

## Ideas for cutting carbon

### **Transportation energy use: Low Hanging fruit (cheap/quick implementation time frame)**

- Encourage telecommuting: business incentives (tax breaks, bronze/silver/gold city rating?), make brochures for businesses to show advantages to them (decrease in traffic congestion, parking congestion, time lost in traffic, improvement in worker morale)
- Encourage biking to work: bike racks, posted bike trail maps, incentives for businesses, incentives for individuals (random prizes for bike riders?)
- “No idling” policy for city trucks, and no left hand turns
- Encourage electric & hybrid cars: Premium parking for electric cars, decreased personal property tax on electric or hybrid vehicles or low mpg cars, bumper sticker or yard sign when you achieve certain guidelines on low emission car - program like RiverStar yard ribbons
- Educate college & high school kids about using train & buses -- make a slide presentation that is used at orientation at ODU, TCC, Norfolk State, etc (use Google Mass mass transit option)
- Have a “Ride the bus” day where all high school and/or college kids ride bus or take train
- General “Ride the Bus” day tied to event or Earth Day
- Scavenger hunt that encourages mass transit use
- Special incentives for residents to use Train Station at Harbor Park, or the Light Rail - random prizes?. This is kind of out of the box but - Educating kids on different types of transportation. How many kids have never been on a public bus or the Light Rail? Public schools partner with City on transportation programs at school and “field trips”.
- Educate people about ease of using train to DC - billboards, or add to city page with transport options and day trip ideas?
- Raffle, win tickets to Redskins game - pool is from train ticket buyers
- In advertising for special events in city, include nearest train stop and/or ferry stop
- Add all transport options to convention and festival event Web pages, e.g. on Virginia Arts Festival page, have ferry and train options listed
- Make a “no-idling” rule for taxis -- they can’t leave car idling while away from their vehicle or while waiting for passenger
- “No-idling” rule for rental cars at airport -- can’t leave cars idling during return and clean-out of cars

### **Transportation energy use: Mid Hanging fruit (less cheap/slower implementation time frame)**

- Rental bikes/Bike share - especially in combo with light rail & near college campuses
- City vehicle purchases : have standard for mpg or certain percentage electric
- Have “Green the city” app to help people choose transport option
- Implement software for city buses and school buses to eliminate left hand turns (UPS uses this to save millions per year)
- Educate residents about ferry to Portsmouth -- same billboard as train education
- Work with trucking businesses to alter truck routes to shorten
- Work with trucking businesses Allow/encourage sharing of loads
- Reach out to trucking businesses to give them energy conservation ideas and cost/benefit

- Ferry Incentive Program
- Partner with companies that have employees that commute between Portsmouth and Norfolk. Incentives for the employees that take Ferry. Incentives for other companies that encourage employees to use Public Transportation.

### **Transportation energy use: High Reach fruit (higher cost/slowest implementation time frame)**

- ZipCar program - especially in combo with light rail & near college campuses
- Bike trails to light rail and on more city streets - already happening to some extent with Bike Plan -- but do more public outreach to compare what we could have in comparison with cities like Copenhagen that are intensely bike friendly
- Investigate re-opening ferry Hampton - Norfolk

