



**Arlington Community Energy Plan
Metrics Report
Baseline Data**

Background

In June 2013 the Arlington County Board adopted a Community Energy Plan (CEP) and made it part of the County's Comprehensive Plan. To help facilitate CEP implementation, the County created an Implementation Framework. In Goal Area 5 of that framework regarding County Government Activities, Strategy 5 calls for the creation of metrics to measure CEP progress. Since there are so many items in the Implementation Framework and energy covers myriad categories, it is important to explicitly define how we plan to measure progress toward reaching our CEP goals. This document provides the performance indicators and metrics that will effectively influence decision-making and help track CEP implementation progress.

As noted in Strategy 5, "the CEP consists of an overarching 'headline goal' – greenhouse gas (GHG) emissions per capita – that is viewed through lenses of economic competitiveness, energy security, and environmental protection. In addition, the Plan includes several more specific goals for different energy sectors that contribute to achievement of the headline goal. It is essential that the County establish metrics to track progress toward these goals. Staff are identifying key indicators and metrics for progress towards energy use reduction, resilience, and energy-related economic competitiveness."

Indicators are defined as characteristics that support the measurement of an overall goal. Metrics are the units of measure for each indicator. The indicators and metrics described in this document either measure performance related to activities over which the community has control and influence, or provide a foundation for the measurement of performance and context for outcomes. The difficulty in obtaining data, e.g., the frequency in which data is provided, helped determine the frequency of reporting each indicator and metric.

This report includes primarily baseline data since the last greenhouse gas inventory, the data source for many of the metrics, was completed in 2012. The next greenhouse gas inventory will be completed in 2017-2018 and the metrics data will be updated concurrently.

Performance Indicator #1: Energy Productivity
Metric: Greenhouse gas emissions per capita (mt CO₂e/capita/year)
CEP Benefits: Environmental Commitment
AIRE Workplan Projects: Multiple / overall CEP implementation
Previous AIRE Projects:

Description

The Community Energy Plan's (CEP) purpose is to establish and guide policy to 1) enhance Arlington County's economic competitiveness, 2) improve energy security and reliability for residents and businesses, and 3) strengthen the community's environmental commitment. The CEP uses greenhouse gas (GHG) emissions per capita as a proxy for overall energy productivity and as a primary metric for environmental commitment. Lower emissions numbers are better as they represent less pollution, resources used, and expenditures.

Data		
Year	GHG Emissions per Capita (mt CO₂e/capita/year)	Notes
2007 (baseline)	12.9	Revised in 2012
2012	11.3	

Performance Indicator #2: Fuel Source Diversity
Metric: Community-wide energy consumption by primary fuel type/total energy consumption
CEP Benefits: Energy Security
AIRE Workplan Projects: Renewable projects - co-ops, solar purchasing, APS coordination
Previous AIRE Projects: IEMPs

Description

Communities with a diverse selection of energy sources are less likely to experience the catastrophic failures or severe economic impacts in a crisis experienced by those that lack energy alternatives. Thus, this metric is an indicator of resiliency. Greater diversity and a balanced fuel portfolio will buffer fuel price shocks and help reduce perceptions of uncertainty and risk. Other potential benefits of fuel diversity (as compared to the current fuel mix) include a cleaner environment as well as greater grid reliability and flexibility.

While influence over grid-supplied fuel diversity rests in the hands of utilities, and thus is out of Arlington County’s direct control, this indicator is more than just informational. As a priority indicator, fuel diversity keeps Arlington moving towards encouraging diverse fuel sources through an emphasis on alternative energy installations and onsite generation. Achieving greater fuel diversity through local measures may incur significant first costs, requiring life cycle and cost-benefit analyses to balance this first cost with the long-term benefits of greater energy security, self-sufficiency, and price stability.

Data								
Year	Electricity	Unleaded	Natural Gas & CNG	Diesel	Fuel Oil & Kerosene	Biodiesel	LPG	Solar
2012 (baseline)	36.25%	38.65%	19.87%	4.18%	0.58%	0.35%	0.12%	0.01%

Performance Indicator #3: Building Energy Efficiency / Energy Use Intensity
Metric: Energy use intensity [kBtUs / gross square foot / year]
CEP Benefits: Environmental Commitment
AIRE Workplan Projects: Green Building Density Incentive Program, Green Home Choice Program, Residential Energy Efficiency Program, LED Bulb Campaign, Commercial Building Financing and Incentives

Previous AIRE Projects:

Description

In Arlington County, the energy use of non-residential buildings alone accounts for 53% of total energy use. Energy efficiency—avoided energy consumption—means less energy demand, which reduces the strain on the existing energy delivery infrastructure and decreases upfront capital and long-term operating costs for end users. More importantly, reduction in demand means that energy needs can be more easily satisfied through renewable or distributed systems, which increases overall system resiliency. Building owners will note that the CoStar Group documents the association between building energy efficiency and higher lease rates. Federal-sector lease agreements now require a demonstrated level of high building energy efficiency, a significant consideration for the Arlington commercial real estate market. The environmental benefits of building energy efficiency include lower GHG emissions, which Arlington County’s greenhouse gas emissions survey will document.

