Draft Energy Assurance Highlights for the City of Virginia Beach

MWCOG Briefing

15 March 2012

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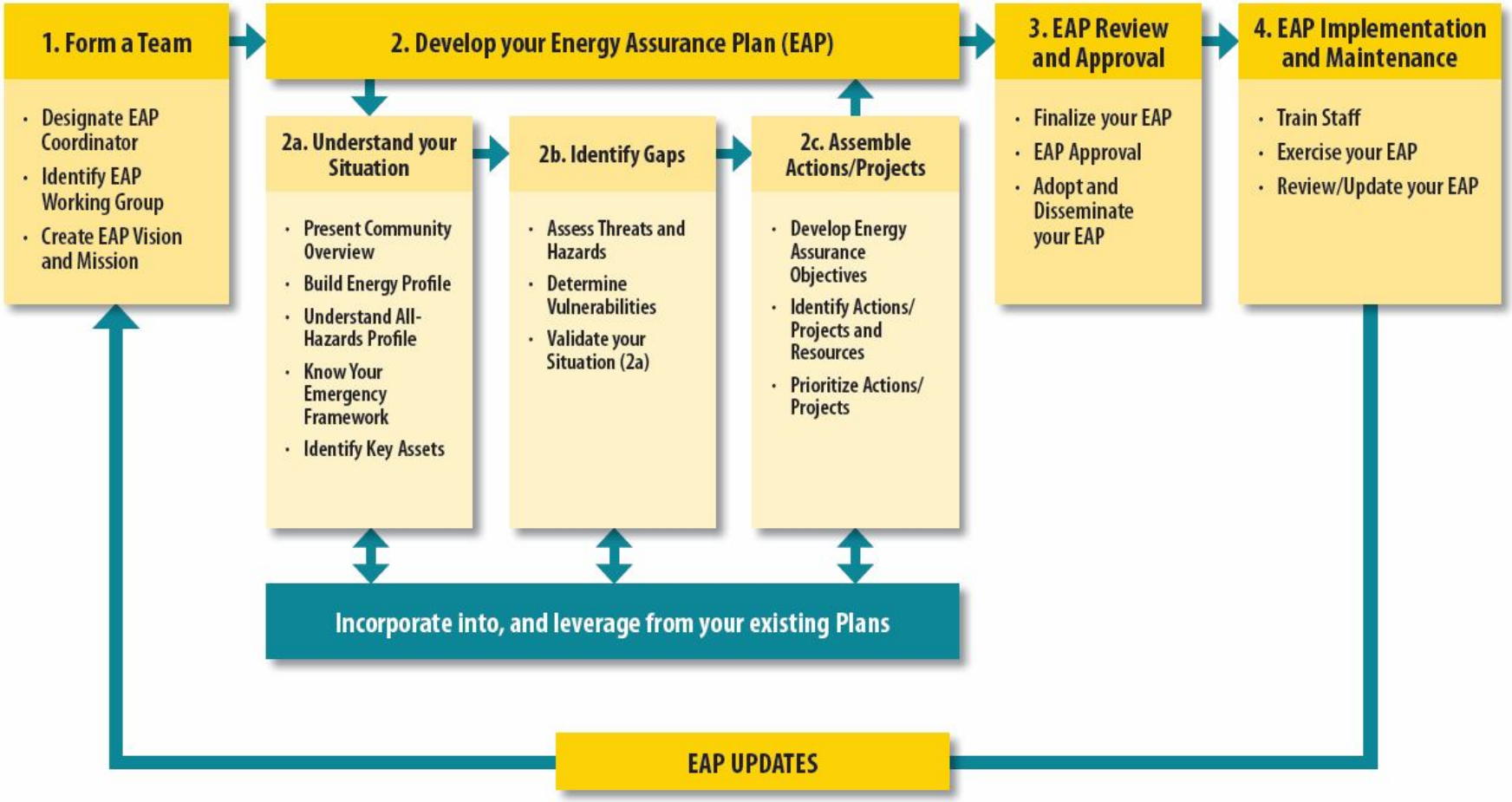
Virginia Beach, Virginia

Dept of Energy Grant - $200,000
Local Energy Assurance Plan (LEAP)

Overall Objective: The overall objective of this plan is to enhance communication and coordination among City departments, citizens, and private industry energy stakeholders so that all may be better prepared for potential energy disruptions, while at the same time ensuring that essential functions and services in the City can be maintained during a disruption.

Since energy infrastructures are largely owned and operated by private industry, the function of a local government energy assurance plan is NOT to assure supply but to continue to provide essential services and functions during a supply curtailment until normal energy supply systems are restored.

Energy Assurance Planning Process



LEAP Planning Activities

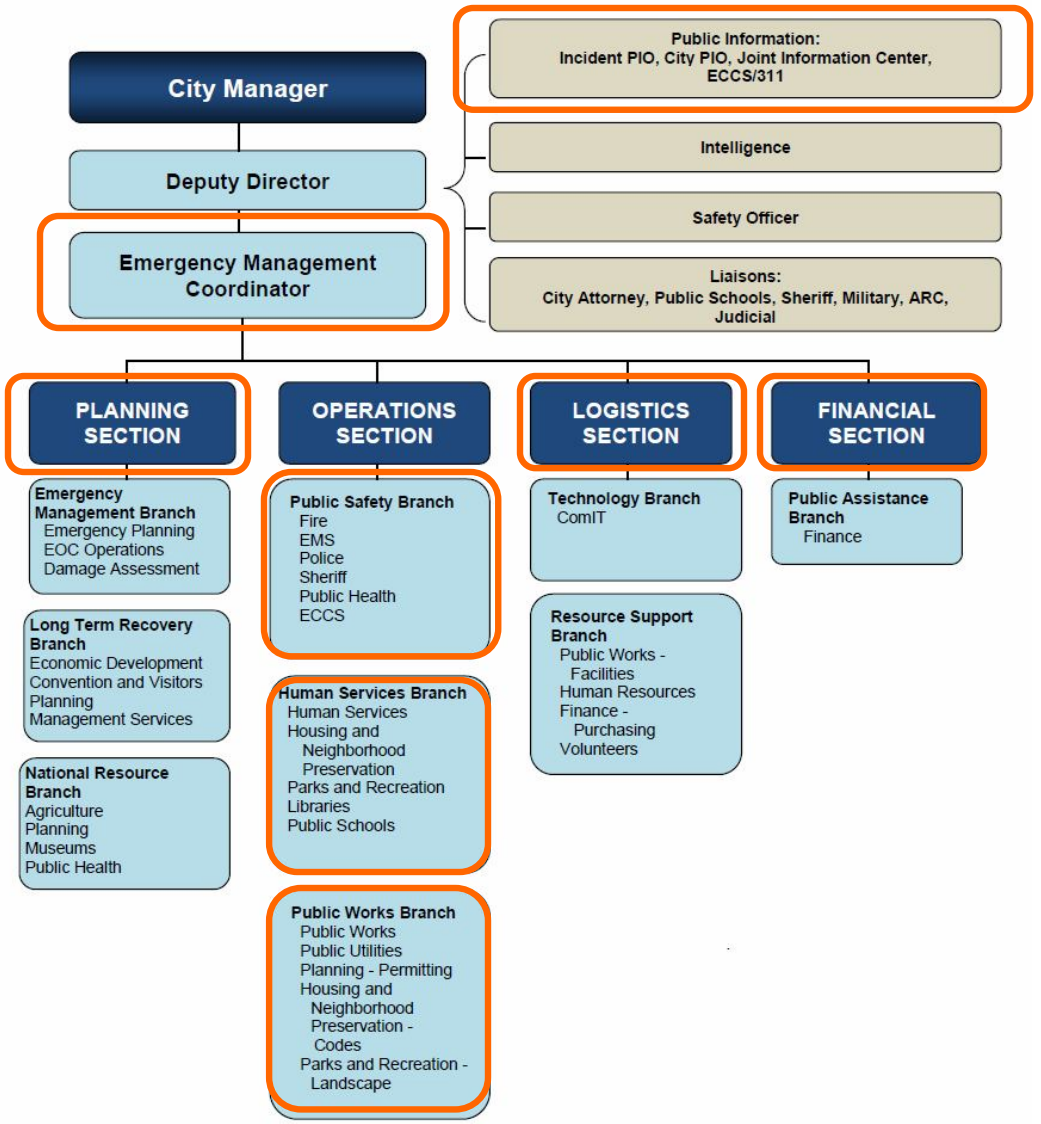
- Researched local energy usage profile
- Researched energy supply and transport infrastructures
- Energy-assurance-oriented interviews and discussions with:
  - City Departments
  - Schools
  - Verizon Wireless
  - Dominion Virginia Power
  - Virginia Natural Gas
  - Virginia Department of Emergency Management
  - Virginia Department of Mines, Minerals and Energy
  - U.S. Army Corp of Engineers
- Developed strategic investment plan for mitigation

Other LEAP Activities

- Energy training for City engineers
- Study of Critical Facilities fed off the Central Plant
- Study of Public Utilities Pump Stations
- Study and design of the Human Service Building (potential EOC functionality)
- City-wide Generator Assessment and “refresh” meeting with U.S. Army Corps of Engineers
- Attended DOE tabletop exercises (Raleigh, March 2010 and Boston, June 2010)
- Participated in VDEM-DMME State tabletop exercise (October 2011)

Local Energy Assurance Planning Team

- Joint Energy Committee
- Emergency Preparedness Committee
  (LEAP subset drawn from incident command structure organizational elements circled at right)



LEAP Documents

- **Document 1**: Local Energy Assurance Plan Master
  The master plan is *reviewed every two years* by the Energy Assurance Planning Team [**NEXT SLIDE**] and *updated as needed*. It is the source document from which selected sections are copied to produce Documents 2 and 3.

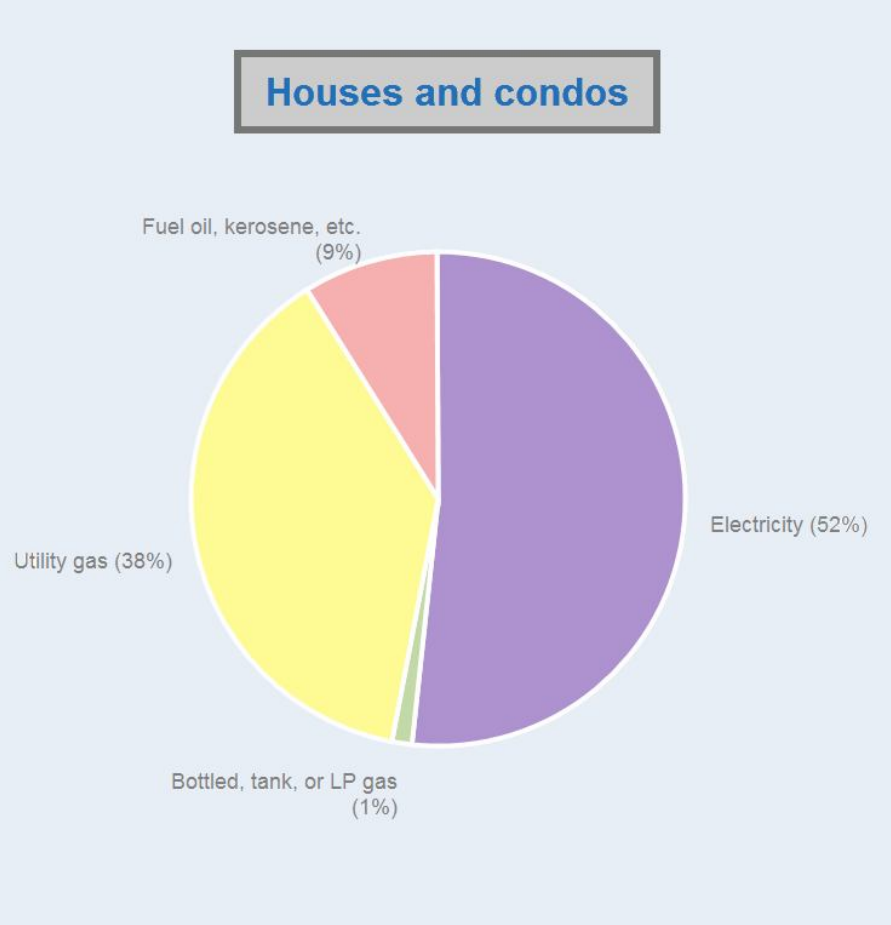
- **Document 2**: Energy Disruption ESF#12 Checklist
  The operational checklist is carried into the Emergency Operations Center by the Energy Management Administrator for quick reference during an energy disruption. It is *reviewed on an event-by-event basis* as part of after-action reporting and *updated as needed*, based on lessons learned during an event.

