Energy Research & Development in Virginia

Virginia Coal and Energy Commission
January 11, 2007

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Energy R&D in Virginia

- Study of Virginia energy R&D under Virginia Energy Plan
- Commissioned Center for Innovative Technology to complete
  - Terry Woodworth
  - Nancy Vorona

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Energy R&D in Virginia

- Study Components
  - Inventory
    - Virginia public universities
    - Federal labs in Virginia
    - Private industry
  - ID state best practices
  - ID opportunities for Virginia
  - ID benefits to Virginia

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Energy R&D in Virginia

- Universities
  - College of William & Mary
  - George Mason University
  - James Madison University
  - Norfolk State University
  - Old Dominion University
  - University of Virginia
  - Virginia Commonwealth University
  - Virginia Military Institute
  - Virginia Tech
- Federal Laboratories
  - Jefferson National Accelerator Facility
  - NASA Langley Research Center
  - Naval Surface Warfare Center - Dahlgren
- Industry
  - Large manufacturers
  - Technology
  - SBIR/STTR companies

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Energy R&D in Virginia

- Energy Generation/Sources
  - Fossil fuels – coal, oil & natural gas
  - Nuclear
  - Fuel cells/hydrogen
  - Alternate fuels – biomass/waste to energy, liquid fuel & products
  - Geothermal
  - Hydropower
  - Solar/photovoltaics
  - Wind
  - Coastal – wind, tidal, current, waves & biomass
- Energy Use & Impacts
  - Energy storage
  - Energy efficiency & conservation
  - Buildings & environment
- Energy Policy & Economics

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Energy R&D in Virginia

Summary of Energy Research and Development at Virginia Universities and Colleges													
	Energy Generation/Sources									Energy Use/ Impact			Energy Policy
				Alternative Fuels	Other Renewables								
Virginia College or University	Coal, Oil, Gas	Nuclear	Fuel Cells/ H2	Alternative Fuels: Waste- or Bio-derived	Geothermal	Hydroelectric	Solar/Photovoltaics	Wind	Coastal (Wind/Tidal/ Current/Wave)	Energy Storage	Efficiency/Conservation	Buildings/Environment	Energy Policy/ Economics
College of William and Mary		•					•		•				•
George Mason University													•
Institute for Advanced Learning & Research				•									
James Madison University			•	•				•	•		•		•
Norfolk State University							•		•				
Old Dominion University				•			•	•	•				
University of Virginia	•	•	•	•			•			•	•	•	•
Virginia Commonwealth University			•	•			•			•	•		
Virginia Military Institute													•
Virginia Tech	•	•	•	•	•	•	•	•	•	•	•	•	•

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Summary of Energy Research and Development at Virginia Federal Laboratories													
	Energy Generation/Sources									Energy Use/ Impact			Energy Policy
				Alternative Fuels	Other Renewables								
Virginia Federal Lab	Coal, Oil, Gas	Nuclear	Fuel Cells/H2	Alternative Fuels: Waste- or Bio-derived	Geothermal	Hydroelectric	Solar/Photovoltaics	Wind	Coastal (Wind/Tidal/ Current/Wave)	Energy Storage	Efficiency/Conservation	Buildings/Environment	Energy Policy/ Economics
Thomas Jefferson National Accelerator Facility (DOE)		•					•	•					
NASA Langley Research Center		•	•	•				•		•	•	•	
Naval Surface Warfare Center - Dahlgren Division											•		

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Energy R&D in Virginia

Summary of Energy Research and Development at Selected Virginia Companies													
	Energy Generation/Sources									Energy Use/ Impact			Energy Policy
				Alternative Fuels	Other Renewables								
Virginia Company	Coal, Oil, Gas	Nuclear	Fuel Cells/H2	Alternative Fuels: Waste- or Bio-derived	Geothermal	Hydroelectric	Solar/Photovoltaics	Wind	Coastal (Wind/Tidal/ Current/Wave)	Energy Storage	Efficiency/Conservation	Buildings/Environment	Energy Policy/ Economics
Afton Chemical, Richmond											•		
Areva NP, Lynchburg		•											
BWXT, Lynchburg		•											
Consutech, Richmond				•									
Delta T, Williamsburg				•									
Dominion Power	•	•					•	•			•	•	•
GE Energy, Salem	•	•					•	•			•		
Northrop Grumman Newport News	•			•						•			
SAIC, Virginia Beach						•		•	•				•
Siemens, Newport News											•		
Verdant Power, Arlington						•			•				
SBIR/STTR Companies	•	•		•	•		•				•		

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Energy R&D in Virginia

- Strengths
  - Broad array of energy R&D
    - Individual faculty
    - Centers
  - Deployment expertise
  - Natural ties to Virginia industry
    - Coal & CBM
    - Nuclear technologies
    - Small business/entrepreneurs
    - Maritime
    - Agricultural
    - Technology
  - Proximity to DC and military installations

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Energy R&D in Virginia

- Weaknesses
  - No overall vision
    - Energy R&D
    - Economic development focus
  - Lack of cross-university coordination
    - No critical mass for large opportunities
  - Lack of matching funds
    - Appropriations
    - Flexibility to respond quickly

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Energy R&D in Virginia

- Other States' Best Practices
  - Broad stakeholder involvement in governance
  - Consistent & substantial funding base
  - Market-driven research roadmap
  - Funding by topic areas – competition for best projects
  - Flexibility with financing instruments
  - Require "Skin-in-the-game"
  - Facilitate real-world demonstration
  - Technology showcases to customers, investors, policy makers
  - Track effectiveness
  - Association of State Energy Research and Technology Transfer Institutions (ASERTTI)

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Energy R&D in Virginia

- Opportunities to Strengthen Energy R&D
  - Develop a state Energy R&D Roadmap
    - Milestones
    - Track results
  - Cost-sharing funding commitment
    - Large federal projects/awards
    - Strategic recruitment opportunities
  - Fund state-level initiative
    - Capacity building
    - Lead to deployment

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Energy R&D in Virginia

- Next Steps
  - CTRF funding
  - Inventory R&D dollar value at universities
  - Virginia Energy Plan/Energy R&D Roadmap
  - Coordination or governance structure
  - Target opportunity areas
  - VRTAC proposal for energy R&D

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