LOUDOUN COUNTY ENERGY PLAN

Draft

Preliminary Findings dated September 2nd 2009

Prepared for
Energy and Environment Committee
Loudoun County Board of Supervisors
Meeting September 9th 2009

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Background

Recognizing the importance of energy and the environment to its overall competiveness, Loudoun County has decided to develop a County Energy Plan that will lay out a 30 years roadmap to guide its energy strategies.

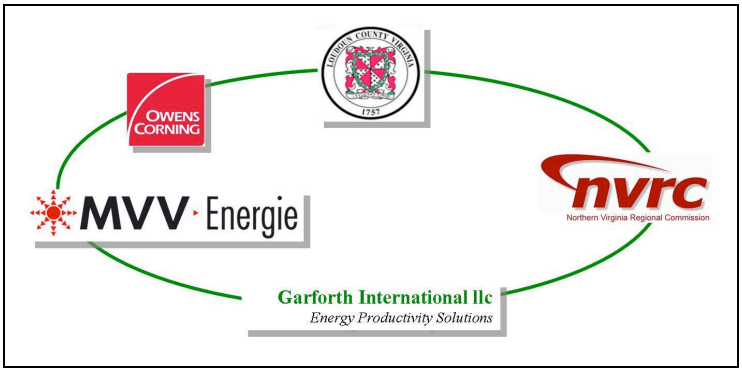
The County staff evaluated experiences from other communities in the USA, Canada and Europe. In early 2009, they participated in a full day workshop on successful community energy planning, organized under the auspices of the North Virginia Regional Commission, and hosted at the German Embassy. Among others, the successful Community Energy Planning experiences of Copenhagen, Denmark, Mannheim, Germany and Guelph, Ontario, Canada were compared and contrasted.

Loudoun started developing the CEP in July 2009, with the initial Assessment process being funded with a grant from the American Recovery and Reinvestment Act channeled through the US DOE Energy Efficiency Community Block Grant (EECBG) program. Additional EECBG funds could be allocated to Loudoun County, and the CEP includes recommendations for their use in Attachment 3.

This summary is an interim report of the CEP Team's findings to date.

CEP Team

The development of the CEP is being done by a Team that represents a mix of local, regional and global expertise, along with substantial community engagement.



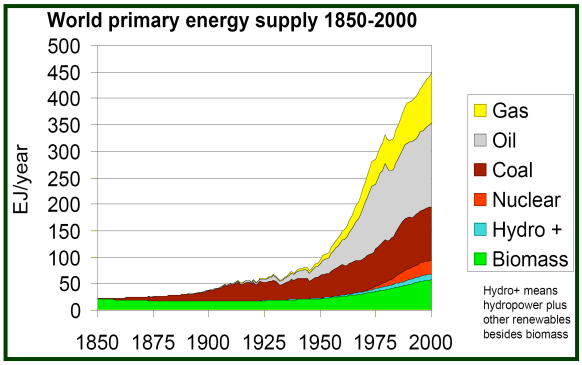
CEP Team – Local, Regional, and Global Expertise

In addition to Loudoun County Staff, the Core Team includes members that bring complimentary perspectives. NVRC brings in-depth best practice benchmarking along with a local perspective as to how the Loudoun CEP could be a catalyst for Northern Virginia as a whole. Owens Corning has wide-ranging knowledge of North American energy efficient residential and commercial construction and renovation. MVV decon GmbH, as the consulting arm of MVV Energie AG, applies its knowledge of highly-efficient municipal energy and water systems as the multi-utility service provider in its home town of Mannheim and six other German cities, and also as advisor to cities and countries globally. Garforth International provides a global and local business view to the integrated CEP recommendations. Dominion Virginia Power, NOVEC, and Washington Gas are also actively engaged with the CEP Team.

1. Energy and Climate Overview

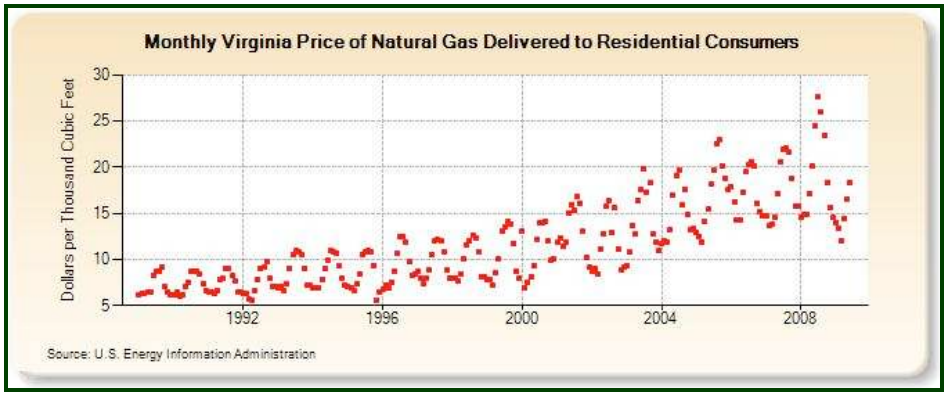
There is an accelerating global trend that is changing the face of the energy markets worldwide, creating high value market opportunities and employment. Loudoun County is well-positioned, along with its neighbors in Northern Virginia to become a globally recognized region serving the needs of the growing green economy and the wider environment.

Since the early 1800s, plentiful availability of low cost energy enabled the USA and the world's other industrialized countries to achieve high levels of well-being and prosperity.



Worldwide Use of Energy from 1850 to 2000

Over the past fifty years, energy demand has increased fivefold, with the expectation that it will double yet again within the next twenty years. In the last decade, there have been increases in energy costs, accompanied by extreme volatility. As US imports of energy grow, the nation is increasingly exposed to the full force of global energy market pressures with the likelihood that energy costs will continue to press higher accompanied by high levels of uncertainty.



Residential Natural Gas Prices in Virginia

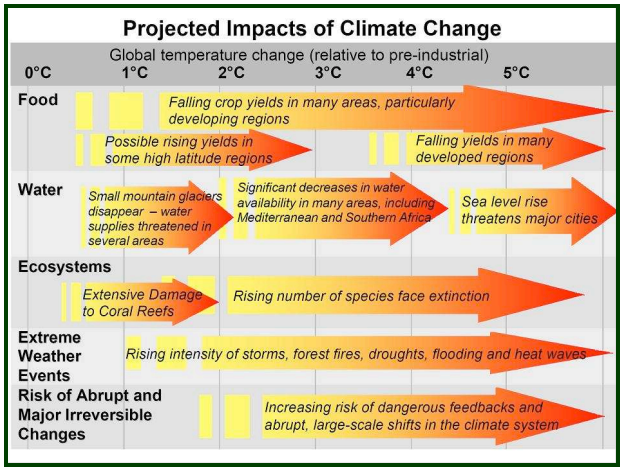
This trend is well exemplified by the steady increase in both volatility and the average price of natural gas charged to homeowners in Virginia shown above. Since 1990 prices have tripled along with a substantial increase in uncertainty.

Region	Population	GDP	Energy	Energy /Capita	Energy /GDP
USA	4.6%	25.9%	20.5%	*100*	*100*
EU	7.5%	31.1%	15.9%	*47*	*60*
Japan	1.9%	8.1%	4.6%	*54*	*67*
China	20.0%	6.1%	15.0%	*17*	*312*
India	17.1%	2.0%	4.7%	*6*	*291*
World	100%	100%	100%	22	81

Comparison of Energy Use by Major Global Regions

The USA uses substantially more energy than many other major regions of the world. Relative to the European Union it uses more than twice the energy per person and about 70% more for each unit of GDP. On a national energy bill well in excess of $1 Trillion, this represents a huge productivity opportunity for national, state, and local economies.

The probable contribution of the human energy use to climate change is increasingly reflected in international, federal, and state legislation.



Possible Impact of Climate Change on Various Natural Systems

At least 70 percent of greenhouse gases caused by humans come from the use of energy, the balance coming from industrial processes and land-use. At 23.6 metric tons per inhabitant, the USA has the second highest level per capita greenhouse gas emissions in the world, representing both an environmental challenge and an opportunity.

At a local level both Virginia and the Washington Metropolitan Area have produced roadmaps aimed at enhancing the region's competiveness and reducing its environmental impact through the ways energy is sourced or used. In the US Congress, the American Clean Energy and Security Act of 2009 has passed the house and comes into law as early as next year. This Act proposes a wide range of energy efficiency and energy supply measures, again aimed at improving supply security and reducing greenhouse gas emissions.

The USA has responded to the 2008 recession, as have other countries, by targeting portions of stimulus budgets towards creating green jobs and new business aimed at reducing energy use and impacts. This, combined with the wider global restructuring trends associated with energy

use, is creating a unique window of opportunity for Loudoun County to adapt their own communities to these new realities and developing new businesses around this market.

2. Energy Challenges for Urban Communities

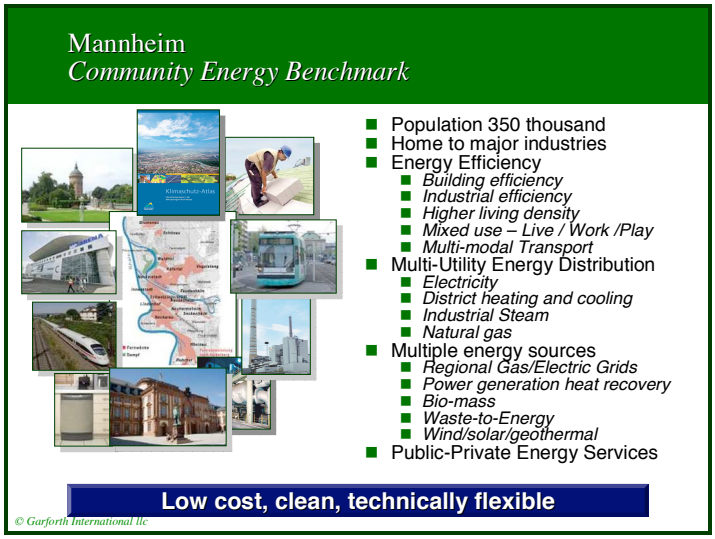
The competitiveness of communities will increasingly be defined by how effectively they use energy, water, and other natural resources.

The demands of economic and population growth strains both fuel supply and the available capacity of transmission grids, as well as the costs of gas networks delivering energy to cities. Virginia and its electrical utilities, including Dominion Power, recognize the need to reduce peak demands and move the investment center of energy service closer to communities and their final end use. Gas companies also recognize the need to rethink their business models under multiple financial and environmental pressures.

Over half of the world's population lives in cities; in USA this is closer to 77%. Well over half of all of the energy used in the USA is for the homes, buildings, and transportation needs within urban communities. Homes and buildings alone account for about 40% of all energy used and consume 70% of all electricity. Transportation accounts for about 30% of the US energy use on average, a ratio that increases in the urban environment, mostly from road vehicles.

Energy is a major part of the cost and resources needed to treat and distribute water, and as such should be included within the general scope of the County Energy Plan. The USA is by far the largest water user in the OECD countries, with a per capita usage of about 61 thousand cubic feet per year, compared to an OECD average of 32 thousand. Germany as an example uses 16 thousand cubic feet. Per capita water use in the USA continues to rise unlike the reducing trends in many other countries.

In developing the CEP, the Team compared the performance of Loudoun County against communities globally recognized for their high levels of energy productivity and greenhouse emissions. This comparison will be detailed in the final report.



Summary of Mannheim, Germany – One of the CEP Benchmark Cities

Mannheim, a highly industrialized city in southern Germany with a slightly larger population than Loudoun County, has per capita greenhouse gas emissions of about one third those of the Washington DC Metro Area, despite a heavy reliance on coal fired electricity. In another example, the greenhouse gas emissions per capita for the Washington Metro are above 19 metric tons, while those in Copenhagen, Denmark are less than 3 metric tons. This is an astonishing difference even allowing for lifestyle and climate differences. In 2009, Copenhagen was rated to be the second most livable city in the world with a thriving, innovative economy combined with an attractive competitive lifestyle. Both Mannheim and Copenhagen have highly reliable, technically flexible, competitively priced energy.

These cities had succeeded in seamlessly integrating efficient buildings, served by district heating and cooling utilities in addition to electricity and gas, with energy supplies sourced from a wide mix of clean, renewable and traditional energy sources. Transport energy use is reduced through efficient urban design combined with multi-modal transport options including the efficient use of the private car.

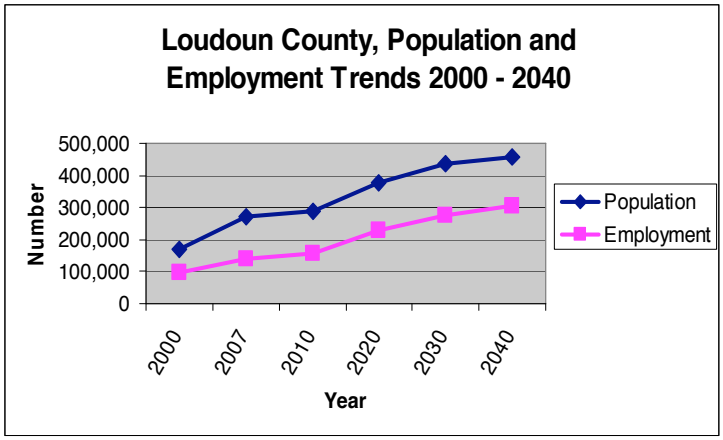
American communities are increasingly recognizing that their quality of life and competitiveness will be significantly influenced by how effectively they manage their energy and water needs as they grow and thrive long into the future.

3. Loudoun County Growth to 2040

Loudoun County's planned growth creates major opportunities for innovative and effective energy solutions both reducing costs and environmental impacts

Loudoun County has 271,177 inhabitants and about 140,637 local jobs. It is a part of the Washington Metropolitan Area and includes a large part of Washington Dulles International Airport within its boundaries. It is one of the most successful regions of the USA in attracting new business, with employment having grown by over 75% between 2000 and 2008.

The County is an interesting mix of rural areas and small towns with historic neighborhoods covering most of the region, combined with rapid suburban growth mostly concentrated in the east and along Highway 7. The County is committed to preserving its attractive rural and historic features, while providing a thriving environment for business and population growth.

