

ENVR 3210 Environmental Technology

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Green Building

Site and Structure • Material

Energy

Water

IAQ

Operation

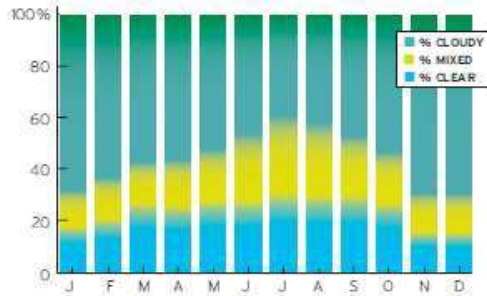
Waste Management



Site and Structure

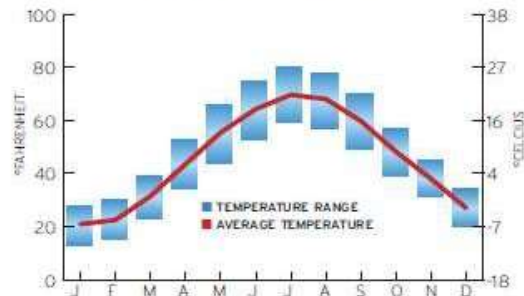
SKY CONDITIONS

The frequently cloudy skies make a brightly lit indoor space all the more appealing.



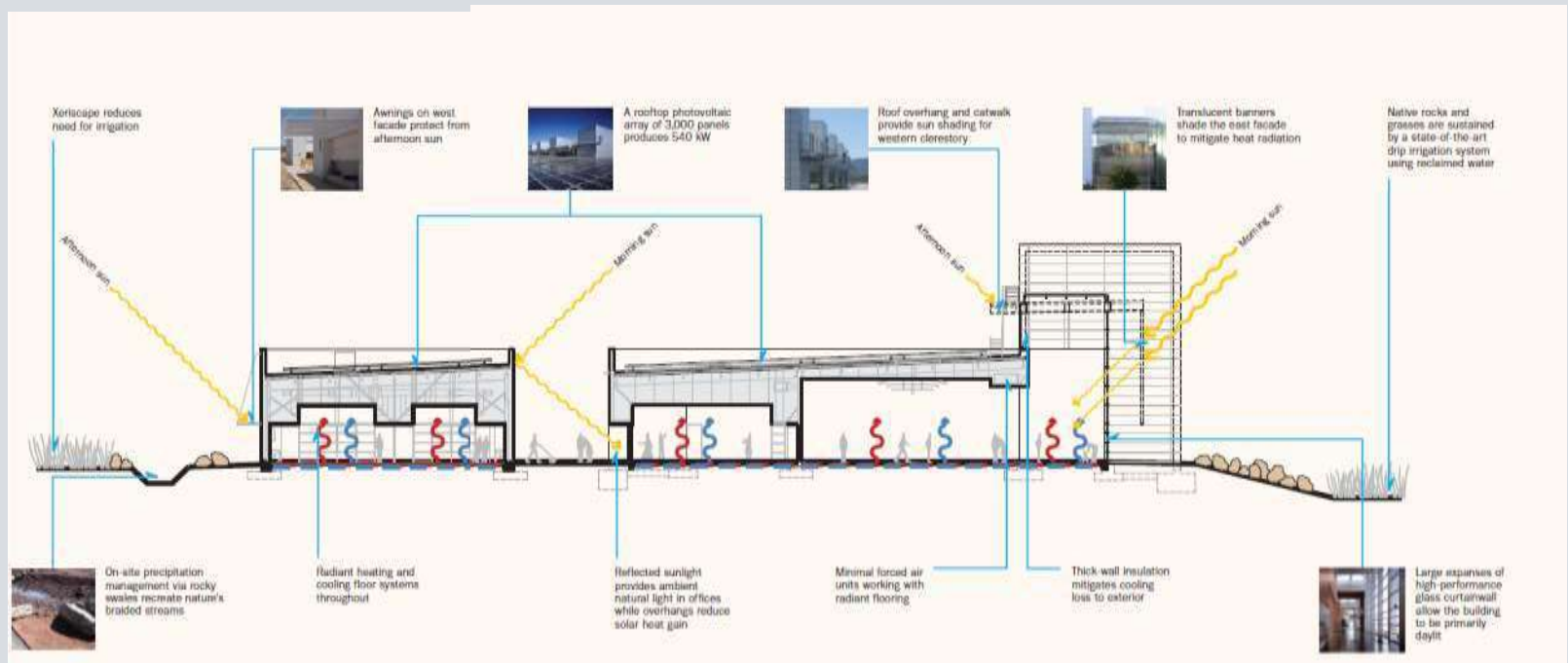
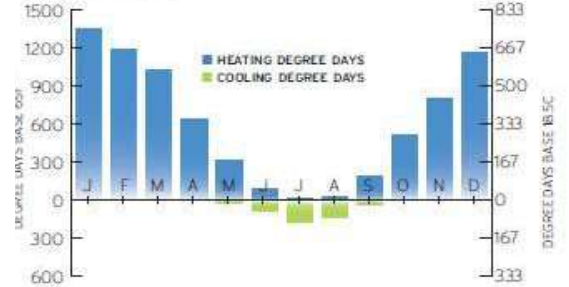
TEMPERATURES

