Southwestern Electric Co-op
GeoLease Program
Profile #120

Executive Summary

Southwestern Electric Cooperative (SWEC or the Co-op) is a small distribution company located in Illinois that like many other cooperatives has been losing market share for residential space heating to natural gas, a situation that has resulted in revenue loss for the Co-op. While gas is thermodynamically more efficient than resistance electric heating, SWEC devised a clever means of providing its members with a win-win solution by promoting ground source heat pumps, an even more efficient technology than gas from a source-BTU standpoint. By doing so, SWEC has been able to save its members money while maintaining its market share and thus revenue stream to keep its rates low and level of service high.

Ground source heat pumps tap a renewable energy form, the heat available in the earth. By compressing this previously unusable heat, heat pumps can provide low-cost heating without expending depletable energy forms like gas and oil. While heat pumps cost less to operate than systems that combust non-renewable resources, they do face a fundamental drawback today: high first cost. Despite their attractive lifecycle economics they have been underutilized because they typically cost $2,000-5,000 more than a comparable conventional heating system. SWEC's GeoLease program addresses this head on, providing below-market loans for the heat exchange loops that are buried in the ground and leases for the "balance of plant."

GeoLease also has another strategic program design feature: In order for homes to qualify for the program's special electricity rates they must meet specific efficiency criteria. For instance, homes must have a minimum of R-38 insulation in ceilings. Qualifying customers' hot water heaters must also be part of the Co-op's radio-controlled load management program. By qualifying, the program assures homeowners that despite paying a higher electricity rate (which covers the cost of the lease) that they can have a positive cash flow compared to what they would have spent on an alternative system.

While SWEC has been promoting heat pumps since 1985, relatively few systems were installed between 1985 and 1993. In late 1993 the program design was fundamentally changed such that rather than providing $1,000-2,000 rebates – reducing but not eliminating the first-cost barrier – SWEC refashioned its program so that participants no longer have to put any money down. This has created a dramatic surge in participation and a doubling of the program's effect. Now a 120-home subdivision within SWEC's service territory is being considered for the nation's first completely geothermally heated subdivision. By trenching and installing loops at the time of other excavation, the costs of the systems can be lowered further, making their application that much more attractive.

SOUTHWESTERN ELECTRIC COOPERATIVE
GeoLease Program

Sector:	*Residential, Commercial*
Measures:	*Ground-source heat pumps along with pump pack, thermostat, auxiliary heater, hose kit, and loop; some air-source heat pumps*
Mechanism:	*Co-op provides below-market interest leases for heat pump equipment and low interest loans for loops*
History:	*From 1985-1993 Co-op provided customer rebates for ground-source heat pumps; Loop Lease program drawn-up but never implemented; GeoLease program implemented in September 1993*

COMPARISON TO ELECTRIC RESISTANCE

Lifecycle cost savings:	*$17,993*
Lifecycle energy savings:	*229,631 kWh*
Lifecycle BTU savings:	*2,296,311,000*

DATA FOR 254 UNITS INSTALLED

Co-op revenues	*$18,158*
Co-op costs:	*$33,020*

CONVENTIONS

For the entire 1994 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the U.S. Federal Reserve's foreign exchange rates.

The Results Center uses three conventions for presenting program savings. ANNUAL SAVINGS refer to the annualized value of increments of energy and capacity installed in a given year, or what might be best described as the first full-year effect of the measures installed in a given year. CUMULATIVE SAVINGS represent the savings in a given year for all measures installed to date. LIFECYCLE SAVINGS are calculated by multiplying the annual savings by the assumed average measure lifetime. CAUTION: cumulative and lifecycle savings are theoretical values that usually represent only the technical measure lifetimes and are not adjusted for attrition unless specifically stated.

Cooperative Overview

Southwestern Electric Cooperative, Inc. (SWEC or the Co-op) serves 14,700 customers in Bond, Fayette, Madison, Effingham, Clinton, Shelby, Montgomery, St. Clair, Marion, and Macoupin counties in the southwestern region of Illinois. The Co-op is a transmission and distribution utility that has a service territory covering 1,700 square miles and has 65 full-time employees.

SWEC purchases wholesale power from Soyland Power Co-operative, a member-owned electric generation and transmission cooperative supplying wholesale electricity to 21 member distribution cooperatives. Soyland is one of more than 60 generation and transmission cooperatives that supply wholesale electric power to rural utilities in the United States. Soyland is a summer peaking utility with a peak demand of 570 MW and total 1994 energy sales of 2,596 GWh, largely generated by burning coal.

SWEC's transmission and distribution system includes a total of 3,099 miles of line consisting of 40 miles of transmission line, 2,668 miles of overhead distribution line, and 391 miles of underground distribution line supplied from 22 substations. SWEC's total annual purchases of energy for 1994 were 249,000 MWh with a June peak month coincident system of 57.58 MW. Gross revenues from energy sales in 1994 were $25 million.[R#16]

Like many other cooperatively owned utilities, SWEC refers to its customers as "members" and in keeping with this uses the honor system for meter reading. To keep rates low, the Co-op requires each member to read his or her own meter on the first of the month and make remittances of the previous month's billing to the Co-op on or before the fifth of the month. In addition and also to keep power rates to a minimum, SWEC has engaged in demand-side management with the dual purpose of minimizing peak power demand (to keep its load profile flat) while boosting overall sales.

SWEC 1994 ELECTRIC STATISTICS

Number of Customers	*14,700*	
Number of Employees	*65*	
Electricity Sales	*249*	*GWh*
Electricity Sales Revenue	*$25*	*million*
Summer Peak Demand	*57.58*	*MW*
Average Electric Rates		
Residential (<2,000 kWh)	*10.85*	*¢/kWh*
Residential (>2,000 kWh)	*7.7*	*¢/kWh*
High Efficiency Residential (>1,000 kWh)	*4.4*	*¢/kWh*

SWEC has engaged in demand-side management in two ways: First, the utility has used its rate structures to flatten its load profile and thus assure the lowest cost, while most reliable power for its members. A variety of rates is offered by SWEC for its members. For instance, residential customers pay 10.70 ¢/kWh for their first 2,000 kWh of energy used and then 7.70 ¢/kWh for additional usage. A host of other rates are available including special rates intended to promote electric resistance heating as well as farm use of electricity. Members utilizing electricity exclusively or partially for the purpose of grain drying, for example, are eligible for a flat rate of 7.70 ¢/kWh during off-peak periods. A special high efficiency rate schedule is offered to members who meet standards set by SWEC. This rate is the same as the residential rate except in the winter when the cost for usage over 1,000 kWh/month drops to 4.4 ¢/kWh. To enable their access to this tariff, members can also receive up to a $500 incentive (called Aid-to-Construction) when building a high-efficiency home. ☞

Second, the utility has engaged in a number of load management activities so that it can shed load at times of peak demand. SWEC's Water Heater program uses both radio-controlled and timer-controlled switches to turn off residential water heaters during peak periods. On the other hand, SWEC provides free electric water heaters to customers building new homes or converting their prior heaters from fossil fuel to electric to build electric load. Home appliances and equipment such as electric clothes dryers, electric water heaters, and electric central air conditioners also qualify for load control devices under the Co-op's Peak Load Reduction Radio program. Like the Water Heater program, members are rewarded with rebates and lower rates for using electricity during off-peak periods.