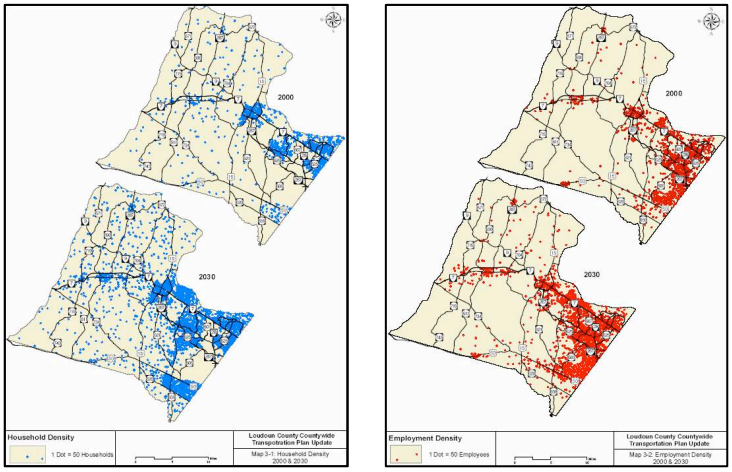


Loudon County Anticipated Population and Employment Trends 2000 to 2040

The population is expected to grow by 69% to 458,162 by 2040. The County has a highly professional and successful economic development process with a proven track record. Going forward, local employment will grow by 116% to a total of 304,896 by 2040.

To support this growth, the County will add over 75,000 housing unit to the existing base of about 100,000, and over 73 million square feet (6.8 million square meters) to the existing 69 million square feet (6.5 million square meters).

In 2000, 45% of Loudoun residents worked in the County. About 39% traveled from Loudoun to Fairfax County and 21% traveled from Fairfax to Loudoun to work. The balance traveled to more distant employment. In the current plan the jobs/capita ratio changes from 1.93 in 2007 to 1.5 to 1 in 2040). Juxtaposing clusters of centers for population and employment on maps offers the following visualization of live / work realities in the County:



Household and Employment Density 2000 and 2030

This combination of densification of neighborhoods clustered around local employment has positive energy impacts. Denser neighborhoods are intrinsically more energy efficient, even without changes in building codes and energy supply strategies. Average journey lengths for both commuting and local travel will be shorter, reducing the transportation energy needs.

In terms of traffic, Loudoun County's roads had a daily total of about 6.3 million vehicle miles in 2007, in many cases on roads beginning to approach congestion levels. In addition to planned highway developments, the Silver Line extension of the Washington Metro will add three stations in Loudoun County by 2016 reducing the reliance on individual vehicle traffic along the critical Dulles Corridor.

4. Developing the Loudoun County Energy Plan

Success results from long-term consistent community engagement and leadership committed to deliver breakthrough energy results supported by sound local practices.

The county's rapid growth combined with the global shifts in the energy market present unique opportunities and risks around energy as a result of increasing density, changes in transportation patterns, and the impact of local employment. The wider changes also open new energy-related business opportunities that will be accelerated by innovative local approaches to energy productivity.

Starting in July 2009, Loudoun County committed to develop an Energy Plan that will ensure its long-term competiveness and environmental performance. There will be a series of community and stakeholder meetings held during September 2006. The final plan will be submitted to the County Board of Supervisors for approval.

To avoid the risk of the CEP becoming a purely visionary exercise, it has been developed very much with effective implementation in mind. Specific short term "next steps" projects and broader policy recommendations will be included. These recommendations will be of sufficient reach and scale to ensure they are prototypical for the County (or even the wider region) as a whole.

The CEP Team evaluated municipal success stories in Canada, Europe and the USA to adopt and adapt the best ideas. The common threads in all these success stories was the importance of taking a multi-decade view; having community leadership in place that ensured consistent implementation of basic strategies year-after-year; and viewing the energy supply to the community as a single integrated whole.

Underlining the need for long term engagement that extends well beyond the political leadership of the day, the CEP Team has also enlisted the assistance and input of a CEP Advisory Board whose members are senior leaders of business and acadaemia in the County. The list of members is included as Attachment 1.

Recognizing this need for a long-term commitment built on tangible and immediate next steps, the CEP has a planning horizon from a baseline year of 2007 to 2040.

The CEP builds on a number of existing land-use and economic development plans and should be seen as a complimentary "layer" to existing planning. Wherever possible, the CEP used existing assumptions around growth and land planning. Where adjustments could bring clear energy or climate benefits, these will be recommended.

5. Existing Community Expertise

Loudoun County has a wealth of community, academic and business expertise and enthusiasm already committed to transforming the energy performance of the region.

Successful implementation of the Community Energy Plan will ultimately depend on the motivation and support of the community. There are many Loudoun-based and regional organizations already making improvements that can potentially impact the entire community. The community is fortunate to have this expertise and the enthusiasm that these organizations can bring to ensure the CEP delivers on its commitments.

As part of gathering the existing data at the start of the energy planning process, the CEP Team made an effort to identify what resources and programs were already available within the County as a whole. The results were impressive and the full listing is included as Attachment 5. This summarizes the Community Assets that already exists. They include funding sources, local businesses, local schools, universities and colleges, non-governmental organizations with an energy focus, educational initiatives, and local government programs. Every effort has been made to ensure this is an accurate summary at the time of preparing this draft. With the help of the Community Workshops and the Advisory Board this will be reviewed for completeness in the coming weeks.

Into the future, this will be the basis of a resource guide that will be regularly updated to help businesses, organizations, and individuals benefit from improved energy productivity.

6. Energy Vision Supporting Economic Development

CEP Vision

Loudoun County will always have reliable and affordable energy, be energy efficient and reduce greenhouse gases.

This proposed CEP Vision is straightforward and addresses the three critical dimensions of a world class energy strategy:

1. Reliability
2. Affordability
3. Environment

This clearly supports the Economic Development Vision:

"Our Vision is to be an innovative, globally competitive economy known for its favorable business environment, exceptional quality of place and strong sense of community"

The CEP Team is proposing that the energy commitment be added to the competitive edges used to attract investors and residents into Loudoun County:

- Recognized Center for Innovation
- Prosperous Business Environment
- High Quality of Place
- Sound Fiscal Health
- Favored Visitor Destination
- *World-class Energy Strategy*

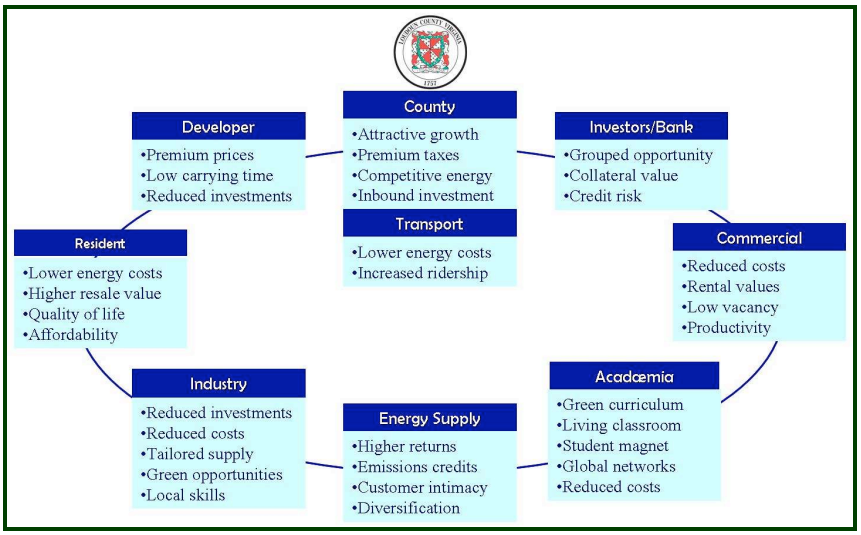
Affordability also addresses the critical need to develop an approach that removes the risk of energy poverty for lower income residents. The CEP Team will be seeking input and opinions from multiple sources before finalizing the recommended wording for the CEP Vision.

7. CEP Goals

1. **Loudoun County will be recognized as a location of choice for investment in part because of its innovative energy strategy.**
2. **Loudoun County will have consistently lower energy costs relative to surrounding areas and inbound investors needs.**
3. **Loudoun County's greenhouse gas emissions will be among the lowest in the world.**
4. **Loudon County will be recognized as a Regional-State-National role model of effective energy and climate management.**
5. **All major investments will visibly contribute to meeting the CEP goals.**

Each goal will have long-term measurements that will be consistently tracked relative to a 2007 baseline with regular formal and informal reporting to the local community at large, to the investment community worldwide, and to the local political, business, and academic leadership.

Successfully achieving these goals brings tangible financial, social, and environmental benefits to residents, business, academic institutions, transport services, developers and builders, banks, investors, energy suppliers, and of course, the Towns and County as a whole.



Benefits of Community Energy Approach

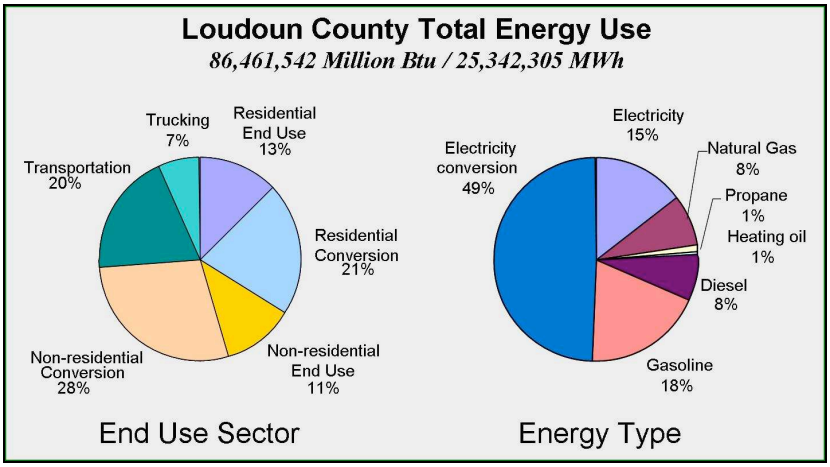
With the high likelihood of US Federal Cap-and-Trade Legislation the monetization of the emissions credits from avoidance of greenhouse gas creation becomes a possibility. This potentially can accrue to any or all of the players highlighted above.

The CEP Team will be seeking input and opinions from multiple sources before finalizing the recommended CEP goals and associated measures of success.

8. Loudoun County Energy and Greenhouse Gas Baseline

a. Energy Use and Supply

During 2007, the 271,177 inhabitants of Loudon County used a total of 25,340 gigawatt-hours (GWh) of energy of all types for homes, work, and vehicles. In the more familiar US measures, this translates to 86,472 Billion British Thermal Units (Btu). Throughout the CEP, both American and International units will be used to simplify comparisons with global best practices.



Loudoun County Energy Use in 2007

The energy used by the County breaks into two parts. About 44% is used in the County as electricity, transportation fuels, and natural gas and other heating fuels. The remaining 56% is

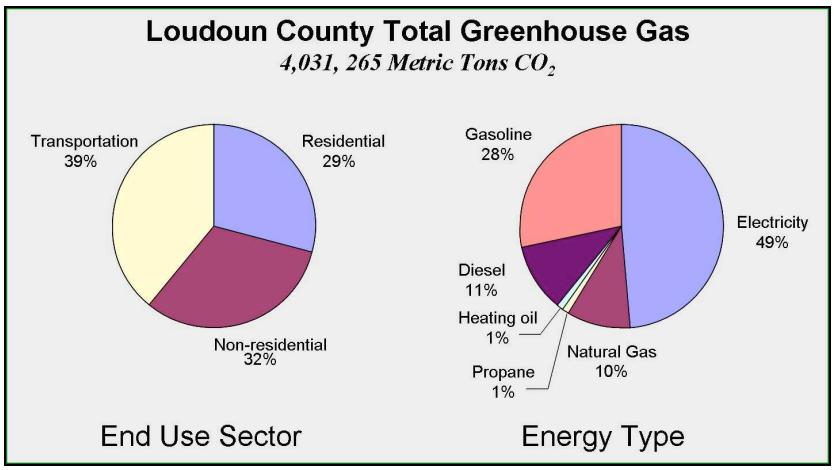
consumed outside yet is a direct result of the County's activities. Nearly 50% is the energy consumed as heat and line losses to make the County's electricity. The remaining 7% is an estimate of the portion of the diesel fuel used by long-haul trucking to serves the needs of the County.

The County's 100,000 homes account for 34% of all energy used by Loudoun County. A further 39% serves the 69 million square feet of other buildings including offices, data centers, shops, hospitals and public buildings. The balance, 27%, is for local and trucking transportation. There is no significant industrial use of energy. Collectively homes and buildings account for over 70% of all energy use.

An average of about 318,900 thousand Btu / 94,000 kilowatt-hours of all kinds of energy for each resident are used by the County every year. On a worldwide comparison this represents at least twice the energy used by the average European Union resident. Loudoun is relatively typical for the USA as a whole, edging towards the upper end of the range. This is not the whole picture as there is about 30% more energy consumed by national industries, defense, shipping and airlines on behalf of each US resident.

b. Greenhouse Gas Emissions

In 2007, the County's use of energy emitted about 4 million tons carbon-dioxide equivalent of greenhouse gases, creating a "carbon-footprint" of each resident of 14.9 metric tons.



Loudoun County Greenhouse Gas Emissions in 2007

Homes account for 29% of these emissions while other buildings, including the extensive data center businesses, account for 32%. The balance of 39% is from vehicle use. Light vehicles (cars, SUV's and light trucks) account for 72% of all transportation emissions and the balance comes from commercial trucks and buses.

There are currently no regulatory constraints on the creation of greenhouse gases.

Loudoun County has a relatively high carbon footprint relative to population compared with much of the rest of the USA.

c. Energy Pricing

The County along with the rest of Virginia has enjoyed some of the lowest electricity prices in the USA, which has discouraged strategic investments in both capacity and efficiency. The demands of growth, combined with investment constraints could put upward pressure on

electricity pricing in the future. Both Dominion and Novec deliver electricity to the County, under the pricing and service regulations set by the State.

