

Task Force on Electric Power for Virginia's High-Technology Industry

Final Task Force Briefing
October 1, 2001



Overview & Scope of Study

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Topics

- Why This Study?
- Virginia's High Technology Industries
- Critical Question
- Study Approach & Scope
- Study Task Force

Why this Study

Maintain and improve Virginia's competitiveness to sustain and attract high-technology businesses.

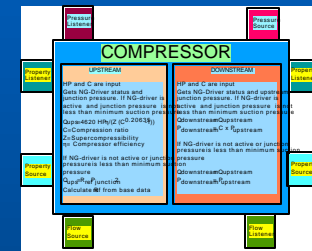
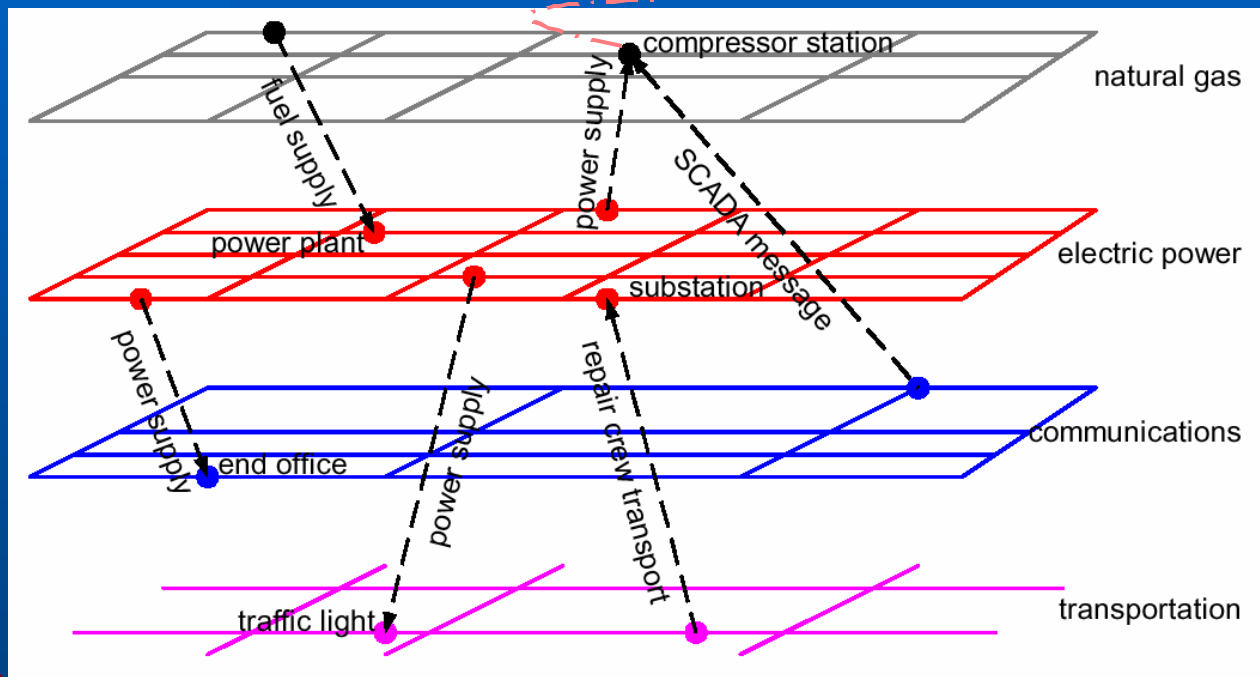
How to be proactive ?

Why this Study

Maintain and improve Virginia's competitiveness to sustain and attract high-technology businesses.

Provided an opportunity to examine our critical infrastructure to sustain unforeseen events

Infrastructure Interdependence



- *Critical system components*
- *Interdependence propagation pathways and degree of coupling*
- *Benefits of mitigation options*

Virginia's High Technology Firms

- **Firms:** 4,300+
- **Earnings:** \$19.4 billion
- **Average Earnings:** \$52,800/Yr
 - 1.8 times average Virginia employee earnings of \$29,665
- **Annual Growth:** 10.8%
 - 1992-1998 (Number of Firms)

