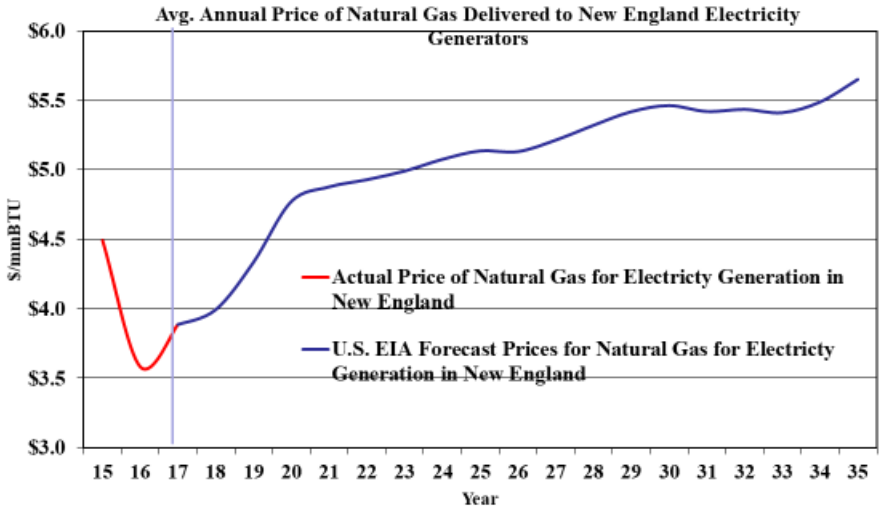
Figure 8
Natural Gas Prices Determine Wholesale Energy Prices in New England and Were at 20 Year Lows in 2015 and 2016



Source: U.S Energy Information Agency, PolEcon

Natural gas prices have risen since 2016 lows and forecasts of the price of natural gas for electricity generation in New England made by the U.S. Energy Information Agency suggest that rising natural gas prices will reduce the risks that the price of electricity sold by Burgess will exceed market prices in New England, or at worst reduce the total dollar cost of above market prices.

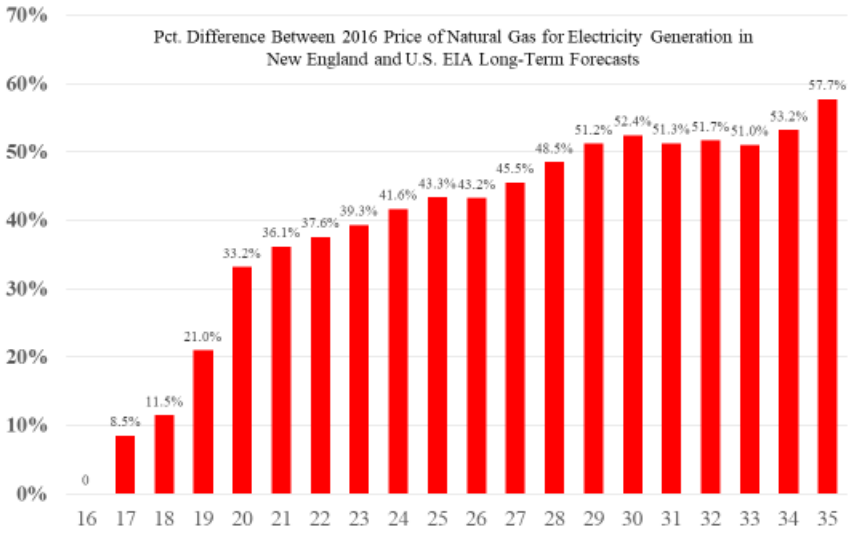
Figure 9
Forecasts of Natural Gas Prices in New England for Electricity Generation Imply Higher Wholesale Prices and Lower or No Above Market Prices for Burgess' Power



Source: U.S Energy Information Agency, PolEcon

Figure 10 shows how much higher, on a percentage basis, natural gas prices for electricity generation in New England are forecast to be until the year 2033. Although energy prices can be volatile, there is clear belief that natural gas prices are unlikely to return to their historically low levels of 2015 and 2016. Because natural gas prices determine the price of wholesale electricity in New England, the implication of the natural gas price forecast in Figure 9 is that the risks of Burgess' electricity prices being above market rates as they were in 2015 and 2016 are greatly reduced.