Virginia has a voluntary target to have at least 12% electricity generation from renewable sources by 2022. The Virginia Energy Plan is targeting a higher 20%. Indicative national targets from President Obama's administration are 25% by 2025. The Senate Energy Committee target recommendation is 15% by 2025. As a non-US reference point, the EU achieved 16% renewable electricity in 2006, with a target to reach 21% by 2010, and 30% by 2020.

Washington Gas and Light delivers natural gas to the County. As mentioned earlier, prices have been on a steady upward trend, though currently they are relatively low. The future outlook is for prices to continue to climb accompanied by significant short term unpredictability.

d. Homes and Building Energy Efficiency

Loudoun's overall energy use has a high potential for reduction. When compared to global best practices, early indicators are that homes use about 250 kWh of energy each year for each square meter (about 10 square feet) of finished space. Current best US or EU practice would be between 125 and 175 kWh.

In the non-residential sector, the CEP Team still needs to separate the data centers' energy use from the rest of the non-residential property to get valid performance indexes. The Loudoun County assessment of their 145 county buildings gives an index of about 225 kWh per year per square meter, again substantially higher than comparable EU practice or US best practice.

Currently Virginia has energy related building codes based on the 2006 IECC Residential and 2004 ASHRAE Commercial recommendations for new construction. In US terms these are mid-range standards. Some updating is expected in 2010 with about a 10% overall efficiency improvement. How this will develop over the 20 to 30 years of the plan is uncertain, with both ASHRAE and the Federal Government aiming to set targets of 30 to 50% reductions in two to three decades. As indicated earlier this would bring Virginia in the range of the current California and EU performance.

On present outlook, renovation, as opposed to new construction, could be expected to be about 15% more efficient for most of the CEP period. Compliance is also a major factor and further inefficiencies of at least 5% must be assumed.

Other loads in buildings such as appliances, entertainment equipment, and so on, will probably become somewhat more efficient. The open question is whether deep stand-by efficiency requirements will come into force in Virginia.

In general, this represents the "Base Case" used in the CEP for future construction and operations of homes and buildings.

e. Transportation Energy Efficiency

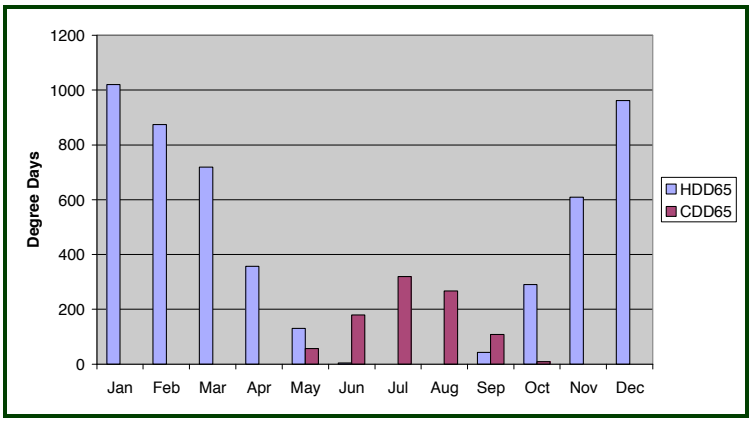
The initial indications are that light vehicle emissions are 510 grams CO2 per vehicle mile or 316 grams per vehicle kilometer compared to a US average of about 280 grams/km, and the current EU average of 160 grams/km. On a per capita basis, transportation produces more than one-third of all emissions, a much higher percentage than for many urban areas around the world.

There are many variables that affect a community's transportation energy use, making the final selection of "Base Case" for the CEP a challenge. It will assume limited changes in the

dominance of the individual vehicle for personal and commercial transport. On this basis the GHG per capita will remain reasonably constant in the "Base Case".

f. Climate

Loudoun County's climate has 5,010 heating and 940 cooling degree days per year referenced to a 65 deg F outside temperature. This indicates the heating and cooling needs over a full year.



Heating and Cooling Degree Days at Dulles Airport

The climate is relatively challenging with significant winter heating needs and substantial summer cooling needs with a relatively high humidity. The CEP will look very closely as to how the heating and cooling needs of homes and building can be met both more economically and environmentally cleaner.

g. Neighborhood Developments

The planned pattern of growth of much of the County is an important part of the Baseline Assessment. Much of the new development will be creating denser, walkable neighborhoods, many served by a variety of transportation choices. This kind of "Smart Growth" blends a range of housing choices with local shops, places of work, and entertainment.

Typical North American Smart Growth Development

This is an accelerating trend in the USA. Loudoun County with its clustered growth patterns and growing access to the Metro transportation system is well placed to benefit. These kinds of neighborhoods also have a great potential to be highly innovative when it comes to energy

sourcing distribution and efficiency. When included in the early planning, the energy needs of these developments can easily be 40 to 50% less than normal, with even higher greenhouse reductions, with good economics and reliability.

In current planning requests, there is no evidence of systematic integrated energy planning, nor is there anticipation of the much higher densities that appear to be gathering market appeal elsewhere in the USA.

h. Renewable Energy Sources

With current technology, the potential for wind generation is poor based on wind resource mapping from NREL. The solar potential to generate electricity is reasonably good and will be a valuable part of the overall CEP. The rural nature of much of the County makes it a clear candidate for converting agricultural waste into various forms of bio-fuel for both heat and electricity generation. Currently there is a negligible amount of renewable energy generated in the County. The CEP "Base Case" will assume limited additional renewable energy in the County.

9. Loudoun County Energy Plan

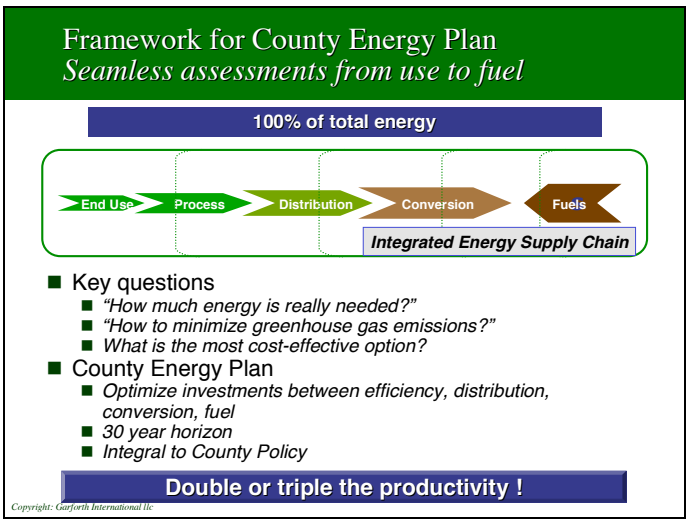
a. CEP Framework

The basic conclusions from the Baseline Assessment are that there is a substantial opportunity to systematically reduce the energy and greenhouse gas footprint of the County.

The CEP will be finalized using the following priorities:

- Maximize the energy efficiency in homes and buildings
- Maximize the energy efficiency of transportation
- Maximize the use of clean combined heat and power
- Maximize the use of economically viable renewable energy sources
- Minimize the peak and average load increases to the existing electricity grid

These need to be viewed as a whole, implemented over many years.



Holistic View of Energy Use and Supply Planning

In the past, the tendency has been to view energy use in a fragmented way, rather than looking at the whole chain. At the level of an individual building or vehicle this is understandable. At the level of a region, far greater benefits can be gained by viewing the entire chain from end use to the choice of source or fuel as a single seamless total. Communities that approach achieving this seamless integration, which always takes some years to do, will typically double or triple the overall effectiveness in the way they use energy.

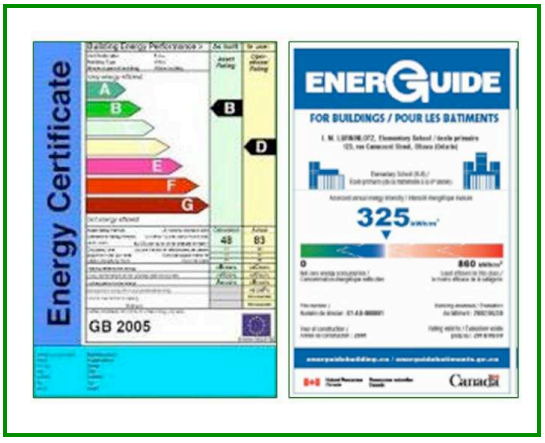
The final CEP will have a detailed set of recommendations summarizing not only the recommended technical measures, but also the community engagement, policy, business and institutional changes that will be the key to success. A few critical support measures are summarized at the end of this section.

b. Maximize the Energy Efficiency in Homes and Buildings

Efficiency has the potential to meet all of the energy needs of the planned residential and non-residential growth from 2010 to 2040.

This could be achieved by the following measures:

- Set a target for new construction to be 30% more efficient than the State Energy Code from 2011, a level approaching California today.
- Set a target for all major renovation to be at least 25% more efficient than the current County average from 2011.
- Incrementally increase efficiency targets by about 1% per year, probably in three to four year intervals.
- Create a program where all homes and buildings will have a current Energy Performance Label whenever sold or rented giving transparency to actual consumption of both new and existing structures.



Energy Performance Labels- EU and Canadian Examples

These measure systematically applied would provide all of the energy needed for the County's growth. Currently building codes are a State jurisdiction. A topic for the various input meetings will be the available incentives, voluntary and planning mechanisms available for the County to capture this benefit without jeopardizing competitive development. This could include teaming with providers of efficient construction financing and mortgages.

c. Maximize the Energy Efficiency of Transportation

The County has the potential to meet all of the community's transportation needs and to halve the per capita greenhouse gas emissions from 2010 to 2040.

This can be achieved through a combination of the following measures:

- Reduce outbound commuting by the successful growth of local employment.
- Develop mixed-use neighborhoods to encourage shorter commutes, walking and cycling.
- Develop transit oriented mixed-use neighborhoods encouraging use of mass-transit and local walking and cycling or short drives to transit hubs.
- Encourage smaller vehicles through urban design and parking strategies.
- Encourage clean diesel, diesel/gas hybrid vehicles or all electric through provisions of appropriate infrastructure.

Transportation is a major challenge for Loudoun County, both in terms of the economic and environmental costs, but also to the perception of livability in the eastern growth areas. Even if the above measures are successful in halving the emissions per capita, the overall emissions of the County will only be reduced by about 15%, suggesting even more aggressive approaches may be appropriate in the future. This will also be a topic for the community input meetings.

d. Maximize the Use of Clean Combined Heat and Power (CHP)

The County has the potential to obtain a high percentage of its heat and electricity needs, as well as reduce peak electricity demand on the grid, through the implementation of clean distributed combined heat and power generation.

This can be achieved through a combination of the following measures:

- Use district energy to supply heating, domestic hot water and cooling to higher density new developments thereby enabling both CHP and heat recovery from other sources.
- Make district energy available in medium to high existing neighborhoods targetted for revitalization thereby enabling both CHP and heat recovery from other sources.
- Evaluate economic and environmental benefits of using distributed CHP on single developments larger than approximately 100,000 square feet.
- Constantly monitor the emerging potential for economically viable micro-cogeneration for suitability of large scale deployment in lower density neighborhoods and to supply smaller single developments.

Implementing district energy, combined with CHP and efficient construction, is a proven way to dramatically reduce total energy needs, to avoid much of the current high levels of electricity conversion losses, and to provide lower cost, reliable heating and cooling services. However, it needs to address a number of overlapping challenges from the standpoints of the developer, the existing utilities, current public service regulation, land planning, and end-user perception. Overcoming these will be a topic for community input from the workshops.

e. Maximize the Use of Economically Viable Renewable Energy Sources

The County has the potential to supply at least 25% of it summer peak cooling demand and a significant portion of its winter heat base load from renewable sources.

This can be achieved through a combination of the following measures:

- Establish a program to deploy at least 25 million square feet of Solar PV across the County by 2040.
- Compliment the heat and power sources with biogas CHP or biomass boilers as District Energy and CHP become more widely deployed.
- Defer any decisions on investing in wind energy, other than for purely educational reasons, until the technology becomes much more cost effective.

This is a classic "chicken-and-egg" situation. To make a substantive and valuable contribution to reducing summer grid peak demand, PV needs to be deployed in large quantity. Traditionally PV initiatives have supported small individual installations. The CEP will make final recommendations as to how to break this logjam. Similarly with biomass the market needs to first be heat and CHP friendly before biomass or biogas can be deployed in a scale large enough to affect the total footprint of the County, and to encourage entrepreneurial investments. Both of these challenges will be topics for the community input sessions.

f. Reduce Peak and Average Load to the Existing Electricity Grid

The combination of efficiency, district energy, CHP, and renewable energy outlined in the CEP will ensure future demands on the regional grid will be less than today and still support growth plans.

In the very short term, this goal may not be achieved, but as the full effect of the various strategic implementations kick-in, the overall demand on the regional grid will initially stabilize and ultimately begin to be reduced. The final CEP will establish the time line for this evolution.

g. Critical CEP Support – Greenhouse Gas Monetization

The combination of efficiency, district energy, CHP, and renewable energy outlined in the CEP will create significant emissions reductions that have potential trading value.

The implementation of a County-wide multi-year integrated energy plan can result in an annuity-like flow of tradable energy and environmental benefits. These benefits might include sales of excess energy, both renewable and conventional; tradable emission reductions; emission reduction credits; energy efficiency credits; renewable energy credits; and tradable tax credits.

The current greenhouse footprint of about 4 million metric tons could easily double in a business-as-usual scenario, as opposed to stabilizing and reducing in the CEP scenario.

To ensure the basics are in place to have a robust monetization strategy, the following steps should be considered:

- Put in place systems to identify and track sustainability projects at a very early stage.
- Consider non-traditional ways to extract value from off-book environmental and energy assets including collaboration with other counties, NGO's, the private sector, or some combination.

- Form an Energy and Environmental Trading Team, after approval of the CEP.
- Immediately develop a priority list of tradable GHG emission reductions and possibly other tradable environmental assets.

With the outlook for GHG emissions credits ranging anywhere form $10 to $100 per metric ton over the next decade, it is incumbent on the County to be prepared to gain maximum benefit from the successful implementation of the CEP.

h. Critical CEP Support – Other

Successful implementation of the CEP will require community wide engagement around education, commitment, policy, institutional, and business aspects related to energy.