### **Building energy use: Low Hanging fruit (cheap/quick implementation time frame)**

- Encourage small lawn mowing business to use push-style mower
- Find and promote companies that would offer fossil-fuel-free lawn care
- Computer power management: get on Energy Star program to have computers, monitors, printers go to sleep at night for all municipal buildings (also applies to all other large buildings like schools). Educate local businesses about the cost savings.  
<https://www.energystar.gov/products/reduceitenergycosts>  
[https://www.energystar.gov/products/low\\_carbon\\_it\\_campaign/put\\_your\\_computers\\_sleep](https://www.energystar.gov/products/low_carbon_it_campaign/put_your_computers_sleep)
- Set HVAC to off or low-power setting in all off-work hours
- Partner with college that has vocational program: student take on as a project to do energy audits, possibly also make improvements, students track savings data afterward
- City Web site with all of this information, and also have a public education booth at any city or special events like RiverStar homes - city requires that any city event has a free booth for solar and energy education
- Evaluate changes to city building codes to ensure home energy efficiency
- Educate people about why to not run TVs 24/7, turn lights off as you leave a room, have motion sensors for turning off lights, turn off computer projectors when not in use
- Volunteer task force that does Friday Night Lights -- goes around buildings and looks for lights left on after hours, leaves a sticker or develops a database of who is leaving things on - then have a prize for best behavior
- Consider white roofs for energy savings or green (living) roofs where possible - both lead to huge energy savings
- Make a slide deck to be used at schools to educate students (to take home to parents) about ways to save energy
- Use vocational tech class students to participate in home energy audits, planning and possibly home weatherization and solar PV installation
- Flyer for residents on small changes they can make -- hang dry clothes for end of dry cycle, use less water when cooking pasta, use cold water wash, adjust water heater thermostats, don't use heated dry or super heated water options on dishwasher, heating swimming pools with solar
- Page on city website with info about the following:
  - Education high efficiency HVAC and Energy Star appliances
  - Education on solar and using it for hot water - payoff times
  - Education on basic efficiencies -- not running TVs 24/7, turning off appliances and

chargers

- Educate landlords and give incentives for increasing energy efficiency of rentals
- Educate residents as to the benefits of a solar power wall instead of a generator for power during weather outage
- Educate residents of public housing on all energy savings method listed above under homes

### **Building energy use: Mid Hanging fruit (less cheap/slower implementation time frame)**

- City make switch in feasible locations to electric or old-style push reel mowers, encourage others to do that
- Write into the city plan to upgrade the energy efficiency of city equipment and facilities at every opportunity.
- Have incentives for residents to buy push-style mowers from city at reduced cost
- Solar motion lights (dusk to dawn)
- Control permits for new home building to make sure they are considering energy use of new homes, and making roofs “solar-ready”, energy-efficiency rating similar to hurricane rating
- Using solar for charging cell phones
- Find grants or loans to change inefficient lights to LED. Add motion detectors in municipal common areas.
- We could apply for late-start in the SunShot \$5M DOE prize competition up to August 1: <https://energy.gov/eere/sunshot/sunshot-prize-solar-your-community-challenge>
- Run city-wide check of losses at transformers and institute upgrade program, paid for by utility savings (check with Arlington on how they found losses in their system). 65% of energy is wasted in electricity transmission – Arlington in particular has made great strides in improving the grid to avoid these losses, and is more than willing to share knowledge and methods.
- For homes: Incentives for weatherization, efficient HVAC
- For homes: Incentives for solar hot water
- For schools: Reduce mowed areas, have green space for student projects
- Advertise easy methods for sequestering carbon (bio-char, no-till methods - for farms but also homes, schools, parks)
- Tree planting to help control sun into buildings
- Public housing: Empower residents with feeling of why do this, how it helps community and them personally (links to asthma rates, etc)
- Encourage always having a home with solar PV and solar pool heat at Homearama

### **Building energy use: High Reach fruit (higher cost/slowest implementation time frame)**

- Zero-interest loans/financing to allow weatherization program, change-out to LED bulbs, installation of solar PV
- Incentives (zero-interest financing, PACE financing) for PV installation on homes -- have a drive-around to identify likely sites)
- Incentives for weatherization, efficient HVAC
- Tax breaks or incentives to get home energy audit or fan door blower test
- For apartment complexes: Zero-interest loans/financing to allow weatherization program, change-out to LED bulbs, installation of solar. Break on real estate taxes for putting in solar