In cold, the transparent walls of the addition allow visitors a way to experience the gardens from the indoor heated space.

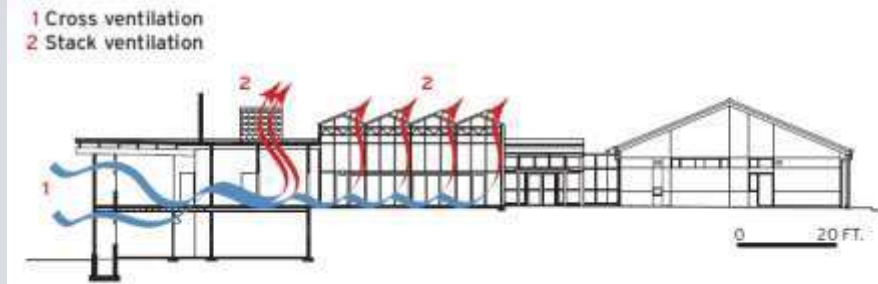


HEATING/COOLING DEGREE DAYS

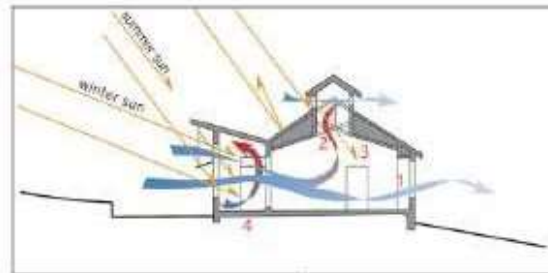
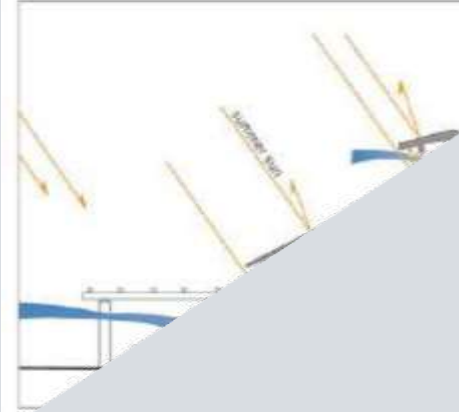
Heating is the dominant demand on the mechanical system in this cold-climate facility.



