

US Department of Energy
***U.S. Clean Technology
Development***



Dan Beckley
State and Local Programs
Energy Efficiency and Renewable Energy

Virginia Commission on Energy and Environment
July 17, 2008
General Assembly Building, Richmond VA



Outline



- Challenges
- What's DOE doing to Address Challenges
- What States can do
- What's Possible

Global and National Challenges



- Energy Demand
- Climate Change
- Energy Security
- Economic Growth

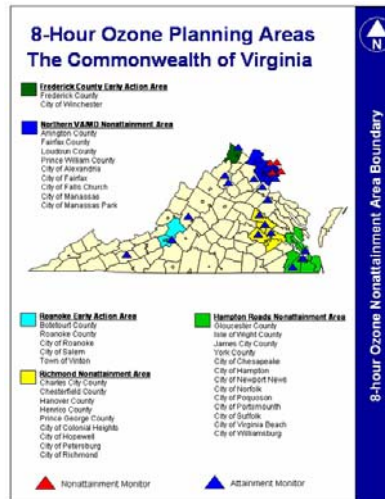


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Virginia Challenges - Drivers



- VA Population Increase 1.3% / year (1.5x the national avg)
- Environmental Costs
- Economic Impact on VA Individual
 - Electricity Consumption growing by 3.2% / year
 - 2008 - 3% of budget
 - 2015 - 6% of budget
 - Transportation -
 - 6% of budget
 - Assumes
 - \$37k per capita
 - \$4.07 per gallon for gas
 - 530 gallons gas per capita
 - 1155 kWh per capita
 - 2008 \$0.0849 cents / kWh
 - 2015 - \$0.160 cents / kWh



Source of per capita data came from EIA State Profile

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We manage America's investment in the research, development and deployment of DOE's diverse energy efficiency and renewable energy applied science portfolio.



Advanced Fuels & Vehicles - \$622 M

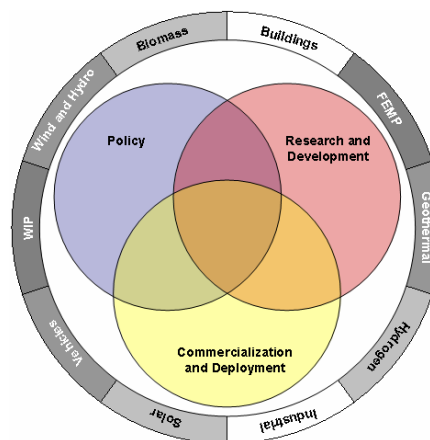
- Biomass/Biofuels
- Hydrogen
- Vehicle Technologies
 - o Batteries

Energy Efficiency - \$ 475 M

- Buildings Technologies
- Industrial Technologies
- Weatherization
- Federal Energy Management

Power Generation - \$247 M

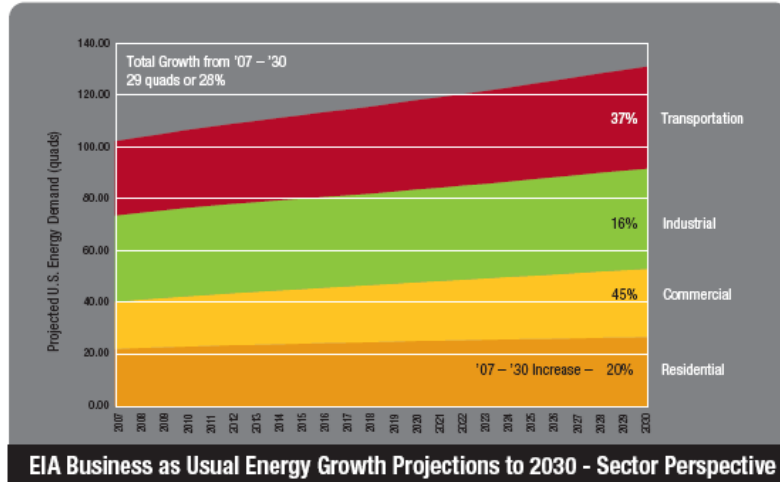
- Solar
- Wind
- Hydropower
- Geothermal



The President's Advanced Energy Initiative aims to change the way we power our homes, business, and automobiles.