PV

- For public housing: Zero-interest loans/financing to allow weatherization program, change-out to LED bulbs, installation of solar
- Lower real estate millage rate (amount of property tax) based on work done, sliding scale for amount of work accomplished in cutting carbon (the funding for this could come from city utility savings). Utility savings of building residents would end up going into local businesses through meal taxes and resident spending etc.
- Direct Energy is a possible 100% renewable energy provider that is entering the Virginia market – this could provide a simple way to cut the carbon footprint of Norfolk with no financial burden. Or, Dominion just filed that they can provide 100% renewable to large customers – possibly that could be City of Norfolk?
- For public schools: Zero-interest loans/financing to allow weatherization program, change-out to LED bulbs, installation of solar
- Get federal or state grants for resilient shelters – solar with battery backup on shelters that cuts their utility bills, but also provides constant power in case of weather-related power outages, so that people who need power at the shelter (medical equipment, oxygen machines, warming baby food, reading lights, etc) can have power. We have a list of good potential sites for sustainable shelters.
- Install a large solar array at the airport with grant or zero-interest loan. As an example, Indianapolis has a 25 MW array at the airport that was a collaboration between the city and the utility.

### **Industry energy use: Low Hanging fruit (cheap/quick implementation time frame)**

- Set HVAC to off or low-power setting in all off-work hours
- Computer power management: get on Energy Star program to have computers, monitors, printers go to sleep at night for all municipal buildings (also applies to all other large buildings like schools). Educate local businesses about the cost savings.  
<https://www.energystar.gov/products/reduceitenergycosts>  
[https://www.energystar.gov/products/low\\_carbon\\_it\\_campaign/put\\_your\\_computers\\_sleep](https://www.energystar.gov/products/low_carbon_it_campaign/put_your_computers_sleep)

### **Industry energy use: Mid Hanging fruit (less cheap/slower implementation time frame)**

- Educate farmers about advantages of no-till methods, crop rotation, sequestering carbon (methods like biochar), silvopasture, tree intercropping, lease land for solar and wind installations (New Earth farm as example - can survive drought periods with no-till and biochar methods)
- City encourages/incentivizes that industrial sites upgrade the energy efficiency of equipment and facilities at every opportunity

## Industry energy use: High Reach fruit (higher cost/slowest implementation time frame)

## Commercial energy use: Low Hanging fruit (cheap/quick implementation time frame)

- Encourage small businesses to use rake instead of blower, have businesses able to buy from city at reduced cost if they turn in their blower
- One low-hanging fruit for a city or company is talking to the EnergyStar folks about having your computers and monitors go to sleep when unused, here is that info:  
<https://www.energystar.gov/products/reduceitenergycosts>  
[https://www.energystar.gov/products/low\\_carbon\\_it\\_campaign/put\\_your\\_computers\\_sleep](https://www.energystar.gov/products/low_carbon_it_campaign/put_your_computers_sleep)
- Education on benefits of heating swimming pools with solar

## Commercial energy use: Mid Hanging fruit (less cheap/slower implementation time frame)

- Set up network of community members with passive income to allow 5-year payback of privately-funded PPAs to give zero-interest loans/financing to allow installation of solar as well as energy efficiency methods: weatherization program, change-out to LED bulbs, etc.
- Tax incentives or city method to get building energy audit
- Food waste is the #4 method in *Drawdown* for cutting carbon: utilize all the strategies in there to help companies minimize food waste.
- From Blacksburg plan: Incentives for Commercial Energy Upgrades: Establish incentives, financing tools, and other resources that would enable local businesses to cost-effectively pursue energy efficiency upgrades in their buildings and operations.
- From Blacksburg plan: Raise the profile of all types of renewable energy by offering information (online resources, tours, workshops, community discussions) regarding renewable energy potential and opportunities in Norfolk.
- From Blacksburg plan: Perform a community-wide analysis of municipal buildings and public properties to determine sites that might be suitable for a municipal solar array or solar water heating system.

## Commercial energy use: High Reach fruit (higher cost/slowest implementation time frame)

## Municipal regulation category: Mid Hanging fruit (less cheap/slower implementation time frame)

- The book *Drawdown* gives the top 100 methods for cutting carbon world-wide. #1 is Refrigerant Management. The reason this is an issue is that, when the world transitioned away from ozone-depleting refrigerants in cooling systems like air-conditioning and refrigerators, they switched to compounds that are 1000 to 9000 times more powerful than carbon dioxide in causing climate change. Thus, every time an old refrigerator or A/C unit is thrown out without being properly drained, and the refrigerant captured, those fluids are escaping and contributing to climate change. The city could start a program to ensure that

all systems are drained, and their refrigerant captured, before disposal.