High Technology Firms of Interest

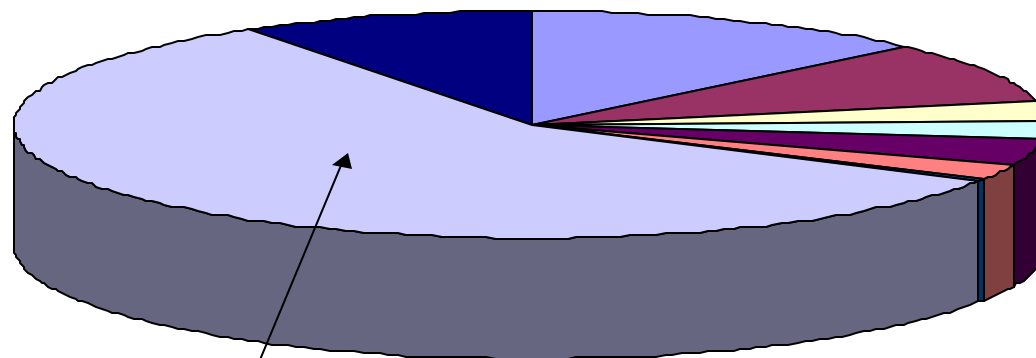
- **Industries and Firms Involved in Manufacture and/or Operation of:**
 - Communications equipment
 - Electronic components and accessories
 - Telephone communications
 - Computer, communications, and data processing services

High Technology Firm Characteristics

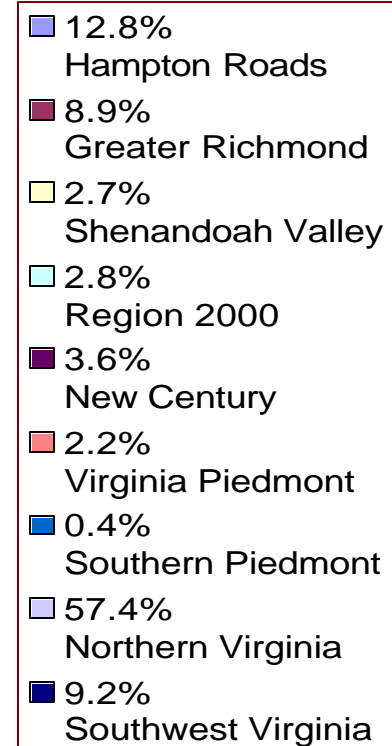
- **Power Required**
 - Premium levels of security, reliability, and quality in large amounts
- **Telecommunication Needs**
 - Secure and very high bandwidth access essential
- **Operation:** 7x24xForever
- **Cost of Outages:** In \$Millions

Virginia's High-Technology Firms*

Total High-Technology Firms > 4,300



Northern Virginia - 57.4%



*Technology in Virginia's Regions, May 2000

Study Approach

- **Form Industry-Government Task Force**
- **Utilize Task Force Members to:**
 - Identify critical infrastructure issues that exist today
 - Identify critical issues that may arise in future

Project Task Force

- **High-Technology Firms (Customers)**
 - America Online, Inc.
 - Dominion Semiconductor, Inc.
- **Utilities (Service Suppliers)**
 - Columbia Gas of Virginia
 - Dominion Virginia Power
 - Northern Virginia Electric Cooperative
 - Old Dominion Electric Cooperative
 - Rappahannock Electric Cooperative
- **Industry Organizations**
 - 7x24 Exchange, Mid-Atlantic Chapter
- **Consulting, Design, and Engineering Organizations**
 - Einhorn Yaffee Prescott Mission Critical Facilities Group
 - EPRI – Power Electronics Application Center, Inc.
 - National Institute of Standards and Technology (NIST)
 - Resource Dynamics Corporation
- **Legal**
 - McGuire, Woods, Battle and Boothe LLP
- **Virginia Commonwealth Organizations**
 - Virginia's Center for Innovative Technology
 - Virginia Economic Development Partnership
 - Virginia Tech, Alexandria Research Institute

Study Scope

- **Major Virginia Infrastructures**
 - Electric Power
 - Natural Gas
 - Communications - Fiber Optic Networks
 - Ozone Nonattainment Areas
 - Water and Wastewater

Study Audiences

- **Legislators, Regulators, and Other Government Organizations**
 - County
 - Commonwealth
- **Economic Development Organizations**
 - County
 - Commonwealth
 - Region

Areas Outside Study Scope

- **Areas Outside Task Force Members' Range of Expertise**
 - Land Use
 - Transportation
 - Social Impacts & Requirements
 - Work Force Education & Training



