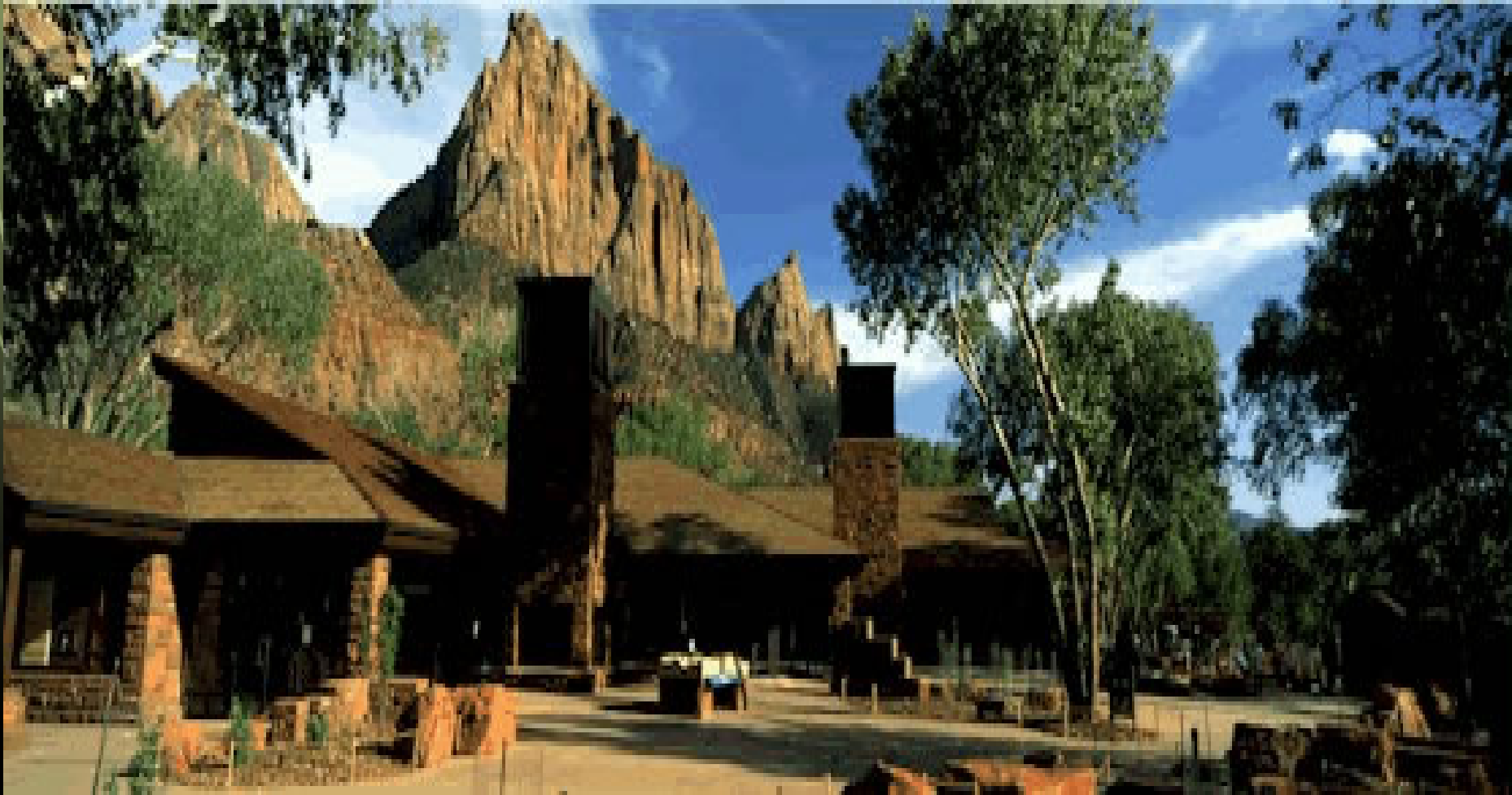