## Resources that could be tapped:

The three Virginia cities that have already signed the Covenant (Arlington, Blacksburg, Roanoke) have a network of city staff that are sharing knowledge, methods, ideas and details. Norfolk could greatly benefit by having the environmental and resiliency officers tied into this network.

The cities' climate plans are at their Web sites:

Arlington: <https://environment.arlingtonva.us/energy/community-energy-plan-cep/>

Roanoke: <https://www.roanokeva.gov/DocumentCenter/Home/View/7531>

Blacksburg: <http://www.blacksburg.gov/departments/departments-l-z/sustainability/climate-protection/climate-action-plan-and-supporting-documents>

Virginia Coastal Energy Research Consortium – allow researchers to implement pilot programs in other types of renewable energy such as tidal, wave or algae at no cost to the city. Use their ties to leverage student time.

ODU and Norfolk State – reach out to local universities to get graduate students involved, who can help cut staff time by researching options, and doing input of data into spreadsheets. ODU is already part of VCERC – could also use VT students who are also part of VCERC. This is easy zero-cost labor to help out existing staff.

NASA Langley – there are many solar energy and wind researchers at Langley. Reach out to them and start pilot programs -- for example, allow researchers to mount vertical axis or high altitude wind turbines on city buildings to provide energy and research data.

Military – DoD has fully embraced renewable energy and moving away from fossil fuels and could be willing to team with the city on installations that would help support local bases. In particular, the best on-shore wind sites that Norfolk has are probably on Naval property.

Knowledgeable local non-profits – utilize time and expertise from Sierra Club volunteers, CCAN, Hampton Roads Solar Group, VA SUN, National Council for Solar Growth (DC).

Virginia Beach may have more on-shore wind sites available than Norfolk -- could partner together to develop.

UVA example: <http://www.wahoosforsustainability.com/achievements-challenges-1/>

They have a climate action plan and a GHG inventory.

1. BOV Engagement in Sustainability: Under the leadership of Kevin Fay, the BOV's Building and Grounds Committee made the advancement of sustainability a major committee goal for the year. Subsequently, expanded attention and resources flowed to

the leaders working on these issues at the University. WFS was glad to have played a part in encouraging BOV members to increase their engagement.

2. UVA Climate Action Plan: When WFS started galvanizing our voice, the University did not have a comprehensive, quantifiable plan to hit the BOV goal of reducing GHG emissions 25% below 2009 levels. They do now! During Earth Week 2017, the University released its 2017 Greenhouse Gas Action Plan. We are thrilled by this substantial step forward, and we are taking it off of Call to Action list. (See revised list below.)

3. Updated and Reduced GHG Emissions: When UVA released its CY2016 Greenhouse Gas Inventory Report this year, it included a substantial change. As of the Spring of 2016, UVA reported it had reduced GHG emissions by 5% over 2009 levels. As of today, UVA is reporting an 11.6% decrease! A significant portion of this decrease is due to an updated "emissions factor" which measures the GHG emissions per megawatt of power produced by the third party utility (i.e., UVA benefited from lower carbon intensity electricity supplied by Dominion VA Power). Nevertheless, it is 100% valid that it counts toward the University's goal and it is welcome news.

4. UVA Utility Scale Solar: In December 2016, UVA and Darden announced that they had signed a deal with Dominion VA Power to develop an off-site 21 MW (17 MW-AC) solar facility - a project expected to address 12% of UVA's electricity demand. WFS is proud to have helped spark these conversations behind the scenes. UVA is now examining additional off-site utility scale solar facilities. We are hopeful about the potential, and we hope to see a commitment to a specified percentage of electricity coming from renewable sources.