The CEP will make recommendations and alternatives to address the following critical implementation aspects:

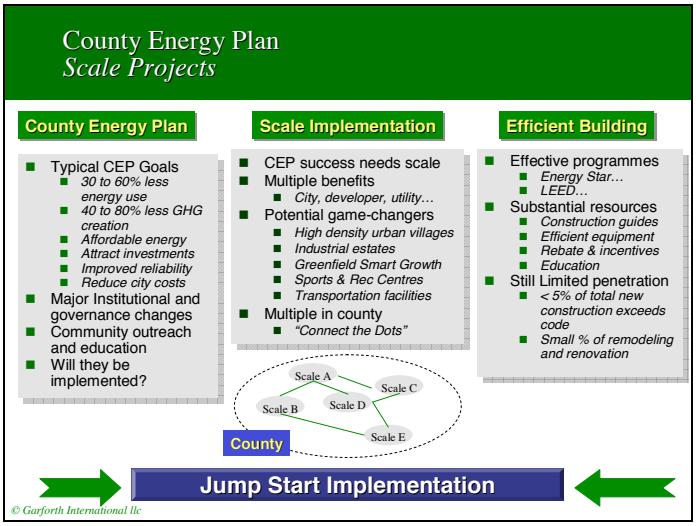
- Public education and engagement
- Planning and land use
- Multi-utility energy services ownership and operation
- Accessing grants and other support mechanisms
- Collecting and reporting results
- Updating future targets

These topics will be raised as specific areas for discussion during the community input sessions.

10. Accelerating CEP Implementation with Scale Projects

Successful long-term achievement of the breakthrough benefits from the Loudoun County Energy Plan will depend in part on successfully kick-starting the energy structures through "Scale Projects".

In the USA, a growing number of counties and cities are developing energy and climate plans. A key question is the extent to which even the best of these will deliver on their targets. Loudoun County is clearly committed to the CEP delivering sustained breakthrough results.



Scale Projects Jump Start Effective Implementation

The role of Scale Projects is summarized above. The CEP has targets shown on the left aimed at achieving breakthrough energy and greenhouse gas creation reductions delivering a world-class competitive and attractive community.

As outlined in the preceding paragraphs, delivering these involves tackling the overall efficiency of homes, buildings, transportation, and restructuring the shape and maybe even institutions of energy supply and land planning. These are daunting tasks. All too often, once the scope of these challenges becomes apparent, CEPs stall and become little more than visionary statements of intent, with little implementation success.

At the same time, as indicated on the right, many excellent programs encourage efficiency in individual homes and buildings, through raising awareness, providing implementation guidelines and various training and voluntary rating programs. Examples are Energy Star, US Green Building Council among many, including public utilities which have excellent energy saving guidelines for all users. These all offer excellent material and have done a great service in raising general awareness of the opportunities and solutions available. However, implementing the CEP "one building at a time" will not successfully deliver the break-through results of the CEP.

Scale Projects bridge this gap. They are developments with the size and timing such that "new guidelines" in line with the CEP can be applied within relatively large, but contained boundaries. They are large enough to address both energy demand and supply within a single project. Over time, multiple Scale Projects blend together. This "connecting the dots" creates the County-wide results demanded by the CEP.

In general, the expectation would be that these CEP Scale Projects would use at least 30 to 50 percent less energy than would be the case with "business-as-usual" and would create 40 to 70 percent less greenhouse gas emissions.

The following two examples from Loudoun County were analyzed at a high-level for their potential to reduce energy usage substantially less than the norm or have the potential to be natural anchors for wider energy transformations - or both.

To ensure there is clarity, the following have been identified by the CEP Team as potentially proto-typical CEP Scale Projects. No agreements with the owners, developers, utilities, or public

authorities have been sought. They should be treated as characteristic examples for the purpose of this document.

The recommended next step is to evaluate these projects further with the interested parties with the aim to develop a Decision Level-Integrated Energy Master Plan (IEMP) for the relevant Project covering at least 25 years into the future. The IEMP would evaluate in detail the economic, environmental, and energy reliability impacts of alternative energy approaches. It would also assess the risks associated with various environmental, common, and legislative scenarios. The IEMP would also identify the possible changes that might be needed in terms of planning permissions, energy supply management structures, and community outreach and education.

Assuming the Decision Level IEMP were sufficiently attractive, the subsequent detailed planning, design, investment, construction and operating steps would be implemented for the benefit of both the immediate Project, and as a stepping stone to the wider CEP implementation.

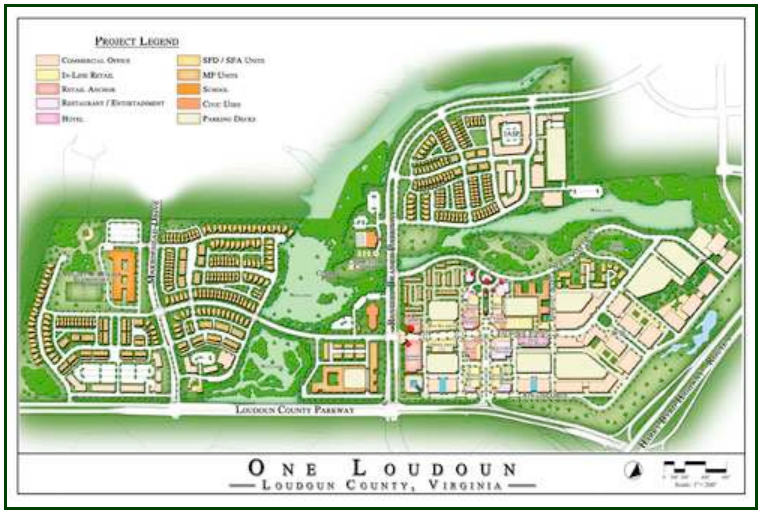
Example Scale Project 1: Commercially Focused Urban Village

(This is adapted from the existing plans for the "One Loudoun" Development.)

Overview

"One Loudoun" is a 358-acre mixed-use business, residential, and retail community located at the intersection of Route 7 and Loudoun County Parkway. The current plan calls for over three million square feet of office space and 700,000 square feet of retail space. "One Loudoun" may include a complimentary residential neighborhood with about 1000 market rate homes in a central park setting with walking trails, a town center, hotel, and public and civic spaces.

A key feature of "One Loudoun" is the "World Trade Center Dulles Airport," at the site's eastern edge. The World Trade Center Dulles Airport will host service organizations whose collective goal is to help foreign companies establish operations in the region. The Trade Center is projected to generate up to 14,000 new jobs for the region, serving as a powerful economic development engine by promoting both international trade and investment from around the world. The site is expected to be fully built-out by 2040, depending on overall market conditions.



Land-use Concept for One Loudon

This was chosen as one of two examples that were evaluated in some detail by the CEP Team, and compared by a "Base Case" and a "Future Case" scenario.

Energy Narrative

Before summarizing the assumptions used in the energy configuration of the site, a comment on density of construction is needed. A rapidly accelerating market trend across the USA is the demand for so-called "Lifestyle Developments" where residential, commercial, and retail activities are combined. The experience of the developers is that densities can be higher than first thought acceptable, as people discover the attractiveness of a more urban lifestyle with walkable neighborhoods.

Based on experience from other developments, the CEP Team is recommending an increase in density from the Base Case to the Future Case. Increasing the housing from the planned 1,040 units to 1,540, and the commercial/retail development from the 4.44 million sq ft to 6.66 m sq ft has positive impacts from an energy standpoint and likely reflects the true face of the growing market trend.

For energy, the Base Case assumed all energy delivered to the development was from the existing regional electricity and natural gas networks, supplying individual buildings each with their own heating and cooling plant. No on-site generation of electricity or other shared utilities was assumed. Buildings were built to a code in 2011 that was nominally about 5% more efficient than the current Virginia level, and that improved over the years by an average of 1% per year. The absence of any performance certification, as is the present situation, means a degree of non-compliance will persist and this is included in the Base Case. Appliance standards as they relate to parasitic power remains unchanged, though some overall improvement in the efficiency of appliances is assumed. The market value of greenhouse emissions avoidance was assumed to be zero.

The Future Case is aligned with the overall recommendations of the CEP. Buildings are required to meet a level of efficiency 30% higher than the current Virginia Code, and in subsequent years improved by 1% per year. The development implements an Energy Performance Labelling program for all property sales and rentals, which will reduce the degree of non-compliance both in new construction and ongoing maintenance. From 2016 it further

assumes that appliances will have deep stand-by modes comparable to those being put in place now by California, Canada, Korea, Brazil, and the EU. On the supply side, the site will have district energy for both heating and cooling for the majority of the property, supplied by centrally managed energy sources, which will be a mix of CHP and grid electricity. Renewables such as PV, Solar Thermal, and Biogas blended with natural gas were estimated as an additional GHG reduction upside. This system would be owned and operated by a "micro-utility" responsible for delivering and invoicing the appropriate energy services. The market value of certified greenhouse emissions avoidance was assumed to follow the mid range estimates of NAM and the EPA.

Based on these assumptions, the following results were achieved between the Base Case and the Future Case:

- Residential energy costs for the average homeowner could be as much as 20% less.
- Commercial energy costs could be as much as 20% less per square foot.
- Construction costs were no more than 3 to 5% per square foot higher assuming the district heating and cooling systems were part of the investment capital of the "micro-utility".
- Development as a whole caused 7% less greenhouse gas emissions, or 17% with an ambitious renewable strategy.
- Each home caused 48% less greenhouse gas emissions or 58% less with renewables.
- Each non-residential building caused 39% less greenhouse gas emissions or 44% less with renewables.
- Peak demand for electricity from the regional grid was reduced by at least 20%.
- The micro-utility made over 10% Return on Investment with a positive net present value on their investments under assumptions the US passes greenhouse gas regulations as expected.

In the Future Case the site had energy and climate performance levels approaching global best practices which acted as a magnet for inbound investors looking to benefit from the growing "green marketplace" in the USA and Canada.

The combination of proximity to employment, an attractive lifestyle, and low-energy costs is also likely to create premium pricing and rentals, in turn causing faster build out with potentially higher densities. If this picture merges, the returns for the "micro-utility" would be significantly higher.

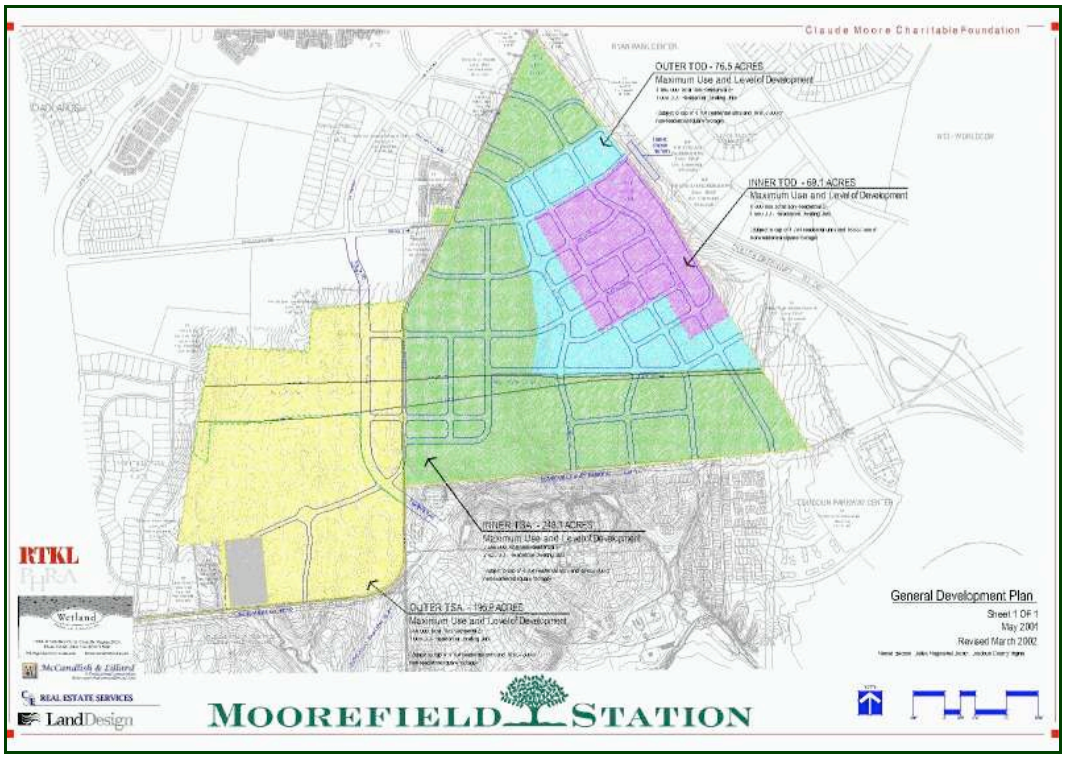
1. Example Scale Project 2 : Transit Oriented Urban Village

(This is adapted from the existing plans for the Moorefield Station Development.)

Overview

Moorefield Station, when completed, will be a 400-acre mixed-use development in Southeastern Ashburn Village, at the intersection of Mooreview Parkway and Dulles Greenway. A critical focus of the development will be the concentration of density and pursuit of transit-oriented development around the terminus of the proposed light rail "Dulles Silver Line." The town center and "lifestyle center" is fully zoned and will include 550,000 square feet of office space and 1,500 units of residential space in Phase One.

When fully built out the development is currently planned to have about 6,000 homes and 9.75 million sq ft of commercial and retail development. Currently, full build-out is estimated to be completed by 2050.



Land-use Concept for Moorefield Station

This was the second of two examples that were evaluated in some detail by the CEP Team, and compared by a "Base Case" and a "Future Case" scenario.

Energy Narrative

As for Scale Project 1, a comment on density of construction is needed. The combination of a general trend to higher density lifestyle developments, combined with the proximity to mass transit is likely to make this one of the prime locations in Northern Virginia. The CEP Team is recommending an increase in density from the Base Case to the Future Case for housing from the planned 6,000 units to 10,140, and to increase the commercial/retail development from the planned 9.75 million sq ft to 14.63 m sq ft. As before, this not only has positive impacts from an energy standpoint, it also is likely to reflect the true face of the growing market trend.

