

Arlington's Community Energy Project

Ensuring a Competitive and Sustainable Community



March 2011

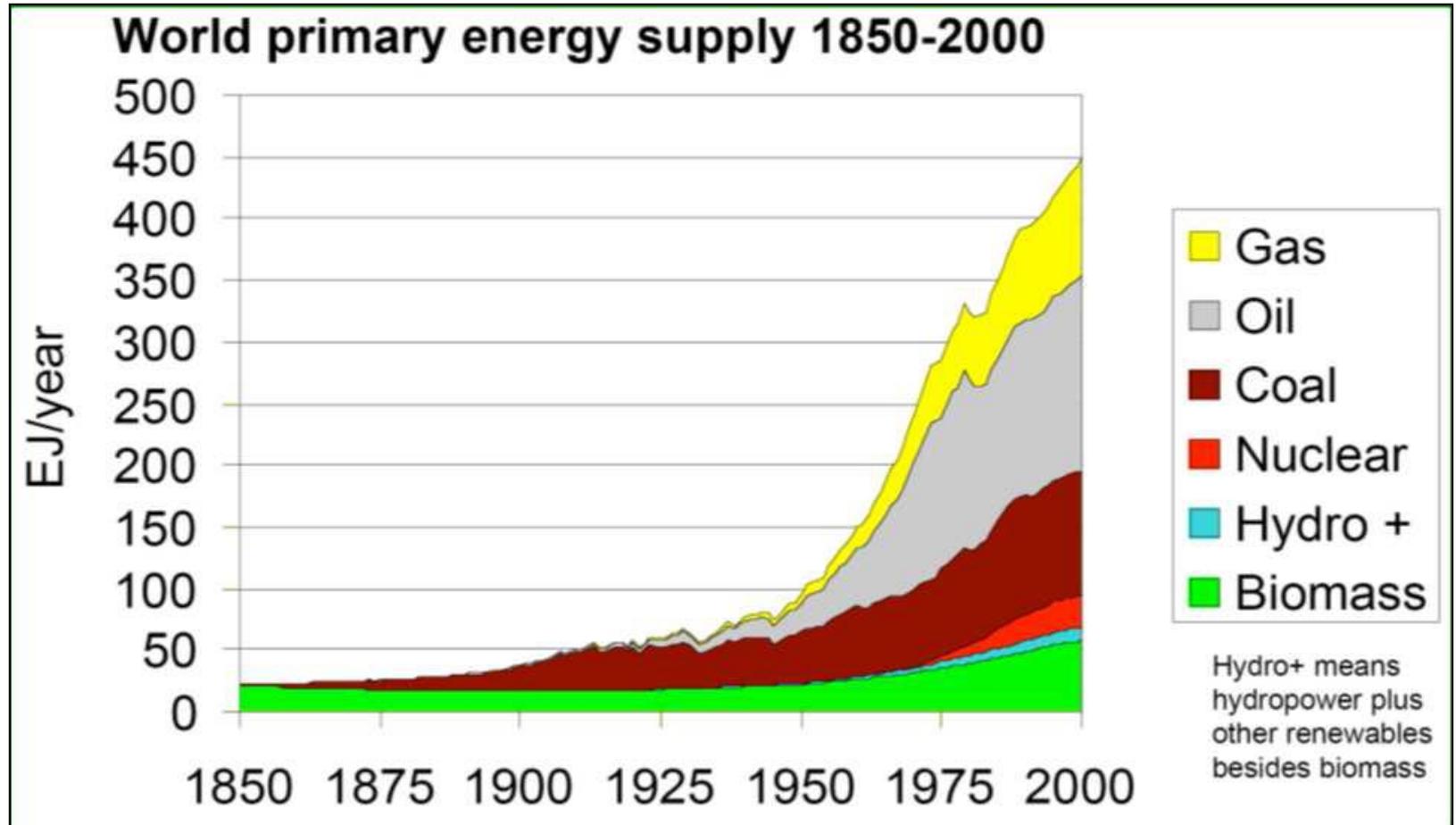
Arlington's History of Planning

- *Affordable Housing*
- *Chesapeake Bay Preservation*
- *Historic Preservation*
- *Homelessness*
- *Information Technology*
- *Land Use*
- *Natural Resources Mgmt*
- *Neighborhood Conservation*
- *Open Space/Public Spaces*
- *Public Art*
- *Recycling*
- *Sanitary Sewer*
- *Stormwater Management*
- *Transportation*
*Streets, Transit, Biking,
Parking, Pedestrians*
- *Urban Forestry*
- *Water Distribution System*
- *Green Buildings*
- *AIRE*

Energy?????