Figure 10
Natural Gas Prices for Electricity Generation in New England are Forecast to Rise From 2016's 20 Year Low, Reducing the Risks That Burgess' Power Will be Sold at "Above Market" Prices



B. Burgess Impact on Electricity Expenditures

A full assessment of Burgess' impact on electricity prices and consumers requires complete information on usage, prices, expenditures and customers by type (residential, commercial, industrial). The most recent data available that supports such an analysis is from 2015. Thus, the analysis presented here is for 2015. Preliminary NH electricity market data is available for 2016 and an analysis of Burgess' impacts using preliminary data from that year is included in Appendix A of this report. Above market prices for Burgess' electricity were nearly $6 million larger in 2016 than in 2015 and that, along with other variables that affect the cost to NH utilities of Burgess' electricity, means that the impact on electricity consumers was greater in 2016 than the 2015 impact reported in this section. Examining the Tables in Appendix A, readers can compare the costs for 2016 with the 2015 costs discussed below but should do so with caution, understanding that 2016 electricity market data is subject to revision.

The $16.5 million dollars in above market costs for Burgess' electricity occur within the context of $1.7 billion dollars of expenditures by NH's residential, commercial, and industrial electricity customers in 2015. Along with above market costs, Burgess' PPA with NH's largest utility includes provisions that allow the utility to capture a portion of the "capacity payments" paid to electricity generators to guarantee their availability to produce electricity as needed by the New England market. In addition, New Hampshire's renewable portfolio standards require electric utilities and providers to purchase renewable energy credits from renewable energy sources (renewable energy sources produce renewable credits for every megawatt of energy they produce) that represent a percentage of all the energy the utility sells to customers. The market for and sale of these credits encourages and supports renewable energy generation. If a utility cannot obtain enough energy credits in the open market then it must make payments into a renewable energy fund in NH at rates that are set above the market rate for credits.

In 2015 the capacity payment and renewable energy credit provisions of Burgess' PPA produced offsets that reduced the net cost to electricity customers of Burgess' above market electricity prices. Table 8 presents the net cost to NH electricity customers of Burgess' above market prices when offsets are included.

Table 8
Net Cost of Above Market Electricity Costs

	2015	2016
Above Market Costs	$16,531,247	$22,276,743
Capacity Payments	($274,596)	($2,177,154)
Renewable Energy Credits	($8,584,000)	$1,830,400[17]
Total Offsets	($8,858,596)	($346,754)
Net Costs	**$7,672,651**	**$21,929,989**

Tables 9 and 10 present two scenarios that calculate the impact of Burgess' above market electricity prices on residential, commercial, and industrial customers in New Hampshire. Table 9 shows the impact on Eversource customers when no renewable energy credit or capacity payment offsets are included. The table shows that the average monthly impact on residential customers in 2015 was $2.51 or $30.13 annually. Table 10 presents costs to customers when offsets are included. We believe that Table 10 is a more appropriate scenario as it incorporates all aspects of Burgess' PPA. In this scenario, the impact on Eversource's average customer was $1.17 per month or $13.98 annually in 2015 and the impact on industrial customers is an increase in their annual electricity costs of 0.81 percent.

Forecasts of natural gas prices suggest that the price of Burgess' electricity will be closer to the New England market prices, reducing or eliminating the above market costs associated with

[17] Based on actual number of REC credits sold and estimated REC prices contained in testimony by Lisa Linowes to the SB 51 study committee, September 13, 2017.