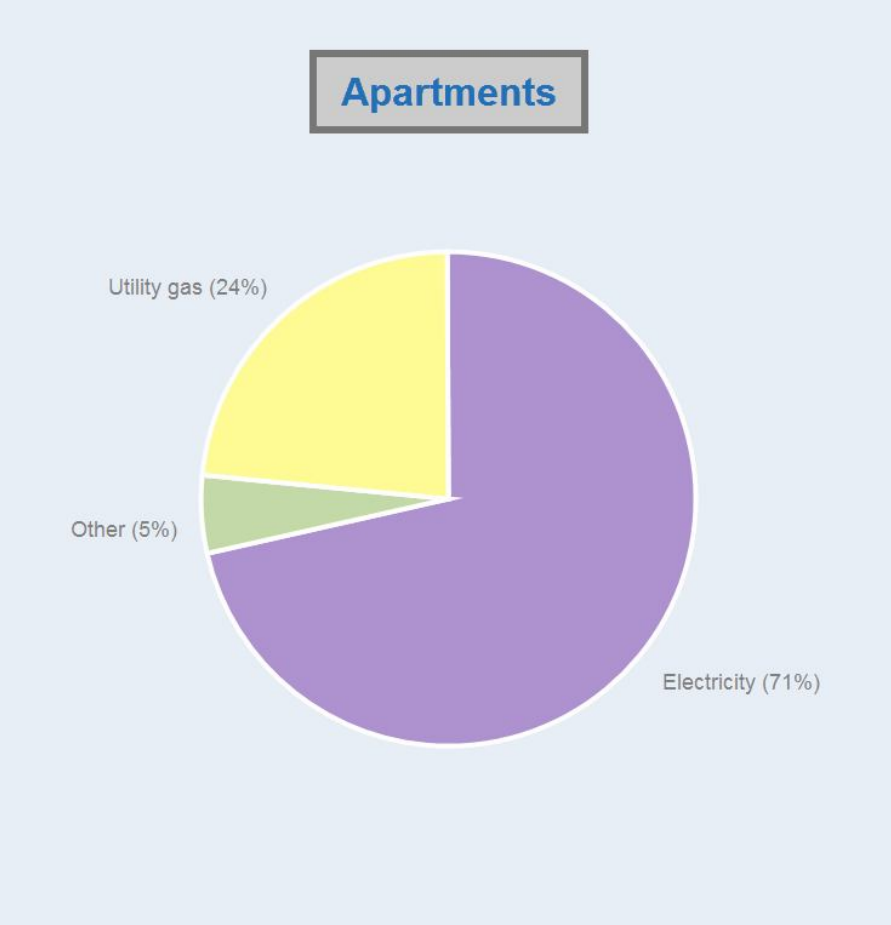
- **Document 3**: Energy Assurance Investment Strategy (Mitigation List)
  This long-term mitigation strategy describes and prioritizes potential capital investments and changes in policies, procedures and practices that would enhance energy assurance and the resilience of the City and its citizens in the face of energy supply disruptions. It is *reviewed and updated semi-annually* by the Joint Energy Committee to reflect any new investments or changes in policies, practices, and procedures.

Local Energy Usage Profile

- In round numbers: 450,000 people living in 150,000 households
- Two-thirds of households are owner-occupied, and one-third are rentals
- Virginia Beach has an average of 3,500 heating degree-days per year
  - Heating of owner-occupied homes is 50% electric, 40% gas, 10% oil
  - Heating of renter-occupied homes is 70% electric, 25% gas, 5% oil
- Virginia Beach has an average of 1,400 cooling degree-days per year
  - Air conditioning is 100% electric
- Electricity consumption: 5 million kWh per year
  - 2.8 million kWh residential (170,000 customers)
  - 1.5 million kWh commercial (17,000 customers)
  - 0.7 million kWh government (1,700 customers)
- Natural gas consumption: 6.6 billion cubic feet
  - 4.4 billion cubic feet residential
  - 2.2 billion cubic feet commercial
- Oil consumption primarily as gasoline for approximately 300,000 vehicles, of which 185,000 are used for commuting to work

Local Energy Usage Profile – Residential Heating

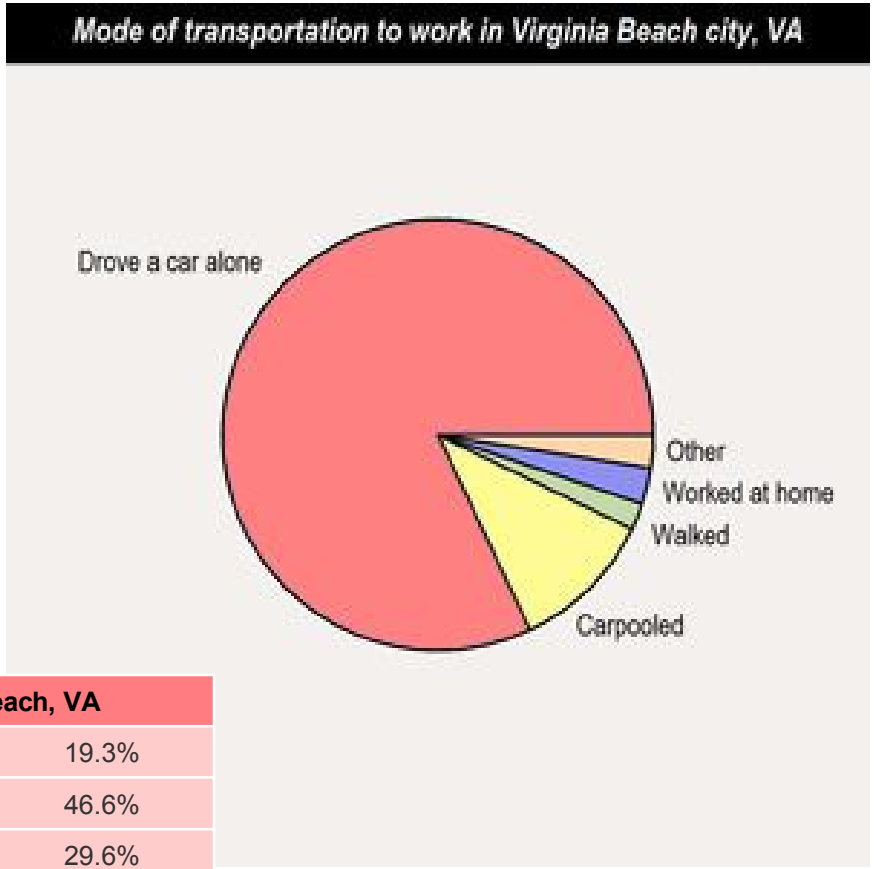




Local Energy Usage Profile – Transportation

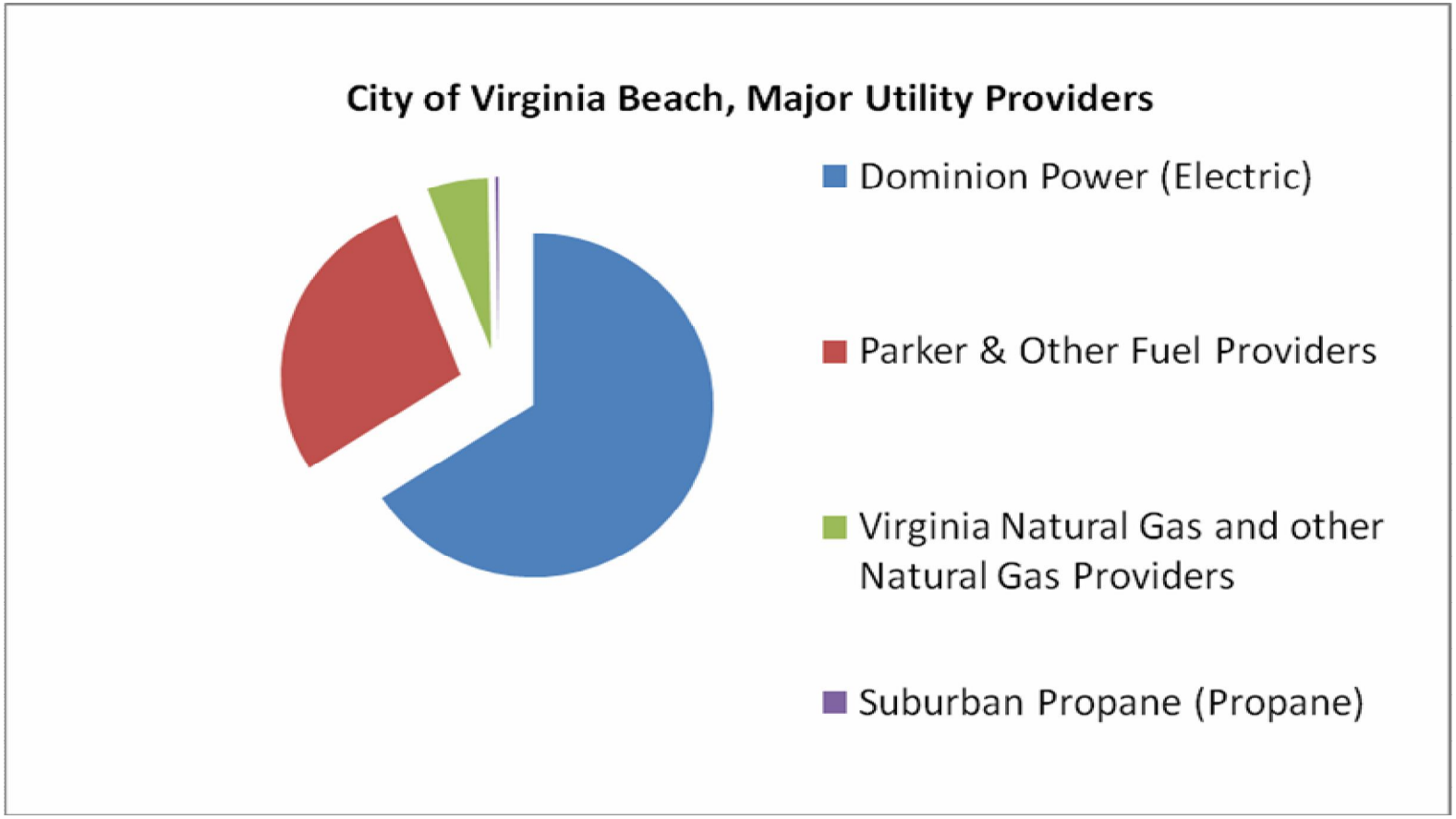
Mode of transportation to work

Single-occupancy vehicle:	**182,639**	**(82%)**
Carpool:	**24,036**	**(11%)**
Worked at home:	**6,165**	**(3%)**
Walked:	**4,369**	**(2%)**
Bus or trolley bus:	**1,544**	**(1%)**
Bicycle:	**719**	**(0%)**
Motorcycle:	**273**	**(0%)**
All other means:	**2,903**	**(1%)**