Insatiable Appetite for Energy

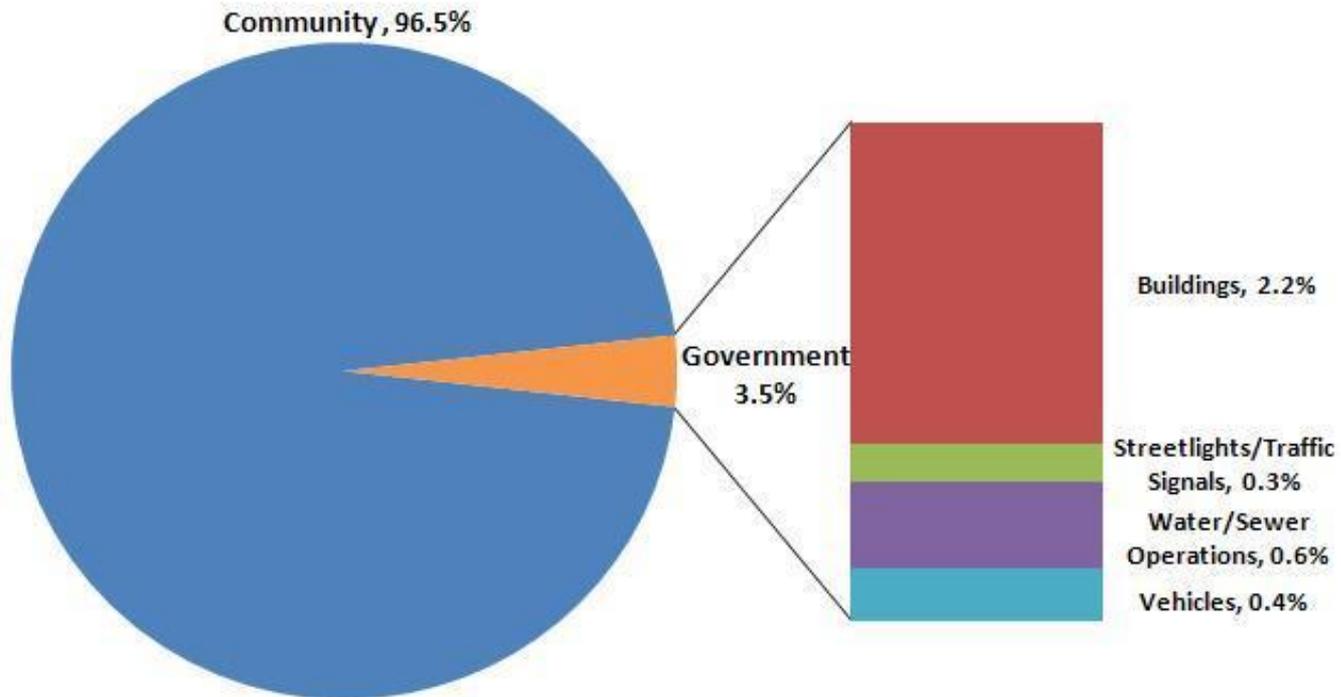
About 70% of it in Cities



Forecast to double by 2030

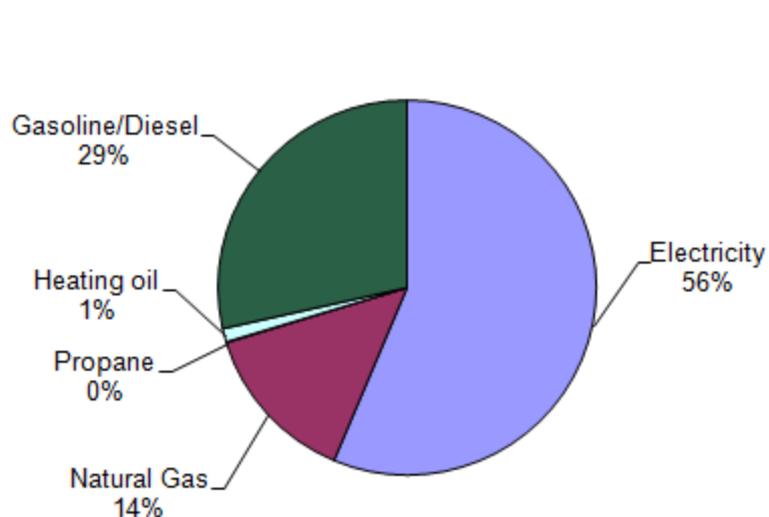
Arlington County Government's Greenhouse Gas Emissions

Total Arlington County Greenhouse Gas Emissions by Sector, 2007

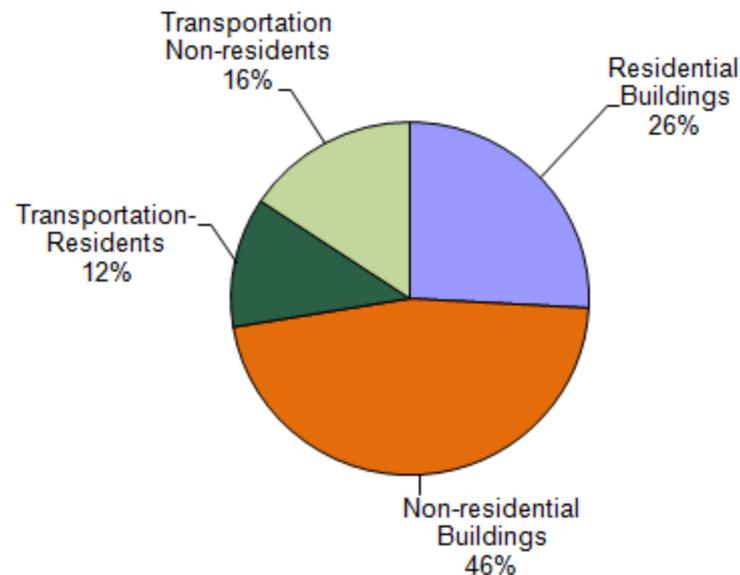


Arlington County - Carbon Footprint

2007 Greenhouse Gas Emissions 2,730,000 metric tons / 6,020,000,000 lbs CO_{2e}



by type



by sector

13.4 metric tons for each Resident

Greenhouse Gas Indicators

- National Greenhouse Gas per capita per year (metric tons CO₂)
 - *Canada* 22.6
 - *USA* 21.7
 - *Denmark* 14.1
 - *Germany* 11.7
 - *European Union* 10.5

- Municipal Greenhouse Gas per capita per year
 - *Washington DC* 19.7
 - **Arlington County** **13.4**
 - *Loudoun County* 14.2 with 6.0 goal
 - *Canada – Guelph* 12.2 with 5.0 goal
 - *Mannheim* 6.0
 - *Denmark - Copenhagen* 3.0

2050 goal for Arlington?

Community Energy Project: Background

Competitiveness

- Energy cost
- Employment
- Investment



Security

- Supply security
- Supply quality
- Flexibility

Environment

- Greenhouse Gas Reduction

Three Groups of Benefits

Purpose

- *Recommend countywide goals for long-term, mid-term and short-term reduction of greenhouse gas (GHG) emissions as well as key strategies and actions to be taken by government, the private sector, the non-profit sector and individuals to meet those goals. Energy use is the predominant cause of GHG emissions and is therefore the primary focus of this effort.*
- *Produce a Community Energy Plan (CEP) that will be the foundation for an Energy Master Plan, which could ultimately become an element of Arlington County's Comprehensive Plan.*

Adopted by Arlington County Board, January 1, 2010

CES Task Force (29 members)

■ Businesses (8)

- *JBG*
- *Little Diversified Architectural Consulting*
- *Lockheed Martin*
- *Marriott International*
- *SRA International*
- *Turner Construction*
- *VA Hospital Center*
- *Vornado*

■ Citizens (4)

- *Arlington Civic Federation*
- *Commissions*

■ Educational Institutions (2)

- *Arlington Public Schools*
- *Virginia Tech*

■ Energy & Energy Tech Industry (3)

- *Dominion Virginia Power*
- *United Solar Ovonic (Uni-Solar)*
- *Washington Gas*

■ Local, State and Federal Gov'ts (5)

- *The Pentagon*
- *US EPA*
- *Commonwealth of Virginia Senate*

■ Nonprofits/Associations (5)