In the energy assessment, it rapidly became clear that the best approach would be to create a fully integrated infrastructure for the inner core, and then to expand it steadily as needed given the length of the build-out time.

The assumptions for the Base and Future Cases were basically identical to those used for Scale Project 1, and followed the overall guidelines of the CEP.

Based on these assumptions, and focusing on the inner core followed by step-wise expansion, the following results were achieved between the Base Case and the Future Case:

- Residential energy costs for the average homeowner could be as much as 20% less.
- Commercial energy costs could be as much as 20% less per square foot.

- Construction costs were no more than 3 to 5% per square foot higher assuming the district heating and cooling systems were part of the investment capital of the "micro-utility".
- Development as a whole caused 7% less greenhouse gas emissions, or 16% less with an ambitious renewable strategy.
- Each home caused 41% less greenhouse gas emissions, or 50% less with renewables.
- Each non-residential building caused 35% less greenhouse gas emissions, or 40% less will renewables.
- Peak demand for electricity from the regional grid was reduced by at least 20%.
- The micro-utility made about 13% Return on Investment with a positive net present value on their investments under assumptions the US passes greenhouse gas regulations as expected.

In the Future Case, the site had energy and climate performance levels approaching global best practices which act as a magnet for residents and businesses looking to benefit from the growing "green marketplace" in the USA and Canada. The combination of proximity to the Metro, local employment, an attractive lifestyle, and low-energy costs is also likely to create premium pricing and rentals.

This Scale Project will also be the example for the reduction in greenhouse gas emissions from transportation as it will have a major impact on both local and commuting use of individual vehicles. The CEP Team is strongly recommending this development for a focused long-term assessment of transportation emissions, probably led by a local academic institution. This aspect was not included in the site modelling.

Attachment 1
CEP Advisory Board

Membership as of September 1, 2009

Name	Title	Organization
Scott Hamberger	Co-founder and President	Fortessa
Ted Lewis	Principal	GeoConcepts Engineering
Tony Howard	President	Chamber of Commerce
Linda Erbs	Director	William H. Gordon Associates
Dr. Kathleen Saylor	President and CEO	Rehau
Cheryl Moore	Chief Operating Officer	HHMI - Janelia Farm Research Campus
Joe May	President, EIT & Delegate and Member	Governor's Climate Change Committee
Dr. Mark Stavish	President and General Manager	Evergreen Partners
Deborah Rosen	Director of Grants & Special Projects	No. VA Community College
Leo Schefer	President	Washington Airports Task Force
Jeff Platenberg	Ass't Superintendent, Support Services	Loudoun County Public Schools

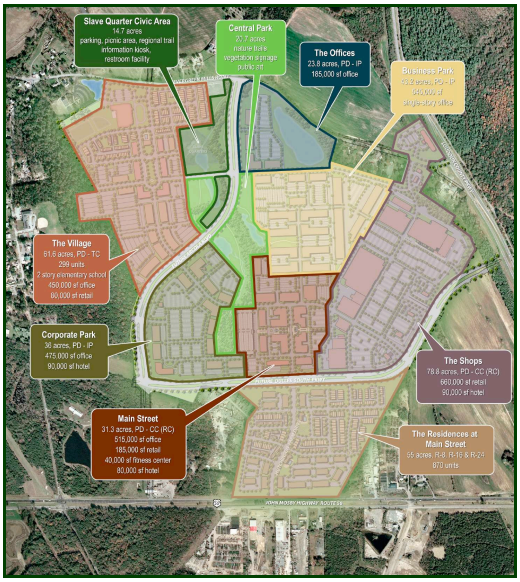
Attachment 2
Typical Scale Projects

Background

The role of "Scale Projects" in accelerating the successful implementation of the CEP is outlined fully in the Plan Summary. Two projects are assessed in some detail in the main text. However, Loudoun County has multiple projects, all of which could be potential candidate for CEP Scale Projects following a reasonably rigorous Decision Grade Assessment. The following list was developed based on the CEP Team's experiences of similar projects from around the world. While selected from ongoing initiatives in Loudoun, they are offered as typical examples rather than specific proposals at this stage.

1. Retail Focused Urban Village

This Center is a planned mixed-use residential, commercial, and retail development on 400 acres located in the south-east of the County. It will be anchored around a 670,000 sq ft Lifestyle Retail Center, an additional 400,000 sq ft of shops, about 2.1 million sq ft of commercial space, about 1,200 homes and two hotels. The Center will be a civic/cultural tourism and educational destination featuring a restored slave quarters dating from the early 1800. Full build-out is expected by 2030.



Adjacent to this retail center is the Main Street area built around a plaza with a fountain and outdoor restaurant seating. Main Street will be lined with approximately 145,000 sq ft of street level shops, restaurants, and professional offices.

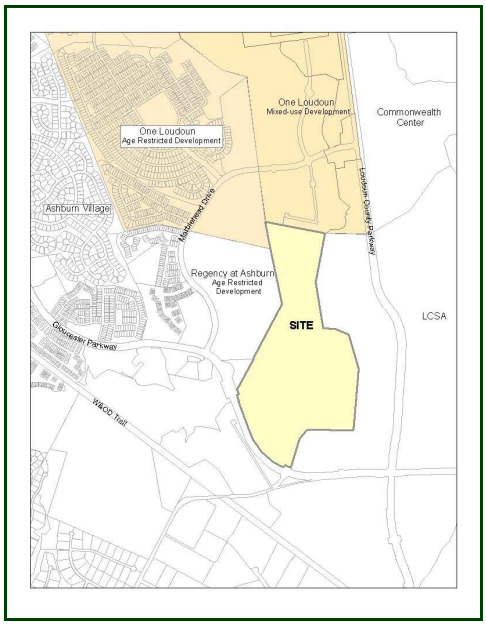
A 69-acre "Village at The Center", located to the northwest of the site, has about 300 homes in a mix of multi-family units and town homes, combined with a Village green recreation center, office space, and retail stores with second-floor office space. The Residences at Main Street, located on 55 acres fronting onto a major route, is the other residential area with a total of about 870 homes, a portion of which is designated as affordable and workforce housing.

The Center's relatively dense mix of residential, commercial and retail space offers possibilities for a significantly different approach to energy and greenhouse gas emissions. By clustering residential, retail and employment activities, there will be a need for less and shorter journeys by car, immediately reducing the transportation energy and greenhouse gas impacts, while creating more socially attractive lifestyles.

This development is one that the CEP is recommending for an immediate Decision Level Assessment similar to that which has been done for the two Example Scale Projects outlined in the CEP. There is no reason to believe that the results would be significantly different, again with the likely recommendation that there is scope for higher densities in response to both energy productivity potential and market trends.

2. Continuing Care Community

This is a 132-acre retirement community located in the south-east corner of the County near the Loudoun County Parkway and east of an existing residential community.



The current plan calls for assisted living and skilled nursing units to constitute a minimum of 15% of the total dwelling units. The development will have a maximum of 2,108 dwelling units consisting of 1,792 independent living units, 96 assisted living units, and 132 skilled nursing units, with the remaining 88 dwelling units to consist of any combination of assisted living units or skilled nursing units.

In concept, this is another, relatively dense, mixed-use urban village, and as such has similar potential for innovative efficient energy solutions. The needs of continuing care sites have some specific energy needs associated with some of the nursing and clinical functions. The cost aspects of an efficient solution for the long-term energy needs are particularly important in a development of this nature.

This development is one that the CEP is recommending for a Decision Level Assessment similar to that which has been done for the Example Scale Projects. There is no reason to believe that the results would be significantly different, again with the likely recommendation that

there is scope for higher densities in response to both energy productivity potential and market trends.

3. Transit Oriented Commercial and Retail Neighborhood

The Route 606 Metro Station is a planned station for the extension of the Silver Line into Loudoun County. It will be located near the intersection of Old Ox Road (Route 606) and the Dulles Greenway. Planned facilities at this station include a pedestrian bridge across the Greenway, bus drop off and pick up, Kiss-and-Ride lanes, and parking for 2,750 cars. The station is scheduled to begin operation in 2016.

The CEP Team recommends that this be considered as an early stage CEP Scale Project. Depending on the land ownership, it may be a candidate for Sustainable Overlay Zoning. It will naturally attract fairly high-density commercial and retail facilities, which are intrinsically good candidates for very high efficiencies combined with shared infrastructure and clean and renewable energy sources.

Its location will obviously make it a significant contributor to the reduction of transportation greenhouse gas emissions. This aspect could be extended by having a parking strategy that effectively and visibly favors local mass transit links, two-wheelers, electric cars, small cars, biking and walkability.

As it is non-residential and located close to Dulles International Airport, this could be a candidate to explore teamed energy systems with the airport.

4. Academic Campuses

George Washington University (GWU) and the Northern Virginia Community College (NOVA) have campuses in Loudoun County. The George Washington University campus occupies over 100 acres on Route 7 near Ashburn. The campus hosts centers of excellence in transportation safety, sustainable energy sources, energy efficiency and high performance computing. The NOVA campus in Sterling occupies 93 acres and supports academic programs for 11,000 students in veterinary technology, horticulture, music recording technology and motorcycle rider and aviation training.

George Mason University (GMU) is exploring the development of a satellite campus in Loudoun County – possibly with NOVA as a co-partner of a joint campus. Several scenarios are under review, many which give precedence to urban and transit-oriented development.

The pressures on energy from costs, reliability, and climate change are creating major shortfalls in available talent to fill the hundreds of thousands of jobs needed for these projects. These campuses can no doubt serve as innovation platforms for new energy technologies and operating approaches. Increasingly the campuses will offer additional curricula that enhance current energy and environmental management and technology programs. In this way redefined energy infrastructure not only provides a cheaper cleaner campus, it also provides a teaching tool for new courses.

The CEP recommends all major campus developments and existing campuses be targeted as potential Scale Projects. Generally, an integrated approach to energy management can substantially reduce the operating costs and environmental impacts. The CEP strongly recommends that Loudoun County seize the opportunity to work with these institutions to turn these campuses into world-class Scale Projects that meet or exceed global best practices.

5. Data Center Expansion

A major data center operator owns a collection of IBX centers in Loudoun County. It is strategically located as a hub of internet traffic exchange to the United States. It is one of the largest internet exchange points in the world. Incorporating environmental awareness and corporate social responsibility are paramount to this company's business practices. The company recently signed a long-term lease for an additional 95,000 square feet of data center space adjacent to the company's Washington D.C. Internet Business Exchange(TM) (IBXR) center. The expansion adds to the approximately 180,000 square feet of data center space.

This could be a serious candidate to consider as a CEP Scale Project. The rapid acceleration in the demand for electricity to serve data centers is becoming a major challenge in the efforts to contain costs, reduce grid peaks and reduce the growth of greenhouse gas emissions. Loudoun County has a growing base of Data Centers. The 24/7 nature of the energy needs can create opportunities for innovative supply approaches and potential use of waste energy for or from neighbouring uses. This site could serve as an example for other Data Centers and communities in the County.

6. Major New Data Center

A data center landlord plans to use 34 acres to build a new data center. The building will be a 135,000 square foot building that will add 400,000 square feet of space. The new facility will support four 2.25 megawatt Turn-Key Datacenter pods, as well as 7,500 square feet of office space.

The sheer size of the development will create major opportunities to rethink the energy use and supply structures to gain major efficiencies through integration. Other comments would be very similar to those mentioned for the previous data center project.

7. Sports, Retail and Commercial Mixed-use Neighborhood

This new development is planned to incorporate a minor-league baseball stadium, and a mixed-use office and retail complex near the intersection of Route 28 and Route 7. The stadium would seat 5,500 fans, and is slated to be completed by 2011.

Sensitively designed sports facilities combined with high density development can be extremely good candidates for innovative energy approaches. This includes ensuring that they have an appropriate approach to minimizing transportation energy and emissions. They are frequently natural anchors for a community energy approach that can be extended into surrounding areas depending on the site.

This is also a potential candidate to explore whether this mixed-use concept would be extended to include residential units. This not only spreads the energy loads more evenly through the day, it also has a positive impact on the energy use and traffic flows in transportation associated with the site.

8. Business Park and Clean Power Plant

A Loudoun-based company is proposing a green energy park that would use natural gas and solar energy and treated wastewater from the Town of Leesburg to heat and cool the data centers and other commercial space. The park would be located near the Dulles International Airport.

The park is conceiving of a 600 megawatt, combined cycle natural gas facility with a wastewater, steam-turbine generator, two 150-megawatt clean natural gas turbines and a one-megawatt solar array.

The site is already being evaluated for a somewhat different energy approach and has all the characteristics to be a possible CEP Scale Project. Assuming locally-based generation is feasible, it would create large amounts of locally available usable heat. This heat could be the basis for supplying the site and even surrounding neighborhoods with heating, cooling and domestic hot water. This could also have a very positive impact on the overall peak demands on the surrounding grid and substantial greenhouse gas reduction potential for the County as a whole.

Business parks, maybe with research facilities and even some light industrial uses, can be opportunities for creative economic and clean energy solutions. In turn, these can become magnets for inbound investors due to the highly competitive, clean and flexible energy services. This is a critical aspect for Loudoun County which is targeting local employment to grow at twice the rate of the population.

9. Downtown Expansion District

The Town of Leesburg has developed a strategic plan to expand the downtown. The plan envisions a mixture of uses and a pedestrian friendly development pattern. The District Master Plan was the basis for revisions to the Town Plan and provides guidance for building heights, street design and location, architectural design, and land use.

This suggested CEP Scale Project addresses the challenge of redefining the energy and environmental performance of a neighborhood where there is a mix of new and existing development with many owners, and where development will take place over many years. Typically, these are situations where the barriers to creating energy breakthroughs are related more to consistent planning, than to costs or technology.

The existing master plan already has many of the elements needed to support sustained Smart Growth approaches. By adding a long-term integrated energy planning aspect to master plans like this, over time they will fundamentally redefine the energy and environmental footprint of the entire neighborhood.

10. Converting Commercial Neighborhood to Mixed-Use

The Dulles Town Center property currently includes extensive retail and office space. There is a concept to create a mixed-use walkable neighborhood including significant residential and service retail elements. This would have a unified pedestrian network connecting all elements of the Dulles Town Center property, a linear park, park-and-ride lots, and in its final stages community oriented plazas and spaces.