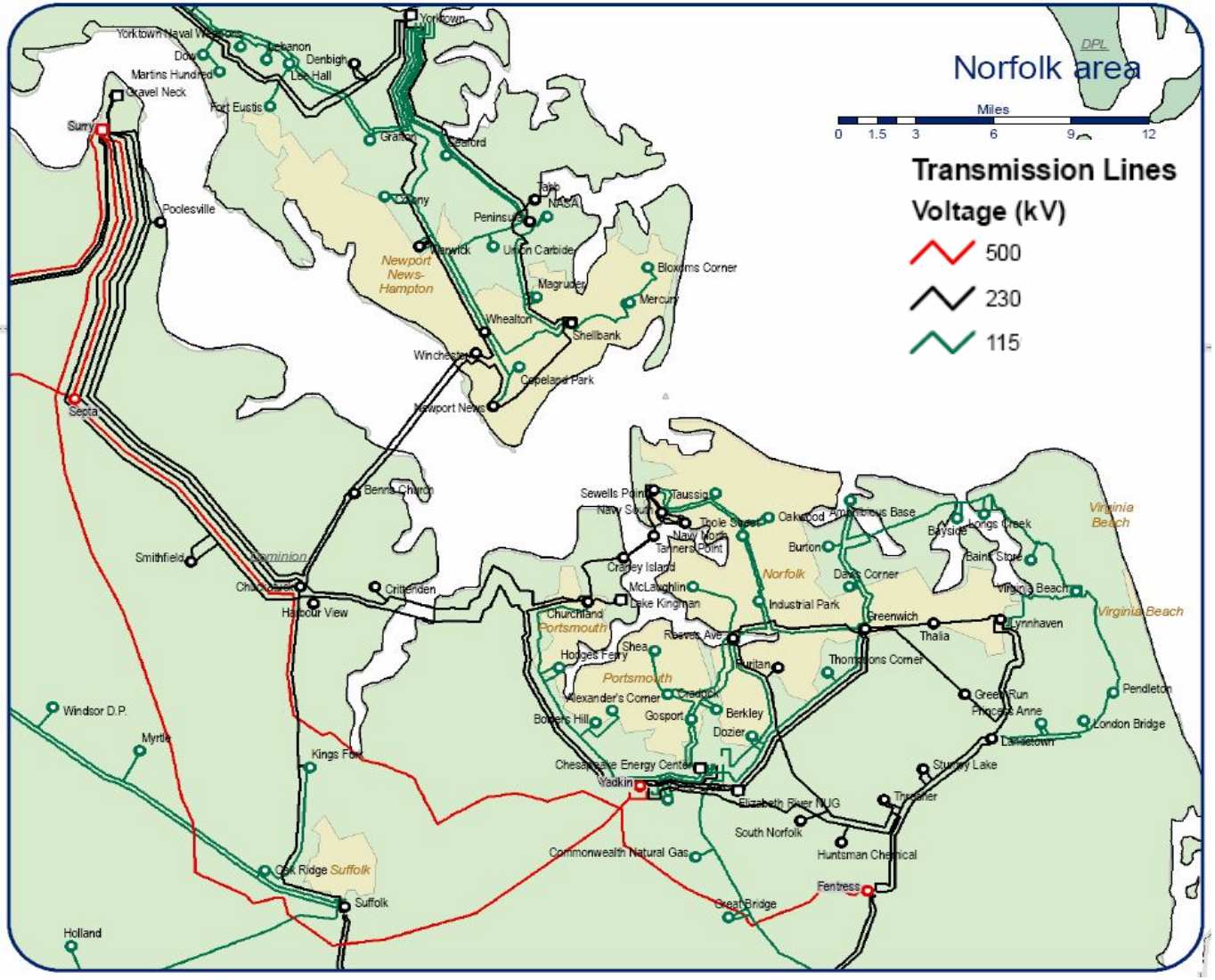


2010 Travel Time to Work	Virginia Beach, VA	
Travel Time Less than 15 Min	37,186	19.3%
Travel Time 15-29 Min	89,936	46.6%
Travel Time 30-59 Min	57,123	29.6%
Travel Time 60+ Min	8,635	4.5%

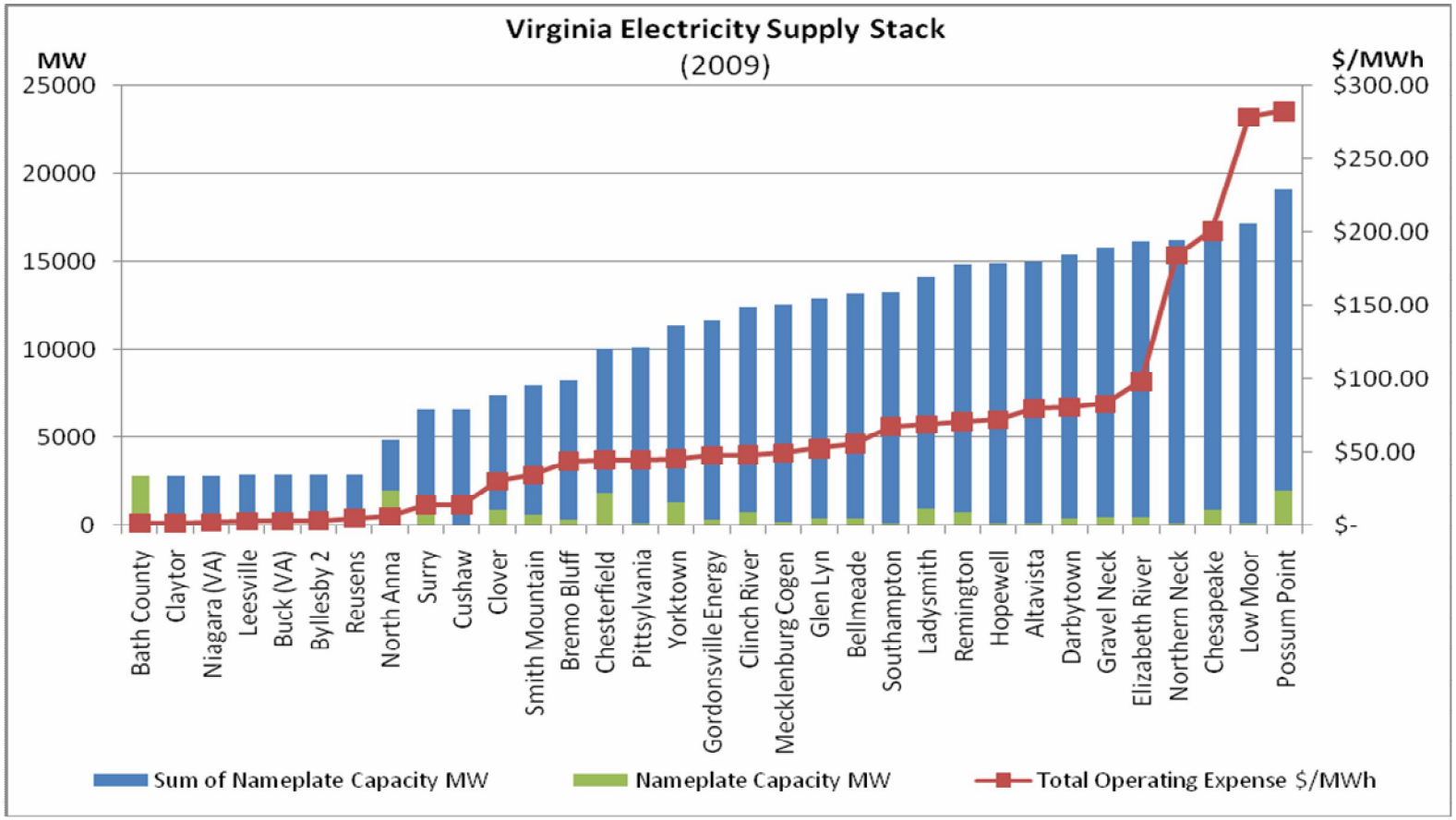
City of Virginia Beach Energy Expenditure was $22.5 Million in FY10-11