Task Force Findings and Recommendations

Dr. Saifur Rahman

and

Mr. John E. Bigger

Adjunct Professor

Alexandria Research Institute

Topics

- **Critical Infrastructure Issues**
- **Task Force Recommendations**
- **Conclusions**

Critical Infrastructure Issues Identified

- **Issues That Could Have Significant Impact on Virginia's Continued Attractiveness**
 1. **Electric Power** – Generation, Transmission, and Distribution
 2. **Communications** – Fiber Optic Cable Capability
 3. **Natural Gas Pipeline Capability** – Transmission and Distribution
 4. **Ozone Nonattainment Areas** – Impacts
 5. **Water and Wastewater** – Supply and Distribution

Critical Infrastructure Issues Identified

- **Issues Related Directly to Siting and Operating High-Technology Facilities**
 6. Siting Requirements for Facilities
 7. Facility Electrical Requirements
 8. On-Site and Emergency Back-Up Generation

Task Force Recommendations

1. **Streamline** Infrastructure Permitting Processes
2. **Increase** Power Generation Technology Portfolio
3. **Examine** Transmission Capability
4. **Document** Fiber Optic Cable Capability
5. **Examine** Natural Gas Pipeline Capability

Task Force Recommendations

6. **Assess** New Ozone Nonattainment Areas' Impacts
7. **Examine** Water and Wastewater Resources
8. **Support** On-Site Generation Technology Transition
9. **Expand** VEDP's *Prospect Decision Support System*

1. Infrastructure Permitting Issues

- **Facility Development Times Getting Shorter**
- **Infrastructure Expansion Approval Delays Commonplace**
- **Permitting Requirements Impacting Siting Decisions**