In the radio-controlled appliance program, special sensors at SWEC offices and substations detect when local electric use is approaching a peak level. At those times a radio signal is sent out that briefly shuts off the controlled appliances. Since the Co-op is summer peaking, cooling appliances are cycled on for 7.5 minutes and off for 15 minutes so that customer inconvenience is minimized. The member saves money thanks to a more favorable electric rate (5.70 ¢/kWh after the first 800 kWh) if the home is all electric, or the member receives a credit of $12.50 per month for allowing the Co-op to control his or her electric central air conditioning for the months between June and September, a $2.50 per month credit for control of an electric clothes dryer, and $3.50 credit per month for control of an electric water heater.[R#17]

SWEC offers a host of energy services, or what the Co-op calls "support" services, to its members including energy audits, security lights, construction standards, the federally funded Low Income Home Energy Assistance Program (LIHEAP), providing individual "powerstats," and maintaining lists of qualified contractors in the Co-op's service territory and vicinity.

SWEC's most advanced energy services program is its GeoLease program, the subject of this Profile. GeoLease is very much in keeping with the Co-op's load building orientation coupled with its ongoing focus on the shape of its load profile. Through GeoLease, members are given the ability to purchase and lease geothermal heat pump equipment that otherwise would be too expensive to purchase but that results in attractive lifecycle economics for the customer while boosting off-peak sales and revenues for the Co-op.

Heat pumps come in many shapes and sizes and fulfill a variety of functions. All, however, have the common goal of shifting the balance of temperature between the conditioned space and the medium into which either excess hot or cold air is expelled. This medium can be the air, the water, or the ground.[R#3]

Heat pumps are attractive sources for heating because they tap essentially renewable energy resources. The energy required for heat pumps is extracted from energy in the earth or in water or air. While this energy is at a lower temperature than is useful, by compressing these heat sources using a standard refrigeration cycle, heat pumps "bump up" the heat value to useful levels. This is a fundamental difference between heat pumps and conventional furnaces or resistance heating systems which depend upon continual fuel inputs to provide heat through combustion. Heat pumps, on the other hand, only require energy to power compressors, an amount of power that is a fraction of the energy required by conventional heating systems.

Another distinct and fundamental advantage of heat pumps is that they can be operated in reverse, providing air conditioning in the summer and heating in the winter. As such, a heat pump system can take the place of conventional HVAC systems that often have independent heating and cooling components. And like furnaces that concurrently provide for domestic hot water needs, GSHPs are often tied in with water heating, reducing water heating costs. However, a hot water heater is needed in conjunction with a GSHP because the heat pump is unable to provide 100% of hot water requirements.

A FOCUS ON GROUND SOURCE HEAT PUMPS

Ground source heat pumps (GSHPs), the thrust behind SWEC's GeoLease program, have been relatively unknown by the general public but in existence in a variety of applications for more than 30 years. Currently there are about 20 times more air source heat pumps sold than ground source units, but ground source sales and installations are predicted to grow by 25 percent annually because of several technical advances combined with a number of promotional efforts around the country such as the National Earth Comfort Program discussed below.[R#3]

Ground source heat pumps employ the same basic principle as both air and water source heat pumps. By using a closed loop containing a heat transfer medium, heat is extracted from the ground during the winter and deposited to the ground in the summer. Ground source units generally have slightly less than twice the heating efficiencies of air source units because the ground offers a higher and more stable source temperature than the outside air. Their main disadvantage is higher installation costs, since digging, trenching, or well drilling is required to connect the system to the earth.[R#3]

Many ground source heat pump systems save up to 50% of the energy used by conventional systems. Peak capacity savings are significant for ground source heat pump systems as well and thus of significant interest of cooperatives such as SWEC. Due to the low fluctuation of temperatures in the ground, GSHPs can be designed so as not to need electrical resistance heat backup heating even during the coldest days

COST AND PAYBACK OF UPGRADE FROM RESISTANCE HEAT/AC TO HIGH EFFICIENCY GSHP	*NEW YORK*	*BURLINGTON*	*CHICAGO*	*ATLANTA*	*PHOENIX*	*PORTLAND*	*AVERAGE*
Vertical - COP 4.1							
Marginal Cost	$5,345	$6,265	$4,945	$4,530	$4,805	$4,420	$5,052
Simple Payback (yrs.)	2.9	3.4	5.4	10.8	6.0	8.8	6.2
Slinky - COP 4.1							
Marginal Cost	$4,360	$4,870	$3,960	$3,455	$3,455	$3,455	$3,926
Simple Payback (yrs.)	2.3	2.7	4.4	4.3	4.3	6.9	4.8

of the year, however, most GSHP systems employed today do have backup heat. Since heat pumps operate at consistent levels they create a positive contribution to utilities' flat load profiles. In fact, winter peak loads may be reduced by as much as 66% over conventional electric resistance heating systems. [R#13]

The table on the previous page dealing with simple paybacks of upgrades shows the economics when GSHPs are used instead of resistance heating/air conditioning systems. The simple payback period for such a replacement depends heavily on the location, being 3-4 years in cold climates like New York and Vermont and exceeding 10 years in warmer locations like Oregon and Georgia.

HEAT PUMP CONFIGURATIONS

The two most common types of geothermal systems are closed-loop and groundwater open-loop systems. In a closed-loop system a sealed loop of piping such as polybutylene or high density polyethylene is buried near the house and a small volume of water or antifreeze mixture is pumped through the loop to gather heat from the ground or to expel heat into the ground. In an open-loop system, water from a well or nearby surface source is pumped through the heat pump's heat exchanger and then discharged to the environment.[R#3]

There are several disadvantages to open loop systems including where to discharge the water, how to protect against changing water levels, and how to keep algae, dirt, and minerals from building up inside the heat exchanger components. Caution must be exercised with surface water in winter because at low temperatures the evaporator can freeze and break. Since closed-loop systems don't have these potential problems they are gaining in popularity.[R#3]

Three basic configurations for ground source closed loops are commonly used. Each system requires that a length of pipe be buried in the ground through which the water and antifreeze mix is circulated. For each ton capacity of the ground source heat pump system, approximately 175-200 feet of pipe is required although this varies by region due to local soil conditions and thermal characteristics.[R#13]

The horizontal loop configuration requires the largest amount of land area but installation costs are the least expensive. The required length of pipe is placed in a trench that loops through the land area four to six feet deep. Typical trench lengths are 400-600 feet per ton. Multiple pipes may be placed in each trench with backfill in between each pipe. By using multiple pipes in each trench, the necessary land area may be reduced by as much as 40%, however this method usually requires about 20% more pipe. (Note that there has been concern about "mining" the thermal aspect of the soil, causing some analysts to question whether or not geothermal heat pumps are truly tapping renewable resources or not.)[R#13]

