



Appendices: Strategic Plan for Transitioning Buncombe County to 100% Renewable Energy by 2042

Author: Green Built Alliance and the Blue Horizons Project
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Acknowledgement of Native American Land



The Blue Horizons Project Community Council humbly acknowledges that the land we are on is the ancestral land of the Anigiduwagi, more commonly known as the Cherokee. This land was acquired through violence, oppression, coercion, and broken treaties.¹ For thousands of years, the Cherokee thrived in **ᏊᏃᏅᏍᏔᏅ (To Ki Ya Sdi)**, “the place where they race,” or Asheville, as it is known today.²

¹ Asheville CVB. (2022, January 11). *Ancient Asheville: Celebrating the Cherokee influence on Southern Appalachia*. Explore Asheville. Retrieved from <https://www.exploreasheville.com/articles/post/ancient-asheville-celebrating-the-choerokee-influence-on-southern-appalachia/>

² Deeds, R. of. (2021, November 5). *As long as the grass shall grow*. ArcGIS StoryMaps. Retrieved from <https://storymaps.arcgis.com/stories/e9913eb717dc4e68aeb7a7c7d3f42c3>

Appendices: Strategic Plan for Transitioning Buncombe County to 100% Renewable Energy by 2042

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Blue Horizons Project Community Council meeting

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Acronyms:

BAU – Business as Usual	FBRMPO – French Broad River Metropolitan Planning Organization
BBC – Better Buildings Challenge	GBA – Green Built Alliance
BC – Buncombe County	GBH – Green Built Homes
BHP – Blue Horizons Project	GHG – Green House Gas
BHPCC – Blue Horizons Project Community Council	GSA – Green Source Advantage
BIPOC – Black, Indigenous, and People of Color	GW – Gigawatts
BTU – British Thermal Units	GWH – Gigawatt Hours
CAO – Community Action Opportunities	HAARP – Heating/Air Repair and Replacement Program
CCS – Carbon Capture and Storage	HELOC – Home Equity Line of Credit
CEI – Clean Energy Impact	HPWH – Heat Pump Water Heater
CI – Carbon Intensity	HVAC – Heating Ventilation and Cooling
COA – City of Asheville	ICE – Internal Combustion Engine
COP – Coefficient of Performance	IRA – Inflation Reduction Act
CPCN – Certificate of Public Convenience and Necessity	KPI – Key Performance Indicators
CSMG – Critical Services Microgrid Group	KW – Kilowatts
DEP – Duke Energy Progress	KWH – Kilowatt Hours
DER – Distributed Energy Resource	LEED - Leadership in Energy and Environmental Design
DOE – Department of Energy	LMI – Low- and Moderate-Income
DSM – Demand Side Management	LOSCVC – Land of Sky Clean Vehicle Coalition
EE – Energy Efficiency	MHO – Mountain Housing Opportunities
EEAS – Energy as a Service	MMT – Million Metric Tons
EIA – Energy Information Association	MPO – Metropolitan Planning Organization
EITF – Energy Innovation Task Force	MSD – Metropolitan Sewer District
ESN – Energy Savers Network	MW - Megawatts
EV – Electric Vehicle	MWDC – Megawatts DC
EVSE – Electric Vehicle Supply Equipment	

MWH – Megawatt Hours

NC – North Carolina

NCDEQ – North Carolina Department of Environmental Quality

NCDOT – North Carolina Department of Transportation

NCUC – North Carolina Utilities Commission

NEVI – National Electric Vehicle Infrastructure Program

NREL – National Renewable Energy Laboratory

PPA – Power Purchase Agreement

PV – Photovoltaic

Q&A – Questions and Answers

RE – Renewable Energy

REC – Renewable Energy Credit

RFP – Request for Proposal

RFQ – Request for Quote

ROI – Return on Investment

SAF – Sustainable Aviation Fuels

SEER – Seasonal Energy Efficiency Ratio

UCD – United Community Development

USGBC – United States Green Building Council

VMT – Vehicle Miles Traveled

VPP – Virtual Power Plant

WNC – Western North Carolina

WWC – Warren Wilson College

WWTP – Wastewater Treatment Plan

Definitions of Key Terms:

Equity: Equity is “the state of being just, impartial, and fair.” Buncombe County’s Racial Equity Plan envisions “systems, policies, and practices that support equity for all people and an organizational culture that embraces diversity and inclusion.”³

Renewable Energy: Renewable energy refers to energy from sources that are not depleted by use. This may include: solar PV, solar thermal, wind, hydropower, geothermal, ocean energy; biomass resources, including agricultural waste, animal waste, wood waste, spent pulping liquors, combustible residues, combustible liquids, combustible gases, energy crops, or landfill methane; waste heat derived from a renewable energy resource and used to produce electricity or useful, measurable thermal energy at a retail electric customer's facility; or hydrogen derived from a renewable energy resource. It does not include peat, fossil fuel, or nuclear energy.⁴

Energy Efficiency: Energy efficiency is the use of less energy to perform the same task or produce the same result. Energy-efficient homes and buildings, compared to traditional buildings, use less energy to heat, cool, and run appliances and electronics. Energy-efficient manufacturing facilities use less energy to produce goods.⁵

Electrification: Electrification is the shift from any non-electric source of energy to electricity at the point of final consumption, and it is an emerging trend in global energy markets.⁶ Examples include shifting from a gas-powered lawn mower to an electric one, shifting from a gas-powered car to an electric one, or shifting everything that uses fossil fuels to directly using electricity.

Greening the Grid: This a phrase used to refer to transitioning our electric grid (the infrastructure which provides us with electricity) to one that no longer uses fossil fuels (coal, natural gas, etc.) and instead uses renewable energy (see above definition).

Local: We define ‘local’ to be within Buncombe County. We will define ‘regionally local’ for renewable energy generally as sited in Western North Carolina (WNC) as well as some of the near border areas of Tennessee.

Initiative: We define initiatives as any concerted action toward the goal by some entity within our community.

³ Deeds, R. of. (2021, November 5). *As long as the grass shall grow*. ArcGIS StoryMaps. Retrieved from <https://storymaps.arcgis.com/stories/e9913eb717dc4e68aeb7a7c7d3f42c3>

⁴ *North Carolina*. NCUC. (n.d.). Retrieved from <https://www.ncuc.gov/Reps/rep.html>

⁵ *Energy efficiency: Buildings and industry*. Energy.gov. (n.d.-a). <https://www.energy.gov/eere/energy-efficiency-buildings-and-industry>

⁶ Sun, Yinong, Paige Jadun, Brent Nelson, Matteo Muratori, Caitlin Murphy, Jeffrey Logan, and Trieu Mai. 2020. *Electrification Futures Study: Methodological Approaches for Assessing Long-Term Power System Impacts of End-Use Electrification*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-73336. <https://www.nrel.gov/docs/fy20osti/73336.pdf>.

Part Five: Appendices

APPENDIX A: Detailed review of Technical Strategy and Assumptions

Buncombe County Energy Demand in 2018

Before we can understand the requirements to achieve the renewable energy goals, we must assess where Buncombe County is today. Our approach builds on the discussion of energy demand in the “Moving to 100 Report,” adding in an estimate of energy demand for the sectors other than electricity and natural gas. A full understanding of energy demand is not complete without also considering petroleum products such as gasoline, diesel, propane, and heating oil, which represent an exceptionally large component of energy demand. Unfortunately, data is not readily available for these sectors, so this analysis approximates each of these, to produce an estimate of total energy demand in Buncombe County for 2018 as shown in Table 2. Details and the data sources and assumptions used to develop the Table 2 baseline energy estimates can be found at the end of this Appendix. Note that all units are expressed as MWH equivalent. Natural gas, oil, and propane have all been converted into equivalent units of electricity. This is for two reasons: (1) It helps to have a uniform measurement of energy regardless of the source, and (2) the goal of renewable energy dictates that most (if not all) energy will be in the form of electricity.

Many assumptions were required to develop the baseline 2018 data from the data available at a county level. The Duke and Dominion data represent just under 46% of total energy use, with another 45% represented by transportation alone. Most of the data, other than what is coming from Duke and Dominion, is available at the state level but not at the county level and had to be estimated based on Buncombe’s share (based on population) of the state. For example, the transportation energy consumption is based on Buncombe County’s share of statewide vehicle registrations times statewide energy use for transportation.

Table 1 – APPENDIX A - Baseline year (2018) MWH Equivalent - County Total

Baseline Year (2018) MWH Equivalent - County total					
	Percent	Total	Electricity	Natural gas	Oil and Propane
Community		13,017,985	3,026,276	2,933,200	7,058,510
Industrial	20.61%	2,683,566	454,593	1,522,903	706,070

Residential	16.44%	2,139,960	1,366,550	535,882	237,528
Commercial excl. COA, BC	17.20%	2,239,142	1,165,178	850,664	223,300
City	0.20%	26,163	15,842	10,321	
County	0.22%	28,837	17,006	11,831	
Utility Use	0.03%	3,711	2,112	1,599	
Duke SL	0.04%	4,953	4,953		
Transportation	45.26%	5,891,613			5,891,613
TOTAL		13,017,943	3,026,234	2,933,200	7,058,510
Energy Source Percent	0.0%	100.0%	23.2%	22.5%	54.2%

Combining the City, County, and utility use values into commercial, we show the energy source and energy sector breakdowns for Table 2 in Figure 12 and Figure 13. Figure 12 shows energy source percentage by fuel, except for electricity which is quantified in MWH equivalent. The data behind the percentages is from Table 2.

Figure 1– APPENDIX A - 1 Buncombe County Energy use by Source (%) – MWH equivalent - Data is a summary of Table 2

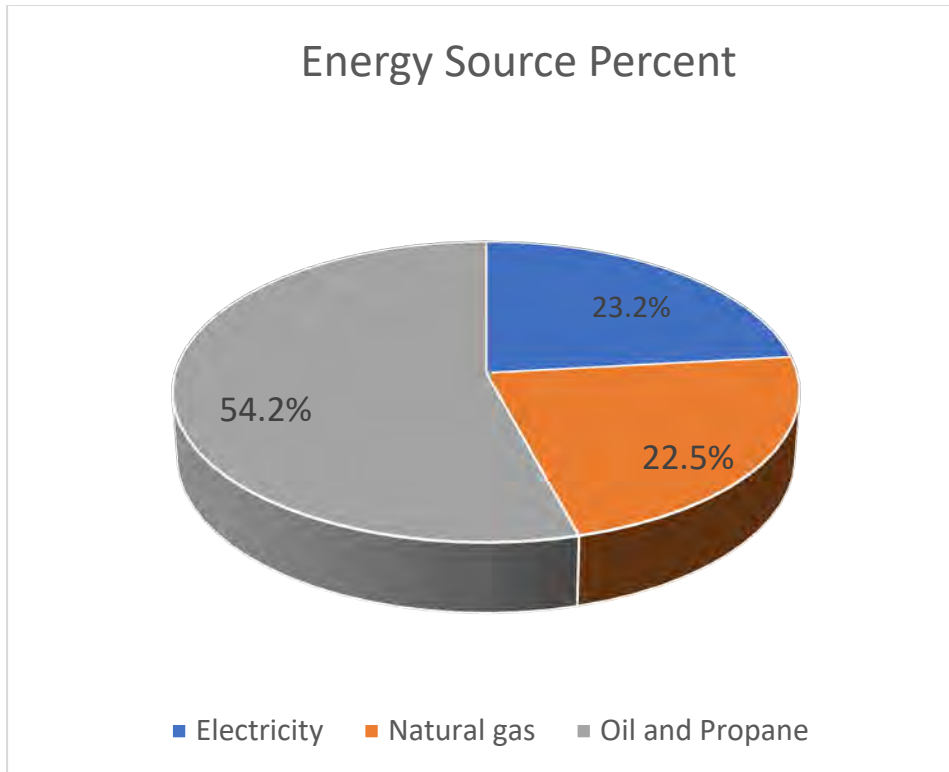
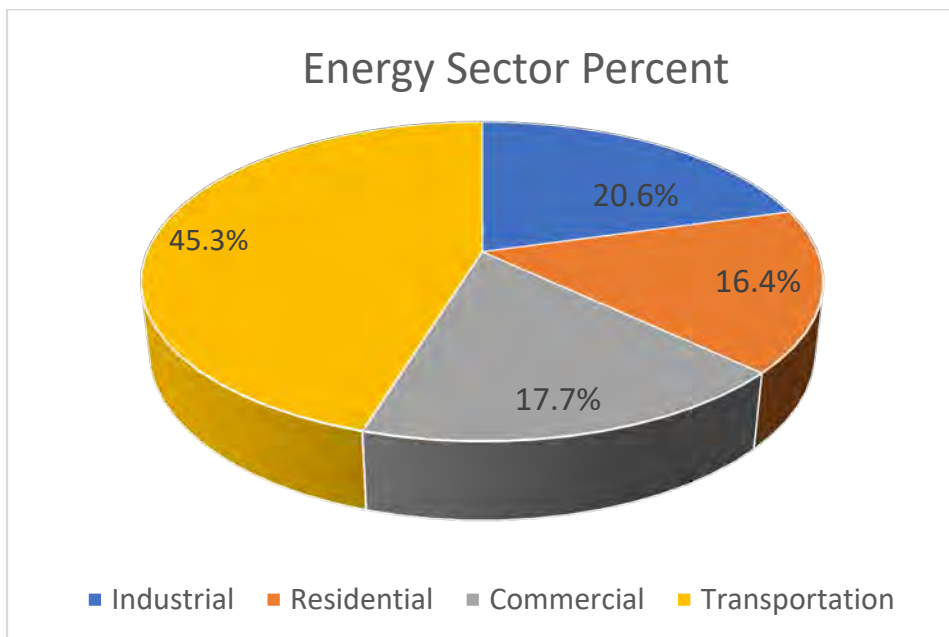


Figure 2 - APPENDIX A - Buncombe County Energy Use by Sector (%) – MWH equivalent - Data is a summary of Table 2



Before proceeding to a forecast, it is helpful to simplify Table 2 by doing some aggregations, first combining the different fossil fuel types into a single “direct fossil fuel use” category. The ‘commercial’ sector in Tables 3 and 4 below is made up of the combined use of the City, the County, street lighting, and Duke Energy’s company use.

Table 2 – APPENDIX A - Buncombe County 2018 Energy Demand by sector in MWH (or MWH equivalent)

2018 Energy Demand in MWH or MWH Equivalent			
	Electric	Direct Fossil Fuel use	Percent Electric
Residential	1,366,550	773,410	45.2%
Commercial	1,205,091	1,096,115	39.8%
Industrial	454,593	2,228,973	15.0%
Transport	0	5,891,613	0.0%
Total	3,026,234	9,990,110	100.0%

Note: In Table 3 above, much of the electricity used in Buncombe County does not come directly from fossil fuels but comes from nuclear. Also, the data above in Table 3 comes from Duke, who does not provide data on EVs. While there most certainly were EVs using electricity in 2018 the usage is estimated to be negligible for these calculations and assumptions.

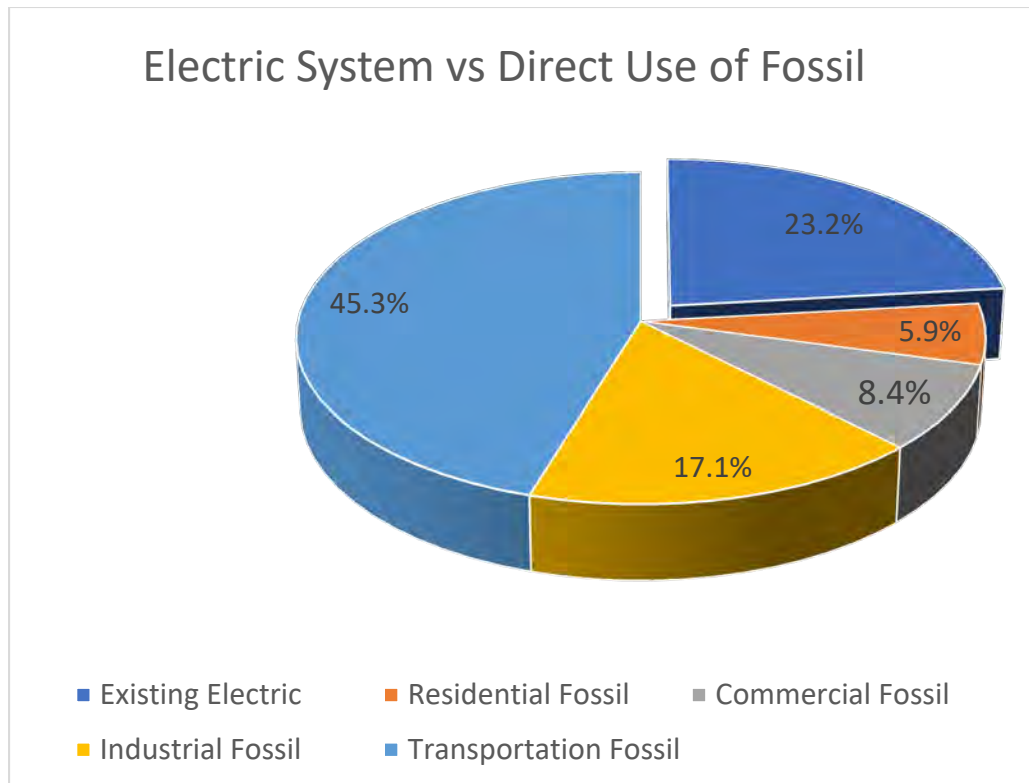
To further simplify Table 3 by expressing all electricity demand as one number, as shown in Table 4 and Figure 14.

Table 3 – APPENDIX A - Buncombe County 2018 Energy Demand by Source in MWH (or MWH equivalent)

2018 Energy Demand in MWH or MWH Equivalent		
	Total	% of Total
Existing Electric	3,026,234	23.2%
Residential Fossil	773,410	5.9%
Commercial Fossil	1,096,115	8.4%

Industrial Fossil	2,228,973	17.1%
Transportation Fossil	5,891,613	45.3%
Total	13,016,344	100.0%

Figure 3 – APPENDIX A - Buncombe County Electric Use vs Direct Use of Fossil Fuel by Sector (%)



It is also worth noting that transportation is an exceptionally large share of total energy use, roughly twice the energy of the total electric sector.

Buncombe County Business as Usual (BAU) Energy Demand in 2042

This analysis will take the simplest possible approach to forecasting Buncombe County’s BAU energy demand for 2042. For each of the major sectors of Table 4 (Existing Electric, Residential Fossil Fuel, Commercial Fossil, Industrial Fossil, and Transportation Fossil Fuel Use), we will (1) calculate 2019 energy use per capita for each sector, (2) estimate the 2042 energy use per capita for each sector based on continuation of past trends, and then (3) multiply each sector’s 2042 projected energy use per capita by an estimated 2042 Buncombe County

population. This methodology was used based on the data available at the time as well as budget for modeling. Improved data would be beneficial for future studies.

According to the North Carolina Office of State Budget and Management, Buncombe County's 2019 population of 262,659 will grow to 309,404 by 2042, an increase of 18%. If a higher forecast of population growth were assumed, then BAU energy demand would be commensurately higher.

We calculated the baseline energy use per capita in each sector by dividing energy use by population. The forecast of changes in energy use per capita must also be derived. This forecast incorporated changes in energy efficiency in each sector plus changes in consumer behavior. The assumed changes in efficiency were based on past trends. This is similar to the methodology that Duke uses for the future projection of energy use and the impact of their programs, developed for the carbon plan. These changes were assumed with respect to BAU. Please note that these assumptions are conservative.

As noted in the EIA's national BAU forecast, energy use per unit of economic output is expected to continue to decline, while overall electricity and industrial energy use is expected to increase.⁷ In deriving Table 5 we continued the historical decline in energy use per capita through the 2042 forecast period. However, to be more conservative, we assumed a slower rate of decline for 2018-2042, by exactly one half of the rate of decline in such use for the state of NC from 2000-2018. For example, from 2000-2018 the per capita energy use of electricity in North Carolina declined at a rate of .72% per year. To be conservative, we made the arbitrary assumption that per capita use of electricity in Buncombe, before extensive electrification, will decline at a rate of 1/2 that, or .36% per year, from 2018-2042. Then we applied the Buncombe County population forecast to get the 2042 BAU value, which shows a BAU increase in energy use of about 5%.

Table 4 – APPENDIX A - Forecast of 2042 Buncombe County BAU Energy Demand

Forecast of 2042 BAU Energy Demand				
	Per capita energy use decline rate 2018-2042	Per Capita Energy Use 2018	Per Capital Energy Use 2042	Total Energy Use BAU 2042 - MWH
Existing Electric	-0.36%	11.59	10.68	3,281,853
Residential Fossil	-1.33%	2.96	2.18	668,995

⁷ U.S. Energy Information Administration - EIA - independent statistics and analysis. EIA. (2023, March 13). Retrieved from <https://www.eia.gov/odata/v1/qb.php?sdid=EBA.CPLW-ALL.D>.

Commercial Fossil	-0.25%	4.20	3.96	1,217,062
Industrial Fossil	-1.11%	8.53	6.60	2,029,534
Transport Fossil	-0.26%	22.56	21.24	6,528,859
Totals		49.83	44.65	13,726,303

The forecast of BAU energy use in 2042 illustrates the challenge ahead for Buncombe County. It incorporates continued significant improvements in energy efficiency, which find their way into the forecast through the decline in per capita energy use. Those improvements imply a continuation of the successes of the last 20 years as a *starting point*. The community of Buncombe County will have to work just as hard for the next 20 years as it did for the last 20 years. In addition, we need to grow our dedicated local/regional workforce, support federal and state policies, find financial support, and engage the public to prioritize efficiency and renewable energy for all sectors of the economy.

The current amount of renewable energy in the system is slightly under 2% as shown in Table 7. This Technical Strategy Overview starts from that point and builds a series of actions to get to 100% renewable energy by 2042.

The Technical Strategy Overview will measure the contribution of each technical pathway to improving the renewable energy percentage and to reducing carbon emissions. It is estimated that the baseline 2018 carbon emissions for Buncombe County are 2.986 MMT (million metric tons). Under the BAU 2042 forecast, carbon emissions increase by 9.5%, which is faster than the rate of energy growth because it assumes no new growth is provided by nuclear, which means the zero-carbon portion of Duke’s portfolio would be declining (Note: the no growth in new nuclear scenario was presented in the Duke Carbon Plan hearing by several intervening organizations. Duke presented only scenarios showing significant increases in nuclear power. The NCUC did not pick any specific scenario in its ruling. There is another review scheduled for September of 2023). The bottom line is that if “Business as Usual” continues, carbon emissions, energy consumption, and renewable percentage will all be going in the wrong direction.

Efficiency Improvements Beyond Business as Usual (BAU)

The BAU forecast implies a continuation of previous efficiency improvements through declining per capita energy use. There are many opportunities for greater efficiency, and indeed this is already a major part of the Blue Horizons Project (BHP) programs, including Energy Savers Network (ESN), Home Energy Chats, and other initiatives discussed in this Plan. From an equity perspective, BHP may want to continue to lead with low-income programs, but there are opportunities throughout the County in all economic sectors. Reducing the need for automobile

transportation and increasing the use of mass transit could be an avenue in the transportation sector. The current and planned efforts for all such programs will be delineated in Part Three. The Technical Strategy Overview assumes, for now, the following reductions in overall energy demand for such programs:

- 1. Current electricity use – 5%**
- 2. Residential direct fossil use – 5%**
- 3. Commercial direct fossil use – 5%**
- 4. Industrial direct fossil use – 5%**
- 5. Transportation direct fossil use – 10%**

The transportation assumption is higher because greater population density offers opportunities for reducing vehicle miles travelled (VMT) per capita and improving utilization of mass transit and greenways. Making the above assumptions results in a reduction of overall energy use by 7.4%. The main contribution of these efficiency changes is to make it easier to achieve electrification and greening the grid.

Electrification

Before we can understand the magnitude of the challenge presented by clean energy transition, we need to understand electrification, which will be briefly summarized here. Even if Buncombe County's electric grid were converted immediately to 100% renewables, there still exists the industrial, transportation, residential, and commercial sectors that use fossil fuels directly, which accounts for 76% of total energy use in 2042 in the BAU forecast. Buncombe County needs to move all those sector numbers to zero and have the electric sector be 100% carbon-free. Until that is done, 100% renewable energy will not be achieved.

The superiority of electricity for various tasks can be illustrated by the example of a Tesla Model 3 covering four miles per kwh. A 30-mpg gasoline car of comparable size uses four times as much energy per mile. Or consider a high-efficiency heat pump with a COP (Coefficient of Performance — a measure of heat pump efficiency) of 4.0, using only 1/5 (20%) of the energy of an 80% efficient gas furnace. Industrial electricity use can often find similar efficiencies, unless elevated industrial heat is required, which is why there is an assumed smaller efficiency gain.

Our assumptions about efficiency gains from electrification are as follows:

- Residential and Commercial – 75%.
- Industrial – 20%.
- Transportation – 75%.

Under these assumptions, which are close to similar assumptions made by Jacobson⁸ in his work, final energy demand for activities that currently use fossil fuels directly is reduced significantly! For a much deeper dive, including comparison of these assumptions to more comprehensive and detailed studies, refer to Jacobson or to the work from the National Renewable Energy Laboratory (NREL) called “The Electrification Futures Study.”⁹

As one can imagine, electrification would already have happened if it were easy. Our current electric system, dominated by fossil fuels, is extremely inefficient. If these end uses were powered by electricity, the efficiency gains of electrification would still be offset by the efficiency losses from converting fossil fuels to electricity at power plants and transmitting electricity from power plants to the place where it is used. These efficiency losses in our current electric system can be dramatically reduced by greening the grid while we convert other end uses to electricity.

Electricity Demand after Efficiency Improvements and Electrification

We forecast that with these improvements, the total electric energy demand in 2042, satisfied by Buncombe County’s 100% renewable and carbon-free electric system, will be 6,579 GWH, a sharp reduction from the BAU value of 13,735 GWH, as shown in Table 6 and Figure 15.

Notes: (1) For the tables and figures below we are using GWH for easier graphical display (versus MWH). (2) In the final column, the units are in actual GWH for the fossil categories, representing the amount of electricity required to meet the demand of end-uses formerly satisfied by the direct use of fossil fuels. In that final column, total energy demand and total electricity demand are the same. (3) Carbon reductions from electrification represent an estimate of Duke’s electric system based on a continuation of Duke’s 2018 energy mix. (Note: the 2018 mix is used for this so that we can attribute the results of the NCUC Carbon Plan and H951 to the greening the grid step below).

⁸ Jacobson, M. Z. (2021). *100% Clean, Renewable Energy and Storage for Everything*. Cambridge University Press.

⁹ Sun, Yinong, Paige Jadun, Brent Nelson, Matteo Muratori, Caitlin Murphy, Jeffrey Logan, and Trieu Mai. 2020. *Electrification Futures Study: Methodological Approaches for Assessing Long-Term Power System Impacts of End-Use Electrification*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-73336. <https://www.nrel.gov/docs/fy20osti/73336.pdf>.

Table 5 - APPENDIX A - Comparison of Buncombe County 2018 Actual Energy Demand (GWH) Compared to 2042 After Efficiency and Electrification

Comparison of 2018 Actual Energy Demand (GWH) Compared to 2042 After Efficiency and Electrification Steps				
	2018 Baseline	2042 - BAU	2042 with Efficiency Programs	2042 with Efficiency Programs and Electrification
Existing Electric	3,032	3,288	3,119	3,119
Residential Fossil	773	669	636	159
Commercial Fossil	1,096	1,217	1,156	289
Industrial Fossil	2,229	2,030	1,928	1,542
Transport Fossil	5,892	6,529	5,876	1,469
Totals	13,022	13,733	12,714	6,578
All units in GWH				

Or in graphical format in Figure 15:



Figure 4 – APPENDIX A - Comparison of Buncombe County Actual Energy Demand Compared to 2042 After Efficiency and Electrification

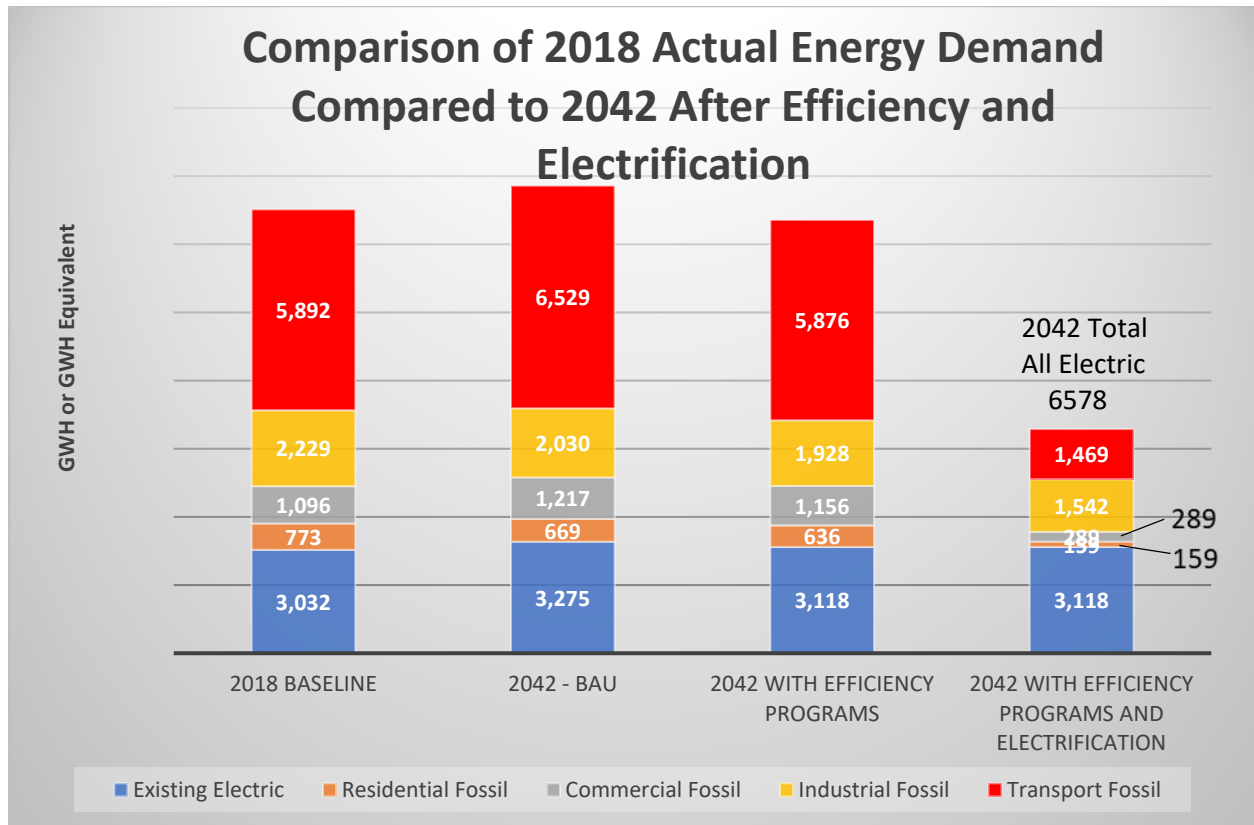


Table 6 and Figure 15 show the true power of energy efficiency and electrification in meeting our goals, by dramatically reducing the amount of energy that needs to be supplied by renewable electricity. Embracing efficiency programs and electrifying everything reduces overall energy use by more than half: 52% from business-as-usual and 53.3% from 2018 actuals. The favorable reductions from the BAU forecast notwithstanding, the 6,579 GWH still represents a more than doubling of electricity demand, from 3,032 in 2018. This more than doubling of the Buncombe County electric system creates new challenges for the electric system in the County that will need to be addressed over the next 20 years.

