Reducing Greenhouse Gases in Morgantown WV

Goal: Reduce GHG emissions by 28% below 2005 levels by 2025.

Major sources of GHG emissions by the City of Morgantown.

1. Electricity
	1. City Buildings
	2. Street lights
	3. MUB (water pumping, sewage treatment)
	4. BOPARC
2. Natural gas (building heating)
3. City Vehicle fleet (Police cars, fire trucks, parking enforcement, building code, etc.)
4. Solid waste
5. Other sources (street paving,

Major GHG sinks

1. Urban forest
2. Solid waste landfills
3. Others???

Options:

1. Energy Efficiency
2. Renewable energy
3. Recycling
4. Composting

**Greenhouse Gas Budget in 2005**

City of Morgantown

**Source Tons CO2e/year**

Electric consumption 5359

Natural Gas 613

Vehicles (gas) 1434

Vehicles (Diesel) 403

Total **7809**

Required reductions = 7809\*0.28 = **2186 Tons CO2e per year**

2011 Energy Services Contract generated ~ 10 % savings in electricity (536 tons per year)

Additional reductions can be achieved by:

1. Implement IAC energy efficiency recommendations (City Hall, Public Safety Bldg., Woodburn, Maintenance Garage, and Signs & Signals buildings).

Save 270,116 kWh of electricity = 266 Tons CO2e/year.

Save 540 MMBTU of gas = 32.6 Tons CO2e/Year

1. Install LED street lights.  (As Joe indicates below, this is probably not a money-saver, but it would more than meet the 28 % target for greenhouse gas reductions from that source.)

Assume 1700 street lights in Morgantown. Assume they operate 12 hours/day:

Sodium vapor lamps use ~ 1095 kWh/year. (\*1700 = 1,861,500 kWH/year)

LED Lamps use ~459 kWh/year (\*1700 = 780300 kWh/year)

Projected savings = 1,081200 kWh/year = ~1063 Tons CO2e/Year.

3)  Provide incentives to malls and large parking areas on private/commercial sites to install LED lighting.

4)  Acquire more efficient and cleaner City buses for MountainLine

5)  Expand bus routes to reduce auto traffic.

6)  Install Park-and-Ride lots to encourage commuters to use bus services.

7)  Integrate bikes with buses and rail trail (this needs some clarification)

8)  Install solar panels on City facilities.  (My Baseline calculation indicates that to displace 28 % of the City's Municipal electric consumption would require 1986 MWh of solar generation. Assuming a capacity factor of 25 %, we would need approximately 900 kW of solar panels. Assuming $2.75 per watt, this would be approximately $2.5 million.  The payback time on this is about 40 years, so this is not free.)

9  Have the City provide incentives for green building standards.

10)  Convert the City fleet to fuel efficient or electric vehicles.

11)  Provide education to City residents and in schools on ways to reduce carbon emissions.

12)  Identify cleaner alternatives for small engines (leaf blowers, lawn mowers, etc.)

13) Purchase of Green electricity credits (Renewable Energy Certificates, RECs).

14) Increase recycling (quantify GHG reductions?

15) Promote water conservation (work with MUB?)

16) Switch parking garage lights from T-8 fluorescent to LED.

24 July 2017

WV Sierra Club

Proposed Climate Action Plan Ideas and Proposals to Implement the Resolution in support of the Paris Climate Agreement.

In March 2015 the US submitted a plan to the Paris Climate Agreement that set a goal of 26% to 28% reduction in greenhouse gas [GHG] emissions by 2025. Despite President Trump’s statement that the US will withdraw from the Agreement, many American cities and states and countries around the world have reaffirmed their commitment to the Agreement and have prepared and implemented plans to meet the Agreement’s objectives. Morgantown, as one of the main cities in the ‘coal state’ West Virginia, is in a position to play a leading role larger than its small population would imply in the world’s efforts to combat climate change.

The following list of action plan items is based on the Downstream Strategies Greenhouse Gas Inventory conducted in June 2014, and on some examples of other cities’ climate action plans. We recognize that the city government's authority is limited by county, state, and federal governments and policies, but within those limits the city can make and encourage significant GHG reductions.

There are three types of actions that Morgantown can take to meet the goals of the Climate Agreement:

1. Establishing connections and information sharing with other cities, states, and countries;

2. Reducing activity-based GHG emissions;

3. Reducing source-based emissions.

**1. Establishing connections and information sharing:** There are a few large, international and interlinked organizations of cities, towns, and regions that have formed to address climate change and related issues. These organizations compile and share data on their GHG emissions and related environmental impacts, exchange ideas, models, and programs for addressing and reducing their climate impacts, and participate in research projects to evaluate programs and test new approaches. It appears that joining and participating in these organizations does not require any fees or other payments. It will be extremely helpful and motivating for Morgantown, and a highly positive influence for West Virginia, if Morgantown could join and participate at least in one of these organizations.

= ICLEI – Local Governments for Sustainability: the leading global network of more than 1,500 cities, towns, and regions working toward a low-carbon, sustainable, efficient, healthy and productive future. This organization’s website, <http://www.iclei.org/> , contains a wide range of activities and information sources. Downstream Strategies strongly recommended that Morgantown join this group.