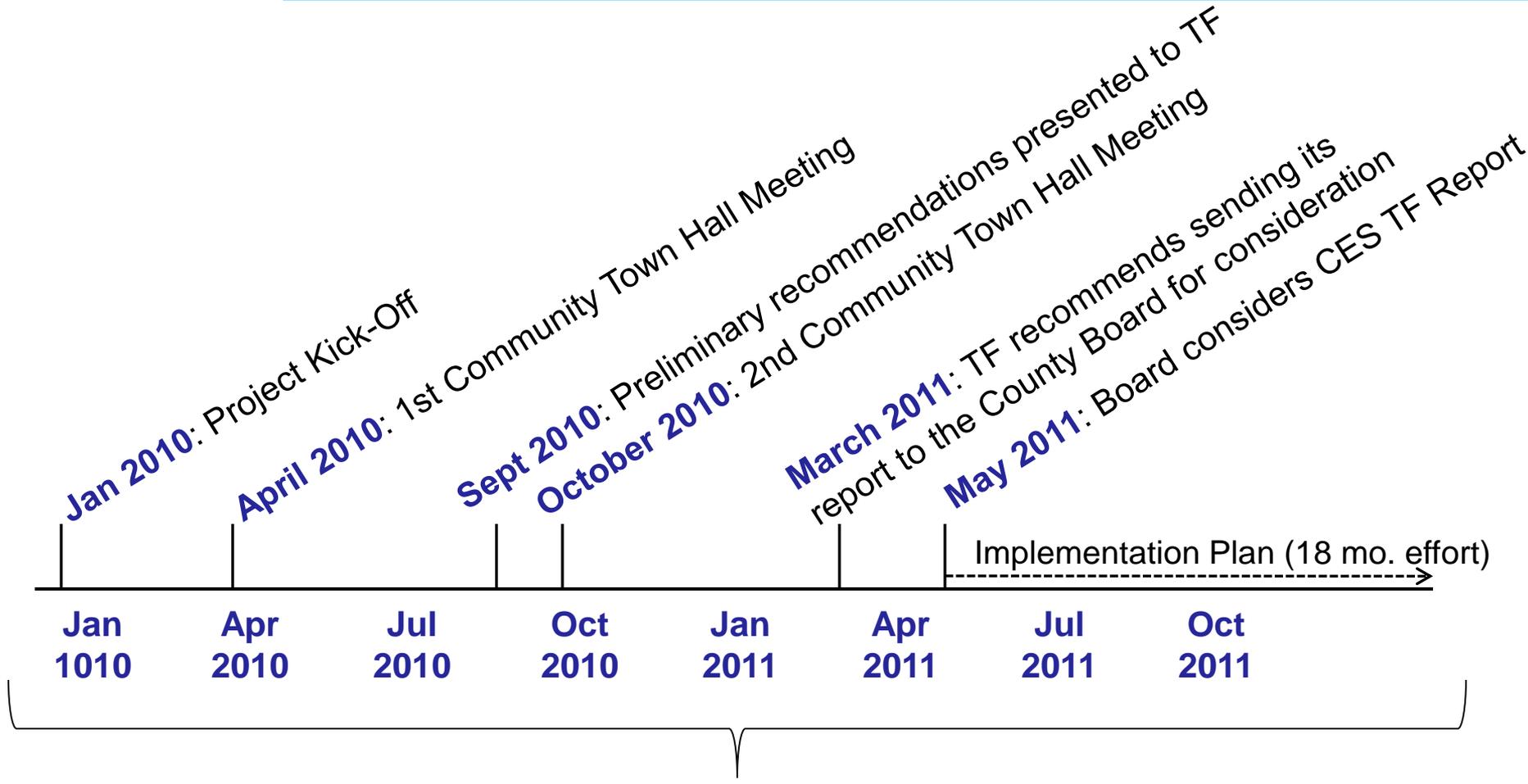
- *Apartment and Office Building Association*
- *Arlington Chamber of Commerce*
- *Arlington Partnership for Affordable Housing*
- *Arlingtonians for a Clean Environment*
- *Pew Center on Global Climate*

■ Regional Transportation Authorities (2)

- *Metro Washington Airports Authority*
- *Metro Washington Area Transit Authority*



Timeline



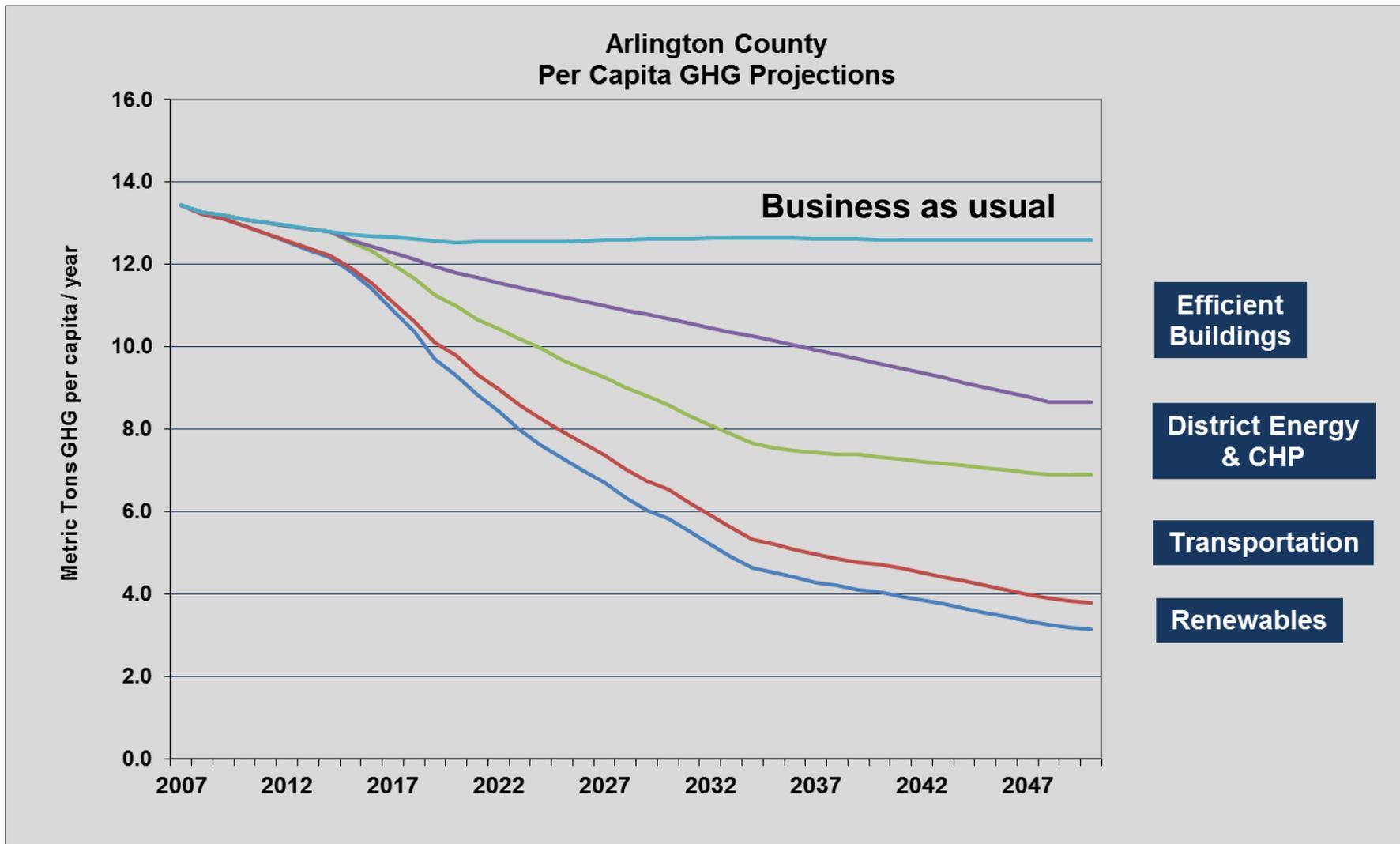
Bi-monthly Task Force Meetings
 Regular Technical Working Group Meetings