Natural Ventilation



1 CROSS-VENTILATION 2 STACK-VENTILATION 3 INDIRECT SUNLIGHT

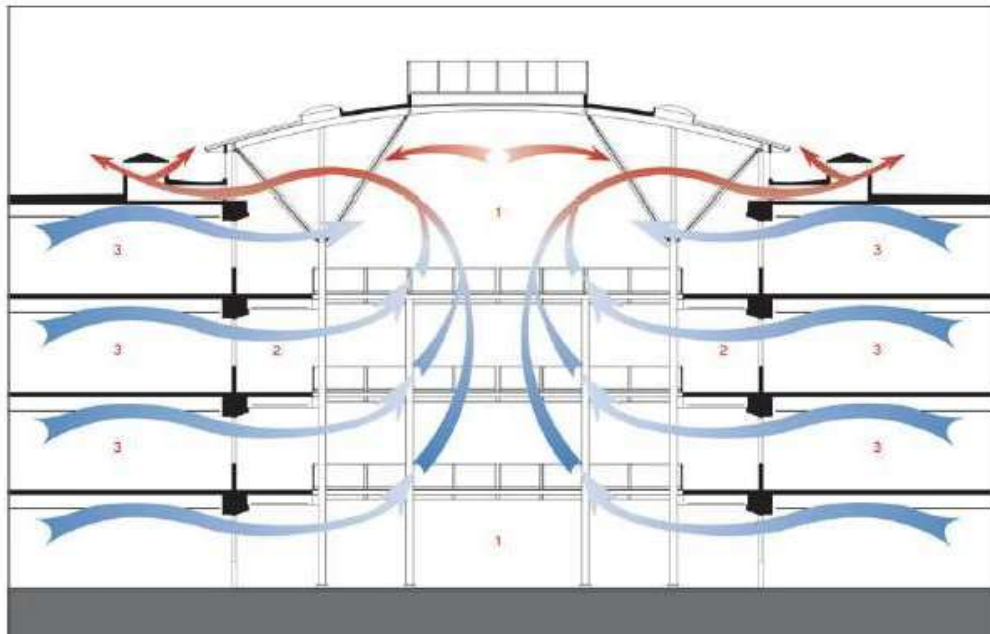


SITE PROFILE

Given the hot location, water conservation and management was an environmental priority for the designers, although many of their proposed strategies have not been implemented. All stormwater is collected in swales and allowed to infiltrate into the water table. Native plants and drought-tolerant turf grasses were selected to reduce water use.

