The National Oceanic and Atmospheric Administration's Honolulu Laboratory Renewal Project

Honolulu, Hawaii

The National Oceanic and Atmospheric Administration's (NOAA's) proposed Honolulu Laboratory Renewal Project will embrace the concept of sustainable architecture. The design considers the impact of the project on the environment, helping to preserve Hawaii's environment for future generations. The existing 2.2-acre laboratory complex was built in the 1950s and is inadequate for the current occupants. Annexes originally designed for storage space are now being used for offices, and the complex houses more than double the number of people it was designed to accommodate.

To improve the occupants' workspace, the laboratory is being redesigned using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED™) rating system to establish environmental and energy use targets. The building's conceptual design is being assessed by the 2002 Green Building Challenge, and the designers hope to achieve a high LEED™ rating. The 100,000-square-foot (10,000-square-meter) building design could serve as a model for future sustainable projects in tropical regions.

The hot, humid climate allows for innovative design elements such as rainwater collection, a unique shading and daylighting system, radiant cooling, and a solar-recharged desiccant system.

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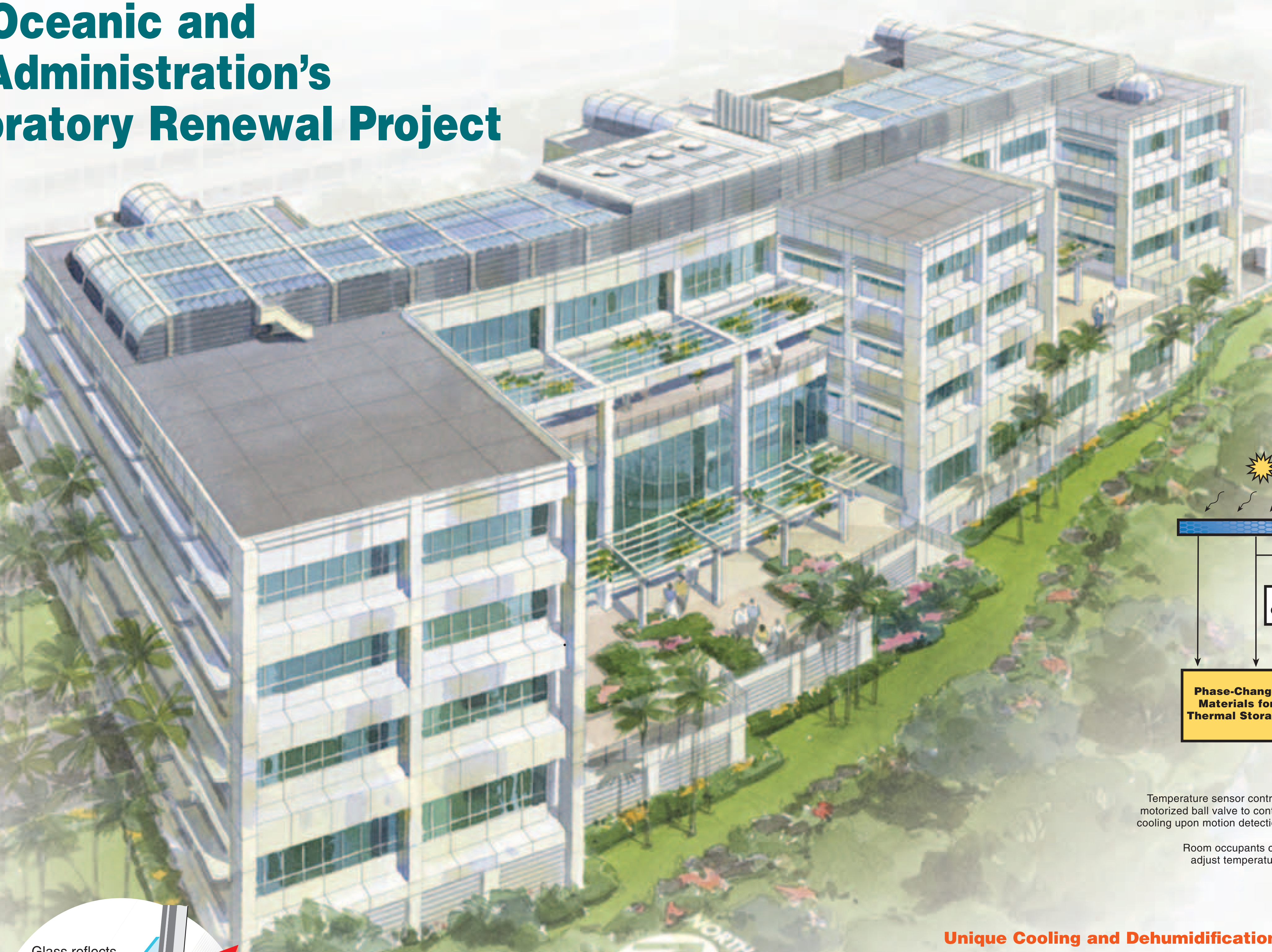