Headline Target: 2050 Greenhouse Gas Emissions

- **Task Force recommends a GHG emissions target of 3 metric tons CO₂e /capita per year by 2050.**
- In 2007, Arlington produced 13.4 metric tons CO₂e per resident
- Task Force also recommended Arlington's target for 2050 be 2.2 metric tons CO₂e /capita if regional energy plan established.

Per Capita GHG Emissions

Impacts of Key Energy Policy Recommendations



Arlington Community Energy Framework

- *Energy efficiency – If you don't need it - don't use it*
- *Heat Recovery – It it's already there – use it*
- *Renewable energy – If it makes sense, go carbon free*
- *Energy distribution – Invest where it makes sense*

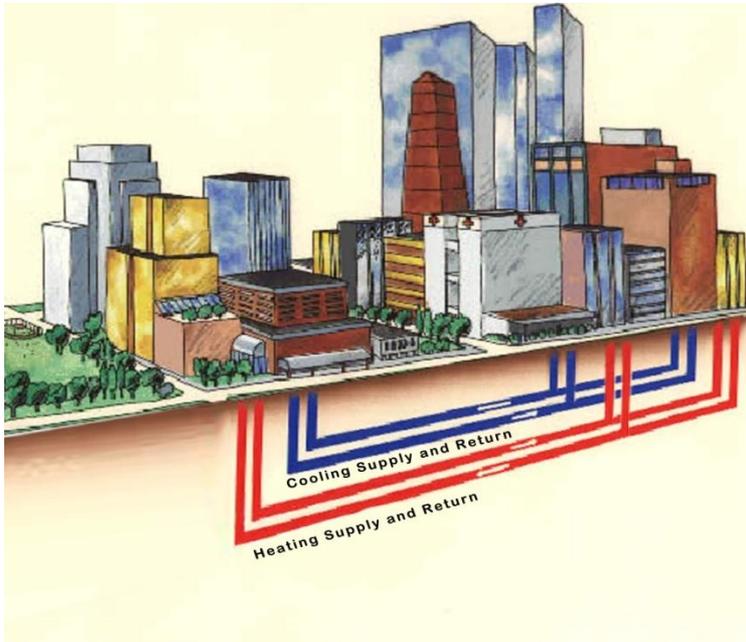
Integrated Solution – Tailored for County!

Recommendation: Energy Efficient Buildings

- Increase energy efficiency in new and renovated homes and buildings, on the order of 30% to 50%
 - *Efficient construction and equipment*
 - *Operations and maintenance*
- Create a mixed-use, net-zero energy scale project



Recommendation: District Energy Systems



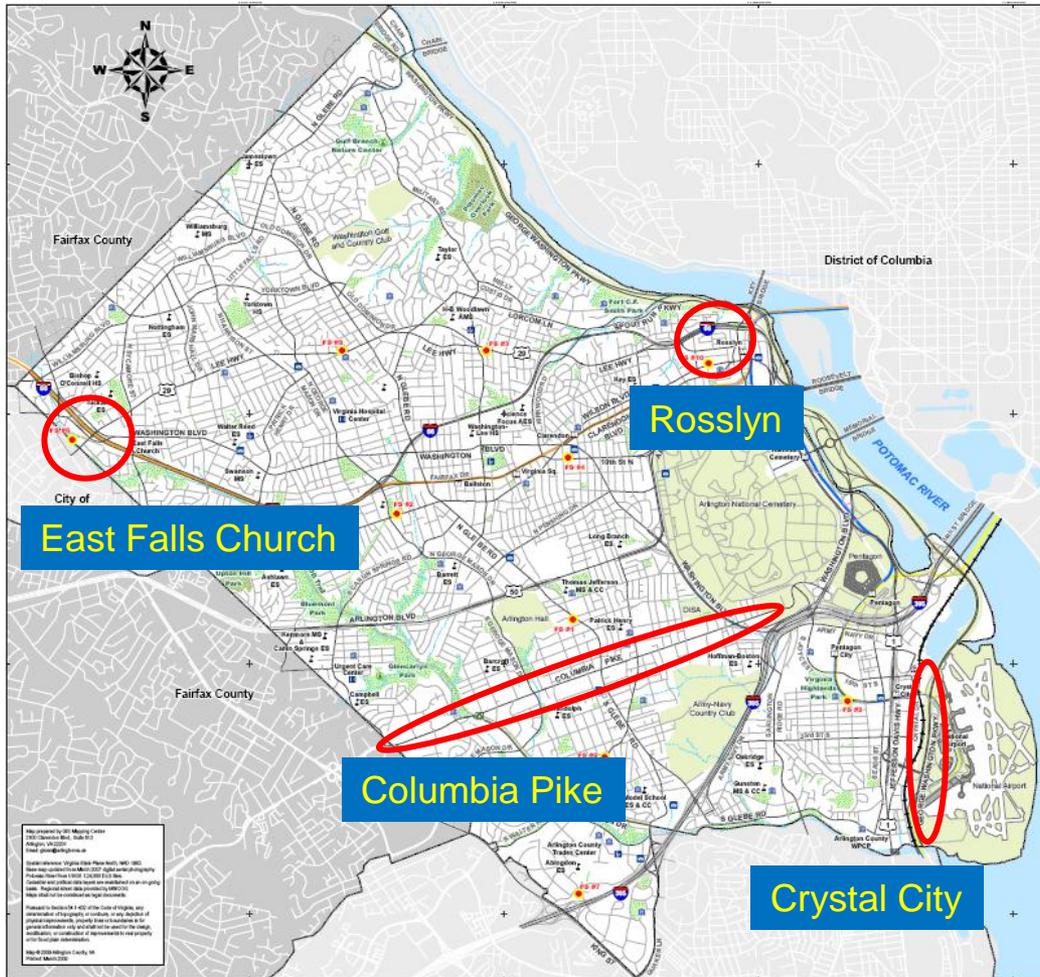
Centralized supply and delivery

- Heating
- Cooling
- Domestic hot water

- Distribution to many homes and buildings
- Closed network of highly insulated pipes
- Optimized energy supply from multiple sources
 - *Combined Heat & Power*
 - *Boilers/Furnaces*
 - *Absorption Chillers*
 - *Electric Chillers*
 - *Solar and Biomass*
 - *Waste heat recovery*
- Typically operated by dedicated DE-Utility