A new type of horizontal loop called the "slinky" system has more recently been developed. This configuration requires less land area and shorter trench lengths than a traditional horizontal loop installation. The slinky system only requires a trench about six inches wide into which a coiled pipe of the required length is placed and backfilled. About twice the length of pipe is required for this configuration. However, trench lengths of 80-125 feet per ton are used, significantly less than a traditional horizontal loop system reducing digging costs which in rocky soils can be very expensive.[R#13]

The vertical loop is usually more expensive to install than a horizontal loop as this method requires drilling several bore holes about 5-6 inches in diameter into which the ground source pipes are inserted. The typical depth of the bore holes differs depending on the local geology. In Oklahoma, for example, depths of 200-250 feet are commonly necessary. Pipe installation becomes difficult at depths greater than 250 feet. The advantage of vertical loops is that they require far less land area than horizontal loop installations.[R#13]

The "alternating ground loop" configuration may be used with either horizontal or vertical loop installations and with loops of varying sizes. Developed by Geotech of Troy, New York, this system uses multiple independent loops which can be used alone or in combination with each other. As heat is exchanged, the soil temperature surrounding a ground loop may change. When soil temperature changes this configuration allows switching to a new loop where the soil temperature is stable and allowing the heat around the first loop to dissipate

or replenish. In this way, operation of the ground source heat pump system is stabilized increasing efficiency and allowing for shorter pipe length requirements.[R#12,13]

THE NATIONAL EARTH COMFORT PROGRAM

To exploit the rich opportunities that heat pumps present, the National Earth Comfort Program was developed. It founded the Geothermal Heat Pump Consortium (GHPC) in late 1994. The group, a collaborative effort sponsored by the electric utilities and industry with financial support from the electric utilities, the Department of Energy, and the EPA is headed by Dr. Paul C. Liepe, an experienced program manager and marketer from Atlantic Electric Company. The initiative is designed as a new program for the utility industry's Climate Challenge under the President's Climate Change Action Plan.[R#4]

The GHPC's challenge is straight-forward: to increase the installation rate of all kinds of geothermal systems from about 40,000 units per year to 400,000 units per year in the year 2000. This will reduce greenhouse gas emissions by 1.5 million metric tons of carbon dioxide annually and save over 300 trillion BTUs annually in 2001. Major thrusts of the program include first cost competitiveness through technology improvements and financing; infrastructure strengthening through training programs, software, and certification; and technology confidence building through national awareness programs.[R#4]

To overcome what its sponsors consider the most important barrier to the widespread adoption of ground source heat pumps, the National Earth Comfort initiative will develop innovative methods for financing the first-cost premium associated with GSHPs, examining methods such as leasing (as is the case with GeoLease – a flagship effort being carefully tracked by Earth Comfort), innovative rates, energy-efficient mortgages, shared savings, and other forms of incentives. Other tasks are to work to demonstrate means of reducing the cost and time involved with installing ground loops through improved drilling methods, equipment, procedure, sizing, and grouting of loops. Innovative and simple methods of including thermal storage integrated into GSHP systems will also be investigated.

The initiative will also undertake a range of activities to increase awareness of the benefits of GSHPs and build confidence in the technology. A chief method will be to engage in as many as twelve cost-shared regional marketing program demonstrations with selected utility partners. Other activities include developing model marketing programs; supporting standards development; and encouraging GSHPs through other Environmental Protection Agency, Department of Energy, and electric industry programs. The initiative will develop and implement informational programs to reach key customers, opinion leaders, trade allies, and educational institutions.[R#4]

Another key aspect is infrastructure strengthening to increase GSHP sales. This can be accomplished in a number of ways. Regulatory changes may be needed to ensure appropriate protection of the below-ground environment. Dealer and installer training and possibly certification are needed to ensure quality installations. Design tools and sizing standards are also needed, and in some cases model state legislation or regulation may be needed to empower utilities to take an active role.[R#4]

At the time of this writing the Consortium has been legally formed as a non-profit corporation. Over 70 electric utilities are now committed to participate and the U.S. DOE has made a major commitment to the Earth Comfort program.

Geothermal systems are the most efficient technology on the market today to provide heating, cooling, and hot water for low-cost comfort. However, not everyone can afford the high up-front cost of geothermal installations. Southwestern Electric Cooperative's (SWEC) GeoLease program addresses the most fundamental barrier to the use of heat pumps – first cost – and has developed a program in which participants need no up-front capital to take advantage of the technology and its attractive lifecycle costs and environmental savings.

PROGRAM EVOLUTION

For many years SWEC, like other cooperatives around the country, had been promoting ground source heat pumps without much success. From 1985 to September 1993 SWEC installed a total of only 154 ground-source heat pumps through its GSHP Customer Rebate program, less than 20 each year. The program's incentive varied from $1,000-2,000 and generally only those customers with an appropriate reserve of cash – not to mention awareness – installed GSHP units. An entire GSHP system, including the heat pump, loop, duct work, and accompanying equipment, costs around $9,000 for three tons (roughly $3,000/ton), approximately the amount of cooling required for a 2,500-3,500 square foot home. For a comparably sized home and system, a standard gas furnace plus air conditioners costs around $4,500, roughly half as much. Simply put, the GSHP rebate offered by SWEC was not a large enough fraction of the $4,500 extra needed to assist all but a few members in purchasing a GSHP. Consequently, the market share in SWEC's service territory suffered as the natural gas industry aggressively marketed to SWEC's members. Additionally, from the utility's perspective the rebate program was neither cost effective in the short nor mid-term planning horizons. [R#5]

To make GSHPs accessible to as many people as possible, SWEC officials realized that something had to change. The first cost barrier was retarding the adoption of the technology, not to mention the market transformation that SWEC officials envisioned. They imagined that the HVAC contractor industry would become the champions of the technology themselves, even providing financing for such systems in the long term. It was SWEC's job, they thought, to stimulate the market for such a fundamental change.

SWEC addressed the challenge head-on, devising a mechanism whereby the first cost barrier was completely taken out of the equation via a leasing mechanism. SWEC officials realized that leasing was becoming highly attractive to American consumers. In fact the movement toward leasing has been a major national trend. Evidence from the auto industry, for example, has clearly shown that consumers are willing to lease products they would not otherwise be able to buy. Automotive leasing has become the dominant means by which consumers are now "purchasing" cars. Currently 62% of luxury cars, 27% of mid-sized cars, and 21% of compact cars are leased.

The idea was simple: The Cooperative would lease a loop, which includes all piping equipment and its installation costs, to any customer who installed a geothermal heat pump system, regardless of whether or not he was a member of the Co-op. (Staff envisioned that ultimately the leasing program could become not only a means to maintain market share and thus support revenues, but also could become a profit center for the Co-op by installing GSHP systems in other service territories!) While the proposed program was indeed a finance program, the utility had planned to promote it as a maintenance-free service program that would provide hassle-free and guaranteed heat and cooling to members at low cost while simultaneously increasing all parties' confidence in the technology.

