



# Laboratories for the 21st Century – *An Brief Overview*

## Why Focus on Laboratories?

- Laboratories are energy intensive.
  - On a square foot basis, labs often consume ten times as much energy as a typical office building.
- Most existing labs can reduce energy use by 30% or more with existing technology.
- Reducing laboratory energy use will significantly reduce greenhouse gas emissions.
- Energy cost savings possible from U.S. labs may be as much as \$2.4 billion annually.
- Labs are typically not speculative buildings—  
informed owners are more likely to invest with lifecycle costs in mind.

## Laboratory Buildings

"Labs embody the spirit, culture, and economy of our age...what the cathedral was to the 14th century and the office building was to the 20th century, the laboratory is to the 21st century."

*Don Prowler, AIA*



*Source: Jonathan Hillyar  
Georgia Public Health Laboratory*

## Whole Building Design Approach *for* Laboratories

- Optimize overall laboratory performance through integrated design and engineering with a life-cycle cost perspective.
- Avoid the traditional approach of optimizing components based on narrowly defined functions.
- Consider benefits of sustainability.



## Sustainability – Beyond Energy

- Water conservation and recovery
- Building materials reduction, reuse, and recycling
- Health and safety risk management
- Innovations in chemical management
- Building for flexibility in design

## Basic Labs21 Principles:

- Adopt aggressive low-energy design and operation targets.
- Assess opportunities from a “whole buildings” approach.
- Use life-cycle cost decision-making.
- Commission equipment and controls.
- Employ a broad range of sustainable energy and water efficiency strategies.
- Measure energy and water consumption and track emission reductions.
- Evaluate on-site power generation, combined heat and power technologies, and renewable power purchases.
- Specify “green” construction materials.
- Promote energy and water efficiency operation and training efforts.
- Explore sustainable design opportunities beyond the building site.

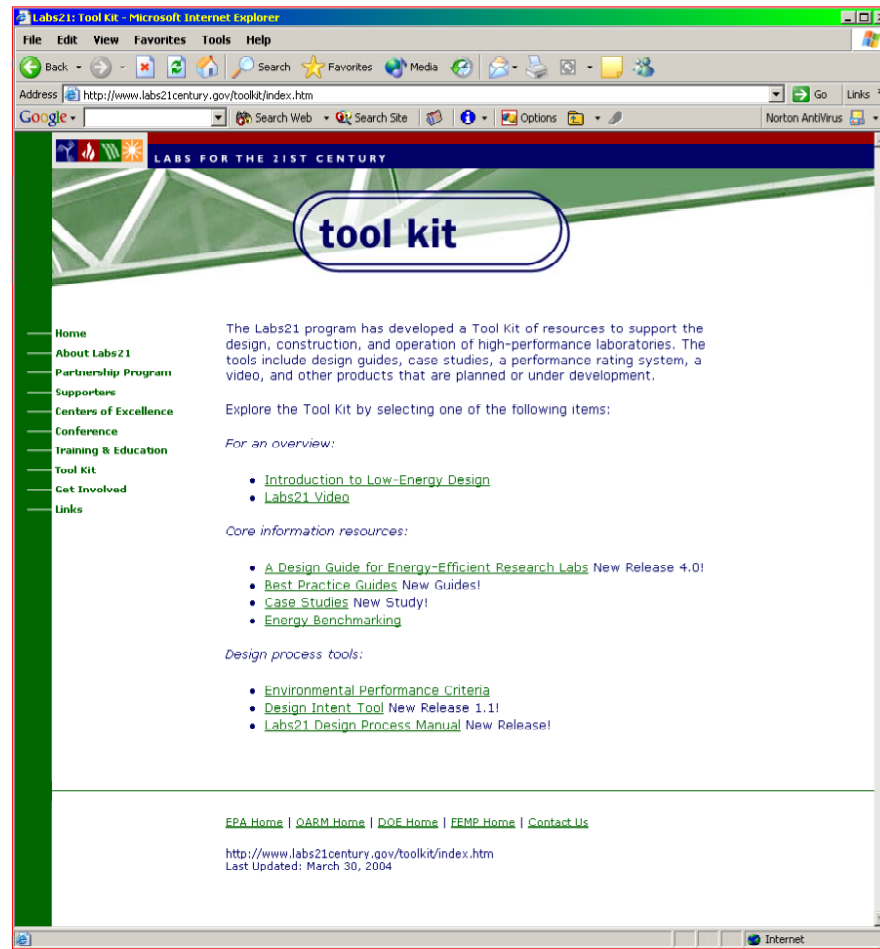
## What is the Labs21 Program?

- A joint EPA/DOE program to improve the environmental performance of U.S. laboratories.
- The goal of the program is to encourage the design, construction, and operation of sustainable, high-performance, facilities that will:
  - Minimize overall environmental impacts.
  - Protect occupant safety.
  - Optimize whole building efficiency on a life-cycle basis.

## Labs21 Program Components

- Partnership Program
  - Draws together lab owners and operators committed to implementing high performance lab design.
- Training
  - Includes annual technical conference, training workshops, and other peer review opportunities.
- Tool Kit
  - Design Guide
  - Case Studies
  - Best Practices
  - Design Intent Tool
  - Environmental Performance Criteria
  - Energy Benchmarking

# Labs21 Tool Kit



## Benefits of applying Labs21 Program and Principles:

- Reduce operating costs.
- Improve environmental quality.
- Expand capacity.
- Increase health, safety, and worker productivity.
- Improve maintenance and reliability.
- Enhance community relations.
- Maintain recruitment and retention of scientists.

## Putting the Program & Principles into Practice:

EPA New England Lab,  
North Chelmsford,  
Mass. (new const.)

- Uses 35% less energy than a typical lab
- Received the USGBC Gold LEED certification

EPA National Vehicle  
Emissions Lab, Ann  
Arbor, Michigan  
(retrofit)

- Reduced energy costs by 60% and water by 50%.



End of Session