Task Force Recommendations

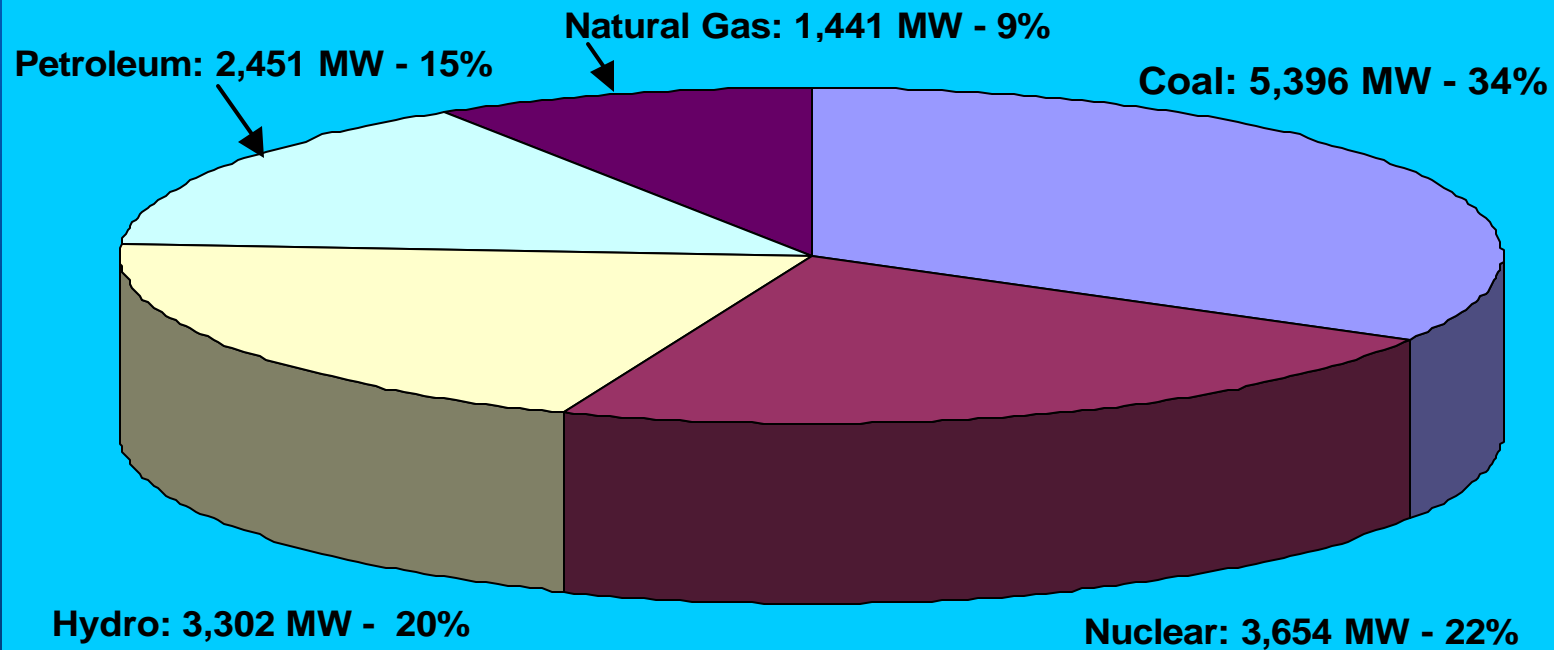
- **Infrastructure Permitting**

- Infrastructure expansions be part of County Comprehensive Plans
- Reexamine local/county/Commonwealth procedures and schedules
- Include “one-stop” approval in reexamination

Be Proactive and Anticipate Needs

2. Virginia Generation Portfolio

Total Utility Generating Capacity = 16,244 MW*



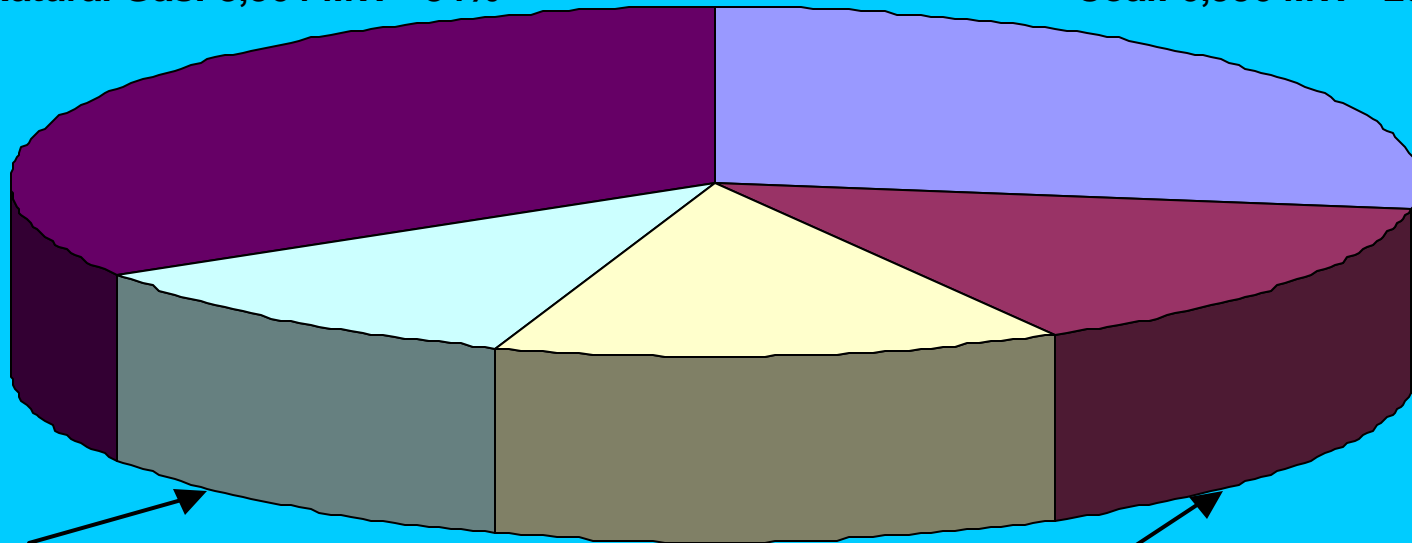
* Virginia Energy Patterns and Trends -- 1999

