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High-Performance Schools in Virginia: Case Studies in Design and Construction

Virginia Sustainable Buildings Network
State of High-Performance Schools in Virginia
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Design

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Construction

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Schools: The Ultimate Sustainable Building Type?

Schools contain precious cargo

Schools are community centers

Schools have a long life

Schools serve their primary function during the day

Schools are about education

Schools are a symbol of our values as a society

The Problem

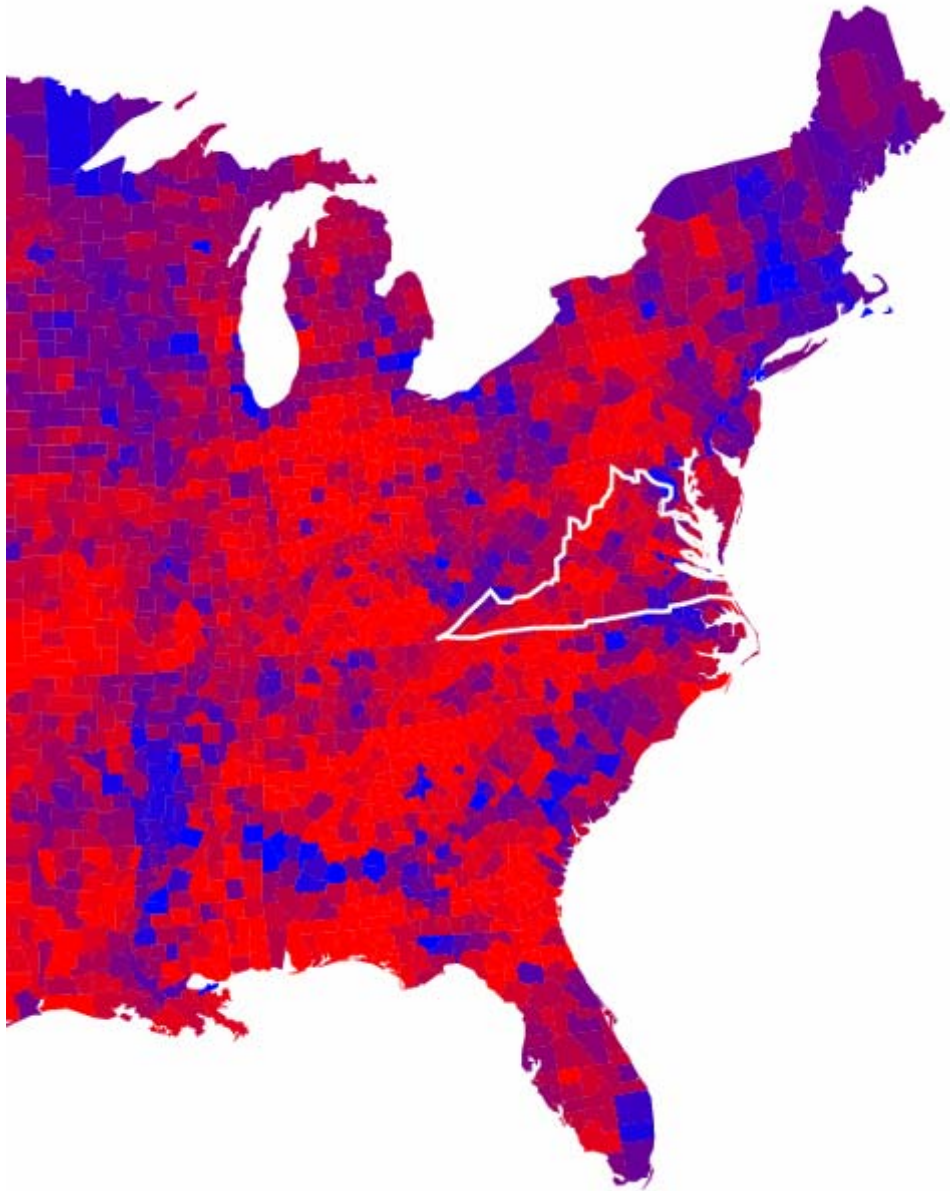
Issues at Hand: Across the Country

No Child Left Behind

Adequate Yearly Progress Accreditation (student achievement)

Operating and maintaining buildings

Exposure to liability



The Problem

Issues at Hand:
In the Commonwealth

No Child Left Behind

Adequate Yearly Progress
Accreditation
(student achievement)

Operating and maintaining buildings

Exposure to liability

We can't do enough to boost student achievement, there's never enough money, and we're risk averse.