its power purchase agreements that were experienced in 2015 and 2016. Thus, the 2015 and 2016 impacts on Eversource customers analyzed in the report are likely to be reduced in future years. In addition, the impending divestiture of Eversource's electricity generating assets will also reduce costs to Eversource customers. It is beyond the scope of this report to analyze the impact that divestiture will have on Eversource customers but the 2015 restructuring and rate stabilization agreement calls for any costs associated with power purchase agreements (such as Burgess's) to be allocated in such a way that all electricity consumers served by the transmission and distribution system of Eversource (the Public Service Co. of New Hampshire), share in the cost of power purchase agreements.[18] Costs will thus be shared over a larger electricity customer base, lowering costs for a majority of current Eversource customers. Residential customers will especially benefit as they will see a reduction in the share of the costs of power purchase agreements reduced from those outlined in our analysis of 2015 and 2016 costs. Industrial and commercial customers may experience a small increase because of how costs are allocated between residential, commercial, and industrial customers, but even as a larger percentage of costs are allocated to commercial and industrial customers, those costs will be spread over a much larger number of industrial and commercial customers (many of whom are in Eversource service territories but purchase electricity from other suppliers), and as a result the impacts on commercial and industrial customers will still be limited.[19]

Impacts on customers in 2016 for each of the scenarios listed above are presented in Tables 11 and 12 in Appendix A for comparison purposes but are not discussed here.

[18] 2015 Public Service Company of New Hampshire Restructuring and Rate Stabilization Agreement, June 10, 2015 NH Public Utilities Commission Case No.: DE 14-238, Exhibit A.

[19] Without detailed information on the volume of electricity sold to different electricity customer categories as outlined in the divesture agreement (that differ from the commonly used standard residential, commercial, and industrial categories,) and by electricity supplier in Eversource territories, we cannot provide a dollar or percentage impact on customer groups.

Table 9
2015 Impact of Burgess BioPower Power Purchase Agreement On Eversource Customers
(*Without* Impacts From Capacity Payments and Renewable Energy Certificate Savings to Eversource)

Eversource Customers	Number of Customers	Average Monthly Usage (kWh)	Total Electricity Usage (mWh)	% of Elect. Usage	Total Expend.	Average Monthly Bill	$ Impact of Above Market Price	Total Expenditures W/O Burgess	Average Monthly Bill W/O Burgess	Impact on Monthly Bill	Impact on Annual Expend.	% of Annual Electricity Costs
Commercial	51,047	2,075	1,271,310	31.8%	$230,431,853	$376.18	$5,258,157	$225,173,696	$367.59	$8.58	$103.01	**2.34%**
Industrial	1,844	8,977	198,692	5.0%	$47,408,231	$2,141.97	$821,795	$46,586,436	$2,104.84	$37.13	$445.56	**1.76%**
Residential	346,880	607	2,526,900	63.2%	$464,295,504	$111.54	$10,451,295	$453,844,209	$109.03	$2.51	$30.13	**2.30%**
Totals	**399,772**		**3,996,902**	**100.0%**	**$742,135,588**		**$16,531,247**	**$725,604,341**				**2.28%**

Table 10
2015 Impact of Burgess BioPower Power Purchase Agreement On Eversource Customers
(*With* Impacts from Capacity Payments and Renewable Energy Certificate Savings to Eversource)

Eversource Customers	Number of Customers	Average Monthly Usage (kWh)	Total Electricity Usage (mWh)	% of Elect. Usage	Total Expend.	Average Monthly Bill	$ Impact of Above Market Price	Total Expenditures W/O Burgess	Average Monthly Bill W/O Burgess	Impact on Monthly Bill	Impact on Annual Expend.	% of Annual Electricity Costs
Commercial	51,047	2,075	1,271,310	31.8%	$230,431,853	$376.18	$2,440,470	$227,991,383	$372.19	$3.98	$47.81	**1.07%**
Industrial	1,844	8,977	198,692	5.0%	$47,408,231	$2,141.97	$381,420	$47,026,811	$2,124.74	$17.23	$206.80	**0.81%**
Residential	346,880	607	2,526,900	63.2%	$464,295,504	$111.54	$4,850,761	$459,444,743	$110.38	$1.17	$13.98	**1.06%**
Totals	**399,772**		**3,996,902**	**100.0%**	**$742,135,588**		**$7,672,651**	**$734,462,937**				**1.04%**