Greening The Grid in Buncombe and Importing Electricity to Buncombe County

Our forecast of electricity demand for a fully electrified energy system (the rightmost column on Figure 15 above) is the starting point for understanding how much renewable energy production is needed. In addition to converting existing electricity production to renewables, renewable energy needs to grow to meet the increased demand for electricity. This is shown in Table 7. The reader is encouraged to study this table to follow the next few paragraphs. As shown

in Table 7 renewable energy, mostly via imports of solar and hydro from Duke, accounted for 6.9% of imports from Duke and 7.4% of total electricity including local production, in 2018 (2018 Baseline). Looking at total energy (versus electric only) the renewables percentage in 2018 was 1.7%.

Table 7 also shows what happens to the numbers for the 2042 BAU case, if we then add efficiency, and then if we add electrification. The final scenario (labeled 2042 Plus H951) shows our assumptions of the impacts of Duke meeting its carbon plan goals. Each scenario as you go down the table builds on the prior scenario. So, if all we do is electrify everything and increase energy efficiency as assumed, but do not green the grid (2042 Plus Electrification scenario) the percentage RE grows to 7.8% of total energy, while carbon emissions show a significant decline. This is based on the elimination of direct use of fossil fuel and Duke's current ratio of renewable electricity in the total. Also note that in all of these scenarios except for the 2018 baseline we assume local RE is at our estimate of the 2022 level (see Table 8).

While efficiency and electrification get us to 7.8% of renewable energy in our analysis, Duke's decarbonization efforts as we interpret them get us to 66.6% (final scenario in Table 7). This is a much higher percentage than that shown in the "Moving to 100 Report" because that report assumed that imports of electricity from Duke were proportional to Duke's forecast production based on an earlier Duke Integrated Resource Plan. However, the 2022 Carbon Plan from the North Carolina Utilities Commission (NCUC) suggests a vastly different mix for Duke by 2042.

We made our best efforts to estimate the composition of our electricity imports from Duke in 2042 under the Carbon Plan. We first assumed that Duke's carbon emissions reduce linearly from 2030 to 2050 (between 70% and 100% based on the requirements of the law behind the Duke Carbon Plan). From these calculations for Duke as a whole we estimated an 88% reduction in Duke's share of fossil fuels below 2005 levels in 2042. We also assume that by 2042 the only fossil fuel used by Duke will be highly efficient combined cycle natural gas plants, like the one at Lake Julian. We allocated the statewide emissions for Duke to Buncombe County, and converted the emissions to fossil energy production, to derive a hard limit of 853 GWH fossil fuel production allocated to Buncombe County imports from Duke.

The allocation of Duke Energy's nuclear production to Buncombe County is problematic because Duke's Carbon Plan has not yet decided the role of nuclear power in electricity production. The NCUC did not endorse any single plan, and intervenor plans differ dramatically from Duke's plan in nuclear usage (an intervenor, in this case refers to an individual or organization who is not already a party but who makes themselves a party by going against Duke's proposed plan, often with a detailed, professionally researched and modeled alternative plan). Intervenors and Duke all assumed the existing nuclear fleet would be operating past 2050. However, Duke relied extensively on new small modular reactors in their projections, whereas intervenors for the most part did not, relying on combinations of wind, solar, and storage instead.

For purposes of the final scenario in Table 7, we assume that Duke does not add new nuclear and that the existing nuclear fleet is retained. That assumption allows us to make an additional assumption that Duke’s nuclear production allocated to Buncombe County is the same as it was for 2018. The percentage of renewable imports from Duke grows to 65.6% in the scenario labeled “2042 Plus Electrification” in Table 7. This is mostly because the use of fossil fuels is limited by the achievement of the H951 goal, and the use of nuclear power is limited by assuming no new nuclear plants by 2042.

Nuclear energy, which comprises a large portion of “non-renewable” imports from Duke, is “zero-carbon.” Considering these existing nuclear plants to be “renewable” due to their lack of carbon emissions would get us closer to our 100% renewable energy goal. However, BHPCC has not chosen to do so, due to input from the community of Buncombe County that nuclear should not be considered to be renewable energy, and adhering to the definition established by NC law defining the renewable energy portfolio standard which specifically excludes nuclear energy).¹⁰ If the Buncombe County Commission were to shift the goal from a focus on "renewable" to one of "decarbonization," this would change. However, the Technical Strategy Overview will not focus on decarbonization but on 100% renewable energy.

The final scenario of Table 7 and the next to rightmost column of Figure 16 illustrate the dramatic decline in emissions and the increase in the percentage of renewables as a combined result of this next to last step of the technical strategy. It must be noted that these results could only be achieved with the electrification and efficiency efforts happening first. Duke’s conversion to renewables on its own, without electrification, shows much fewer benefits because most electricity production and emissions would continue to be provided directly by fossil fuels. Efficiency, electrification, and H951 and the NCUC Carbon Plan result in renewable energy of 66% and an emissions reduction of 2.39 MMT (from 2.98 today to .59). The remaining 34.4% renewable energy and .59 MMT of carbon reduction will need to come from local production of renewable energy.

Table 6 - APPENDIX A - Technical Pathways to 100% Renewable Energy and Zero Carbon

Technical Pathways to 100% Renewable and Zero Carbon									
	Fossil Plus Nuclear Imports	RE Imports	Total Electricity Imports	RE % of Imports	Local RE	RE % of Total Electricity	Total Energy	RE % of Total Energy	Total Emissions (MMT)
2018 Baseline	2,798	208	3,016	6.9%	16	7.4%	13,022	1.7%	2.98

¹⁰ North Carolina. NCUC. (n.d.). Retrieved from <https://www.ncuc.gov/Reps/rebs.html>

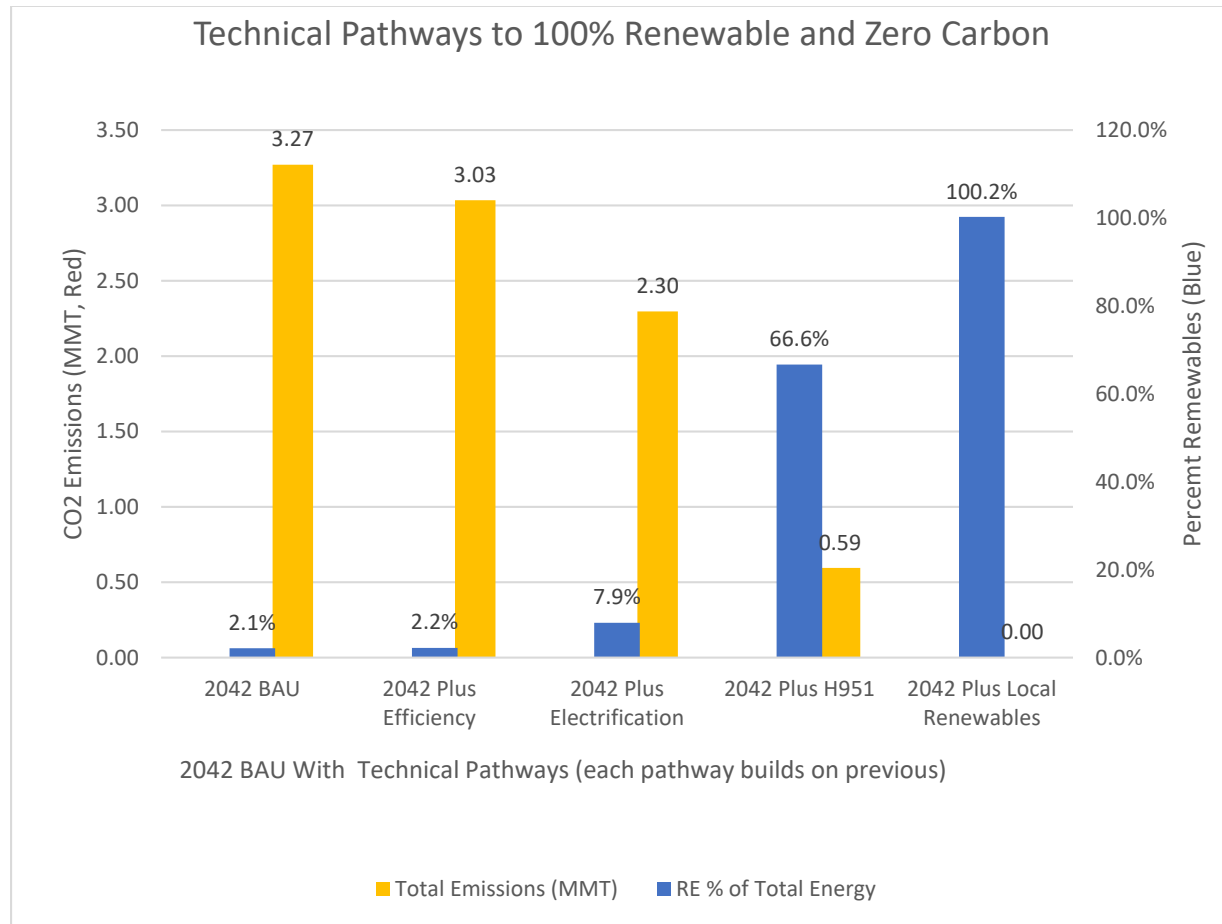
2042 BAU	3,048	226	3,275	6.9%	66	8.8%	1.14	2.1%	3.27
2042 Plus Efficiency	2,902	215	3,118	6.9%	66	8.8%	1.09	2.2%	3.03
2042 Plus Electrification	6,123	455	6,577	6.9%	66	7.8%	2.30	7.9%	2.30
2042 Plus H951	2,260	4,317	6,577	65.6%	66	66.0%	0.59	66.6%	0.59
2042 Plus Local Renewables	-16	-30	-45	NA	6,623	100.2%	0.00	100.2%	0.00

Note: Units are GWH except Emissions in MMT and Percentage where noted.

Adding in Countable Renewable Energy Production

The final step in achieving the 100% renewable energy goal is to incorporate renewable energy production as an offset to non-renewable imports from Duke. This is depicted in Figure 16 below, which shows the cumulative effect of efficiency, electrification, increased renewable energy imported from Duke resulting from the NCUC Carbon Plan, and renewable energy we can count as an offset.

Figure 5 – APPENDIX A - Emissions Vs. Renewable Energy: Technical Pathways to 100% Renewable Energy and Zero Carbon



What renewable energy can we count toward offsetting non-renewable energy imports from Duke? Two major options have emerged.

One option, selected in the “Moving to 100 Report,” assumed that countable renewable energy production simply offsets total electricity imports from Duke. This sounds reasonable, but the implication is that we would need to offset all electricity imports from Duke to meet the goal. If these offsets had to come from production within Buncombe County, then all consumption of energy within Buncombe County would need to be met by renewable sources like solar and wind which were produced in Buncombe County. Needless to say, this would be an extraordinary challenge. It would still be an extraordinary challenge if we said that such production could come from within our mountain region (WNC and adjacent Tennessee border areas). Likely the only feasible solution would require us to also develop renewable sources of energy outside of the local region and acquire the renewable energy credits (RECs), and even that would be a very large amount of energy developed by or on behalf of Buncombe County residents and businesses.

A simpler and more feasible approach would be to assume that we will count Buncombe County renewable energy and other renewable energy from the region, or beyond, as offsets to the non-renewable imports from Duke. The result of this approach is that instead of needing countable renewable energy production equal to 100% of imports from Duke, we would only need countable renewable energy production equal to the 35% of imports from Table 7 that are non-renewable. If we decided to only offset the fossil fuel portion of what we import from Duke (implying that we are OK with importing nuclear energy from Duke) then the countable renewables production required would be in the order of 13% of imports from Duke.

We can employ the approach used in the “Moving to 100 Report” to compute an equivalent amount of solar capacity required. That report stated that Buncombe County would need 3,124 GWH renewable energy, which would be equivalent to 2,300 GW utility scale solar installations and 14,600 acres of land.¹¹ But the “Moving to 100 Report” only included energy for buildings whereas our analysis, which includes all fossil fuels and not just natural gas, suggests that we need 6,578 GWH (Figure 15) equivalent to 4.8 GW utility scale solar and 36,600 acres of land. This acreage is equivalent to about 1/2 of the total farmland in Buncombe County covered with utility scale solar farms.

The second option would require proportionately far less solar — 2,302 GWH/1.7 GW for offsetting nuclear and fossil fuel imports from Duke and 855 GWH/.6 GW for offsetting only fossil fuel imports from Duke. We recommend focusing on the still dramatic increase in solar required to achieve either of these goals.

A Framework for Renewables

Regardless of whether meeting our goal requires 4.8 GW of solar or a fraction of that, the amount of renewable energy capacity we need is huge compared to where we are today. Although the BHPCC is already engaged in initiatives to create more local renewable energy capacity, we need to better understand how renewables can fill the gap to offset non-renewable imports from Duke.

This understanding requires several steps: (1) define where we are today, (2) define what renewables we want to pursue first, as some renewables may provide greater local benefits than others, (3) define our capability to achieve these "high benefit" renewables, and (4) create a plan on whether or not, and how, we go about utilizing lower benefit renewables.

(1) To define where we are today, the team obtained data from NCSEA and other sources on the amount of renewable energy currently produced in Buncombe County, as shown below in Table 8.

¹¹ CADMUS. (2019, July 31). *Moving to 100 Percent: Renewable Energy Transition Pathways Analysis for Buncombe County and the City of Asheville*. Retrieved from <https://www.buncombecounty.org/common/sustainability-office/documents/renewable-energy-draft-report.pdf>

Table 7 - Current RE inventory in Buncombe County

Technology	Number of Systems	Capacity MW	Energy GWH
Solar	2571	27.98	49
Hydroelectric	1	2.4	7
Biomass	2	2.39	10
Wind	1	0.01	0
TOTAL	2575	32.79	66

(2) We recognize that the benefits to obtaining renewable energy can go beyond just our ability to meet the 100% goal. For the most part those benefits occur in proximity to where the renewable energy is produced, hence the desire for local production. Local renewables can:

- Help to address social justice and equity issues.
- Provide opportunities for income or bill reductions for residents.
- Create jobs for local installers.
- Reduce the need for transmission from Duke or new fossil or nuclear plants in the County (the doubling of the electric grid will require this in the absence of local renewables).
- Increased resilience to disaster through micro-grid potential with local renewables.
- Positive impacts on tourism and public opinion in general. Large renewable energy installations will be greatly visible to the public.

And we should acknowledge that there are many challenges with local renewables as well:

- Need for land. Buncombe County population density is higher than the state or nation and much land is restricted due to mountains, forests, and parks.
- Need for local transmission upgrades. Some areas that are ideal for renewables production will need access to the grid, which will require transmission upgrades.
- Possible need for transmission from Duke. Local production of renewables will likely require greater transmission from Duke, depending on seasonality and time of day. More transmission and storage will be needed to accommodate more local renewables.
- If solar is the only renewable source considered, then the amount of solar needed will be much higher due to the limited solar available in winter months.
- Cost. It is entirely possible that the cost of renewable energy locally, given constraints, will be more than the option of importing renewable energy from elsewhere. That will almost certainly be the case for producing wind energy locally.

We define local renewables that provide these benefits as projects sited in Buncombe County and define a secondary class of regionally local renewables that provide some of these benefits as generally being sited in WNC or possibly some of the near border areas of Tennessee.

(3) Given this definition and understanding of the priority of projects, we further need to evaluate

the capacity of Buncombe County to host an increased level of renewables. (4) Given the technical potential we can then define what levels of countable renewable capacity we need to obtain from outside the local region, if any, and develop a plan to obtain that capacity through such measures as Power Purchase Agreements (PPAs) and Renewable Energy Credits (RECs).

Summary and Benefits of the Transition

The 2042 electric system would need to produce over twice as much energy as the electric system today (even as overall energy use declines dramatically). While that might sound like a huge number, it can be achieved with 3.42% annual growth in overall electric production from 2018 to 2042. For reference, the US electric system grew at a 1% annual rate from 1990 to 2018, but it grew at a 4.5% annual rate from 1960 to 1990. A rate of growth of 3.4% is within the range of our historical experience. The growth we are expecting from renewable energy will be even greater, far in excess of what we are experiencing today.

If you take the energy consumed by each fuel in Buncombe County from Table 8 in 2018 and apply the average cost of energy for electricity (\$.10 per KWH), natural gas (\$1.00 per therm), and gasoline (\$3.00 per gallon) we can calculate an energy spend today of over \$1,000,000,000 per year in Buncombe County. If we achieve our goal, all this energy cost will be paid through electricity bills and public charging stations. The overall cost of energy we pay in this future could easily be less than the total that we are paying today, without considering any of the climate or health benefits of the transition. Jacobson comes to this conclusion for North Carolina as a whole, calculating that overall energy bills will be reduced by more than half from a total of \$56.5 billion per year to \$26.9 billion per year after the complete transition.

What would the community of Buncombe County be spending in 2042 on energy in our fully electrified system at current rates? The answer is simply the 6,579 GWH or final electric demand times \$.10 per KWH at current rates (most likely even less since industrial rates are lower), which equals \$657.9 million per year, less than 2/3 of the \$1 billion we are spending today. Also, there are several reasons to assume that our electric rates could be lower than they are today, consistent with Jacobson's modeling of even greater cost decreases, including:

- Electric production fixed costs will be spread over a much larger base.
- Solar and wind and battery costs are headed down, not up.
- Fossil fuel costs are headed up due to depletion, environmental regulation (such as methane leakage restrictions), and potential carbon pricing.
- Buncombe County's consumers and businesses will no longer have to pay for the natural gas infrastructure through monthly fixed charges.
- This analysis does not consider health, climate change, or resiliency benefits. Jacobson provides further analysis on this point and determines that a similar future electric system

will result in the US spending 66% less on energy than today, a number which rises to 88% when the cost of climate and health benefits are included.

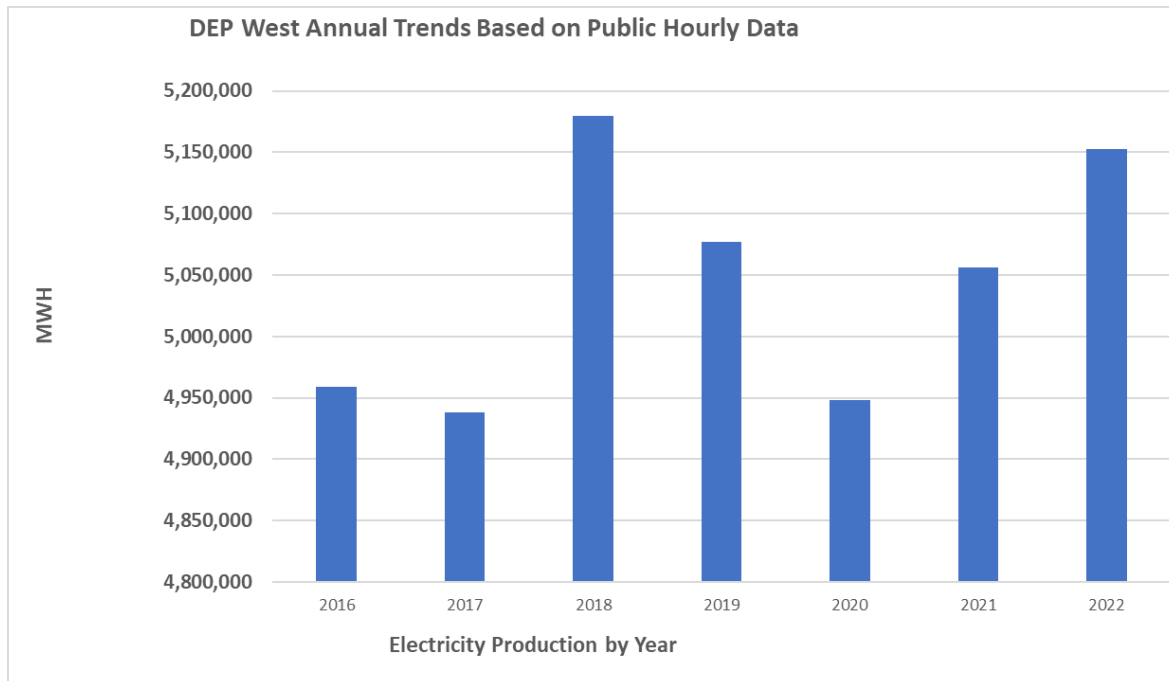
Assumptions and Data Used for Modeling and Calculations

Baseline Energy Use

Electricity - Electricity data was taken from the “Moving to 100 Report” for 2018 and covers electricity usage supplied by Duke Progress West for Buncombe County. As noted in the “Moving to 100 Report,” this data was obtained from correspondence with Duke Energy. It would be helpful to have the data for subsequent years, but we believe the data for 2018 is a good indicator because another source of data—the hour-by-hour demand for electricity in the DEP West region (of which Buncombe County is a large percentage)—shows 2018 numbers were higher than 2022 even though the region continues to grow. This regional data can be accessed at the U.S. Energy Information Administration’s website.¹² We were able to aggregate the hourly values into monthly and annual totals.

Here are the annual trends from the data we have for 2016- 2021.

Figure 6 – APENDIX B - DEP West Annual Trends



¹² U.S. Energy Information Administration - EIA - independent statistics and analysis. EIA. (2023, March 13). Retrieved from <https://www.eia.gov/opendata/v1/qb.php?sdid=EBA.CPLW-ALL.D.H>

The key thing to note is the minor variability from the mean of -1.75% in 2017 to +3.1% in 2018, with 2021 being very close to the mean. Buncombe County, at about 3,026,000 MWH in 2018 represents around 60% of the total. While we would prefer to have updated data from Duke, this data we do have suggests we are not yet amid any sort of breaking new trend in energy consumption in Buncombe County.

Natural gas - Data is from the “Moving to 100 Report,” but additional data from Dominion Energy provides energy use in 2018 for residential, commercial, and industrial categories.

Propane and Fuel Oil - Residential propane and fuel oil sales for NC from EIA are allocated to Buncombe County by share of NC homes using propane for heat according to the US census (2.1% propane and 7.8% fuel oil). Commercial and industrial propane and fuel oil sales for NC from EIA are allocated to Buncombe County by share of NC population living in Buncombe County.

Transportation fuel - Transportation fuel for NC is allocated to Buncombe County by population share.

Business-as-usual (BAU) forecast numbers

Population history and forecast numbers for Buncombe County and NC are provided by the North Carolina Office of State Budget and Management.¹³ The population forecast shows a slight decline in the population of Buncombe County relative to NC.

The forecast of energy use for Buncombe County is developed by first projecting the change in energy use per capita for each sector. The historical energy use per capita data comes from NC energy data from EIA. The period 2000-2018 was a period of rapid decline in energy use per capita, and this analysis assumed those rates of decline would be halved from 2018-2042.

Efficiency improvements beyond BAU and Electrification

Assumptions in this analysis are provided in the text of the document.

Carbon Intensity and Greening the Grid Assumptions

The analysis includes a calculation of carbon emissions in million metric tons (MMT) for Buncombe County. The calculation is performed separately for direct fossil fuels and for the grid.

¹³ North Carolina Office of State Budget and Management. County/State Population Projections | NC OSBM. (2022, December 15). Retrieved from <https://www.osbm.nc.gov/facts-figures/population-demographics/state-demographer/countystate-population-projections>

The direct fossil fuels calculation is based on the following estimates of MMT of CO2 emissions per TWH (thousand GWH) equivalent energy consumption:

- (1) Residential .17
- (2) Commercial .17
- (3) Industrial .15
- (4) Transportation .23

These numbers are based on carbon intensity estimates from EIA statewide data for carbon emissions and energy consumption.

Carbon intensity for the electric sector is based on the estimated electricity production from fossil fuels in Buncombe County. The carbon emissions for the 2018 baseline are assumed based on Duke's fossil fuels, with coal and gas each at a ½ share of the fossil fuels allocated to the county. This results in a carbon intensity of .35 for the 2018 baseline and 2042 BAU forecast.

In the 2042 greening the grid scenarios (after Duke's H951 commitment), fossil fuels are assumed to come completely from natural gas and to be limited to an amount of fossil fuels that would satisfy Duke's H951 commitments for 2030 (70% reduction) and 2040 (100% reduction). It is assumed for 2042 that Duke's limit of carbon emissions is 88% (12/20 of 100% and 8/20 of 70%) of the 2005 statewide value allocated to Buncombe County. This results in a carbon intensity of .10 for electricity imports once Duke's H951 commitment is incorporated.

For scenarios of reductions of Duke imports due to local renewables production, the share of fossil (13.7%) nuclear (22.6%), and renewables (63.7%) of electricity imports is held constant at the same ratio, so the carbon intensity of imports remains constant as imports are reduced due to local renewables production.

Measuring heat versus measuring electricity

We have chosen to use units of electricity as our basic unit of measurement for energy. The use of heat (BTUs) as a measure of energy is outdated. We are moving to an electric world by greening the grid and electrifying everything. In that electric world, the heat content of a fuel is less and less relevant as wind, water, geothermal, and solar do not need to create heat first to produce electricity. Instead, we will focus on measuring electricity directly by talking about:

- kilowatt hours (KWH) which is the energy of 1,000 watts, for an hour,
- megawatt hours (MWH), which are thousands of KWH,
- gigawatt hours (GWH), which are thousands of MWH and millions of KWH,
- and terawatt hours (TWH), which are thousands of GWH.

For the remaining uses of fossil fuels, we will convert them from BTUs to equivalent electric Kilowatt Hours (KWH) by dividing the BTU numbers by 3,412—the number of BTU

required to produce one KWH. When passing electricity through a resistor, we create “resistance heat.” One KWH of electricity used in resistance heating produces 3,412 BTU of heat.

There are far more efficient ways of producing heat with electricity than passing through a resistor. A heat pump might produce 13,600 BTUs per KWH compared to only 3,412 per KWH from resistance heat. When showing energy use, we will take any energy expressed in BTUs and convert it to equivalent KWH. Then, we factor in the increased efficiency of electric end-uses like heat pumps or electric vehicles. It is a two-step process.

Just for reference, the US consumption of energy of 100,274 quadrillion BTU in 2019 mentioned above can also be expressed as $(100,274 \times 1,000,000,000,000) / (3,412 \times 1,000,000,000) = 29,288$ TWH equivalent. However, the end use energy consumed was somewhat lower, at 22,694 TWH, because of the fossil energy being wasted by the conversion of fossil fuels to electricity. In our assessments we will use the end use energy being consumed as our denominator and the end use energy produced by renewables as the numerator to calculate our percent renewable goal

$\% \text{ Renewable} = \text{Buncombe County Renewable Energy Production} / \text{Buncombe County Total Energy Consumption}$.

Since achieving our goal requires all electricity to be produced using renewables only and renewables produce electricity with 100% efficiency, we will ignore the fossil losses in electricity production to calculate % Renewable, although we will consider them for measuring carbon emissions.

Tracking Progress

Tracking the progress of the Plan is done by calculating the percentage of total energy consumed in Buncombe County that is renewable. The goal is met when that percentage is at or above 100%. A secondary metric of tracking progress is done through calculating CO2 emissions by Buncombe County. The denominator is energy consumed, while the numerator is renewable energy produced for consumption.

A secondary scorekeeping metric — Buncombe County CO2 emissions in millions of metric tons (MMT) — is also utilized.

Expressing this algebraically, the following would need to be true for us to meet the goal:

$\text{Buncombe County Renewable Energy} / (\text{Buncombe County Total Energy Consumption}) \geq 100\%$
 (“ \geq ” means greater than or equal to)

This can also be expressed as:

$\text{Buncombe County Renewable Energy} \geq \text{Buncombe County Total Energy Use}$

APPENDIX B: Details and Discussion for New Initiatives

Topics:

1. Utility Scale Renewable Energy and Storage
2. Residential and Commercial Renewable Energy and Storage
3. Low-Income EE/RE
4. Building Efficiency and Electrification
5. Transportation

Topic 1: Utility Scale Renewable Energy and Storage

Initiatives:

1. Transmission-Scale Solar (>20MWac)
2. Floatovoltaics
3. Agrivoltaics
4. Green Source Advantage Choice Expansion
5. RECs & PPAs

Table 8 - Initiatives – Utility Scale RE and Storage Analysis Results

Initiative	Potential Feasibility	Potential Scale of Impact	Potential Equity Impacts	Cost vs Benefit	Total Ranking Points
1 Transmission Scale Solar	Medium	Medium	Low	High	9
2. Floatovoltaics	High	High	Medium	Low	9
3. Agrivoltaics	High	High	High	Medium	11
4. Green Source Advantage Choice Expansion	Medium	Low	Low	Low	5
5. Renewable Energy Credits (RECS) and Power Purchase Agreements (PPAs)	High	Medium	Low	Low	7

Initiative 1: Transmission-Scale Solar (>20MWac)

Description: We will need to procure approximately 6-7 GW of Solar to meet our 100% renewable energy community goal. Transmission-scale solar refers to very large solar installations requiring large blocks of land, hundreds of acres, to install. The advantage is that these are the best cost benefit solar options available. Also, if we were to blend other RE resources (waste energy, digester at WWTP) as well we could have a higher potential for scalability. However, such large blocks of land will be difficult to come by, limiting our ability to develop such projects locally. Duke programs or other sorts of purchased power agreements might be available to allow us to develop such projects elsewhere and count them toward our goals.

Phase 1 Analysis: Initiative Ranking: Transmission- Scale Solar

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	Medium	One of the most feasible pathways for our community to currently procure RE is through the Green Source Advantage program, which will be challenging since we'll need to aggregate 40-80MW worth of demand to sign a GSA PPA.
Potential Scale of Impact	Medium	By aggregating large energy buyers in AVL/Buncombe and signing GSA PPAs for 80MW Qualifying Facilities (QFs), we can make sizable strides towards the goal. Due to topographical and geospatial challenges, solar has limited scalability.
Potential Equity Impacts	Low	This would have a minimal impact on improving or hurting equity in the community.
Cost Vs. Benefit	High	Would be relatively expensive in the short term, but a 10-year PPA at around today's avoided cost is going to fare well over the length of the PPA given that energy costs will likely increase. Further consideration is recommended to investigate budgets, values, local benefits, and financial impacts, etc.

Phase 2 Analysis - What is needed to make this initiative happen - Transmission-Scale Solar

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Medium - long -term, ongoing	
Implementing Departments and Partnering Organizations	Duke, private local developers, local govts, NC green bank?	
Activities to be undertaken to support the initiative	Talk with local govts about zoning	It may be worth engaging with Duke about increasing PV Request for Proposal (RFP) at Lake Julian. 20 MWDC could go on 3 phase before worrying about capacity but need to look at points of interconnect to tie into Duke's lines. Look at the map of distribution lines for potential projects. Identify land within Buncombe County that is feasible for utility scale solar.

Initiative 2: Floatovoltaics

Description: A transmission scale solar installation floating on bodies of water (floatovoltaics) could possibly be developed on Lake Julian and/or the North Fork Reservoir. Buncombe County has paid for a feasibility study to look further into this possibility and to gain insight and information. As of May of 2023, the County has submitted a pre-application interconnection request to Duke for a 9MW system on lake Julian. The County should secure a letter from Duke acknowledging their consent to move forward with a floatovoltaics project at Lake Julian prior to filing an interconnection application. The County currently has funds in place in the budget for the interconnection application. It is anticipated that the interconnection study for the project conducted by Duke will take about 12 – 24 months. Before the interconnection studies are completed, the County should identify a solar development partner who is interested in building and operating the project, securing zoning and environmental approvals and work with the solar partner company to create a financial business plan for the project. We recommend that the feasibility study includes the potential of pumped storage in the reservoir system as that has great potential to even further the benefits and efficiency of such an endeavor.