Loop Lease, however, was never placed on the market because of a significant program design constraint. Leased equipment is fundamentally bound by an obligation to serve as collateral in the event of a default. SWEC's lawyers determined that the way Loop Lease was designed was counter to this basic principle and legal aspect of leasing. SWEC would not have been able to legally retain ownership of the leased piping equipment if a member moved or terminated participation in the program because once the loop was installed in the ground around a home, it then legally became part of that home. Functionally, the utility would have had little leverage in the event of a default as it would likely cost more to dig up a loop than the value of the reclaimed loop itself! Thus the design was fundamentally flawed and SWEC's program designers found themselves back at the drawing board.

THE GEOLEASE PROGRAM

To solve the problem with the Loop Lease program, SWEC developed the GeoLease program which was launched in September 1993. The GeoLease program was designed to increase market share of customers' use of electricity for heating, increase revenues to the Co-op, save energy for Co-op members, compete with alternative fuels, lower the entry cost of geothermal systems, and further develop energy services for the Co-op's membership. The program was also designed to

usher SWEC into a period of enhanced energy services and potential profitability from selling efficiency as well as energy.

The fundamental difference between the GeoLease and the proposed Loop Lease program is that in the GeoLease a qualified participant must purchase the nonredeemable loop and then may lease the heat pump equipment. This way, if the member decides to move or defaults on the lease, the heat pump equipment – which is physically located in the home – may be recouped. And to overcome the first cost barrier associated with the loop and its installation, loans would be available to qualifying members for the purchase of the loop. Thus no capital outlay is required of participants in the GeoLease program.[R#2,5]

Note also that while the thrust of the GeoLease program has been to promote ground source heat pumps – what SWEC officials consider the most appropriate types of heat pumps in their service territory – customers can elect to lease and finance (and of course purchase) water source and air source systems through the program as well. To date this has been done in isolated instances with the vast majority of the installations being ground source heat pumps. Members who elect to install air source heat pumps, however, are eligible for 10-year lease periods instead of the 17-year leases made possible for ground source heat pumps.

GEOLEASE CUSTOMER OPTIONS

Qualifying Co-op members have several options for acquiring a GSHP system. They may employ the lease mechanism, apply for an Energy Resource Conservation (ERC) loan, purchase the equipment outright, or use a combination of these. Typically members who participate in the GeoLease program apply for an ERC loan to finance the purchase of the loop (which generally costs $2,500-3,500) and then lease the rest of the associated equipment. Thus for no money down, the customer avoids an up-front cash payment for both air conditioning and heating systems with a combined cost upwards of $5,000, while preparing for a long and happy history of lower utility bills!

The Lease Option: One of GeoLease's most attractive elements is its below-market rate lease mechanism. To qualify for a lease with a 5% interest rate a member's home must first meet a set of rather stringent efficiency standards. According to Perry Cochran, Chief Engineer at Southwestern Electric Cooperative, "It only wastes energy to install a geothermal system in an inefficient, unweatherized home. In such a scenario, the Co-op would make more money off the customer, but the customer simply would be wasting money and resources." Therefore, the Co-op has set minimum efficiency requirements for residential customers in order to qualify for a lease. The efficiency requirements include:

- minimum insulation levels for ceilings and attics of R-38, walls R-15, and floors R-19;
- a vapor barrier made of polyethylene;
- metal doors insulated with a urethane core of R-13.5 or polystyrene core of R-7.5;
- double pane, low-E windows;
- certification by an Air Conditioning and Refrigeration Institute (ARI) 330 rating for a closed loop system and ARI 320 for an open loop system;
- hot water heaters 50 gallons or larger must be controlled by the Co-op;
- air source heat pumps must have a minimum Energy Efficiency Ratio (EER) of 10.0;
- water source heat pumps must have a minimum EER of 11.0 at 95°F and 2.9 Coefficient of Performance (COP) at 35°F.

Once the member has qualified for the leasing plan under the high efficiency home status, SWEC purchases the GSHP equipment at wholesale cost and leases it to the customer, recouping the wholesale cost plus interest over time. The customer pays for the equipment with a monthly leasing charge embedded in electricity rates of 10.70 ¢/kWh for the first 1,000 kWh or 2,000 kWh per month depending upon whether it is winter or summer. (The greater threshold in the summer reflects the Co-op's higher-cost summer peak energy purchases.) All additional usage then costs 7.78 ¢/kWh. This latter rate is 3.38 ¢/kWh more than SWEC's High Efficiency electricity tariff, reflecting the lease payments. The energy charge also covers the cost for an annual maintenance visit, which normally costs about $40, to ensure that all GSHP systems installed through the program are operating at their maximum efficiencies. The rate is built into the electric bill for a maximum term of 17 years with the utility maintaining ownership of the heat pump equipment until the payments are completed. Therefore, if the resident leaves the home during this time, they are not obligated to continue payments.[R#7]

Another option for members who don't qualify as owners of high efficiency homes – and who thus are not able to receive the leases – is a short-term higher interest lease for geothermal heat pump systems. Under this option, leases are available with five-year terms at 7% interest with no early payoff penalty.

Energy Resource Conservation loans: ERC loans serve an essential purpose within the GeoLease program since they provide members who qualify for a lease a means of financing the initial cost of a loop. This function is critical because through a combination of lease and loan the GeoLease participant does not have to provide any capital outlay to acquire a GSHP system.

Another feature of the GeoLease program is that SWEC has been instrumental in working with local lenders so that members can combine their home mortgages with ERC loans. By doing so, members can simply "roll" the cost of efficiency upgrades into their routine mortgage payments. In the future, members that are GeoLease participants and whose new homes qualify for Fannie Mae loans may qualify for energy-efficient mortgages (EEMs) at lower interest rates. (For more information on EEMs see The Results Center Profile #90, Energy Rated Homes of America, Uniform Energy Rating System)

ERC loans are also available for those members whose homes don't qualify as high efficiency and thus do not qualify for leases under the GeoLease program. These loans of up to $6,000 at a 5% interest rate finance the cost of prescriptive energy conservation measures in all-electric residential structures over a period of five years. A variety of approved energy-saving devices and systems are eligible for such loans including air source heat pumps, electric thermal storage, control devices, central heating and central air conditioning system replacements, and weatherization measures.[R#15]

A Co-op representative approves an ERC loan only if he is satisfied that the proposed energy conservation measures meet reasonable installation, material, and performance standards and will be cost effective. For these members, the Co-op bills them for the periodic payments on the ERC loan at the same time it bills for the electric service although the loan amount, unlike the lease fee, is not included on the customer's kWh charge.