Electric Power Supply Infrastructure



Electric Power Supply – Cost to Generate vs. Cost to Purchase Wholesale



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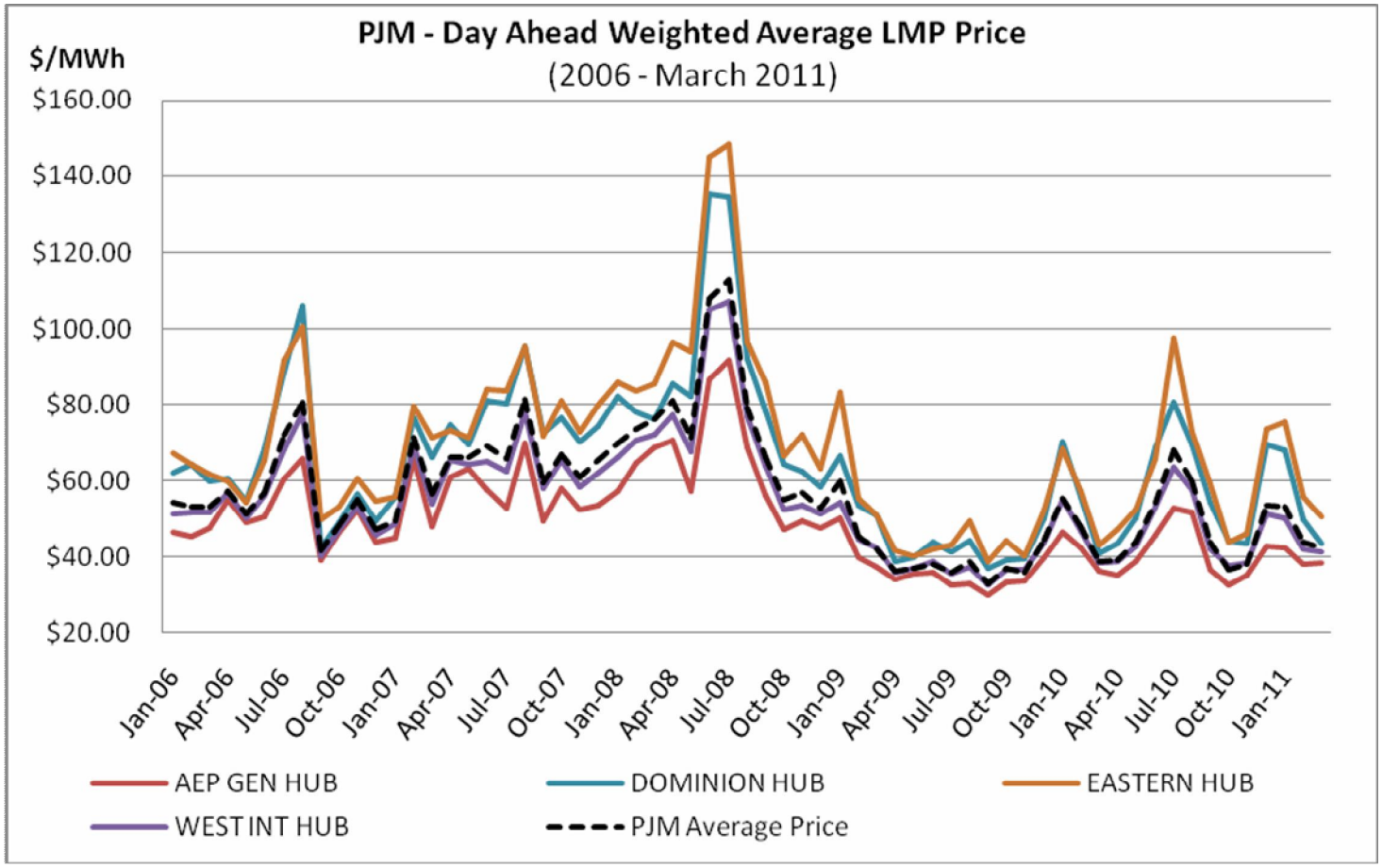
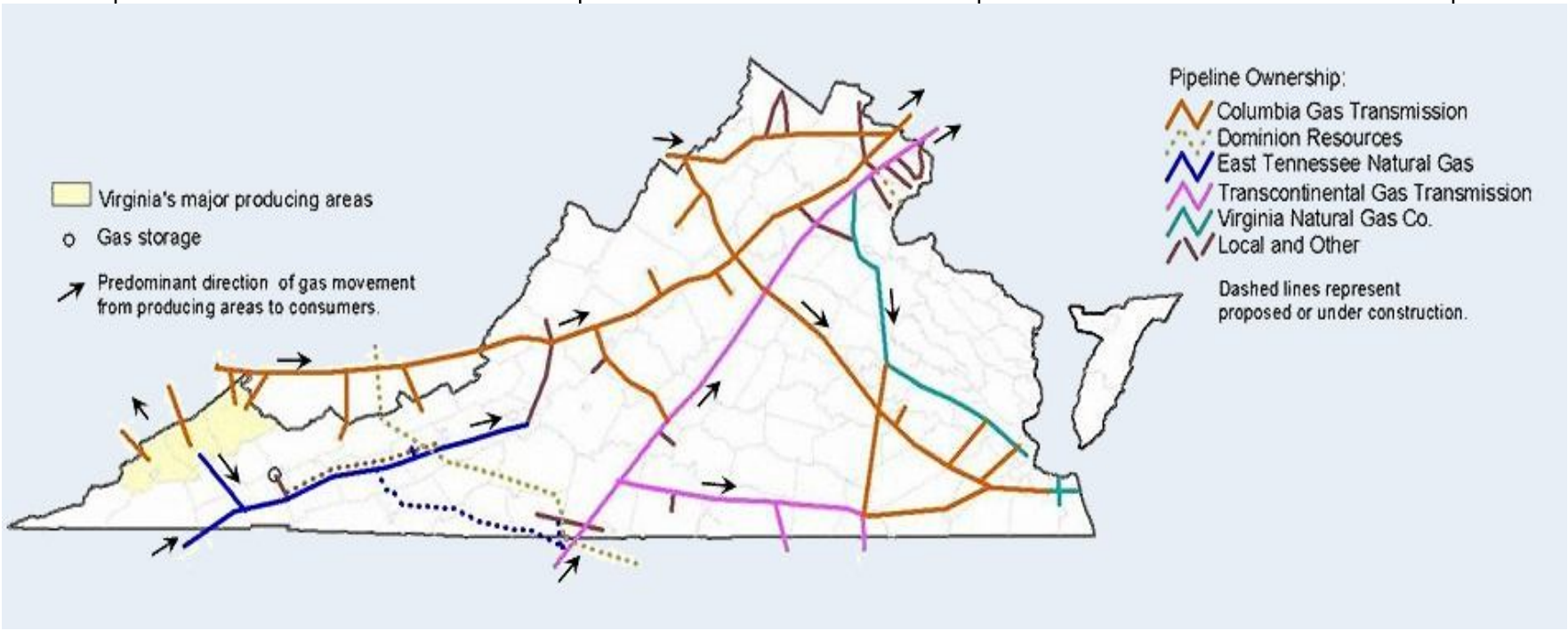


Natural Gas Supply Infrastructure

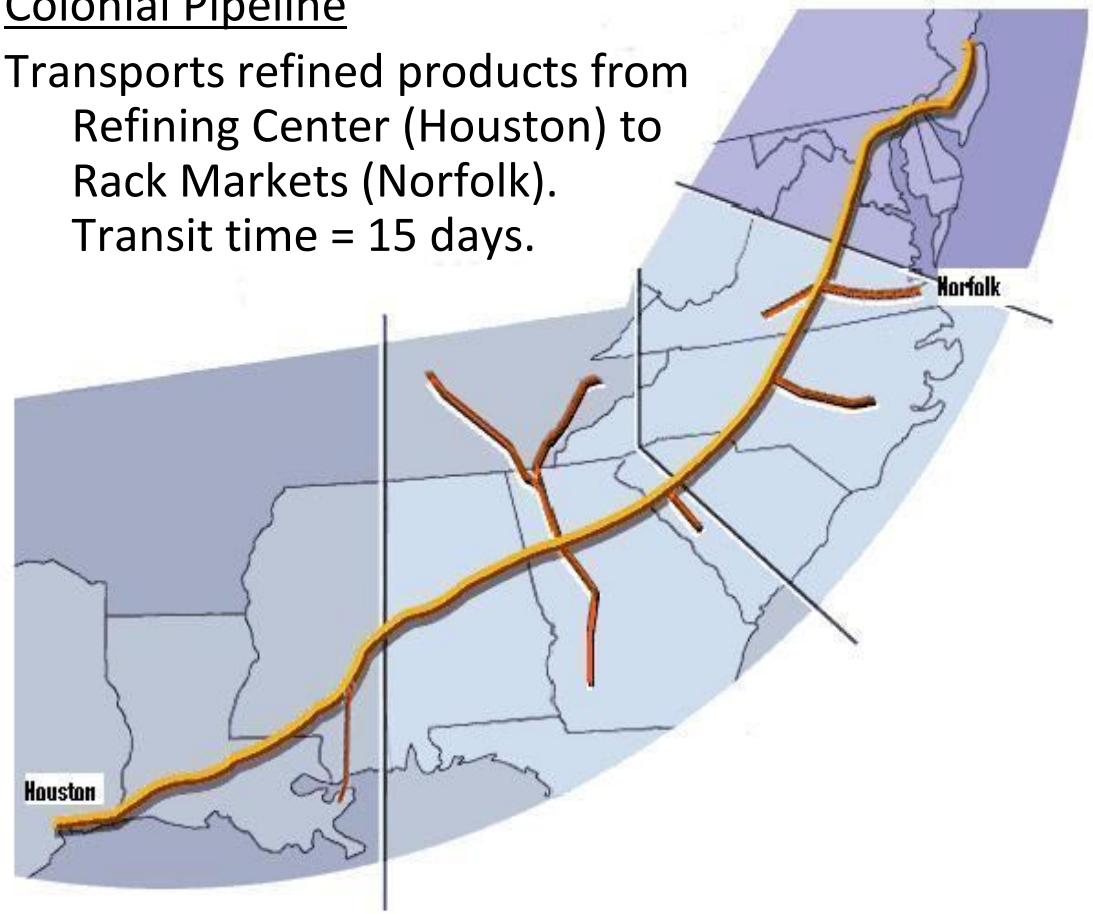
Pipeline Company	Enters Virginia	Exits or Terminates
Columbia Gas Transmission Co.	Interstate from West Virginia	District of Columbia & Maryland
Dominion Transmission Corp/Virginia Natural Gas (includes gas from Cove Point)	Intra-state from northern Virginia to Hampton Roads	Chesapeake
East Tennessee Natural Gas Co.	Interstate from Tennessee	Roanoke & spur to Martinsville
Transcontinental Gas Pipeline Co. (TRANSCO)	Interstate from North Carolina	North to District of Columbia and Maryland and spur southeast



Petroleum Fuels Supply Infrastructure

<u>Colonial Pipeline</u>

Transports refined products from
Refining Center (Houston) to
Rack Markets (Norfolk).
Transit time = 15 days.



Spot Market =
Gulf Coast

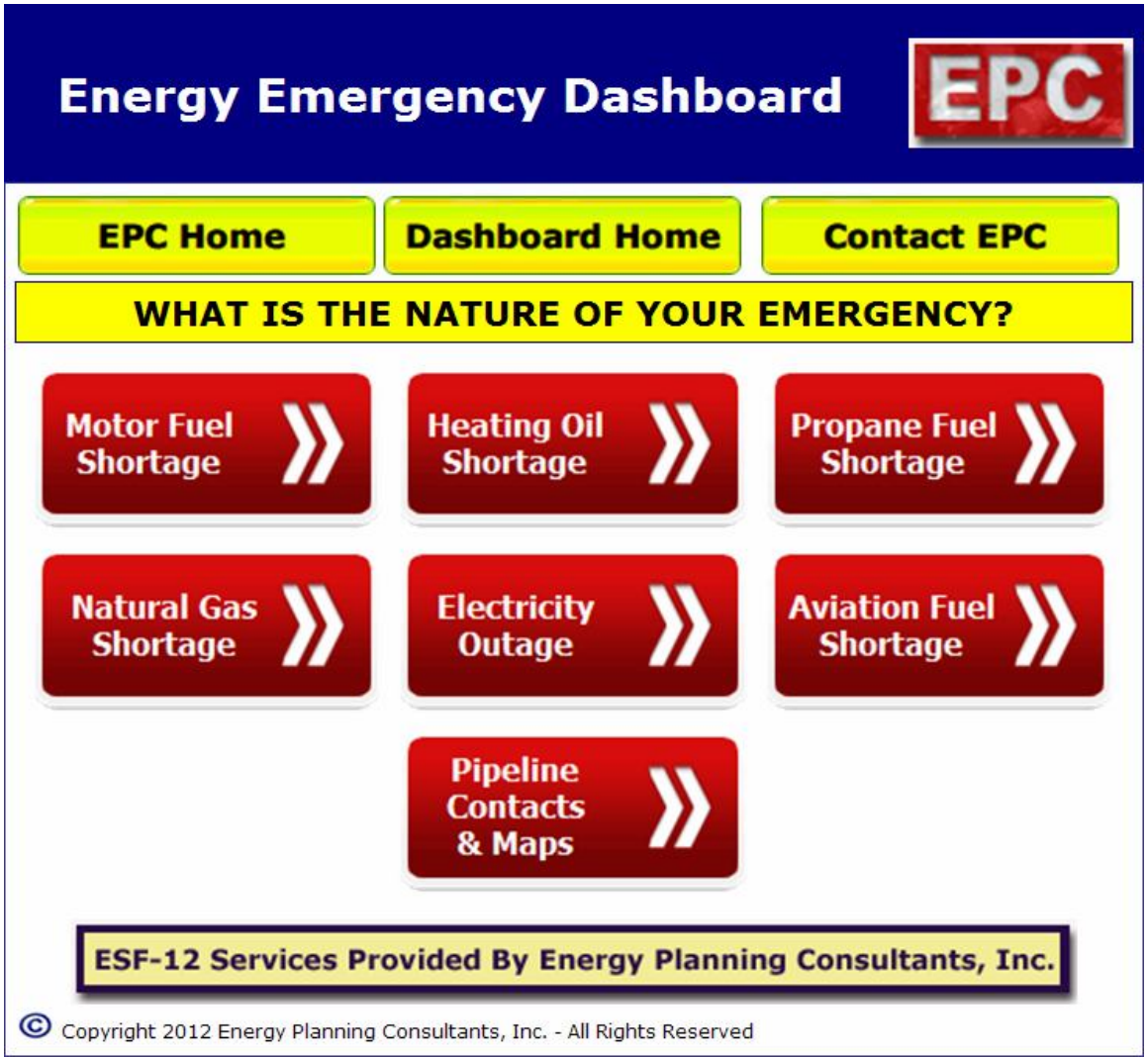
Wholesale/Rack =
Norfolk/Chesapeake

Retail =
Local Fuel Station/
End-User Location

Strategic Investments (Long-Term Mitigation Strategy)

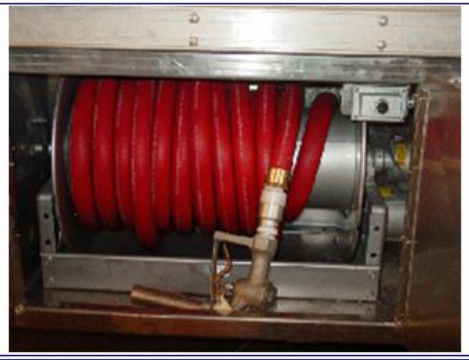
1. Recommendations to state (DMME and VDEM)
   a. Weather and energy market awareness push
   b. Vehicle fuel assurance along hurricane evacuation routes
2. Additional focused studies at local level (to support appropriate capital investment planning)
   a. Generators and quick connects at critical facilities
   b. Energy vulnerability of public communication channels
   c. City-approved “ready to go” energy conservation plans in response to forecast temperature extremes
   d. Fuel re-supply from outside City and routing within City
   e. Traffic signal assurance at critical intersections
3. Potential energy assurance roles for wind and solar
   a. Offshore wind development update
   b. Local energy supply as a system of systems

VDEM ESF 12 staffed during emergencies only (need for energy information "push" to localities)



Recommendation for Commonwealth Study of Fuel Assurance Along Evacuation Routes

When the electricity fails such as recently in Florida, Louisiana, Alabama etc. gasoline stations, motor pools, and fleet managers were unable to get fuel. During a motor fuel emergency, 8,000 gallon tankers can be located strategically located in communities or along highways. There are thousands of these delivery trucks and they can become a portable fueling station station. The cost for the conversion nozzle assembly for the large transport truck is range from $400 to $925 depending on the type of truck. For more information contact Energy Planning Consultants Inc.