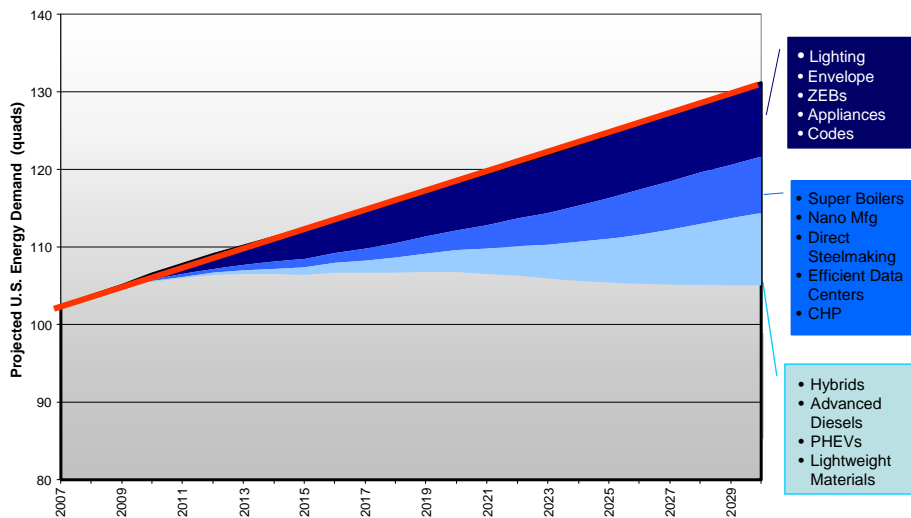
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Business-As-Usual Scenario



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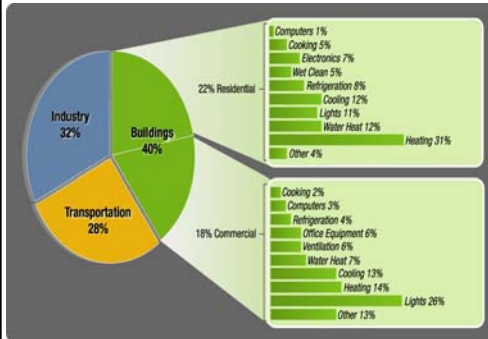
Energy Efficiency Has the Technical Potential to Level Energy Demand Growth



Source: DOE Scenario Projections

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Why Buildings?



Buildings and homes emit more CO₂ than any other sector;

Most of the nation's growth in CO₂ emissions through 2030 will be due to increased electric service demands for cooling, lighting, heating and other services;

Efficiency offers least-cost solutions to avoid these emissions

Buildings account for about **40%** of US energy, of which **72%** is electricity costing Americans **\$370B** each year on utility bills .

Source: *Buildings Energy Data Book*, September 2007

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R&D: Driving Toward Net-Zero Energy Buildings

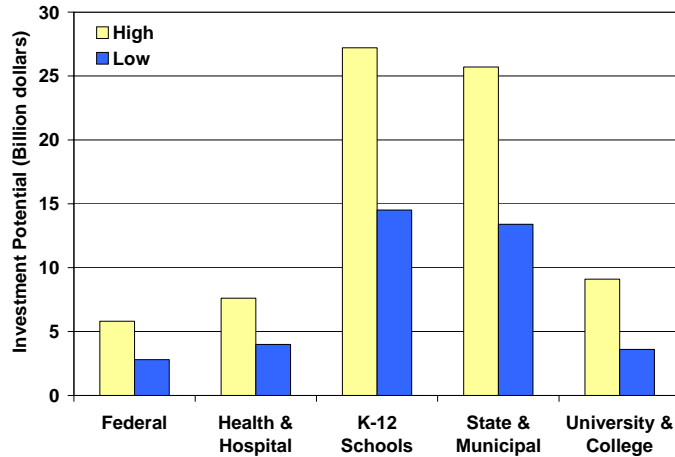


Grid-connected buildings that:

- Use 60% to 70% less energy than conventional counterparts
- And, over the course of a year, produce with renewable sources as much energy as they consume

