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FINAL REPORT

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SUMMARY

Title)

This project involved the design, installation, and monitoring of a water-preheat system for coin laundries. The system has two components. One component is solar, the other is waste heat reclamation from the clothes dryer exhaust. The energy savings achieved amount to roughly 50% of the total water heating load for a typical coin laundry.

BODY

The general objective of the project was to replace a portion of the fossil fuels required to heat water for coin laundries with renewable solar energy and with reclaimed heat which is normally wasted from the dryer exhaust air. More specific objectives were (1) design and test a preheat system to achieve the above general objective that is durable, dependable, and affordable. In other words, a system that would be acceptable to laundry owners to the extent that they would see it as a desirable investment thereby enhancing the prospect that it would be widely used and result in a significant energy savings for the Country. (2) Monitor and develop the system in order to measure its cost effectiveness.

Coin laundries consume large amounts of hot water, typically from 1000 to 4000 gallons per day. This magnitude of consumption coupled with the fact that most laundries use natural gas to heat water practically rules out solar alone as a cost effective way to preheat their water. For example the cost of a solar system to replace 70% of the water heating load for a laundry using 2500 gallons per day would be on the order of \$40,000 plus, and assuming a 10% annual increase in the cost of natural gas, would never pay for itself. The operative hypothesis in this project was that because

of the typical pattern of usage, a relatively small collector array would compliment a dryer heat reclamation system in such a way as to be cost effective.

The amount of recoverable heat wasted from dryer exhaust in coin laundries is massive. The challenge to recovering that heat lies in the fact that it is carried by very moist air laden with small fibers(lint). The most effective way to transfer heat from air to water is with a finned-tube heat exchanger. The successful prevention of the heat exchanger becoming blocked by accumulation of lint was central to the success of this project. The resolution of this problem was achieved by placing the finned-tube coils at the end of a central collection duct so that the fins are vertical. permits most of the lint to be carried completely through the coils by the combined forces of gravity and the velocity of the dryer exhaust air directed downward. The above described positioning of the coils also permits the use of a specially designed arm, that is mounted above the coils, and that at timed intervals flushes the coils with water.

Included in this report are pages excerpted from the Owner's and Installation Manual developed by Cloud Enterprises for their market version of this system. These pages will explain the mechanical design and installation requirements of the system.

There are three data summary sheets included in this report. Two of them (Green Acres Coin Laundry and Bell's Coin Laundry) were compiled from installations that included a six panel solar collector array. The third(Bowles Laundry) was compiled from an installation that has the heat reclamation system (Therm-Katcher) only.

In the laundries that included solar the contribution made by the preheat system to the total water heating load varied from a low of 41% in Winter to a high of 91% in Summer. In these installations the solar component accounted for approximately one half the total cost. In the laundry where there was only the heat reclamation system the contribution varied from 29% to 52% and appears to be unaffected by the time of year.

From the data on the Bowles laundry it is possible to project an average annual savings of \$1644.32.

2650 gal/day X 365 days X 340 BTU/gal X 50¢/therm = \$1644.32

Cloud Enterprises installed this system and was paid \$4500 for the complete installation. The laundry owner is taking a tax credit of \$1125 which leaves him with an effective cost of \$3375. With gas at 50¢ per therm his savings should equal his cost in approximately 2.1 years. Any increase in his volume of business or the price of gas will shorten his payback period.

CONCLUSIONS AND RECOMMENDATIONS

Since the solar component of the system represents about 50% of the cost and less than 20% of the savings contribution, the conclusion here is that most laundry owners would be better advised to install the heat reclamation system only. While it does not show up in the data, it is evident from the experience gained in this project that laundry owners with older less efficient equipment can realize a larger savings than owners with newer more efficient equipment.

There are some models of laundry equipment that are not compatible with this type of heat reclamation system. The Maytag Homestyle laundry equipment, for instance, has such a low exhaust air volume that the resistance to air flow offered by the heat exchange coils prevents the dryers from operating properly.