5. UVA Rooftop Solar Inventory: While there has not been a public commitment as of yet, UVA appears to be accelerating its appetite for rooftop solar at the University. The Office of Sustainability, in concert with the engineering school, is currently conducting an inventory of rooftop solar potential. We are hopeful that this will result in a commitment to 3 MW or more of rooftop solar.

6. Integration of Sustainability and Advancement: From day one WFS has been emphasizing to UVA leadership that the Office of Sustainability should be able to turn to Advancement to help raise funds for sustainability projects. In the past, the Office of Sustainability has had no way to communicate potential projects to donor alumni or foundations. Now, it appears that might be shifting. Due to BOV and senior leadership interests, there are indications that this gap will be addressed, enabling potential donors to be aware of and direct their funds to such projects as rooftop solar, energy efficiency and water conservation.

## Some on-line book references:

Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming, <http://www.drawdown.org>, ranking and description of the top 100 methods for cutting carbon emissions world-wide

Sustainability Without the Hot Air -- has great calculations of how much energy we use, and what changes could be made by using renewables. <http://www.withouthotair.com>

Plan B 4.0 -- a very comprehensive look at worldwide energy use and ways to become more sustainable. [http://www.earth-policy.org/images/uploads/book\\_files/pb4book.pdf](http://www.earth-policy.org/images/uploads/book_files/pb4book.pdf)

## Tools to use for planning installation of renewables

[http://www.nrel.gov/analysis/models\\_tools.html](http://www.nrel.gov/analysis/models_tools.html) Many tools for renewable analysis

<http://pvwatts.nrel.gov> Analysis of PV cost/benefit at a single address

<http://www.nrel.gov/gis/wind.html> US Wind maps

<https://maps.nrel.gov/wind-prospector/> NREL interactive wind prospector

[http://apps2.eere.energy.gov/wind/windexchange/windmaps/resource\\_potential.asp](http://apps2.eere.energy.gov/wind/windexchange/windmaps/resource_potential.asp) US DOE wind maps

[http://apps2.eere.energy.gov/wind/windexchange/wind\\_resource\\_maps.asp?stateab=va](http://apps2.eere.energy.gov/wind/windexchange/wind_resource_maps.asp?stateab=va) VA wind maps