Like other suggestions on this section, the redevelopment of an entire neighborhood with high density mixed-use neighborhoods, combined with a transit-oriented focus, create a once-in-a-100 years opportunity to redefine the energy structure. The proximity to the airport may also open up energy infrastructure teaming approaches.

11. Revitalization of an Existing Neighborhood

Sterling Park is 1,700 acres of suburban-style single-family residences at the southeastern edge of Loudoun County that is currently confronting aging housing stock, (typically between 30 to 50 years), high percentages of foreclosures relative to the rest of Loudoun County, and economic

stress. Particular attention is now focused on the future prospects of the 3 million square foot 1960's-era Sterling Park Shopping Mall that has become redundant through the development of newer commercial and shopping areas. The County is now working to rebuild and revitalize the Sterling Park Neighborhood Center through the launch of the "Sterling Park Revitalization Plan," that calls for, among other work, a collaborative design process addressing the physical infrastructure and design improvements for the Mall.

The CEP recommends that in the context of the Sterling Park Revitalization Plan, that this be considered a candidate for a sustainable planning overlay, where specific energy guidelines for renovation, new construction and energy supply would be in place early, to ensure that the neighborhood captured both the affordability, livability and long-term environmental benefits of a well thought neighborhood energy strategy.

12. Resort Complex

This resort complex is a luxury development intended as a spa destination and high-end conference location. The resort construction began in 2007, but is on hold until the demand for such a complex increases. The resort will have 168 rooms, horse stables, and various other amenities on 342 acres in Middleburg. The project was a highly debated topic within the Town, with challenges over the scale of the development and the environmental impacts.

As a project typical of many resort and conference facilities, the CEP Team is recommending this as a Scale Project. The energy uses of a complex like this are typically very wasteful. However, with good integrated energy planning, and staff and guest orientation, reductions well over 50% are not uncommon with no loss of guest comfort, and with very attractive economics for the site.

Not unlike the campus, this kind of site has the outreach capability to touch many thousands of people a year with new thoughts and concepts around energy, and can play an invaluable role in communicating the values of the Community as a whole, and maybe even attracting added investment.

13. Route 7-Battlefield Parkway Interchange Southeast Quadrant

The "Route 7-Battlefield Parkway Interchange" consists of 86 acres near the Leesburg Water Pollution Control Facility. The area is mostly undeveloped. The Town of Leesburg is exploring the development of a "regional office" complex that blends mixed uses, including hosts for corporate headquarters, technology and conference facilities, educational institution and possibly a hotel. Residential and retail uses also may be integrated into the site to create a mixed-use, walkable neighborhood.

As in many of the examples discussed in this section, from an energy standpoint, developments like this have the potential to have breakthrough energy and climate performance as long as the requisite energy planning is done early on.

The CEP Team is recommending developing energy zoning guidelines for this development, probably in conjunction with the neighboring Water Pollution Control Facility. There is the possibility that the methane and/or other by-products from the wastewater treatment process from the Town's Water Pollution Control Facility could be a renewable energy source for development surrounding the facility.

Attachment 3
Suggested Projects
DOE "Energy Efficiency Community Block Grants"
American Recovery and Reinvestment Act 2009

1. Background

Under the auspices of the American Recovery and Reinvestment Act, Loudoun County is eligible for a formula based grant amount of $2,215,600 for energy efficiency projects. $250,000 has been allocated and approved for the preparation of the County Energy Plan and the costs of the ICLEI software.

Subject to final approval by the DOE the balance of $1,965,600 could be awarded to projects nominated at the same time that the County Energy Plan is completed. Based on the initial findings of the CEP Team, the following are suggested as candidates with rough estimates as to the costs included. This list is suggested from those projects that specifically and clearly support the integrated goals of the CEP and does not exclude the inclusion of other energy efficiency initiatives.

1) Loudoun Public School Integrated Energy Solution

a) Project Description

Identify a school where there is a good probability of significant energy productivity gain from implementing an integrated solution including efficiency upgrades, heat and power supply from CHP and PV, likely combined with upgrading heating and cooling distribution. The school would likely be at least 100,000 sq ft, and have a heating/cooling plant that is between 15 and 25 years old, targeted for replacement within the next five to ten years. The solution will result in significantly reduced operating cost for the school and be a potential model for other schools within the system. The schools' energy use is by far the larger part of the County's own energy use in its own assets.

b) Energy Outcomes

The energy use reductions should be at least 25% better than business-as-usual, with greenhouse reductions (direct or indirect) in the range of 40%.

The project should be selected and designed also as a teaching platform for elementary and high-school pupils, and maybe the public at large.

c) Financial

$1 million of the block grant, probably combined with some pre-existing budgets from the school system, would cover the bulk of the feasibility, design, and initial construction costs. Since this is grant money, it would effectively front the feasibility stage and act as a transition to subsidize the learning curve. The economic returns should be at least 2 to 3% better than municipal bonds. The budgeting should include adequate funds for tracking the results for at least two years after commissioning.

d) Fit to CEP

About 40% of Loudon County's energy use is from non-residential facilities. The CEP targets the potential for energy and GHG reduction when either major renovations or

significant new construction are planned. In effect any significant non-residential renovation has the potential to be a CEP Scale Project. This would be a living example for all medium to large non-residential developments, public or private, within the County.

2) CEP Scale Projects – Moorefield Station / One Loudon

a) Project Description

Moorefield Station and One Loudoun are mixed-use urban villages. One is Transit-Oriented around the Metro, and one will be commercially oriented around a "World Trade Center". Both combine high-density residential, retail, and commercial property in a compact, walkable neighborhood concept.

These have been initially evaluated as candidates for fully integrated energy solutions following the initial guidelines of the CEP combining above code efficiencies, district energy (heating and cooling) with on-site clean and renewable energy supplies. On initial analysis these appear to be attractive possibilities.

The proposed project would take the form of Decision Grade-Integrated Energy Master Plans, one for each of the Scale Projects, developed in conjunction with the master developers and potentially an entity that has an interest to become a future energy system operator for the sites.

b) Energy Outcomes

Energy use reductions in the range of 30 to 40% less than business-as-usual, combined with greenhouse reductions in excess of 45% and reasonably attractive investment economics, along with a clear implementation plan.

c) Financial

This is estimated between $150,000 and $250,000 for each IEMP, combined with some funding or in-kind matching from the respective master developers and the incumbent utilities (DP and WGL). This would take between three and four months for each to be completed.

From the preliminary CEP estimates this would leverage about 2% of the total construction costs in energy efficiency investments and about $32 million in energy system investments.

d) Fit to CEP

This will help overcome one of the recurring issues in the early stages of implementing neighborhood energy solutions which is that of the initial cash expenses to evaluate transformative energy alternatives. The developer is usually at the point of maximum cash leverage and reluctant to spend any cash that may not yield guaranteed valued. Possible energy system investors/operators are unwilling to proceed without the enthusiastic engagement of the developer, so this situation often results in a stalled process.

Once the initial two IEMP's are complete, the model and the benefits will be clear, which will make it much easier to complete the subsequent IEMP's on the other potential scale projects that are in the CEP. In fact, it is likely that having an IEMP could become a normal part of the permitting process for similar developments as a result of this project.

3) CEP Scale Projects – Data Center

a) Project Description

The project will select one of the two potential Data Center Scale Projects identified in the CEP and develop an IEMP (similar Scope as for Moorefield/One Loudoun) specifically aimed at the energy service efficiency and reliability needs of the Data Center. The project should be selected where there is a reasonable possibility of linking the Data Center's energy needs to the surrounding community, either as a source of energy or as a recipient of energy that would otherwise be wasted.

The Data Center owner/operator would participate in-kind, and be committed to implement a reasonable range of solutions resulting from the findings of the IEMP. Few Data Centers have a high performance energy plan, and even fewer have a strategic plan to address greenhouse gas emissions and risks. The project will serve as a role model for future Data Center investments and expansions.

b) Energy Outcomes

Data Centers consume 10% of the total electricity in Northern Virginia and as the overall baseline of Loudoun County shows, the efficient use of electricity, increasingly combined with distributed CHP and renewable sources is a critical element in reducing GHG.

c) Financial

Like the preceding Scale Project, the IEMP would be a $150,000 to $250,000 project, probably leveraging in-kind and other resource contributions from the Data Center owner/operator and possibly the incumbent utility.

d) Fit to CEP

The CEP is calling for at least 30% energy efficiency in the non-residential segment at the same time as the County is planning to double employment, with Data Centers being a clear strategic economic development target. This project will provide the critical model to allow the County to tailor their energy offerings and expectations to the incoming and incumbent Dater Center operators to further accelerate the successful integration of Data Centers into the CEP.

4) Education and Outreach - Homeowners

a) Project Description

The CEP will call for substantially more energy efficient new construction, deep efficiency upgrades in renovation projects, and Energy Performance Labelling for all residential units. There is also a likelihood it will recommend thermal utilities and other forms of shared energy systems, in high density neighborhoods, and increased use of clean and renewable energy supplies in lower-density neighborhoods. The CEP is recommending Energy Performance Labelling for all homes and buildings when they are sold, leased, or rented; an entirely new process than can bring significant benefits to builders, owners, tenants and mortgage banks.

This is a very different picture from that of today, and opens up many more decision points for homeowners, homeowners' associations, tenants, residential builders and developers. The project will be a structured outreach and education program for all players in the

residential community. The goal should be not only to inform but to encourage implementation of both individual and shared solutions.

b) Energy Outcomes and Fit to CEP

This should give a significantly increased penetration in implementing the CEP recommendations in the critical residential segment that is a very large, very inefficient part of the County's energy use. It is one that is diffuse and difficult to access in sufficient scale to deliver the CEP outcomes.

c) Financial

About $250K assigned to this program, ideally with some matching money from a trust or foundation such as the Pew Center or the Clinton Foundation.

This umbrella project should also leverage other incentives such as the various Federal Tax Credits for efficiency and renewable energy, and Virginia's Homeowners' grant / rebate program aimed at supporting energy efficient investments.

Given the long-term interest that the gas and electric utilities will have in restructured energy systems, especially in higher density residential areas, it would be ideal if they also participated.

5) Education and Outreach – Businesses

a) Project Description

Loudoun has an aggressive employment growth and economic development plan aimed at date centers, retail, commercial and some light industry. This segment is already the largest energy user, and will remain a significant energy user and creator of GHGs.

The CEP, through Scale Projects like One Loudoun, will certainly address the concept of commercial parks with shared infrastructure and different operating models. It will also encourage teaming between commercial players to ensure best practices from each are proliferated as fast as possible. In addition, many businesses have access to global best practices from elsewhere in their global networks, and the CEP will encourage a structured approach to maximizing the benefit to the County from this.

Engagement of the business community will be essential not only to manage their own energy footprint, but also to be a force for continuity in the overall success of the CEP in all sectors.

The project will be a structured outreach and education program aimed at the County's business community. A good model would be the Silicon Valley business community's approach to reduce the energy and greenhouse gas footprint of the Valley.

b) Financial

About $250K assigned to this program, ideally with some matching money from a trust or foundation such as the Pew Center or the Clinton Foundation.

This activity could be guided by the Advisory Board, or some similar sub-set.

Proliferation of best-practices and the overall active engagement of the business community in this critical aspect of the CEP will ensure a very high leverage on the initial investment of the EECBG funds.

6) Education and Outreach – Transportation

a) Project Description

Transportation use of energy accounts for nearly 40% of the GHG emissions from Loudoun County. The CEP recognizes this is a segment where reduction will come from a variety of measures, including urban design for walkability and two-wheel use, encouraging smaller lighter vehicles with efficient drive trains, maximizing the focus on viable mass transit, and encouraging businesses to have structured approaches to managing the transportation energy content of their goods and services. This could target the general public to highlight the total benefits of higher density urban living. It would also be structured to raise the awareness of the energy efficiency opportunities for fleet managers and operators. The urban design, county planning, architectural and developer communities could also be targetted to understand the energy and climate impacts of their respective decisions.

b) Financial

About $250K assigned to this transportation energy outreach and education program, again potentially with matching money from various sources.

