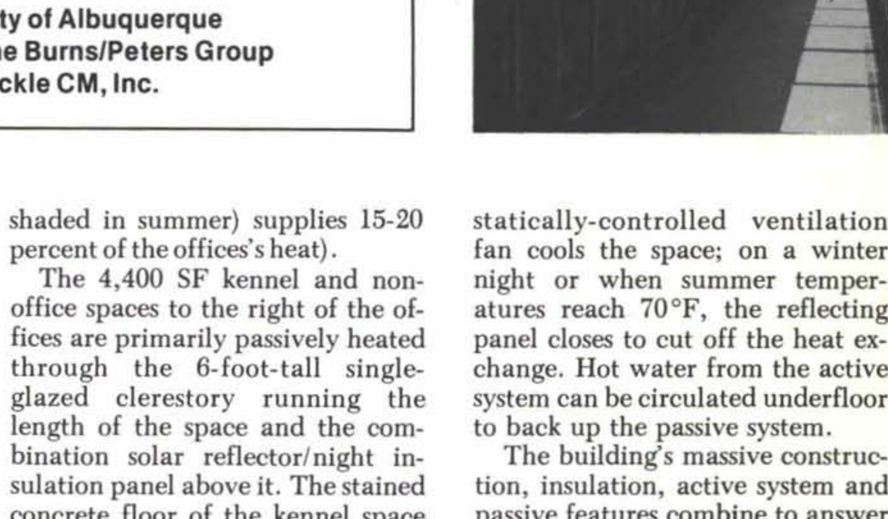
ALBUQUERQUE ANIMAL CONTROL CENTER

Owner: City of Albuquerque
Architect: The Burns/Peters Group
Solar Engineer: Bickle CM, Inc.

The City of Albuquerque gave The Burns/Peters Group an almost perfect opportunity to blend energy conservation, active solar utilization, and passive design in this municipal animal control center. The site allowed for maximum southern exposure. The simplicity, open plans, and masonry construction typical of animal shelter design fit a passive approach. The economical underfloor radiant heating typically employed in kennels was compatible with active solar collection. A comfort range broader than the normal range for human comfort reduced peak demands on the solar system. Based on a preliminary feasibility study conducted by the project's designers, the federal Energy Research & Development Administration (ERDA) subsidized construction of the active system with a $39,250 demonstration grant. The long and relatively narrow geometry of the project capitalizes on its southern exposure. The 2,200 SF office area is heated primarily by the active solar system (48 rooftop tracking collectors and a 1,500 gallon water storage tank). Passive solar heat gain through the dark masonry walls and southern glazing (fascia-shaded in summer) supplies 15-20 percent of the offices's heat).

The 4,400 SF kennel and non-office spaces to the right of the offices are primarily passively heated through the 6-foot-tall single-glazed clerestory running the length of the space and the combination solar reflector/night insulation panel above it. The stained concrete floor of the kennel space absorbs both direct and reflected solar radiation. When temperatures exceed 65°F, a thermostatically-controlled ventilation fan cools the space; on a winter night or when summer temperatures reach 70°F, the reflecting panel closes to cut off the heat exchange. Hot water from the active system can be circulated underfloor to back up the passive system.

The building's massive construction, insulation, active system and passive features combine to answer not only 60 to 75 percent of its heating needs but 15 to 20 percent of its cooling load as well.



SECTION THRU DOG RUN — PASSIVE HEATED AREA

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This process would require as much as 40 tons of corn for the mash and eight cords of wood for the distillation process (1) (2). It would be labor intensive and require storage space for the corn, the mash, the wood and the alcohol. Under these conditions, it is doubtful that on site production of alcohol fuel would be attractive to building owners. Alcohol would be a viable fuel if it were available from distributors and could be delivered to buildings just as fuel oil and propane are. Fuel oil burners can be converted to burn alcohol. Also, alcohol is a clean burning pollution free fuel.

Wood is commonly used as a fuel source on a residential scale in New Mexico. However, it is much less frequently used on a commercial-institutional-industrial scale. Boilers and furnaces with dual fuel, wood and natural gas or oil capabilities with firing rates of up to 500,000 BTU per hour are available (3). These units are usually hand fired, will handle unsplit logs up to 4'-0" in length and will go up to 12 hours on a single charge. In the event that the wood fire is not meeting the heating requirements, the boiler or furnace will automatically switch over to the alternate fuel.

Large scale boilers that utilize wood as a fuel are commonly used in the wood product and paper industry. These boilers burn the byproducts from the manufacturing and milling processes and require the sophisticated operation, maintenance, fuel handling and pollution controls typical to large scale power plants. Boilers such as these might find applications in large scale building complexes such as prisons, college campuses, etc.

Without proper combustion controls and adequate air supplies, wood burners release considerable amounts of smoke including particulate matter and unburnt creosote into the atmosphere. In urban areas, such as Albuquerque, this pollution can build up to intolerable levels. It can be expected that strict environment controls will be imposed upon wood burning if its current widespread usuage is continued.

Photovoltaics

Photovoltaic solar conversion holds the potential for low cost, decentralized generation of electrical power. The Federal government through the Department of Energy has plans to foster widespread use of solar electricity. The DOE photovoltaic budget for fiscal year 1980 is close to $140 million making it the best funded Federal solar initiative.

Photovoltaic electrical generating systems are much like flat plate solar collectors. They require fairly large areas of unshaded south exposure. For instance, a non-concentrating array large enough to provide the 8 to 10 kilowatts required for a typical house would cover as much as 500 square feet. The size of an array can be reduced by concentrating the sunlight and by keeping the array normal to the sun with tracking mechanisms. Whenever intense concentrations are used, the photovoltaic cell requires cooling in order to prevent overheating. Concentrators, tracking mechanisms, and cooling systems have a tendency to add to the complexity and detract from the reliability of a photovoltaical system.

Current cost of photovoltaic arrays range from $10 to $15 per peak watt. However, storage batteries, DC to AC convertors, additional floor space, and technical assistance increase the final cost to the user substantially. A good example of this is the photovoltaic installation at Schuchuli, Arizona for the Papago Indian Tribe. The cost of the photovoltaic equipment amounted to $109,000.00 or $1.76 per KWH. After the additional cost for equipment, fees, etc. were added in, the total amounted to over $330,000 or $5.30 per KWH (5).

Photovoltaic solar conversion is not competitive with utility company electrical service wherever power lines are readily available. However, at remote sites, where power line extension would be costly, photovoltaics should be considered. If the DOE timetable for economic photovoltaic cells is realized, they will be a common feature of building design, even in urban areas, by the end of this decade.

Conclusion

There are a number of technically and economically feasible alternative energy systems that can be used by architects and engineers to satisfy a building's energy requirements. In most instances, these alternatives are directly contrary to modern societies' automated plug-in and turn-on energy systems. They are decentraized and in many cases labor intensive. They tend to be a prominent part of a building both in terms of appearance and budget.

However, alternative energy systems are destined to play a vital role in the future of architecture. A viable alternative energy strategy would be to first reduce a building's energy requirements through energy conservation and passive design including passive heating, natural ventilation and natural lighting. Then, consider active solar, wind, biofuels, and photovoltaic energy systems. This strategy would minimize a building's requirements for utility company energy. *DF*

Bibliography

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3. *The Woodburners Encyclopedia*, Vermont Crossroads Press, 1979.
4. *Lighting Design and Application*, Vol. 9, #2, February 1979.