The Problem

Issues at Hand:

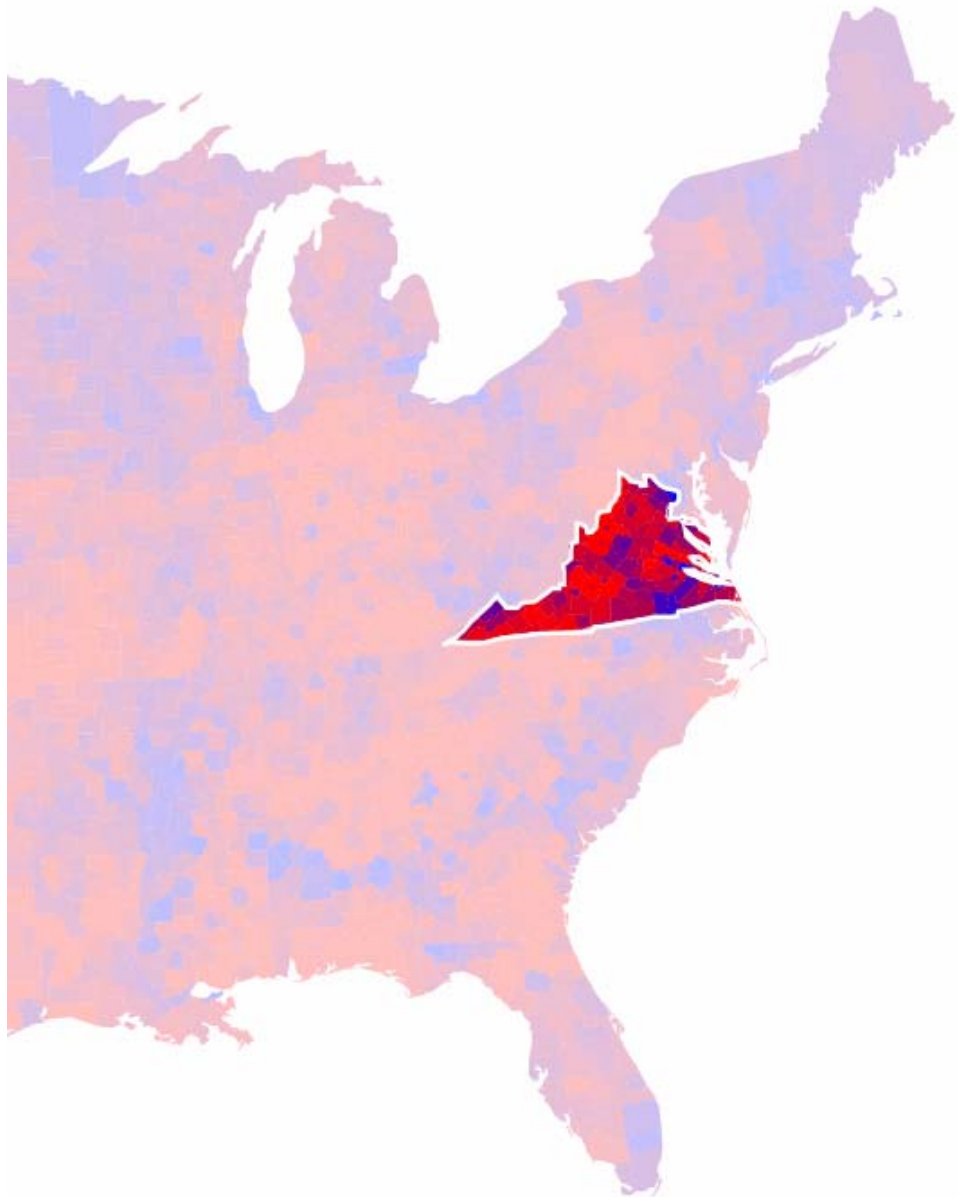
In the Commonwealth

VIRGINIA SENATE BILL NO. 1273

Any state agency authorized by the General Assembly to undertake a major facility project located on state-owned land, **shall build to LEED certification standards**....

The provisions of this article **shall not apply to** any construction project of **a public school district.**

DID NOT PASS.