Attachment 4

2007 Baseline Energy and Greenhouse Gas Data

Draft Only- Subject to validation and adjustment- as of September 1, 2009

1. Energy Use by Sector

Loudoun County 2007 Baseline - Annual by End-Use Segment								
	Energy MMBtu	Energy %sub-total	Energy % total	GHG mt	GHG %sub-total	GHG % total	Energy MMBtu/capit	GHG mt/capita
Residential-Direct	10,985,966	29.0%	12.7%	1,174,504	32.2%	29.1%	40.5	4.33
Non-Residential-Direct	9,875,559	26.1%	11.4%	1,276,119	35.0%	31.7%	36.4	4.71
Transportation-Local	16,985,978	44.9%	19.6%	1,192,859	32.7%	29.6%	62.6	4.40
County Total-Direct	***37,847,503***	***100.0%***	***43.8%***	***3,643,482***	***100.0%***	***90.4%***	***139.6***	***13.44***
Residential-indirect	18,333,196	37.7%	21.2%	0	0.0%	0.0%	67.6	0.00
Non-Residential-indirect	24,491,144	50.4%	28.3%	0	0.0%	0.0%	90.3	0.00
Trucking - Indirect	5,799,699	11.9%	6.7%	387,783	100.0%	9.6%	21.4	1.43
County Total-Indirect	***48,624,039***	***100.0%***	***56.2%***	***387,783***	***100.0%***	***9.6%***	***179.3***	***1.43***
Residential-Total	29,319,162	33.9%	33.9%	1,174,504	29.1%	29.1%	108.1	4.33
Non-Residential-Total	34,366,703	39.7%	39.7%	1,276,119	31.7%	31.7%	126.7	4.71
Transportation-Total	22,785,676	26.4%	26.4%	1,580,642	39.2%	39.2%	84.0	5.83
County Total	***86,471,542***	***100.0%***	***100.0%***	***4,031,265***	***100.0%***	***100.0%***	***318.9***	***14.87***

2007 Total Energy Use by Sector in American Units

Loudoun County 2007 Baseline - Annual by End-Use Segment								
	Energy MWhe	Energy %sub-total	Energy % total	GHG mt	GHG %sub-total	GHG % total	Energy MWh/capita	GHG mt/capita
Residential-Direct	3,219,669	29.0%	12.7%	1,174,504	32.2%	29.1%	11.9	4.33
Non-Residential-Direct	2,894,240	26.1%	11.4%	1,276,119	35.0%	31.7%	10.7	4.71
Transportation-Local	4,978,098	44.9%	19.6%	1,192,859	32.7%	29.6%	18.4	4.40
County Total-Direct	***11,092,007***	***100.0%***	***43.8%***	***3,643,482***	***100.0%***	***90.4%***	***40.9***	***13.44***
Residential-indirect	5,372,929	37.7%	21.2%	0	0.0%	0.0%	19.8	0.00
Non-Residential-indirect	7,177,645	50.4%	28.3%	0	0.0%	0.0%	26.5	0.00
Trucking - Indirect	1,699,724	11.9%	6.7%	387,783	100.0%	9.6%	6.3	1.43
County Total-Indirect	***14,250,297***	***100.0%***	***56.2%***	***387,783***	***100.0%***	***9.6%***	***52.5***	***1.43***
Residential-Total	8,592,597	33.9%	33.9%	1,174,504	29.1%	29.1%	31.7	4.33
Non-Residential-Total	10,071,885	39.7%	39.7%	1,276,119	31.7%	31.7%	37.1	4.71
Transportation-Total	6,677,822	26.4%	26.4%	1,580,642	39.2%	39.2%	24.6	5.83
County Total	***25,342,305***	***100.0%***	***100.0%***	***4,031,265***	***100.0%***	***100.0%***	***93.5***	***14.87***

2007 Total Energy Use by Sector in ISO Units

2. Energy Use by Source

Loudoun County 2007 Baseline - Annual by Energy Source								
	Energy MMBtu	Energy %sub-total	Energy % total	GHG mt	GHG %sub-total	GHG % total	Energy MMBtu/capit	GHG mt/capita
Electricity	12,847,302	33.9%	14.9%	1,961,655	53.8%	48.7%	63.3	7.23
Natural Gas	6,753,903	17.8%	7.8%	397,854	10.9%	9.9%	33.3	1.47
Propane	759,854	2.0%	0.9%	51,219	1.4%	1.3%	3.7	0.19
Heating oil	500,467	1.3%	0.6%	39,895	1.1%	1.0%	2.5	0.15
Transport - Diesel	692,551	1.8%	0.8%	46,306	1.3%	1.1%	3.4	0.17
Transport - Gasoline	16,293,427	43.1%	18.8%	1,146,553	31.5%	28.4%	80.3	4.23
County Total Direct	***37,847,503***	***100.0%***	***43.8%***	***3,643,482***	***100.0%***	***90.4%***	***186.5***	***13.44***
Electricity conversion	42,824,340	88.1%	49.5%	0	0.0%	0.0%	211.0	0.00
Trucking - Diesel	5,799,699	11.9%	6.7%	387,783	100.0%	9.6%	28.6	1.43
County Total-Indirect	***48,624,039***	***100.0%***	***56.2%***	***387,783***	***100.0%***	***9.6%***	***239.6***	***1.43***
County Total	***86,471,542***		***100.0%***	***4,031,265***		***100.0%***	***426.0***	***14.87***

2007 Total Energy Use by Source in American Units

Loudoun County 2007 Baseline - Annual by Energy Source								
	Energy MWhe	Energy %sub-total	Energy % total	GHG mt	GHG %sub-total	GHG % total	Energy MWh/capita	GHG mt/capita
Electricity	3,765,172	33.9%	14.9%	1,961,655	53.8%	48.7%	13.9	7.23
Natural Gas	1,979,373	17.8%	7.8%	397,854	10.9%	9.9%	7.3	1.47
Propane	222,691	2.0%	0.9%	51,219	1.4%	1.3%	0.8	0.19
Heating oil	146,672	1.3%	0.6%	39,895	1.1%	1.0%	0.5	0.15
Transport - Diesel	202,967	1.8%	0.8%	46,306	1.3%	1.1%	0.7	0.17
Transport - Gasoline	4,775,132	43.1%	18.8%	1,146,553	31.5%	28.4%	17.6	4.23
County Total Direct	***11,092,007***	***100.0%***	***43.8%***	***3,643,482***	***100.0%***	***90.4%***	***40.9***	***13.44***
Electricity conversion	12,550,574	88.1%	49.5%	0	0.0%	0.0%	46.3	0.00
Trucking - Diesel	1,699,724	11.9%	6.7%	387,783	100.0%	9.6%	6.3	1.43
County Total-Indirect	***14,250,297***	***100.0%***	***56.2%***	***387,783***	***100.0%***	***9.6%***	***52.5***	***1.43***
County Total	***25,342,305***		***100.0%***	***4,031,265***		***100.0%***	***93.5***	***14.87***

2007 Total Energy Use by Source in ISO Units

3. Transportation Energy

Loudoun County 2007 Baseline - Annual End-use Road Transportation					
	Distance veh/km (k)	Energy MWhe	GHG mt	Energy kWh/km	GHG g/km
Cars	3,059,123	3,871,509	929,194	1.27	304
Light Trucks and SUV	616,515	984,397	235,631	1.60	382
Motorcycles	9,432	4,822	1,155	0.51	122
Buses	20,469	117,370	26,879	5.73	1,313
Heavy Trucking (allocated)	365,060	1,699,724	387,783	4.66	1,062
Total	***4,070,599***	***6,677,822***	***1,580,642***	***1640.50***	***388.31***

2007 Total Energy Use by Vehicle Type in ISO units

Attachment 5

Community Assets

Draft Listing as of September 1st 2009

Overview

Successful implementation of the County Energy Plan will ultimately depend on the motivation and support of the community. There are many Loudoun-based and regional organizations already making improvements that can potentially impact the entire community. The County is fortunate to have this expertise and the enthusiasm that these organizations can bring to ensure the CEP delivers on its commitments.

As part of gathering the existing data at the start of the energy planning process, the CEP Team made an effort to identify what resources and programs were already available within the County as a whole. The results were impressive and the full listing is included that summarizes the Community Assets that already exist.

They include funding sources, local businesses, local schools, university and college resources, non-governmental organizations with an energy focus, educational initiatives, and local government programs. Every effort has been made to ensure this is an accurate summary at the time of preparing this draft. With the help of the community workshops and the Advisory Board this will be reviewed for completeness in the coming weeks.

Into the future, this will be the basis of a resource guide that will be regularly updated to help businesses, organizations and individuals benefit from improved energy productivity.

1 Educational Institutions

1.1. Loudoun County Public School District

The County has made an enduring commitment to quality in all levels of education. Recently the School District committed to improving the quality of education through environmental programs. Their focus is generally two-fold, encompassing an educational and subject material component, as well as improving conservation and making eco-friendly choices. The Loudoun County Public School District and the higher education institutions (see below) have set priorities which both inform and encourage, sustainability.

The Loudoun County Public School District has implemented a wide-ranging Energy Education Team. This team aims to reduce the use of energy throughout the school system while improving the educational environment, while simultaneously ensuring efficient and effective stewardship of public resources.

The Team's goals are aimed at the many interacting aspects to reducing energy use and cost without jeopardizing quality:

- Develop energy savings habits within all levels of facility users.
- Implement energy saving programs and practices.
- Evaluate and utilize the most effective energy providers and rates.
- Review and authenticate energy usage and billing.
- Facilitate timely processing of all utility bills.
- Research and recommend energy efficient methods and materials.
- Generate an attitude and culture of energy savings.

- Represent LCPS interests in committees and organizations.
- Provide data and counsel regarding energy usage and cost.
- Observe and report areas for energy use reduction.
- Coordinate energy savings efforts with all departments within LCPS.
- Incorporate energy accounting software to maintain clear and accurate records.
- Develop and maintain professional and industry contacts.
- Seek program improvement through staff development.

The LCPS Energy Education Team partnered with Energy Education Incorporated to create and implement this with transformational energy management program. EEI specializes in energy management consulting for schools.

The recognition of the Loudoun County Public School District increases regularly. Their Administration Building is LEED Certified. The U.S. Environmental Protection Agency (EPA) presented Loudoun County Public Schools with the coveted ENERGY STAR Award for twenty two of its school sites and the Administration Building in July 2008. The ENERGY STAR Award for these sites recognizes the LCPS Support Services Department and its Energy Education Program for achieving superior energy and environmental performance.,

1.2. Higher Education Institutions

The intellectual capital and research potential of universities are invaluable resources. Loudoun County is home to two institutions of higher education and many more universities are located within the greater Northern Virginia area.

The George Washington University Virginia Campus is a center for innovative research, graduate education, and regional corporate partnerships. Its Loudoun campus is a research and technology center, with specialties that include energy science and technology, transportation safety, and high performance computing. The GWU Virginia campus also hosts a Public Policy Forum that explores regional topics, most recently concerning air quality and water use. The campus partners with Gallery 222[1] in hosting "Touch the Earth", a celebration of spring and sustainability.

The Loudoun Campus of Northern Virginia Community College is planning an environmental science/policy/studies program and has appointed a Green Construction Committee to inform the college's construction activities. Other area schools such as George Mason University, and Virginia Tech offer environmentally focused programs and support.

2 Local Government

2.1. Loudoun County

Loudoun County has already proven the value of more sustainable development. The County has led numerous initiatives and has received a variety of honors related to sustainability, technological innovation, building practices, and energy conservation. Recent accomplishments include:

- Adopted LEED Silver as the Green Building standard for new county facilities.
- Adopted a 15 percent energy reduction goal for Loudoun County government by year 2012, with clear progress already underway.

[1] http://www.loudounacademy.org/galleryindex.html

- Tied for first place in the 2008 Virginia Municipal League's "Green Government" Challenge.
- Created the Energy Conservation Cabinet composed of liaisons from every department to engage all employees in best practices to reduce energy, which yielded $124,000 in annual savings to date and growing.
- Pledged to reduce the carbon emission of county operations by 3 % in 2008 as part of the Metropolitan Washington Council of Governments' "Cool Capital Challenge"; the goal was exceeded by 3%.
- Conducted comprehensive energy audits of six major county facilities and identified facility improvements to reduce energy costs by at least 9%.
- Plans to begin energy audits of the County's remaining 44 buildings to identify retrofits and improvements to save additional energy costs.
- Implemented a telework program resulting in 1.5 million less miles driven each year by county employees.
- Reduced vehicle miles traveled by more than 26 million riders in 2008 using public transportation in lieu of single occupant vehicles.
- Saved 20.2 tons of NOx (Nitrogen oxides) and 6.25 tons of VOC (Volatile Organic Compounds) emissions by passengers using the commuter bus program.
- Implemented recycling programs in county government offices and schools resulting in the equivalent of 2.2 million kilowatt hours in energy savings per year.
- Increased the use of recycled content paper products including 35 percent post-consumer recycled copy paper, and 100 percent recycled tissue paper and paper towels.
- Purchased Energy Accounting Software to manage data.

The Loudoun County Board of Supervisors has approved the implementation of extended energy-conservation measures at the six largest energy-using county facilities. This contributes to the goal of reducing energy consumption by 15 percent by 2012. The facilities are the Claude Moore Recreation Center, the Department of Information Technology, the Fire & Rescue Training Building, the Loudoun County Government Center, the Shenandoah Building and the Courts Complex including the Judicial Center and historic Courthouse. Measures include installing high-efficiency lighting; reprogramming controls to limit electric demand and more efficiently deliver outside air to heating and cooling systems; improved weatherization; and water conservation.

In January 2009, the Board of Supervisors created a new standing Committee on Energy & Environment replacing the Ad-Hoc Committee on Energy Efficiency formed a year earlier.

The county is part of the ENERGY STAR partnership, a joint program of the U.S. Environmental Protection Agency and the Department of Energy designed to reduce greenhouse gas emissions through energy efficiency. In partnership with ENERGY STAR, the County will:

- Measure and track the energy performance of county facilities using the wide array of ENERY STAR tools.
- Develop and implement a plan consistent with the ENERGY STAR Energy Management Guidelines to achieve energy savings.
- Help spread the word about the importance of energy efficiency to the Loudoun County government workforce and citizens.

- Support the nationwide ENERGY STAR Challenge to improve the energy efficiency of America's commercial and industrial buildings by at least 10%.
- Loudoun County will receive recognition on the ENERGY STAR web site as a partner and also as a supporter of the ENERGY STAR Challenge.
- As an ENERGY STAR Partner, the County will share its progress to meeting the challenge.

The Loudoun County Board of Supervisors endorsed October 2008 as Energy Efficiency & Conservation Month. As part of this effort, the County joined in a nationwide effort to promote public understanding of our energy needs and to reduce energy consumption in our everyday lives. Programs and activities focused both on what Loudoun County employees can do in their homes and office and what residents and businesses can do to save energy and reduce the carbon footprint of the County.

2.2. Town of Leesburg

Leesburg is a progressive town within Loudoun County. In 2008, the Town Council adopted Resolution 2008-158 for reducing Town government energy use 10% by 2012. The actions to meet this goal are detailed in the Town's Strategic Energy Conservation Plan[2]. The Leesburg Energy Efficiency Program Group has led the completion of energy audits and tracks energy use with the U.S. EPA's Portfolio Manager Software relative to a 2007 baseline. The town also has two initiatives aimed at the wider population; the Energy Education Plan and the Change a Light Campaign.

2.3. Town of Purcellville

The Town of Purcellville is a strong and ardent supporter of a comprehensive CEP process. Purcellville adopted a new comprehensive resource plan in 2006. Purcellville aims to be a regional standard for effective, integrated utility planning and growth management. To plan examines water and sewer facilities to appropriately address desired future land use patterns and to encourage utility systems for all types that are cost-effective, efficient, and include state-of the art technology that promotes environmental protection, conservation and green development.

Purcellville aims to be recognized for effective inter-modal transportation system and street, pedestrian and trail connections that enhance community connectivity, preserve special community assets, promote attractive environments and improve transportation safety. The Town Codes also recognize the need to protect and conserve forest and agricultural lands through specific districts, one reason being for the production of local food. Purcellville recognizes these initiatives are essential for the long-term competitiveness of the community as well as for the impacts on the local and global environment.