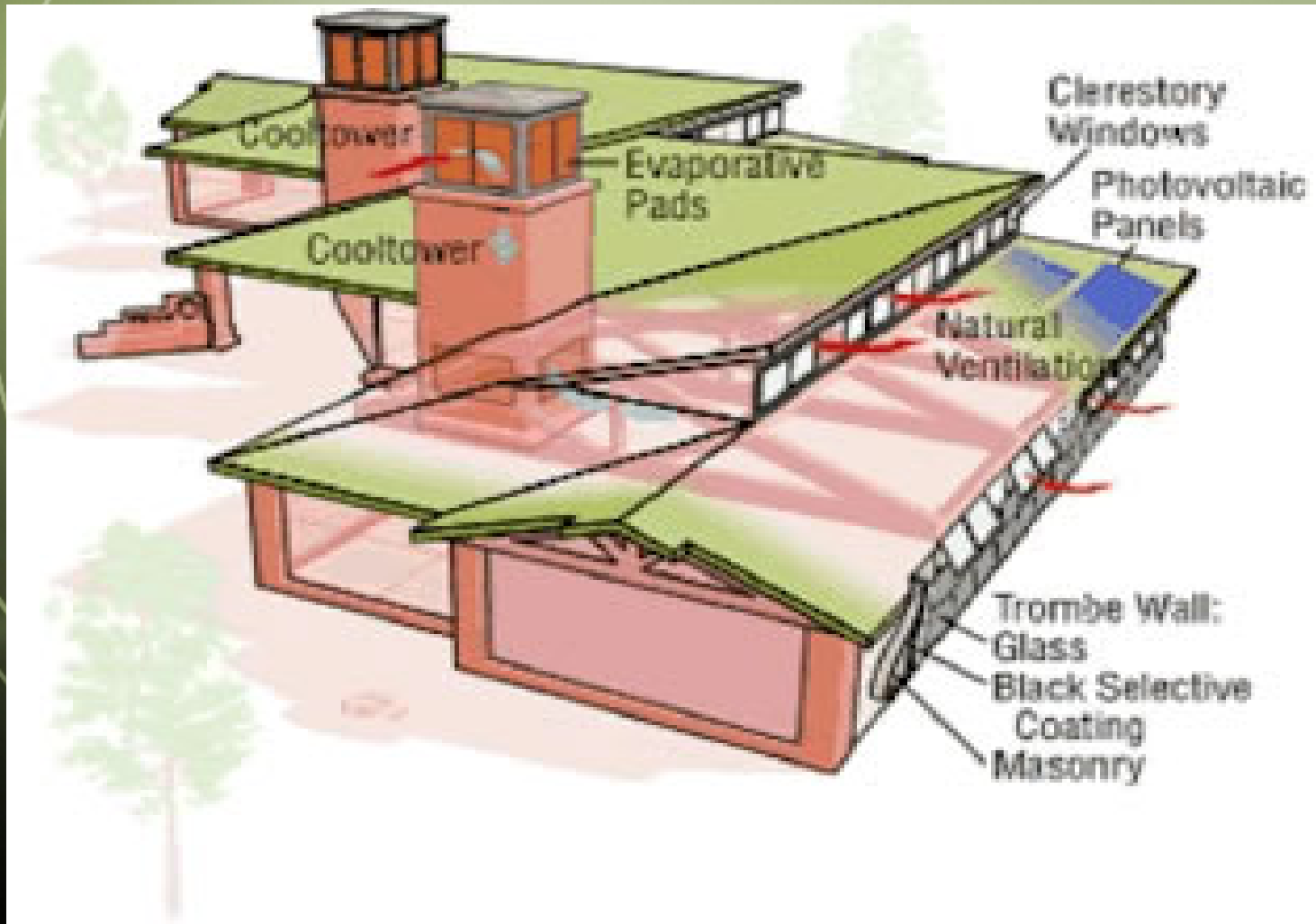