Smart Building Control

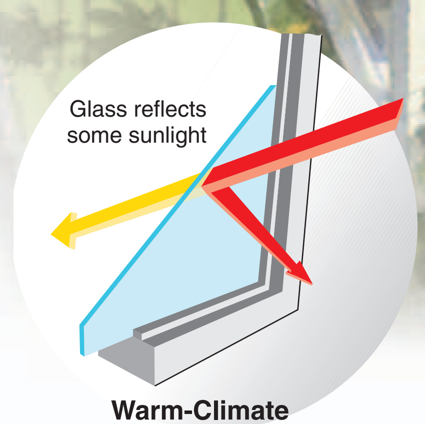
Advanced building controls will "learn" the behavioral patterns of the occupants and will adjust the HVAC equipment to minimize the operating cost and maximize the available solar resource.

Daylighting

Large south-facing windows combined with light shelves on the building's facade will provide glare-free natural light to the building's occupants, reducing the need for electric lights. Providing daylighting to the work spaces will also reduce the cooling load.

High-Performance Glass

Windows selected for the building will be spectrally selective low-e glass that lets in a higher percentage of light than heat, resulting in daylight with reduced solar heat gain. To further reduce heat gain, the use of glass on the western facade was minimized.



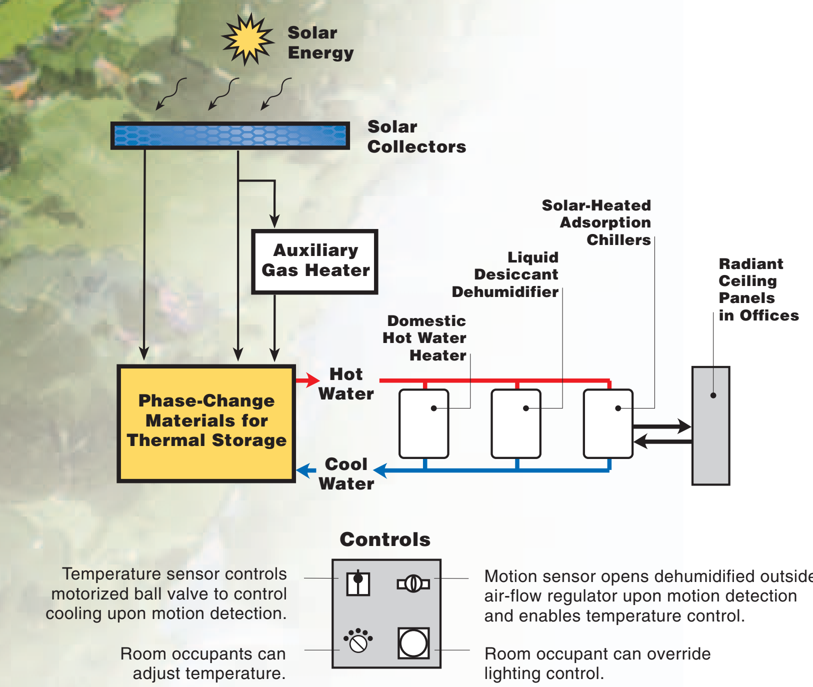
Warm-Climate Windows

Recycled Construction Materials

The construction materials will have a high recycled-material content and low volatile organic compounds emissions. The recycled flooring will be a good example of this. Products from sustainable forestry practices will be selected.