Phase 1 Analysis: Initiative Ranking - Floatovoltaics

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	Floatovoltaics is an emerging market that is taking off around the globe and makes sense especially in areas like WNC that have topographical and geospatial challenges. There is already transmission at Lake Julian. Further details to come from the results of the feasibility study.
Potential Scale of Impact	High	Although there are not many lakes/reservoirs within Buncombe County, the space that they provide is massive compared with other locations for utility scale RE within Buncombe County and could contribute significantly more RE to our goals than any other local initiatives.
Potential Equity Impacts	Medium	Local RE provides local benefits. This is the only option that provides large scale RE within Buncombe County
Cost Vs. Benefit	Low	Should be explored further once the feasibility study is complete.

Phase 2 Analysis: What is needed to make this initiative happen - Floatovoltaics

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)		Buncombe County is drafting an engagement contract with D3 ¹⁴ and other engineering consultants to undertake a near term feasibility study and early-stage development work on a potential floating PV project at the area on Lake Julian not utilized for outdoor recreation. Key steps include securing a site agreement with Duke Energy which has jurisdiction over the water body, filing an interconnection application with Duke Energy and engaging utility scale developers to identify a potential partner who would

¹⁴ Developer, D. E.- F. S. (n.d.). *Floating solar developer*. D3Energy. Retrieved from <https://d3energy.com/>

		finance, construct, and operate the system. The Lake Julian project would likely be in the 5 - 15 MW range. The county may also pursue a potentially much larger project (up to 60 MW) in partnership with the City of Asheville, but this would occur on a later time frame.
Implementing Departments and Partnering Organizations		Buncombe County Sustainability Office. The county has engaged with Duke Energy about the potential project. Duke staff did not express interest in being the developer/owner of a floating PV project but expressed openness to providing cooperation with the county around a county led feasibility study and development initiative.
Activities to be undertaken to support the initiative		County to engage engineering partners to initiate an interconnection study and associated project due diligence.
Financial Costs and Benefits to those involved		The initial costs of the interconnection application and engineering analysis would be borne by the county.

Initiative 3: Agrivoltaics

Description: Any agricultural piece of land that stays in production while also having elevated solar arrays to allow farm equipment to pass underneath and for agricultural practices to continue. Agrivoltaics can be slightly more expensive than utility scale solar farms, but it is cheaper than rooftop solar. This practice brings all the value of solar benefits which raises the sum of avoided costs by 10-50 cents per kw/h of solar.¹⁵

Due to our limited space and geographical difficulties, agrivoltaics is a simple solution and very promising initiative that would provide a myriad of benefits. As it accelerates, it dramatically reduces the market for biofuels and has global implications for land conservation.^{16 17}

¹⁵ Hayibo, Koami Soulemene & Pearce, Joshua. (2021). A review of the value of solar methodology with a case study of the U.S. VOS. Renewable and Sustainable Energy Reviews. 137. 110599. 10.1016/j.rser.2020.110599.

¹⁶ Professor Mark Jacobson, Stanford Univ., 100% Clean, Renewable Energy and Storage for Everything, Cambridge Univ. Press, 2020 <https://web.stanford.edu/group/efmh/jacobson/WWSSBook/WWSSBook.html>

¹⁷ Helmut Haberl, Tim Beringer, Sribas Bhattacharya, Karl-Heinz Erb and Monique Hoogwijk (2010) The global technical potential of bio-energy in 2050 considering sustainability constraints, *Current Opinions in Environmental Sustainability*, 2, Nov. 10, 2010, DOI 10.1016/j.cosust.2010.10.007

Installed on just 10% of existing farmland in Buncombe County, it is estimated that agrivoltaics could produce enough energy to cover almost 100% of Buncombe County’s current electricity needs.¹⁸ Local generation capacity could be determined as part of a feasibility study for RE generation capacity within Buncombe County.¹⁹

Agrivoltaic systems are currently utilized for many agricultural crops: berries, grains, row crops, orchards, hay, native pollinator plants/seed production, and ‘Conservoltaics’ to conserve land/habitat, often for native pollinator restoration. These Agripollinator gardens can be installed along greenways (or other public spaces) and serve as great demonstration projects.

Phase 1 Analysis: Initiative Ranking - Agrivoltaics

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	This is a maturing technology (not new). Hardware already exists, with software coming soon. Basic components already exist, it just needs to be scaled up. Warren Wilson College (WWC) is currently in the feasibility phase to install an agrivoltaics microgrid on their campus that would serve as an educational resource for local farmers on best practices thereby potentially providing immense educational opportunities for our local farmers and beyond.
Potential Scale of Impact	High	72,284 acres of farmland exist within our county (as of 2017) ²⁰ . Farmers and communities can benefit from revenue produced from agrivoltaics. Installed on just 10% of existing farmland in Buncombe County, it is estimated that agrivoltaics could produce enough energy to cover almost 100% of Buncombe County’s current electricity needs. ²¹ Distributing Agrivoltaics systems throughout farmland could reduce the amount of needed new high-voltage transmission lines as they would be located on land

¹⁸ Michael P. Totten (2022) "Illustrative estimates of farm-based Agrivoltaic power generation in Buncombe County," prepared for the Critical Microgrid Group, unpublished.

¹⁹ Adeh, E.H., Good, S.P., Calaf, M. *et al.* Solar PV Power Potential is Greatest Over Croplands. *Sci Rep* 9, 11442 (2019). <https://doi.org/10.1038/s41598-019-47803-3>

²⁰ Farmland Protection Plan Buncombe County, North Carolina. (2020, June). https://www.buncombecounty.org/common/_RTE/file/FarmLand-Protection-Plan_Final.pdf

²¹ Michael P. Totten (2022) "Illustrative estimates of farm-based Agrivoltaic power generation in Buncombe County," prepared for the Critical Microgrid Group, unpublished.

		<p>where power distribution infrastructure already exists. Aluminum carbon conductors²² (further information here)²³ increase the carrying capacity of existing distribution networks. Agrivoltaics markets are currently thriving in Co-ops and are highly scalable for our community and beyond.</p>
Potential Equity Impacts	High	<p>Local workforce development in installation of systems and the potential of farm-market opportunities (value added crops). Educational opportunities - what farmers are doing, promoting solar canopy gardens on school grounds which would also serve the local community and can be integrated into curriculum. This was given a ‘High’ potential impact also because most rural farming communities are low-income.²⁴ The potential for rural economic development is large.</p>
Cost Vs. Benefit	Medium	<p>A ‘Medium’ rating is given because agrivoltaics is cheaper than rooftop solar, but not quite as cheap as large-scale utility solar. However, the additional benefits of agrivoltaic systems are greater than any other type of utility-scale solar (improved national security, cyber/natural disaster resiliency, preserving farmland, water conservation, etc.) Any analysis of solar should incorporate the true value of its benefits which are not accurately accounted for in current the utility rate base (there are about a dozen analyses done on this that range between 12 and 50 cents/per kwh benefits).</p>

Phase 2 Analysis - What is needed to make this initiative happen - Agrivoltaics

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	<p>Near Term</p> <p>Medium - Long - Term</p>	<p>Near Term – Encourage local universities to establish regional agrivoltaic research stations and trials</p>

²² Sloan, J. (2020, September 11). *Carbon fiber featured in New Electrical Transmission Cable*. CompositesWorld. Retrieved from <https://www.compositesworld.com/articles/carbon-fiber-featured-in-new-electrical-transmission-cable>

²³ Google. (n.d.). *US20040182597A1 - carbon-core transmission cable*. Google Patents. Retrieved from <https://patents.google.com/patent/US20040182597A1/en>

²⁴ Michael P. Totten (2022) "Illustrative estimates of farm-based Agrivoltaic power generation in Buncombe County," prepared for the Critical Services Microgrid Group, unpublished.

		<p>to verify crop and energy performance (3-5 years) Medium Term- Distribute research finding and best practices via research station digital twins to farmers and policy makers. Long Term - Upgrade utility rate base, farm policy, and financing programs needed to facilitate rapid scaling and adoption of agrivoltaic technology.</p>
<p>Implementing Departments and Partnering Organizations</p>	<p>Duke, French Broad EMC, Rural co-ops/Swannanoa/French Broad Co-op, local farmer associations, local educational institutions, Land use and conservation organizations, WWC, CSMG</p>	<p>Other noteworthy potential partnering orgs:</p> <ul style="list-style-type: none"> • Appalachian Sustainable Agriculture Project • Work Colleges Consortium • Southeastern African American Farmers’ Organic Network • National Women in Agriculture Association • National Young Farmers Coalition • National Sustainable Agriculture Coalition • Appalachian College Association • Appalachian Regional Commission • Southern Appalachian Highlands Conservancy • Carolina Farm Stewardship Association • Farmers Market Coalition • Critical Services Microgrid Group • Univ. of North Carolina at Asheville • North Carolina State University • Land of Sky Regional Council (western NC) • National Rural

		<p>Electric Cooperative Association</p> <ul style="list-style-type: none"> • Critical Services Microgrid Group
<p>Activities to be undertaken to support the initiative</p>	<p>Educational outreach, initiate independent study/analysis of the undervalued benefits to the grid of solar and agrivoltaics, improve transmission infrastructure</p>	<p>Educational outreach to policy makers, farmers, the public, and utility commissions to highlight the benefits of a distributed renewable energy model for grid planning/expansion that can deliver increased national security, grid resiliency, preservation of ag-land production, reduced NIMBY pushback for future solar development, zero carbon emissions, and more. National laboratories initiate independent study/analysis of the undervalued benefits to the grid of solar in general and agrivoltaics specifically.</p> <p>Utilities will need to add new cabling and new substations (but much cheaper than new transmission). Aluminum carbon conductors (further information here) could help with transmission.</p>
<p>Financial Costs and Benefits to the Organizations</p>	<p>High Benefits</p>	<p>Grant and philanthropic funding of university agrivoltaic research programs create a magnet for student enrolment, garnering international media attention and builds reputation. Rural electric coops increase investment in generation and become major energy producers. Farm organizations and communities are strengthened as farm revenues increase.</p> <p>Any utility that moves in this direction and allows a rate base to support agrivoltaics will:</p> <ul style="list-style-type: none"> -Reduce fuel use and reduce rates -Improve resilience

		-Have financial gains because agrivoltaics is less expensive or equal cost to building new utility facilities with transmission lines and can be done much more quickly and will be equal to or less expensive than current operations.
Additional Resources and Support Needed		New USDA and Farm Bureau programs to promote and provide grants and low-cost financing for farmer investment in agrivoltaic systems. Incentives for rural electric coops to invest in upgrading distribution assets to support the adoption and rapid scaling of agrivoltaic systems in their service areas.

Initiative 4: Green Source Advantage Choice Expansion²⁵

Description: The current (pilot) program – limited to “large energy users” – from 2019 has just four customers: the City of Charlotte, Wells Fargo, Bank of America, and Duke University. None have completed projects yet, mainly because of solar supply chain and cost issues.

The new version (proposed Jan 2023) would allow customers to contract with either Duke Energy or third-party solar or wind developers for up to 100% of their energy use instead of 30%. The new GSA Choice program would also include battery storage, which would help companies use renewable energy 24 hours a day, instead of just when there's sun or wind.

In a separate filing, Duke also proposed a separate program called Clean Energy Impact. It would give businesses and consumers the option to buy renewable energy credits that would allow them to support solar and wind development.

Phase 1 Analysis: Initiative Ranking – Green Source Advantage Choice Expansion

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>

²⁵ Energy, D. (2023, January 31). *Duke Energy to help customers go 100% renewable*. Duke Energy | News Center. Retrieved from <https://news.duke-energy.com/releases/duke-energy-to-help-customers-go-100-renewable#:~:text=Clean%20Energy%20Impact%20will%20be,or%20looking%20to%20install%20solar>.

Potential Feasibility	Medium	Large-scale energy users have not previously found the program financially compelling enough to move forward. The program largely leaves it up to the energy users to find its own 3rd party sources (which could be Duke if they choose. However, many organizations are looking to purchase RECs and GSA is a relatively easy way to do so in NC.
Potential Scale of Impact	Medium	Nearly 4 years into the NC pilot program and very little has materialized. Not clear how new options will move significant resources into renewable development. However, with rates increasing, and potentially avoided costs increasing, Adoption could also increase. If it were adopted at a large scale, it could have an immense impact on the 100% RE goal
Potential Equity Impacts	Low	Low consumer adoption rates in similar programs elsewhere
Cost Vs. Benefit	Medium	Initial cost estimates continue to rise, delaying action, potentially flipping the cost-benefit equation into the red for large energy users. However, If electricity rates continue to rise, this could offset cost and make it more beneficial. In general, the benefit to the environment is positive in terms of RE, but land use and conservation issues arise.

Phase 2 Analysis: What is needed to make this initiative happen – Green Source Advantage Choice Expansion

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Ongoing	Commercial user program participants continue to claim they will continue to pursue alternative sources. The effort in Charlotte, at least, seems to be focused on developing new solar farms ... There are evidently no 3rd party providers to turn to in NC (see Clean Choice Energy in IL) ²⁶

²⁶ Renewable Energy Company for ComEd customers in Illinois: Switch to CleanChoice Energy. CleanChoice Energy. (n.d.). Retrieved from <https://cleanchoiceenergy.com/go/renewable-energy-commonwealth-edison>

		Further options for WNC should be explored? Consumer opt-in to buy RECs will only happen with measurable advertising and PR effort, and only if cost is negligible.
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Initiative 5: Renewable Energy Credits (RECs) & Power Purchase Agreements (PPAs)

Description: Purchasing Environmental Attributes from grid-connected renewable generators (commonly known as Renewable Energy Credits or RECs) allows the City/County to claim the benefits of those carbon free resources. Depending on the resource’s technology, location and online date, these claims can be used to qualify for recognition programs such as the EPA’s Green Power Partnership and are a great first step to show our community the path to decarbonization.

Phase 1 Analysis: Initiative Ranking – Renewable Energy Credits (RECs) & Power Purchase Agreements (PPAs)

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	High
Potential Scale of Impact	Medium	Low to Medium (3rd Party REC Procurement, Duke Clean Energy Impact Plan) High (Duke Green Source Advantage Plan) - Path to 24/7
Potential Equity Impacts	Low	Low
Cost Vs. Benefit	High, Medium, or Low	Requires further investigation

Phase 2 Analysis: What is needed to make this initiative happen – Renewable Energy Credits (RECs) & Power Purchase Agreements (PPAs)

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Immediate	3rd Party REC contracts can be entered into immediately. Duke Clean Energy Impact (CEI) and Green Source Advantage (GSA) Plans were just

		submitted to the NCUC on 1/31/23 and are yet to be approved. ²⁷
Implementing Departments and Partnering Organizations	City and County governments, DEP	
Activities to be undertaken to support the initiative		3rd Party RECs - an RFP could be conducted to award based on the lowest price and/or other criteria (location, etc....) Duke Plans - conversations with DEP to see if they would agree to include RECs/PPAs from geographically proximate resources would improve relevancy.
Financial Costs and Benefits to the Organizations	TBD	Costs - Incremental costs of RECs/PPAs Benefits - Would allow BHPCC and Duke to work together to highlight benefits of grid scale renewables to local ratepayers. GSA Plan would begin movement to 24/7 renewables
Additional Resources and Support Needed	Limited	Administration of a 3rd Party RFP

Topic 2: Residential and Commercial Renewable Energy and Storage

Initiatives:

- 1. Solarize- bulk buying**
- 2. Appalachian Offsets**
- 3. Microgrids**
- 4. Community Solar + Storage**

Residential and commercial RE and storage are the definition of local energy, meaning energy systems located onsite and locally distributed.²⁸ In one of the most detailed analyses to date by the Rocky Mountain Institute, *Small is Profitable*, the authors describe “207 ways in which the size of ‘electrical resources’—devices that make, save,

²⁷ Energy, D. (2023, January 31). *Duke Energy to help customers go 100% renewable*. Duke Energy | News Center. Retrieved from <https://news.duke-energy.com/releases/duke-energy-to-help-customers-go-100-renewable#:~:text=Clean%20Energy%20Impact%20will%20be,or%20looking%20to%20install%20solar>.

²⁸ Woodrow W. Clark, Chapter 6 - Analysis: 100 Percent Renewable Energy Systems, Editor(s): Henrik Lund, *Renewable Energy Systems*, Academic Press, 2010, Pages 127-157, ISBN 9780123750280, <https://doi.org/10.1016/B978-0-12-375028-0.00006-6>

or store electricity—affects their economic value. It finds that carefully considering the economic benefits of ‘distributed’ (decentralized) electrical resources typically raises their value by a large factor, often approximately tenfold, by improving system planning, utility construction and operation (especially of the grid), and service quality, and by avoiding societal costs.”²⁹

Therefore, the more local the generation is (meaning within Buncombe County), the more the residents will directly experience the benefits of the local RE generation. The most salient benefits include creating local employment and businesses, circulating more energy expenditures within the local economy to create an economic multiplier, accruing health benefits from cleaner local air, and new sources of revenue for distressed family farms and rural communities installing agrivoltaic microgrids.

Arguably, among the most important and valuable attributes of locally distributed energy systems is strengthened energy security. Onsite energy systems have been embraced by the U.S. Department of Defense (DoD) in the wake of 9/11 and the explosive growth of new 21st century threats to the nation’s critical infrastructure and national security. In addition to physical attacks, these new threats include cybercrime and climate-triggered weather catastrophes, all of which pose risks to grids, pipelines, refineries, and large centralized power plants. The DoD has decreed all military installations shift to distributed “island-able” microgrids capable of full operation if the grid and pipelines collapse.

The civilian sector is also recognizing the considerable value of such resilient, even anti-fragile,³⁰ local energy systems, most notably the National Rural Electric Cooperative Association (NRECA), which owns nearly half the distribution systems nationwide. NRECA is now promoting “agile fractal grids” where standalone, island-able onsite and distributed microgrids enhance security and are capable of aggregation.

Aggregation of distributed energy service options, technically known as Virtual Power Plants (VPPs), are increasingly recognized as a valuable opportunity. VPPs encompass the diverse range of customer-side (demand-side, or behind-the-meter) energy service options: solar PV, geothermal, batteries, electric vehicles, smart thermostats, heat pumps, other connected devices, and high-performance constructed buildings (e.g., PassivHaus, Net Zero, and Beyond Zero designs).

²⁹ Amory Lovins et al., (2002) *Small is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size*, Rocky Mountain Institute, <https://rmi.org/insight/small-is-profitable/>

³⁰ Nassim Nicholas Taleb (2014) *Antifragile: Things That Gain from Disorder*, Random House. In the context of ever-present uncertainty of threats collapsing grids and pipelines, distributed local energy systems are less likely to be disrupted, resulting in providing services just when they are most needed.

The recent emergence of digitization, machine language/artificial intelligence, and electrification are giving rise to synergy between solar PV resources and energy efficient electrification products. The result is a nationwide VPP market estimated to be worth several hundred gigawatts in the coming decades, accruing \$17 billion in customer savings by 2030.³¹ The Virtual Power Plant Partnership (VP3) — a coalition of nonprofit and industry entities (spanning automotive, building, energy service, software, and other sectors) — emphasizes changing policies, regulations, and market rules to unlock and scale VPPs.³² VPPs offer multiple benefits: accelerated decarbonization, improved health, equity & consumer empowerment, economy-wide electrification, improved affordability, and enhanced resilience and reliability of service. However, as the VP3 coalition underscores, “to access the full benefits of VPPs, there remains a need to understand and communicate VPP benefits, advance best practices, and shift policy and regulation to put VPPs on a level playing field with traditional grid investments.” The VP3 advises upgrading the distribution system to accommodate the expansion of distributed VPPs, an effort that is currently under-assessed by utility regulatory review and under-planned by utilities.³³

Interestingly citizen perspectives on local generation vary greatly. Some residents of Buncombe County believe that local renewable energy (RE) generation should be within Buncombe County limits, some believe it should be within North Carolina, and others believe that local RE generation can be within the Southeastern U.S.

There are, of course, benefits to developing RE generation within the state or SE region of the U.S. For example, the landscapes of Buncombe County pose unique topographical and geospatial challenges that make the development and installation of large-scale RE limited and more costly. Therefore, developing RE generation outside of Buncombe County but within the state of North Carolina or within the Southeastern U.S. might prove to be more financially viable for periods of time when local demand exceeds local supply, while also providing some of the GHG emission reduction benefits. Locally delivered RE generation, however, offers great benefits compared to generating, transmitting, and delivering energy services from elsewhere. These numerous benefits may be unfamiliar to many residents. Therefore, we need more communication on the benefits of distributed local systems, especially strengthened security, which may change many citizens’ perceptions and preferences.

³¹ Kevin Brehm, Avery McEvoy, Connor Usry, and Mark Dyson (2023) *Virtual Power Plants, Real Benefits*, RMI, <https://rmi.org/insight/virtual-power-plants-real-benefits/>.

³² VP3 (2023) *Unlocking the 21st Century’s Greatest Untapped Energy Resource*, Virtual Power Plant Partnership, <https://vp3.io/>.

³³ See, for example, Kevala (2023) *Electrification Impacts Study, Part 1: Bottom-Up Load Forecasting and System-Level Electrification Impacts Cost Estimates*, Prepared for: California Public Utilities Commission, Energy Division, Proceeding R.21-06-017 (Order Instituting Rulemaking to Modernize the Electric Grid for a High Distributed Energy Resources Future), <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M508/K423/508423247.PDF>.

Table 9 - Initiatives – Residential and Commercial RE and storage - Analysis Results

Initiative	Potential Feasibility	Potential Scale of Impact	Potential Equity Impacts	Cost vs Benefit	Total Ranking Points
1. Solarize - Bulk Buying	High	Medium	Medium	High	10
2. Appalachian Offsets	High	Medium	Medium	Medium	9
3. Microgrids	High	High	High	Medium	11
4. Community Solar + Storage	Low	High	High	Medium	9

Initiative 1: Solarize Campaigns

Description: Solarize is a residential solar bulk-buying discount installation program. It would build on the successful prior initiative, completed in 2022, that installed 1.3 MW of solar in Buncombe County.

Phase 1 Analysis: Initiative Ranking – Solarize – bulk buying

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	Green Built Alliance implemented a highly successful campaign in 2021. Suggestions have been made to repeat the campaign every 2-3 years, so 2024 is a good year to do it again.
Potential Scale of Impact	Medium	In the last campaign, a total of 183 property owners signed contracts to advance toward owning a system through the community-led discount solar energy purchase program. That’s the equivalent of 2,009,732 kWh produced annually and an estimated \$251,215 in annual utility bill savings for owners of their new rooftop solar energy systems.
Potential Equity Impacts	Medium	Leasing solar has a better equity impact than retail sales. Financing is also out of reach for many low-income families. There are not many efforts to reach moderate-income

		households, and this program is perfect for this demographic.
Cost Vs. Benefit	High	<p>A solarize campaign needs someone to run the marketing to homeowners (\$70k/year staff expenses) but otherwise all expenses are taken on by the property owner, not a public entity, and since it is still an economic benefit for them.</p> <p>With the IRA providing additional financial resources, installing solar could be up to 30-50% cheaper for homeowners depending upon which qualification for incentives they meet.</p>

Phase 2 Analysis: What is needed to make this initiative happen – Solarize – bulk buying

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near Term	Determine the start date and work backward from there based on the previous program.
Implementing Departments and Partnering Organizations	Solar installer(s), GBA, Duke Energy Progress, Solar Crowdsourc	
Activities to be undertaken to support the initiative	Secure funding for the coordinating staff member.	
Financial Costs and Benefits to those involved	Net positive over 25 years, but high initial capital outlay.	Solar has a 20–25-year time horizon. The average residential solar power system payback is about 8.7 years, but it varies by location and property. So, the typical payback period is about 6 – 10 years. ³⁴

Initiative 2: Appalachian Offsets

Description: Applies carbon offset donations/funds directly to local renewable energy projects.

³⁴ Palmetto. (2021, November 29). *Solar Panel Payback period (guide)*. Palmetto. Retrieved from <https://palmetto.com/learning-center/blog/solar-panel-payback-period-guide>

Phase 1 Analysis: Initiative Ranking – Appalachian Offsets

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	This project is already being delivered by Green Built Alliance. St. Paul's Missionary Baptist Church in the Burton Street Neighborhood received a \$25k payment toward their 8.6 kWh system through the program. United Way's solar installation is in the planning stage.
Potential Scale of Impact	Medium	Provides access to nonprofits that wouldn't be able to afford it. However, it is limited by generosity from individual donors.
Potential Equity Impacts	Medium	A medium ranking is given because of its indirect equity benefit which comes from increasing the capacity of nonprofits serving specific communities that amongst other things also provide equity benefits to LMI and BIPOC communities.
Cost Vs. Benefit	Medium	Solar is traditionally an expensive option compared to weatherization, however, the long-term nature of the energy production and zero cost outlay by the recipient balance this cost.

Phase 2 Analysis: What is needed to make this initiative happen – Appalachian Offsets

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Ongoing	Additional carbon offsets sold. Marketing efforts would need to be ramped up.
Implementing Departments and Partnering Organizations	Green Built Alliance	If the IRA creates a market for renewable energy credits and increases the refundable tax credit by up to 50%, this program could reach many more nonprofit organizations.
Activities to be undertaken to support the initiative	Marketing	There is need in the community, but funders need to be found to buy RECs from GBA.

<p>Financial Costs and Benefits to the Organizations</p>	<p>Free to organizations, up to 25 years of energy production.</p>	<p>Solar installations are free to the organization receiving them, so they get all that solar production for 20-25 years with very little cost. The cost varies by system capacity, etc. but right now it's about \$2.80 per watt installed. Emphasizing participation in County and Duke programs for weatherization paired with a solar installation would maximize energy and financial gains.</p>
<p>Additional Resources and Support Needed</p>	<p>More donations</p>	

Initiative 3: Microgrids

Description: A microgrid is a local cluster of energy resources (i.e., PV and battery storage) that have the capability of operating independently from the grid. Unlike rooftop solar, microgrids can continue to provide power when the grid fails. Microgrids can also operate in conjunction with the grid, acting as a tool to help energy customers manage costs, participate in energy prosperity, and reduce carbon emissions. They are designed not only for power (backup and primary), but provide important services to the central grid, and they can be a particularly valuable resource when the grid is under strain or needs flexibility to balance resources. Additionally, microgrids provide local benefits such as resilience, cost savings, workforce development, clean energy, etc.¹

Phase 1 Analysis: Initiative Ranking - Microgrids

<p><u>Analysis Area</u></p>	<p><u>Favorability Ranking (Low, Medium, or High)</u></p>	<p><u>Description of how/why action initiative received the ranking given</u></p>
<p>Potential Feasibility</p>	<p>High</p>	<p>There are no regulatory constraints and many benefits to implementing microgrids. Technology already exists, equipment is here and readily available. It just requires planning and investment. There are also EAAS - companies who will finance the project while simultaneously producing money and energy savings. Microgrids provide stacked benefits that can gain support by the WHOLE community. There also exist additional IRA incentives and rebates for local govts. (For PV, batteries, and microgrid controllers).</p>

		Installing and implementing microgrids will be cash Positive on several projects from day one.
Potential Scale of Impact	High	Microgrids can be utilized on all applications, one could start with just one location (fire station e.g.), and scale from there with education and experience learned. There is an added convergence of various technologies to synergize for optimization of cost-effective opportunities for the community AND the grid, as well as continuous technological improvements that will accelerate the benefits. Microgrids could very easily be scaled to accommodate almost any and all needs within Buncombe County, which would in turn have a high scale of impact.
Potential Equity Impacts	High	A ‘High’ rating was given because disadvantaged and under-resourced communities have been disproportionately affected by the externalities of fossil fuel energy generation and waste. Microgrids can be a clean, safe, and healthy energy investment instead. Equity and land tenure - microgrids promote keeping people on their land and aging in place. They can also include co-location of e-mobility including e-Bikes, EV car shares, etc. supporting increased means of transportation without the need for purchasing vehicles. Microgrids can also be used to provide Electric Vehicle Supply Equipment (EVSE) for EV car share before EV's become affordable. Once EV's are affordable, the EVSE will already be there. This is a great model for installing EVSE at Multi-Unit Dwellings.
Cost Vs. Benefit	Medium	The upfront cost is higher than centralized large utility scale solar systems, but cheaper than SMRs and other carbon capture and storage with natural gas. Because the energy is created, stored, and used locally, the community receives direct benefits. Utility-scale clean energy helps in general, but not necessarily for local community members. Distributed Energy Resources are also a form of local control, it is power in Buncombe County’s ‘backyard.’ These energy systems will operate in Texas even when ERCOT freezes up and fails, for example

Phase 2 Analysis: What is needed to make this initiative happen - Microgrids

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
<p>Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)</p>	<p>Near to Medium-Term</p>	<p>Near-Term: Buncombe County is currently conducting a feasibility study for electrification plus storage for its facilities. Microgrids would be a good addition to this study if it is not already being considered.</p> <p>Microgrids for First Responders ASAP, 2nd and 3rd responders can be phased in. All equipment is readily available.</p> <p>Medium-Term: Demonstration could be done on public facing and public affecting projects. There is someone in the community who is currently working with other municipalities in the country to implement microgrids on Wastewater Treatment facilities providing several benefits to the municipalities including financial gains, health gains, increased resilience, etc....)</p>
<p>Implementing Departments and Partnering Organizations</p>	<p>City of Asheville, Buncombe County, CSMG, Fed (IRA) up to 40% check</p>	<p>Find a willing partner.</p> <p>Organizations could combine an electric police car or first response vehicle with a microgrid-based EVSE. That is an ideal combination to see how the microgrids support the use of EV's and then provide all the other stack of benefits.</p> <p>Warren Wilson College is in the feasibility investigation stage with an agrivoltaics microgrid project and is successfully implementing a Mobile Microgrid Work Vehicle Project (in partnership with UNCA and CSMG)</p>
<p>Activities to be undertaken to support the initiative</p>	<p>Engage with CSMG, Host design charrettes to get an action agenda</p>	<p>Assess the County's utility distribution & transmission power lines that can be upgraded with highly efficient <u>Aluminum carbon conductors</u>.^{35 36}</p> <p>Host a seminar at the Sherril Center to gather information</p>

³⁵ Sloan, J. (2020, September 11). *Carbon fiber featured in New Electrical Transmission Cable*. CompositesWorld. <https://www.compositesworld.com/articles/carbon-fiber-featured-in-new-electrical-transmission-cable>

³⁶ Google. (n.d.). *US20040182597A1 - carbon-core transmission cable*. Google Patents. <https://patents.google.com/patent/US20040182597A1/en>

<p>Financial Costs and Benefits to those involved</p>	<p>See above</p>	<p>Multi-million-dollar grant opportunities available. Fed (IRA) pays for up to 40% of the project. The upfront cost is higher than centralized large utility scale solar systems, but cheaper than small nuclear reactors and other carbon capture and storage with natural gas. Because the energy is created, stored, and used locally, the community receives direct benefits of resilience, cost savings, and clean energy. Distributed energy resources are also a form of local control, it is power in Buncombe County’s ‘backyard.’</p>
<p>Additional Resources and Support Needed</p>	<p>State, local, & national governments</p>	<p>Provide national and state incentive for microgrid development of all community critical services, police, fire, water, wastewater, health, schools. Partner with the state Green Bank to finance rapid development of microgrids for critical services.</p>

Community Solar and Storage

Description: Paraphrased from the DOE: Community solar is generally considered a project or purchasing program, within a geographic area, in which the benefits of a solar project flow to multiple customers such as individuals, businesses, nonprofits, and other groups. In most cases, customers benefit from energy generated by solar panels at an off-site array.³⁷

Community solar customers can either buy or lease a portion of the solar panels in the array, and they typically receive an electric bill credit for electricity generated by their share of the community solar system — similar to someone who has rooftop panels installed on their home. In Duke territory, however, this credit is limited to the avoided cost of energy, which is substantially lower than the retail rate.