Zion National Park

⊕ High Performance Visitor Center



Energy Efficient Center



Overview

- ⊕ Introduction
- ⊕ Features
 - ⊕ Clerestory Windows
 - ⊕ Cool Towers
 - ⊕ Day lighting
 - ⊕ Energy Efficient Landscaping
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 - ⊕ Ventilation
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Introduction

- ⊕ Covers 229 sq miles in Southwestern Utah
- ⊕ Park welcomes 2.5 M visitors a year
- ⊕ National park works U.S department of energy to minimize impact on the environment in saving energy and reducing cost.
- ⊕ Visitor center designed to use 70% less energy than any typical building without costing more to build.

Clerestory Windows

Clear story windows are part of lighting, heating and cooling systems

- ⊕ Computer simulations are used to size the windows to collect the right amount of light
- ⊕ Sun enters in the winter helping to keep space heated(passive solar heating).
- ⊕ Roofs overhangs shade the glass from the high summer
- ⊕ Emissive coating on the glass reduces heat loss from the building allowing light and heat to enter.
- ⊕ Windows are made from glass that diverts the suns heat
- ⊕ Trees also minimize the heat gain on summer afternoons



Cool Towers

- ⊕ Cool Towers help cool waters help cool the air when natural ventilation is not enough.
 - ⊕ Water is pumped over pads located at the top of the tower.
 - ⊕ This water evaporates, cooling the air.
 - ⊕ The cool dense air falls through the tower and exist through the large openings at the bottom.
 - ⊕ Energy management computer controls these openings and can direct cool air into the buildings or out onto the patio.



Day Lighting

- ⊕ Day lighting is the main source of light in the visitor center
 - ⊕ Energy computer adjusts electric light as needed.
 - ⊕ No incandescent or halogen lights are used.
 - ⊕ Instead the building uses T-8 fluorescent lamps and compact fluorescent lamps because they are more energy efficient.



A Zion staff member checks the energy management computer.

Energy Efficient Landscaping

- ⊕ Landscaping including shade structures and existing trees, creates an extension of the visitor center.
- ⊕ The outdoor rooms for permanent displays allow for a smaller building design as well as lower capital and operation costs



Insulation/Thermal Flooring

- ⊕ The roof is made of structural-insulated panels.
 - ⊕ The panels keep heat out during the summers and inside during the winters
 - ⊕ Building also has foam insulation in wall cavities and insulated windows.
 - ⊕ During winter sunlight shines directly centers concrete floor.
 - ⊕ The concrete absorbs and stores the sun's heat.
 - ⊕ Rock walls remain warm on cool nights after the sun has warmed them on sunny days