Fueling from a "Bob-Tail" Truck

Emergency Refueling Kit

In-Line Fuel Meter

Ready to Fuel Vehicle

Fueling Bob Kistner's Vehicle

Truck Valves

Generator Assessment

Emergency Generators at Critical Facilities

- Whole house or partial? What parts?
- Flag units over 20 years old for priority replacement
- Inspect, maintain, and test per NFPA

Veeder-Root Software

Increases remote awareness of generator run time capacity by providing fuel inventories without physically going to site.

Quick Connects

Review of quick connects – What is already in place? What is needed?

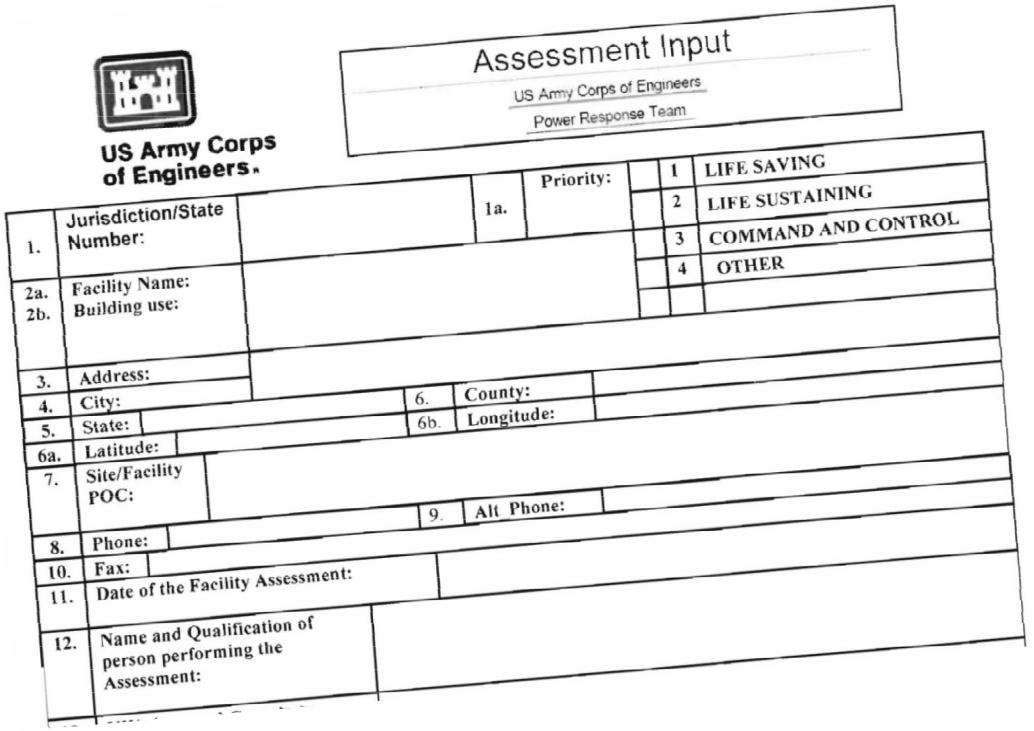
U.S. Army Corps of Engineers Emergency Power Mission from FEMA

Coordinated by need through City EOC request to Virginia Department of Emergency Management

- Generators provided for local government, hospitals, other health care (nursing homes, dialysis, etc)
- Generators also can be provided to utilities
- Fuel can be supplied (even without generators)

U.S. Army Corps of Engineers Emergency Power Mission from FEMA

- Priorities assigned on state-wide basis
- Generator staging out of storm path (e.g., Fort A.P. Hill)
- Common sizes in standard pallet
- **Pre-filing a Facility Assessment can save up to 72 hours in obtaining generators**



US Army Corps of Engineers

Assessment Input

US Army Corps of Engineers

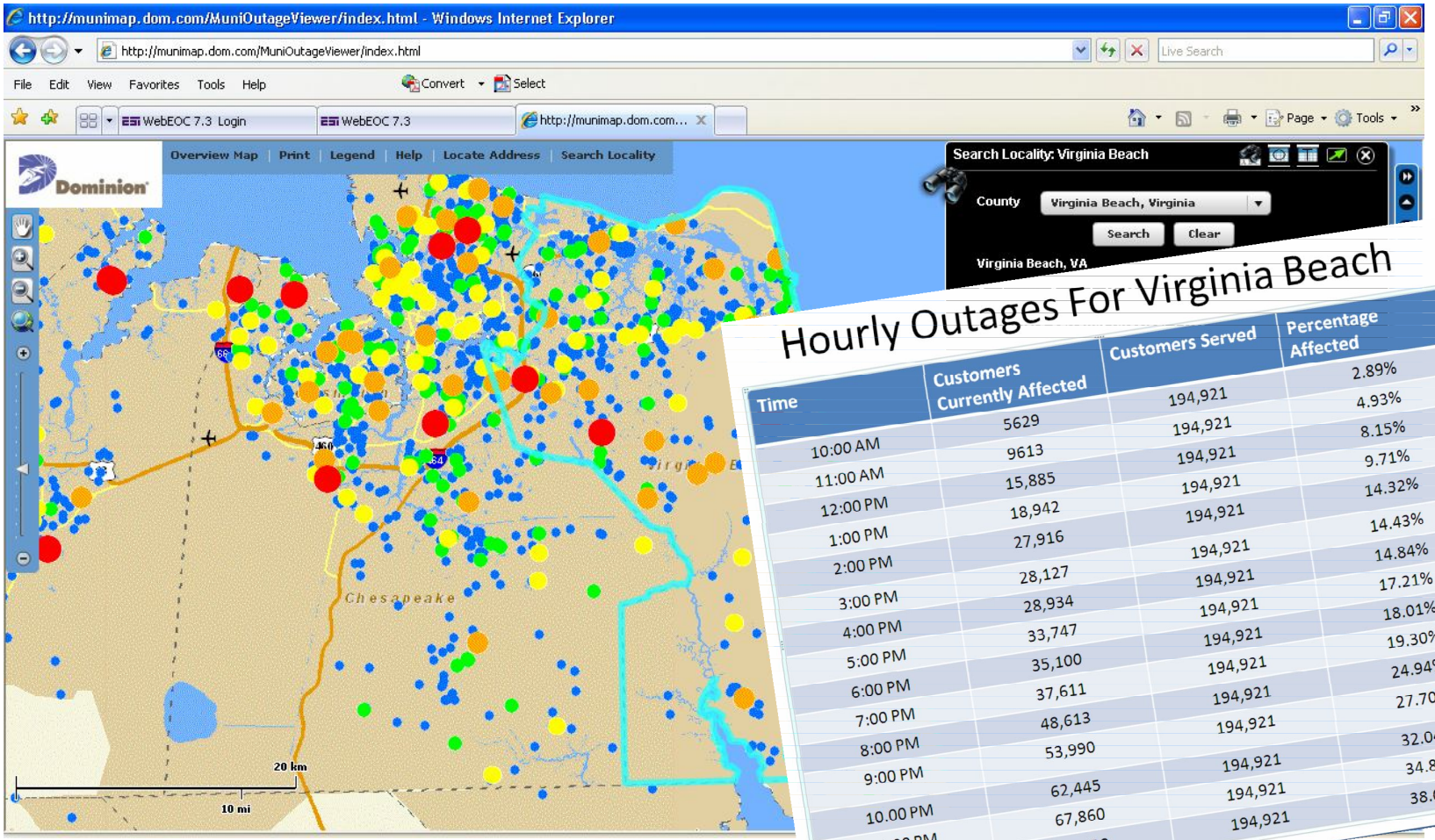
Power Response Team

1.	Jurisdiction/State Number:		1a.	Priority:	1 LIFE SAVING
2a. 2b.	Facility Name: Building use:				2 LIFE SUSTAINING
					3 COMMAND AND CONTROL
					4 OTHER
3.	Address:				
4.	City:		6.	County:	
5.	State:		6b.	Longitude:	
6a.	Latitude:				
7.	Site/Facility POC:				
8.	Phone:		9.	Alt Phone:	
10.	Fax:				
11.	Date of the Facility Assessment:				
12.	Name and Qualification of person performing the Assessment:				

City Generator Team

- **<u>Annual Generator Review Meeting</u>** - Schedule annual Generator Review Meeting (in June) ahead of CIP schedule with the involvement of following attendees:
  1. Public Utilities
  2. Public Works (PW) Fleet
  3. PW Building Maintenance
  4. PW Facility Maintenance
  5. PW Energy Management
  6. Emergency Management (Fire)
- June meeting also ensures hurricane preparedness

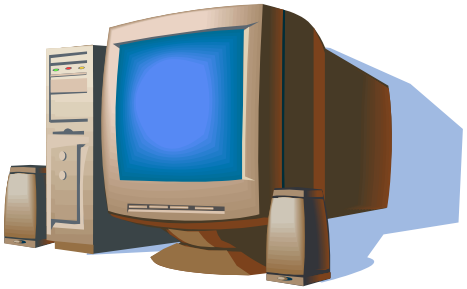
Virginia Beach EOC - ESF 12 Staffing

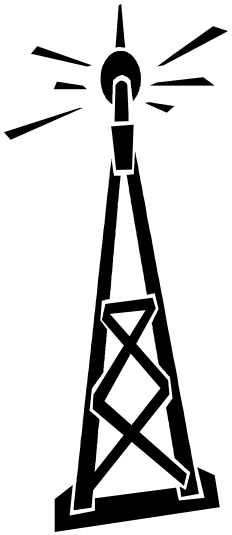


Hourly Outages For Virginia Beach

Time	Customers Currently Affected	Customers Served	Percentage Affected
10:00 AM	5629	194,921	2.89%
11:00 AM	9613	194,921	4.93%
12:00 PM	15,885	194,921	8.15%
1:00 PM	18,942	194,921	9.71%
2:00 PM	27,916	194,921	14.32%
3:00 PM	28,127	194,921	14.43%
4:00 PM	28,934	194,921	14.84%
5:00 PM	33,747	194,921	17.21%
6:00 PM	35,100	194,921	18.01%
7:00 PM	37,611	194,921	19.30%
8:00 PM	48,613	194,921	24.94%
9:00 PM	53,990	194,921	27.70%
10.00 PM	62,445	194,921	32.04%
11:00 PM	67,860	194,921	34.81%
12:00 AM	74,138	194,921	38.03%

Energy Vulnerability of Public Information Channels





We still need to think about and resolve - how do we communicate?