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Bringing Private Capital to State and Local Governments - ESCOs



ESCOs need to invest \$35-70B to capture remaining EE savings potential in MUSH market; larger than total estimated ESCO activity from 1990-2006 (\$28B)

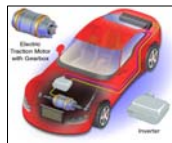
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Plug-in Hybrid Electric Vehicle (PHEV)



Energy Storage

Batteries are a critical enabling technology for the development of PHEVs



Power Electronics and Electric Machines

Development of new technologies that are compatible with high-volume manufacturing (motors, sensors, control systems)

Hybrid and Vehicle Systems

Notice of Intent (NOI) - PHEV Demonstration and Validation

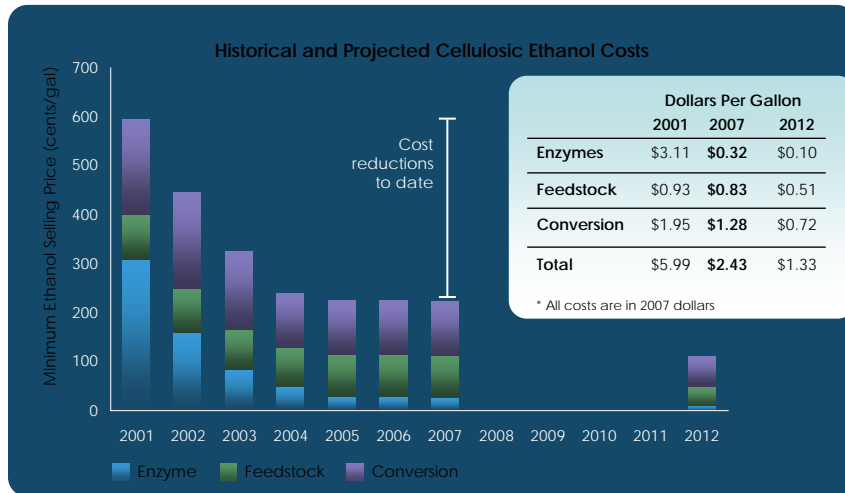


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Cellulosic Ethanol Status and Goal



Cellulosic ethanol anticipated cost competitiveness and sustainability attributes are key to biofuels growth potential



Source: NREL Modeled Cost

U.S. Department of Energy – Clean Tech v2.0

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DOE is Investing in Projects that Rely on Cellulosic, NOT Food, Crops



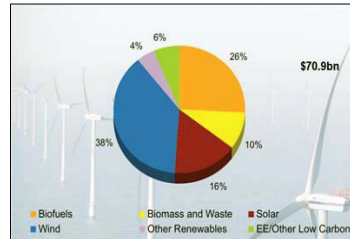
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Global Renewable Energy – Investment Trends Going Up



- Investors poured \$71 billion of new investment into companies and new sector opportunities in 2006, a 43% jump from 2005
 - In 2007, clean energy investments predicted to be \$85 billion
- Venture capital and private equity investments increased 167% between 2005 and 2006
 - Wind, biofuels, and solar attracted 71% of VC/PE investment
- Stock market investments in technology development, commercialization and manufacturing firms increased 141% in 2006 compared with 2005
 - Solar dominated in the public market arena in 2006, with \$5.7 billion of investment activity

Global Investment in Sustainable Energy by Technology (2006)



| Percent of Annual New Capacity | | | |
|--------------------------------|------|------|------|
| | 2004 | 2005 | 2006 |
| Renewables | 2% | 11% | 22% |
| Natural Gas | 72% | 85% | 72% |
| Coal | 2% | 2% | 5% |
| Petroleum | 1% | 1% | 1% |
| Dual Fired | 22% | 0% | 0% |
| Other* | 0% | 1% | 0% |

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Source: UNEP, 2007—Sustainable Energy Finance Initiative, New Energy Finance

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U.S. State and Local Governments Have Jurisdiction Over Many Clean Energy Policies