The Direct Purchase Option: Naturally members may elect to utilize the utility's services regarding GSHP analysis, specification, and contractor certification, but then choose to purchase their GSHP outright or as part of their normal home construction or renovation costs. These members can, however, still take advantage of the special high efficiency electricity tariff as long as their home meets high efficiency specifications.

Other program incentives: In addition to leases, loans, and preferential rates, the Co-op as well as Soyland Power Cooperative, provide other direct incentives for ground source heat pumps and other equipment. For new construction the Co-op provides an Aid-to-Construction rebate up to a maximum of $500 for homes that meet the high-efficiency terms and conditions. Soyland also provides a $500 cash rebate to members who install geothermal systems.[R#15]

MARKETING

Marketing the GeoLease program has been an especially important aspect of the program's success since most Co-op members simply didn't know what a ground source heat pump was prior to the program. Furthermore, it has been SWEC's challenge to disseminate information that educates not only its members but also contractors and relevant state agencies. Staff have accomplished this through a number of means including member newsletters; presentations at trade meetings; promotional pieces that have been presented to local government agencies, manufacturers, contractors, and members; and perhaps most importantly through persistent word-of-mouth and one-on-one customer interactions. Gary Wobler, SWEC's General Manager, has been an important outspoken advocate of the technology and GeoLease program. As discussed in the Savings section, getting the word out on the GeoLease program has successfully increased its participation from 154 over the course of seven years to over 100 in two years.

The lease system also has several basic marketing advantages that make it very attractive to customers. First, evidence from the auto and other industries shows that consumers are more than willing to lease products they would not otherwise be able to buy. Second, market research suggests that many if not most utility customers believe their electric utility should sell heating and cooling equipment. Trust between an electricity provider and a customer is easily forged when proper sales and services are provided. Third, maintenance, a main concern of customers and often a barrier to GSHP purchases, is bundled into the package and perceived to be free. Fourth, embedding the lease charges in the kWh charge removes the need for yet another monthly payment which can dissuade members from participating in a program.[R#5]

THE STEP-BY-STEP DELIVERY PROCESS

Site visit and preliminary analysis: Once a customer inquires about the Geolease program, an employee from Southwestern Electric's Technical Services Department visits the home to perform a heat loss/gain evaluation of the member's home to figure the heating and cooling needs of a home. If it is a new home construction he or she obtains a set of blueprints to perform the analysis. SWEC evaluates which options are most cost-effective for the member. The SWEC representative also takes this time to further educate and explain the GeoLease program and GSHP technologies. This preliminary evaluation and education process usually takes a few hours.

Detailed heat loss and benefit/cost analysis: The information gathered at the site, coupled with the initial analysis of customer options, is then turned over to SWEC's computer technician who inputs the square footage, insulation values, window and door types, and other pertinent information into a specially programmed piece of computer software designed for heat loss/heat gain calculations. From this information, it is determined what size unit is required and how much operating costs will be, based upon different rates available to the member. The member also is explained the pros and cons of the GSHP system when compared to an air source heat pump unit and electric heat, gas heat, propane, and oil-based systems.

Members are provided analysis results: Based on the information gathered and analyzed in the previous steps, SWEC provides an information and options sheet in booklet form to show members their costs and options in purchasing the geothermal equipment. At this time the member is given names of contractors whom they can contact to obtain installation bids. These contractors already work in conjunction with SWEC since the Co-op requires all contractors installing GSHP equipment to be certified through the International Ground Source Heat Pump Association before they are allowed to be involved in the GeoLease program.[R#16]

Members solicit bids from contractors: At this point the member contacts the contractors from which they wish to entertain bids for the installation of the system. When the member informs the contractor that they are interested in the program, the contractor in turn contacts SWEC to obtain technical information in order to give the member a qualified bid.

Contractors install the equipment and loop: Once the member has chosen a contractor to perform the work, the member contacts SWEC to arrange for all necessary equipment and paperwork to be completed.

Under the GeoLease program plans, the Co-op leases only the heat pump unit to the member. The contractors bidding for the job call SWEC to obtain technical information and loop design specifications. Once a contractor is chosen, the installation is scheduled between the member and the contractor.[R#2]

Post-installation inspection conducted by SWEC: When the system is completely installed, the member calls SWEC to perform a system analysis check to ensure that the system is performing to design specifications.

Provisions established for ongoing maintenance: All repairs are made by qualified contractors as per the customer agreement. This agreement warrants all repairs and labor for a "dig-in" or to repair leaks in the loop and manifold to the point of entry to the home. Once each year a contractor representative visits each installation and performs a system analysis check to ensure that the system is performing to design specifications.

MEASURES INSTALLED

The leased heat pump system consists of the heat pump unit itself; a pump pack which transfers fluid from the ground through the system; a thermostat for temperature control; an auxiliary heater for times of extreme cold or pump failure; and a hose kit that connects the pump to the heater.[R#12]

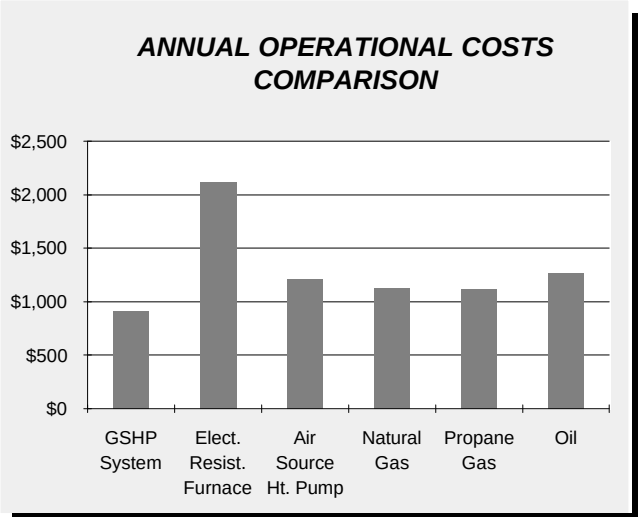
STAFFING REQUIREMENTS

A total of less than half a full-time equivalent staff person (0.4 FTE) is devoted to the GeoLease program. Marla Pourchot, Assistant Director of Marketing and Member Services, spends more of her time with the program than any other staff, devoting approximately 30% of her time to the program. She implements and administers the program, providing marketing and promotions for the program as well as taking care of it on a daily basis. Gary Wobler, General Manager of SWEC and the driving force behind the program, also devotes some time to the program, working with Perry Cochran, SWEC's Chief Engineer, to continually refine the program's design.[R#12]

Program Savings

TYPICAL HOME ANNUAL COST COMPARISON	HEATING	COOLING	HOT WATER	TOTAL	DIFFERENCE FROM GSHP	LIFECYCLE DIFFERENCE FROM GSHP
GSHP System	$408	$249	$258	$915	$0	$0
Elect. Resist. Furnace	$1,412	$312	$390	$2,114	$1,200	$17,993
Air Source Ht. Pump	$509	$312	$390	$1,211	$296	$4,446
Natural Gas	$619	$312	$190	$1,121	$206	$3,096
Propane Gas	$609	$312	$188	$1,109	$194	$2,916
Oil	$731	$312	$225	$1,268	$353	$5,301