Data				
Year	Residential (kBtu/sf)	Commercial (kBtu/sf)	County Buildings (kBtu/sf)	Public School Buildings (kBtu/sf)
2012 (baseline)	46	93	94	67

Performance Indicator #4: Energy Intensity of Production
Metric: Total annual energy use (all sectors) / jobs
Metric: Total annual energy use (all sectors) / capita
Metric: Total annual source energy use (all sectors) / (capita and/or jobs)
CEP Benefits: Economic competitiveness
AIRE Workplan Projects: Education/Outreach projects
Previous AIRE Projects:

Description

Traditionally countries report their economic output per unit of energy consumed. However, it is difficult to accurately assess economic output at the County level. Thus, as a proxy for energy intensity of production we plan to assess the total energy consumed divided by total number of Arlington County jobs. A separate but related metric would be total energy consumed divided by total number of Arlington County residents.

"Site energy" includes electricity, gas, and other fuels consumed by the building (or other end user). "Source energy" is more comprehensive and includes all fuels consumed to produce, transmit, and delivery energy to the building.

Data			
Year	Annual Site Energy Usage (MMBtu/capita)	Annual Site Energy Usage (MMBTU/job)	Annual Source Energy Usage (MMBtu/capita)
2012 (baseline)	121	113	217

Performance Indicator #5: Distributed Backup Electrical Generation Capacity
Metric: Total number of off-grid hard-wired, stand-by generators
CEP Benefits: Energy Security
AIRE Workplan Projects: Keeping apprised of resiliency grant opportunities
Previous AIRE Projects:

Description

The need to have backup power is an indicator of resiliency to the failure of the central electrical grid. This metric looks at the community's ability or capacity to meet its electrical demand without grid support using hard-wired, stand-by generators.

Data	
Year	Number of Generators
2012 (baseline)	327

Performance Indicator #6: Demand Response Program Participation
Metric: # of time-of-use program participants
CEP Benefits: Energy security
AIRE Workplan Projects: Education/Outreach projects, Residential Energy Efficiency Program
Previous AIRE Projects:

Description

Demand response is a market-based, time-of-use economic tool available to utilities and their customers to reduce power demand when power is most expensive. Electric power is most expensive during periods of high peak demand. Customers can contract with utilities or third party vendors to reduce their electric demand using load management, standby generation, or other means. Participation in demand response program signals the ability of the Arlington energy infrastructure to be flexible in the face of energy challenges, and is an indicator of community energy use sophistication.

Data	
Year	Time-of-use Participants in Dominion Territory
2013 (baseline)	17,139

Performance Indicator #7: Transportation Fuel Diversity
Metric: Number of county-registered alternative fuel vehicles / number all vehicles registered (includes public and private vehicles)
Metric: Number of electric vehicle charging stations in Arlington
CEP Benefits: Environmental Commitment
AIRE Workplan Projects: Electric vehicle charging policy
Previous AIRE Projects:

Description

Alternative fuel vehicles create less demand for conventional petroleum-based fuels, leading to increased transportation flexibility, another factor cited throughout the literature as a key indicator of energy security. Transportation fuel diversity shares many of the benefits of built environment fuel diversity. It hedges against price spikes and supply disruptions. Transportation fuel diversity also results even more directly in environmental benefit, since alternative fuel vehicles are often low-emitting vehicles. Greater transportation fuel diversity is thus especially significant in our metropolitan area as a whole, which has the worst traffic congestion in the nation, according to a 2011 study by Texas A&M University.

Data			
Year	# of County-registered Alternative Fuel Vehicles / # all Vehicles Registered	# of County-registered Alternative Fuel Vehicles	Number of Electric Vehicle Charging Stations in Arlington (2016 data)
2013 (baseline)	0.0000159	6	57

Performance Indicator #8:

Vehicle Efficiency

Metric:

Avg. EPA-estimated MPG for all vehicles registered in the County

CEP Benefits:

Environmental Commitment

AIRE Workplan Projects:

Electric vehicle charging policy

Previous AIRE Projects:

Description

Congress first established Corporate Average Fuel Economy (CAFE) standards in 1975, largely in response to the 1973 oil embargo. Those standards have become more stringent over time. The latest set of standards covering light vehicle model years 2017-2025 were finalized by the U.S. Environmental Protection Agency and U.S. Department of Transportation in August 2012. These new standards will reduce average global warming emissions of new passenger cars and light trucks in a way that is equivalent to 54.5 miles per gallon (mpg) if the standards were met exclusively with fuel efficiency improvements.

