

## 2009 Case Study



# Madonna Rehabilitation Hospital

Lincoln, Nebraska

Intern: Sam Marin

Major: Industrial Engineering

School: Kansas State University



### *Company background*

Madonna Rehabilitation Hospital is a facility that specializes in caring for people who have suffered severe brain injuries or other debilitating illnesses. It has long-term care facilities, an assisted-living facility, a child development center, and a physical therapy gym along with typical hospital facilities. Madonna also owns and operates a fitness center—ProActive—at another location.

### *Project background*

Marin's project was largely focused on alternative energy options but also included a water-saving lawn care initiative. Madonna is an environmentally conscious group of facilities and though it has taken step to conserve natural resources, it wanted to find new ways to reduce its environmental impact. Major projects researched included solar energy, geothermal heating and cooling, and wind power.

### *Incentives to change*

Madonna strives to provide a healthy recovery environment and to be an environmentally friendly facility. Through energy-saving efforts, it can reduce its costs which will help it continue to provide state-of-the-art care for its patients. In addition, according to Energy Star for Healthcare, "Every dollar a nonprofit health care organization saves on energy is equivalent to generating new revenues of \$20 for hospitals."

### *Projects reviewed for E2/P2 potential*

#### 1. Solar energy

The first option investigated was solar energy. At Madonna the best use of solar energy would be in heating water. Areas where it could utilize solar hot water included the swimming pool, domestic hot water, and domestic water for the kitchen. It was determined the focus would be the kitchen and domestic water because of the scale of usage. Currently, the payback is too long to make this a viable option, but the project would be advisable if

natural gas prices rise to previous highs again in the near future. Marin recommended further investigation.

#### 2. Wind energy

Wind energy was also investigated. After reviewing wind data for the location and Madonna's urban location, it was determined that a wind turbine could not provide enough energy to offset the cost in a reasonable payback period. In addition, Madonna also lacks the physical space to fully utilize a wind turbine. Marin does not recommend implementing wind energy as an alternative energy source.

#### 3. Geothermal heating and cooling

Geothermal heating and cooling was another area of focus. It was suggested that geothermal heating and cooling could be added to two of the smaller out buildings on the main campus and to ProActive as well. Once it was established that the test drill alone cost more than a year's worth of electricity for one of the smaller buildings, the focus became ProActive alone. Leuck's Drilling has been contacted to provide a quote and a comprehensive cost analysis. The recommendation is that Madonna pursue a comprehensive estimate of cost and savings from a professional.

#### 4. Sprinkler water reduction

Finally, it was determined that water could be saved by adjusting lawn care practices. The best method in this area is to water in shorter bursts with breaks in between for the lawn to absorb what is applied. This practice reduces water run off. The method was tested and found to be successful in the test areas. If Madonna continues to water for two minutes less per cycle, it will save 148,238 gallons of water per year, equating to approximately \$220 annually. Provided the lawn responds positively to the change, the recommendation for Madonna is to implement this practice campus wide.

Rain sensors were also a part of the water-saving

lawn care initiative. Four of six control boxes did not have rain sensors and two of those without rain sensors were equipped to have them added to the existing system. It is recommended those two be upgraded to include sensors. The sensors don't generate enough savings to justify replacing the

existing system control box at this time; however, if Madonna should decide to upgrade the system for any reason, it is recommended that it choose a control box with a sensor.

*Summary of 2009 E2/P2 intern recommendations for Madonna Rehabilitation Hospital*

<b>Project description</b>	<b>Annual estimated environmental impact</b>	<b>Annual estimated cost savings</b>	<b>Status</b>
Solar hot water	103.6-123.9 Million BTU	\$621-\$1857	Further research is needed
Wind energy	14,597 kWh	\$871	Not Recommended
Geothermal heating and cooling	Unknown	Unknown	Further research is needed
Water-saving lawn care	53,016 gal.	\$80	Implemented
NOPS-RainMaster box and sensor	54,144 gal.	\$81	Not Recommended
Alz. Wing- RainMaster box and sensor	46,368 gal.	\$70	Not Recommended
Shop rain-dial sensor	7,104 gal.	\$10	Recommended
Duplex-GreenKeeper sensor	17,568 gal.	\$26	Recommended
<b>Total savings *</b>	<b>77,688 gal.</b>	<b>\$116</b>	
<b>GHG reductions *</b>	<b>0.182 metric tons CO2e</b>		

\* Does not include projects that are "not recommended" or "further research is needed."