DATA ALERT: Savings are presented based on a typical home that requires a three-ton cooling system. Power plant losses are accounted for in the source-BTU savings analysis while transmission and distribution losses for both electric and fossil heating systems are not. For more detailed information on region-specific variations and opportunities, see the EPA's report "Space Conditioning: The Next Frontier."[R#13]



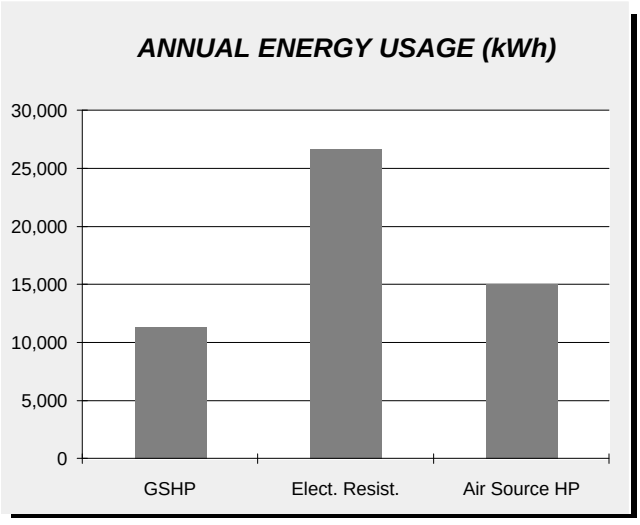
The GeoLease program was not designed to conserve electricity. Instead, it is a program that is intended to increase market share of a technology that uses electricity wisely for the benefit of its customers and the Co-op alike. By efficiently using electricity to tap a renewable resource not only can the Co-op demonstrate responsibility when comparing various heating

TYPICAL HOME ANNUAL ENERGY USAGE COMPARISON	HEATING	COOLING (kWh)	HOT WATER	TOTAL	DIFFERENCE FROM GSHP	LIFECYCLE DIFFERENCE FROM GSHP
GSHP System (kWh)	5,239	2,767	3,316	11,322	0	0
Elect. Resist. Furnace (kWh)	18,151	3,467	5,013	26,630	15,309	229,631
Air Source Heat Pump (kWh)	6,542	3,467	5,013	15,022	3,700	55,504
Natural Gas (therms)	1,125	3,467	345			
Propane Gas (gallons)	937	3,467	289			
Oil (gallons)	975	3,467	300			

and cooling schemes from a source-BTU standpoint (a view that considers the energy costs of electricity all the way back to the power plant), but it can save its customers money through off-peak sales that in turn generate revenues for the Co-op.

SWEC staff have calculated the annual cost of various heating systems for a typical home that requires three-tons of heating or cooling. By using a ground source heat pump the annual cost for heating, cooling, and to produce domestic hot water using a desuperheater water heater is $915 versus $1,121 for natural gas and $2,114 for electric resistance heating. When simply comparing the kilowatt-hours required for a GSHP application versus electric resistance heat (and cooling and hot water heating), the GSHP-conditioned home requires 11,322 kWh versus 26,630 kWh for the electric resistance heating, only 42% as much, a major energy savings.

When comparing various heating systems based on the source-BTUs required, an analysis that considers the amount of energy lost when electricity is generated at the power plant, the ground source heat pump is clearly the most environmentally attractive alternative. For the typical home the ground source heat pump requires 113 million BTUs annually compared to 182 million BTUs for natural gas, what has been the most popular choice. Air source heat pumps consume 150 million BTUs annually while electric resistance heating requires some 266 million BTUs annually, fully 153 million BTUs more than the GSHP alternative. Note that the table suggests far lower consumption for propane because it is modeled after homeowners who use less propane as a result of far higher fuel costs and price elasticity.



PARTICIPATION RATES

The high first cost and concern for the reliability and longevity of geothermal heat pump equipment has retarded market penetration. GeoLease was designed to address these issues and increase saturation. Builder and consumer acceptance of the GeoLease has improved with approximately 100 members signed up since its introduction in early Spring of 1993. This compares with 154 geothermal systems installed on Co-op lines from 1985 through 1992. All told, SWEC has installed 254 geothermal systems in its service territory of 14,000 customers representing 1.8% of all residential customers and a much higher fraction of the market for new construction although SWEC does not know what market share the GSHP systems currently fulfill.[R#8]

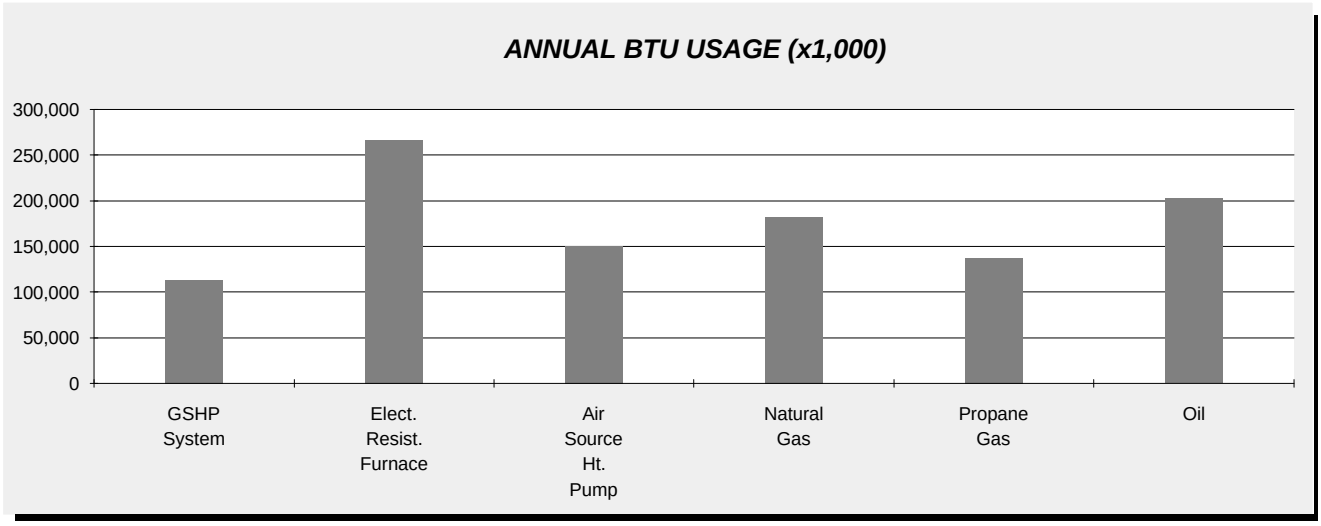
Planned participation includes one subdivision with a total of 120 homes to be built by Greg Grinter Development, a local developer. This innovative approach to installing geothermal systems may produce the country's first all geothermal subdivision. Due to a joint venture between the developer and SWEC, the normally high up-front costs for the geothermal systems was much lower. The developer made GSHPs part of the deal of purchasing a new home, which ensures that even if some of the homes are sold, the GSHPs will stay in the ground.[R#5,9]