Widely deployed proven technology

Task Force Recommendations High Priority Candidates



Potential Scale Project Areas

Recommendation: Energy Efficient Transportation

- Reduce vehicle miles traveled
- Support federal efforts to increase vehicle fuel efficiency
- Support the reduction of carbon content in fuels



Recommendation: Renewable Energy

- Increase use of solar photovoltaic systems countywide
 - *Target: 160 Megawatts of capacity by 2025*
- Increase use of clean and renewable energy sources for domestic hot water and space heating needs

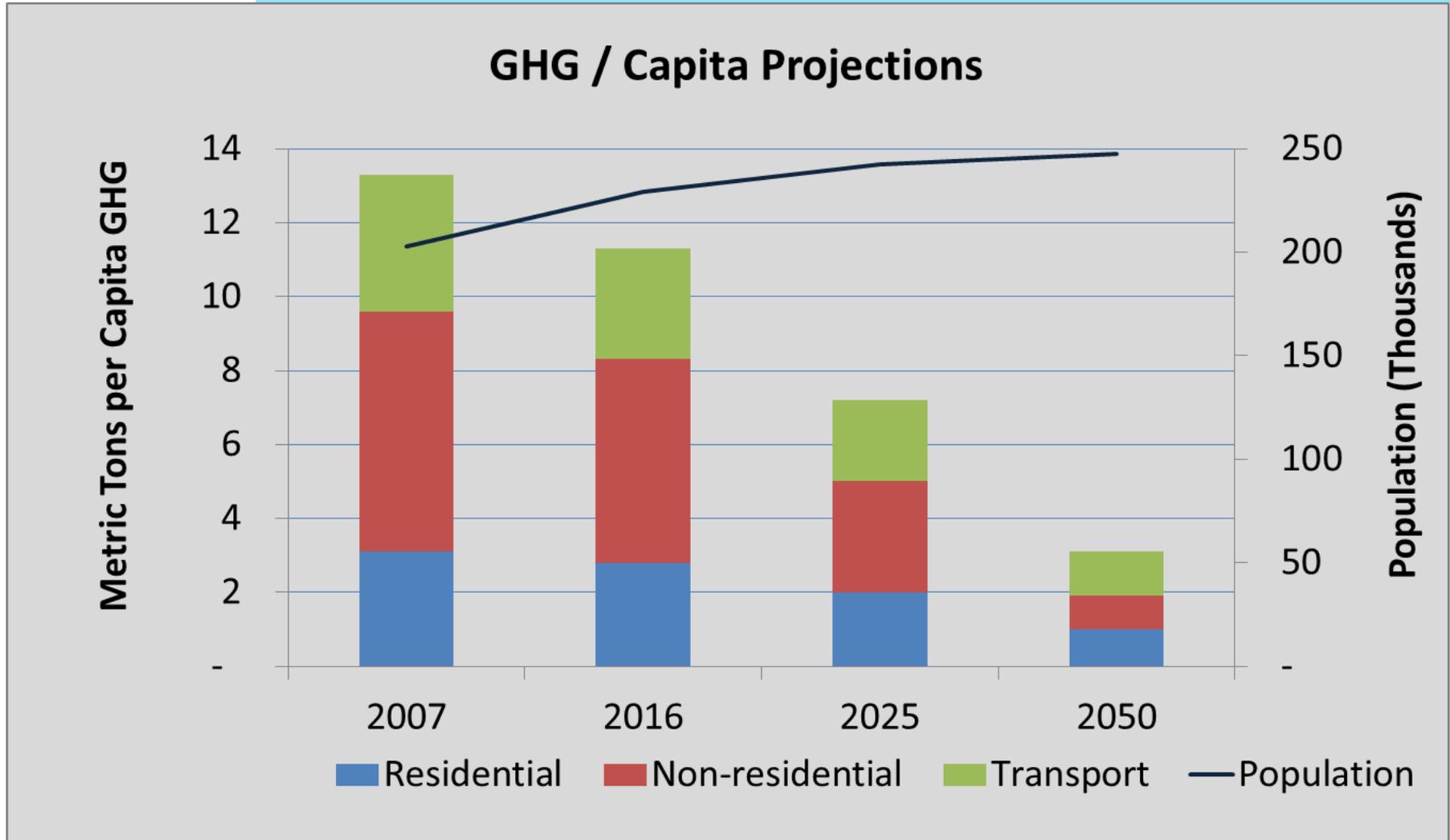


Recommendation: Enabling Strategies

- Institutionalize energy planning
- Energy performance labeling
- Education and training
- Financing and incentives
- Ongoing County and regional programs



Energy Modeling Results



Benefits of Success!



Resident

- *Less utility costs*
- *Resale value*
- *Employment*
- *Quality of life*

- *Environmental impact*
- *Competitive energy services*
- *New business investment*

Commercial

- *Reduced costs*
- *Rental values*
- *Low vacancy*
- *Productivity*

Academic

- *Sustainable curricula*
- *Lower costs*
- *Student magnet*
- *Global network*

Developers

- *Premium prices*
- *Low carrying time*
- *Reduced investment*

Utilities

- *Higher returns*
- *Emissions credits*
- *Customer intimacy*
- *Diversification*