Photovoltaic cells

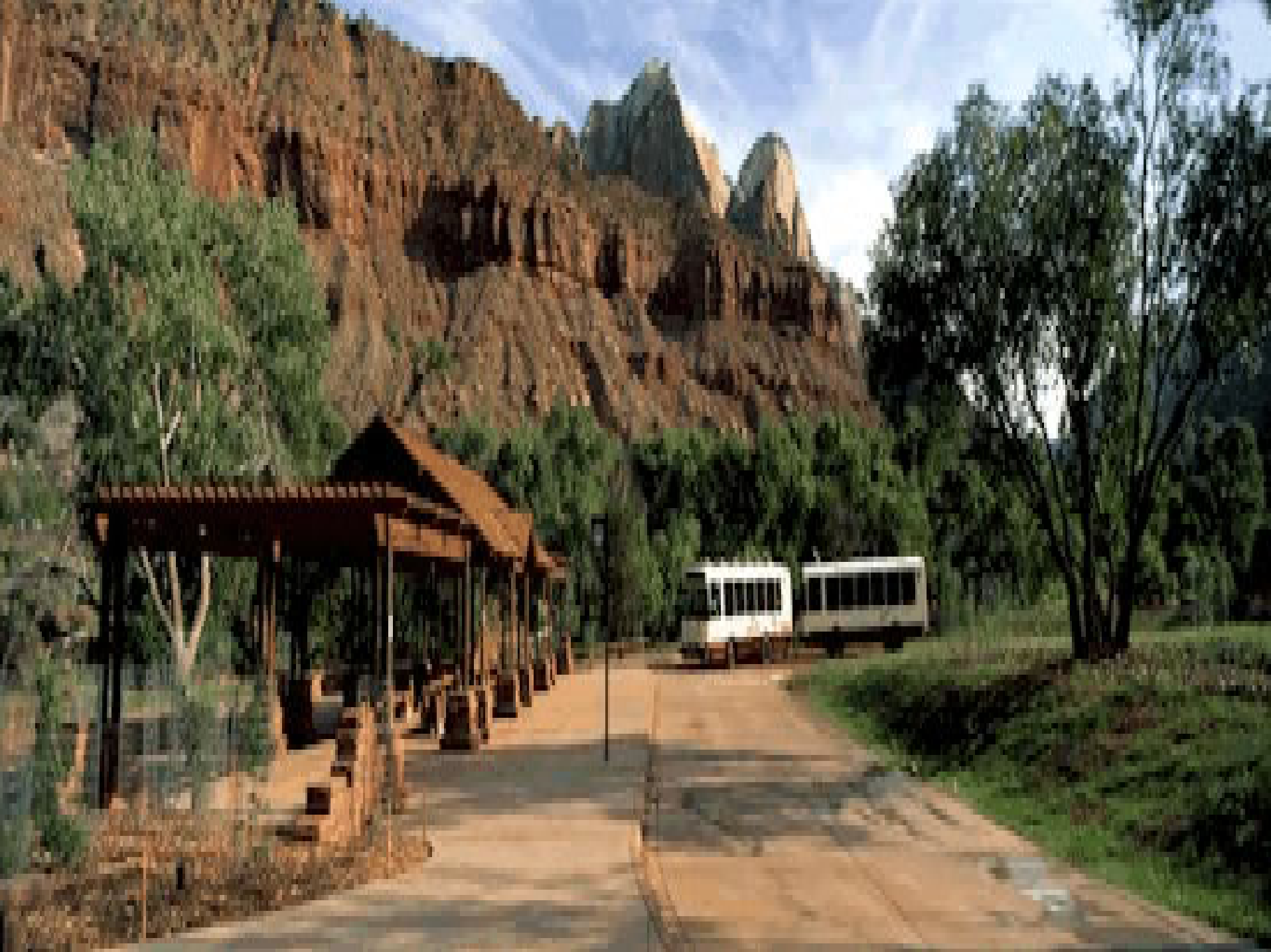
- ⊕ Visitor center was designed to use very little electricity.
- ⊕ Photovoltaic panels provide around 30% of needed electricity.
- ⊕ Photovoltaic panels convert sunlight directly into electricity.
- ⊕ The electric current can be used immediately or can be stored for later use.
- ⊕ Excess power is sold back to the power company for use elsewhere.



Researcher Ron Judkoff inspects a rooftop PV panel.

Transportation

- Automobile traffic causes air and noise pollution as well as congestion
 - Transportation was part of the plan to keep the park environmentally friendly.
 - Clean running propane buses shuttle visitors to nine stops in the canyon and six stops in the nearby town of Springdale
 - Visitors are asked to leave their cars outside the park and use Zion's buses at no charge reducing the noise, air pollution and congestion.



Ventilation

- ⊕ The high clerestory windows help to cool the visitor center by allowing hot air to escape while low windows near the doors allow cool air to come in.
- ⊕ The buildings energy management computer controls operation of the clerestory windows.



Conclusion

- *The center saves energy and money while protecting the environment.*
- *Along with a shuttle system that relieves congestion and pollution, the helps Zion achieve its most important goal-preserving its natural beauty.*