Develop City-Approved “Ready to Go” Energy Conservation Plans for Temperature Extremes

- Closure of retail outlet doors along resort strip in heat wave
- Government and commercial building temperature adjustments
- Hot water heater setbacks
- Reduced local government service hours
- Compressed work week (Mon-Thurs)
- Telecommuting
- Evaluate these and other alternatives for cost-benefit and obtain prior City Council approval before summer, so that appropriate public service announcements and other public information packages can be prepared for various media

Recommendation for City Traffic Signal Study

White Paper

Traffic Signal Head Removal Prior to Hurricanes

February 15, 2005
Version 2

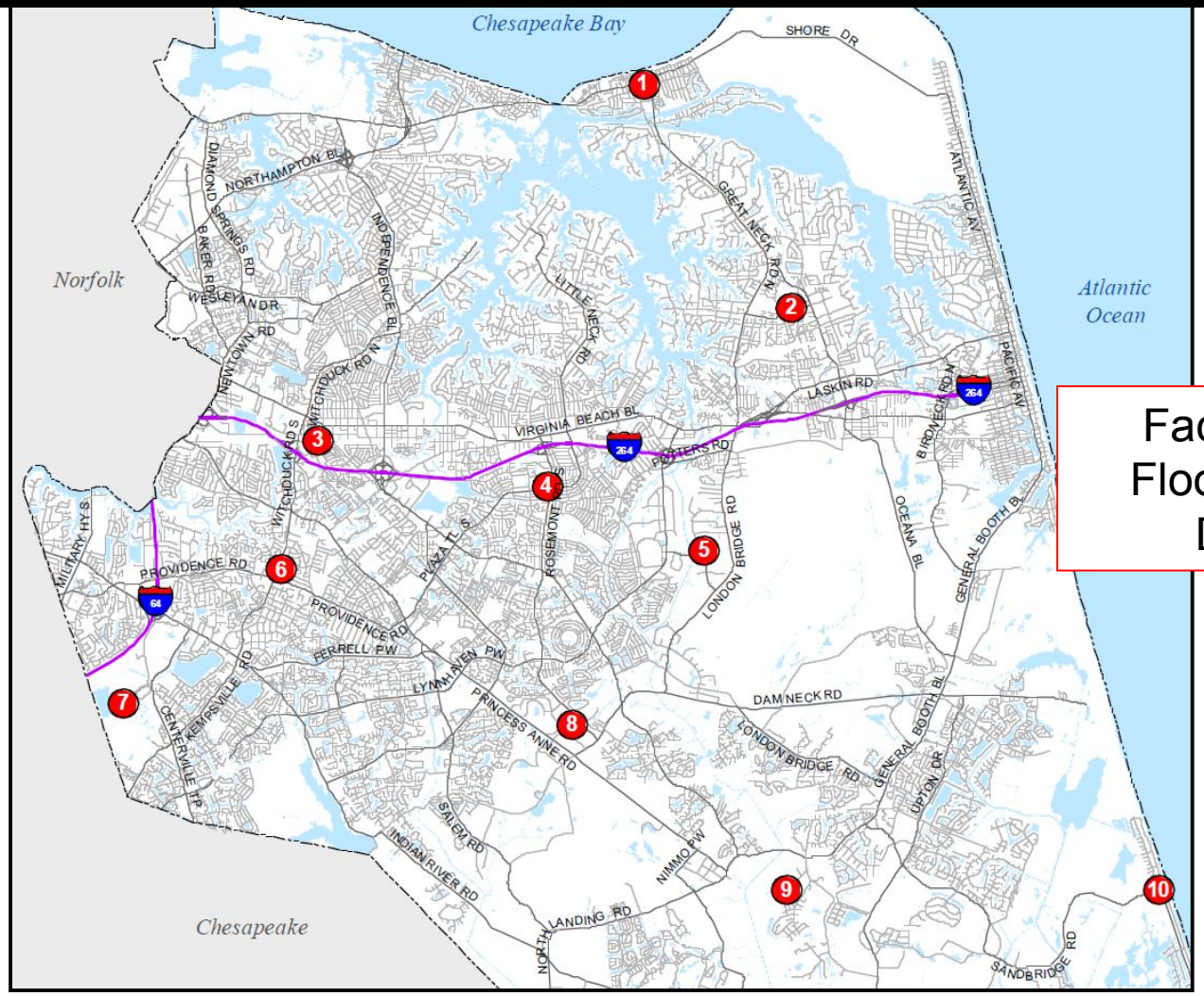
Prepared for:
Florida Department of Transportation
Traffic Engineering and Operations Office
Intelligent Transportation Systems (ITS) Section
605 Suwannee Street, M.S. 90
Tallahassee, Florida 32399-0450
(850) 410-5600

Hurricane Ike Traffic Signal Preparation & Recovery

Presented by:
Jeffrey S. Weatherford, P.E., PTOE
Sr. Assistant Director/City Traffic Operations Engineer
Traffic and Transportation Division
Department of Public Works and Engineering
City of Houston, TX

Recommendation for City Traffic Signal Study

Recommendation for City Fuel Route Planning



Factoring in Flooding and Debris

Recommendation for City/Region Fuel Re-supply Plan

Mutual Aid Agreements with neighboring Cities/Counties

Going Forward – Energy Exercises

Tabletop Energy Exercises

Regional “Stress Test”

- Over-subscribed Generator Contracts?
- Over-subscribed Fuel Contracts?
- Identify break points where total regional demands exceed supplies (help inform Corps emergency power mission)

Going Forward – Energy Assurance What do Cities and Counties Need?

Expanded ESF 12 Staffing at DMME and VDEM

State-Wide Energy Market Vulnerability - Cities and Counties need assistance monitoring energy supply markets (locally unified awareness of possible energy disruptions)

Regional Fuel Route Plan - Creating fueling plan for evacuation routes (Hampton Roads)

VDEM Maintenance of Facility Assessments for Emergency Power – Ensuring that information is passed to FEMA and the Army Corp of Engineers with less delay

State-Wide Study to Assess Energy Disruption Communication Modes – Assessing energy vulnerability for TV station, radio, social media, etc.)

Develop and Maintain an Energy Conservation Template Database Develop a public information packet for various scenarios - heat wave, flood, energy outages, etc.

State-wide Energy Assurance Preparedness Training - education for Cities and Counties regarding the states EAP

State-wide Study and Recommendations on Energy Assurance using Renewable Energy (e.g., wind & solar) - What can Virginia's climate really deliver?

Going Forward – City's Energy Assurance Investment Strategy

- Support the Commonwealth's efforts to staff Energy Assurance at VDEM and DMME
- Maintaining Facility and Generator Assessments
- Prioritizing mitigation investment strategy (City Joint Energy Committee)
- Investment funding – Federal grants; CIP requests

Questions?

NERA Study of Fossil Generation Portfolio in PJM

Issue No. 2
April 2009

NERA
Economic Consulting

Energy Market
Insights

Valuing Fossil Fuel Generation Assets in a Green Economy

by James Heidell & Mike King

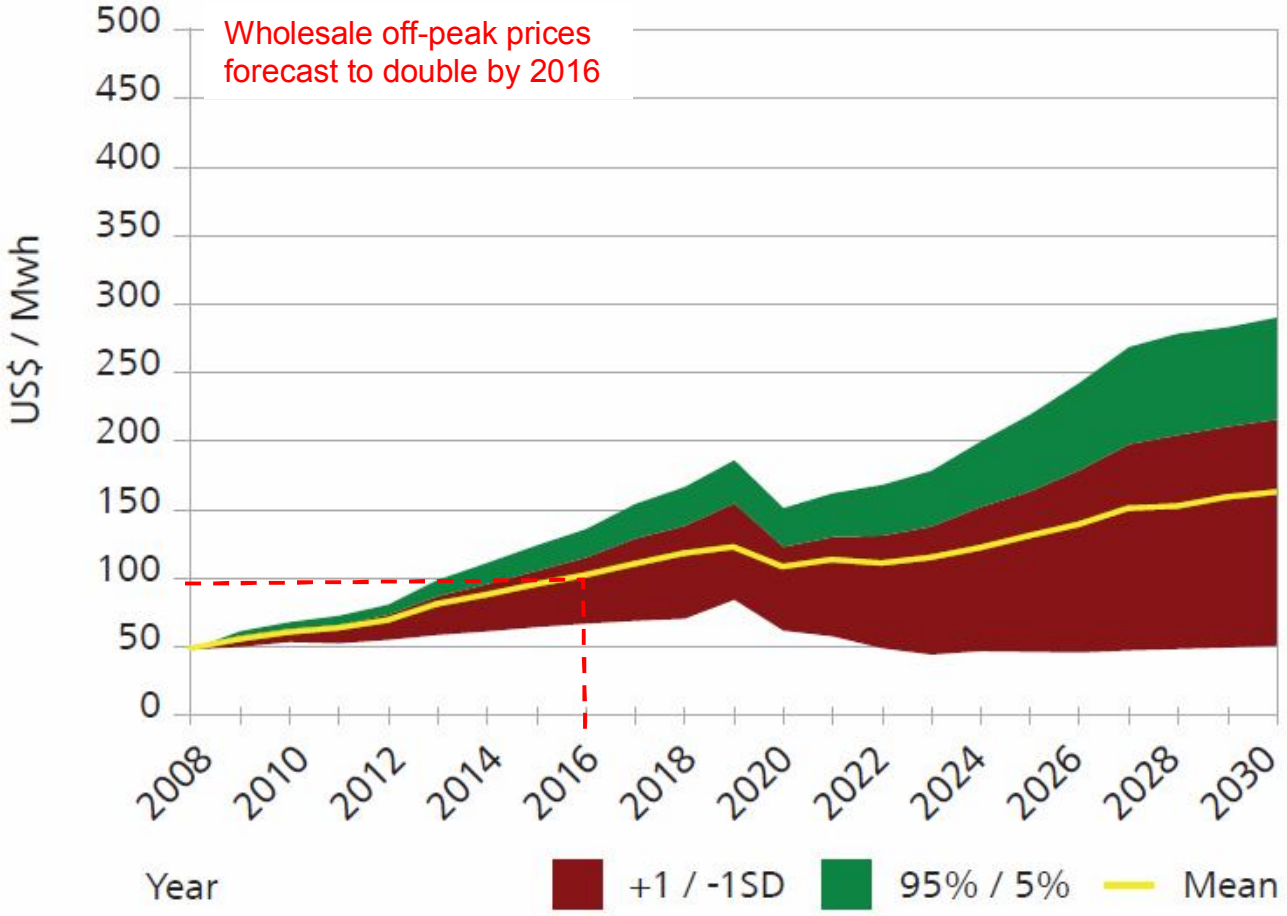
Dominion imports approximately one-third of the power needed to meet its customer demand from the PJM wholesale market

Case Study

The following case study highlights our assessment process for an actual portfolio of coal-fired and gas-peaking plants located in the PJM region. On a MW basis, the existing portfolio consists of approximately [redacted] and [redacted]. Our case study incorporates uncertainty related to fossil fuel prices, RPS standards, greenhouse gas regulations, load growth and power plant replacement costs. In the case study, each of the key variables had three associated forecasts. This created 729 potential permutations or cases.