However, Duke Energy’s South Carolina community solar program offers net-metering to customers and waives application and initial fees for qualifying low-income customers.³⁸

Community Solar could also take advantage of the new IRA tax credits by incorporating low-income people into the Community Solar program, which might make it economical despite the fact that Duke Energy only supports Community Solar at avoided cost rates. See this page for more details on what Duke Energy calls “Shared Solar”:³⁹

³⁷ U.S. Department of Energy. (2023). *Community solar*. Energy.gov. <https://www.energy.gov/communitysolar/community-solar>

³⁸ Energy, D. (2019, February 7). *Duke Energy Carolinas Program will provide South Carolina customers a new choice for solar energy*. Duke Energy | News Center. <https://news.duke-energy.com/releases/duke-energy-carolinas-program-will-provide-south-carolina-customers-a-new-choice-for-solar-energy>

³⁹ *NC Shared Solar*. Duke Energy. (n.d.-a). <https://www.duke-energy.com/home/products/renewable-energy/nc-shared-solar>

Phase 1 Analysis: Initiative Ranking - Community Solar + Storage

Analysis Area	Favorability Ranking (Low, Medium, or High)	Description of how/why action initiative receives the ranking you gave it
Potential Feasibility	Low	The structure is allowed and supported by Duke. Even though the projects are technically and legally feasible, the current credit rate being so low is problematic. Provisions from the IRA may reduce upfront capital costs enough to possibly make this more feasible.
Potential Scale of Impact	High	Notwithstanding the rate issue, the potential scale of impact is significant. Our region has many residents who can benefit from this structure. Over a third of county residents rent, and 23 census tracts (almost half) are designated poverty, severe distress, or adjacent to coal plants. ^{40 41 42}
Potential Equity Impacts	High	The potential here is high because participants do not need to own their own home and can participate if they are renting dwelling units. Additional provisions from the IRA will require a low-income focus which will have a high equity impact. If Duke Energy adopted a program similar to their South Carolina one, more low-income customers could apply. It is important that options like waiving fees for low-income customers are included to increase equity concerns.
Cost Vs. Benefit	Medium	Currently the cost vs the benefit is highly uncertain and depends on final regulations under the IRA along with Duke’s support for implementing such a program, therefore we rated this as medium.

Phase 2 Analysis - What is needed to make this initiative happen – Community Solar + Storage

Analysis Area	Summary	Discussion
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Medium- Term	Policy shifts may be needed to provide enhanced credits for equity goals and ultimately all participants. A feasibility analysis should be conducted.

⁴⁰ Dig deeper. PolicyMap. (2023). <https://www.policymap.com/newmaps#/widget/117/4D2AFE10710D41918F180775F0A353F2>

⁴¹ American Clean Power Association. (2023, April 4). *IRA Energy Communities*. ArcGIS StoryMaps. <https://storymaps.arcgis.com/stories/844bd085378b4c1c9da9bf1081d5bb66>

⁴² enviroatlas EPA. (2023, January 25). *EnviroAtlas*. EPA. <https://enviroatlas.epa.gov/enviroatlas/interactivemap/?featuredcollection=e5f95175f9184d508be636377796f1c2>

Implementing Departments and Partnering Organizations	The implementing department needs to be identified. Potential partners include Duke Energy Share Solar Program, Grid Alternatives , ⁴³ and others to be identified in a Feasibility analysis.	The NCSP ⁴⁴ recently convened a national group of community-focused organizations who seek to support community solar and provide support for targeted populations with a focus on equity-based goals. ⁴⁵ Include trusted partners to involve - (e.g., Solomn, Neighborhood Sun, Arcadia, Community solar Partners, etc.)
Activities to be undertaken to support the initiative	Funding needs to be identified for the Feasibility analysis and the provider to do it.	Potential funding from the IRA.
Financial Costs and Benefits to the Organizations	TBD after Feasibility Analysis	
Additional Resources and Support Needed	TBD after Feasibility Analysis	Look into the new net metering guidance rules that will be launching soon.

Topic 3: Low-Income EE/RE

Initiatives:

1. Energy Savers Network (ESN)
2. Community Action Opportunities (CAO)
3. Neighbor to Neighbor Solar (N2N)

Table 10 - Initiatives – Low Income EE/RE Analysis Results

Initiative	Potential Feasibility	Potential Scale of Impact	Potential Equity Impacts	Cost vs Benefit	Total Ranking Points
1. Energy Savers Network (ESN)	High	Medium	High	High	11

⁴³ People. planet. employment. GRID Alternatives. (2023). <https://gridalternatives.org/>

⁴⁴ U.S Department of Energy. (n.d.-c). *Community solar*. Energy.gov. <https://www.energy.gov/communitysolar/community-solar>

⁴⁵ U.S. Department of Energy. (n.d.-d). *NCSP releases summary on feedback from community-focused organization convenings*. Energy.gov. <https://www.energy.gov/communitysolar/articles/ncsp-releases-summary-feedback-community-focused-organization-convenings>

3. Community Action Opportunities (CAO)	High	Medium	High	Medium	10
4. Neighbor to Neighbor Solar	High	Low	High	Low	8

Initiative 1: Energy Savers Network (ESN)

Description: This initiative recommends continuing ESN activities but growing in scale and services. Energy Savers Network (ESN) provides a suite of energy efficiency upgrades and education at no cost to all income qualified residents of Buncombe County other than those living in multi-family buildings. ESN has completed approximately 1000 of these ‘Tier 1’ upgrades (lower-cost simple basic retrofits) since 2016, using a combination of staff and volunteers to do the work. Recently ESN has begun to provide a limited amount, subject to funding availability, of ‘Tier 2’ deeper upgrades to clients with high energy burdens. These higher-cost, more advanced retrofits (Tier 2), including new or replacement heat pumps, are discussed below.

For the program to have the greatest impact on equity and energy goals, we estimate that ESN would need to ramp up the Tier 1 upgrades over the next five years from the current rate of around 200 homes per year to an annual rate that is much higher. Ideally the increased rate would be 5x the current rate, or 1000 homes per year. This expanded program would mean that ESN would be able to serve about 18,000 homes from 2023 to 2042, or about 40% of the eligible low-income population. This potential goal is based on the following:

- Around 33% of the population (representing around 45,000 homes) is below 200% of the federal poverty level (11.75% of the Buncombe County population is below 100% of the federal poverty level).⁴⁶
- ESN does not serve multi-family units and not every homeowner/property owner will allow ESN to serve their home (which reduces the addressable population).
- ESN has completed ~1000 Tier 1 upgrades since 2016 and would complete another ~2800 or so over the next five years as it ramps up from the current 200 homes per year to 1000 by the fifth year.

In addition, ESN should expand its Tier 2 deeper retrofit services to as many households per year as possible. The deeper retrofits would include HVAC replacements and transition to heat pump water heater replacements vs. electric water heater replacements, due to the significant energy efficiency savings that heat pumps provide. According to the Department of Energy, heat pump water heaters can be two to three times more energy efficient than

⁴⁶ U.S. Census Bureau quickfacts: Buncombe County, North Carolina. United States Census Bureau. (n.d.). <https://www.census.gov/quickfacts/fact/table/US/IPE120221>

conventional electric resistance water heaters.⁴⁷ ESN should also expand its Tier 2 deeper services to add insulation in the walls, crawlspace, and around ducts, thereby expanding the amount of savings per home. Some of these Tier 2 upgrades could be achieved through expanded cooperation with Community Action Opportunities (see initiative 2: CAO). For more detailed information on the costs, funding, work completed, and impacts of ESN thus far see APPENDIX F.

Phase 1 Analysis: Initiative Ranking – Energy Savers Network (ESN)

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	This is an ongoing successful program that needs more funding to increase the scale of impact. The basic measures and processes are well known.
Potential Scale of Impact	Medium	ESN’s basic Tier 1 upgrades save low-income customers around \$195 per year according to the latest summary of the ongoing measurement and verification reports (M&V) as detailed in APPENDIX F. Assuming the current rate of upgrades (approximately 200/year) continued for the 2024-2042 period, that would represent 3,800 homes (including those already completed) for a total savings of \$936,000 per year. If the anticipated expansion of ESN’s Tier 1 upgrades discussed above occurred, then ESN would have helped 19,000 families for a combined total of \$3,705,000 per year in lower bills to the lowest income people in our community. We have not yet estimated the full impact of the Tier 2 deeper retrofit expansion for the higher energy burden households but believe the impacts will be substantial. Creating such an estimate should take place before substantial additional funding is allocated beyond what is already available from Duke Energy and the Inflation Reduction Act. This would have a high impact on the resident, but medium impact to the overall energy goal.
Potential Equity Impacts	High	The above estimated reduction in energy costs of \$3.7 million annually for the lowest income members of our community would have an incredibly high equity impact.

⁴⁷ Heat Pump Systems. Energy.gov. (n.d.-a). <https://www.energy.gov/energysaver/heat-pump-systems>

		Focusing additional Tier 2 resources on the subset of that population with the highest energy burdens would also have an incredibly positive equity impact. More work is needed to develop a good estimate of these savings.
Cost Vs. Benefit	High	The estimated cost for ESN to serve a home is \$850 (see APPENDIX F). Assuming the same cost per low-income family, the cost over the 2024-2042 period to serve 18,000 families would be \$15,300,000. The savings per year for that investment would be \$195 per customer, or \$3,510,000 for an annual return of 23%. This is a remarkably high rate of return, and it brings other benefits as well including improved health outcomes. We believe that the benefits and the cost for the Tier 2 upgrade expansion will be much higher than for Tier 1, and the annual return will be favorable, but likely lower than for the Tier 1 upgrades.

Phase 2 Analysis: What is needed to make this initiative happen – Energy Savers Network (ESN)

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline	Near -Term, Ongoing	In the near term we need to maximize funding from the IRA and other sources while building up our capacity to increase staffing and volunteer support to meet our goals.
Implementing Departments and Partnering Organizations	Green Built Alliance, SVCM, Eblen, CAO, Habitat, MHO, Manna, ABCCM, Duke, City & County, and more	GBA provides day to day implementation of ESN and therefore would need more capacity, funding, and collaboration with more local nonprofits and social service agencies to identify more clients and provide more services, including marketing to help further those goals. Continued support and collaboration with these partners will be beneficial and result in more successful projects.
Activities to be undertaken to support the initiative	Additional funding for community outreach is needed to grow the impact and number of	We need to increase funding by as much as five times to meet our goals. Additional funding would be needed for more materials, staff time, and for building volunteer capacity. The

	ESN clients and volunteers.	federal IRA is a potential source of funding to grow ESN as is Duke Energy’s new funding for Tier 2 upgrades. A good portion of this funding will move through local and state governments. GBA has been in contact with the City of Asheville, Buncombe County and North Carolina Department of Environmental Quality (NCDEQ) to request consideration of support for ESN growth from the IRA.
Financial Costs and Benefits to the Organizations	Free Service to clients, costs to City & county and other financial contributors	There will be high upfront costs, but the long-term benefits are also high over time as well as long lasting.
Additional Resources and Support Needed	Increased funding, staffing & volunteers	

Initiative 2: Community Action Opportunities (CAO)

Description: CAO operates a Tier 2 deeper retrofits (see ESN above) program for income qualified residents of a multi-county area including Buncombe County. Historically CAO has served far fewer clients than ESN, typically around 40 clients per year in Buncombe County. New federal funding opportunities through the Inflation Reduction Act offer the possibility that CAO will be able to increase its impact by serving more residents with their comprehensive services.

Through this initiative, BHP will encourage this expansion and seek to maximize collaboration with ESN to achieve the greatest impact of the two efforts together. ESN clients could be referred to CAO as an alternative to ESN’s own Tier 2 upgrades and CAO can refer applicants to ESN if ESN is a better fit for the specific client with its focus on Tier 1 clients. For example, some applicants for CAO do not meet their requirements but would be able to be serviced by ESN. By working closely together, ESN and CAO can achieve a greater contribution to the overall BHP goals. CAO’s website states: “The work may include testing the safety and efficiency of the primary heating system; air sealing walls, floors and ceiling; installing ventilation fan; insulating attics, walls, floors, heating ducts, pipes and water heaters; installing vapor barriers; testing and installing smoke alarms and carbon monoxide detectors; replacing old energy-consuming refrigerators; and Heating/Air Repair and Replacement Program (HARRP).”⁴⁸

Phase 1 Analysis: Initiative Ranking - Community Action Opportunities (CAO)

⁴⁸ Community Action Opportunities 1 day ago When you're a part of the Life Works program. (2023, March 1). *Programs and services*. Community Action Opportunities. Retrieved from <https://communityactionopportunities.org/>

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	Because of an increase in federal funding that goes to CAO for energy efficiency weatherization efforts, more clients will have access to deeper energy efficiency retrofits provided by CAO.
Potential Scale of Impact	Medium	A medium rating was given because not everyone who is income-qualified for this program is going to apply or be eligible since CAO has a lot of requirements (i.e., home repairs must be completed first).
Potential Equity Impacts	High	This has a positive impact for low-income households because it enables them to save more money on their energy bills.
Cost Vs. Benefit	Medium	Potentially high cost but also has high benefits (savings) i.e., HVAC replacement and insulation are big energy bill savers but also very expensive.

Phase 2 Analysis: What is needed to make this initiative happen - Community Action Opportunities (CAO)

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline	Near-Term, Ongoing	Expansion in the near to medium-term is likely through increased funding from the IRA
Implementing Departments and Partnering Organizations	Community Action Opportunities (CAO) and their vendors	One of the partnering organizations could end up being Energy Savers Network/GBA
Activities to be undertaken to support the initiative	Careful coordination between CAO and ESN	BHP should seek greater participation by CAO in the BHP. At the same time, ESN can do more work to better coordinate and cooperate with CAO. A step-by-step approach should be developed to identify the ESN clients that would be better served by CAO for Tier 2 upgrades than by ESN so they can be referred to CAO.

Financial Costs and Benefits to the Organizations	Financial benefits per dollar spent is less than for ESN basic activities but still positive for clients	Free Service to those households served as well as to the City & County since CAO’s program is funded by the federal government.
Additional Resources and Support Needed	CAO will need to increase their capability for any expansion	Increase the amount of staff and volunteers for CAO or through BHP/ESN to help clients fill out the rigorous application paperwork for CAO’s services.

Initiative 3: Neighbor to Neighbor Solar (N2N)

Description: This initiative would continue and expand an ongoing program to provide solar installations for low-income households funded by grants (i.e., City/County ARPA) and possible charitable donations from individuals and foundations. Green Built Alliance (administration costs are funded by City/County ARPA) selects a local solar installer to do the work and manages the process at no cost to the homeowner. For more detailed information on the costs, funding, work completed, and impacts of Neighbor to Neighbor Solar thus far see APPENDIX F.

Phase 1 Analysis: Initiative Ranking – Neighbor to Neighbor Solar

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	This initiative is very feasible but limited by the amount of funding provided and finding qualified households that are south facing with newer roofs. The program is on course to meet its goals of ten solar installations/yr. for a period of two years, as currently funded (7 installations so far have been completed from Nov 2022 to May 2023). New net metering may alter the feasibility of this program. The impact of these new rules should be assessed in further detail.
Potential Scale of Impact	Low	Currently this has low impact because of the lower number of installations. To make a higher impact, it will need substantially more capacity and funding.
Potential Equity Impacts	High	There is high impact for the households that received the free energy from solar installations. The total expected production savings for 7 installs is 35,195 kwh (5027 kwh average savings/home).

Cost Vs. Benefit	Low	There is high impact for the households that received the free energy from solar installations. The total expected production savings for seven installs is 35,195 kwh (5027 kwh average savings/home). However, the cost per kwh savings is relatively high.
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Phase 2 Analysis: What is needed to make this initiative happen – Neighbor to Neighbor Solar

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline	Ongoing	The contract is for two years currently with 20 homes as the goal. For this to have a more meaningful impact on our kwh savings for the county, it will require significantly more funding starting in 2025.
Implementing Departments and Partnering Organizations	Green Built Alliance & Solar Installer	GBA provides day to day implementation of N2N and therefore would need more capacity and funding. Sugar Hollow Solar currently implements the installation but if the project is scaled up, it will need more installers to take on the increase.
Activities to be undertaken to support the initiative	Seek more funding and installers, and more community engagement to overcome the problem of finding qualified candidates (i.e., newer roofs, homeowner, etc.)	Determine how to leverage IRA funding / tax credits, Also, the education of customers on the Duke net metering program should be factored in so that they understand that they will be paying a higher monthly cost and may have to go on time of use rates which could make the program less feasible.
Financial Costs and Benefits to the Organizations	Free Service to clients but at a relatively high cost to City & County and other financial contributors	
Additional Resources and Support Needed	Find more qualified candidates, increased funding, staffing, and installers.	

Topic 4: Building Efficiency and Electrification**Initiatives:**

1. **Better Buildings Challenge (BBC)**
2. **ENERGY STAR Benchmarking (Portfolio Manager)**
3. **LEED / LEED for Cities**
4. **Heat Pump Water Heater (HPWH) Promotion & Bulk Buying Program**
5. **Electrify HVAC Systems**
6. **Moderate Income Energy Upgrades and Consultations**
7. **Work with the Planning Department on Education for Applicants (i.e., providing checklists) for New Construction and Major Remodels.**
8. **Expand Duke Multifamily Retrofit and DSM Program.**
9. **Expand Duke Energy Small Business Energy Saver Program**

Table 11 - Initiatives – Building Efficiency and Electrification Analysis Results

Initiative	Potential Feasibility	Potential Scale of Impact	Potential Equity Impacts	Cost vs Benefit	Total Ranking Points
1. Better Buildings Challenge (BBC)	Low	Medium - High	Medium	unclear	6
2. ENERGY STAR benchmarking (portfolio manager)	Medium	Medium - High	Medium	High	9
3. LEED / LEED for Cities	Medium	Medium	Medium	High	9
4. Heat Pump Hot Water Heater Promotion & Bulk Buying Program	High	Medium	High	High	11
5. Electrify HVAC	Medium	High	High	High	11
6. Moderate Income energy upgrades and consultations	High	Low	Medium	High	9

7. Work with planning departments to provide education to applicants for new construction and major remodels	Medium	Medium	High	Low	8
8. Duke multifamily retrofit Demand Side Management Program	High	Medium	High	Medium	10
9. Duke Energy Small Business Energy Savers Program	High	Medium	Medium	High	10

Initiative 1: Better Buildings Challenge (BBC)

Description: The Better Buildings Challenge is an initiative through the Department of Energy (DOE) targeted at building portfolio owners, though municipalities can also join the challenge, encouraging commercial building owners in the municipality to participate. Atlanta has done this for example.⁴⁹ The program connects these municipalities/building owners with technical and industry experts to develop cost-effective energy solutions and earn recognition. To join the challenge, municipalities email the DOE directly for more info. Partners who sign up commit to publicly pledging to improve energy intensity by at least 20% within 10 years, publicly announce an initial showcase project within 6 months & initiate within 12 months, announce the use of one or more energy efficiency implementation models within 6 months, make available portfolio-wide, building level energy performance info within 12 months and track on an annual basis.

In 2017 the South face Institute, a nonprofit whose mission is to promote sustainable homes, workplaces, and communities, in 2017 showed that they would need ~\$70,000 to organize, promote and implement the BBC program for Buncombe County. The Land of Sky Clean Vehicles Coalition (LOSCVC) has worked on a similar program in the past and would be a good partner to involve.

⁴⁹ *Atlanta's Better Buildings Challenge Planning and Implementation Model*. Atlanta Better Buildings Challenge RSS. (n.d.). Retrieved from <https://www.atlantabbc.com/initiatives/implementation-model/>

Phase 1 Analysis: Initiative Ranking – Better Buildings Challenge (BBC)

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	Low	This seems like a heavy lift. It would require the County (or a 3rd party manager) to set up the implementation model, to include a reporting process, technical support, educational materials, etc. We could potentially create our own version of this however as part of the “badging” idea that has been suggested. For example, if commercial building owners report / track their energy use, they receive an X badge. If they reduce their energy use by 20%, they receive Y badge and get further recognition, etc.
Potential Scale of Impact	Medium or High	The commitment is to reduce building energy use by 20%. According to Buncombe county’s report here , 34% of the county’s energy use is from commercial buildings. ⁵⁰
Potential Equity Impacts	Medium	This is focused primarily on building owners and helping businesses save money and energy. If resources are set up with partners to help small business owners, minority owned businesses, etc. track and reduce energy use, that could have a positive equity impact (see initiative #9 for small business energy savers program).
Cost Vs. Benefit	Unclear	It is unclear what funds would be needed to implement a program such as this. There would need to be significant staffing resources to set up the program and then maintain it. It wouldn’t be a revenue generating program unless buildings paid a fee for an energy audit, 3rd party verification of data, etc.

Phase 2 Analysis: What is needed to make this initiative happen – Better Buildings Challenge (BBC)

⁵⁰ Background and renewable energy baseline - Buncombe County, North Carolina. (n.d.). Retrieved from <https://www.buncombecounty.org/common/sustainability-office/documents/ashville-buncombe-renewable-energy-goals.pdf>

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline	Long-term	If the county wanted to sign up for this program, preparation work would need to be done beforehand.
Implementing Departments and Partnering Organizations	Local governments, Chamber of Commerce (or other business groups), Explore Asheville (for hotels)	Bringing together this coalition for implementing the BBC would require significant coordination. A full-time person at the Chamber of Commerce, a local government, or Green Built Alliance (GBA) would be needed for the program to have a substantial impact.
Activities to be undertaken to support the initiative	Create a working group dedicated to creating an implementation plan	
Financial Costs and Benefits to those involved	High initial costs	Per the general notes above, a quote from the Southface Institute in 2017 estimated \$70k needed to implement and promote this program.
Additional Resources and Support Needed		

Initiative 2: ENERGY STAR Benchmarking (Portfolio Manager)

Description: ENERGY STAR Portfolio Manager allows building owners to benchmark (measure and compare) their energy use (as well as water use, waste and materials, and greenhouse gas emissions) via an online platform. This information can then be used to target efficiency improvements and compare year-to-year performance. Buildings that earn an ENERGY STAR score of 75 or higher are eligible for ENERGY STAR certification.

Phase 1 Analysis: Initiative Ranking – Energy Star Benchmarking (Portfolio Manager)

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>

Potential Feasibility	Medium	This service is easy to access, user-friendly, and free - all that is needed is some basic building info and utility readings to track and share data. Feasibility will depend on how this initiative is used. For example, would there be an incentive for buildings to report energy use data and if so, is that provided by the county or Duke? Would GBA need to assist the process? Land of Sky Waste Reduction Partners could potentially help with the process and technical resources.
Potential Scale of Impact	Medium or High	Although this will certainly get building owners thinking of their energy use, it is unclear how that will affect making changes to become more efficient. But you can't improve what you don't measure so this would be a great first step. There are lots of great resources for improving energy efficiency as well. If we link this energy reporting to ENERGY STAR resources ⁵¹ as well as BHP resources / initiatives, this could be effective.
Potential Equity Impacts	Medium	From an "accessible" lens (meaning minimal barrier to entry), this service is easy to access, user-friendly, and free - all that is needed is some basic building info and utility readings to track and share data (could be used by big and small business owners alike). There is an additional equity piece if we were able to partner with a pro-bono certifier for small business owners, minority owned businesses, disadvantaged neighborhoods, etc. (this comes into play if you want to be ENERGY STAR certified).
Cost Vs. Benefit	High	Cost appears relatively low to implement (admin, IT, and depending on incentives). If this route were taken, there would be a need to understand how this data would be used in the broader initiative. For example, is the county requesting this data be exported to them? What will be done with the data? Or do building owners simply show proof of tracking? Is this just a resource we point building owners to? Benefits of improved energy efficiency could be high as the need to address the impact of existing building energy loads increases.

⁵¹ Benchmark your building using energy star® portfolio manager®. ENERGY STAR. (n.d.). Retrieved from <https://www.energystar.gov/buildings/benchmark>

Phase 2 Analysis: What is needed to make this initiative happen – Energy Star Benchmarking (Portfolio Manager)

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Medium-Term	The ENERGY STAR Portfolio Manager ⁵² is a trusted platform with lots of resources that can be used. The timeline is going to be dependent on how we implement this tool to meet our goals.
Implementing Departments and Partnering Organizations	County, Duke, local PE/RA volunteers, Waste Reduction Partners	<p>This could be led by several entities – e.g., County, Duke, GBA.</p> <p>Can we partner with individuals or organizations to provide free PE/RA services for ENERGY STAR certification? (Requires a site visit and verification of application)</p> <p>The only cost associated with ENERGY STAR is if a building is certified, which requires a Licensed Professional (registered professional engineer or registered architect) to do a site visit and sign-off on the application. Consider: would someone be willing to partner with us to provide this service for free for eligible building owners?</p>
Activities to be undertaken to support the initiative	Need to understand the broader initiative	<p>It is unclear how the initiative would be implemented. This is just a tracking measure that should be part of a larger initiative. Here’s an example from Austin, TX: https://austinenergy.com/en/energy-efficiency/ecad-ordinance/for-commercial-buildings⁵³</p> <ul style="list-style-type: none"> • Program would be voluntary but consider incentives / policies that the county could provide. • Ultimately, this could be a benchmarking tool used for a larger initiative for getting the existing

⁵² Benchmark your building using energy star® portfolio manager®. ENERGY STAR. (n.d.). Retrieved from <https://www.energystar.gov/buildings/benchmark>

⁵³ For commercial buildings. Austin Energy. (2022, June 23). Retrieved from <https://austinenergy.com/en/energy-efficiency/ecad-ordinance/for-commercial-buildings>

		<p>non-residential building stock on a path towards energy efficiency.</p> <ul style="list-style-type: none"> Review how it could align with commercial MLS
Financial Costs and Benefits to the Organizations	Admin costs	
Additional Resources and Support Needed		It would be great if there could be an incentive for buildings to report energy use data. GBA/Duke/local governments could potentially assist in the process.

Initiative 3: LEED / LEED for Cities

Description: LEED for Cities is a program for local jurisdictions (cities or counties) that helps guide and then recognizes sustainable plans and initiatives that address natural systems, energy, water, waste, transportation, and quality of life. Like the LEED building rating systems, this is a rating system that mirrors those major topics and looks at sustainability through a more holistic lens, compared to our targeted energy initiatives.

This could be an overarching program for the County to use that further supports our individual initiatives. Specifically, the County could look at implementing or integrating different credit strategies into their sustainability plans including green policies and incentives (for existing private buildings, new private development, and public buildings), energy & greenhouse gas emissions performance (tracking), energy efficiency, renewable energy, grid harmonization, and equity/quality of life.

Notes/Resources:

- Other NC jurisdictions that are certified: Charlotte, Raleigh, Durham, Greensboro, Winston-Salem, Orange County
- [v4.1 LEED for Cities Guide](#) (scroll down to “Get Started” section for the guide link)⁵⁴
- LEED for Cities 2023 Cohort Applications could be considered for 2024. If selected for the program, cities/counties receive many benefits including yearly USGBC membership, registration fees, certification fees, dedicated technical support, monthly meetings with USGBC and other cities in the program, additional guidance and support, etc.:⁵⁵

⁵⁴ *LEED for cities and Communities*. LEED for Cities and Communities | U.S. Green Building Council. (n.d.). Retrieved from <https://www.usgbc.org/leed/rating-systems/leed-for-cities-communities>

⁵⁵ *Apply to the LEED for Cities 2023 Local Government Leadership Program*. U.S. Green Building Council. (n.d.). Retrieved from <https://www.usgbc.org/articles/apply-leed-cities-2023-local-government-leadership-program>

- [Apply to the LEED for cities Local Government Leadership Program](#)⁵⁶
 - [Program Packet](#)⁵⁷

Phase 1 Analysis: Initiative Ranking – LEED/LEED for Cities

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	Medium	The Feasibility is Medium and dependent upon a couple of factors. There is a potential that Asheville/Buncombe County is already doing some of the credits and/or planning to consider many of the strategies included. If that is the case, this would be more feasible. It would also be more feasible if the county applied for the cohort and got accepted into the program, as this will guide them through the process. If there is not strong alignment with Buncombe County’s current initiatives and credits and/or we don’t apply for the cohort, the feasibility would be low.
Potential Scale of Impact	Medium	This has the potential to have a holistically high impact. But for energy initiatives specifically for the Strategic Plan, that is just a part of this rating system. Those strategies would include things such as green policies/incentives (for new development & county owned buildings), energy & greenhouse gas performance (tracking Scope 1 and Scope 2), energy efficiency, renewable energy, and grid harmonization.
Potential Equity Impacts	Medium	The LEED rating system has a whole section dedicated to “quality of life” which encompasses many equity pieces such as affordable housing and transportation, environmental justice, civic and community engagement, etc.
Cost Vs. Benefit	Potentially high	If Buncombe County applies and is selected for the cohort program, this could be an opportunity for the cost related to the LEED specific fees to be highly favorable. Additionally, this cohort program provides support for how to earn certification, which reduces the staff hours required compared to figuring it out on our own. However, staff

⁵⁶ *Apply to the LEED for Cities 2023 Local Government Leadership Program*. U.S. Green Building Council. (2023). <https://www.usgbc.org/articles/apply-leed-cities-2023-local-government-leadership-program>

⁵⁷ *LEED for Cities Local Government Leadership Program - Program Packet*. USGBC. (2023). <https://www.usgbc.org/>

		<p>resources would still be needed to coordinate this effort. There’s a link in the description above for more information. Another option would be for the county to apply strategies from the rating system as needed and to use the rating system as a guide.</p> <p>Without being accepted into the cohort, the price would be somewhere around \$15,000 for LEED registration and certification only (not including staff resources, etc.).</p>
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Phase 2 Analysis: What is needed to make this initiative happen – LEED / LEED for Cities

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline	Long-term	If the county wanted to sign up for this program, I think we would need to do some homework beforehand.
Implementing Departments and Partnering Organizations	Buncombe County Duke Energy USGBC (if certifying)	
Activities to be undertaken to support the initiative		Apply for the program, do a deep dive into the credits with the City to understand the feasibility
Financial Costs and Benefits to those involved		Staff resources, program costs to implement new strategies, certification (if applicable)
Additional Resources and Support Needed		

Initiative 4: Heat Pump Water Heater (HPWH) Promotion & Bulk Buying Program

Description: This is an intentional program to accelerate the adoption of Heat Pump Water Heaters for everyone in Buncombe County. Heat Pump Water Heaters lower water heating energy use by up to 75% compared to a traditional electric or gas water heater.⁵⁸ It’s one of the most cost-effective ways to reduce carbon emissions and achieve our community energy goals.