Virginia Generation Portfolio - 2005*

Total Utility + Merchant Capacity = 25,320 MW

Natural Gas: 8,564 MW - 34%

Coal: 6,996 MW - 28%



Petroleum: 2,801 MW - 11%

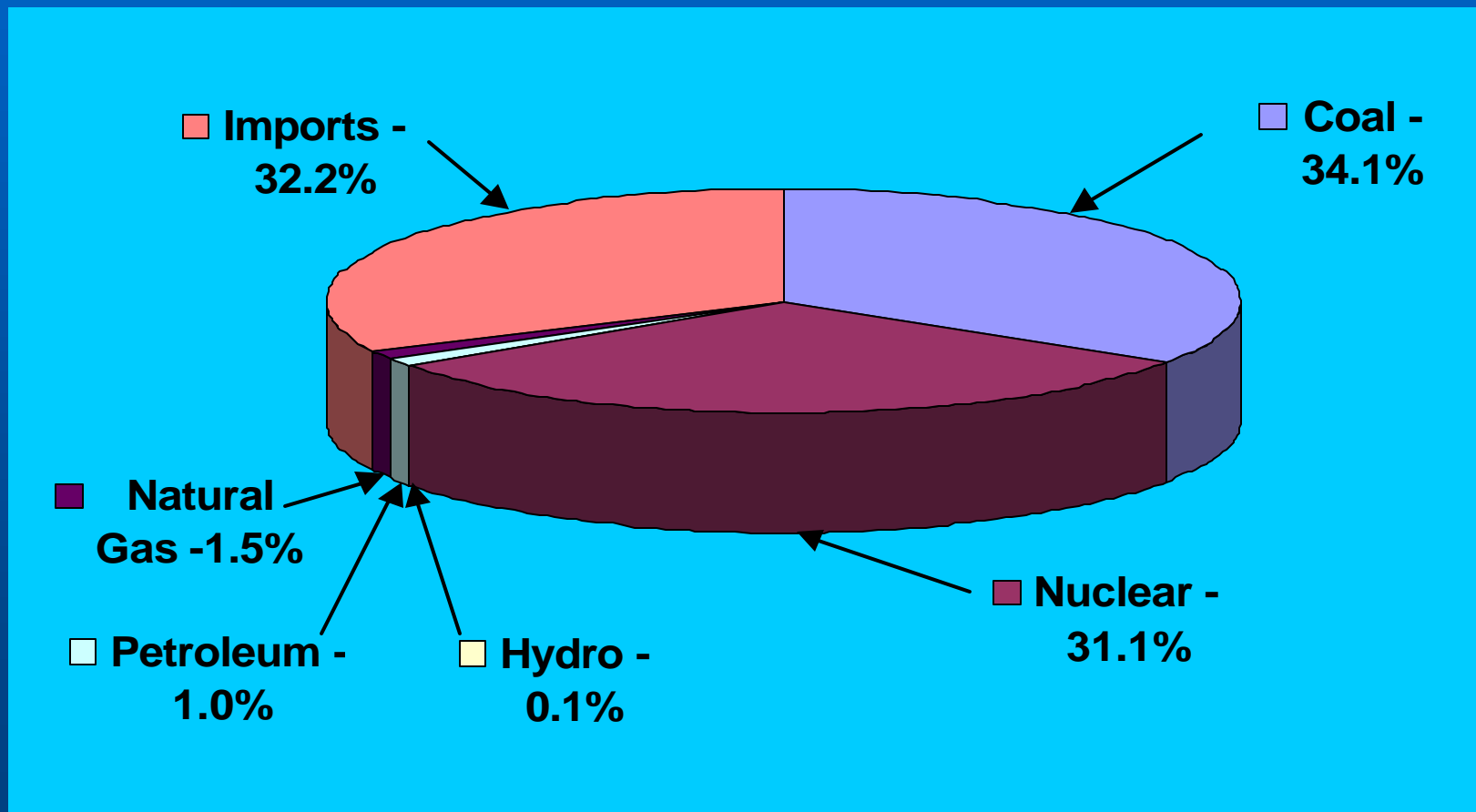
Hydro: 3,302 MW - 13%

Nuclear: 3,654 MW - 26%

Assumes 50% of Proposed Projects are Built

* ARI Staff Estimate

Virginia Energy Production & Use*



* Virginia Energy Patterns and Trends -- 1999

Virginia - New Generation Needs

	1992-1999 Average	1998-1999 Average
Assumptions		
Energy Load Growth	2.0 GWh/Yr (2.9%/Yr)	2.8 GWh/Yr (3.15%/Yr)
Type of Plant	Combined Cycle	Combined Cycle
Annual Operating Hours (%)	6,575 (Ann. CF = 75 %)	6,575 (Ann. CF = 75 %)
Fuel & Plant Efficiency (%)	Natural Gas (50 %)	Natural Gas (50 %)
Results		
New Plant Capacity Needed	305 MW/Yr	425 MW/Yr