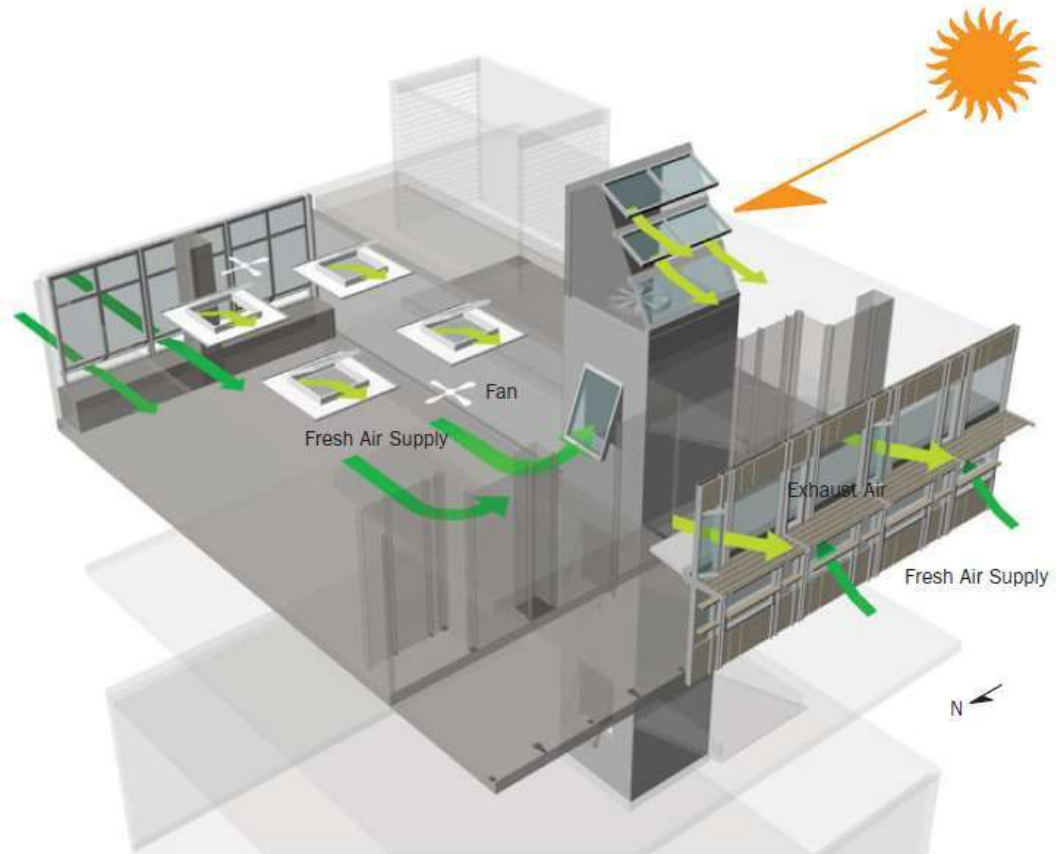
Natural Ventilation

Solar chimney



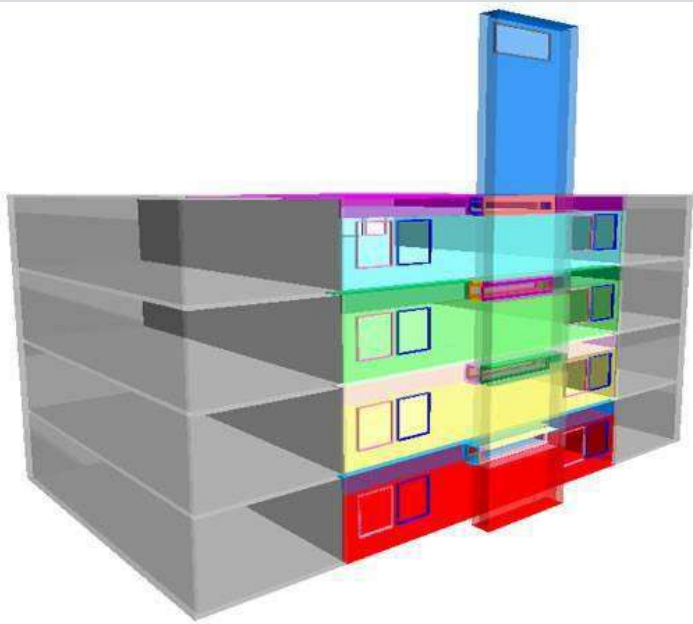
Solar Chimney

- passive cooling in hot days
- faster night cooling rates
- greater thermal mass
- improved thermal comfort



DIAGRAM

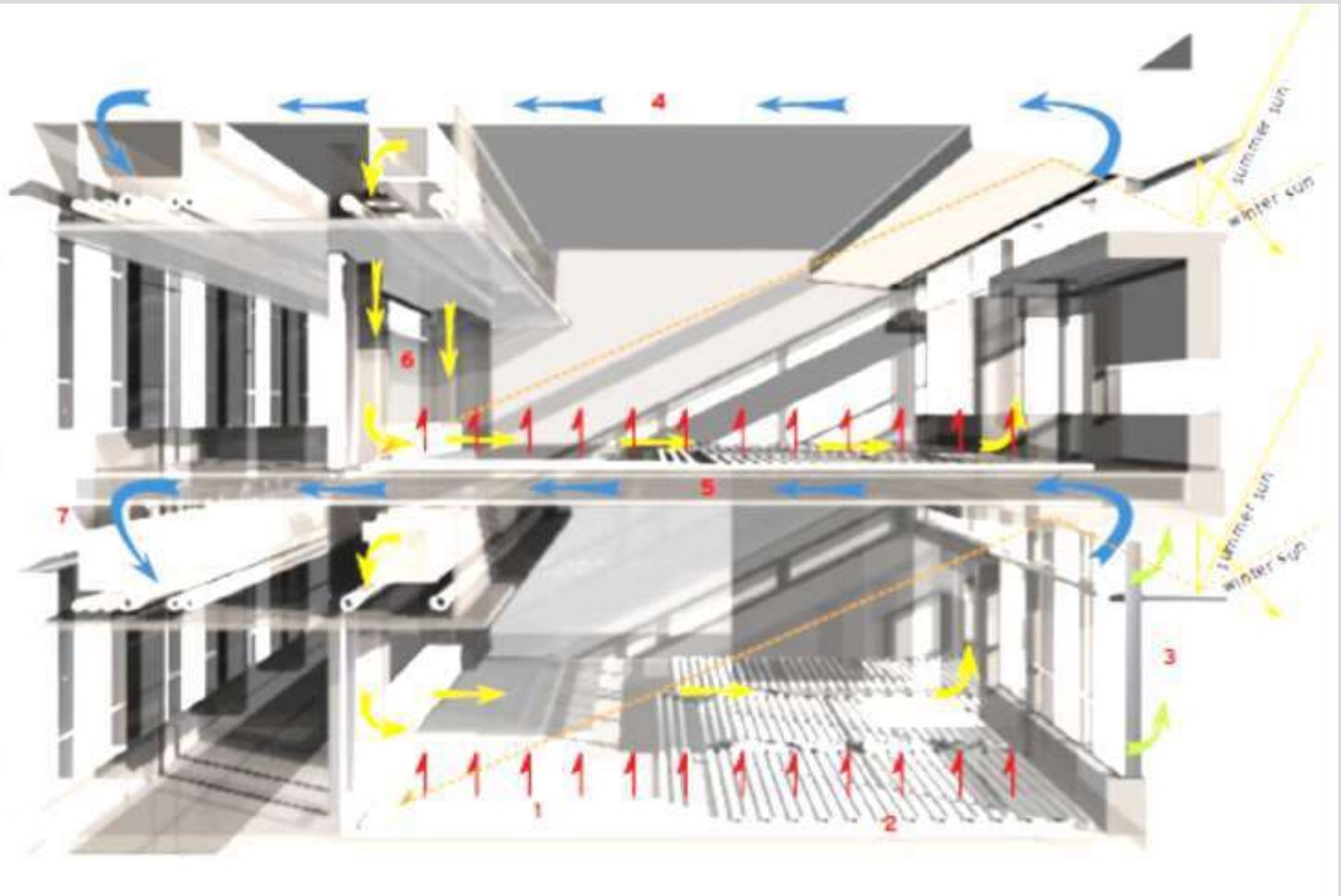
Solar chimneys designed for passive ventilation serve the specialty classrooms in the addition. South-facing glazing at the tops of the shafts heat the air within, creating a convection current that draws cooler air in through north-facing open windows. Portals in the shaftways within the building demonstrate the operation and effectiveness of the passive cooling systems with a telltale that moves with the breeze and a wind chime. The solar chimneys are also intended to be used in mechanical ventilation and air-conditioning modes, demonstrating the responsiveness of both passive and active systems to the local climate.