= The Compact of Mayors , <https://www.compactofmayors.org/> , is another international group of cities committed to addressing climate and environmental issues by establishing “standardized measurement of emissions and climate risk, and consistent publication of their efforts.“ It is linked to ICLEI and the UN.

**2. Reducing activity-based emissions:** This is the main area in which the city and its residents can act to reduce GHG emissions. These suggestions mainly address the three main GHG contributors in Morgantown (after the MAE plant, see below): transportation, municipal, and residential and commercial energy consumption. Public involvement would also help meet the GHG goals.

Transportation:

* Hire a staff person to assist the bicycle and pedestrian board to increase infrastructure and signage for bicycling to make the biking community’s presence known and supported (such as what is currently present on Willowdale), and to finish the implementation of shared use paths that are already funded and fully planned. This person could also propose further programs to expand non-GHG producing transport.
* Install electric vehicle charging ports in parking lots and parking spots.
* Research the needs and potential for expanding bus transport in Morgantown and provide more bus options.
* Require new large buildings to offer facilities for fostering low-carbon transportation options (walking, biking, transit, car-sharing, etc.)
* Provide preferred parking for electric vehicles, ride sharing vehicles, and compact vehicles, as well as more and better bike-racks, for example with shelters.
* Require all new municipal vehicles produce low GHG emissions (hybrid or electric vehicles).
* Work with WVU to expand the hours of operation of the PRT.

Municipal Energy Consumption:

* Replace outdated technologies for lighting, heating, and cooling in municipal buildings.
* The solar panels on the roof of the farmers’ market shelter on Spruce Street was an excellent step. The city should find ways to set up similar panels on as many city buildings as possible.
* Encourage municipal and residential installation of small-scale wind turbines, of which there are many options and designs such as those in the new Eastwood Middle School on the Mileground.

Residential and Commercial Energy Consumption:

* The city should find ways to encourage more businesses (like the Book Exchange next to Kroger’s Market on Patteson), WVU, and perhaps other organizations like churches to emulate the city and install panels as well.
* Consider purchasing electricity through Arcadia Power (or similar) in order to offset electricity used created by natural resources with electricity produced by renewable sources (such as wind and solar).
* Have specialists from WVU evaluate these possibilities of installing wind power structures adjacent to Morgantown for low cost (after initial investment) and GHG-free electric power, and investigate possible private-sector investments in such projects, especially as coal supplies decline in the region.
* Provide incentives for existing commercial entities to meet minimum energy consumption and suggest methods to achieve this (ICLEI members can provide many ideas for this).
* Require any new construction to meet minimal standards for solar capacity and energy consumption or a minimum LEED rating.
* Evaluate the potential for introducing a municipal carbon tax or fee.

Public involvement:

* The city could organize a group from the community including WVU to write, publish, and post on the internet a guidebook for Morgantown residents that explains the issues of GHG emissions and .individuals, families, and groups to reduce their own GHG footprint.
* The city could also hold some public meetings, with reports in the Dominion Post, to inform residents of its actions for GHG reductions, perhaps with an outside speaker who could comment on them.
* The city could also hold some “GHG Free” events, such as stopping traffic on the main roads and having a bicycle day, with shops having booths and children’s events and so forth to popularize the GHG reduction efforts.
* The city could also encourage schools, churches, and other social groups to recognize the dangers posed by global warming and to make efforts to educate their students and members.

**3. Reducing source-based emissions:** The Downstream Strategies GHG inventory shows that the main energy source emitter of GHGs within the jurisdiction of the city is the coal fired Morgantown Energy Associates power plant. Any effort the city could make in addressing the emissions from the power plant will be a progressive and necessary step in achieving the goals of the Paris Climate Agreement. Many cities, countries, and industries are abandoning coal as a main electricity source, and we should consider following their lead. Perhaps some city council representatives could meet with representatives of MEA to discuss their long term plans in light of the growing global recognition of the need to reduce GHG emissions.

Time frame for all of these ideas:

* Some of these proposals can be implemented relatively quickly, for example in a matter of weeks or a few months, but others may need several months or more than a year to organize. The city's Climate Action plan should therefore have a sequence of deadlines that correspond to the different lengths of time necessary for these varied proposals, so that action can be taken as soon as possible to reduce GHG emissions.
* The city council should review climate action plans by other smaller towns, or other similar plans, some of which can be found at the ICLEI website and similar sources.

Oct. 2, 2017

Morgantown Green Team – Ad Hoc Climate Action Plan SubCommittee

Proposed Climate Action Plan Ideas and Proposals to Implement the Resolution in support of the Paris Climate Agreement.

On August 2, 2017, the City of Morgantown adopted a Resolution in support of the 2015 Paris Climate Agreement, as proposed by the National Mayors Climate Action Agenda. That Agreement set a goal of 26% to 28% reduction in greenhouse gas [GHG] emissions by 2025. Despite President Trump’s statement that the US will withdraw from the Agreement, the City of Morgantown joined American cities and states and countries around the world to reaffirm their commitment to the Agreement. The Resolution specified that the City commits to develop and implement a “Climate Action Plan” to reduce greenhouse gas emissions, and would encourage “other commercial, residential and public sectors to seek reductions in greenhouse gas emissions”.