⁵⁸ Heat Pump Water Heaters. Energy.gov. (n.d.-a). <https://www.energy.gov/energysaver/heat-pump-water-heaters>

The overall reduction in energy usage is affected by details of the HVAC efficiency of the building and on the installation location, e.g., in a closet or basement. Taking HVAC load into account suggests that the savings in energy will be in the range of 50% (for very inefficient HVAC such as electric baseboard) to 70% (for very efficient HVAC such as ground source heat pump).⁵⁹

Why are Heat Pump Water Heaters (hybrid) so efficient? Their advanced technology absorbs heat from the air and transfers it into the water in the storage tank making them significantly more energy efficient. The Heat Pump Water Heater also provides dehumidification to the space. In a basement, this is an added bonus. It does cool as well, which should be considered in placement of the appliance. Basement or (sufficiently sized) crawlspace is an ideal location in our region.⁶⁰

Water heating typically accounts for about 15 to 25% of a monthly energy bill.⁶¹ An ENERGY STAR-qualified heat pump (hybrid) water heater is one of the most efficient water heaters available. Replacing even a brand-new, working water heater is cost effective due to the significant operational cost savings involved. Significant financial incentives exist for replacing water heaters with more efficient Heat Pump Water Heaters. Duke Energy has a \$350 Rebate for the replacement of hot water heaters.⁶² The Inflation Reduction Act has a tax credit of \$2,000 and an upfront discount of \$1750, the max covered is 50%, up to 14,000 across all electrification projects.

If you already have an electric water heater, it's a simple swap out. You still need to get a permit from the City or County even if you're doing it yourself. If you have a gas water heater, a Heat Pump Water Heater may require an additional electric circuit. If a water heater is currently in a small space, a little work to add sufficient airflow may be necessary.

A request for Proposal (RFP) will be released to identify plumbers who agree to be part of the program. This includes picking up the water heaters from the distributor, doing the installations, getting permits, and providing documentation for incentives and tax credits.

A full-time staff member will need to be hired to promote the adoption of Heat Pump Water Heaters. The scope of work would include:

- Identifying qualified plumbers to do the installations (through an RFP, RFQ or through a referral basis). Duke Energy has trade allies that install HPWH, perhaps they could be prequalified.
- Marketing and promotion of the campaign via events, news, social media, etc.

⁵⁹ Nicholson, D. M. (n.d.). (rep.). *The Effect of Change in Heating/Cooling Load*. To be published

⁶⁰ *How Heat Pump Water Heaters Work*. Goclean.masscec.com. (n.d.). <https://goclean.masscec.com/article/how-heat-pump-water-heaters-work/>

⁶¹ *Water heating*. Energy.gov. (n.d.). <https://www.energy.gov/energysaver/water-heating>

⁶² *Smart Saver - heat pump water heater*. Duke Energy. (n.d.). https://www.duke-energy.com/home/products/smart-saver/heat-pump-water-heater?_gl=1%2A29d3y3%2A_ga%2AMTc0MjQ3NTczMi4xNjgzMjg2NzM4%2A_ga_HB58MJRNTY%2AMTY4MzI4Njc4xLjEuMTY4MzI4Njc1NS4wLjAuMA..&_ga=2.143923189.155312145.1683286738-1742475732.1683286738&_gac=1.154063434.1683286738.Cj0KCQjw0tKiBhC6ARIsAAOXutkhPajkCzr6R-1WslTpruohH_hj53MNFJ37eXXm5TrDON--UufW45oaAvexEALw_wcB

- Channeling potential clients to contractors
- Tracking adoption of this technology
- Ensuring that operating instructions and tax resources are available

Hopefully funding can be obtained from foundation or government grants. This program can launch in summer or fall of 2023. The bulk buying program could also fit into a larger program that provides training for tradespeople, mass marketing of the technology and a program to ensure that all new affordable housing units built in Asheville and Buncombe County use this technology. A proposal from the BHP Technology committee has been made to place a hold on 250 units to receive a bulk buying discount. After this initial round of units are installed, we will re-evaluate the savings and funding needed.

Phase 1 Analysis: Initiative Ranking - Heat Pump Water Heater (HPWH) Promotion & Bulk Buying Program

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	The technology and economics are good and the tax incentives and upfront rebates with IRA are substantial. There are also local installers familiar with installing HPWHs.
Potential Scale of Impact	Medium	The scale of the impact is higher than most programs proposed in this Plan. Especially expanded from bulk-buy to general promotion for 10 years of heat pump water heaters to take maximum advantage of the IRA.
Potential Equity Impacts	High	The installation of a HPWH drastically reduces energy consumption and therefore utility bills. Low-income residents could get one for free. Energy Saver’s Network (ESN) could track which homes are ‘heat pump water heater ready’ so that they can be eligible and ready for this program. *Could* work for a mobile home with a 110V but the height might be a problem. If a mechanism can be sorted out for ESN to make this a standard offering, it would be a “High” favorability for equity.
Cost Vs. Benefit	High	The return on investment is approximately 3 years, especially with the IRA incentives.

Phase 2 Analysis: What is needed to make this initiative happen - Heat Pump Water Heater (HPWH) Promotion & Bulk Buying Program

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near-Term	To begin around summer or fall 2023 and going through 2025. Promotion of the units can occur after 2025, although the bulk buying portion of the program should be complete by that time.
Implementing Departments and Partnering Organizations	GBA/BHP Buncombe County Tradespeople	Retail plumbing supply companies and manufacturers will be contacted to purchase the units. Ideally the plumbers would purchase and store the equipment. Identify licensed plumbers and contractors via an RFP, RFQ or referral process.
Activities to be undertaken to support the initiative	Hire a full-time staff person, Launch the program	Public outreach - drive demand Visit 1 or 2 CEOs of local plumbing companies to plant seed and get feedback
Financial Costs and Benefits to those involved	Energy Savings for customers Plumbers open a new or expanded business line for heat pump water heaters	Money going into the local economy through installations and energy bill savings and short ROI. Potential to charge a fee per heat pump water heater to help fund BHP program. Financing could be done through the Green Bank, HELOC, credit card, bill financing, etc.
Additional Resources and Support Needed	Green Bank funding to pay for upfront costs. Traditional financing - e.g., Self-help	What would it take to add on-bill financing? Ask the County and the water utility.

Initiative 5: Heating Electrification

Working with HVAC Contractors Electrify HVAC (Heat Pumps or Mini Splits)

Description: Significant incentives and cost savings are available for homeowners and housing providers to change fossil fuel (oil, propane, and gas) heating systems to electric ones (heat pumps and mini splits). On average, heating systems last about 15 years so about 7% of all heating

systems are upgraded each year.⁶³ With so many systems being changed each year there is a big opportunity for making headway on electrification of heating systems.

HVAC contractors are the front line in changing out old, broken, or inefficient systems. They also can support clients with quality information about how to save energy, money, and access Duke Energy HVAC replacement incentives and IRA tax credits and rebates.

Phase 1 Analysis: Initiative Ranking – Heating Electrification

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	Medium	<p>This market is highly developed. We inserted “Medium” here due to the resistance of HVAC professionals to specifying only high efficiency equipment. While resistance to change remains among HVAC tradespersons, owners, managers, and salespersons, it will most likely be the homeowners, contractors, and architects requesting / requiring the higher efficient offerings to bring a more notable moving to this proverbial needle. However, an educated salesperson can be quite effective when not caught off guard by these inquiries and able to provide the answers to any related questions.</p>
Potential Scale of Impact	High	<p>The potential scale is ‘High’ on a couple of fronts. One being in the reduction of energy demand certainly, and as stated, the HVAC system is the largest consumer of energy demand in the home.⁶⁴</p> <p>Another way is because Asheville and Buncombe County have become the leader in this arena, the resources provided and the talent committed to these initiatives, will have impact to surrounding areas and neighboring cities. They (neighboring areas to Asheville) have increasingly followed our lead and will continue to do so.</p> <p>If this initiative were to gain traction and support from professionals the potential scale of impact can be high based on heating systems being the largest use of energy in</p>

⁶³ *When is it time to replace?* ENERGY STAR. (n.d.). Retrieved from https://www.energystar.gov/campaign/heating_cooling/replace

⁶⁴ *North Carolina*. North Carolina Residential Energy Efficiency Potential. (2017, January). Retrieved from <https://resstock.nrel.gov/factsheets/NC>

		the residential sector and how many HVAC systems get replaced.
Potential Equity Impacts	High	<p>HVAC upgrades can be made for renters, owners, and all income levels. IRA tax incentives and upfront rebates can have a high equity impact for point of sale and installation costs. Most capital benefits will probably be gained by homeowners and property managers, while ongoing operational benefits will be gained by the occupant. GBA’s low-income heating repair and replacement program provides free upgrades of highly efficient equipment to a certain number of income qualified residents (based on GBA capacity).</p> <p>We do not yet know all the logistics of how exactly the IRA funds (rebates and tax incentives) will be implemented, and how that occurs will affect the equity impacts. The specifics of IRA tax incentives and utility rebates will be the driver here. As these logistics and specifics are rolled out, getting the fundamental ‘nuts and bolts’ of these specifics to the varied contractors, homeowners, etc. will be key of course. Vendors, Manufacturers, and Contractors all seem to be aware that ‘it’s in the pipeline and soon to come’.</p>
Cost Vs. Benefit	High	<p>More efficient equipment has substantial Duke Energy incentives and tax credits as well as IRA rebates and tax incentives to offset high upfront costs.</p> <p>Having a streamlined location for a homeowner / contractor to access details and the necessary math may prove helpful. Understanding the math of energy, (number of BTUs in a gallon of oil or propane vs what is lost through the flue vent) has been very helpful to our company in converting customers to electric Heat Pumps. These fossil fuels, when accurately assessed with all associated math concerning cost of operation, are indeed more costly to operate and service than are the offerings in electric Heat Pumps.</p>

Phase 2 Analysis: What is needed to make this initiative happen – Heating Electrification

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-	Near-Term, Ongoing	It will take a couple of years or so to iron out most of the issues we are currently facing (inventory

<p>Term, Long-Term, Ongoing)</p>		<p>issues due to the pandemic, new rating called SEER 2⁶⁵, shifting away from old refrigerants to newer and better refrigerants, etc.) that may slow down heating electrification. However, there is readily available highly efficient electric heating that can drastically reduce energy costs as well as tax incentives and upfront rebates from the IRA. The time to act is as soon as possible (especially once IRA rebates roll out)</p>
<p>Implementing Departments and Partnering Organizations</p>	<p>GBA/BHP to lead community engagement efforts. Duke Energy. HVAC contractors are essential to the success of the program</p>	
<p>Activities to be undertaken to support the initiative</p>		<ul style="list-style-type: none"> • Organize meetings, continuing education, engagements with HVAC contractors and other organizations/jurisdictions working on similar efforts so that we can understand what is slowing down implementation of electric highly efficient HVAC systems. What are the pros and cons to trying to implement such an effort? • Then implement a strategy based on knowledge learned. • Get a list of local HVAC contractors and plumbers. • Create a flier on the benefits of electrification of HVAC. • As it is more challenging to convert / educate all dealers, starting with the top 5 volume local residential companies could provide max dividend and the quickest at that. • Manufacturers must make certain that installers understand the products and provide training.

⁶⁵ Seer2 new efficiency standards. SEER2.com. (2023). Retrieved from <https://seer2.com/about.html>

		<ul style="list-style-type: none"> • Having an engaging electric utility representative teach me HVAC contractors at their level some things they might not know is powerful and effective.
<p>Financial Costs and Benefits to the Organizations</p>	<p>Long term costs and benefits of electrification for the consumer is positive</p>	<ul style="list-style-type: none"> • While this may require higher upfront costs, the monthly cost will be the same or lower and the long-term cost will be lower. • An excerpt from a local seasoned HVAC contractor: “Back in 1995 the local utility was known as CP&L at that time and later consolidated under what is currently Duke - Progress. They had a 2-day class The class also addressed common misperceptions about Heat Pumps and how the ‘newer’ ones (at this time comparing back to a model from the early 80’s) were better, more improved, and why, doing load j calculations, and the utility’s grassroot efforts. at this time, they were offering a Heat Pump loan to the consumer at 6% financing, 5-year term and the bill would be added to the customer’s electric bill - Get a new system and have a positive cash flow as a result.... sold a TON of Heat Pumps.” This program financially benefited all parties – the customer, the HVAC contractors, the manufacturers, and the utility in financial and other ways.
<p>Additional Resources and Support Needed</p>		<ul style="list-style-type: none"> • Newer Heat Pumps can be more difficult to install. For the higher efficient models, the setups can be more tedious, finicky, and ultimately confusing to an undertrained installer. Training for installers is needed. • It is also important to understand how building codes will evolve in the future as localities promote and move towards electrification Contractors are programmed and conditioned to be satisfied with meeting the current and existing codes. • More and more studies are coming out showing the negative health effects of gas

		<p>combustion in homes. This information should be shared more broadly so to be widely accepted and understood.⁶⁶⁶⁷</p> <p>We need to know:</p> <ul style="list-style-type: none"> • How can we get more HVAC contractors to be amenable to handing out a flier created by GBA/BHP of why/how this makes financial sense? • Understand how IRA will implement its programs
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Initiative 6: Moderate Income Energy Upgrades and Consultations

Description: Promoting IRA and Duke Smart Saver rebates, home energy house calls Home Energy Chats, customer experience for homeowners, and a tool like the Home Energy Efficiency Upgrades program by NYSERDA.⁶⁸ Even a worksheet like that on the last page of “Go Electric,” Rewiring America’s Guide to the Inflation Reduction Act.⁶⁹ This is shifting from a live resource (Home Energy Chats) to a static or self-direct resource (online tool, worksheet) to help people decide “what next” on their renewable energy personal journey.

Phase 1 Analysis: Initiative Ranking – Moderate Income Energy Upgrade Consultations

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	This is shifting from a live resource (Home Energy Chats) to a static, or self-direct resource (online tool, worksheet) to help people decide “what next” on their renewable energy personal journey. The feasibility is high because it is just an upgrade to an initiative that is currently in place.

⁶⁶ Blum, D. (2023, January 11). *Gas stoves are tied to health concerns. here's how to lower your risk.* The New York Times. Retrieved from <https://www.nytimes.com/2023/01/11/well/live/gas-stoves-health-risks.html#:~:text=In%20addition%20to%20asthma%2C%20there,who%20participated%20in%20the%20study>.

⁶⁷ Lewis, T. (2023, January 19). *The health risks of gas stoves explained.* Scientific American. Retrieved from <https://www.scientificamerican.com/article/the-health-risks-of-gas-stoves-explained/>

⁶⁸ *Home Energy Efficiency Programs.* NYSERDA. (2023). <https://www.nyserd.ny.gov/All-Programs/Home-Energy-Efficiency-Upgrades>

⁶⁹ *Go electric! - rewiring America.* Rewiring America. (2023). <https://content.rewiringamerica.org/reports/Rewiring%20America%20Go%20Electric%20Digital%20Guide.pdf>

Potential Scale of Impact	Low	This initiative is about education, community engagement and doing outreach to help people make a personal shift. While personal shifts matter, the biggest shifts are going to come from systematic, industrial, and commercial energy shifts.
Potential Equity Impacts	Medium	Moderate income households are not well represented in our current EE portfolio. They're served by Duke Programs, but they may not know those programs even exist. This has a medium impact on equity to match the moderate income of the participants. Also, renters need more support for doing energy efficiency upgrades.
Cost Vs. Benefit	High	The costs here could be very low, but provide exceptional results to self-directed, self-funded, at-home energy improvements.

Phase 2 Analysis: What is needed to make this initiative happen – Moderate Income Energy Upgrade Consultations

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near and medium term	As of the time of the writing of this Plan, access to utility and low-income resources are currently available and not fully subscribed. Many IRA funding blocks haven't been implemented yet and funding avenues are still being figured out.
Implementing Departments and Partnering Organizations	Community agencies, local and state governments, and contractors.	GBA is lead on community engagement. Duke has incentives and programs that need promotion. The IRA will be coming from local governments.
Activities to be undertaken to support the initiative	Community engagement - consumers and tradespeople	Through marketing, social media, events, etc. reach consumers. See if Duke can do a bill insert in early to mid-2023. Reach out to tradespeople and organizations to increase participation in utility and gov't EE rebate programs for homes.
Financial Costs and Benefits to the Organizations	Easy addition to existing services for tradespeople.	Additional revenue streams for small business/trades people. Long-term savings for customers.

	Outreach and marketing needed.	Costs for PR and marketing for the programs.
Additional Resources and Support Needed	Make a tool for people to self-search what they can do right now.	Funding for an online tool and physical worksheet to help folks navigate the myriad programs available.

Initiative 7: Work with the Planning Department on Education for Applicants (i.e., providing checklists) for New Construction and Major Remodels.

Description: Education of residents and developers for new construction and major remodels to encourage green and sustainable building practices that increase energy efficiency, money savings, and resiliency. Provide the Green Built Homes (GBH) and/or Energy Star checklist for the City and County officials to provide as a tool and resource that could educate residents on what they should consider doing and facts about why they should do it. This would be an educational tool keyed to climate/buildings in WNC as well as incentives and financing options. Such a tool could be enhanced for affordable housing as well. The information provided should also include a list of relevant rebates and incentives through Duke Energy Progress and through the Inflation Reduction Act (IRA).

Phase 1 Analysis: Initiative Ranking – Work with Planning Department on Education for Applicants

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	Medium	The potential for providing quality information to planners and building officials to provide applicants is high. However, expectations for having the officials provide the information to applications are probably low. GBH is available for single family and multifamily projects, including affordable housing.
Potential Scale of Impact	Medium	If permit applicants receive a GBH checklist early enough in the development process it could encourage them to certify their project. According to the 2017 Greenbuilt Homes Study, homes that meet the rating system perform on

		average at least 30% better than code-built buildings. Since new homes will be in place for 30-100 years any improvements made during construction can have long-lasting benefits.
Potential Equity Impacts	High	Affordable housing that meets GBH or Energy Star certification are cheaper to operate and maintain. The largest certifier of GBH is Habitat for Humanity. Ensuring that green housing is available for all people in all communities is essential.
Cost Vs. Benefit	Low	Low cost, potentially medium benefit.

Phase 2 Analysis: What is needed to make this initiative happen - Work with Planning Department on Education for Applicants

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near Term	Meeting with City and County planning and building departments to discuss providing a checklist to applicants would be helpful and to list current available rebates and incentives.
Implementing Departments and Partnering Organizations	City of Asheville, Planning and Development. Sustainability Depts and Officers of the same.	Green Built Alliance (GBA), the implementer of Green Built Homes, will provide checklists and a list of current available rebates and incentives to planning departments and offer ongoing support if affordable housing applicants need consultation.
Activities to be undertaken to support the initiative	Meet with planning officials. Determine if they feel comfortable providing GBH and/or energy star checklists	The City of Asheville is considering an expansion of its “public benefits” incentive process beyond hotels and focusing on multi-family developments. Engaging and supporting City planners early on can encourage effective implementation. This would provide incentives for developments who implement energy efficiency/electrification/renewable energy.

Initiative 8: Expand Duke Multifamily Retrofit and DSM Program.

Description: Expand utilization of Duke’s demand side management (DSM) programs, particularly in multifamily new construction development. Currently, participation requires landlord/owner sign-off, which creates a barrier for renters who would like to participate in this program. Participation is incentivized with an annual bill credit (up to \$75). By pre-installing Energywise devices and pre-enrolling new apartments into Energywise, the barrier to renters can be eliminated. There is currently no incentive or obligation for multifamily developers to do this.

Phase 1 Analysis: Initiative Ranking – Expand Duke Multifamily retrofit and DSM programs

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	The existing Duke program (Energywise) has been piloted with multifamily developers (MHO) for both existing occupied buildings and new construction. Could easily be expanded to see greater adoption by all multifamily developers in Asheville/Buncombe.
Potential Scale of Impact	Medium	While it could have a big impact on the number of units enrolled in DSM, new apartments are generally energy efficient, so not the greatest strain on the grid during times of peak demand. Possibly impactful in the aggregate, but not as impactful on a per unit basis.
Potential Equity Impacts	High	Expanding use of EnergyWise among renter households would target higher numbers of BIPOC households, as well as lower income households. The associated bill credit going to renters would be a small, but positive way to help lower income and BIPOC households manage increase in electric bills as rates increase.
Cost Vs. Benefit	High, Medium, or Low	Unsure.

Phase 2 Analysis: What is needed to make this initiative happen – Expand Duke Multifamily Retrofit and DSM Programs

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>

Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near-Term	Would need to connect dots between Duke’s program staff and City/County planning staff to see how Energywise participation can be strongly encouraged for new multifamily developments. The City of Asheville is considering an expansion of its “public benefits” incentive process beyond hotels and focusing on multi-family developments. Engaging and supporting City planners early on can encourage effective implementation. Otherwise, it is just a matter of helping boost participation in an existing Duke program.
Implementing Departments and Partnering Organizations	Duke Energy, Asheville Planning Dept/Development Services, Buncombe County Planning/Permit staff	Duke Energy, Asheville Planning Dept/Development Services, Buncombe County Planning/Permit staff
Activities to be undertaken to support the initiative	Outreach to market-rate developers to see if they even know about the existing Duke programs and assess barriers to implementation.	
Financial Costs and Benefits to those involved	No cost to developer, annual bill credit (\$50-\$75) to tenant paying electric bills	
Additional Resources and Support Needed	Unsure	

Initiative 9: Expand Duke Energy Small Business Energy Saver Program

Description: Duke Energy has a Small Business Energy Saver Program that includes 3 main components:

1. A free energy assessment from an approved contractor.

2. Free recommendations for ways to improve your energy efficiency based on the assessment.
3. Duke includes turnkey installation through contractors and pays up to 80% of selected improvements upfront.

Highlight this program in our resources. Build upon it if possible.

Program info:

<https://www.duke-energy.com/business/products/small-business-energy-saver>⁷⁰

Several case studies are shown at the bottom of the resource page, including Hi-Wire brewing:

<https://desitecore10prod-cd.azureedge.net/-/media/pdfs/for-your-business/sbes-hi-wire-case-study.pdf?rev=46f99977446742b3996896e9f1004a89>⁷¹

Phase 1 Analysis: Initiative Ranking – Expand Duke Energy Small Business Energy Saver Program

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	This is an ongoing program that is currently offered by Duke Energy. We should seek to amplify this program in our Strategic Plan and / or discuss how it can further grow.
Potential Scale of Impact	Medium - High	Commercial buildings are a large chunk of building stock in the county (commercial buildings are 34% for example ⁷²). We must make sure these are targeted in an effective and meaningful way. This program specifically targets “small business owners” so we need to understand what qualifies as a “small business” to understand the full impact opportunity.
Potential Equity Impacts	Medium	This program is catered towards small businesses and helps upfront the cost of energy efficient upgrades so that the expected savings have a shorter pay-back period (for

⁷⁰ *Small business energy saver - business*. Duke Energy. (n.d.). Retrieved from <https://www.duke-energy.com/business/products/small-business-energy-saver>

⁷¹ *Small Business Energy Spotlight*. Duke Energy Progress Small Business Energy Saver - Hi-Wire case study. (n.d.). Retrieved from <https://p-scapi.duke-energy.com/-/media/pdfs/for-your-business/sbes-hi-wire-case-study.pdf>

⁷² *Background and renewable energy baseline - Buncombe County, North Carolina*. (n.d.). Retrieved from <https://www.buncombecounty.org/common/sustainability-office/documents/ashville-buncombe-renewable-energy-goals.pdf>

		example, the case study pay-back periods were 1-2 years). Can this be further expanded upon in any way? For example, are there minority owned businesses that may fall outside of “small businesses” that should be considered?
Cost Vs. Benefit	High	Because this is an existing program funded through Duke Energy, the costs are low from a BHP standpoint. The benefits are not revenue generating but they do help us attack the commercial buildings as part of our “embrace energy efficiency” initiative.

Phase 2 Analysis: What is needed to make this initiative happen – Expand Duke Energy Small Business Energy Saver Program

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline	Near-term	The program exists; therefore, we would just be highlighting this as a resource. Consider opportunities to build upon the program.
Implementing Departments and Partnering Organizations	Duke BHP	
Activities to be undertaken to support the initiative	Minimal, consider talking to the Duke Energy representative to better understand the implementation and limitations of the program	Minimal, consider talking to the Duke Energy representative to better understand the implementation and limitations of the program
Financial Costs and Benefits to those involved	Large financial benefits for small businesses who are eligible for Duke incentives (up to 80%).	Large financial benefits for small businesses who are eligible for Duke incentives (up to 80%).
Additional Resources and Support Needed	Questions for Duke: <ul style="list-style-type: none"> • What qualifies as “small business”? • Need to better understand what “up to” 80% means. 	

Topic 5: Transportation

The Blue Horizons Project seeks to accomplish its goals through three mechanisms: emphasizing efficiency, electrifying everything, and greening the grid. Improved transportation efficiency rests on three pillars: 1) reduced vehicle miles travelled (VMT) and demand for motorized travel (fewer passenger miles traveled); 2) more efficient, cleaner fuels and electric vehicles (increased load factor); and 3) and providing opportunity to be carfree.¹

Transportation is the largest source of greenhouse gases in North Carolina.² For most individuals and households, purchasing a car or getting from place to place is their second largest expenditure.³ Many businesses have large fleets of vehicles and the huge burdens of vehicle cost and fuel and maintenance.

These carbon and financial costs give us a great opportunity to see real changes quickly. Electrifying fleets, developing vehicle miles traveled reduction plans, and building infrastructure that is both denser and providing sidewalks and bike paths are all strategies that will help the BHP meet the 2042 goal of 100% renewable energy.

As with all the initiatives in the strategic plan, Universal Planning for City and County is vital. A new expectation of building practices which include EV charging infrastructure and policies is needed. Policies and programs must be made by governments which require both new and existing apartment complexes and housing communities to include vehicle chargers. Policies also need to be developed that allow vehicle owners to use the existing 110 plugs to charge vehicles. In situations where mandates cannot be implemented, incentives should be provided.

Links to additional resources:

[MPO plan⁴](#)

[Land of Sky clean vehicles coalition.⁵](#)

Initiatives:

- 1. Electrification of Public Transit**
- 2. Electrification of Fleets and adoption of Electric Vehicles (both public and private)**
- 3. Promote expanded EV charging infrastructure**
- 4. Reduce Vehicle Miles Traveled (VMT) Per Capita**
- 5. Increasing walkable communities and workplaces**

Table 12 - Initiatives – Transportation Analysis Results

Initiative	Potential Feasibility	Potential Scale of Impact	Potential Equity Impacts	Cost vs Benefit	Total Ranking Points
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1. Electrification of Public Transit	Medium	Low	Medium	High	8
2. Electrification of Fleets and Adoption of Electric Vehicles	High	High	Medium	Medium	10
3. Promote Expanded EV Charging Infrastructure	High	Medium	High	High	11
4. Reduce Vehicle Miles Traveled (VMT) Per Capita	Low	High	High	High	10
5. Increasing Walkable Communities and Workplaces	Medium	High	High	Medium	10

Initiative 1: Electrification of Public Transit for Buses, Small Vans, etc.

Description: Build a compelling cost-benefit analysis, perhaps with incentives, to persuade conversion of fleets to EVs. Leverage efforts and results from cities/counties across the country to make the case.

Asheville and Buncombe County are, by and large, poorly configured for significant conversion from private vehicles to public transportation, but the political will and the region can support this to overcome difficulties. Furthermore, while increasing ridership on existing transit service lowers energy consumption and emissions, adding new transit service only lowers overall energy consumption and emissions if it reduces total passenger miles traveled enough to offset the lower efficiency (higher energy consumption and emissions per passenger mile) of transit. Essentially, ridership would need to increase enough to offset the energy it would require adding High ridership = High benefit. Low ridership = low benefit. Buncombe County currently has relatively low ridership

The equity benefits of this initiative are High due to increased air quality. If transit is used in conjunction with density, that is ideal for all benefits.

Phase 1 Analysis: Initiative Ranking - Electrification of Public Transit for Buses

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	Medium	<p>ART has an existing EV program - limited to some extent by bus manufacturers and the size of EV buses (EV bus size is incompatible with some mountain roads within Buncombe County, some electric buses are too long (35') for certain routes.)</p> <p>Mountain Mobility is constrained by availability of EV options but has a plan in place to have 67% of its fleet on "alternate fuels" by 2026. Ford E-Transit and Mercedes eSprinters are now sold only in commercial cargo van configuration, not as human transport, but both could become available by 2024. Lightning Motors is another current option.</p> <p>The process of procuring buses is quite involved and is usually done so in conjunction with other municipalities.</p>
Potential Scale of Impact	Low	<p>Asheville and Buncombe County are, by and large, poorly configured for significant conversion from private vehicles to public transportation, but the political will and the region can support this to overcome difficulties. Furthermore, while increasing ridership on existing transit service lowers energy consumption and emissions, adding new transit service only lowers overall energy consumption and emissions if it reduces total passenger miles traveled enough to offset the lower efficiency (higher energy consumption and emissions per passenger mile) of transit. Essentially, ridership would need to increase enough to offset the energy it would require adding and operating additional service times and routes.</p>
Potential Equity Impacts	High	<p>Bus transit is critical to creating an equitable transportation infrastructure.</p>
Cost Vs. Benefit	High	<p>The Inflation Reduction Act provides tax and rebate incentives, along with other potential grants.</p> <p>EV initial price differential is proving to be far outweighed by lower cost of operation and maintenance.</p> <p>Financial Benefit is Medium to High, Environmental benefit is dependent on ridership. High ridership = High benefit. Low</p>

		<p>ridership = low benefit. Buncombe County has relatively low ridership</p> <p>Equity Benefits are High due to increased air quality. If transit is used in conjunction with density, that is ideal for all benefits.</p>
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Phase 2 Analysis: What is needed to make this initiative happen - Electrification of Public Transit for Buses

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near term	<p>Near term (2024) for eSprinter vans.</p> <p>These may be available before 2024 and Mountain Mobility might be very interested, however, they require extra hardware installed. Mountain Mobility may be subject to Buncombe County fleet requirements and might have telematics.</p> <p>Many of the buses will need to be replaced in the near future anyways, so replacing them with electric buses during that time would be ideal.</p>
Implementing Departments and Partnering Organizations	ART Mountain Mobility Local cabbies? Other region’s transportation departments	Other regions need to be buying buses at the same time, as the process is very involved and often requires bulk purchases from multiple regions at once. Unified efforts between governments the three US DOE Clean Vehicle Coalitions in North Carolina and two EV bus manufacturers in the Carolinas should help.
Activities to be undertaken to support the initiative		Examples of potential action: Be an active partner with local, regional, and statewide government, non-government, and non-profits to continue electrification and move to more efficient fuels. All activities that encourage high density building and building along corridors served by ART will increase ridership and the multiple benefits of EV and cleaner fuels.
Financial Costs and Benefits to those involved	High	The financial Benefit to City of Asheville and Buncombe County is High due to lower operational costs for EV transit as well as improved air quality for local residents.

<p>Additional Resources and Support Needed</p>		<p>Look into EV shuttles.⁶ Other regions need to be buying buses at the same time, as the process is very involved and often requires bulk purchases from multiple regions at once.</p>
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Initiative 2: Electrification of Fleets and Adoption of Electric Vehicles

Description: The switch from internal combustion engines (ICE) to electric vehicles (EVs) is a giant leap for most vehicle buyers, involving many factors, among them being a simple lack of awareness of what the change will mean to their lives and the resulting benefits. Elevating awareness among the driving public will contribute to increased adoption, including delivery companies — especially those with pre-existing solar. It is recommended that the City and County mandate or support EV charging infrastructure.