GSHPs INSTALLED	*PARTICIPANTS*
1985-1992	154
1993-1994	100

PROJECTED SAVINGS

While the average life of the loop for a GSHP is 50 years – in fact most suppliers provide a 50-year guarantee on the loop piping itself – the heat pump equipment in the home lasts roughly 25 years. Note that for cost and savings calculations in this Profile, a measure life of 15 years is used. Using a conserva-

TYPICAL HOME ANNUAL SOURCE-BTU COMPARISON (x1,000 BTU)	HEATING	COOLING	HOT WATER	TOTAL	DIFFERENCE FROM GSHP	LIFECYCLE DIFFERENCE FROM GSHP
GSHP System	52,388	27,667	33,162	113,217	0	0
Elect. Resist. Furnace	181,509	34,667	50,129	266,304	153,087	2,296,311
Air Source Ht. Pump	65,424	34,667	50,129	150,219	37,003	555,039
Natural Gas	112,545	34,667	34,545	181,758	68,541	1,028,112
Propane Gas	78,233	34,667	24,151	137,051	23,834	357,506
Oil	128,461	34,667	39,540	202,668	89,451	1,341,764



tively estimated fifteen-year average measure life, The Results Center has calculated the energy savings resulting from the installation of one GSHP over its measure life compared to natural gas heating to be fully a billion BTUs and 2.3 billion BTUs when compared to electric resistance heating. Thus the GeoLease program, assuming that every installation will substitute for natural gas heating, will save 254 billion BTUs of energy over the life of the units installed. When compared to electric resistance heating the lifecycle savings jump to well over a half trillion BTUs of energy savings! Looking exclusively at electricity savings when compared to resistance heating, a ground source heat pump results in annual savings of 230 MWh.

COST AND REVENUE COMPARISON PER UNIT	AIR-TO-AIR HP	GSHP	DIFFERENCE
Gross Revenue	$566.55	$378.99	$187.56
Marginal Cost	$426.92	$307.51	$119.41
Net Annual Revenue	$139.63	$71.48	$68.15
Net Revenue (15 yr. @5%)	$1,449.32	$742.00	$707.32

DATA ALERT: Cost savings are based upon the following price figures: 55 ¢/therm for natural gas, 65 ¢/gallon for propane, 75 ¢/gallon for oil, 7.70 ¢/kWh for electric heating, 9.0 ¢/kWh for electric cooling, and 7.78 ¢/kWh for electric hot water. These rates include the add-on associated with the high efficiency lease rate.

THE UTILITY COST PERSPECTIVE

Given the utility's loss of heating market share to natural gas heating, the GeoLease program can essentially be viewed as a marketing strategy to promote wise electricity use through ground source heat pumps. While it is true that heat pumps use less electricity than resistance heating – and the utility will therefore experience some revenue loss in some cases – SWEC recognizes the need to build a lasting relationship with its customers to retain them and to satisfy their needs through the highly efficient use of electricity.

In order to maintain and build heating market share, SWEC has had to incur several costs including 1) the costs to administer the GeoLease program, 2) a share of the costs of the ERC loan program, 3) the costs of providing below-market rates for loans, 4) the costs of providing below-market rates for leases, and 5) the costs of collecting lease payments from customers for up to 17-year terms. The latter four of these costs, unfortunately, are unavailable from SWEC as they have not yet been analyzed and computed by staff there.

The costs to administer the GeoLease program, however, are worthy of examination. According to SWEC program officials, all facets to administer the GeoLease program combine to require roughly four hours of staff time per home. This includes the audit and analysis time and the time it takes to provide detailed explanations and answers to members' questions. This four-hour period is valued at $65 by the Co-op. Then an average "overhead" cost of an additional $65 per home is added. Thus SWEC estimates that the total participant administrative cost for each home is $130, equivalent to just over $33,000 ($33,020) for all 254 program participants to date. This can be easily compared to the $18,158 in annual revenues that result from the program, giving the administrative portion of the program costs a simple payback of 1.82 years.

In terms of the program's impact on revenues, while a GSHP saves the customer money, the utility actually makes less revenue when compared to an air source or electric resistance heating and cooling system. For an average residential air

ANNUAL COST AND REVENUE COMPARISON	REVENUE	UTILITY COST	PAYBACK (years)
One Unit	$71	$130	1.82
254 Units	$18,158	$33,020	1.82

source heat pump the net total annual revenue is $139.63, or $1,440.32 over 15 years, while a GSHP installation results in a net total annual revenue of $71.48, or $742.00 over 15 years, a decrease, or cost in revenue of $68.15 annually, or $707.32 over 15 years. However, when a SWEC member installs a GSHP rather than a natural gas system, the result is an increase of $71.48 in annual revenue.

THE CUSTOMER COST PERSPECTIVE

The consummate barrier to market penetration of GSHPs has always been the high first cost to the participant. However, under the GeoLease program a member incurs no first-costs because of the lease and loan mechanism. As shown in the Typical Member Savings from GSHP chart, an installation of a GSHP actually saves $34.24 on monthly energy bills. This figure can be coupled with the savings that the customer achieves by having a smaller mortgage than he or she would have if the purchase cost of a conventional furnace and air conditioning system were included in the total mortgage. SWEC estimates that by leasing the HVAC equipment customers will realize a monthly mortgage savings of $16.82. Thus the member saves a total of $51.06 per month. The member's monthly lease payment is $30.68, resulting in a net monthly savings of $20.38, or $244.60 annually.[R#21]

While the above savings was for a typical home in SWEC's territory, varying heating and cooling technologies exist within the territory that result in disparities in cost savings. As shown in the Typical Home Annual Cost Comparison chart, a member with a high efficiency lease rate who installs a GSHP actually saves a significant amount of money for home space heating, cooling, and hot water heating in comparison to other technologies. On an annual basis a GSHP saves $1,200 (131% cost savings per unit) compared to electric resistance, $296 (32% cost savings per unit) compared to an air source heat pump, $206 (23% cost savings per unit) compared to natural gas, $194 (21% cost savings per unit) compared to propane. and $353 (39% cost savings per unit) compared to oil source heating, cooling, and hot water heating.

