

# RETROFITTING EXISTING SCHOOLS FOR A GREEN GENERATION

In 1998, the average public school building in the United States was 42 years old.

## OBJECTIVES

### EDUCATIONAL

- + Empower students to affect change in their own school
- + Teach all subject areas with an environmental perspective: Ties social, moral, behavioral principles with concrete, real-life examples, promoting learning transfer  
"All education is environmental education." David Orr, Oberlin College
- + Increased interdisciplinary studies- understanding interdependence, collaboration, and human symbiosis in all systems: industrial and natural
- + Get students to identify their needs, design experiments to test their hypotheses and implement successful strategies school or district-wide

### ARCHITECTURAL

- + Reveal how things work: literal transparency, living & moving parts transform the school into a learning laboratory
- + Let students interact with the facade, change the filter through which they see the world, i.e. manipulate the building envelope
- + Let the building change over time: with participatory design, the building is a symbol of school pride

Ecological design- the practical application of the concepts of interrelatedness, systems, and long time horizons- is changing how we think, and how we think about thinking.  
- DAVID ORR, Professor at Oberlin

### from TECHNOLOGICAL WASTELANDS



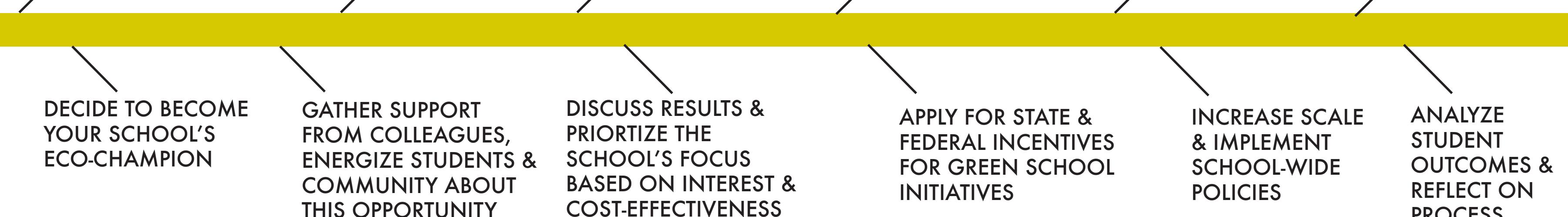
### to LEARNING LANDSCAPES

We are currently preparing students for jobs that don't yet exist, using technologies that haven't yet been invented, in order to solve problems we don't even know are problems yet.

- KARL FISCH, educator quoted in *The Third Teacher*

### SAW AMAZING POSTER PRESENTATION AT UO ABOUT RETROFITTING

### TIMELINE



## POLICY & CURRICULAR

- + Spend a professional development day centered on environmental education: will help identify what tools are needed, what learning environment is most important to the school, what funds are available for environmental initiatives
- + Provide teachers with environment-based lesson plans that meet curriculum standards  
Many relevant plans are available from Earth Day Network, Alliance to Save Energy, National Energy Education Development, Green Education Foundation, Eco-Schools USA
- + Highlight the site and its geological features with extensive signage
- + Let students lead their own afterschool project or community initiative, e.g. monitoring waste, energy auditing, follow waste, water, resource streams
- + Change the school food system, see the Center for EcoLiteracy's Re-Thinking School Lunch
- + Take students out to wildlife refuge, farmers' markets, local farms, community gardens, parks and other living spaces to trace closed-loop systems
- + Hire a garden coordinator or request a volunteer to manage the maintenance of new eco-projects

An environment-based education movement-at all levels of education-will help students realize that school isn't supposed to be a polite form of incarceration, but a portal to the wider world.  
RICHARD LOUV, author of *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder*