Banks

- *Collateral Value*
- *Credit worthiness*

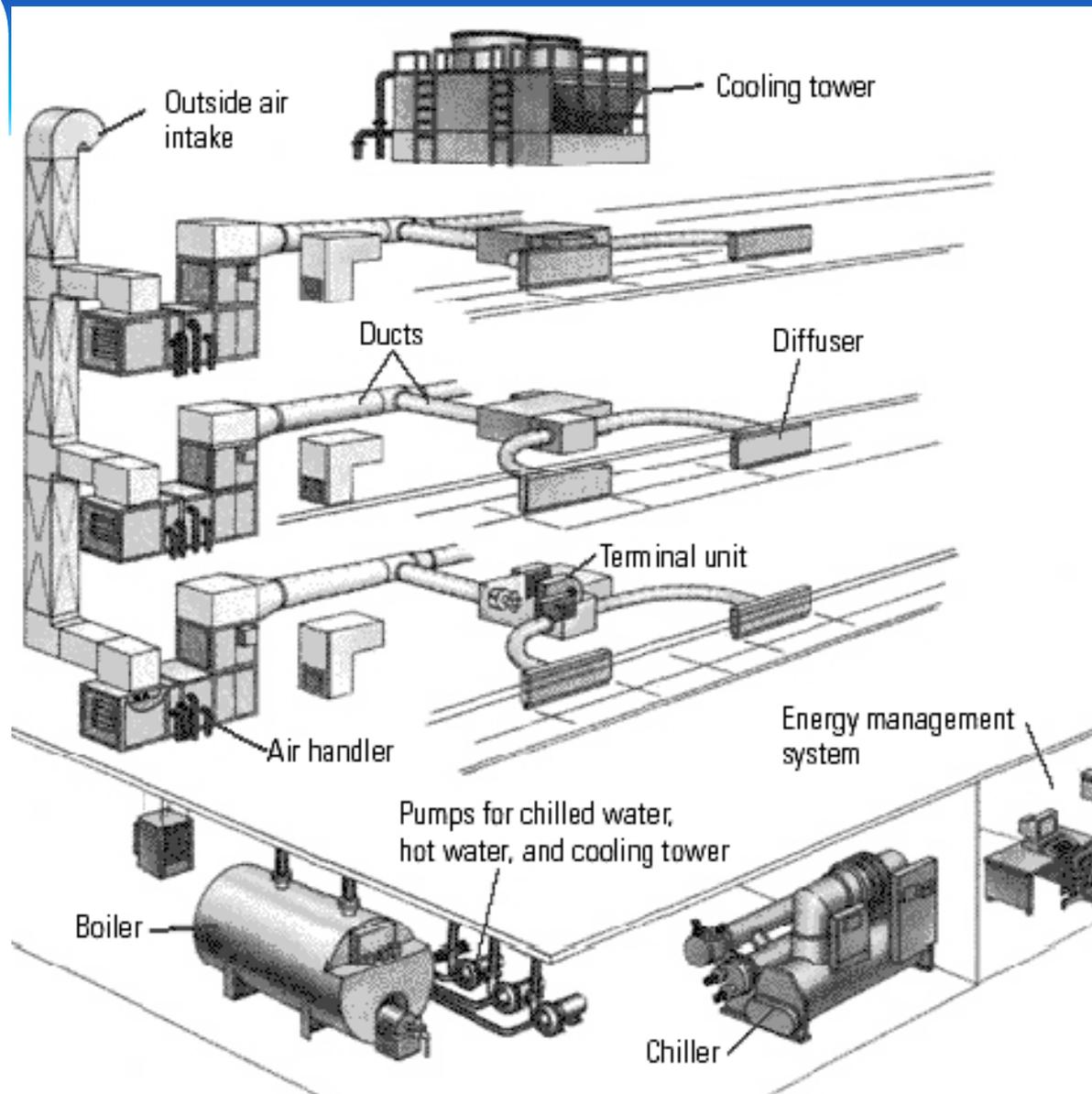
New Relationships – New Rules

For more information:



www.arlingtonva.us/energyplan

ADDITIONAL SLIDES



Making Electricity Wastes a Lot of Energy

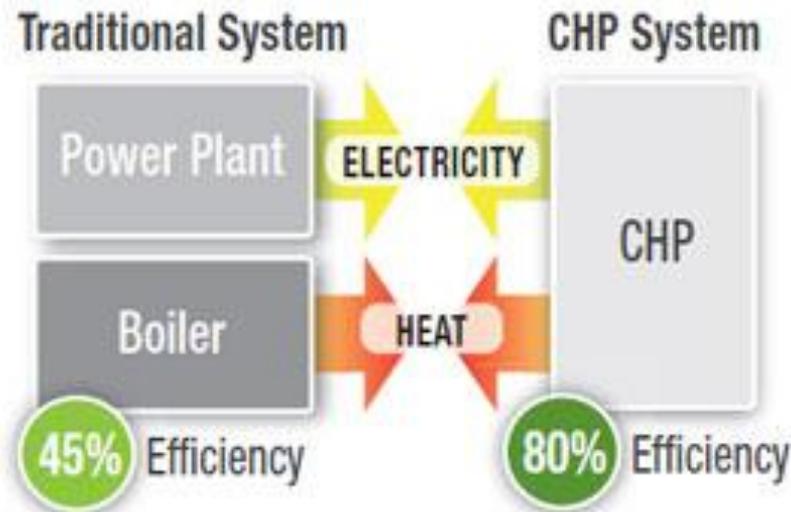
Environmental laws cleaned up a lot of pollution from power plants, so many “smokestacks” are really “just” cooling towers. But that is valuable heat just thrown away – into air or bodies of water!



Combined Heat & Power (CHP), or *Cogeneration*

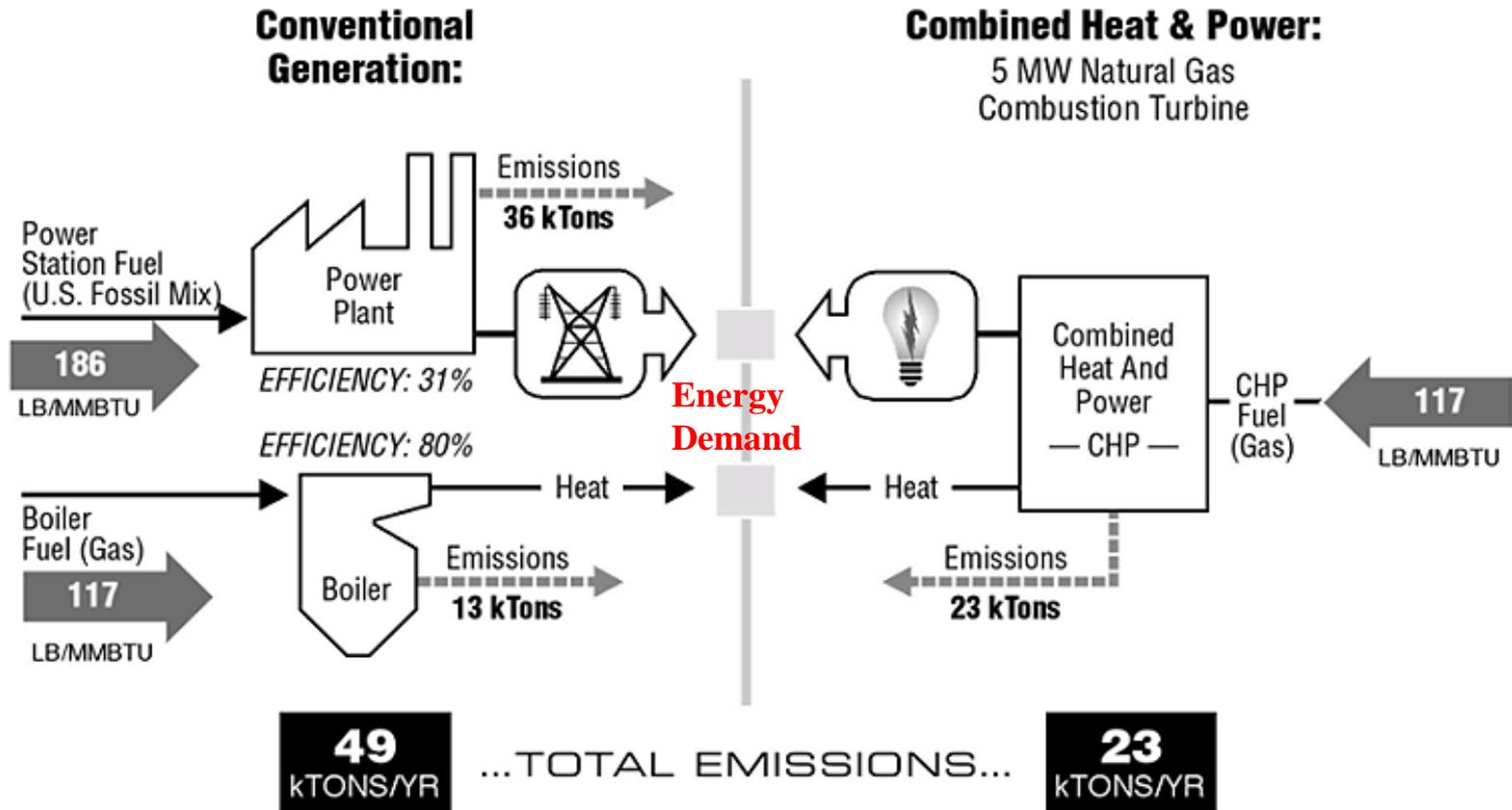
Burning a fuel to make electricity, and capturing the 'waste heat' for use in other applications, such as space heating, water heating, or even driving chillers to make electricity.