Phase 1 Analysis: Initiative Ranking — Electrification of Fleets and Adoption of Electric Vehicles

<p>Analysis Area</p>	<p>Favorability Ranking (Low, Medium, or High)</p>	<p>Description of how/why action initiative received the ranking given</p>
<p>Potential Feasibility</p>	<p>High</p>	<p>Lack of awareness of the capabilities of EVs is often one of key difficulties in adoption. BHP and the LOSCVC can create good case studies about the EVs and the newest models as they become available. The economics for ownership makes a strong case for purchasing once the decision is made. Develop/Add a resource page that is a clearinghouse of information and case studies that give un-biased information to business and fleet owners. Highlight local action when we can like Dynamite Roasting and Mountain Mobility.</p>
<p>Potential Scale of Impact</p>	<p>High</p>	<p>Often new technologies are slow to be adopted. Governments sometimes have access to funds to minimize risk. It is important to capture what is learned from the early adopters and share unbiased information about the risks and rewards. Business and government fleets are a great place to start and show success. Often vehicle fleets have better resilience when difficulties happen. EV fleets are also mostly immune</p>

		from the periodic fuel shortage experienced in the mountains of North Carolina. EV also fit fleet use very well.
Potential Equity Impacts	Medium	<p>All businesses and their employees can benefit from cleaner fleets that are both more energy and economically efficient. There currently exist several obstacles for low-income folks to adopt EVs -such as high EV purchase prices and limited current charging infrastructure for non-homeowners. However, used EVs are available, as well as IRA incentives, and future increased charging infrastructure. People who rent will have difficult charging where they live.</p> <p>A new expectation of building practices which include EV charging infrastructure and policies is needed. Policies and programs must be made by governments which require both new and existing apartment complexes and housing communities to include vehicle chargers. Policies also need to be developed that allow vehicle owners to use the existing 110 plugs to charge vehicles. In situations where mandating this is not an option, incentives should be developed to encourage it.</p>
Cost Vs. Benefit	Medium	<p>Lots of effort for outreach with low benefit. However, it does expand geometrically, one person converts 2, 2 convert 4, etc.</p> <p>The Inflation Reduction Act provides tax and rebate incentives, along with other potential grants.</p> <p>EV initial price differential is proving to be far outweighed by lower cost of operation and maintenance.</p> <p>Financial Benefit is Medium to High, Environmental benefit is dependent on ridership. High ridership = High benefit. Low ridership = low benefit. Buncombe County has relatively low ridership</p> <p>Equity Benefits are High due to increased air quality. If transit is used in conjunction with density, that is ideal for all benefits.</p>

Phase 2 Analysis: What is needed to make this initiative happen — Electrification of Fleets and Adoption of Electric Vehicles

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>

<p>Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)</p>	<p>Near term and ongoing</p>	<p>Increase awareness. In some places this threshold (for mass awareness of the benefits of EVs) has been crossed, and in others it has yet to be crossed. The efforts will need to be continued as EVs enter new vehicle markets and the possibility of purchasing used EVs expands.</p> <p>As technology evolves and becomes available, it is important to let business know. Near term (2024) for eSprinter vans. These may be available before 2024, however, they require extra hardware installed. Mountain Mobility may be subject to Buncombe County fleet requirements and might have telematics. Assist everyone in making the accounting connection between using solar electricity savings to pay for the more expensive EV fleet vehicles.</p>
<p>Implementing Departments and Partnering Organizations</p>	<p>LOSCVC MPO EV owners' groups Plug in NC</p>	<p>Other regions need to be buying buses at the same time, as the process is very involved and often requires bulk purchases from multiple regions at once. Unified efforts between governments the three US DOE Clean Vehicle Coalitions in North Carolina and two EV bus manufacturers in the Carolinas should help.</p>
<p>Activities to be undertaken to support the initiative</p>	<p>Continue/Increase support for existing organizations</p>	<p>Continuing to support the Blue Ridge EV club. Western Carolina Tesla club. Continue/increase support of LOSCVC.</p> <p>It would be great if ESN's next vehicle were an electric van.</p> <p>Examples of potential action: Be an active partner with local, regional, and statewide government, non-government, and non-profits to continue electrification and move to more efficient fuels.</p> <p>Assist and create an online resource to share the most important information.</p> <p>Use the expertise found on the BHP Community Council and Tech Committees to track new technologies and prepare case studies,</p>

		testimonials, and education pieces to share with the business of the region. Be eyes and ears to help connect business and fleet owners to the Land of Sky Clean Vehicles Coalition.
Financial Costs and Benefits to the Organizations	IRA \$ Local business cases on financial benefits	IRA incentives for local governments and non-tax entities. Using Dynamite roaster’s model as a financial argument to share with other businesses.
Additional Resources and Support Needed		Educate residents/businesses to be EV ready. Potential program for dealerships to lease vehicles and claim tax credit. Could we do anything to increase the number of EVs/hybrids sent to our region? Bulk purchases? BHPCC/transportation committee work with Green Bank to help finance (with IRA incentives)

Initiative 3: Promote Expanded EV Charging Infrastructure

Description: In addition to cost and unfamiliarity, much of the resistance to switching to EVs is founded in the perceived lack of charging infrastructure. Continuing to promote expansion of that infrastructure is critical to acceptance. General expansion of EV infrastructure is helpful, but the primary need right now is for Level 2 charging in workplaces and multifamily residential developments, to enable convenient charging for people who don’t own their own homes.

Phase 1 Analysis: Initiative Ranking - Promote Expanded EV Charging Infrastructure

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative received the ranking given</u>
Potential Feasibility	High	1. “Perceived” is the operative word here. DC fast charging infrastructure is already in place to enable convenient road trips most anywhere in the country with all three plug types (Tesla, Carbon Capture Storage (CCS), and CHAdeMO). Tesla and CCS installations are expanding at an extremely rapid rate (CHAdeMO will most likely languish now that Nissan is moving to CCS). The primary real need right now is for Level 2

		<p>charging in workplaces and multifamily residential developments, to enable convenient charging for people who don't own their own homes.</p> <p>2. Now that cars are becoming much more widespread, education can easily correct the misperceptions, and multifamily developers will soon be seeing increased demand from potential tenants.</p> <p>3. BHP can assist and acknowledge property owners and rental companies for providing EV charging infrastructure in rental units.</p>
Potential Scale of Impact	Medium	With societal (and auto industry) momentum already tilting toward EVs, homeowners are very likely to electrify regardless of our involvement. On the other hand, our advocacy for workplace and multifamily L2 charging could significantly speed up adoption among the 1/3 of the population that rents.
Potential Equity Impacts	High	EVs provide significant operational cost savings to their owners. Used EVs (especially the short-range models) can be purchased at significant discounts compared to new ones. New car depreciation is one of the only places in society where trickledown economics works. Regardless of range, EVs are an effective option only for people with convenient, reliable L2 charging (or the ability to use L1 charging for 8-12 hours per day on a near-daily basis).
Cost Vs. Benefit	High	This is all about networking (people to people, not chargers to the cloud); hence, very low cost for a substantial benefit.

Phase 2 Analysis: What is needed to make this initiative happen - Promote Expanded EV Charging Infrastructure

Analysis Area	Summary	Discussion
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near- to Medium-Term	<p>Near-term: continuation of EV familiarization and demonstration activities will help to continue the rapid transition of the vehicle market. Given the present rate of adoption, it won't be needed for long.</p> <p>Continuing near- and medium-term outreach to workplaces and multifamily developers will significantly speed up that aspect of infrastructure development.</p>

		Develop a recognition and reward program, perhaps a list of rental properties that allow/encourage EV ownership
Implementing Departments and Partnering Organizations	<p>Electrify America</p> <p>ChargePoint</p> <p>Blink</p> <p>Tesla</p> <p>Blue Ridge EV Club,</p> <p>Land of Sky Clean Vehicles Coalition</p> <p>NCDOT-NEVI Program</p>	<p>NCDOT just published it’s NC Clean Transportation Plan⁷ (4/6/2023) under the NEVI (National EV Infrastructure) Program. North Carolina expects to receive up to \$109 million to build out EV infrastructure along its approved corridors.⁸ The City and County have clean vehicle programs in place which should be strengthened and expanded.</p>
Activities to be undertaken to support the initiative	<p>Near-term and Ongoing</p>	<p>Dig into what Raleigh is doing, since it seems that they are somehow mandating EV charging infrastructure for new development, despite it being above/different what NC code requires.</p> <p>Promote and support: National Drive Electric Week, Drive Electric Earth Day, and similar events.</p> <p>Blue Horizons outreach to workplaces and multifamily housing developers</p> <p>Advocate for and petition state NEVI funds to be applied toward partnering with EV charging vendor for installation of level 2 street parking chargers, especially in multi-unit housing neighborhoods and where residents are not as likely to be able to (or afford to) install level 2 home chargers.⁹</p> <p>EV Charging: Encourage, recognize, reward, mandate, that every new garage have a wired 220 circuit suitable for an EV Charger (cost during construction is very low).¹⁰</p> <p>Recommend and support putting EV chargers into light poles and other easy to use multiple location infrastructure (perhaps identify them with a different color.</p>
Financial Costs and Benefits to the Organizations		<p>Cost of installation and maintenance might be shared between state allocated NEVI funds, the County/City and the EV charging vendor. The vendor (and perhaps the county/city) would benefit from charging fees. The</p>

		neighborhoods would obviously benefit from access to charging infrastructure.
Additional Resources and Support Needed	People willing to get out in the community and talk about the change, City/county policies to incent/mandate (see link to Salt Lake City efforts)	Connect with Salt Lake City who has a proposed ordinance that would require developers of new apartment and condominium construction projects to make at least 20% of newly designated parking stalls electric vehicle-ready. ¹¹

Initiative 4: Reduce Vehicle Miles Traveled (VMT) Per Capita

Description: The Financial Cost and Benefits of VMT strategies are often economic externalities, perpetually difficult to measure through cost benefit analysis. The public benefits through improved transportation options, better air quality, fewer climate emissions, and personal financial benefits through lower cost/no car living.

Often it seems that NC DOT follows the field of dreams planning model of, “If you build it, they will come.” The opposite is also true. Through strategically not building roads and focusing on alternatives like bike lanes, transit, and high-density housing served by many transportation options, we can reduce vehicle miles travelled.

Phase 1 Analysis: Initiative Ranking — Reduce Vehicle Miles Traveled (VMT) Per Capita

Analysis Area	Favorability Ranking (Low, Medium, or High)	Description of how/why action initiative received the ranking given
Potential Feasibility	Low -Medium	The most effective way to reduce VMT per capita would be to encourage more development in more established, urban areas (Downtown Asheville, N Asheville, W Asheville, Black Mtn, Weaverville, some others) as reflected in the French Broad River Metropolitan Planning Organization (FBR MPO) Land Use Study (2019) ¹² and the <u>NCDOT VMT Reduction Study</u> . ¹³ Is it possible to link additional infrastructure to outlying areas with an increased commitment to busses/van/ vanpools and other transportation demand programs to help minimize the effect of people commuting into Asheville for work? This would really need to come from Duke, MSD, County, City, and

		water resources – but the effect is possibly high (not as high as focusing on density and urban villages).
Potential Scale of Impact	High	Reducing VMT would be beneficial by helping to reduce energy demand as well as other pollutants, such as particulate matter. Demand for roadway widening would be reduced as well.
Potential Equity Impacts	High	Reducing vehicle pollutants would improve air quality, especially in neighborhoods closer to interstates. Currently Car ownership is linked to better job opportunities and increased vehicle miles travelled. Better transit and density can both solve some of the issues preventing a cleaner carbon free future. <u>A Capitol One Study on the benefits to employment of car ownership</u> : Capital One conducted an anonymous self-reported survey of 2,200 car buyers to better understand the role of car ownership within the context of socioeconomic mobility in the United States, particularly as it relates to access to employment opportunities. According to survey results, respondents who had cars were more likely to have greater access to job opportunities, while also feeling an increased sense of financial security and wellbeing, than non-car owners. ¹⁴
Cost Vs. Benefit	High	The changes would be primarily to local land use policies.

Phase 2 Analysis: What is needed to make this initiative happen - Reduce Vehicle Miles Traveled (VMT) Per Capita

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Medium Term, Ongoing	Upzone and allow greater development by-right in more of the region’s city centers. Creating policies and savings for employees to carpool, vanpool, or telecommute will have the double benefit of reducing VMT and providing additional parking spaces for customers. Businesses and governments who prioritize telecommuting, when possible, can significantly reduce VMT (although telecommuting’s primary benefit is reducing peak-hour demand).

<p>Implementing Departments and Partnering Organizations</p>	<p>Local Govs, FBRMPO, NCDOT, ConnectBuncombe.org Bicycle-share programs?</p>	<p>Buncombe County has tracked the VMT reduction during the pandemic and continued VMT reductions through their telecommuting policy. Creating draft policies and statements about both the savings and highlighting that increased effectiveness of staff would help reduce VMT. All efforts to create and promote pedestrian, bicycle, group commuting, ride-share services, et.al.</p>
<p>Activities to be undertaken to support the initiative</p>		<p>Promote "Missing-middle development" regulations which allow for more density on a smaller land footprint, which decreases the cost per inhabitant. It also encourages denser, less car-dependent architecture.¹⁵ Identify and support vehicle-use reduction programs. Recommend to the City and County to prioritize bus routes to high density housing areas and ask ART and Mountain Mobility to commit to providing transit to new high-density housing in the planning stages and add more frequent and efficient transit to existing areas that meet high density areas. Recommend increasing ART route frequency, especially on 171 Black Mountain. Assist the City and County in developing a free circulator route similar to the <u>R-Line in Raliegh</u>, and developing free park and shuttle routes into the city.¹⁶ Carfree Zones: Case study on ways to introduce (Madrid)</p>
<p>Financial Costs and Benefits to the Organizations</p>		<p>The Financial Cost and Benefits of VMT strategies are often economic externalities. The governments pay for these things that will be perpetually difficult to measure through cost benefit analysis. The public benefits through improved transportation options, better air quality, fewer climate emissions, and personal financial benefits through lower cost/no car living.</p>

Additional Resources and Support Needed		
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Initiative 5: Increasing Walkable Communities and Workplaces

Description: Transportation planning and decisions have historically minimized both the realities and potential of biking and walking to get to work, play, and school. Replacing trips in cars with sport shoes and pedals can have a dramatic effect on clean energy and carbon goals and can save individuals huge amounts of money in fuel, parking, and car ownership – the second largest expenditure item in most budgets. The difficulties cut across all energy goals. Do people live close to work? Is walking or biking safe, and what can be done to make it safer? Are there resources available to fill the gaps in need?

Asheville Buncombe needs to embrace pedestrians and cyclists commuting by adding greenways and bike paths on the arteries from where people live to downtown and other centers of work. Supporting high density housing on the existing and planned commuting paths is vital. There are financial rewards for both those who commute without a car and the businesses who employ green commuters. It will take comprehensive planning building now to make these pathways possible in the future. Additionally, supporting these behaviors with a bus system will make both more successful.

Phase 1 Analysis: Initiative Ranking — Increasing walkable Communities and Workplaces

Analysis Area	Favorability Ranking (Low, Medium, or High)	Description of how/why action initiative received the ranking given
Potential Feasibility	Medium -High	The region has relatively little bicycle and pedestrian infrastructure and a relatively low share of bike/ped trips (by some measures (i.e., a shared bicycle systems such as Blue Bikes that goes hand in hand with bus transit on major routes such as Downtown to Arden via Biltmore Ave)) meaning increasing infrastructure could help to increase the number of bike/ped trips. A bike share study by the city of Asheville has been undertaken but has been stalled for a year. Given a “High” potential feasibility ranking because the percentage of trips by walking and biking is relatively low, even in more densely populated areas. Current infrastructure

		is also relatively low compared to like-sized cities. Lots of improvements are on the way; creating more opportunities therefore, trips are only likely to increase.
Potential Scale of Impact	High	More trips by walking and biking would help to reduce energy demand across the county. Add bike and e-scooter to the options.
Potential Equity Impacts	High	Improving bicycle and pedestrian infrastructure could reduce bike/ped fatalities and injuries, which disproportionately impact minority and low-income residents.
Cost Vs. Benefit	Medium	Bike/Ped infrastructure can be expensive (Haw Creek and Johnston Road sidewalk projects are coming in at approximately \$3 million per mile) but new greenways are averaging roughly 8k-12k trips/week.

Phase 2 Analysis: What is needed to make this initiative happen - Increasing walkable Communities and Workplaces

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Ongoing	The pathway to support car free commuting needs to be ingrained into the planning process – adding access and resources as new residential and commercial properties are approved, when roads are built, or renovated sidewalks and bike paths need to be added – in case where this is not possible greenways and other paths need to be planned and built. ART later into the evening, Remote parking with shuttles
Implementing Departments and Partnering Organizations	Local Govs, FBRMPO, NCDOT, ConnectBuncombe.org Bicycle-share programs?	All efforts to create and promote pedestrian, bicycle, group commuting, ride-share services, et.al. Local Govs, FBRMPO, NCDOT, ConnectBuncombe.org, Asheville on Bikes, Blue Ridge Bike Club, Bike rental services, bicycle-share programs, possibly an Environmental Justice lens can be helpful.
Activities to be undertaken to		Develop policies based on best practices and research that incorporate bike and pedestrian

<p>support the initiative</p>		<p>infrastructure into building the clean energy city of the future. These policies and research tools can be used to leverage funds as grants become available and money from the NC DOT- Federal Highway Administration (FHA) funds become available like the Surface Transportation (STP)- Direct Apportionment funds. also Identify and support vehicle-use reduction programs</p>
<p>Financial Costs and Benefits to the Organizations</p>		<p>Building bike and pedestrian infrastructure is expensive – not as expensive as the roads which are competing for the same funds. It is difficult to acquire funds when most homes and buildings also need vehicle access.</p>
<p>Additional Resources and Support Needed</p>		<p>It might be helpful to have a public commitment pledge or bike pedestrian efficiency formula to help provide data that shows the infrastructure that will be used.</p>

APPENDIX C: Industry and Aviation

Industry and Aviation are both very large energy consumers. The industry sector is the larger of the two, estimated (APPENDIX A, Table 2) to be 20.6% of overall energy demand. Of that 20.6%, 17% is direct consumption of electricity, 57% is natural gas, and 26% is oil and propane. It would be possible for many industrial processes to use electricity instead of gas, as a study by Lawrence Berkeley National Laboratory found that about half of the energy used in industrial processes had a “high” or “medium” potential for electrification.⁷³ The main barrier is that using electricity for these processes would be significantly more expensive than natural gas, as they require generation of significant heat. However, if there were incentives for such industries to electrify their operations (as there are for residential and commercial applications like in the IRA) then the barrier of cost could be deemed irrelevant, likely encouraging the transition from natural gas to electricity and greatly improving the ability for us to reach renewable energy goals.⁷⁴

There are now emerging industrial heat pump applications that may well solve all our industrial process heat needs. A recent project proposed by a local innovation firm led by active BHP volunteers, has examined energy use in the brewery sector for a Department of Energy (DOE) grant application, increasing our overall knowledge base and confirming significant fossil fuel use for regional industrial process heat. That team determined that all the brewing process heat, as well as building heat loads in industrial buildings, could be electrified using standard heat pumps for building heat and emerging high temperature heat pumps for process heat. Electrification of building and industrial process heat in Buncombe County represents a major opportunity for energy efficiency and decarbonization.

Aviation is another sector that is present within our community and represents an opportunity for change. JFK Airport in New York recently released (beginning of 2023) their plan to create a microgrid at the airport terminal one, which as explained in microgrid initiative recommendation (see Topic 2: Residential and Commercial Renewable Energy and Storage), has a myriad of benefits both for the airport and the community. They are also utilizing energy as a service (EEAS) method to reduce energy usage and increase financial savings. Such an approach shows that airports, regardless of size, are great candidates for current large energy consumers to change how they operate and help the community achieve its RE goals.⁷⁵

⁷³ Deason, J., Wei, M., Leventis, G., Smith, S., & Schwartz, L. C. (2018). Electrification of buildings and industry in the United States: Drivers, barriers, prospects, and policy approaches.

⁷⁴ Popovich, N., & Plumer, B. (2023, April 14). *How electrifying everything became a key climate solution*. The New York Times. https://www.nytimes.com/interactive/2023/04/14/climate/electric-car-heater-everything.html?unlocked_article_code=8QWB0Vb4S6IZJEhX9VX7weP4InL_6trXK3TRWlQ2t20md3-YgyTqVhwOpDtZqz3DvSPbncxZ2bR4pOye6rO_Lrr9LrDmHDnyMX9E3_Ctyq_jGrNsNIQMd6XDOjZ159YV-Gxgxr228QwPjg7QVpvtH3QSyCwCAWZu3HVpxbRuUISCJzqOK2xJNY3fCSO_AlsnzzpFOfq_zuH6HNvZs7kHwumtvaiAxuSMwklVn0gYmciOQssTILRH_gseXPmE5druYSbRjw-7_XeyYtJaw221743CpGafU6-IJckUxswSEL4DdZFOJ0PodLOSTAb9EnQ5SCFsF9vWPSX57vqAVXnYZVGpN-7cdvD-U-QzT7SWv79CY8EWZmR2Pw&giftCopy=0_NoCopy&smid=url-share

⁷⁵ Gallucci, M. (2023, January 26). *A giant solar microgrid is coming to New York City's JFK Airport*. Canary Media. Retrieved from <https://www.canarymedia.com/articles/air-travel/a-giant-solar-microgrid-is-coming-to-new-york-citys-jfk-airport>

Other potential opportunities to monitor in the aviation sector include drop-in jet fuels called SAF (sustainable aviation fuels), made from low carbon intensity (CI) ethanol and bio-oils, and new electric short distance airplanes. SAF are interchangeable with fossil fuels and can be used on any existing plane. AVL hosts many short flights to Charlotte, Atlanta, Newark, and Florida, which may be good candidates for the emerging electric planes being tested in Europe.

Important and relevant actions that could be taken now and in the near term at Asheville Regional Airport. Buncombe County and the City of Asheville have representation on the Greater Asheville Regional Airport Authority and should be encouraging a transition to 100% renewable energy for all airport functions. Such measures could include:

- Encourage Greater Asheville Regional Airport Authority to develop carbon reduction plan.
- Install electric high-efficiency heating and cooling (currently ongoing).
- Electrification of fleet vehicles like baggage and ground maintenance trucks.
- Installing on-site renewables (parking deck and potentially some ground mount PV), this could potentially produce a surplus for the County.
- Perform a feasibility study for creating a microgrid for the airport (see a description and analysis of microgrids at initiative # 3 under the topic 'Residential and Commercial Renewable Energy and Storage').
- Provide rapid EV charging stations, and an EV priority area for taxi, car share, and shuttle van services. Increase shuttle and bus services regionally.
- Display information on low-carbon tourism and transit alternatives for travelers.
- Institute a 'no idling policy' for pick-up.

Another option worth consideration is for the local governments to require an assessment for all travel to compare the energy consumed associated with each potential travel option, to choose the least emitting option, and then to offset the energy consumption of the chosen method of travel (including flights). Although changing the aviation industry seems infeasible, there are still many things that can be done to prepare for a transition to more sustainable travel including implementing actions that are currently feasible and readily available. This approach can be applied to the industry sector as well, since the industry and aviation sectors will need to be addressed in order to achieve the goal of 100% RE in Buncombe County by 2042.

APPENDIX D: Initiative and Policy Analysis Criteria and Definitions⁷⁶

Evaluation Criteria (Phase 1)

Potential initiatives were analyzed and rated in several different ways in attempts to gain a more in-depth understanding of each action. The first set of analyses evaluated feasibility, scale of impact, equity impacts, and cost vs. benefits. Each initiative is rated qualitatively for favorability from Low to High in several criteria:

- **Potential Feasibility (Low to High).** The potential feasibility of each strategy was ranked for favorability from low to high and is intended to show how achievable the strategy is based on staff capacity (GBA, City and County primarily), community partners, utility (Duke Energy) alignment, policy barriers and political will, and technical barriers. A ‘High’ ranking in feasibility indicates that there are few barriers to implementation (i.e., there are low costs, it is technologically possible, and there is limited or no political opposition), while low feasibility means that it will be difficult to implement the strategy due to one or more barriers.
- **Potential Scale of Impact (Low to High).** The potential scale of impact that a strategy is expected to have on the County-wide 100% renewable energy goals was assessed for favorability on a scale of Low to High with a ‘Low’ ranking meaning the impact was minimal on the overall goal, and ‘High’ meaning that there was a substantial impact on the renewable energy goal.
- **Potential Equity Impacts (Low to High).** ‘Equity is “the state of being just, impartial, and fair.” Buncombe County’s Racial Equity Plan envisions operationalizing “systems, policies, and practices that support equity for all people and an organizational culture that embraces diversity and inclusion.” The potential equity impacts of each strategy were ranked for favorability from Low to High and refer to the benefits and harms associated with the strategy. This includes the equity impacts of renewable energy availability, cost savings, local public health, and workforce development. For example, community shared solar would have a ‘High’ equity impact as it improves access to renewable energy cost benefits to citizens who may not otherwise be able to install their own solar PV systems (i.e., renters; LMI community members).

⁷⁶ CADMUS. (2019, July 31). *Moving to 100 Percent: Renewable Energy Transition Pathways Analysis for Buncombe County and the City of Asheville*. Retrieved from <https://www.buncombecounty.org/common/sustainability-office/documents/renewable-energy-draft-report.pdf>

- **Cost Vs. Benefit.** This area of analysis encompasses several associated costs and benefits, grouping together Potential Financial Impacts, Potential Environmental Impacts, and Potential Local Impacts. A ranking of ‘High’ favorability signifies the overall benefits of financial impacts (relatively limited upfront or ongoing cost associated with it (or produces savings), environmental impacts (overall benefits to the environment), and local impacts (generates local benefits within the county). See below for further details and explanations for the ratings of ‘Cost Vs. Benefit.’

- **Potential Financial Impact (Low to High).** The potential financial impact and/or benefits that a strategy is expected to have on utility customers and local governments in terms of cost to implement was rated for favorability from low to high, with a ranking of ‘High’ favorability meaning that the strategy has a limited upfront or ongoing cost associated with it (or produces savings), and a ranking of ‘Low’ favorability meaning that the strategy has significant upfront or ongoing costs.
- **Potential Environmental Impacts (Low to High).** The environmental impacts of each strategy were ranked for favorability from Low to High and refer to the environmental benefits and harms associated with the strategy. This includes impacts on resiliency, land use, CO2 and air quality emissions and conservation. A High ranking indicates that the strategy should cause overall benefits to the environment and a Low ranking indicates that the overall impact to the environment will be negative.
- **Potential Local Impacts (Low to High).** The potential local impacts of each strategy illustrate whether the scenario will have a positive local impact (such as local renewable energy generation within City/County limits) and the ability of the strategy to improve the County and City’s role as a leader. A High rating means that the scenario occurs within the County (or possibly neighboring counties) and generates local benefits, and a Low rating means that the scenario does not occur locally or has limited local impacts (i.e., RECs).

Further Analysis (Phase 2)

The Second phase of analysis for each initiative assessed what types of actions and resources each would need. These were categorized and assessed as follows:

Timeline of Strategy (Near-Term, Medium-Term, Long-Term, Ongoing): This gauges whether an initiative would be coming to fruition, occurring, and providing benefits in the ‘Near-Term (within 1-5 years), Medium-Term (within 5-10 years), Long-Term (10-20 years), or ongoing throughout the entirety of the timeline (now until 2042+).

Implementing Departments and Partnering Organizations: Who are the departments and organizations that will be responsible for organization and implementation of the initiative (i.e., County, City, Nonprofit, etc.)? Who are the departments and organizations that might help support the development and/or implementation of the initiative?

Activities to be undertaken to support the initiative: What are the main actions required to develop this initiative? What are the actions that are required to implement the initiative? What actions should be considered to overcome any existing barriers or obstacles? Can this happen now or in the future?

Financial Costs and Benefits to the Organizations: What types of costs might the initiative incur (i.e., staff time, program costs, lease payments)? What types of financial gains might the initiative produce (i.e., money saved, tax credits, etc.)?

Additional Resources and Support Needed: What other resources are needed for the success of the program (initial capital, ongoing program management, initial program set up expertise, etc.)?

APPENDIX E: Funding

To make the transition to 100% renewable energy, significant financial resources will be needed to support the movement from fossil fuels to renewables. Funding will need to come from market investments, philanthropy, federal, state, and local governments, businesses, homeowners, car buyers, and utility companies. Fortunately, many of these sectors and the people in them are aligned in values with the clean energy economy. Now it is time for all to channel funding into energy efficiency, renewable energy, electrification, storage, and EV transportation. Fundamental assumptions regarding financial support for the clean energy transition include:

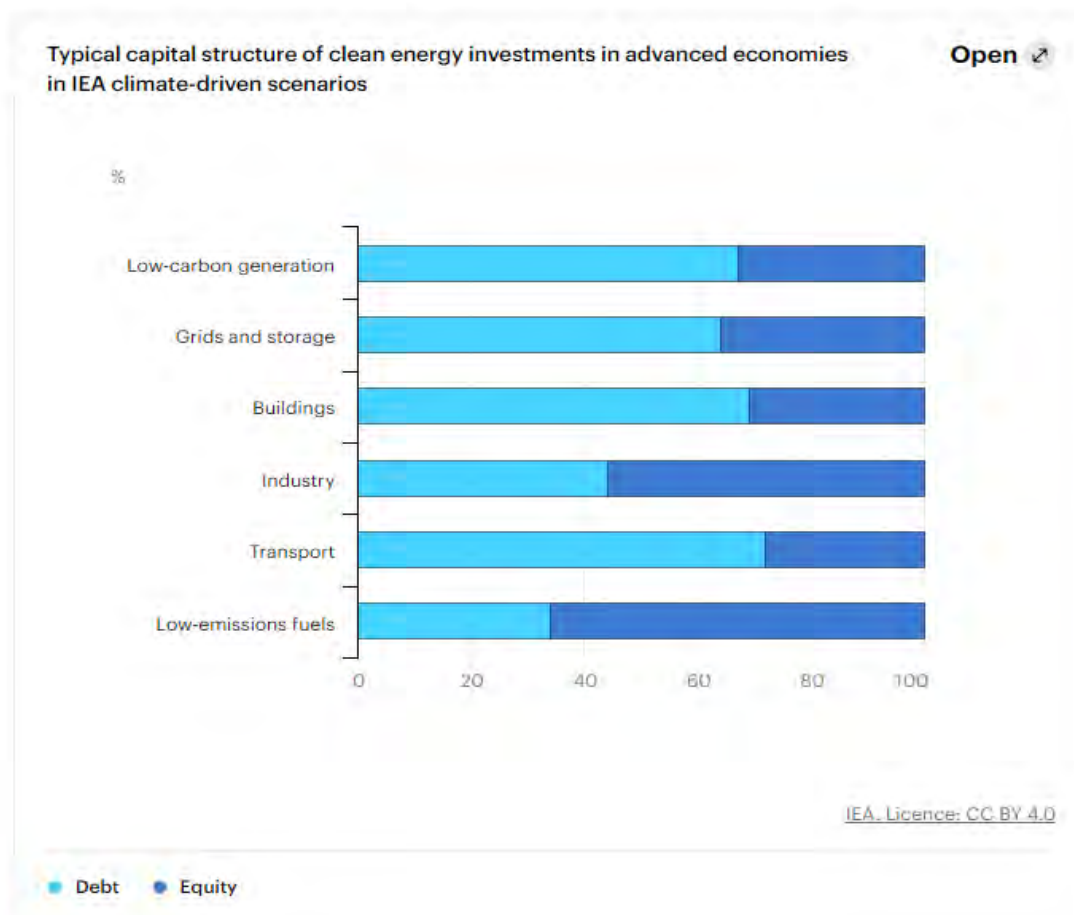
- Consistent long-term investment in clean energy requires stable policies and political support to enable financing efforts to take shape and be implemented. Banks and financing efforts will view instability or constant tweaks to policies (like net metering) as risk and this will, in turn, reduce the likelihood for financing to be implemented.
- Effective education for all stakeholders is critical to setting and achieving investment goals. Business owners and policymakers must understand the difference between energy rates (commodity pricing) and energy costs (financial, societal, and environmental). Education about the effectiveness of financial programs to manage energy costs must be embraced to ensure that political stability can develop and progress.
- Public funds, where available, should maximize and leverage private capital financing.
- Existing efforts and authority should be enhanced or coordinated to expand investment in clean energy in lieu of creating new structures. This focus will tap into existing expertise, minimize duplicative efforts, and streamline development of such programs.
- Innovation and pilot programs should be recognized and supported to maintain advanced progress in investment mechanisms and technologies.
- Knowledge and awareness of success and impact of expanded investment is critical to maintaining political stability.
- Consistent and long-term policy support and political stability for the clean energy transition (as described previously) will result in market transformation and acceptance. This transition will reduce the need for public funding to support investment in clean energy. Stability ensures a track-record of success, requires limited political intervention, and provides time for financing efforts to take root.