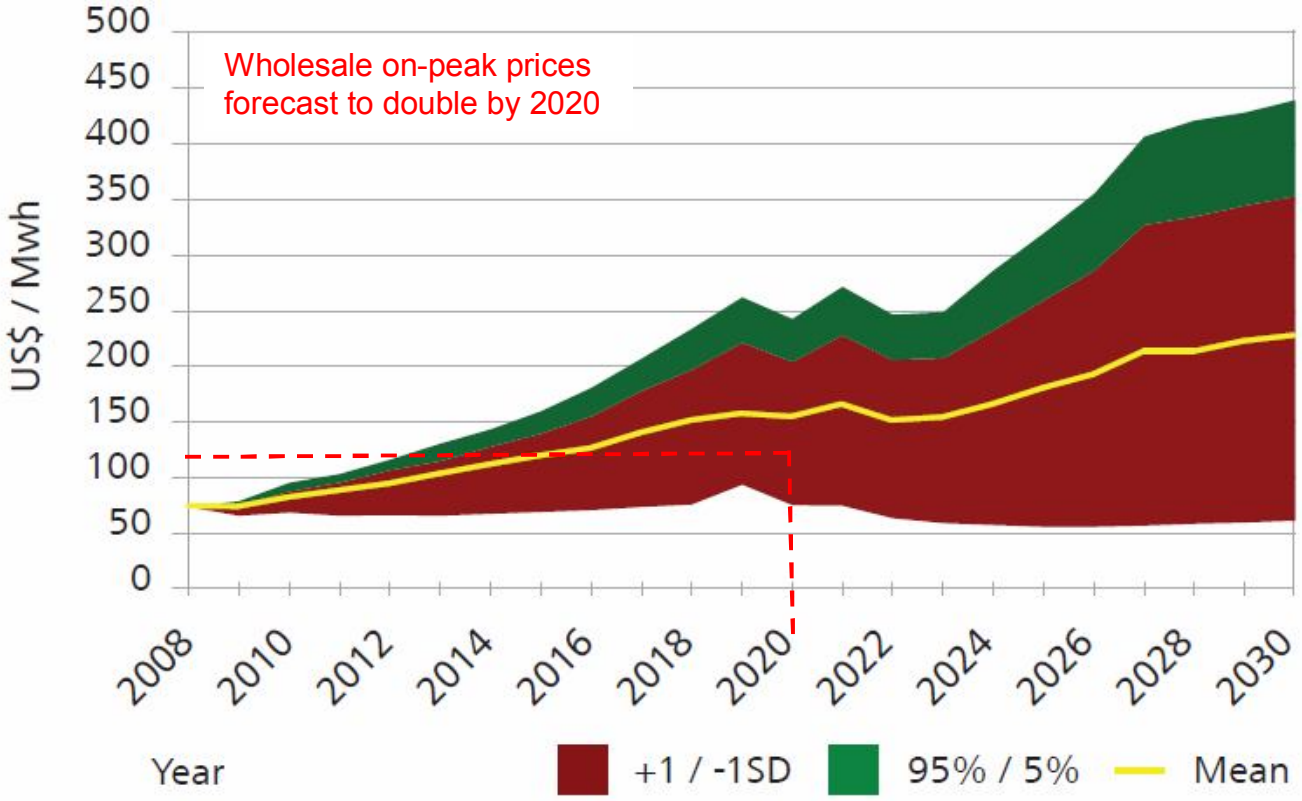
PJM Long- Term Electricity Price Forecast

Figure 3. Distribution of Off-Peak Prices

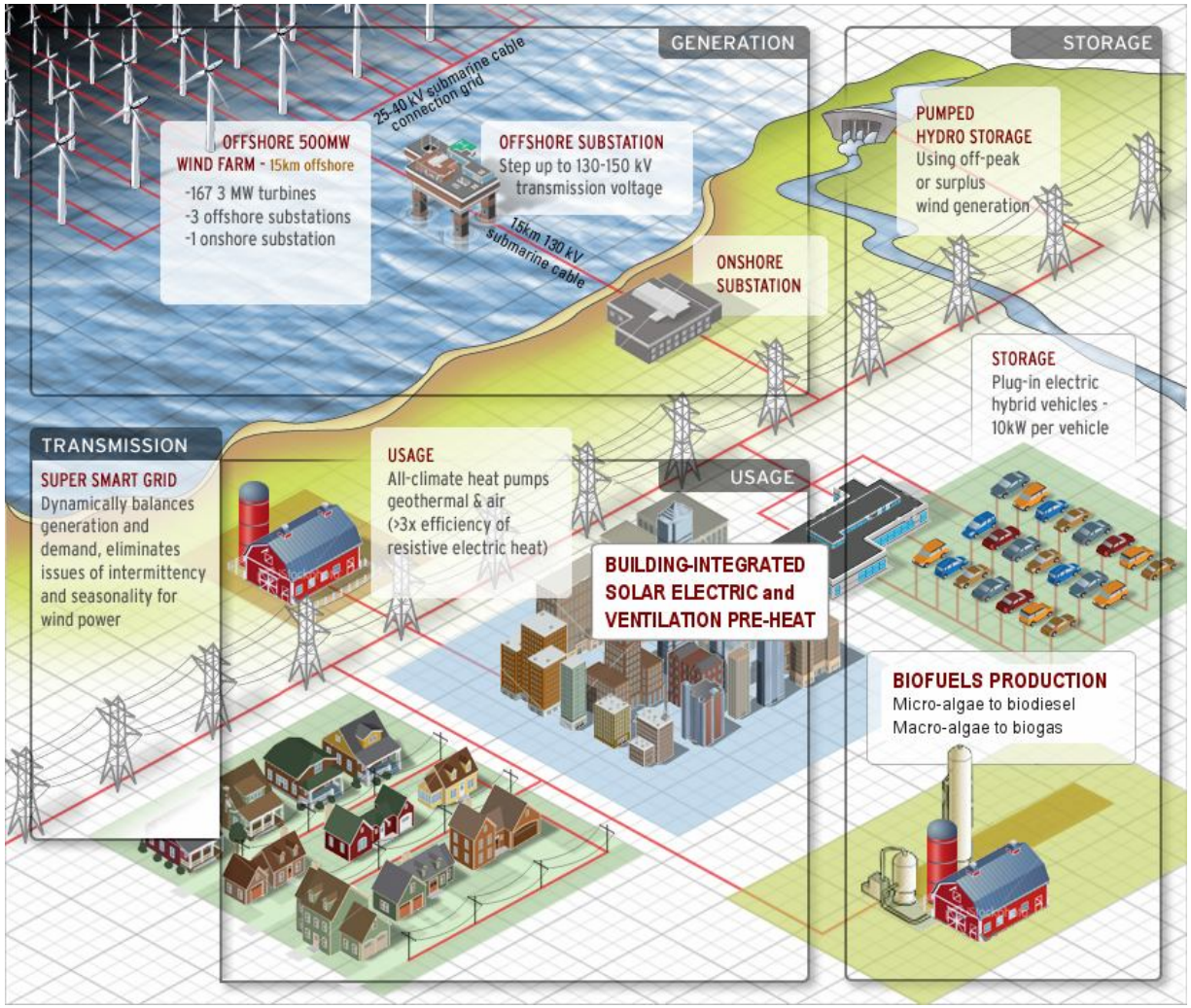


PJM Long- Term Electricity Price Forecast

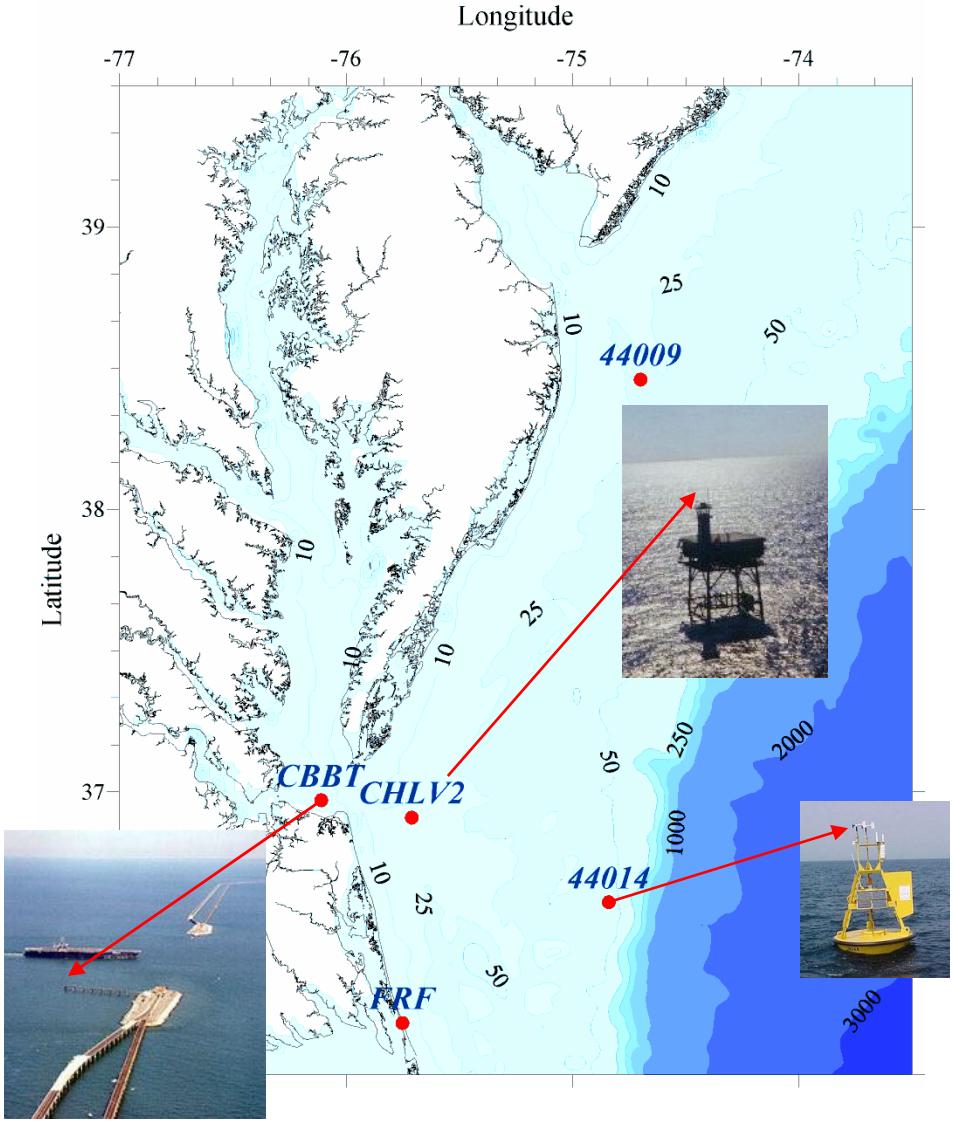
Figure 2. Distribution of On-Peak Prices