Passive Cooling and Heating

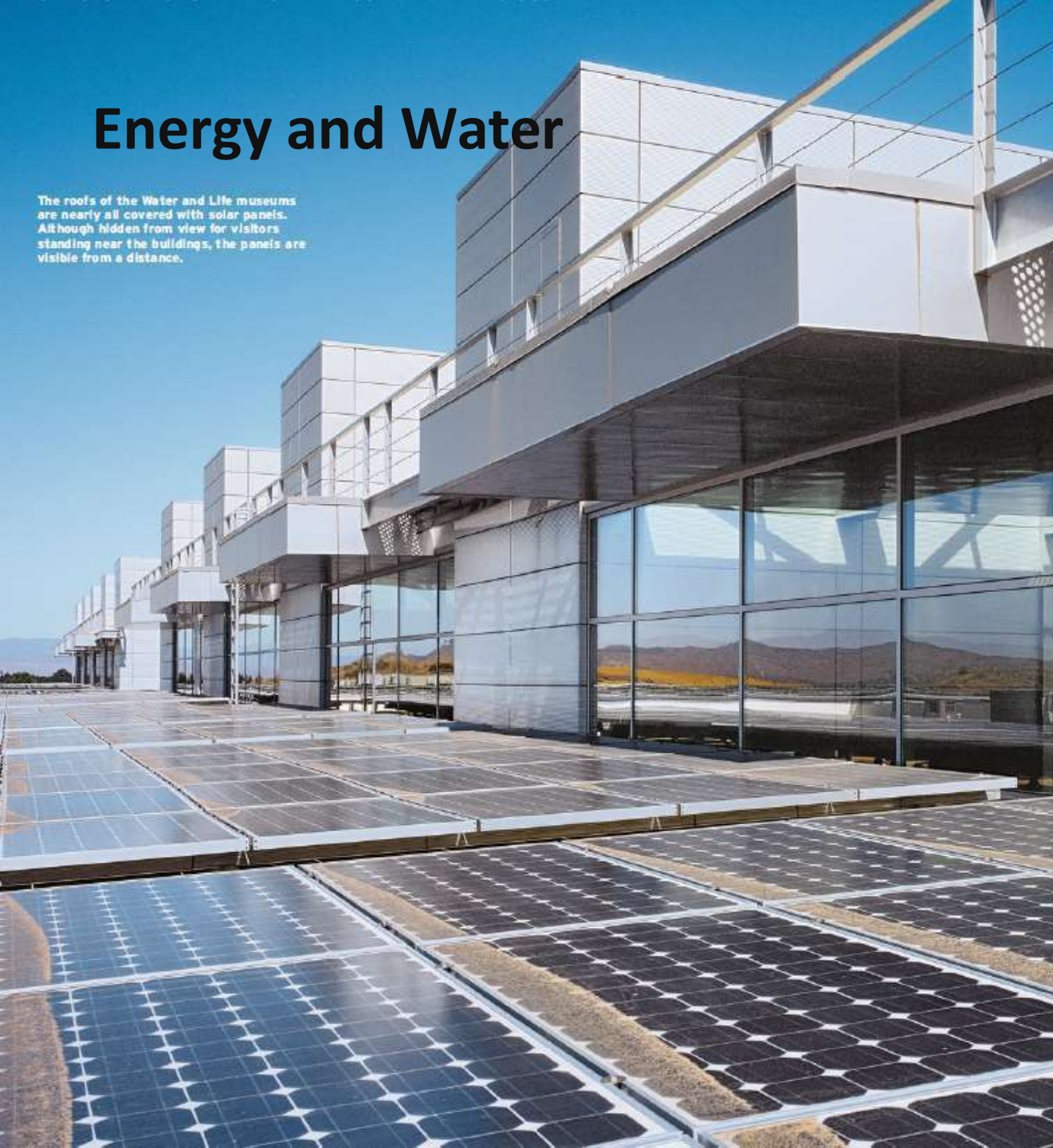
HEATING & COOLING DIAGRAM

1 Durable tile flooring reflects light 2 Radiant floor heating provides even heat distribution 3 Top and bottom operable vents allow passive cooling 4 Thermal mass stores solar energy in winter and slows heat transfer in summer 5 Return air moving through hollow-core slab picks up or dissipates heat 6 Corridor lighting penetrates into classrooms through transom 7 Return air duct completes the loop to the air handler