VIII. Economic Impacts of Above Market Electricity Costs

Any negative economic impacts related to increases in electricity prices related to the price of Burgess BioPower's electricity can be estimated and must be netted-out from economic benefits associated with the project. To estimate the economic costs associated with Burgess' above market electricity prices in 2015 we modeled the costs as a reduction in disposable income to NH households by the amount of above market costs that are paid by residential customers. For industrial and commercial customers, we modeled a reduction in output in amounts equal to the portion of above market costs that were paid for by each category of customer. We allocated increased costs to commercial and industrial customers to industries in proportion to the percentage of industry output that they contribute in the NH economy. This method of modeling the impacts of Burgess' above market electricity prices produces the largest possible negative impacts as it is possible that production by commercial and industrial customers is not affected and instead their profitability is reduced. In that case negative job impacts would be much smaller.

In a worst-case scenario, if no capacity payment or renewable energy credit sales offsets are factored into the cost of Burgess' electricity prices, and costs reduce production, then 2015 above market electricity costs associated with the facility lowered job growth in NH by an estimated 85 jobs across NH, while labor income grew by $4 million less. When the benefits to ratepayers of capacity payments and renewable energy credit sales are included in the impact calculations, then job growth was lower by 44 jobs, and labor income grew by $2.08 million less. New Hampshire experienced strong job growth in 2015 and 2016 and it is important to note that the job impacts do not represent jobs lost or layoffs but rather a lower level of job growth than would have occurred without Burgess' above market electricity prices in those years.

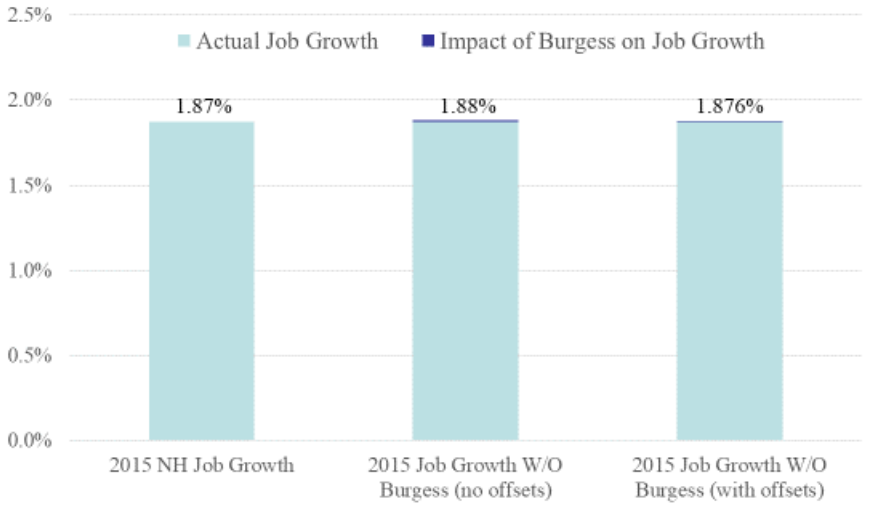
To put these 2015 economic impacts into context, NH added 15,793 wage and salary and proprietor jobs in 2015.[20] Our analysis suggests that without the impact of Burgess' electricity costs the state would have added either another 85 jobs (if offsets to above market prices are not included in Burgess impacts on electricity costs) or another 44 jobs (if offsets are included). The impact on NH's employment growth rates under each of these scenarios is presented in Figure 11. The chart shows that Burgess' impact on NH's employment growth rate in 2015 was to lower it

[20] According to the U.S. Bureau of Economic Analysis(BEA), *State Annual Personal Income and Employment.* Note that BEA employment numbers include proprietors' employment.

by approximately 1/100th of one percent (0.01%) when no renewable energy credit or capacity payment offsets are considered, and 0.005% when offsets are included in calculations.

Under either of the scenarios considered, the impact that the annual operation, employment and expenditures of Burgess on Coos County and the State of New Hampshire far exceeds the negative impacts from Burgess' above market electricity prices.