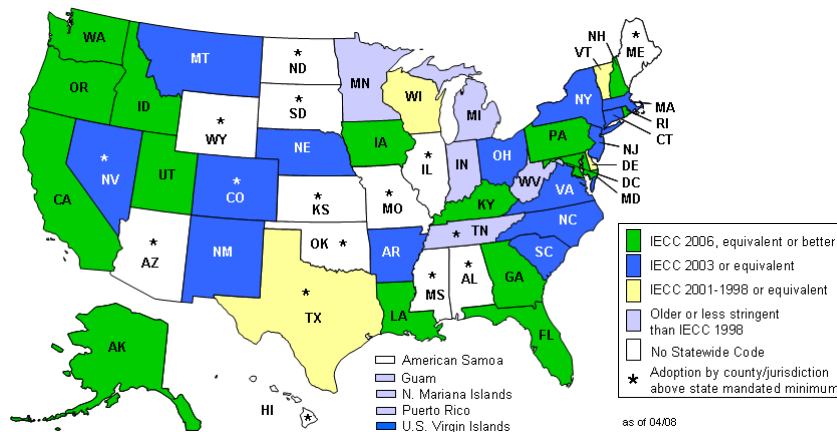


- The Federal Government (particularly through DOE State Energy Program) coordinates with extensive State jurisdiction over:
 - ❖ Commercial and Residential Building Codes
 - ❖ Electricity Portfolio Standards
 - ❖ Utility/Electricity Regulation, Pricing, and Interconnection
 - ❖ Transmission Siting and Permitting
 - ❖ Demonstration of fuels and advanced vehicles in State Fleets
 - ❖ Research, Development and Deployment (RD&D)
- State policies can create opportunities (e.g., portfolio standards, building codes, transmission, etc.)

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Many states have outdated building codes (residential map)

Energy Efficiency & Renewable Energy



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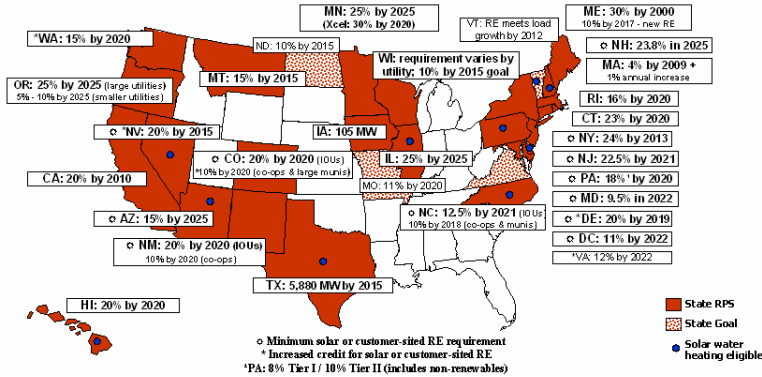
State Portfolio Standards Create Opportunities for Renewable Project Development



DSIRE: www.dsireusa.org

September 2007

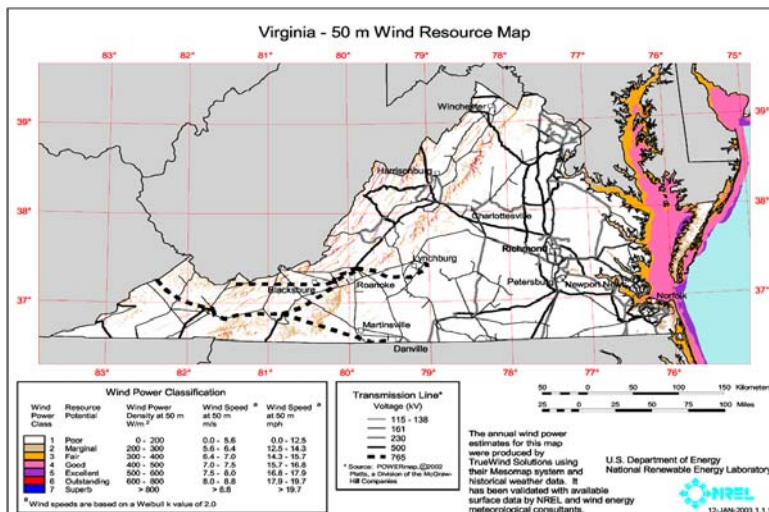
Renewables Portfolio Standards



It is projected that RPSs will provide support for 70 GW of new renewable power by 2020