Power Plants Planned for Virginia*

- **33 Projects Planned**

– Peaking	5,180+	MW
– Intermediate	12,320+	MW
– Base	1,600	MW
– Total Capacity	19,100+	MW

- **Primary Fuel**

– Natural Gas	17,150+	MW	90 %
– Oil	350	MW	
– Coal:	1,600	MW	

- **Schedule**

- Most scheduled for operation by end of 2005

* Virginia SCC, Virginia DEQ, VEDP, Elec. Pwr. Supply Assoc., and Public Announcements

Task Force Recommendations

- **Virginia's Power Generation Infrastructure**

- Explore legislative, regulatory, and business options to increase diversity and reduce risk
 - Energy sources – coal, renewable (solar, biomass, wind)
 - New generation strategies – e.g., distributed generation, aggregated on-site generation, etc.

3. Electric Transmission Capability

- **Transmission Systems Designed and Built To:**
 - Transmit energy from utility's sources to its customer areas
 - Interconnect with adjacent utilities to enhance reliability
 - Transfer moderate amounts of low cost energy among regional utilities
- **For Two Decades, New T/L Capacity in US Has Not Kept Up With**
 - Load Growth
 - New Generation Capacity

Virginia's Transmission Networks

- **The Situation**

- Within next few years, Virginia will go
 - From: ~ 30 % importer of electric energy
 - To: Major exporter of electric energy
 - To: Major link in regional network

- **Only One New Line Approved by SCC**

- AEP's 765 kV Line from West Virginia to Virginia

Task Force Recommendations

- **Virginia's Electric Transmission Infrastructure**
 - In-depth examination of the high voltage (>150 kV) networks
 - Ensure low-cost electricity available to all areas
 - Identify need for expanded facilities
- **Transmission Infrastructure Critical to Competitive Electricity Markets**

4. Fiber Optic Cable Capability

- **Over 650,000 Miles of Cable Already Installed in Virginia**
 - Majority installed by private companies
- **Only General Information Available**
 - General routes and locations
 - No cable characteristics
 - No information on “dark” capacity