The Solution

Green Schools:

Promote Student Achievement

Reduce the Cost to Operate and Maintain Schools

Reduce Your Exposure to Liability

***And*…are not as costly as you think!**

Research: Student Achievement

Nicklas and Bailey, 1996

- Natural light – 3.2 to 3.8 fewer absences per year

Heschong-Mahone, 1999, 2001, 2003

- Daylight – students progressed 20% on math tests and 26% faster on reading tests
- Views to the outdoors – 5-10% increase in productivity

Capital-E Report, 2006

- Temperature controls – 3.6% increase in productivity
- Lighting – average 3.2% increase in productivity
- Indoor Air Quality – average 41% reduction in reported health issues

Research: Operations & Maintenance

Capital-E Report, 2006

- Green schools use an average of 33% less energy than conventionally designed schools.
- Green schools use an average of 32% less water than conventionally designed schools.
- The cost of both energy and water will rise dramatically in the coming years.

Research: Occupant Health and Liability

Capital-E Report, 2006

- There are some 60 million students, faculty, and staff in schools.
- Students and faculty spend 85-90% of their time indoors and spend more time in school than in any environment outside the home.
- The concentration of pollutants indoors is typically higher that outdoors.
- Children are growing and their lungs and other organs are still developing.
- Because they breathe at a higher rate than adults, children take in more air relative to body size, and as a result sustain greater health problems and risks than adults.
- Analyzed studies showing an average improvement of 41% in health impacts, including asthma, flu, sick building syndrome, respiratory problems, and headaches, due to improved air quality.

Research: Cost

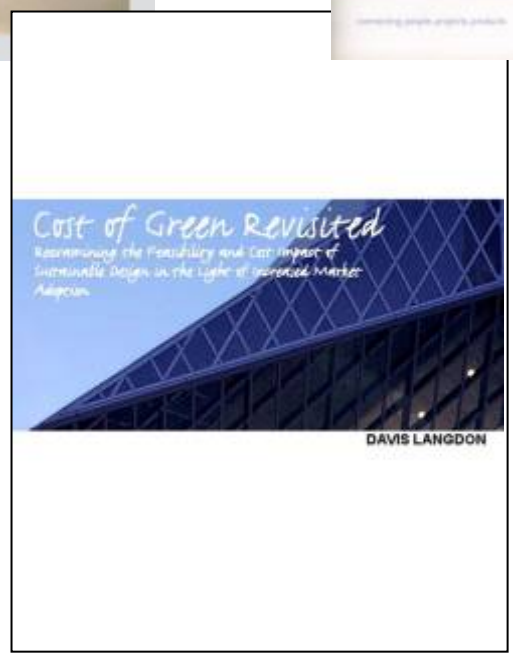
Nothing is free. Green schools do cost more…but not as much as you might think.

• Capital-E Report, 2006

Green Schools cost 0-6.5% more…but the return on investment is 4-20 times the first cost.

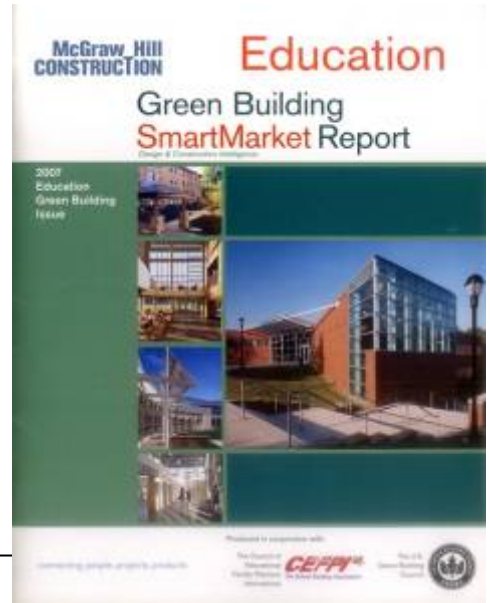
• *Davis-Langdon*, 2007

There is no significant difference in average cost for green buildings as compared to non-green buildings.



• McGraw-Hill Report, 2007

Perceptions of higher first costs remains a significant obstacle to building green.