Morgantown City Council and the City Manager asked the Morgantown Municipal Green Team (MMGT) to propose a Climate Action Plan. This Morgantown Climate Action Plan proposes to meet Morgantown’s share of the Paris Agreement’s objectives by reducing greenhouse gas emissions from municipal facilities by 26-28 % compared to the 2005 baseline.

**Greenhouse Gas Inventory**

The MMGT is unaware of any comprehensive greenhouse gas inventory to determine emissions for Morgantown in 2005. In 2014, a cooperative effort by the City and Downstream Strategies, completed a greenhouse gas inventory for Morgantown (Simcoe et al. 2014). For purposes of this Climate Action Plan, the 2005 baseline emissions estimates were developed from the 2014 study by applying known changes in Morgantown’s municipal facilities, policies and programs since 2005.

Tasks

1. Estimate GHG baseline since 2005. Compile list of changes in facilities, policies and programs from 2005 to 2014. (Vehicle purchases and retirements, 2011 Energy Services Contract, new buildings and building closures, etc.
2. Estimate additional improvements from IAC EE report to be implemented soon.
3. Evaluate Electric Vehicle initiative (see <https://www.bloomberg.com/news/articles/2017-03-14/cities-shop-for-10-billion-of-electric-vehicles-to-defy-trump> for details from the NMCAA)
4. Identify additional EE improvements in electricity use (City street lights, more EE projects, MUB, BOPARC, etc.)
5. Evaluate feasibility and cost of City-owned (commercial-scale solar, waste methane use, biomass fuels, etc.) renewable energy.

To encourage the commercial, residential and private sectors to reduce GHG emissions, the City could:

1. Provide incentives for renewable energy sources
2. Encourage carbon sequestration through tree planting in public and private lands.
3. Revise City zoning and transportation plans to reduce vehicle miles traveled, encourage bicycles and pedestrian travel, and promote mass transit.
4. Support local businesses in adopting energy efficiency projects (LEEP),
5. MORE IDEAS NEEDED

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**From:** Rick Landenberger
**Sent:** Saturday, October 21, 2017 5:17 PM
**Subject:** urban forest carbon sequestration

I have a copy of the 2004 Morgantown urban forest assessment (Nowak et. al. 2005). They used the i-Tree Eco (formerly UFORE) model to estimate various factors (see table below). Do you / the urban forestry committee have updated info on these variables? If so, the Paris Climate group could use them in their analysis of the city's CO2 situation.

Table 1. Summary Statistics for Morgantown’s urban forest

Feature Estimate

Number of trees 658,000

Tree cover 35.5 %

Most common species sugar maple, black cherry, hawthorn

Trees < 6 inches diameter 70.2 %

Pollution removed 104 tons/year ($711,000/year)

Carbon storage 93,000 tons ($1.9 million)

Carbon sequestration 2,900 tons/year ($60,000/year)

Building energy reduction $380,000/year

Avoided carbon emissions $18,500/year

Structural value $488 million

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Cities Climate Action Compendium (<http://climatemayors.org/actions/climate-action-compendium/> )

Albany, NY. Bike sharing. Established Mayor’s Office of Energy and Sustainability.

Austin, TX. Approved contracts to purchase 400 MW utility scale solar.

Boulder, CO. Passed a Climate Action Plan tax to fund initiatives to reduce GHG emissions. Adopted Energy Efficiency codes, requires commercial and industrial buildings to monitor and improve energy efficiency.

Cleveland, OH. 100 residential solar installs. 160 home energy retrofits Planted 50,000 trees, increase canopy from 19 to 30 % by 2040. 25 resident-led neighborhood-based projects to reduce GHG emissions.

Columbus OH. Added 167 CNG vehicles, anti-idling devices on all vehicles. Purchasing 14 % renewable electricity, goal 100 % by 2020. Urban forestry campaign to plant 300,000 trees by 2020, to raise canopy cover from 22 to 27 %

Dubuque Iowa. Solar arrays on 5 of 6 fire stations (150 kW). Resilient Communities Advisory Commission.

Kansas City, MO. Installed 25 kW arrays on 59 municipal buildings. LEED Gold required for new municipal buildings.

Knoxville, TN. LED street lights. EE upgrades to 1200+ homes.

The ideas we discussed last week include:

More ideas are welcome, and we will need to prioritize these, as well as develop specific implementation recommendations.  We also should think about how to quantify emission reductions to provide realistic estimates.

Asphalt (assume 2-inch thick at 28 ft-wide) = ~100 tons CO2e/mile. Calculated from:

Chehovits, J. and L. Galehouse. 2010. Energy Usage and Greenhouse Gas emissions of pavement preservation processes for asphalt concrete pavements. Paper # 65, In: Compendium of Papers from the First International Conference on Pavement Preservation. Transportation Research Board. National Academies of Science, Engineering, and Medicine. Newport Beach, CA.