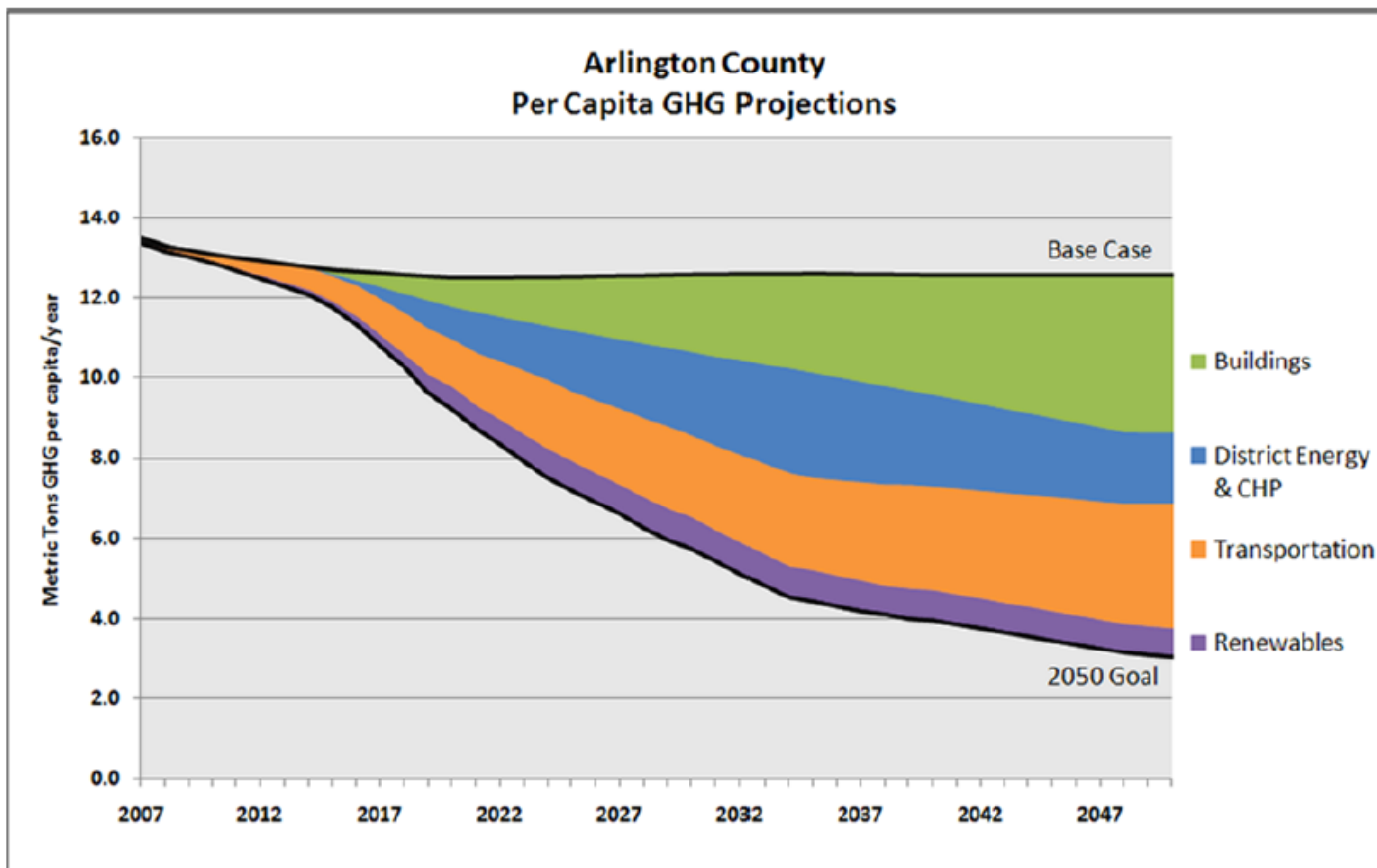
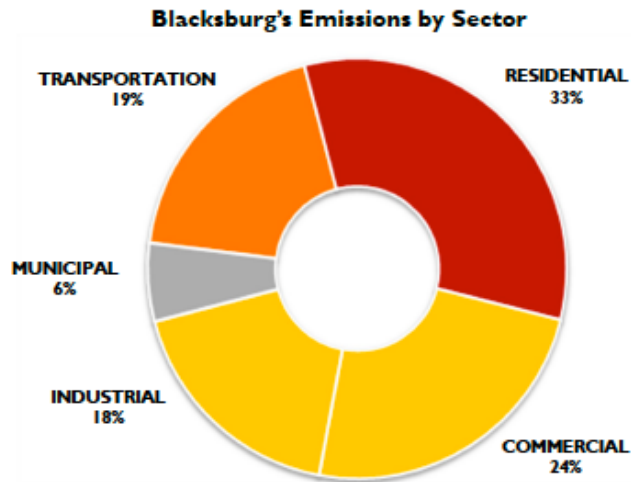


Figure 5: Arlington County Per Capita GHG Projections

## Simple payoff timelines for renewable installation

For residence: Solar PV + quick weatherization/energy efficiency upgrade ~\$5K  
 \$1500 tax credit first year, \$500 per year savings on utility bills, paid off in 7 years

For business (or non-profit with an individual funding installation):

Assume \$100K install

First year \$50K back from tax credit and depreciation

Payback \$7K per year from utility bill savings, plus depreciation \$5K 2nd year, \$3K 4th,  
\$2K 5th

Paid off in 5 years

## Relation to flooding issues with Cities

Ideas from Norfolk

Norfolk - part of 100 Resilient Cities - <http://www.100resilientcities.org/cities/entry/norfolks-resilience-challenge#/-/>

Norfolk Vision2100 - plan for mitigation and adaptation to sea level rise - <http://www.norfolk.gov/vision2100>

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