CHP Process Flow Diagram



Source: *Combined Heat and Power - Effective Energy Solutions for a Sustainable Future*, Oak Ridge National Laboratory. December 1, 2008.

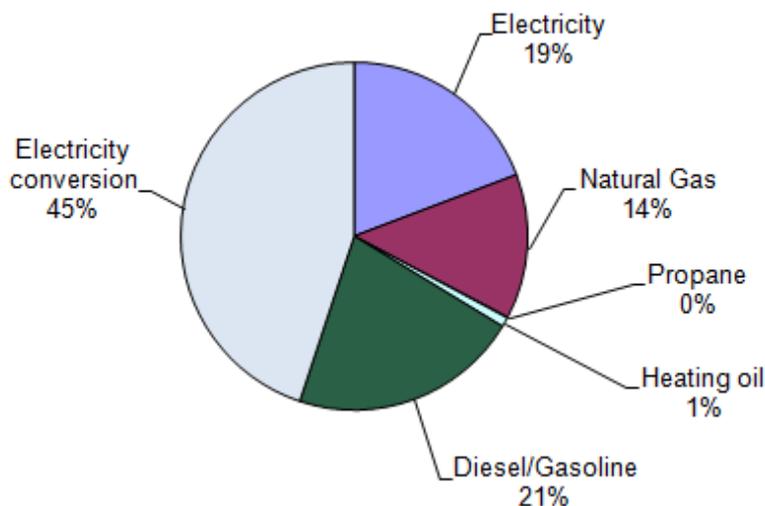
Conventional Energy Delivery vs. Combined Heat & Power



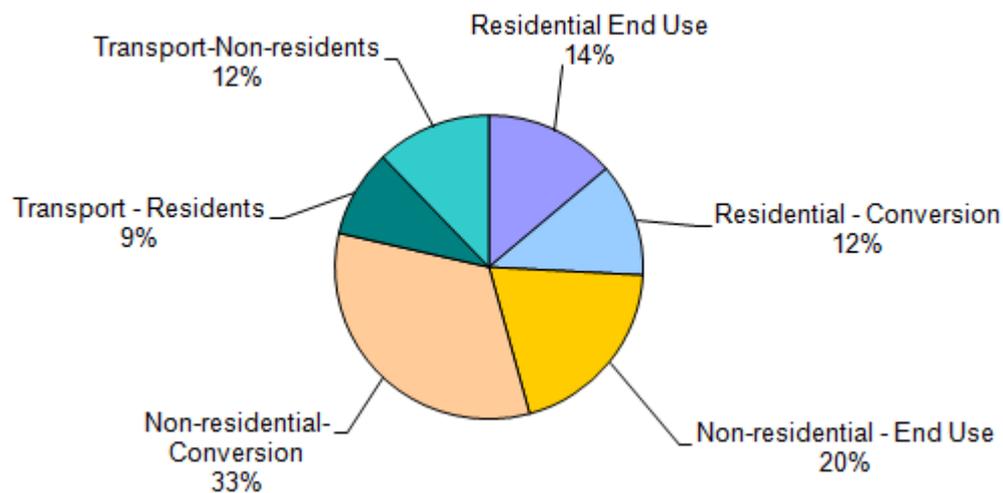
Emissions of Carbon Dioxide (CO₂)