Task Force Recommendations

- **Virginia's Fiber Optic Cable**

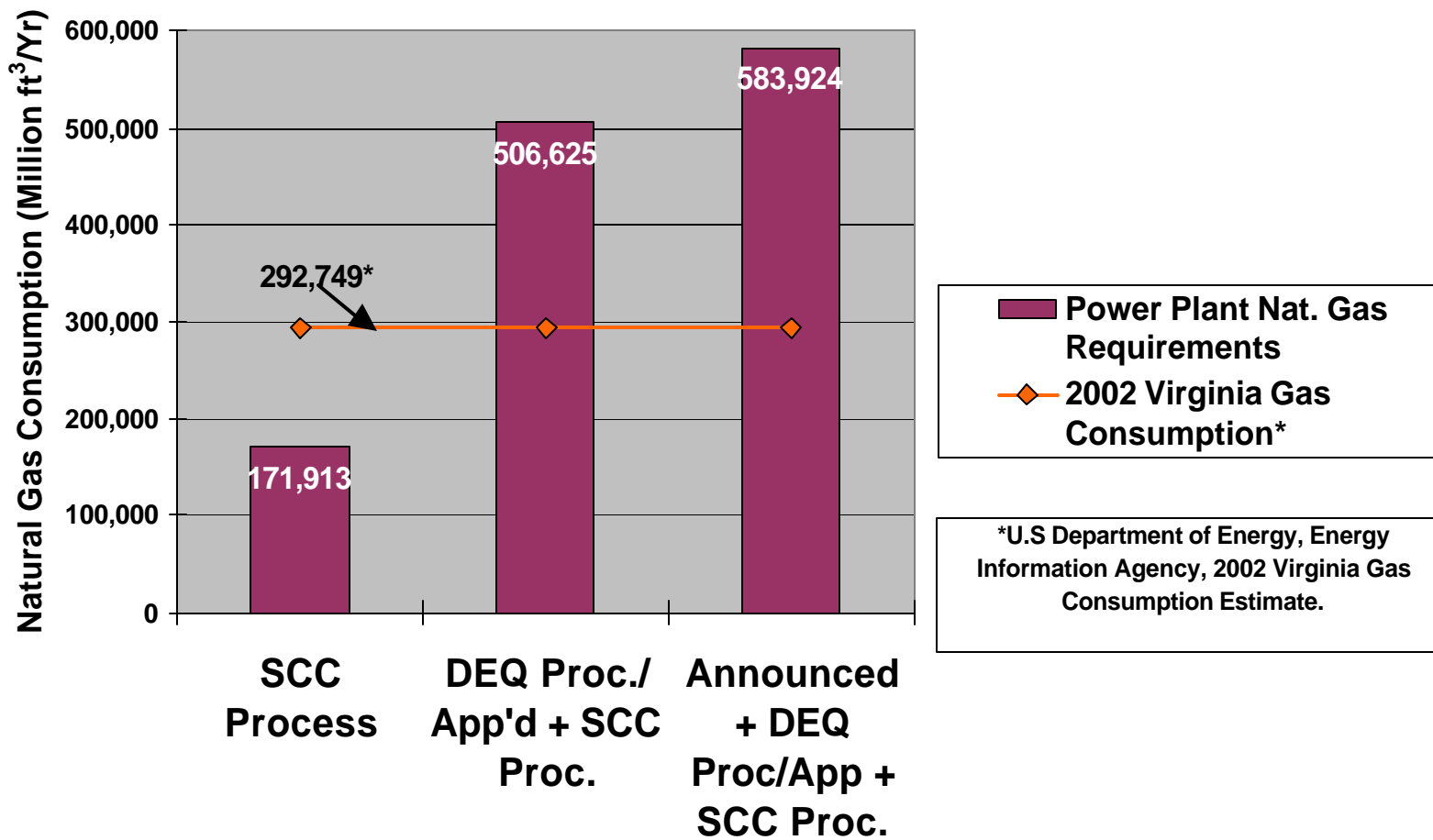
Infrastructure

- Document capabilities and characteristics of long-haul fiber optic trunk lines in Virginia
- Add to the Commonwealth and county infrastructure knowledge

5. Natural Gas Pipeline Capability

- **Interstate Pipeline Capacity**
 - Only 18% used in Virginia
 - Majority Transported to NE and Mid-Atlantic Markets
- **Large Increase in Price Last Winter (2.5x)**
- **Proposed Power Plants Will Have Significant Impact**