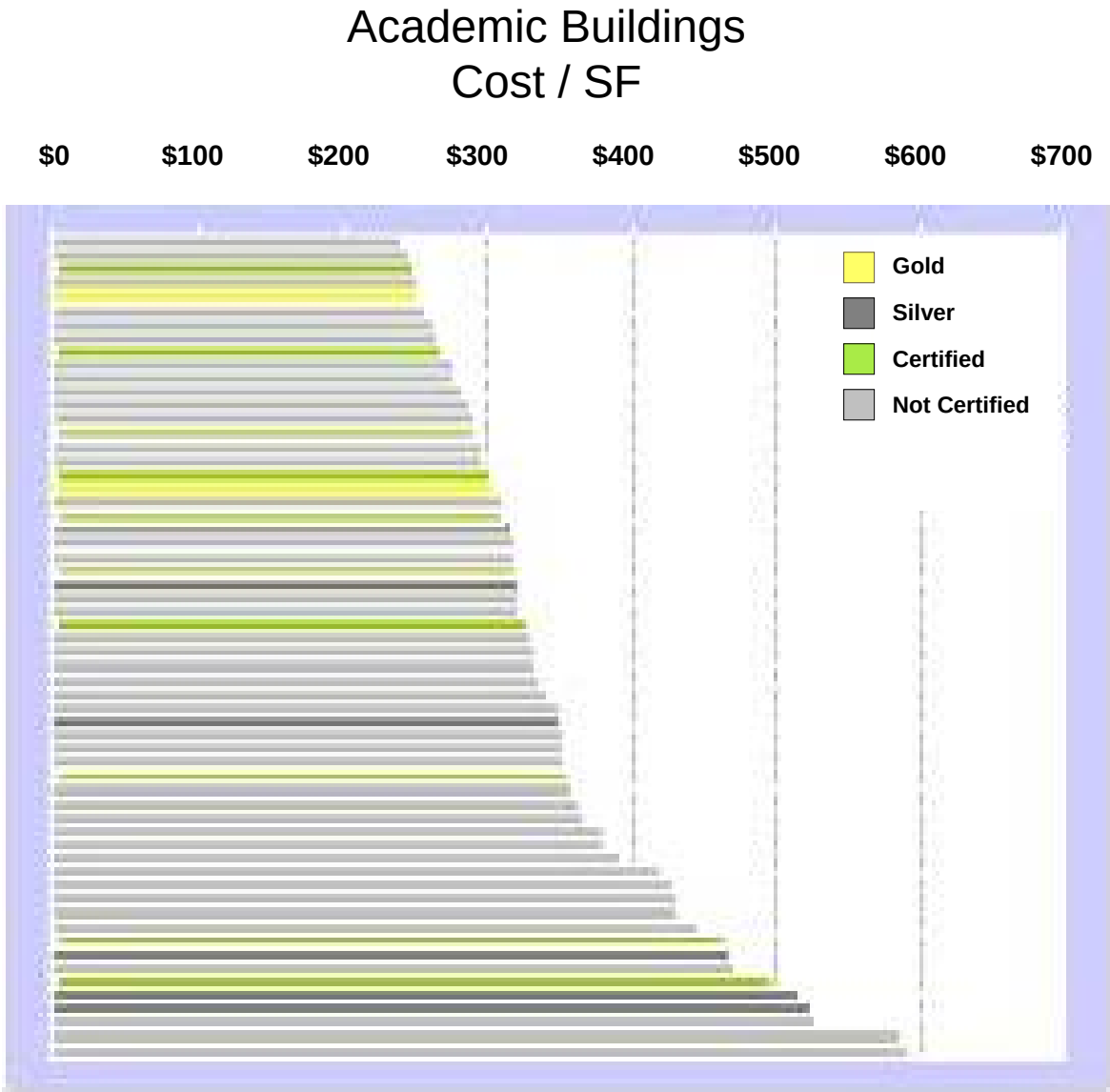


Research: Cost

***Davis-Langdon*, 2007**

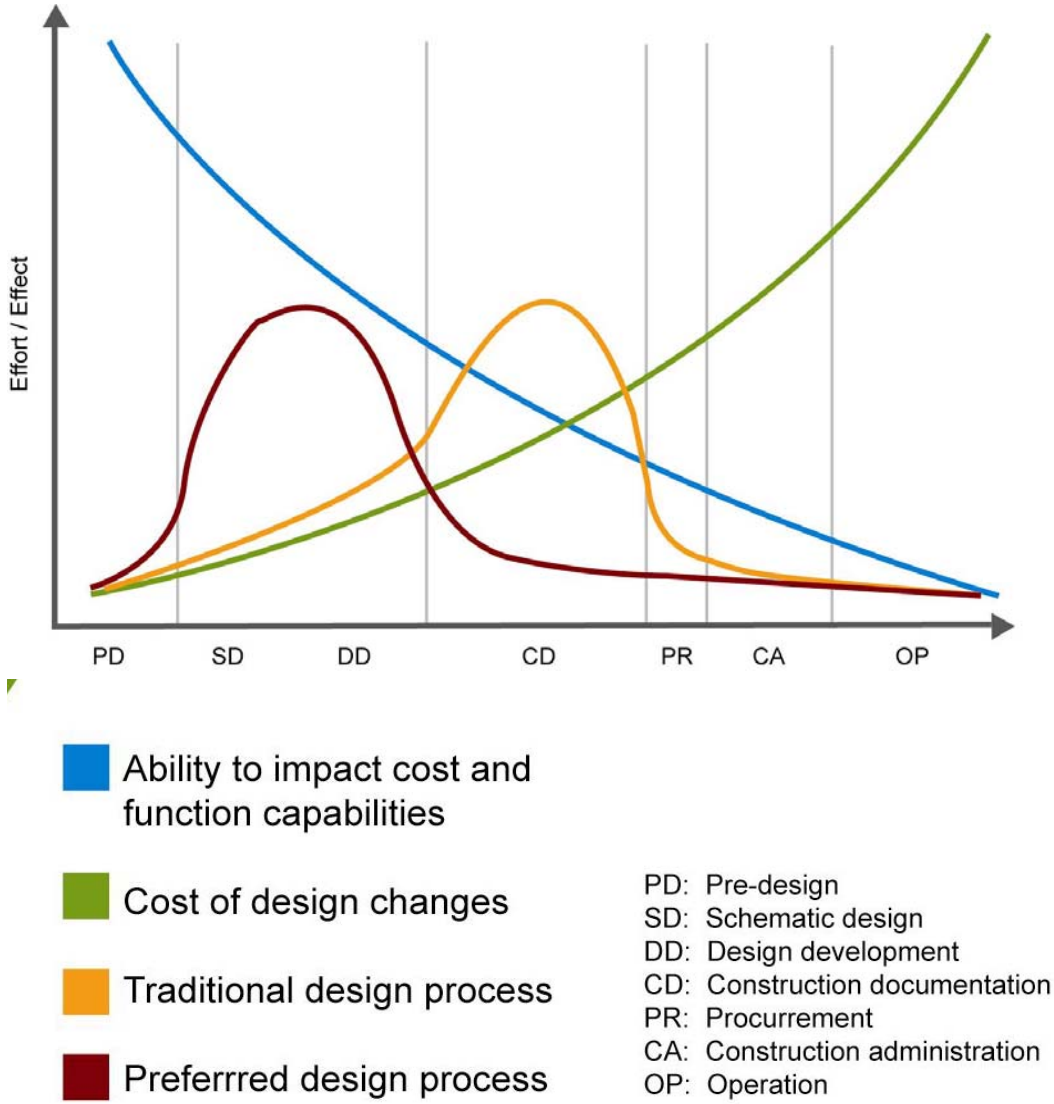
Green schools were built at all levels of the cost spectrum.

Green schools can be built on any budget if the decision to do so is made very **early** in the process.



Research: Cost

- Green schools can be built on any budget if the decision to do so is made very early in the process.
- Establish goals, expectations, and expertise from the very beginning of the project
- Commit to an integrated design process
- Build a cost model to align the budget with the goals
- Monitor cost throughout design and construction



Charlottesville Waldorf School (Little Green)

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Charlottesville Waldorf School [“Little Green”]

- Program
- Process
- Project Goals

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Little Green + LEED

- LEED as construction management tool
  - Budget
  - Schedule
  - Coordination of subs, suppliers, installers

- Third party verification

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Successes + Failures

- The Good
  - 30% energy savings over the baseline case
  - 77% of construction waste diverted from landfills
  - Project delivered on tight budget [$110/SF]
  - 25% water savings over baseline case
  - Educational philosophy evident in design and materials
- The Bad
  - Schedule's impact on MEP design/build process
  - Electrical service
  - Getting used to new materials + methods

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- The Ugly?

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Nuts and Bolts

- Construction waste management
- Subs are the key
  - Field meetings
  - Handing out copies of LEED credits to subs
  - Explain WHY we're doing things "differently"
- Client representative
- Photographs

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Nuts and Bolts

- Don’t take “No” for an answer

Conclusions

- It’s not about LEED (means vs. ends)
- It’s about MINDSET – client, designer, contractor, community
- Find dedicated experts
- Find shared values
- Commit Early (project initiation)
- Use a decision-making tool to set goals and evaluate progress
- Money Matters (but consider the true cost)
- It’s about EDUCATION!

Resources

EnergyStar
www.energystar.gov

U.S. Green Building Council
www.usgbc.org

2030 Challenge
www.architecture2030.org

Living Buildings Challenge
Cascadia Region Green Building Council
www.livingbuildings.org

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