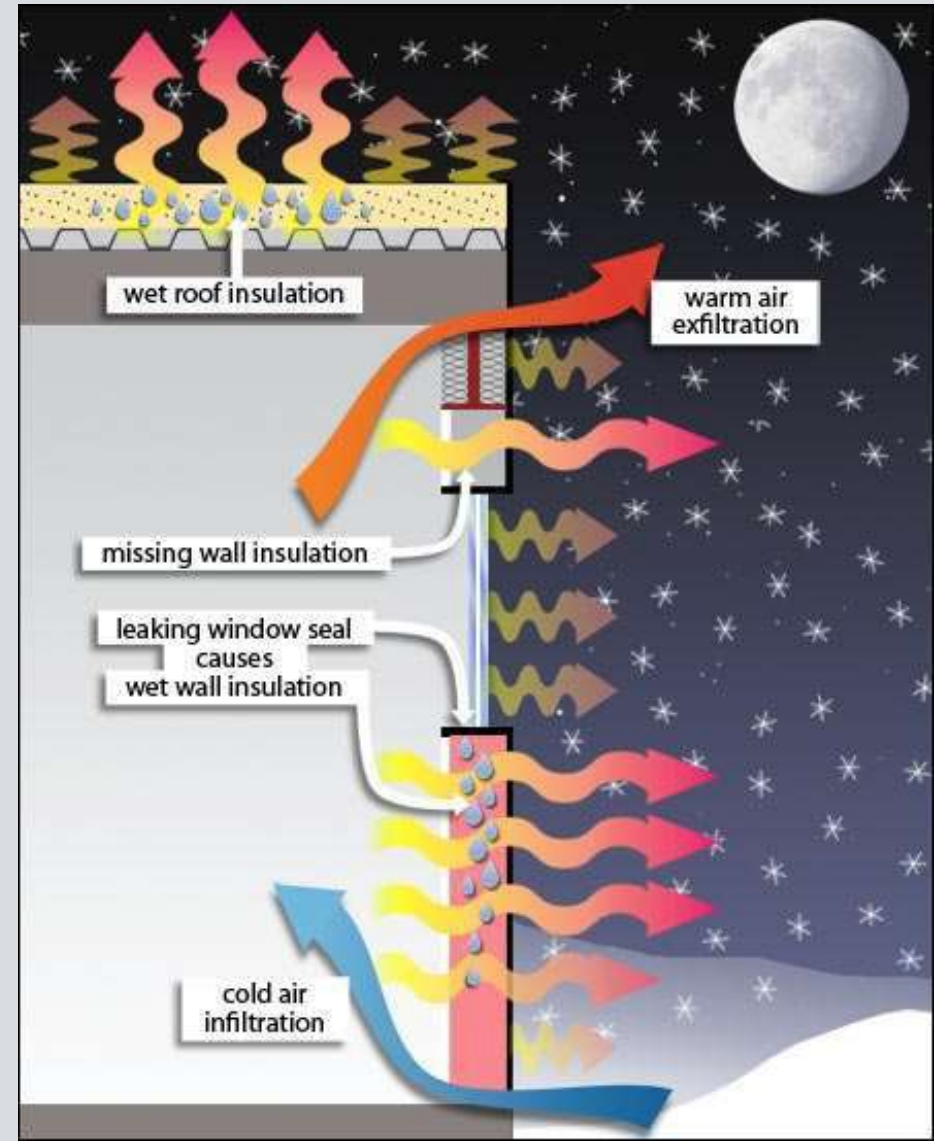


Energy and Water

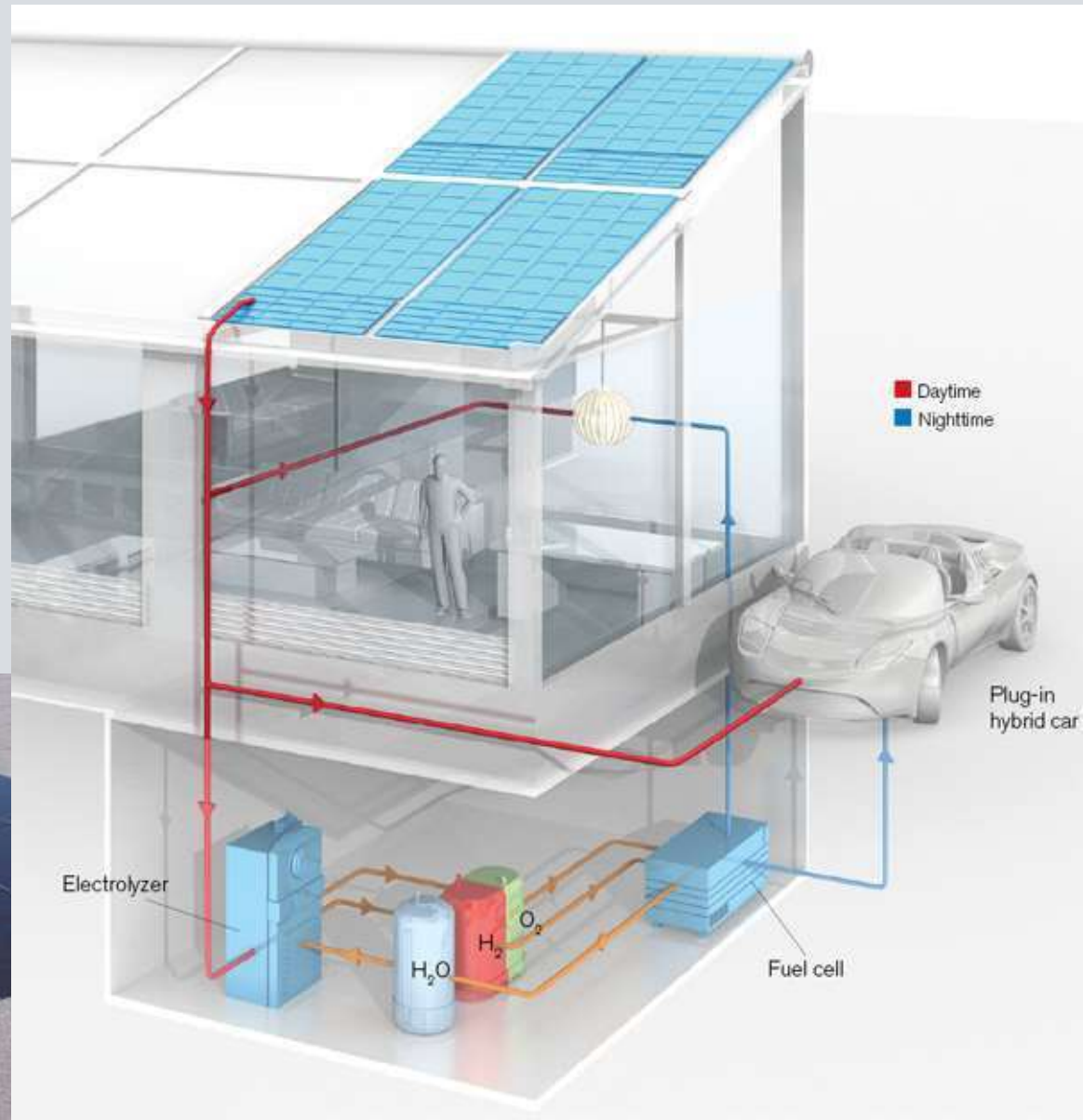
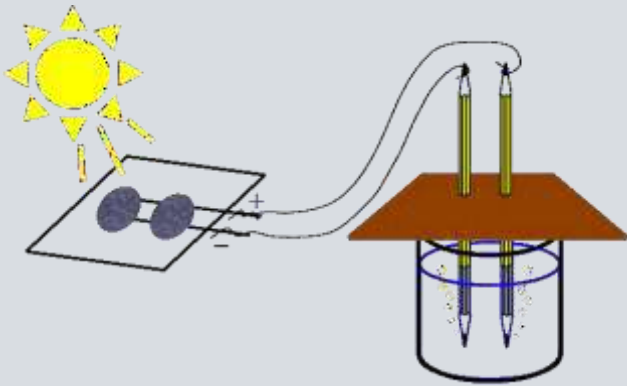
The roofs of the Water and Life museums are nearly all covered with solar panels. Although hidden from view for visitors standing near the buildings, the panels are visible from a distance.