CASE STUDY: THE SCHMIDT RESIDENCE

After an energy audit was performed these members decided to install a vertical loop geothermal heat pump. The couple elected to proceed with a 17-year lease for the heat pump equipment and took an ERC loan for the vertical loop and its installation. Because their home did not meet the GeoLease program's efficiency criteria, they failed to qualify for the high efficiency lease rate and were therefore forced to use the higher cost lease rate with a shorter term.[R#17]

CASE STUDY: THE LITTRELL RESIDENCE

The Littrells were building a new home when they saw the geothermal information in SWEC's monthly publication. They decided to employ a horizontal loop geothermal system, financing it through a 7% lease. They qualified for the High Efficiency rate, received a free hot water heater, a $500 rebate from Soyland, and a $500 Aid-to-Construction. It now costs only $483 per year for heating ($159), cooling ($169), and hot water ($155) for their 3,000 square foot house.[R#17]

TYPICAL MEMBER SAVINGS FROM GSHP	*DOLLAR SAVINGS*
Monthly Energy Cost Savings	$34.24
Mortgage Savings	$16.82
Monthly Lease Payment	$30.68
Net Monthly Savings	$20.38
Annual Savings	$244.60

LESSONS LEARNED

GeoLease exemplifies an effective energy services program that creates customer value while generating Coop revenues: Fundamentally, Southwestern Electric Cooperative has shown that by providing enhanced customer energy services, in this case by enabling customers access to a highly efficient heating technology, a win-win situation is indeed possible. The customer can save money and invest in renewable energy resources while the utility maintains heating market share and thus maintains revenues.

The ground source heat pump is an electrotechnology that saves money and source-BTUs: Ground source heat pumps are a great example of an electrotechnology that saves money for end-users, provides sales and revenues for the utility, while promoting the highly efficient use of renewable energy. Thus GeoLease provides a three-way win-win situation between customers, utility, and the environment. Naturally the utility incurs costs to promote its product, providing low-interest, 15-year leases to stimulate sales and to engage a fundamental and exciting market transformation.

The GeoLease program produces benefits for home builders and lenders: The consumer receives the most efficient – and one of the most expensive – heating and cooling systems available with no capital outlay while the home builder – ever sensitive of the total costs of a home – is able to deliver more home for less total dollars. This also helps lenders that find it easier to qualify more borrowers since the total cost of the home, and the value of the required monthly payments, will be less.

GeoLease has been an effective means of recapturing a dwindling market share for electricity-based heating: Ground source heat pumps coupled with effective financing do provide a means for electric utilities to maintain (and recapture) dwindling market shares. Over the past decade cooperatives such as SWEC have seen the market share for electric heating decline as natural gas heating has been on the rise, thanks in large part to a 2:1 basic cost advantage over conventional electric heating. While the Coop has sold less kilowatt-hours than it would have if it were still promoting resistance electric heating, it has sold more electricity that it would had the trend toward natural gas continued unchecked.

GeoLease squarely addresses the high first costs of GSHP systems enabling members to benefit from their attractive lifecycle benefits: Many home buyers today are understandably inclined to select natural or propane gas for their heating system in order to keep the total cost of their homes lower, even though they may know they are giving up long-term energy savings for short-term benefits. (Actually these consumers have already recognized that resistance heating is the cheapest to install but most costly to operate.) While rebates have increased consumer awareness of geothermal technology, the benefits have remained available primarily to those that can most afford the higher front-end investment. Now through a combination of leasing and loans, customers can afford to tap the long-term benefits of the most efficient systems from the onset.

Utilities can effectively bundle leases with loans to overcome legal issues surrounding collateral: While Loop Lease was intended to cover the entire cost of a GSHP system, SWEC's attorneys realized that once a loop is placed underground on the homeowner's property, SWEC can't take the loop back if the member decides to terminate his lease or relocates. Thus, the Loop Lease program was never implemented. To solve this problem, the GeoLease program requires members to purchase the loop outright while the reclaimable portion of the system – the equipment that is located in the member's home – can be used as collateral. SWEC in turn, offers the ERC loans to counter this initial capital outlay.

GSHPs offer a multitude of benefits to customers using them: According to the EPA's report, "Space Conditioning: The Next Frontiers," GSHPs result in the lowest operating cost for heating and cooling needs. Moreover, the systems are reliable due to simplicity and lack of exposure to the weather; they produce virtually no noise; and they result in better comfort, producing higher air supply temperatures in colder weather.[R#4]

GSHPs offer electric utilities powerful means of engaging lasting "handshakes" with their customers: Once a ground loop is installed, the customer is likely to continue to use it indefinitely or at least until he decides to sell the home, creating not only cost savings for the customer but a lasting relationship (or "handshake") between the utility and the customer that is especially important as utility competition in-

creases. By bundling the lease payment through a customer's utility tariff, the handshake or bond is that much firmer and long lasting. Furthermore, through the maintenance agreement, the utility is provided another means of serving and retaining its valued customer.

TRANSFERABILITY

The GeoLease program developed by Southwestern Electric Cooperative appears to be highly transferable to transmission and distribution coops as well other utilities including publicly owned utilities and investor-owned utilities keen on establishing powerful means for customer retention. In fact, SWEC has been contacted by several investor-owned utilities (IOUs) interested in the GeoLease program including Central Maine Power Company, Baltimore Gas and Electric Company, TU Electric, Long Island Lighting Company, and Central Vermont Power Company. While the program can be modified for specific circumstances, overall it is one that makes sense for utilities of all kinds that can access relatively low-cost off peak power to enable their customers means to save money and benefit from a renewable energy resource.[R#5]

Ultimately, leasing programs – as well as other forms of financing programs – are creating a bridge to a time when utilities profit from sales of electricity and energy services. While SWEC has not intended to make a profit from its program, there's no reason why the program design can't be modified to earn money rather than subsidize a market transformation. This could be done in a number of ways. For instance, a utility could bulk purchase systems (tapping wholesale prices) and lease them based on a conventional retail price. Another option would be to increase the interest on the lease (and/or loans) to above market rates. As long as customers are still provided a means for financing the full package and then achieve even a small positive cash flow, the program design remains solid and effective. (Utilities could also extend the term of the lease and/or loan to assure the positive cash flow while extracting profit.) Another option, as alluded to in this Profile, is for utilities to offer the program in other service territories, potentially even establishing profit-making subsidiaries that could provide turnkey services by performing audits, installations, and on-going maintenance services as well as complete financing.

The promotion of ground source heat pumps, however, need not rest with individual utilities. The first cost barrier discussed at length in this Profile could be overcome by others, such as the equipment suppliers themselves, by banks, and/or by national financing organizations such as Fannie Mae and Freddie Mac. Shortly following the launch of GeoLease, SWEC General Manager Gary Wobler organized a meeting with several of the major GSHP manufacturers and rural financing organizations in an effort to encourage a national program. He envisions a future scenario in which GSHP manufacturers take on the role of leasing the equipment, much as car manufacturers do today, with the cooperatives acting as dealers and rural financial organizations, banks, and others providing financing. In another scenario, a national financing organization such as Fannie Mae (see Energy Efficiency News & Views, Issue #4 on Fannie Mae), or possibly a subsidiary of the cooperative system, would be able to administer a GSHP leasing program on a national basis. A successful national leasing program would allow Americans who live on a month-to-month basis without a large amount of savings to afford GSHPs. The National Earth Comfort program of the Geothermal Heat Pump Consortium is doing just this, hoping to provide the leadership to obtain $65 million from the private sector and $35 million from Federal funding to initiate this kind of a national initiative.[R#5,7]

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