Potential Power Plant Gas Demand**

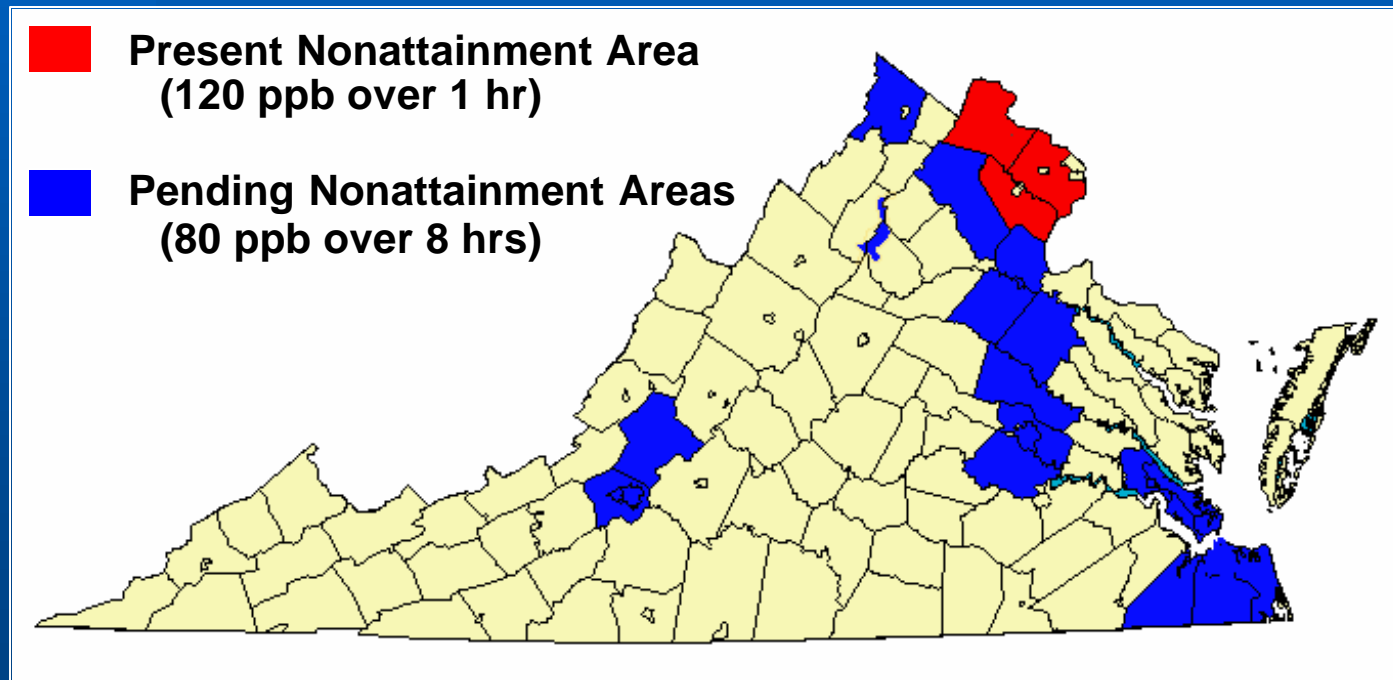


**ARI Staff Estimate

Task Force Recommendations

- **Virginia's Natural Gas Infrastructure**
 - Examine interstate and intrastate networks
 - Future demands
 - Operating limitations
 - New capacity opportunities
 - Impact of new applications and strategies
 - Gas-fired power plants
 - Distributed generation
 - Aggregated on-site generation

6. Virginia Ozone Nonattainment Areas



Ozone Non-attainment Areas

- **Non-attainment Area Expansion May Have Significant Impacts**
 - Industry operations
 - Equipment selection options
 - New power generation applications and strategies

Task Force Recommendations

- **Virginia's Ozone Nonattainment Areas**
 - Assess impact of expanded areas on Virginia industries
 - Impacts of new installations and applications
 - Proposed power plant projects
 - Distributed generation
 - Aggregated on-site generation

7. Water and Wastewater Resources

- **New Facilities With Large Water Requirements**
 - High technology manufacturing firms
 - Firms with very large air conditioning loads
- **Water Becoming Critical Issue**
 - New power project siting: intermediate and base-load plants
- **Regional Low Rainfall Periods**
 - Some water supply limitations

Task Force Recommendations

- **Virginia's Water & Wastewater Infrastructures**
 - Assess overall availability and vulnerability
 - Water needs for projected industrial and residential use
 - Assess alternative potential sources
 - Use of reclaimed water for industry and power plants
 - Assess interregional water transfer capabilities

8. On-Site Generation Facilities

- **Situation Today in Virginia**
 - **Installations:** Few thousand units
 - **Sectors:** Comm, ind, res, agriculture, gov't.
 - **Unit Size:** 1 kW to over 2 MW
 - **Fuels:**
 - Diesel - larger units, Gasoline - smaller units
 - **Emissions**
 - Diesels - High CO₂, NO_x, SO₂, and particulates
- **Diesels are Baseline Technology**

Task Force Recommendations

- **Virginia's On-Site Generation Facilities**
 - Initiate facility accounting
 - Initiate efforts to accelerate upgrading of existing baseline diesel units
 - Initiate efforts to accelerate adoption of cleaner technologies
 - Propose joint industry-manufacturer-government efforts

Task Force Recommendations

- ***VEDP Prospect Decision Support System***
 - Continue support for upgrading both hardware and software
 - Continue support for updating databases, including fiber availability/capability maps

<http://www.ari.vt.edu/taskforce>

- **Presently on the Web Site**

- Executive Summary: Draft 9/5/01
- Briefing Presentation: 10/2/01

- **To be Added**

- Project Final Report: About 11/1/01
- Send e-mail if you need a hardcopy of the report



Wrap Up

- **What Actions Can You Take**
 - Raise questions about infrastructure adequacy and vulnerability
 - Encourage local governments to address the issues raised
 - Provide input to legislators – both Commonwealth and county

Wrap Up

- **What We Need From You**
 - What are your priorities for these findings and recommendations?
 - What areas were missing that you believe need to be examined?
 - Feedback:
 - E-Mail: jbigger@vt.edu
 - Phone: 703.535.3457
 - Fax: 703.518.8085 (Attn: John Bigger)

