

# Labs21 Approach

Laboratories for the 21st Century (Labs21) is a program dedicated to the pursuit of sustainable, high-performance, and low-energy laboratories that will:

- Minimize overall environmental impacts
- Protect occupant safety
- Optimize whole building efficiency on a lifecycle basis
- Establish goals, track performance, and share results for continuous improvement

To demonstrate their commitment to this philosophy, Labs21 Pilot Partners will pursue the following strategies:

## Adopt Energy and Environmental Performance Goals

Labs21 Partners will adopt voluntary energy and water reduction goals designed to reduce the environmental impacts of their laboratory facilities. Labs21 will work with each Partner to establish a baseline for measurement purposes.

## Assess Opportunities From a “Whole Buildings” Approach

When evaluating potential energy or water efficiency upgrades, Labs21 Partners will pursue the overall improvement from a facility-wide perspective. Piecemeal improvements to specific components will not achieve significant reductions. Replacing the existing lighting system, for example, with energy-efficient T-8 bulbs and ballasts might improve lighting efficiency by 60 percent, but the facility's overall efficiency might be

- Adopt Energy and Environmental Performance Goals
- Assess Opportunities From a “Whole Buildings” Approach
- Use Lifecycle Cost Decision-Making
- Commission Equipment and Controls in New Construction and Retrofit Projects
- 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



improved by only 5 percent because lighting components represent a small percentage of a laboratory's total energy consumption. Only a comprehensive, "whole buildings" approach focuses on all of a laboratory's energy systems and energy losses, including its HVAC and electrical supplies, and has the potential to achieve significant efficiencies and cost savings.

## **Use Lifecycle Cost Decision-Making**

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Efforts to achieve significant energy and water savings are traditionally avoided because they can increase initial costs. An emphasis on initial cost, however, obscures potential long-term savings resulting from improvements in energy or water efficiency. Labs21 Partners should consider adopting energy and water efficiency upgrades that more closely match the expected useful life of the facility. In terms of simple lifecycle analysis, this might be equated to payback periods of 10, 12, 15, or even 20 years. Labs21 Partners might also consider "bundling" upgrades so that projects with a short payback period (e.g., lighting) can be used to offset the costs for projects with longer payback periods (e.g., installing a fuel cell to power the facility). Bundling projects in this manner can allow Labs21 Partners to maximize the scope of energy and water improvements.

## **Commission Equipment and Controls in New Construction and Retrofit Projects**

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To ensure that new laboratory facilities or upgrades meet the energy and water performance targets identified during the design phase, Labs21 Partners will conduct a system-wide, continuous commissioning review to validate building performance after construction or after upgrades have been implemented.

## **Employ a Broad Range of Sustainable Energy and Water Efficiency Strategies**

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Labs21 Partners will evaluate and adopt a wide range of energy and water efficiency strategies, which might include the following:

- **Central Plant Optimization**—Maximize energy and water efficiencies by using modular equipment, high-efficiency chillers, variable frequency motors and fans, and other strategies to avoid or minimize simultaneous heating and cooling.
- **Supply and Exhaust Distribution Optimization**—Optimize airflow using strategies such as variable air volume fume hoods and room supply systems, occupancy sensors, automated duct work design, and other strategies.
- **Energy Recovery Optimization**—Recover all potential waste energy streams by using heat pipes, run-around coils, enthalpy wheels, and other strategies.
- **Lighting Design Optimization**—Maximize daylighting opportunities and use occupancy sensors, daylight dimming sensors, energy-efficient fluorescent fixtures, and other strategies to reduce energy consumption.



- Water Optimization—Increase water efficiency with strategies such as installing water-efficient sinks and toilets and waterless urinals. In addition, Labs21 Partners with sufficient roof space should consider collecting rainwater for landscaping applications or to flush toilets.

## **Measure Energy and Water Consumption and Track Emission Reductions**

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Labs21 Partners also will measure energy and water consumption. To do so, Labs21 Partners should consider using a direct digital control (DDC) monitoring system. This automated system encompasses and integrates each laboratory subsystem, including lighting, power, fire, environmental conditioning, and energy management. Using a DDC monitoring system, Labs21 Partners can document the energy and environmental performance of a laboratory in real time. Alternatively, Labs21 Partners might agree to annual energy and water consumption audits by in-house personnel or third-party experts. Energy use also contributes to the air emission levels in the Earth's atmosphere. Labs21 Partners should consider tracking the emission reductions resulting from their energy improvements.

## **Evaluate On-Site Power Generation, Combined Heat and Power Technologies, and Renewable Power Purchases**

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Because the combustion emissions associated with electricity generation are among a laboratory's most significant environmental impacts, Labs21 Partners will evaluate on-site renewable energy sources and renewable power purchases. The on-site power sources might employ fuel cell technologies, photovoltaics, biomass, or natural gas energy sources. Labs21 Partners also should consider using combined heat and power (CHP) technologies at their facilities. CHP technologies can provide a secure and highly efficient method of generating electricity and usable heat in a single, integrated system. CHP technologies should be an integral component of the building's energy system, maximizing use of all available energy and reducing energy waste.

## **Specify "Green" Construction Materials**

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A wide range of recycled-content, low toxicity, and other environmentally preferable building materials are available (e.g., low VOC paints, caulks, and adhesives). Labs21 Partners will evaluate the use of these "green" materials in new construction or retrofit activities. Partners also will consider adopting the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) criteria, which allows owners to rate the environmental preferability of their buildings with a standardized rating system. Additional information on LEED is available at <[www.usgbc.org](http://www.usgbc.org)>.

## **Promote Energy and Water Efficiency Operation and Training Efforts**

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In addition to meeting the Labs21 reporting requirements, Labs21 Partners will promote their energy and water efficiency efforts. Promotional opportunities include annual corporate reports, case studies, advertisements, and conferences.



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## Explore Sustainable Design Opportunities Beyond the Building Site

Labs21 Partners will consider pledging to pursue scientific and research methods that reduce or minimize the production of toxins, waste, and other pollutants (e.g., adopting green chemistry approaches). Partners also will consider instituting an aggressive corporate health and welfare policy that addresses the health and safety of workers, nearby communities, and future generations. Partners might elect to adopt advanced management strategies, such as automatically tracking material inventories to reduce unnecessary purchases and disposal costs associated with overstocking. Partners should also strive to minimize their dependence on community water and wastewater systems, utilize regional energy and other resources, and support recycling markets by recovering used building materials for recycling.



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### How Can I Learn More About Labs21?

Visit the Labs21 Web site at

[<www.epa.gov/labs21century>](http://www.epa.gov/labs21century)

for more information on Labs21, including the annual conference and training opportunities.