Figure 11
The Impact of Burgess' Electricity Prices on NH's Job Growth in 2015 Was Miniscule



IX. Conclusions

This report examined the economic, fiscal, socioeconomic and demographic impacts of the initial years of annual operations of the Burgess BioPower electricity generating facility. The purpose of the report is to inform the public and policymakers in New Hampshire of the benefits and costs of Burgess' annual operations at a time when there are strong and sometimes competing concerns about the cost of electricity in NH, the environmental impacts of electricity generation from fossil fuels, and the role that renewable sources of energy should play in meeting both the energy and environmental goals of the state.

The report documents significant economic benefits from Burgess in the form of increased jobs and income, and tax revenues in a region that has been characterized by weak job and income growth and weakening socioeconomic and demographic trends. The report finds early evidence that Burgess is helping to improve regional socioeconomic and demographic trends, although lags in the reporting of these data and Burgess' short operating history allow for only a preliminary assessment of Burgess' impacts on these trends.

Finally, in an energy environment where historically low natural gas prices have reduced the wholesale price of electricity in New England, resulting in the price of Burgess BioPower's electricity to be above New England market prices, the impact on electricity customers in New Hampshire has been minimal. The economic impact of Burgess' above market electricity prices in 2015 was to reduce annual job growth in New Hampshire by about 1/100th of a percent or less. Comparing the economic benefits of Burgess to the costs associated with Burgess indicates that the economic benefits (not including socioeconomic and demographic benefits) greatly exceed Burgess' costs.

The principal finding of this report is that the economic and fiscal benefits of the Burgess BioPower facility to the City of Berlin, the County of Coos, and the State of New Hampshire significantly exceed costs associated with the facility's impact on electricity prices in New Hampshire.

Appendix A: Impacts on 2016 Electricity Prices

Table 11
2016 Impact of Burgess BioPower Power Purchase Agreement On Eversource Customers
(*Without* Impacts From Capacity Payments and Renewable Energy Certificate Savings to Eversource)

Eversource Customers	Number of Customers	Average Monthly Usage (kWh)	Total Electricity Usage (mWh)	% of Elect. Usage	Total Expend.	Average Monthly Bill	$ Impact of Above Market Price	Total Expenditures W/O Burgess	Average Monthly Bill W/O Burgess	Impact on Monthly Bill	Impact on Annual Expend.	% of Annual Electricity Costs
Commercial	49,349	1,622	960,720	27.4%	$200,393,614	$338.39	$6,094,421	$194,299,193	$328.10	$10.29	$123.50	**3.14%**
Industrial	1,727	4,987	103,332	2.9%	$39,041,954	$1,884.17	$655,499	$38,386,455	$1,852.54	$31.63	$379.61	**1.71%**
Residential	345,479	590	2,447,637	69.7%	$475,950,864	$114.80	$15,526,823	$460,424,041	$111.06	$3.75	$44.94	**3.37%**
Totals	**396,555**	**92,641**	**3,511,689**	**100.0%**	**$715,386,432**		**$22,276,743**	**$693,109,689**				**3.21%**

Table 12
2016 Impact of Burgess BioPower Power Purchase Agreement On Eversource Customers
(*With* Impacts from Capacity Payments and Renewable Energy Certificate Savings to Eversource)

Eversource Customers	Number of Customers	Average Monthly Usage (kWh)	Total Electricity Usage (mWh)	% of Elect. Usage	Total Expend.	Average Monthly Bill	$ Impact of Above Market Price	Total Expenditures W/O Burgess	Average Monthly Bill W/O Burgess	Impact on Monthly Bill	Impact on Annual Expend.	% of Annual Electricity Costs
Commercial	49,349	1,622	960,720	27.4%	$200,393,614	$338.39	$5,999,557	$194,394,057	$328.26	$10.13	$121.57	**3.09%**
Industrial	1,727	4,987	103,332	2.9%	$39,041,954	$1,884.17	$645,295	$38,396,659	$1,853.03	$31.14	$373.71	**1.68%**
Residential	345,479	590	2,447,637	69.7%	$475,950,864	$114.80	$15,285,137	$460,665,727	$111.12	$3.69	$44.24	**3.32%**
Totals	**396,555**	**92,641**	**3,511,689**	**100.0%**	**$715,386,432**		**$21,929,989**	**$693,456,443**				**3.16%**