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Wind Potential In VA

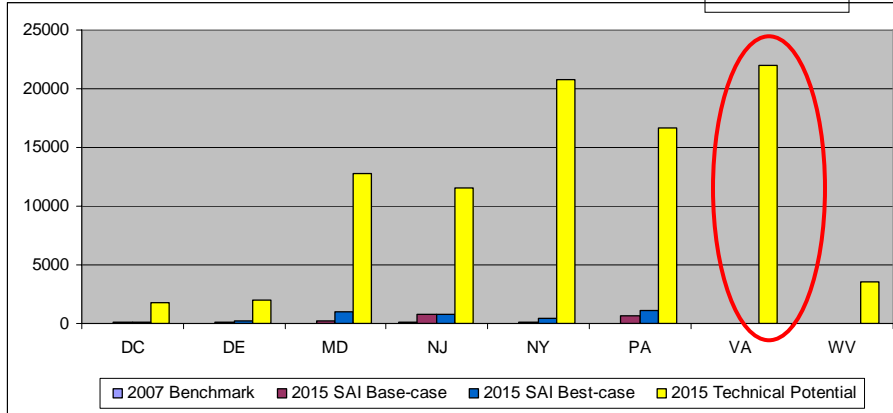


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VA Rooftop Potential in PV is 20 GW



+/- 20 GW



Solar Market Penetration Study

Source: Renewable Systems Interconnection: Rooftop PV Market Penetration Scenarios, Prepared by Navigant Consulting for the U.S. Department of Energy, October 30, 2007.

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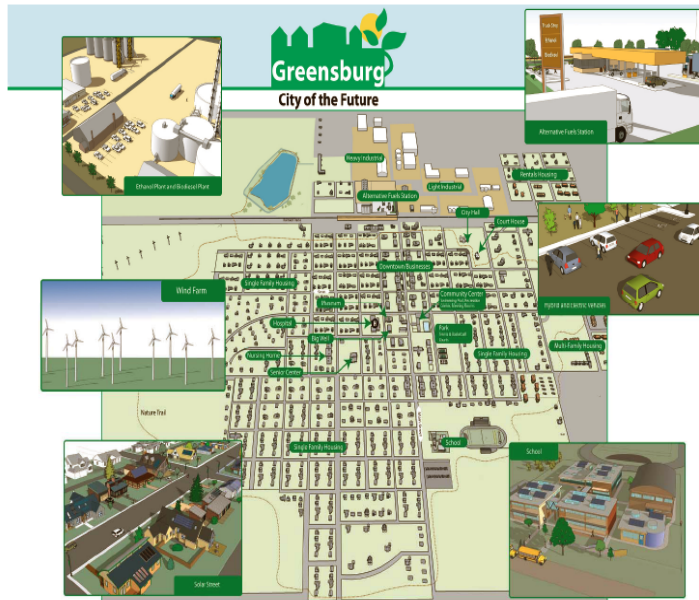
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A Vision For Greensburg: A National Energy Leader



http://www.nrel.gov/docs/temp/43014_vol1_draft.pdf

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DOE Resources for States



- Strategic partnership with National Governor's Association
 - Workshops, Information tools, Technical Assistance
- Best Practices in Energy Policies and Programs
 - First evaluation completed on EEPS, RPS, and RFS policies
 - http://www.nrel.gov/applying_technologies/scepa.html
- Accelerating state/local performance contracting
 - Energy Services Coalition, NASEO, NAESCO, NCSL
- TAP – Technical Services/Access to National Laboratories
 - Contact James Ferguson/Julie Riel
 - <http://www.eere.energy.gov/wip/tap.cfm>

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Summary Points



- States are leaders in addressing Climate
- State Policies are moving clean energy markets
- As you develop new energy policy do not aim policies for where we are today, but rather, aim them for where we need to be!
- Look for opportunities where VA businesses can create product and services to address our future energy challenges.

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Contact Info



Dan Beckley
US Department of Energy
Energy Efficiency and Renewable Energy
202-586-7691
Dan.beckley@ee.doe.gov

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