### FACILITIES

#### MINOR

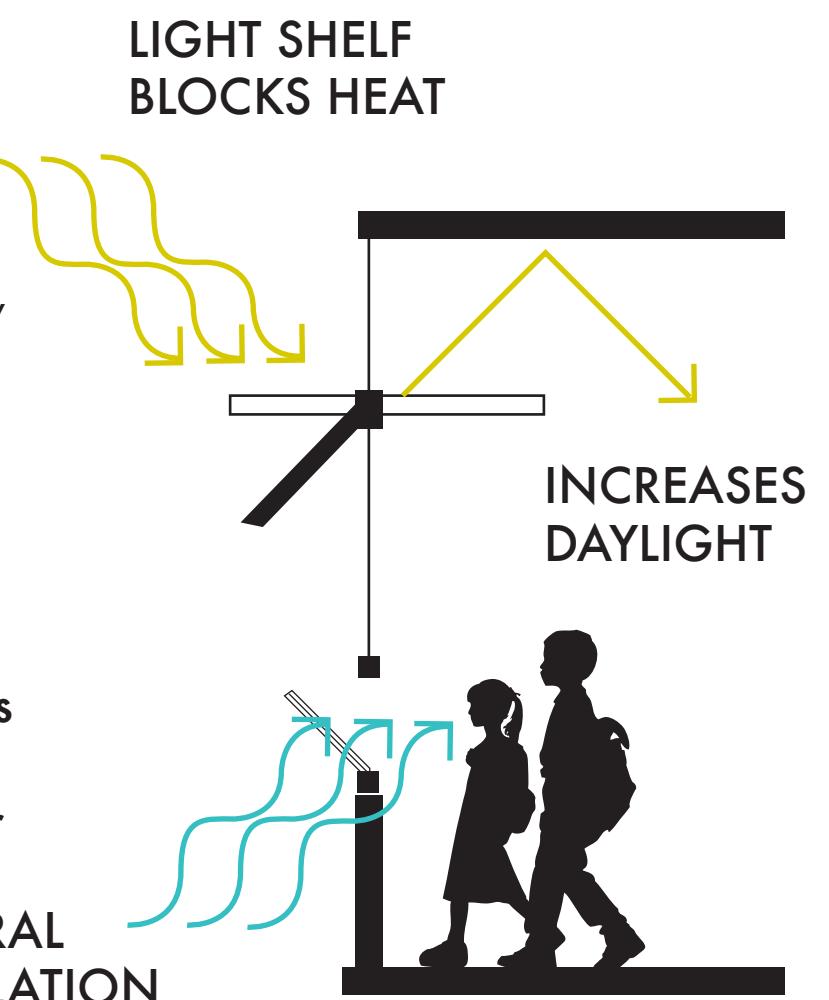
- + Annual energy auditing: facilities managers can use the Operations Report Card to evaluate their school's energy performance  
Produced by the Collaborative for High Performance Schools [www.chps.net/orc](http://www.chps.net/orc)
- + Install occupancy sensors and connect equipment to power strips to cut vampire loads while rooms are not in use
- + Change purchasing policy to favor durable, nontoxic, sustainably harvested, high-recycled-content, and highly recyclable cleaning and classroom materials
- + Expand the programmed HVAC comfort zone  
By adjusting the temperature at which the heating or cooling system is initiated, schools can save thousands of dollars annually by tolerating slightly cooler temperatures in the winter, and slightly warmer in the summer.

#### MEDIUM

- + Replace asphalt with green schoolyard  
butterfly gardens, vegetables, rainwater catchment, pond, outdoor classrooms, trellises, wildlife corridors
- + Install individually operable, programmable HVAC system controls that
- + Install light sensors and dimmable ballasts to automatically conserve energy when there is sufficient daylight in the room
- + Install shading devices or climbing plants on the south and western facades
- + Install an indoor edible wall for cafeteria use, maintained by students
- + Add skylights and/or light shelves for natural daylight to reduce lighting costs

#### MAJOR

- + Green roof provides habitat & reduces heat island effect (need structural assessment)
- + Investment in on-site energy generation: solar arrays or wind turbines
- + Install super-insulated windows
- + Replace boilers with high efficiency HVAC system  
Most important is the heat exchanger, which collects heat from exhaust air before it is released from the building
- + Add insulation to existing walls & ceilings, (see Passiv Haus standards)
- + On-site wastewater treatment, (e.g. Living Machine)



## OPPORTUNITIES

Asthma is the leading cause of absenteeism, responsible for more than 20 million missed school days in the US per year

The greenest building practice is to adapt an existing building. Less resources, more benefits.

The financial benefits of greening schools are about \$70/sf, more than 20x as high as the cost of going green.

## OUTCOMES

### REGIONAL RESOURCES

CORVALLIS SCHOOL DISTRICT, Corvallis, OR  
Strategies: Energy efficient, digitally controlled lighting, heating and cooling; program to turn off computers and lights not in use.  
Projected savings: \$1.5 million over 5 years

CLACKAMAS HIGH SCHOOL, Clackamas, OR  
Strategies: Sustainable systems class at a public high school, hands-on learning to help overcome fear of nature. (LEED Silver school building)

CENTER FOR ECO-LITERACY, Berkeley, CA  
Hosts workshops and conferences for teachers and administrators to get trained in environmental education programs and starting movements.

ECO-TRUST FARM TO SCHOOL, Portland, OR  
Works with schools and farms to incorporate healthy, locally sourced products, nutrition-based curriculum; experiential learning

COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS, San Francisco, CA  
Best practices manual, rating programs, energy audits adapted for student use, directories of green products and services.

### POSTER REFERENCES

Bruce Mau Design/VS Furniture/Cannon Design. (2010). *The Third Teacher: 79 Ways to Use Design to Transform Teaching and Learning*, 1st Ed. New York: Abrams  
Danks, S. (2010). *Asphalt to Ecosystems: Design Ideas for Schoolyard Transformation*. Oakland, CA: New Village Press  
Stone, M.K. (2009). *Smart by Nature: Schooling for Sustainability*. Berkeley, CA: University of California Press.

Resource Demand Reduction

Monetary savings  
Regenerative School Buildings  
Change School Culture

Visual Reinforcement of ecological principles address various learning strategies  
Active Learning Experiences where concepts are enacted

Revision of Educational Philosophy

Increased interdisciplinary studies, a holistic understanding of both education and place  
Students' environmental attitudes

Lifelong Learners

Environmental Stewards

Practical skills for societal contribution regardless of college bound, technical school or further training

Redefinition of Life Skills  
Redefinition of Progress  
Intergenerational Dialogue

## OUTLINE