Data	
Year	Average EPA-estimated MPG
2013 (baseline)	23.4

Performance Indicator #9: Transportation Mode Split
Metric: Average Household Trips/Day (Measure 7)
Metric: Commute Mode Share (Measure 8)
Metric: Usage of ART & Metrobus (Measure 9)
Metric: Usage of Bicycle Infrastructure (Measure 10)
Metric: Number of cars per household
CEP Benefits: Environmental Commitment
AIRE Workplan Projects: Education/Outreach projects
Previous AIRE Projects:

Description

Commute mode share is a strong indicator of whether Arlington residents and workers are utilizing available alternative transportation options. Measuring this indicator over time can reveal whether Arlington is successfully managing travel demand and the transportation systems, a specific policy outlined in Arlington’s Master Transportation Plan. This measures ties into the MTP Goal 1: Provide High-Quality Transportation Services, Goal 2: Move More People Without More Traffic, and Goal 5: Manage Effectively and Efficiently.

Arlington County anticipates a 22 percent increase in population and a 38 percent increase in jobs between 2010 and 2040. A reduction in the drive alone commute mode share is important to managing the experience of traffic congestion in a constrained network, and to minimizing the wear and tear on roadways to help each infrastructure investment last longer.

Average Number of Trips per Household per Day					
Year	Drive alone	Rideshare	Transit	Walk/Bike	Other
2010 (baseline)	1.5	1.2	0.4	0.6	0.1

Commute Mode Share for Persons Living in Arlington					
Year	Drive alone	Carpool/vanpool	Transit	Walk/Bike	Telework/CWS
2013 (baseline)	0.53	0.06	0.26	0.07	0.08

Performance Indicator #9: Transportation Mode Split (data continued)

Usage of Art and Metrobus			Usage of Biking Infrastructure		
Year	ART Passengers	Metrobus Passengers	Year	Bike Trail Volume (trips)	Capital Bikeshare Membership
2013 (baseline)	2,644,933	18,495,908	2013	2,224,788	2,120

Vehicles per Household				
Year	0	1	2	3+
2012 (baseline)	11.5%	48.8%	30.4%	9.3%

Performance Indicator #10: Transportation: Infrastructure Energy Use
Metric: % of county-owned streetlights converted to LEDs; MWh saved (Measure 30)
CEP Benefits: Environmental Commitment
AIRE Workplan Projects: Ongoing AIRE support to Arlington DOT Transportation Engineering and Operations staff
Previous AIRE Projects:

Description

Arlington has retrofitted over 65 percent of its streetlights to LED, and maintains a centrally controlled GIS-based web inventory to monitor streetlight location, status and energy use. Arlington also operates a smart streetlight program, where streetlights dim as the activities on street go down. For example, on residential streets, lights turn on at a 75 percent illumination level at dusk and gradually decrease to 25 percent at 11:00 PM, then stay at that level for the rest of night.

Data		
Year	MWh saved	% of County-owned Streetlights Converted to LEDs
2012 (baseline)	1190	34%
2014	2614	67%

Performance Indicator #11: Energy Efficiency: Public Sector & Utility Programs
Metric: Public-sector spending on energy efficiency programs [\$ per capita / year]
Metric: Utilities' budget for energy efficiency programs [\$ per capita / year]
CEP Benefits: Economic competitiveness
AIRE Workplan Projects: AIRE projects in the CIP; AIRE annual workplan
Previous AIRE Projects:

Description

Allocating resources and incentives for energy efficiency is a key factor in market uptake, leading to reduced energy demand, increased energy availability, and enhanced energy security. Reports using REMI (Regional Economic Models, Inc.) modeling, such as the one cited earlier for the New England Region, also connect this metric to economic competitiveness.

Data				
Year	AIRE Budget [\$ per capita / year]	Energy Efficiency CIP Budget [\$ per capita / year]	Energy Efficiency Incentive Funds Disbursed to Public [\$ per capita / year]	Utilities' Budget for Energy Efficiency Programs [\$ per capita / year]
2012 (baseline)	\$7.56	\$1.22	\$0.00	\$4.77

Performance Indicator #12: Solar PV Investment
Metric: Number of public solar energy systems installed
Metric: Capacity of public solar systems
Metric: Number of all community solar energy systems installed
Metric: Capacity of all community solar systems
CEP Benefits: Environmental Commitment
AIRE Workplan Projects: Solar in the Community projects
Previous AIRE Projects:

Description

The use of renewable energy, particularly solar photovoltaics (solar electric) can reduce operating costs for businesses and homes. Since solar photovoltaics (PV) generate electricity largely coincident with summer cooling demands, the use of solar PV helps reduce the summer peak demand for electricity.

Data				
Year	# of Public Systems (Schools + Govt)	County System Capacity (kW, Schools + Govt)	# of Total Systems (Entire Community)	Total Solar PV Capacity (kW)
2011 (baseline)	3	72	54	236
2013	4	162	68	347
2015	5	659	125	1,088