Different energy sectors have different capital structures, making them more sensitive to variation in the cost of either debt or equity. Power investments typically rely on high levels of debt, which reflects the fixed element in cost and revenue structures, especially for renewables and grid infrastructure. Some end-use sectors rely on debt financing, such as efficiency in commercial buildings, residences financed with green mortgages and electric vehicles purchased with car loans. Together, these investments can be served by a robust yet flexible central

financing effort. The broad recommendations here provide a framework for what this effort can look like and what considerations, opportunities and concerns are present. The framework provided is an initial evaluation and starting point for understanding and developing more specific recommendations and implementation strategies.

Investment amounts are not entirely debt based. Equity investment will continue to play a dominant role in financing smaller transactions in cases where credit is constrained (e.g., consumers and small businesses). Equity and innovative models will also be needed to support technologies with higher risks (e.g., low-emissions fuels). The share of debt to finance the investments was reported in a recent IEA climate-driven scenarios report and indicates that debt will rise over time, but that equity remains critical to kick-start investments in emerging or riskier segments. The following table shows the IEA conclusions of debt-to-equity shares in specific sectors and industries.

Figure 7 - APPENDIX E - IEA conclusions of debt-to-equity shares in specific sectors and industries



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⁷⁷ IEA. (2021, December 17). *The cost of capital in clean energy transitions – analysis*. IEA. <https://www.iea.org/articles/the-cost-of-capital-in-clean-energy-transitions>

Local government

Structural Support

Structural financial support for local government support of plans and programs is the first, most critical, and cost-effective investment. Funding should be stable and recurring in support of internal government staff as well as continuing the work of the Green Built Alliance to staff and implement the Blue Horizons Project. Continued and expanded support from Buncombe County and the City of Asheville are integral to this effort. With local government funding a baseline of support has been established to get this effort off the ground. With continued support a message is sent to businesses and residents that this is a priority for our community.

Recommendations:

- Following the first comprehensive draft of the 100% Renewable Energy Strategic Plan, the Blue Horizons Project Community Council (BHPCC) should develop a proposal to the County and City of the realistic and necessary financial support for implementation.
- Evaluating opportunities to leverage long-term public support with foundation or grant sources should be an initial goal.
- Long-range funding efforts should be evaluated as Blue Horizons Project (BHP) becomes an active partner in the financing efforts and products that arise from implementation (such as fee for service technical assistance, contracting support, etc.).

Program Support

We need direct programmatic support for financing clean energy and electrification. Clean energy investment finance from public sources is generally comprised of state and federal programs. The need for local government action is now more critical than ever. Federal support for clean energy is becoming more state-focused and the opportunity to leverage federal efforts with local government efforts reflects our role as the more appropriate vehicle for public policy efforts related to clean energy. Local governments can enact policy and programs quicker and with less political challenges. Local governments are closer to the industries, businesses, and residents within the region. At the local level, governments are more aware of regional economic development opportunities associated with clean energy investment and financing.

Asheville and Buncombe's current investment efforts in clean energy are characterized primarily by project-specific funding and limited involvement in leveraged financing with private capital. The State's primary focus is on providing prescriptive rebate programs, whether through utilities or state managed programs. These programs limit innovation (through their prescriptive nature) but can enhance investment from private sources by reducing costs for projects. The

focus of the federal government has dramatically changed with the adoption of the Inflation Reduction Act (IRA). These changes will transform the structure and opportunity for almost all financing efforts for clean energy. A focus on financing structures that leverage limited public funds with private capital will provide a greater impact for clean energy. This focus is central to the IRA funding goals. North Carolina provides broad authority to local governments (both counties and cities) to participate in funding for “financing energy improvements”:

- **§ 160D-1320. Program to finance energy improvements.**
- (a) Purpose. - The General Assembly finds it is in the best interest of the citizens of North Carolina to promote and encourage renewable energy and energy efficiency within the State in order to conserve energy, promote economic competitiveness, and expand employment in the State. The General Assembly also finds that a local government has an integral role in furthering this purpose by promoting and encouraging renewable energy and energy efficiency within the local government's territorial jurisdiction. In furtherance of this purpose, a local government may establish a program to finance the purchase and installation of distributed generation renewable energy sources or energy efficiency improvements that are permanently affixed to residential, commercial, or other real property.
- (b) Financing Assistance. - A local government may establish a revolving loan fund and a loan loss reserve fund for the purpose of financing or assisting in the financing of the purchase and installation of distributed generation renewable energy sources or energy efficiency improvements that are permanently fixed to residential, commercial, or other real property. A local government may establish other local government energy efficiency and distributed generation renewable energy source finance programs funded through federal grants. A local government may use State and federal grants and loans and its general revenue for this financing. The annual interest rate charged for the use of funds from the revolving fund may not exceed eight percent (8%) per annum, excluding other fees for loan application review and origination. The term of any loan originated under this section may not be greater than 20 years.
- (c) Definition. - As used in this Article, "renewable energy source" has the same meaning as "renewable energy resource" in G.S. 62-133.8. (2019-111, s. 2.4; 2020-3, s. 4.33(a); 2020-25, s. 51(a), (b), (d).)⁷⁸

⁷⁸ North Carolina General Assembly. (n.d.). https://www.ncleg.gov/EnactedLegislation/Statutes/HTML/BySection/Chapter_160D/GS_160D-1320.html

Opportunities described in the provisions of GS 160D-1320 abound.⁷⁹ Embracing the authority in this statute can transform Buncombe County and Asheville from passive support into an active financing participant. If the County and City develop their own financing efforts to leverage other opportunities, through direct financing or credit enhancements, the initiative will leverage limited public capital to reduce risk on investments and attract private capital. This approach has been the focus of research and enthusiasm among policy makers and industry leaders. Available research on programs (like green banks and clean energy finance authorities) suggest that based on existing programs in the US, initial capitalization for direct financing can leverage significant private investment.⁸⁰ The example of the Connecticut Green Bank is provided in their most recent annual report summarizing their 10-year effort on clean energy deployment:

“By investing \$322.4 million of Green Bank funds, we have helped attract \$1,945.6 million of private investment in clean energy for a total investment of nearly \$2.3 billion in Connecticut’s green economy. In addition, \$113.6 million in estimated tax revenues have been generated from this investment. This is supporting the deployment of 509.8 MW of clean renewable energy, saving an estimated of 65.6 million MMBtu of energy, producing 21.3 MWh of clean energy, and avoiding an estimated 10.4 million tons of CO₂ emissions over the life of the projects, while creating over 26,000 job-years, and improving public health benefits by \$317.1 to \$717.2 million as a result of cleaner air.”⁸¹

The benefits of these authorities include diverse programs, diverse sector support, the ability to focus on both technology push as well as market pull support. When governments adopt these efforts, the focus moves from government and ratepayer funded rebates to leveraging private capital. This transition and the government’s presence will help alleviate the political instability currently plaguing the expansion of clean energy financing. Providing government support for entities fulfilling the administrative role of these authorities will avoid having to expend the resources needed to initiate and support internally. Such efforts function more effectively at the regional or state level. Having local government support ensures rapid and efficient deployment of capital to the jurisdiction.

The concept of attracting private capital is well known but not well implemented. Successful implementation will require us to explore and develop private funding options and

⁷⁹ North Carolina General Assembly. (n.d.). https://www.ncleg.gov/EnactedLegislation/Statutes/HTML/BySection/Chapter_160D/GS_160D-1320.html

⁸⁰ Belden, A., Clemmer, S., & Wright, K. (2015, July). Financing clean energy: A power tool for driving investment in new ... <https://www.ucsusa.org/sites/default/files/attach/2016/12/new-hampshire-clean-energy-finance.pdf>

⁸¹ Annual Comprehensive Financial Report of Connecticut Green Bank. (2022, June 30). <https://www.ctgreenbank.com/wp-content/uploads/2022/07/Connecticut-Green-Bank-FY22-ACFR-FINAL-2022.10.21.pdf>

partnerships with responsive programs, whether direct support or credit enhancements. Beyond the initial rollout, efforts can include loan portfolio sales and asset-backed securitization. Private funding supplementation is necessary to achieve a 100% renewable energy goal and all cost-effective energy efficiency. Success requires market growth, as well as stability and benefits from standardization of products, processes, and the availability of accurate risk and performance data, all of which can be implemented through regional partners.

Opportunities:

- NC already receives and expends millions of dollars related to clean energy investment. More is on the horizon. North Carolina is home to its own “green bank,” the [North Carolina Energy Fund](#).⁸²
- The North Carolina Clean Energy Fund is a not-for-profit financial institution that utilizes its capital to catalyze investments in clean energy, energy efficiency, and green projects. The mission is to accelerate investment in clean and efficient energy solutions and increase climate resilience in North Carolina, particularly to the benefit of underserved populations. The Fund partners with public and private investors, foundations, and other non-profit organizations to deploy sustainable financing solutions that will create long-lasting environmental, economic, and social benefits.
- There is recognition by the utilities, the government, and the industry that private capital is a critical part of meaningful clean energy investment.
- There are growing examples of successful efforts to leverage private capital in [Connecticut](#),⁸³ [New York](#),⁸⁴ recent efforts in [Pennsylvania](#)⁸⁵ and [Rhode Island](#).⁸⁶
- There are existing models used by utilities and government “authorities” that prove the success of financing in the clean energy sector.
- National efforts include the [Coalition for Green Capital](#).⁸⁷ Made up of a number of [state efforts](#)⁸⁸ (beyond the ones listed above), the Coalition is striving to institutionalize a national green bank.
- Existing authority exists to expand financing programs into a more focused clean energy finance effort working with extant and developing partners.

⁸² North Carolina Clean Energy Fund. (2023, March). <https://www.nccleanenergyfund.com/>

⁸³ *CT Green Bank: Accelerating green energy adoption in CT - make your home, business, city or town more energy efficient with affordable financing from Connecticut Green Bank. join us in helping Connecticut Spark a green energy movement and learn how you can start saving now.* CT Green Bank | Accelerating Green Energy Adoption in CT - Make your home, business, city or town more energy efficient with affordable financing from Connecticut Green Bank. Join us in helping Connecticut spark a green energy movement and learn how you can start saving now. (n.d.). <https://www.ctgreenbank.com/>

⁸⁴ *NY Green Bank.* NYSERDA. (n.d.). <https://greenbank.ny.gov/>

⁸⁵ Post, S. (2020, October 21). *State treasurer Torsella establishes Keystone Green Bank Partnership to support Clean Energy Project.* hcs2. <https://www.heartlandnetwork.org/single-post/state-treasurer-torsella-establishes-keystone-green-bank-partnership-to-support-clean-energy-project>

⁸⁶ Rhode Island Infrastructure Bank. (n.d.). <https://www.riib.org/>

⁸⁷ Holly. (2023, May 1). *Home.* Coalition for Green Capital. <https://coalitionforgreencapital.com/>

⁸⁸ Rodriguez, A. (2023, May 15). *American Green Bank Consortium.* Coalition for Green Capital. <https://coalitionforgreencapital.com/american-green-bank-consortium/>

- The transition from government incentives to public-private leveraged financing can promote political stability.
- There are several stakeholders that can align to support this effort and may be a bridge for bringing parties together that have at times been at odds. These parties include (but are not limited to): financial institutions (particularly CDFIs), NC Clean Energy Finance, regional business owners, Duke Energy Progress, industry and service providers, and others.

Community Development Finance Institutions (CDFIs) are particularly well suited to participation in the clean energy transition. With a community focus, mission orientation, and increased support from federal and institutional funders, the CDFI can provide a wider range of products to support focused smaller projects. As of 2021, the Department of Treasury showed 23 certified CDFIs in NC, many of which seek to support clean energy and targeted population-based lending (such as low- or moderate-income (LMI) and Native populations):

Figure 8 - APPENDIX E - Certified CDFIs in NC

Community Development Financial Institutions Fund									
List of Certified Community Development Financial Institution (CDFIs) with Contact Information as of April 14, 2021									
Total Number of Certified CDFIs as of April 14, 2021: 1264									
Total Number of Certified Native CDFIs as of April 14, 2021: 70									
Organization Name	Financial Institution Type	Native CDFI (Y/N)	City	State	Zipcode	Address1	Address2	Organization Website	
Business Expansion Funding Corporation	Loan Fund	N	Charlotte	NC	28210	5970 Fairview Rd. Suite 218		https://www.befcor.com/	
CAHEC Capital Inc	Loan Fund	N	Raleigh	NC	27615-330	7700 Falls of Neuse Rd Ste 200		http://www.cahec.com	
Cares Project, Inc., The	Loan Fund	N	Winston Salem	NC	27103	3410 Healy Drive, Suite 209		thecaresproject.org	
Carolina Community Impact, Inc.	Loan Fund	N	Raleigh	NC	27622	P.O. Box 30662		Non given	
Carolina Small Business Development Fund (The Support Center)	Loan Fund	N	Raleigh	NC	27604-103	3128 Highwoods Blvd Suite 170		www.carolinasmallbusiness.org	
CMHP Mortgage, Inc.	Loan Fund	N	Charlotte	NC	28217-192	4601 Charlotte Park Drive Suite		hccharlotte.com	
Greater Kinston Credit Union	Credit Union	N	Kinston	NC	28501-394	901 N. Queen St.		www.greaterkcu.org	
Latino Community Credit Union	Credit Union	N	Durham	NC	27702-536	P.O. Box 25360		www.latinoccu.org	
Local Government Federal Credit Union	Credit Union	N	Raleigh	NC	27603-136	323 West Jones Street Suite 600		http://www.lgfcu.org	
M&F Bancorp, Inc	Depository Institution Holding Company	N	Durham	NC	27707-280	2634 Durham-Chapel Hill Blvd		www.mfbonline.com	
Marine Federal Credit Union (BNC)	Credit Union	N	Jacksonville	NC	28546-674	4180 Western Blvd		www.marinefederalhb.org	
Mechanics and Farmers Bank	Bank or Thrift	N	Durham	NC	27707-280	2634 Durham Chapel Hill Blvd		http://www.mfbonline.com	
Mountain BizCapital, Inc. d/b/a Mountain BizWorks	Loan Fund	N	Asheville	NC	28801-279	153 South Lexington Avenue		www.mountainbizworks.org	
Mountain Housing Opportunities Loan Fund	Loan Fund	N	Asheville	NC	28801-332	64 Clingman Avenue, Suite 101		http://www.mthousing.org	
North Carolina Comm. Dev. Initiative Capital, Inc.	Loan Fund	N	Durham	NC	27701	P.O. Box 1331		www.theinstitutenc.org	
Nova Credit Union	Credit Union	N	Charlotte	NC	28208	3601 Mulberry Church Road		Non given	
Piedmont Business Capital	Loan Fund	N	Greensboro	NC	27406-220	1451 S. Elm-Eugene Street		www.piedmontbusinesscapital.org	
Premier Federal Credit Union	Credit Union	N	Greensboro	NC	27415-693	PO Box 26590 1400 Yanceyville		http://www.premierfcu.org	
Self-Help Credit Union	Credit Union	N	Durham	NC	27702-361	PO Box 3619		www.self-help.org	
Self-Help Federal Credit Union	Credit Union	N	Durham	NC	27701-322	301 W. Main St.		http://www.self-helpfcu.org	
Self-Help Ventures Fund	Loan Fund	N	Durham	NC	27702-361	P.O. Box 3619		www.self-help.org	
Sequoyah Fund Inc., The	Loan Fund	Y	Cherokee	NC	28719-120	PO Box 1200		http://www.sequoyahfund.org	
Thread Capital	Loan Fund	N	Raleigh	NC	27610-291	4021 Cary Drive		www.threadcap.org	

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⁸⁹ CDFI Program Award Book - Community Development Financial Institutions Fund. (2021, April 14). https://www.cdfifund.gov/sites/cdfi/files/2021-12/Final%202021%20CDFI%20Award%20Book_v2.pdf

Utility Funding

Efficiency Programs

Duke Energy provides funding for energy efficiency programs. The company has also made investments in local photovoltaics (PV) and storage. Duke is committed to funding their "greening the grid" efforts as part of the NC Carbon Plan process. This funding will come from a combination of shareholder and financial institution funds. Increased focus on efficiency and electrification investments can be expanded to enhance the transition and benefit the utility, rate payers, and the transition:

- Opportunities
 - Economic savings from energy efficiency accrue over the lifespan of the efficiency upgrade and are often the first and most cost-effective clean energy effort.
 - The opportunity for effective partnerships exists with respect to expertise in technology and finance with the utilities and the professional clean energy sector.
 - Expanded funding can provide a wider range of prescriptive as well as innovative measures if balanced right for both technology push as well as market pull objectives.
 - Efficiency is, in many cases, the least cost energy resource when compared to costs for most sources of generation. The ACEEE has researched this concept in depth for decades.⁹⁰
- Concerns
 - Despite the wealth of knowledge regarding the economic, social, and environmental benefits of energy efficiency, utility-based financing remains subject to political instability.
 - Utility financing programs are finite and funds for previous efficiency programs can experience a cycle of funding and depletion.

⁹⁰ Cohn, C. (2021, June 23). *Analysis: Saving energy costs less than building new power plants*. ACEEE. <https://www.aceee.org/blog-post/2021/06/utilities-plan-new-power-plants-analysis-shows-saving-energy-low-cost-alternative#:~:text=Source%20data%3A%20ACEEE%20Utility%20Scorecard,to%20meet%20its%20resource%20needs>.

- Current, residential-specific rebates, utility programs do not generally do enough to leverage private financing of energy efficiency due to their low cost and coverage.⁹¹
- Business-specific rebates realize 80% up front coverage but are limited to lighting, refrigeration, and HVAC and do not include wider retrofits.⁹²
- Considerations for Success:
 - Evaluating the success and awareness of existing programs can determine what role these programs can play in the transition. Routine evaluation is necessary to match innovation in technology and changes in the financing landscape.
 - Efforts to expand private financing should focus on leveraging utility programs and should be aligned with a wider effort to unify state-funded efforts that intend to leverage private capital.
 - Utility programs and results should be effectively messaged to businesses and the business associations to promote these programs as effective methods to manage energy costs.
 - Utility sponsored “Pay as you Save” efforts should be expanded as part of financing options to stimulate investment and energy savings.
 - Goals for utility programs should include non-energy benefits as a part of the program.

Foundations

Foundations will be an important, although relatively small, part of the overall funding effort. Grants can be used to focus on funding pilot programs and proof of concept efforts. Program implementation support and initial rollout of these pilots can be achieved through the Green Built Alliance (GBA) and other non-profits who invest directly in energy efficiency (EE) and renewable energy (RE) programs for their facilities and constituents. Foundation funding can be leveraged for developing and supporting pilot programs. Pilot programs should be used to create examples and proof of concept for financing that face resistance due to novel technology, lack of institutional knowledge, complexity of overlapping incentives, and/or the rapid innovation in technology and financing products available in the field. An example of this is understanding the value stack and revenue models for battery storage systems that are stand-alone or paired renewable energy systems.

Foundation support requires resources to secure funding (oftentimes through competitive solicitations), complete reporting requirements and provide administrative support for funds and

⁹¹ *Smart Saver - home improvement rebates*. Duke Energy. (n.d.-b). <https://www.duke-energy.com/home/products/smart-saver>

⁹² *Small business energy saver - business*. Duke Energy. (n.d.-a). <https://www.duke-energy.com/business/products/small-business-energy-saver>

programs that are financed by these funds. The need for this support points to the need for a stable entity (maybe BHP/GBA) to ensure future implementation.

Federal Government

The Inflation Reduction Act (IRA)

The Bipartisan Infrastructure Law and the Inflation Reduction Act both provide funding for program support and tax incentives for installed equipment such as PV, Electric Vehicle (EV) charging stations, EVs, heat pumps, heat pump water heaters, etc. Promoting this funding to residents and businesses is essential to make sure our community receives the greatest allocation possible of these resources. The broad recommendations here provide a basic framework for action that financing efforts can leverage targeted components of the transition. The use of federal public funds to support the transition is as high as they have ever been. Tax incentives for clean energy have increased and become stable. Expanded support for technologies like storage, heat pumps and EVs and associated infrastructure form the basis for the multi-sectoral transition. Properly leveraged and ready for early implementation.

- The EPA maintains a comprehensive list of provisions of the IRA that are targeted to specific technologies and sectors.⁹³ The following summarizes those provisions: Tax Credits benefit infrastructure deployment by lowering the overall cost of the installation and attracting investors to larger packages to leverage these credits:
 - Renewable Energy (48/48E)
 - Investment Tax Credit. Stackable credit with domestic content (tracts in Buncombe County), certified LMI beneficiaries (+10/20%)
 - Additional requirements apply for systems over 1MW in capacity that begin construction after Jan 28, 2023.
 - Direct pay options for tax-exempt organizations. This option is competitive and capacity limited.
 - This credit applies generally to many renewable energy and energy storage systems.
 - Becomes technology neutral in 2025, meaning the credit will not prioritize certain types of renewable technologies.

⁹³ Environmental Protection Agency. (n.d.). EPA. <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#:~:text=Most%20provisions%20of%20the%20Inflation,%2C%20local%2C%20and%20tribal%20organizations.>

- Residential Rebates – these programs lower the cost for target efforts and can be blended with financing efforts described in Appendix E:
 - Energy Efficient Home Improvement Credit:
 - Credit at 30% of costs
 - Annual credit limited to \$1200 for most qualified improvements (audits, envelope, insulation, equipment)
 - Separate annual credit of \$2000 for electric or natural gas heat pump water heaters, electric or natural gas heat pumps, and biomass stoves and biomass boilers.
 - Only applies to existing homes or additions
 - Some limits on secondary homes — no credit for rentals unless improvements are made by the renter
 - Cannot carry forward, credit is annualized
 - Nonrefundable
 - Residential Clean Energy Property Credit:
 - Credit at 30% of the cost
 - Credit carries forward
 - Applies to solar (electric and thermal), geothermal, energy storage (3kw+)
 - Applies to new and existing homes
 - Not available to owners of rental units (except tenants can claim)
 - Nonrefundable
 - The Home Energy Performance-Based, Whole-House Rebates (HOMES) program provides \$4.3 billion in rebates for home energy-saving retrofits — with up to \$4,000 available for most homeowners and up to \$8,000 available for households earning less than 80% of the area median income
 - The High-Efficiency Electric Home Rebate Program provides \$4.5 billion for grants to states and Tribes to administer rebate programs for electric home appliances for low- and middle-income recipients (they must earn less than 150% the area median income). The program provides up to \$14,000 per household, including:
 - \$8,000 for heat pumps,
 - \$1,750 for heat pump water heaters
 - \$840 for electric stoves and improvements to electrical wiring

- Programmatic funding for:
 - HUD funding to support energy and water efficiency in Section 8, 2236, and 202 programs
 - DOE support for grants to help states adopt updated energy codes beyond IECC standards
 - Energy contractor training programs
 - Clean energy technologies in low-income and disadvantaged communities

The Greenhouse Gas Reduction Fund is a competitive program, described by the EPA: “This first-of-its-kind program will provide competitive grants to mobilize financing and leverage private capital for clean energy and climate projects that reduce greenhouse gas emissions with an emphasis on projects that benefit low-income and disadvantaged communities, furthering the Biden-Harris Administration’s commitment to environmental justice.”⁹⁴

Financial Institutions and the Green Bank

Loans for residential, commercial, and industrial energy efficiency and renewable energy projects will help grow adoption of these technologies. Standard debt financing takes many forms and is well-beyond the scope of this paper. Traditional lending structures seek to minimize risk or price that risk in the cost of capital. The key components of understanding challenges with conventional debt financing and its role in clean energy investments are as follows:

- Lack of technical knowledge and familiarity with clean energy projects and technologies result in perceptions of risk and concerns related to performance.
- Long-term financing for businesses and homeowners is limited by credit risk, debt to income levels and other financial considerations.
- Most projects at the residential and small commercial scale are below typical loan amounts.
- Underwriting and due diligence processes can result in high transaction costs for smaller clean energy projects.

Institutional debt financing is an important part of the investing equation. In NC, debt financing has primarily been the responsibility of project proponents. The shift toward programs that incorporate debt financing can assist in the leveraging of private capital through public funds, which is a theme discussed above within the existing programs as well as part of additional

⁹⁴ Environmental Protection Agency. (2023, April 19). EPA. <https://www.epa.gov/newsreleases/epa-releases-framework-implementation-greenhouse-gas-reduction-fund-part-president>

policy considerations. Lender concerns about long-term loans for small businesses should be addressed in long-range planning for increased investment and credit enhancements.

Increased education about the value of energy and non-energy benefits of investment should be developed for financiers, end-users (businesses and residents of NC) and policy makers in order to protect from instability over public funding that can be used to leverage private capital.

Private and Venture Capital

In the 10-20 years the greatest transition of wealth in US history will occur as middle- and upper-class individuals pass their inheritance onto their families and the causes they care about.⁹⁵ Motivating private donors and venture capital to invest in energy faces headwinds. Venture capital (VC) funding is private investment in startup companies and smaller businesses where the investor sees opportunity for high returns. These investments are usually characterized by higher risk in the hopes of higher returns. Companies seeking VC funds usually have limited profits, are pre-market and may not have an extensive history in their operations. These characteristics make traditional capital markets difficult to access. Investors are usually high wealth individuals or VC funds.

In recent years, the flow of private and VC funds into the cleantech and clean energy sectors has gyrated significantly. In 2008 total VC investments reached 5 billion. By 2014, this investment had dropped to 2 billion, where it remains today. [A 2016 MIT study](#) found that while new companies in the segment can produce safe investments, the chances of the traditional tech type of returns are significantly lower.⁹⁶ It is important for the clean energy sector to recognize this and for policy makers to respond accordingly.

Tailoring policy and new finance vehicles to the industry requires more support from patient investors to match the services and products in the industry that is ripe for growth and innovation. Public policy considerations should be made without an eye toward providing donors and VC funding due to the apparent lower returns in clean energy.

⁹⁵ Cerulli: *Press release: Cerulli anticipates \$84 trillion in wealth...* Cerulli Associates. (2022, January 20). <https://www.cerulli.com/press-releases/cerulli-anticipates-84-trillion-in-wealth-transfers-through-2045>

⁹⁶ Gaddy, B., Sivaram, V., & O'Sullivan, F. (2016, July). *The wrong model for clean energy innovation*. https://energy.mit.edu/wp-content/uploads/2016/07/MITEI-WP-2016-06.pdf?trk=article-ssr-frontend-pulse_x-social-details_comments-action_comment-text

APPENDIX F: Current BHP Programs Impact Report for Fiscal Year 2023

Green Built Alliance (GBA) staff, as implementers of the Blue Horizons Project (BHP), conducted the following inventory and evaluation process to provide insight to the BHP Community Council as well as the City and the County to improve programming for future years.

This summary includes cumulative data on GBA's work on the BHP since 2017, as well as fiscal year-to-date (i.e., July 1, 2022 - March 30, 2023) information.

Each program listed below has received funding from the City of Asheville and Buncombe County. Most programs have also received additional funding from other sources such as foundations and private donations.

While it is difficult to compare programs since they have unique offerings and goals, we have done our best to show how resources are spent and the energy savings achieved, community engagement activities, and forward progress towards Buncombe County's community goal of 100% renewable energy by 2042.

When tackling a multi-billion-dollar challenge like reaching 100% renewable energy by 2042 for the whole county, we realize there are limits to an effort with only a few hundred thousand dollars of resources. However, acknowledging that limitation, GBA has put multiple resources to use in order to help reach our goal, and be as equitable as possible.

BHP Program results

- Energy Savers Network (ESN) has produced approximately 2.1 gigawatt-hours (GWh) of savings in 943 households since 2017. There is some overlap in timeframes for our measurement and verification data as follows:

Calendar year savings based on Deemed savings for 2017-2019 and Vandemusser reports for 2020-2023:

- 2017: 249.53 MWh
- 2018: 501.54 MWh
- 2019: 496.6 MWh
- 2020: 264.36 MWh
- 2021: 323.65 MWh
- 2022: 247.3 MWh

Fiscal year savings based on Vandemusser Reports:

- July 1, 2020 - June 15, 2021: 255.49 MWh
- July 1, 2021 - Dec 31, 2021: 128.29 MWh

- July 1, 2021 - June 15, 2022: 226.43 MWh
- Jan 1, 2022 - Dec 31, 2022: 247.30 MWh
- Neighbor to Neighbor Solar installed 2 systems capable of 11,078 kWh annual production at the end of 2022. Since January 2023, N2N installed 5 systems capable of 24,117 kWh annual production. N2N funding comes from City and County ARPA (American Rescue Plan Act) funding and Buncombe County Office of Sustainability funding.
- ARPA funding is also allowing us to expand the programs and offer no cost heating repair and replacement equipment for income qualified clients. Eleven HVAC projects have been completed in the County; 5 projects are currently in the pipeline.
- Expanded outreach in person at festivals and fairs, as well as presentations to live and video conference groups have expanded dramatically in FY23 year, reaching 52 groups and 40,055 attendees to date. Of these attendees, we had 1,224 individual conversations on ways to save energy, improve sustainability and/or install renewable energy.
- Blue Horizons Project nears completion of the 100% Renewable Energy Strategic Plan, taking up the next steps where the Cadmus report left off. Collaborative authorship has been funded by other sources including Kendeda Foundation and GBA unrestricted donation funds from individuals, leveraging the BHP funding provided by the County and City.

BHP Community Council and Subcommittees

The BHPCC and its subcommittees meet virtually, with in-person meetings when needed to do work between meetings. The next in-person meeting is June 7. Anyone from the public may join the meetings by following the [details on the website](#).⁹⁷

There were three active subcommittees and task forces in this quarter, but only 2 remaining at the end of the quarter.

The Technology Subcommittee was discontinued. The BHPCC decided that assigning task forces to handle individual initiatives directly from the 100% Renewable Strategic Plan is a better use of time than a standing committee.

Community Engagement Committee ([meeting docs](#)) meets monthly. The committee is balanced between staff, BHPCC members, and other community members. Mica Crouse, communications expert, drafted a [Community Outreach Plan](#) that was reviewed by the committee and submitted for the Strategic Plan. This plan will guide staff and committee engagement for years to come. Committee members spent several weeks [calling community churches](#) to invite them to participate in either a presentation from staff or a weatherization blitz at their congregations.