Arlington County - Energy Use

2007 Fuel Use
 48,252,000 MMBtu_e / 14,141,000 MWh_e



by type



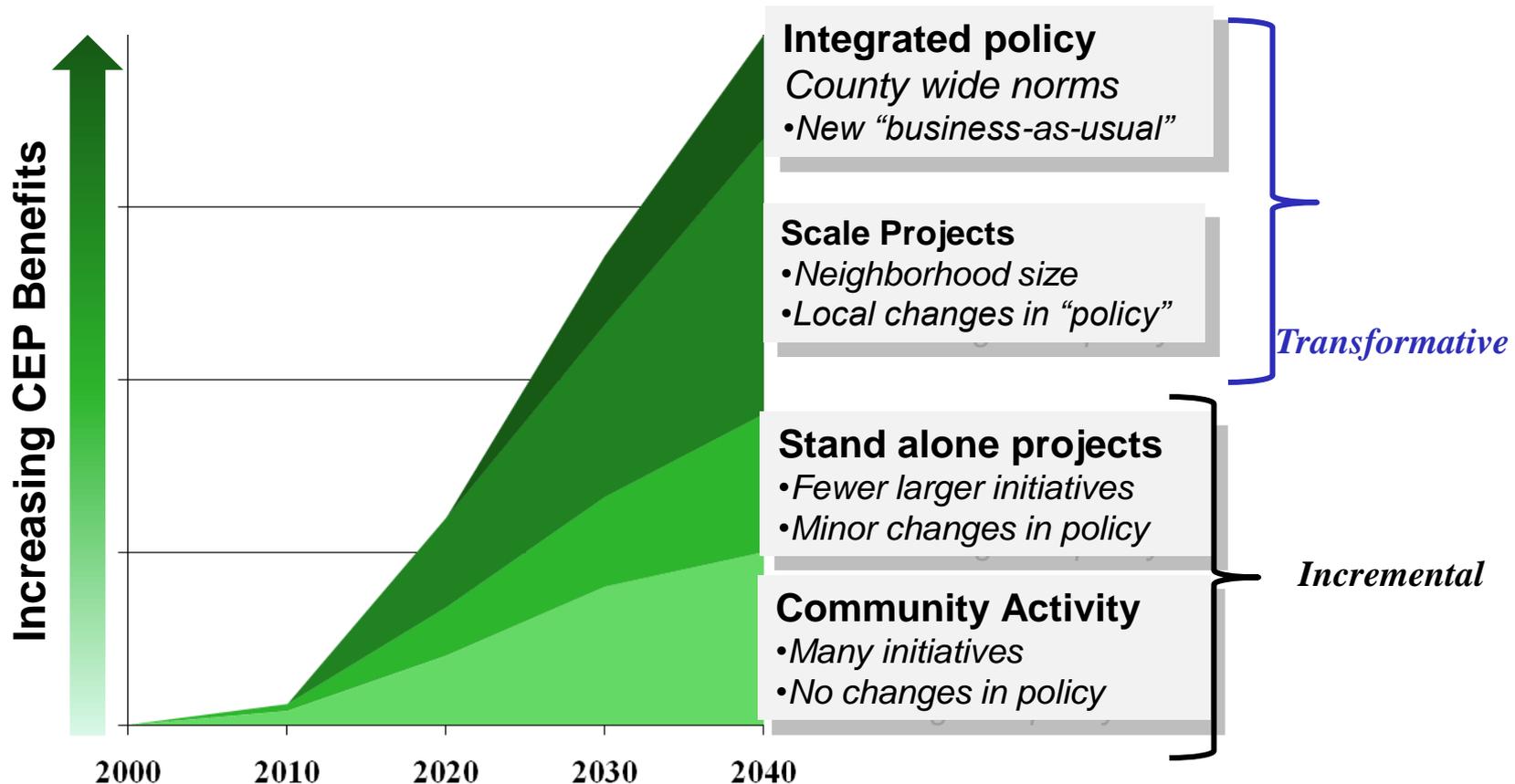
by sector

236 MMBtue / 69 MWh_e for each Resident

Arlington Initiative to Reduce Emissions (AIRE)

- January 1, 2007: Fresh AIRE program launched
- Set a Goal: 10% reduction in greenhouse gas emissions from County government operations from 2000 to 2012
- Set specific action targets
- Directed outreach to residents and businesses. Premise: the County is “leading by example”
- Funding: Established dedicated funding thru residential utility tax + EECBG federal funds

CEP Goals. Transformative or Incremental



Framing Goal Indicators Needed Early

“Scale Projects” *Selection Criteria*

- High probability of being implemented
- Manageable number of participants
- Large enough to implement integrated energy solutions within its boundaries
- Possibility to apply different energy supply and efficiency than surrounding norms
- Potentially economically, environmentally and operationally attractive
- Future possibility to link to other community projects

District energy systems produce steam, hot water or chilled water at a central plant. The central plant may be part of a building.

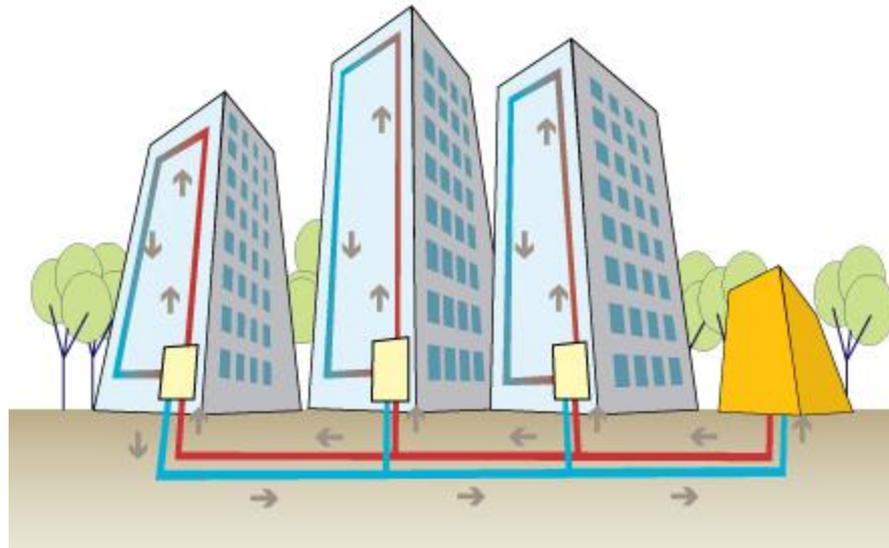
The steam or water is piped underground to individual buildings for space heating, hot water, and air conditioning.

Individual buildings served by district energy do not need their own boilers, furnaces, chillers, or air conditioners. The district energy system does that work for them, providing valuable benefits including:

- greater energy efficiency
- reduced operations and maintenance costs
- improved reliability
- more space available for other uses

District energy systems usually begin with as few as 3 or 4 buildings interconnected, and can grow to serve hundreds or even thousands of buildings.

The buildings are usually in a cluster, and often owned by the same company or institution. However, interconnection of buildings with different owners is possible and increasingly common.



Built-environment – County leads by example

Central Library: from FY2000 to FY2010, lighting retrofits and building “tuning” have cut electricity use by 43% and total energy use by 27%, saving \$80,000/year.



Central Library now uses 63% less energy (per sq. ft.) than average of commercial buildings in Arlington

EXAMPLE: MIDTOWN THERMAL PLANT – ATLANTIC CITY, NJ

- Centralized Thermal and Power Generation Plant
- One of 3 District Solutions Operated by PES
 - Atlantic City, Wilmington DE, Washington DC
- Built in 1997 – Investment: ~\$100M
- Plant Capacity
 - Chilled Water: 53,800 tons
 - Steam: 840 mmBtu/hr
 - Now Serves 8 Commercial Clients via 3.8 mile network of piping
 - Adding 7MW of Onsite Power Generation (Lowering Operating Costs)
 - Capacity available for more Buildings
- Satellite Generation Facilities
 - 3 Locations within System
 - Enhances System Reliability and Capacity



Energy Use and Greenhouse Gas Emissions

Sector	Energy Use	Greenhouse Gases
<p>Transportation</p> 	<p>21%</p>	<p>28%</p>
<p>Residential</p> 	<p>26%</p>	<p>26%</p>
<p>Non-Residential</p> 	<p>53%</p>	<p>46%</p>