Other specific initiatives include:

- The Town and Dominion Virginia Power have partnered for an LED Street Lighting Pilot Project. Ten LED street lights have been installed to investigate the energy savings, efficiency, longevity and illumination quality of this new and promising lighting technology. The initial Post Installation Performance Report indicates that the project is achieving a 55% reduction in energy usage while actually enhancing the quality of street illumination and therefore the safety of the traveling public. The LED lights utilized have "smart technology" onboard that dims the lights during the early morning hours to further

[2] http://www.leesburgva.gov/Modules/ShowDocument.aspx?documentid=2455

conserve power. Purcellville's Pilot Project was Dominion's first LED street lighting project installed in the Commonwealth. Another benefit of LED technology is that it utilizes no hazardous materials such as mercury which is ubiquitous in current lighting technologies and both an environmental and health hazard.

- The Town created a residential rebate program for residents to encourage use of high efficiency clothes washers and toilets. The rebate program for clothes washers is the first of its kind in the Commonwealth. In addition, the Town offers free low flow showerhead retrofit kits, facet aerators and dye leak test kits to our residents. Local restaurants in the Town can obtain free spray nozzles to reduce water usage. To date these programs have saved over 739,000 gallons of water. The program has the dual benefit of reducing both energy and water demand both at the source (appliance/user level) and the utility treatment or production level.
- The Town has conducted Rain Barrel Workshops for residents to encourage the use of rain barrels for gardening and lawn watering; therefore reducing water and energy demand.

2.4. Town of Lovettsville

The Town of Lovettsville is in the process of updating their Comprehensive Plan which will reflect their long range vision to preserve and nurture its rural character while developing realistic growth goals. The Town also has a streetscape plan and a pedestrian-bike path along Route 287. Completion of the wastewater treatment facility expansion is expected in the fall of 2009.

2.5. Town of Middleburg

The Town of Middleburg adopted a 2008 Vision for the Future, which included stressed that *"Middleburg is a leader among small towns in the green conservation movement. Through the efforts of area residents, Town citizens and leaders we have achieved recognition for creative and cost saving approaches to educating our citizens about environmental stewardship and the application of green technologies, while maintaining our historic character. Middleburg's economy, agricultural infrastructure, and food supply are locally sustained by an active commitment to 'buy local, buy fresh'".* This broader sustainability Vision will have significant impacts on both the energy and greenhouse gas impacts of the community.

2.6. Town of Round Hill

The Town of Round Hill adopted their Comprehensive Plan which values conservation and compliments regionalized efforts that support the environment. The plan proclaims *"Round Hill as a community should be committed to educating its individual and business citizens on the necessity of conserving resources and improving the condition of the environment"* and aims to *"support environmental protection programs and codes on a regional basis in recognition of the regional scale of environmental management concerns."*

2.7. Town of Hamilton

The Town of Hamilton values the environment and sustainable practices in the adoption of their Comprehensive Plan. The town highlights "horizontal threads" that tie together all of their future plans. One of these overarching concepts is to "uphold a high standard of environmental stewardship, promoting clean air and water and promoting effective tree, waterway and wildlife preservation standards." Moving forward, energy will be clearly one of these unifying "horizontal threads."

3 Utility Companies

3.1. Dominion Virginia Power

Dominion Virginia Power is a major electricity provider for Northern Virginia. Dominion has made strides towards informing customers about the energy conscious choices available. A voluntary program is available that allows customers to purchase renewable electricity, in the process supporting the development of new renewable energy facilities. These supplies are certified using EPA methodology. Dominion offers seasonal energy saving tips to help homeowners and business owners reduce electricity consumption and overall costs.

Dominion has developed a SmartGrid demonstration program in Charlottesville, Virginia that Loudoun County could model. "SmartGrid Charlottesville" seeks to reduce electricity consumption and lay the groundwork for future planning by using Dominion's electrical distribution, communications, and information technologies. The outcomes are expected to include:

- Reduction of 4% or more for typical residential customers through more-efficient and automated management of electricity deliveries; reducing carbon dioxide emissions by 12,000 tons annually, equal to removing 2,100 cars from the road.
- Optional time-based rates that give customers the choice to shift electricity use to off-peak times for additional savings.
- Integration of battery storage systems that could accelerate the use of renewable electricity generation such as solar.
- Increased customer convenience through remote turn on and turn off of service, and remote meter reading.
- Demonstration of light-emitting diode (LED) street lighting.
- Assistance for Charlottesville to evaluate electric transportation.

3.2. Valley Energy

Valley Energy provides heating oil, propane, and commercial fuel products including all grades of gasoline and diesel. The main office and storage facility is located in Purcellville, and services extend to the surrounding communities of Loudoun, Clarke, Fauquier and Prince William Counties.

3.3. North Virginia Electric Cooperative

NOVEC is a locally based and operated cooperative supplier of electricity and other energy services. The cooperative delivers cost-efficient, reliable energy to residential, commercial, business and government customers. It is headquartered in Manassas, but serves much of the surrounding area. NOVEC recently contracted with Cogentrix to buy electricity. Cogentrix designed its newer Hopewell and Portsmouth plants for cogeneration. Cogeneration is a more efficient method that produces two or more energy products, such as steam and electricity, from one fuel supply significantly reducing the greenhouse emissions in producing electricity. The CEP will include significant amounts of cogeneration in the future.

3.4. ThompsonGas

ThompsonGas also serves the Loudoun area, providing propane fuel for residential, commercial, agricultural and industrial uses. They promote the use of propane for vehicles, machinery and home appliances, because it has less waste and burns cleaner than some

alternatives. ThompsonGas also promotes the use of tankless water heaters familiar in Europe for decades and now coming to the USA which reduce both energy and water consumption.

3.5. Washington Gas and Light

The description of Washington Gas and Light's many energy efficiency and climate mitigation initiatives is pending and was not available for this draft version.

3.6. Loudoun Water

Loudoun Water provides water and wastewater services to the unincorporated areas of Loudoun County. Loudoun Water has helped to reduce usage and encourage responsible water use. Loudoun Water is a partner in the national "Water-Use It Wisely" campaign which promotes water conservation. In May 2009 they were awarded $1.78 million in Stimulus Funds for two shovel-ready "green" infrastructure projects that will deliver reclaimed water for non-potable uses to commercial facilities in Loudoun. Loudoun Water also supports July as Smart Irrigation Month to encourage responsible watering.

4 Businesses

As a hotbed for technology-focused businesses, Loudoun County is an ideal location for innovative sustainable businesses to thrive. The following are a sample of businesses broadly defined by their focus on the rational and productive use of energy.

4.1. Rehau

Rehau is a manufacturer that addresses sustainable design priorities by engineering products that enhance comfort and conveniences, reduce energy costs, create healthy and safe environments and conserve resources. Rehau is a leading supplier of polymer-based solutions to the construction industry, and continues to be a community leader in advocating for environmentally friendly initiatives. http://na.rehau.com

4.2. SandEnergy

SandEnergy provides renewable energy services to homes, businesses and government agencies. www.sandenergy.net.

4.3. Ancon Mechanical Systems

Ancon Mechanical Systems specialize in geothermal heating and cooling, design and installation. www.ancogeothermal.com

4.4. Middleburg Bank

The Middleburg Bank branch in Leesburg, was completed in 2008 to LEED silver certification. The building uses 38 percent less energy than a conventional building. It has 5 geo-transfer wells and a solar reflective roof. During construction 10% of the materials were locally sourced and 75 percent of the waste was diverted from landfills. The Middleburg Bank, a subsidiary of Middleburg Financial Corporation, has pledged that future buildings will all meet LEED certification. https://www.middleburgbank.com

4.5. ClearStandards

ClearStandards produces software for carbon management and sustainability solutions. www.clearstandards.com

4.6. Green Advantage

Green Advantage is an environmental certification program that trains practitioners to be knowledgeable and current about constructing high performance buildings. They also work to bring consumers together with the certified building professionals.

4.7. EcoVillage

EcoVillage is a community designed to preserve and restore biodiversity, quality, and abundance of natural resources. Some of their primary objectives include promoting the use of environmentally friendly techniques to maximize energy independence and minimize use of non-renewable resources, minimizing environmental toxicity through the use of organic and low-toxicity materials and products that are safely biodegradable, and enhancing local air quality by developing a microclimate that minimizes reliance on active heating and cooling systems.

4.8. Janelia Farm Research Campus

Janelia Farm Research Campus is a world-class research center where scientists of different disciplines collaborate on biomedical research. The campus has set a precedent for conscientious site development and building construction. In preparing the campus for building, the trees felled were recycled into mulches, milled for plank flooring of buildings on site, or prepared for waste-to-energy plants. The “landscape” building has the 2nd largest green roof in the country, totaling 180,000 square feet.

4.9. GeoConcepts

GeoConcepts provides professional engineering services during design and construction of land development/building construction projects. GeoConcepts was recognized in 2001 as the New Business of the Year by the Town of Leesburg and also as an Entrepreneur Finalist of the Year by Loudoun County. Their work includes Phase I Environmental Site Assessments (ESAs), Phase II ESAs, Soil and ground water sampling and analysis and Underground Storage Tank (UST) management and removal.

4.10. Buchanan Partners

Buchanan Partners is one of the largest commercial real estate developers in the metropolitan area, with a reputation for integrity, innovation, and community involvement. The Arcola Center is a future project of the Buchanan Partners which will be a planned mixed-use development in Loudoun County. Based on “smart growth” principles and incorporating the recommendations of a local citizen task force, Arcola Center will be a development that combines residential, commercial, retail, entertainment, and cultural uses.

4.11. Fortessa Inc

Fortessa, Inc. is a leading designer, developer and marketer of quality tableware for the high-end commercial foodservice market globally, as well as for the luxury consumer market, headquartered in Sterling. The company is active in the local business community to promote efficient energy use. http://www.fortessa.com/

4.12. EIT

EIT is a privately owned company that provides full contract electronic design and manufacturing services from product concept through distribution and aftermarket support. EIT operates multiple sites with headquarters located in Sterling. EIT has shown a commitment to encourage reduced energy use within Loudoun County. http://www.eit.com/

4.13. Wal-Mart

Wal-Mart Corporation has several Loudoun retail locations. Wal-Mart is currently one of the most progressive large-scale companies. Recently, the corporation won the award for Corporate Energy Efficiency at the second annual Aspen Institute Energy and Environment Awards. Wal-Mart continues to research and make progress towards reducing greenhouse gas production at retail locations and reducing the energy consumption of the distribution fleet. They are also actively promoting the sale of energy efficient lighting and appliances. They have a corporate target to have 100% renewable energy for all their operations.

5 Organizations Supporting Sustainable Objectives

5.1. Loudoun Committee for a Sustainable Society

The Loudoun Committee for a Sustainable Society promotes the development of a local community economy based on environmental stewardship and the sustainable use of resources. In addition to sponsoring public education and outreach events, the members have frequently participated in advocating for achieving energy sustainability in Loudoun.

5.2. Loudoun Watershed Watch

Loudoun Watershed Watch is a consortium of citizen groups, local and state authorities protecting the water resources of Loudoun County.

5.3. Loudoun Wildlife Conservancy

Loudoun Wildlife Conservancy is a local all-volunteer non-profit organization dedicated to promoting the preservation and proliferation of healthy wildlife habitats throughout Loudoun County.

5.4. Blue Ridge Center for Environmental Stewardship

Blue Ridge Center for Environmental Stewardship is a local farm that seeks to preserve nature, encourage sustainable practices and engage in learning about the natural world.

5.5. Audubon Naturalist Society

Audubon Naturalist Society fosters stewardship of the environment of the greater Washington area by educating citizens about the natural world, promoting conservation and biodiversity, and protecting natural habitat.

5.6. Capital Region Earth Force

Capital Region Earth Force focuses on young people and encourages them to improve the environment and their communities now and in the future.

5.7. NAIOP

NAIOP, the Commercial Real Estate Development Association, is the leading organization for developers, owners and related professionals in office, industrial and mixed-use real estate. NAIOP provides industry networking and education, and advocates for effective legislation on behalf of members. NAIOP advances responsible, sustainable development that creates jobs and benefits the communities. The Northern Virginia chapter recently helped shape the slow growth initiatives in Loudoun County.

6 Sources of Funding

There are a number of federal, state and local governmental and non-governmental organizations within and around Loudoun that can serve to financially support sustainability initiatives.

6.1. Local agencies

- *Virginia Environmental Endowment* – www.vee.org - The mission of the endowment is to improve the quality of the environment by using its capital to encourage all sectors to work together to prevent pollution, conserve natural resources, and promote environmental literacy.
- *Piedmont Environmental Council* – www.pecva.org – The Council works toward energy solutions that emphasize efficiency first, use appropriate technologies for the 21st Century and respect the scenic and historic character of the Piedmont.
- *Newton Marasco Foundation* – www.newtonmarascofoundation.org – The mission of the foundation is to work collaboratively on issues related to environmental stewardship.
- *Goose Creek Association* – www.goosecreekassn.org - The Association works through an active board charged with monitoring stream water quality, proposed developments, legislation, zoning changes, and other actions that have potential impact on the environment and quality of life in this region.

6.2. Federal Programs

The American Recovery and Reinvestment Act **and** the U.S. Department of Energy's Energy and Efficiency Conservation Block Grants associated with the Act.

In addition, the current U.S. Tax Code offers a $.30-$1.80 per square foot tax deduction for energy-efficient commercial buildings through 2013. Improvements must work towards a reduction of 50% in comparison to minimum ASHRAE standards. For renewable energy, there is a tax depreciation deduction of 50 percent for buildings that place renewable energy sources into service in 2008 or 2009. A tax credit or federal grant is available for up to 10-30 percent of expenditures for clean renewable energy. This includes solar, fuel cells, small wind turbines, geothermal, micro-turbines and combined heat and power.

6.3. State Government

To promote energy efficiency, the Commonwealth offers a property tax of energy-efficient buildings can be assessed at a reduced rate. An energy-efficient building is defined as any building that exceeds the energy efficiency standards of the Virginia Uniform Statewide Building Code by 30 percent; meets performance standards of the Green Globes Green Building Rating System, the Leadership in Energy and Environmental Design (LEED) System.