⁹⁷ BHPCC subcommittees. Blue Horizons Project Community Council. (2023, March 2). <https://bluehorizonsproject.com/bhpcc-subcommittees/>

We received little response, and it was determined Creation Care Alliance and other faith-based environmental organizations have this sector covered.

The 100% Renewable Energy Committee ([meeting docs](#)) This subcommittee's work is funded by The Kendeda Fund and unrestricted funds from Green Built Alliance, leveraging the City and County support for our work. This group is writing a strategic plan for the community to get to 100% renewable by 2042. Discussion this quarter focused on finalizing the plan by finalizing the first full draft, and convening a BIPOC advisory committee to ensure the plan reflects as many voices as possible.

Previous Recommendations to GBA

GBA has been successful implementing these previous BHP Community Council Recommendations that were made 12 months ago:

- **Expand energy efficiency programs:**

Through our efforts with the Energy Efficiency Collaborative, GBA was able to begin participating in Tier 2 Duke Energy Progress Weatherization (DEPWX) incentives. These resources will help Energy Savers Network reach more homes and go deeper on energy efficiency work at each home, potentially including a new refrigerator, insulation, and additional air sealing.

- **Promote community engagement:**

Expanded outreach in person at festivals and fairs, as well as presentations to live and video conference groups have expanded dramatically this year, reaching 52 groups and 40,055 attendees to date. Of these attendees, we had 1,224 individual conversations.

- **Focus on equity:**

- In 2023, GBA hired J Hackett to conduct an equity review of the 100% Renewable Plan. He has also provided thought leadership ([equity task force report](#)) to change routines, habits and procedures on the BHP Community Council to improve equity outreach. Specifically, he recommends, and the BHP Community Council plans on adopting, a BIPOC Advisory Committee. This group will convene, in-person, in June to consider their input as part of a larger strategic process.
- In addition to implementing the suggestions he has provided; Energy Savers Network has expanded outreach to Spanish speaking families in the Latinx community.

- **Agrivoltaics exploration:**

- BHP Community Council members and supporters, on their own, have applied to DOE for Agrivoltaic exploration. This project is still under consideration by the DOE. Catalyzing these actions by others is a core part of BHP's objectives.

- **Green Built Home Certification:**

Existing program that provides “an MPG for homes” as suggested by the BHP Community Council Member last year. The HERS rating serves this function for new and existing homes. We certify approximately 120 Green Built Homes per year.

BHP Community Council Recommendations that have been **partially implemented** since the last report 12 months ago:

- **More intentional collaboration with Duke Energy** to increase people signed up for EnergyWise Home, Home Energy House Call and Renewable Energy Advantage
We do promote these programs, but there isn’t a clear connection from Duke to be able to amplify this effort.
- **Continue to investigate on-bill financing**
This item is advancing, but it is not available yet.
- Use mapping and **visualization to benchmark homes’ energy use** and share this data
Some mapping is occurring, but this item would best be led by Duke Energy, or other data aggregator that could help us.

Areas in Buncombe County and City of Asheville that need more attention to reach 100% renewable energy goals generally focus on access to energy resources by moderate income households. These recommendations from GBA include:

- Solarize-type crowdfunding programs for residential solar and energy efficient appliances.
- A lending program to help moderate-income households access energy resources.
- Additional tradespeople in the HVAC and electrician sectors to increase uptake of available financial incentives for homeowners.
- Outreach and visibility to increase participation by the citizens of the City and County in energy efficiency programs offered by Duke Energy Progress and new Inflation Reduction Act (IRA) funds.
- Dedicated funding for translation services for live translation in Spanish.

FY22 Funding for Specific Programs

The City and County each provide GBA with \$100,000 per fiscal year to provide baseline support for ESN and BHP. Green Built Alliance has greatly leveraged this support to win additional funds to support these programs. Benefits include wrap-around energy services for clients, home safety repairs and an iterative, collaborative planning process to reach 100% renewable energy goals equitability. Without City or County support these other opportunities may not have been available to support these programs. Overall, the City and County contribute about 60% of the resources to deliver this programming.

Summary of additional funding secured to support this project:

- \$500,000 - City and County ARPA funds to fund Neighbor to Neighbor Solar, HVAC repair and replacement and an apprenticeship program commencing 2022. These funds were awarded in 2022 and continue through 2026.
- \$100,000 - Dogwood Health Trust funds to provide no-cost home repairs to clients. Additional funding has been requested.
- \$35,000 - Helping Home Fund (Duke Energy Progress)
- \$84,000 - Kendeda Foundation to support writing a 100% renewable plan over 3 years
- \$10,000 - Bank of America for the heating repair and replacement
- \$10,000 - Anonymous individual donation

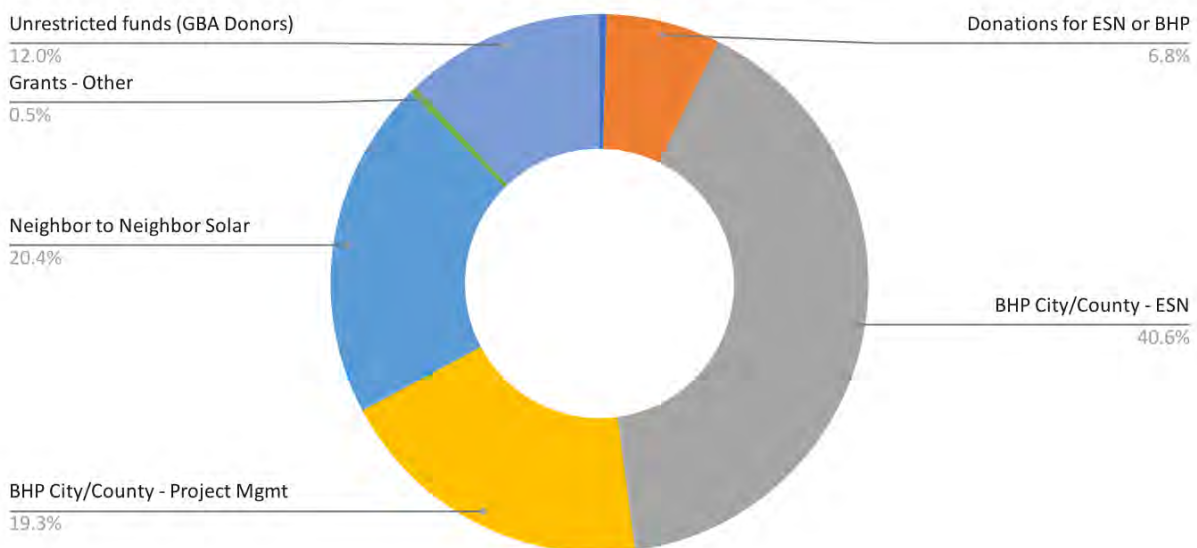
FY23 - Three quarters of accounting

What follows is an accounting of income and expenses fiscal year-to-date (July 1, 2022 to March 30, 2023) for each of these programs and tallied together from GBA’s accounting records. As the timing of funds and expenditures DO NOT always line up with this 3-quarter time frame, there is a lack of precision in some of this data. Staff added to funds acquired in previous quarters that have been held in restricted funds that were used during this 3-quarter time frame.

For example, The Dogwood Health Trust provided funds in 2021 that were spent down through 2023. As income happened before this time period, but expenses were still incurred, significantly more expenses are noted than income.

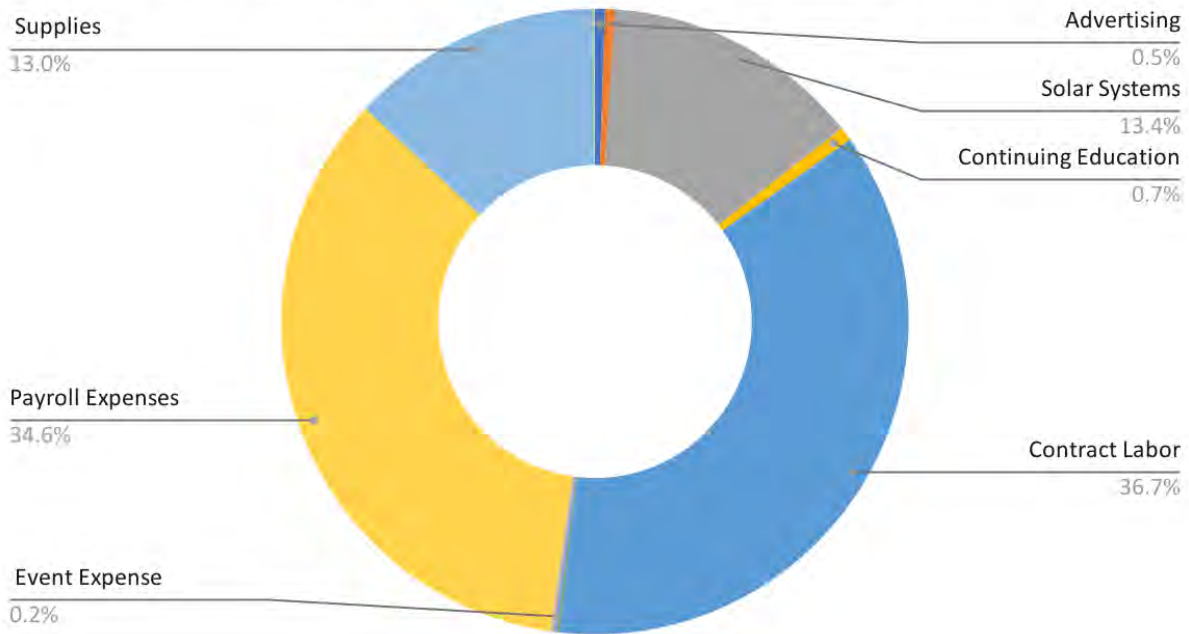
Please interpret accordingly.

Income - ESN and BHP From July 1, 2022 - March 30, 2023



	Total
Dogwood Health Trust [accessed from previous quarter]	\$150,000
BHP City/County - ESN	\$111,499
Neighbor to Neighbor Solar	\$56,000
BHP City/County - Project Mgmt	\$52,963
Receivables from BHP/ESN City/County Contract January - March 31, 2023	\$46,551
Unrestricted funds (GBA Donors)	\$32,897
Donations for ESN or BHP	\$18,791
Grants - Other	\$1,250
Sponsorship	\$1,200
Total Income	\$471,150

Expenses ESN and BHP from July 1, 2022 to March 30, 2023



Item	Amount
Contract Labor	\$172,451
Payroll Expenses	\$162,789
Solar Systems	\$62,935
Supplies	\$60,890
Continuing Education	\$3,312

Advertising	\$2,424
Automobile Expense	\$2,410
Event Expense	\$1,038
Mortgage and Utilities	\$425
Dues and Subscriptions	\$416
Meals and Meetings Expense	\$403
Travel, Lodging and Per Diem	\$370
Web Site	\$272
Total Expenses	\$471,150

Energy Savers Network

Energy Savers Network (ESN) provides free energy-efficiency upgrades for low-income households at 200% of the federal poverty level or below. We have a BPI-trained Project Manager working with our staff and trained volunteers to deliver energy-efficiency upgrades. We also make referrals for home repair and Neighbor to Neighbor Solar projects.

United Community Development has been a sub-contractor for weatherization projects. They have performed upgrades for 119 homes since 2020. This number is included in the 943 total households served.

Wrap-around services have been available this year to help serve this population with home repairs for safety and comfort via funding from Dogwood Health Trust, as well as HVAC repairs and replacement through County ARPA funds.

This fiscal year-to-date, the ESN team has recruited 223 clients, identifying new clients through word-of-mouth as well as local community partnerships with Eblen Charities, Manna Foodbank, Bounty and Soul, Mount Housing Opportunities, Habitat for Humanity, and Community Action Opportunities. Of those opportunities, ESN has weatherized 167 homes to date.

ESN is a very valuable offering to the community and has the potential for expansion with additional funding and staffing resources.

Energy Savers Network Recommendations

Founded in 2017, Energy Savers Network (ESN) is a cornerstone program of the overall Blue Horizons Project effort. It specifically works toward BHP Community Council equity goals to help those most affected by climate change reduce their energy costs, and carbon impact.

Weatherization Outputs

- Years of ESN program implementation 2017 - present
- Total spent/kwh saved is about \$0.52/kwh saved
- Cost per home is about \$850
- The market rate for the type of weatherization we do is \$800 - \$1,500 per home.
- Total homes served - 943
- Number of HACA apartments weatherized - 88
- Average gas, oil, and electric savings per homes - \$195 annually
- Average air leakage improvements per home since July 2022.
 - Total blower doors performed: 74
 - Lowest air leakage reduction: 6%
 - Highest air leakage reduction: 48%
 - Average air leakage reduction: 24%
- Weatherization workday volunteer (1262) and staff hour (1,346) = 2,608 total hours
- Amount of time spent in a home average- 3 hours for 2017-2019, 5.5 hours for 2020-present. Typically, there are three people per project, with a combination of staff and volunteers.
- Note: Savings Numbers are based upon VandeMusser FY21 and FY22 M&V reports.

ESN strives to reach all members of the community, but especially BIPOC members. Through our community partnerships and work in the Spanish-speaking community we can diversify our client base and reach as many audiences as possible.

- Demographics of clients July 1, 2022 -March 30, 2023
 - 31% White
 - 20% Black
 - 45% Latinx
 - 1% Asian
 - 1% Native
 - 1% Afghan
 - 1% Multiracial

Climate and Community Impact Over Time:

	2017	2018	2019	2020	2021	2022
Site-built Home Completed	43	51	75	49	47	56
Mobile Homes Completed	58	152	126	58	84	137
Total homes completed	101	203	201	107	131	193
Savings per home (\$) *	\$205	\$205	\$205	\$189	\$231	\$195

Energy saved for new homes annual (kWh equivalent)	249,533	501,536	496,595	264,356	323,651	247,302
Energy saved cumulative (kWh equivalent)	249,533	751,069	1,247,663	1,512,020	1,835,671	2,082,973
Total \$ Savings for new homes that year	\$23,331	\$46,893	\$46,431	\$24,717	\$30,261	37,734
Total \$ saved/total for all years	\$23,331	\$70,224	\$116,655	\$141,372	\$171,633	\$209,367
CO2 save in year (metric tons)	84	170	168	89	109	163.9
Cumulative CO2 savings (metric tons)	84	254	422	511	620	783.9

*M&V reports specifically for this program were not conducted before 2020, the savings numbers before that time are extrapolated from 2020 - 2023 ESN M&V data or from EPA or DOE guidelines. Savings per home can differ based on weather, sample size and occupant behavior.

We will continue to work on scaling this program by leveraging other resources. In April, we began implementing new funding from the Duke Energy Weatherization program for low-income households. It is highly likely that there will also be expansion opportunities through the Inflation Reduction Act.

Home Energy Chats

Home Energy Chats have reached 20 individuals since July 1, 2022. In general, chats have received the most attention from relatively high-income households and we believe that this demographic is already being served by other programs and general contractors in the private sector.

For the last quarter of this fiscal year, GBA will focus on recruiting BIPOC households and those in the low-to-moderate income bracket. However, pivoting to emails or referrals only (i.e., to Duke Energy Progress programs) will help this element of our work be more efficient.

- Number of chats this fiscal year: 20
- All chats completed: 57
- Program inception: February 2021

Neighbor to Neighbor Solar

This program restarted with 3 separate funding sources from the City and County. All applicants must be 200% or below the Federal Poverty Guidelines.

- Contracts signed: 8
 - Household demographics of clients July 1, 2022 -March 30, 2023
 - 2 Black
 - 2 Latinx
 - 4 White

- Kilowatts contracted for: 27.65 (each system is 3.95 kW)
- Direct applicants reviewed so far: 10
- Potential clients identified by ESN crew: 18
- Staff hours: 2-5 hours per week
- Cost per installation: \$14,000
- Years of program implementation: 2

Neighbor to Neighbor Recommendations

Currently funded for 20 systems by the end of 2024, this program helps low-income households participate in our County and City solar generation goals. Drawing from Energy Savers Network Clients, and new clients, the team evaluates each applicant on the following criteria:

- Be a site-built homeowner within Buncombe County.
- Be served by Duke Energy.
- Make below 200% of federal poverty guidelines based on 2022 income and household size complete including taxable and nontaxable income.
- Have a roof 15 years or younger with priority given to roofs 10 years or younger.
- Self-identify as not having \$50,000 in savings including retirement balance.

Eight households have qualified since December 2022, and seven have been completed and energized. More storytelling resources will continue to be gathered to ensure ongoing interest from private funders.

Community Engagement

The Community Engagement Committee drafted a [Community Engagement Plan \(see community engagement section\)](#). This plan will guide staff and BHP Community Council going forward. The plan focuses on raising awareness, expanding reach, and engaging community members in energy-efficiency and clean-energy education. Action is divided into two phases: Communications and Community Engagement. Each phase uses more precise tactics including hosting climate action-focused events, conducting environmental justice surveys, and tracking awareness, engagement, and action using key performance indicators. Following this plan will guide staff work going forward. It will shape the on-the-ground work, as well as online outreach.

In this period, **online and social media** resources have been activated and maintained including the following:

- Social Media [Website and Social Media traffic - Blue Horizons Project](#)
 - Views and Engagements - average Facebook reach of 3959 per month
 - Posts: 300 between Facebook and Instagram
 - Growth (Note: Reach = new users; does not include repeat post visitors)
 - Facebook follower growth: 1098 to 1146

- Instagram follower growth: 493 to 554
 - 38,102 cumulative Facebook reach
 - 9,199 cumulative Instagram reach
 - 51 YouTube subscribers
- Website views and engagement:
 - Average of 343 visitors and 824 page views per month
 - Began measuring new users in Sept 2022, averaging 300 new users per month to date
- Newsletters sent: 14
 - Views/opens: Avg open rate is 39.02% vs 25.17% for nonprofits that use Mailchimp
 - Subscribers: 498
 - Plans to merge ESN and BHP newsletter audiences by end of FY23 to gain nearly 200 new subscribers

Live and in-person outreach was also featured in the plan and continues from the plans submitted to the City and County for this contract year. Community presentations are speaking to a group of people, usually briefly, but up to an hour. We also included outreach lasting one hour or less and radio appearances. Presentations also include ESN client recruitment outreach appearances. The team presented to 24 groups and did outreach at 18 events.

The team also garnered 2 earned media instances: [ESN WLOS Article](#),⁹⁸ [Jamie Wine, the Clean Energy Program Manager for GBA, spoke for BHP at Sustainability Panel](#)⁹⁹

Events	Presentations
1. Groovin’ on Grovemont 1	1. Habitat ReStore
2. Groovin’ on Grovemont 2	2. AMOS
3. Protect Pisgah Rally	3. Perc Collider
4. YMCA in conjunction with the Mexican consulate visit	4. GBA Annual Party
5. Groovin’ on Grovemont 3	5. Burton Street Meeting
6. Sourwood Festival	6. Olivette
7. LEAF Down by the River	7. UU Church
8. Weaverville Tailgate Market 1	8. Climate Buzz Radio Appearance
9. East End Valley Street	9. Warren Wilson

⁹⁸ Patel, A. (2022, November 3). *U.S. consumers expected to pay up to 28% more to heat their homes this winter*. WLOS. <https://wlos.com/news/local/heating-winter-cost-energy-biden-administration-billions-helping-low-income-assistance-program-eb-len-charities-savers-network-buncombe-county-north-carolina>

⁹⁹ Randle, B. (2023, April 17). *Local experts collaborate, offer hope on sustainability efforts*. Mountain Xpress. <https://mountainx.com/news/local-experts-collaborate-offer-hope-on-sustainability-efforts/>

<ul style="list-style-type: none">10. Goombay Festival11. Weaverville Tailgate Market 212. Blue Ridge Pride13. Ciderfest14. Burton Street Agricultural Fair15. Weaverville Tailgate Market 316. Eblen Charity Drive at Westgate17. Second Gear18. Junior League of Asheville Volunteer Expo	<ul style="list-style-type: none">10. Leicester Library YMCA Mobile Market11. Climate Buzz Radio Appearance12. WRES Radio Appearance13. Neighborhood Advisory Council14. Erwin Middle School (3 days)15. Skyland United MANNNA Food Market16. Creation Care Alliance Conference17. Warren Wilson Job Fair18. AB Tech- Energy Efficiency Class19. The Ramble HOA20. Council on Aging at First Baptist Church Weaverville21. Field Day at Asheville Middle School22. Lights Out At the Collider23. Rotary Club of Asheville24. Eblen Prom Dress Expo
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APPENDIX G: Community Engagement Plan

The Community Engagement Plan

In order to educate, engage and inspire action, we need to increase the visibility of the Blue Horizons Project, so people understand who we are, what we are trying to accomplish, and how we can support them in the clean energy transition. As such, the BHP's community engagement efforts focus on two important aspects of this work: 1) communications: raising awareness and expanding reach to drive positive impact and build trust and credibility, and 2) community engagement: engaging residents, community groups, and local businesses in energy-efficiency and clean-energy education and action that promotes diversity, equity, and inclusion.

Because community engagement lies at the heart of why the Blue Horizons Project was created, it is a cross-cutting function that will play a substantial role in supporting all BHP-led initiatives and policy changes that support the BHP's vision.

The following BHP-led activities will support the overall vision of the energy transition described in this strategic plan and specific initiatives and policy recommendations emerging from this plan:

Communications

- Create a 30-second version of an updated BHP video to replace the 3:30-min version on the website by the end of 2023.
- Because BHP is a Green Built Alliance program, work with a local graphic designer to update and better align the BHP logo with GBA branding by adding a leaf (on or near the sun) and possibly adding similar colors by the end of 2023.
- When there is news to share, promote it on the BHP website, through BHP's digital media platforms and directly to local media outlets and key reporters to garner media interviews and secure earned media coverage. Also create a running list of partner organizations and individuals that engage with diverse communities and promote news and events through their existing channels.
- Run at least one local print ad and 1 local radio ad semi-annually to showcase equitable, clean energy progress in the region and promote the community climate challenge and/or countywide event (see below).

Community Engagement

- Lead and manage a month long, peer-to-peer community climate challenge, where people sign up to track and submit their climate-friendly actions on a weekly basis.
- With partners who share similar goals and objectives, plan, and host – or co-host – at least 1 annual climate action-focused, countywide event that could include:
 - Prominent speakers, such as elected officials from the City and County, Black, Indigenous, and People of Color (BIPOC) community leaders, etc., and a live Q&A.
 - Expo booth showcasing a diverse array of private and public entities working to advance a just, clean energy future.
 - Award ceremony recognizing the top, most impactful local clean energy projects and companies of the year.
 - Eco-friendly prize raffle for residents who actively participated in the community climate challenge.
 - Live music from a well-known local band.
- Engage the equity focus group to conduct research and interviews with communities missing from previous engagement strategies.
- Conduct an annual environmental justice survey to better understand the needs and challenges of communities experiencing disproportionate environmental harm and risks.
 - Share survey findings with the City and County.
 - If applicable, update the BHP Strategic Plan to ensure it addresses the findings.
 - Promote survey findings within vulnerable communities to educate and engage residents in programs that help lower the energy burden, such as GBA’s Energy Savers Network.
- Participate in and conduct outreach at least ten relevant, local community events, speaking engagements, festivals, fairs, farmer's markets, and other forums per quarter, including BHP presentations to community groups, churches, non-profit organizations, and businesses.
 - Ensure Community Council members represent BHP by attending at least one GBA event per year.
 - Engage community members in the planning process to help ensure events are relevant and effective.
- Cast a wide net to reach Buncombe County and Asheville residents and businesses using culturally relevant, inclusive language, hashtags, and visuals on an array of digital media platforms, including BHP’s website, Facebook, Instagram, YouTube, email newsletters, and paid digital advertisements.
- Increase engagement with BHP’s digital media platforms by 5% quarterly, from a July 1, 2022, baseline, for a 20% cumulative increase across all platforms annually by:

- Spotighting at least one impactful clean energy project (e.g., solar, wind, electrification, microgrid, geothermal, storage, etc.) per month with an equity lens by telling stories from the people leading and benefitting from the project, including BIPOC communities.
- Posting before, during and/or after relevant events, including key takeaways.
- Producing and promoting at least 1 Home Energy Advice video per quarter.
- Promoting relevant articles, blog posts, op-eds, community climate challenge highlights and resources.
- Sharing and boosting important news and announcements with targeted, digital advertisements.
- Meet the outreach and performance goals laid out in BHP contract.
- Engage BHPCC and staff in job training with the Energy Savers Network summer apprentice program, which focuses on youth, BIPOC, and LGBTQ+ communities.

Achieving the goals laid out in the BHP Strategic Plan requires significantly more community engagement than current staffing will allow. This extended effort will need to come from a combination of additional funding and expanded volunteer efforts from the BHPCC and those wanting greater involvement to achieve the local energy transition.

The BHP will track awareness, engagement, and action for each of the relevant initiatives listed above to develop a baseline throughout the year. Key performance indicators (KPIs) will then be developed for all relevant initiatives by the end of 2023, aligning with contracts the BHP has in place with the City and County. The BHP will use the KPIs to evaluate performance and adjust, as necessary, on a semi-annual basis. For more detailed information on the costs, funding, work completed, and impacts of community engagement thus far see APPENDIX F.

APPENDIX H: Policy

Policy Initiative 1: Incentives for Green Development

Description: Buncombe County and the City of Asheville are limited by state law in their ability to regulate new development. The main policy lever available is to provide incentives for developers who electrify, include renewable energy, provide EV charging, and develop more energy efficient structures. This method is already used extensively to promote other objectives, but the sustainability components of these programs should be improved in the following ways: The success of this initiative will lead to improved financial prospects.

The Buncombe County Commission and the City of Asheville should craft legislation to create a tax rebate grant for new construction that encourages green building, onsite renewable energy generation, all electric utilities, and EV infrastructure similar to the affordable housing Land Use Incentive Grant in the City of Asheville. There should be target incentives for small-scale housing as well as multi-family housing. In addition, green building, renewable energy generation, electrification components should be added to existing economic development incentives. Additional opportunities to incorporate incentives in the City of Asheville include:

- Update the Hotel Overlay map with green incentives, and use similar process to multi-family housing/multi-unit housing incentives
- Create community benefits incentive table for multi-family housing projects
- Come up with a small developer and/or single-family home incentive/grant for green building, renewable energy, and electrification
- Make it a standard condition of Conditional Zoning applicants to pre-enroll units in Duke EnergyWise program (in City, and in County if and when the County creates a conditional zoning process)

The incentives for these programs include expedited approvals process (no need to visit council/commission for approval) assistance navigating state and federal financial incentive program and stop gap funding where IRA is not available, as well as a tax rebate grant program for capital expenditures that help meet the 100% renewable energy goal.

These tweaks to our economic and development policies should be considered low hanging fruit, with high feasibility, and favorable cost benefit ratio, and could be implemented in the near future.

Phase 1 Analysis: Initiative Ranking – Incentive Green Development

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative receives the ranking you gave it</u>

Potential Feasibility	High	These mechanisms are already in place are being used to incentivize various priorities of our local government. Elected champions are part of the BHPCC and share our goals
Potential Scale of Impact	Low - Med	Not all developers will take advantage of these grants. This will only impact newly permitted development.
Potential Equity Impacts	Medium	These initiatives need to be crafted to complement existing affordable housing priorities and in consultation with affordable housing advocates
Cost Vs. Benefit	High	Changing these policies is of little cost to the community, and implementing will have a negligible impact on the City and the County Budget

Phase 2 Analysis - What is needed to make this initiative happen – Incentive Green Development

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near -Term	
Implementing Departments and Partnering Organizations	- City Planning Dept. - County Planning and Development Dept. - City Economic Dev. Dept	
Activities to be undertaken to support the initiative	-Build political support -Convene Development Community	BHP staff would need to assist with communications and recruiting partners with support from the BHPCC

Policy Initiative 2: Permitting and Inspections Improvements for Cost Savings and Efficiencies

Description: Review the process for permitting and inspections for both the City and the County and make recommendations for efficiencies and cost savings. A specific deliverable date with results should be requested. Expedited and lower cost procedures should be developed for the key technologies needed for the transition to renewable energy:

- Heat pump water heaters
- Heat Pump HVAC
- Solar
- Battery storage
- EV charging
- Electric Induction Ranges

Phase 1 Analysis: Initiative Ranking - Permitting and Inspections Improvements for Cost Savings and Efficiencies

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative receives the ranking you gave it</u>
Potential Feasibility	High	This is a common strategy that is being implemented all over the state and is already on radar of sustainability staff
Potential Scale of Impact	Medium	This will help to lower costs and timelines for desirable projects
Potential Equity Impacts	Neutral	
Cost Vs. Benefit	High	These reforms may even save money and time of City inspectors

Phase 2 Analysis - What is needed to make this initiative happen - Permitting and Inspections Improvements for Cost Savings and Efficiencies

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near-Term	May already be in progress
Implementing Departments and Partnering Organizations	-City Development Services -Buncombe County Permit and Inspections	
Activities to be undertaken to support the initiative	Engage installer, electricians, and development community	

Policy Initiative 3: Establish staff position(s) at City and County to provide a liaison / ombudsman for developers and others to navigate and accelerate the permitting process for the above technologies.

Description: The City and County need dedicated staff to seek to speed up the transition to 100% Renewable Energy. This would be a public-facing position responsible for advocating for speed and cost reductions for builders and installers.

Phase 1 Analysis: Initiative Ranking - Establish staff position(s) at City and County to provide a liaison / ombudsman for developers and others to navigate and accelerate the permitting process for the above technologies

<u>Analysis Area</u>	<u>Favorability Ranking (Low, Medium, or High)</u>	<u>Description of how/why action initiative receives the ranking you gave it</u>
Potential Feasibility	Medium - High	The City and the County have been adding capacity and one additional staff position seems like a reasonable budget request
Potential Scale of Impact	High	Having a clearing house for all permits that considers the RE/ EE potential would operationally be an opportunity to influence all new construction
Potential Equity Impacts	Neutral - Med	Because this position is servicing new development it does not necessarily reach LMI residents
Cost Vs. Benefit	High	The impact would warrant the staff expense

Phase 2 Analysis - What is needed to make this initiative happen - Establish staff position(s) at City and County to provide a liaison / ombudsman for developers and others to navigate and accelerate the permitting process for the above technologies

<u>Analysis Area</u>	<u>Summary</u>	<u>Discussion</u>
Timeline (Near-Term, Medium-Term, Long-Term, Ongoing)	Near-Term	This should be possible in the next 3 -5 years
Implementing Departments and Partnering Organizations	-Development Services -Buncombe County Permit and Inspections	
Activities to be undertaken to support the initiative	- Look at other Cities and Counties -Identify Funding	

Policy Initiative 4: Create a financing structure to further the energy transition

Description: One of the major barriers to energy system changes is that the costs tend to be upfront (capital), but the benefits occur based on fuel cost savings. Access to and cost of capital are major issues. This effort would develop our community's access to financing through the NC Clean Energy Fund (thereby leveraging funding through the IRA) and other sources. This effort could include efforts to provide contractors, residents, and organizations with access to capital on a preferential basis, including through Community Develop Financial Institutions (CDFI).

Analysis: Financing structures are essential in helping to build the upfront capital for the clean energy transition. The financing mechanisms can vary, and we are not able to perform an analysis matrix for all of the potential options. The BHP would support financing mechanisms that create low interest loans to property owners and businesses to enable them to invest in renewable energy infrastructure, energy efficiency retrofits and electrified operations. Lenders like the North Carolina Green bank can raise funds to assume some of the risk associated with loans for low to moderate income individuals to make these programs more accessible and equitable. The County has recently contributed to the bank for such purposes, and that model is being developed.