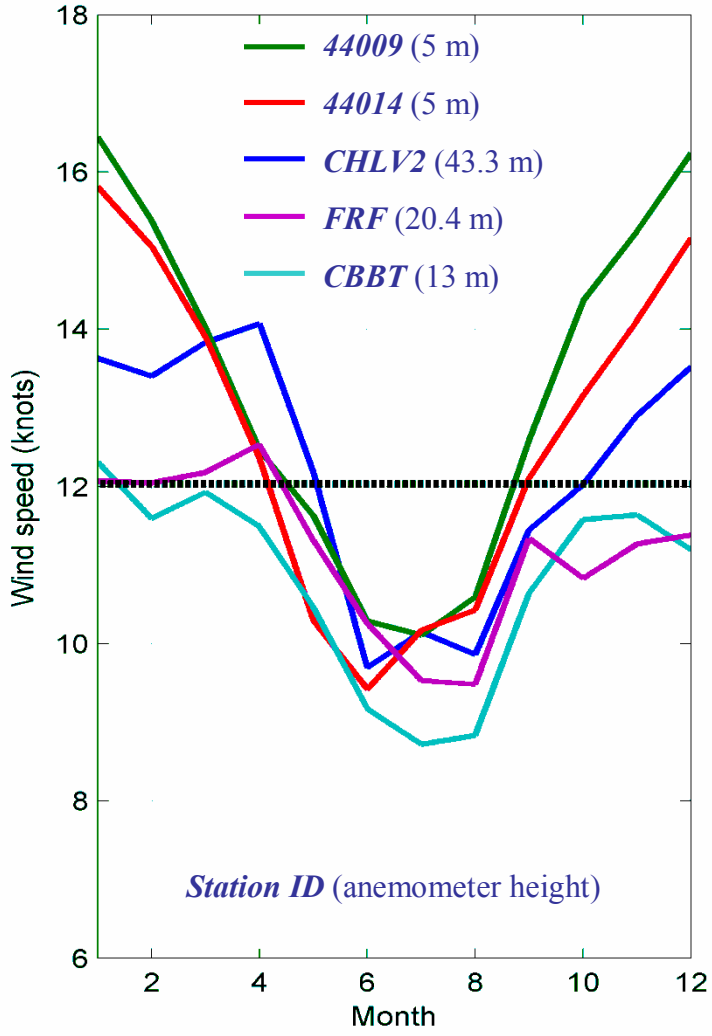


Local Energy Supply
A System of Systems

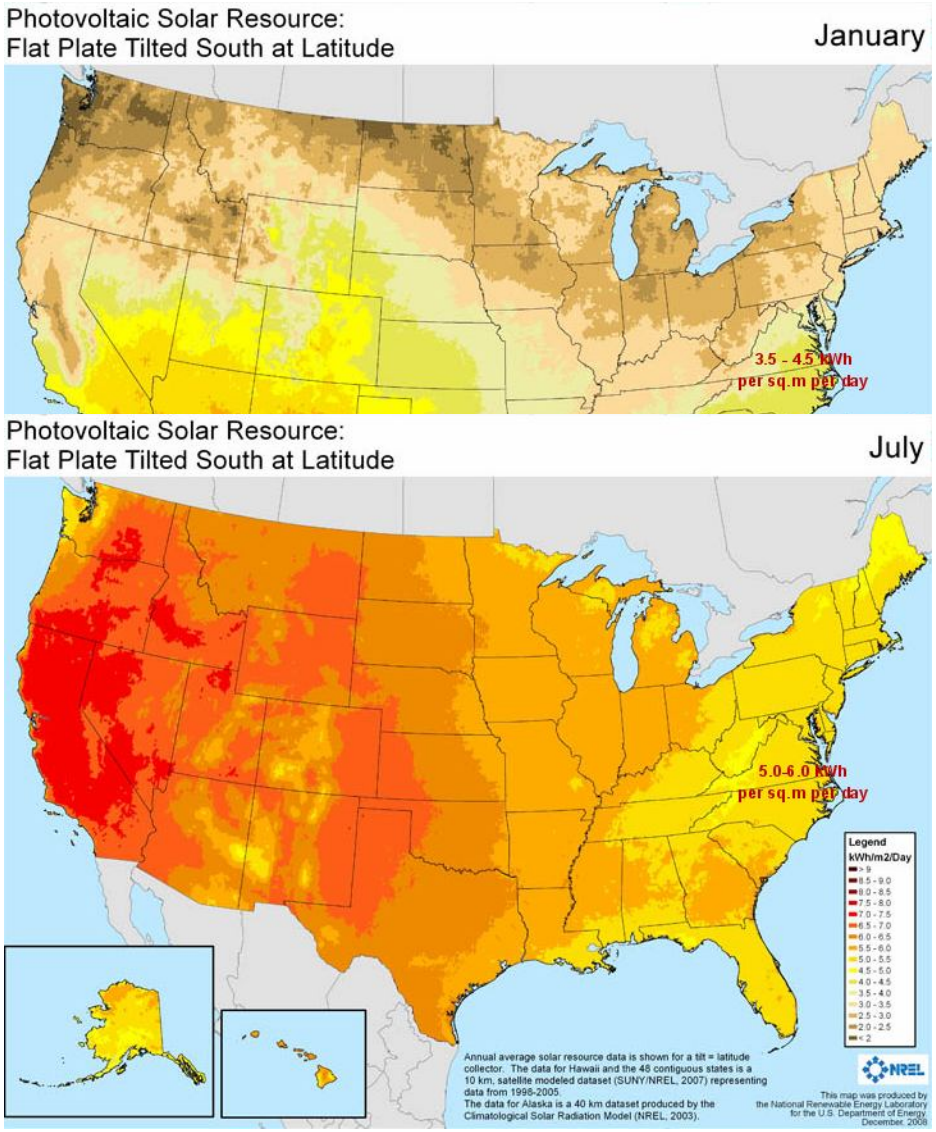


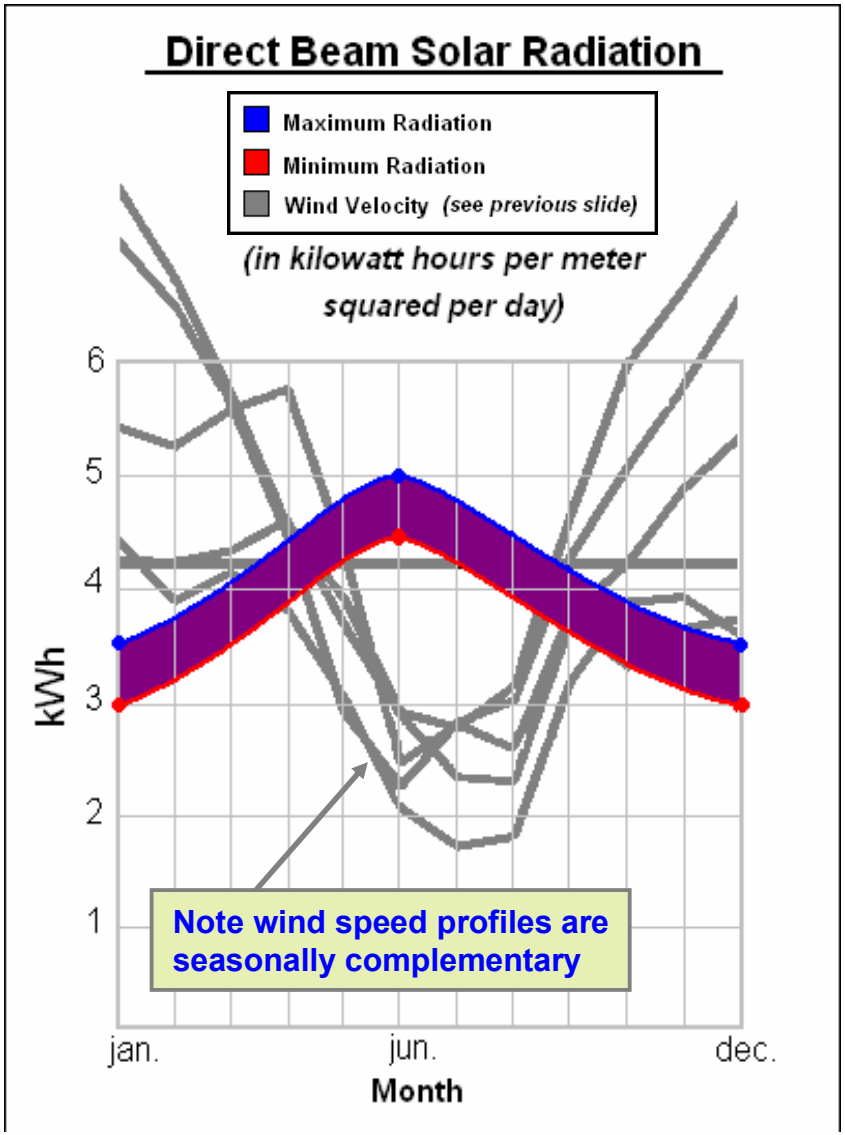
Renewables – Wind is Winter-Peaking



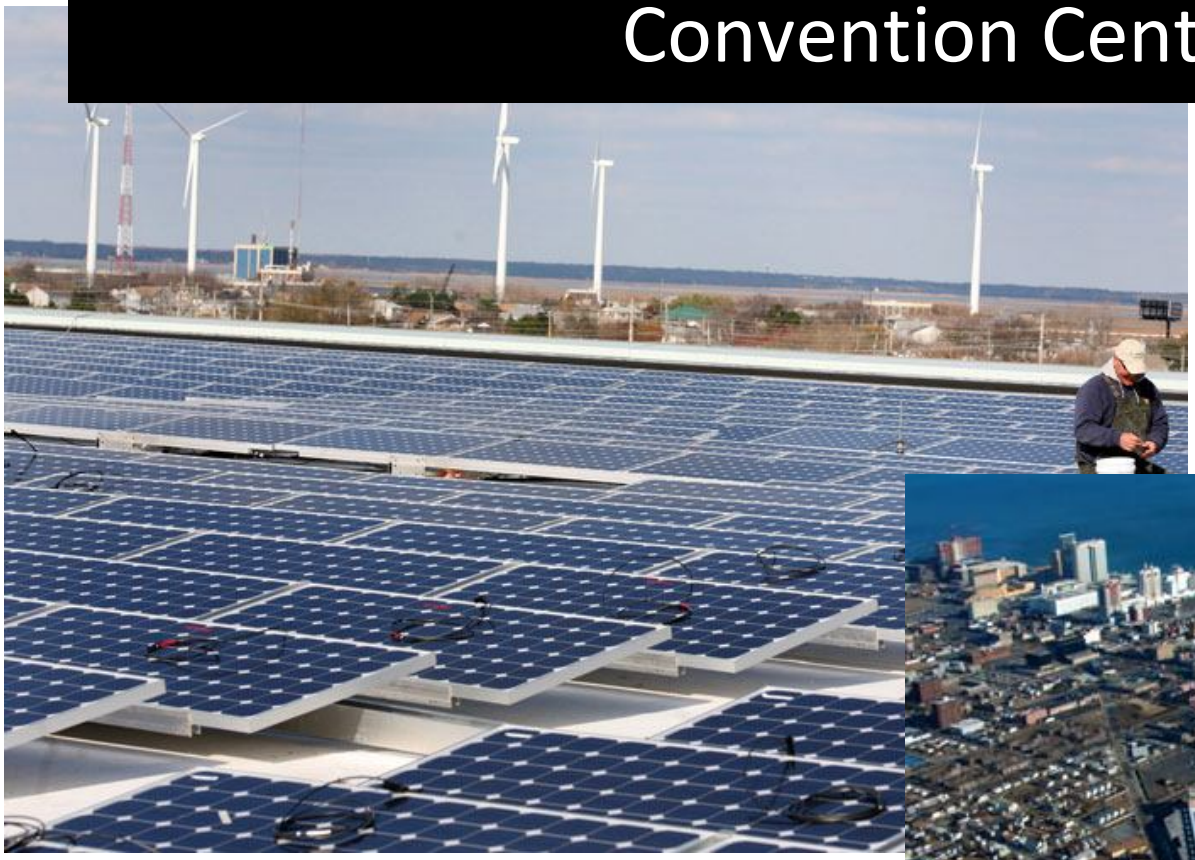


Renewables – Solar is Summer Peaking





Renewables – Solar at the Atlantic City Convention Center



Single-crystal 175-watt solar panels installed using “Trinamount” panel support frames.

Renewables – Solar at the DeSoto Energy Center

DeSoto Next Generation Solar Energy Center