Green Building Envelope

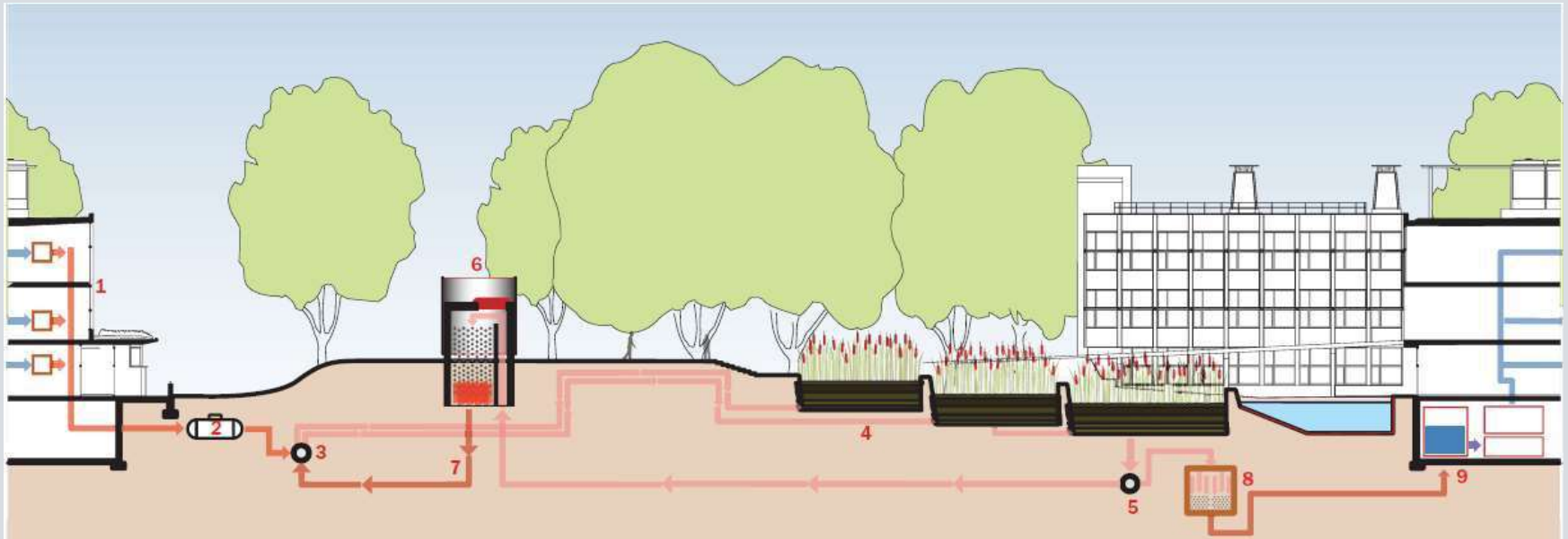


Energy Storage and Generation



WASTE WATER TREATMENT SYSTEM

1 Wastewater from restrooms/laboratories 2 Pre-treatment tank 3 Flow splitter 4 Wetlands 5 Pump 6 Tricking filter 7 Return line 8 Sand filter 9 Reuse holding tank



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