Engineering and
Environmental Services

MEMORANDUM

To: Wendell Davis, Manager, Durham County

Through: Peri Manns, Deputy Director, Engineering and Environmental Services

From: Tobin L. Freid, City-County Sustainability Manager

Date: September 21, 2018

Subject: Cost Implications for a Transition to Renewable Energy

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The March 13, 2018 Joint City-County Committee meeting included a discussion regarding a proposed resolution setting forth an aspirational goal of transitioning to 100% renewable energy for government operations by 2050. Both the City and County Managers requested additional information regarding the cost of implementing such a goal. Due to the significant uncertainty surrounding the renewable energy market, legal landscape in NC, and even our own energy use, the resolution first calls for Durham "to establish a plan" to make progress in achieving this goal in the next 15-30 years.

The resolution calls for the plan to encompass five major guiding principles:

1) Include all sectors of energy use in the government sector
2) Be economically responsible
3) Be technologically feasible
4) Be equitable for all members of the community
5) Be transparent and inclusive

The development of such a plan is expected to cost up to $40,000 and will help provide the County with more accurate cost assessments, based on the technical expertise of energy sector professionals. This plan will help the County understand and prioritize all the options, the impact of those options on the environment and equity, the cost of implementation including effects on utility rates, and possible options for financing.

The attached white paper outlines staff's preliminary analysis of the major cost considerations and identifies some current costs and cost trends that shed light on potential costs. Staff has compiled the best available information for each type of energy the County uses – electricity, natural gas, gasoline, and diesel – as well as factors that may affect those costs. These estimates are based on current prices, trends, and expected incentives. The cost of renewable energy is expected to decrease in the next 15-30 years as technology improves and supply increases. In addition, as the County improves energy efficiency in its operations, the amount of energy needed is expected to decrease.

This table shows current energy use and cost, as well as, greenhouse gas emissions from each fuel type.

Durham County Energy Use FY17				
Electricity (kwh)	Natural Gas (therms)	Gasoline (gallons)	Diesel (gallons)	
31,020,014	564,085	312,927	98,746	
Energy Cost FY17				
Electricity	Natural Gas	Gasoline	Diesel	Total
$2,393,486	$579,459	$435,364	$828,231	$4,236,541
Greenhouse Gas Emissions FY17 (MT CO2e)				
Electricity	Natural Gas	Gasoline	Diesel	Total
11,399	2,999	9,607	1,008	25,012

Options

Options vary for replacing each type of fuel with renewable alternatives.

Efficiency (all fuel types) - The most cost-effective option is reducing energy use through efficiency and conservation. This has the added benefit of saving tax-payer dollars and upgrading facilities and equipment while reducing emissions.

Generation (electricity and natural gas) – The County could generate some renewable energy. This includes electricity through solar photovoltaics (solar PV) and natural gas through biodigestion of waste water sludge or other organic waste products.

Offsets or credits (electricity) – The County can purchase renewable energy certificates (RECs) to offset a portion of electricity that we cannot otherwise be sourced directly.

Fuel switching – The County can replace gasoline and diesel in vehicles with other fuels such as electricity and biodiesel.

Costs

The cost to transition to and purchase renewable fuels in the future are affected by many factors including:

- The amount and type of energy we use in our operations in the future
- The cost of renewables and the associated technology in the future
- The mix of renewables offered by Duke Energy and PSNC in the future
- The timing of implementation of various options
- Changes in the costs and technology of traditional fuels (business as usual)

Electricity

Solar PV – Solar PV has recently become more attainable as an option for governments through H589, which was signed into law in July 2017. This law includes new financial incentives and options including a $0.75 rebate per watt up to $75,000 (for a 100kw system), new options for leasing PV that eliminate upfront investment by the County, new community solar options, and an

expanded Green Rider option. Even without these new incentives and financial tools, the cost of solar PV has been decreasing rapidly as new technologies, scaled production, and competition drive down prices to where they are competitive with traditional energy sources. Across the country, solar PV costs have decreased by more than 50% in the last five years.

- To meet the County's current electricity needs (19MW) by solar PV, one would need about 112-185 acres of solar panels with today's technology. This would cost roughly $20 million with today's pricing, assuming the County did not have to purchase additional land. This price does not include the rebate or leasing options, which would be significantly less.

- To meet any difference between what renewable electricity could be locally generated, the County could purchase RECs. The cost for RECs vary based on the type of renewable energy, market demand, and size of purchase, though overall the cost has declined sharply over time. RECs are not a one-time purchase, but would be a reoccurring purchase in the years for which we had inadequate local generation. The below sections show the costs between the jurisdictions.

    - If the County wanted to buy RECs to offset all current electricity, it would cost approximately $24,800 - $27,900 per year for wind RECs (or roughly 1% of the total $2.4 million electricity expenditure for the County in FY17) and $46,500 for NC solar RECs (roughly 2% of the County's FY17 total electricity expenditure). **If the County wanted to buy NC solar RECs to cover 10% of its electricity use, that would cost about $4,650 per year.**

<u>Natural Gas</u>

- Renewable natural gas prices have recently been around $20/mmbtu. At this price, it would cost the County **approximately $1.4 million per year total,** if we could access the fuel. PSNC does not currently have a tariff for RNG and is not supplying it or know of any NC suppliers. There is an RNG standard in front of the NC Utilities Commission and once that is approved it will clear the path for more RNG production, which could bring the price down.

- Another option is to build a biodigester. This would cost many millions of dollars, depending on the size and technology. Additional cost estimates are needed for a biogester in the Durham community. The City of Raleigh is in process of building a biogester. The project totals $90 million, of which half is funded by a low-interest loan. It may be feasible to partner with the City, Duke University, or others private entities to build a Durham biodiester and bring down the cost.

<u>Gasoline and Diesel</u>

There is a great opportunity to increase fleet fuel efficiency to decrease the amount of fuel used and greenhouse gas emissions produced. This can be achieved by purchasing more fuel-efficient vehicles, including more hybrids, and by improving driver behavior through telemetrics and training. The largest cost

associated with transitioning fleets to renewable energy is the cost of replacing the vehicles.

- Driver training about ways to improve vehicle performance and efficiency could be achieved with relatively little funding, but would include the cost of staff time to attend the trainings.

- Using telemetrics to measure and improve driver performance and fuel economy could decrease fuel costs by 10-40%. The costs depend on the technology selected and the number of vehicles included in the program. There are other benefits to telemetrics including improved safety, driver productivity, and efficiency of routes.

- The County could purchase replacement vehicles with higher miles per gallon. The cost would depend on what options are available.

- Switching from diesel to B20 (20% biodiesel) for non-emergency vehicles could be achieved without replacing those vehicles. The current state contract price for B20 is about $0.04/gallon more than diesel. This would translate to **approximately $3,800 more for the County (2%).** Fuel prices are notoriously volatile, so this price difference is likely to vary. Cary, Wilmington, and Raleigh are all using B20 extensively in their fleet. To use this in all diesel vehicles other than emergency vehicles would entail purchasing and installing a separate tank.

- The County could purchase more hybrids and all-electric vehicles as the selection of models expand and prices decrease. Maintenance costs for EVs are significantly less than traditional vehicles because there are fewer systems and parts to be maintained. Current EVs get about 3 miles/kWh, which comes out to about **$0.03/mile in fuel costs, compared to $0.23/mile for gasoline vehicles and $1.44/mile for diesel vehicles**. While it is true that not all functions can be served with electric vehicles, a switch to EVs when it is financially feasible from a life-cycle perspective would help the transition to renewables, assuming the electricity is sourced from renewables.