Water Conservation

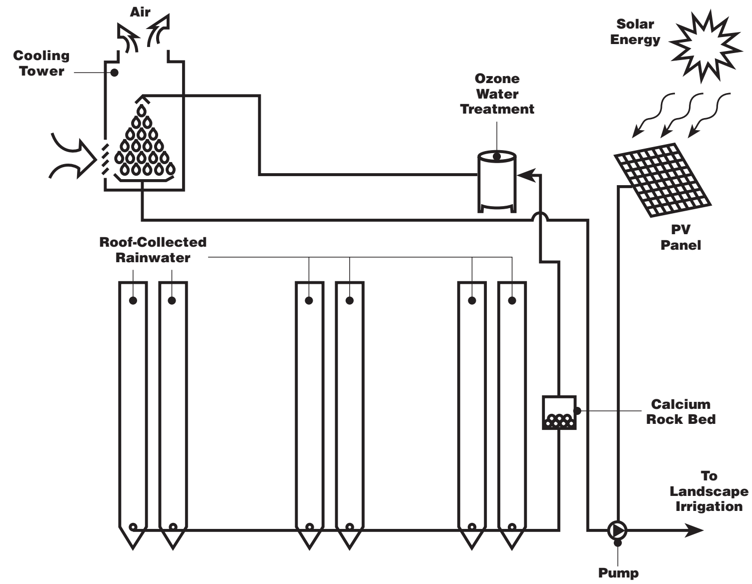
Six large rainwater collection tanks are integrated into the design on the west side of the building. The collected rainwater will feed the cooling towers. No chemicals will be used in the tower, allowing highly aerated water to be drawn off the tower basins for landscape irrigation.



HVAC System

Unique Cooling and Dehumidification System

Most air conditioning systems use chilled water to dehumidify and cool air for the building. In the NOAA building design, the air conditioning functions of dehumidification, temperature control, and ventilation are separated. A solar-regenerated desiccant system will be used instead of a refrigeration system to remove humidity from outside air. The outside air for the building will pass through a chemical desiccant material that absorbs airborne moisture. The desiccant material will be regenerated using heat from roof-mounted solar thermal collectors. The building will use radiant cooling ceiling panels for cooling occupied spaces. Individual room temperature sensors will control room temperatures by regulating the flow of chilled water to the radiant ceiling panels. The air-handling system will distribute outside dehumidified air to the occupied spaces for ventilation purposes. No air will be recirculated into the building, resulting in very high indoor air quality. Occupancy sensors will adjust lighting and airflows to suit individual room occupation.



Water Cycle

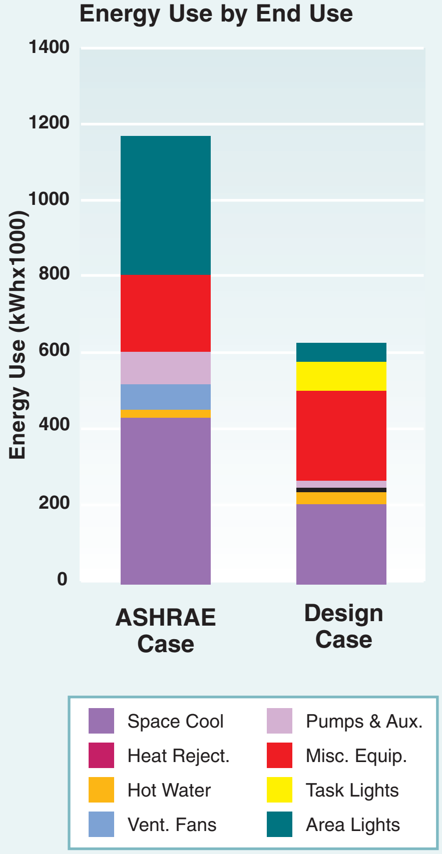
Reducing Energy Use in Buildings

Because of their high energy-consumption rates, laboratory buildings have recently become the target for improved energy efficiency within the federal government. The NOAA building is expected to use 40% less energy than comparable laboratory buildings. Energy-saving strategies such as the shading, high-performance glass, and the solar-regenerated desiccant system will help make this possible. Many of the lessons learned from the NOAA project can be applied to laboratory buildings in other states, particularly warm or moderate climates.

More Information

The chart below compares the predicted energy performance of the NOAA Honolulu Laboratory Renewal Project with the maximum level allowed by the ASHRAE Standard 90.1-99. Energy costs for lighting and space cooling are reduced significantly.

Comparison of Annual Energy Use by End Use



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