GEOS Houses are 85% More Energy Efficient
Cost per year

- **Cooling:** $100
- **Heating:** $1100
- **Hot Water:** $200
# Heating and Cooling EE homes

<table>
<thead>
<tr>
<th></th>
<th>Heat</th>
<th>Cool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peak load</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in kbtu/h</td>
<td>15-20</td>
<td>8-10</td>
</tr>
<tr>
<td><strong>Annual load</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in kbtu/year</td>
<td>21,000</td>
<td>5,000</td>
</tr>
<tr>
<td>in kWh/year</td>
<td>2,000</td>
<td>250</td>
</tr>
</tbody>
</table>
GEOS Houses are 80% More Energy Efficient
Cost per year

- **$100** cooling
- **$1100** heating
- **$200** hot water
- **$200** (GEOS shell)
- **$600** (GEOS shell)

- R15 slab basement
- R28 walls
- R42 ceiling
- R6 windows
- <.05 NACH
GEOS Houses are 80% More Energy Efficient

Cost per year

- $100 cooling
- 50%
- $1100 heating
- GEOS shell: $600
- GEOS solar orientation: $300
- $200 hot water
GEOS Houses are 80% More Energy Efficient

Cost per year

Conventional house: $1100 heating, $200 hot water
GEOS shell: $600 heating, $200 hot water
GEOS solar orientation: $300 hot water
GEOS mechanical system: $100 ground source heat pump, $100 heat pump water heater

50% efficiency savings across all components
System for Ventilating, Heating, Cooling, and Hot Water
Geo-Assisted Energy Recovery Ventilation (ERV)

- Constant filtered fresh air
- Pre-treated by Earth Tubes
- Heating/cooling distribution
- Extracts 96% of exhaust heat
- Low maintenance
- Very low noise
Ground-Air Heat Exchange: Capitalizing on the Earth’s Energy

- Intake air temperature: 91°F (33°C)
- Soil temperature: 50°F (10°C)
- Output air temperature: 62°F (17°C)
Hourly Space Heating Load (Btu)

1/4 of the smallest furnace in the U.S.

374 hours of backup heat
17% of total heating hours
200 kWh year or ½ PV panel

83%
- Ground Source Loop
- Heat Pump
- Hot Water Tank
- ERV with Fan Coil
- Fresh Air via Earth Tube
- Low Velocity Supply

Mechanical Diagram
**Electric Loads**

**Conventional House**
- Clothes washer: 105 kWh
- Dishwasher: 145 kWh
- Dryer: 891 kWh
- Lighting: 2575 kWh
- Range: 447 kWh
- Refrigerator: 775 kWh
- Miscellaneous: 350 kWh

Total: **8,890 kWh**

**GEOS House**
- Clothes washer: 51 kWh
- Dishwasher: 75 kWh
- Dryer: 300 kWh
- Lighting: 1000 kWh
- Range: 600 kWh
- Refrigerator: 350 kWh
- Miscellaneous: 1800 kWh

Total: **4,200 kWh**
Net-Zero Energy Homes That Are Cash Flow Positive

Reduced utility payments plus tax savings offset increased mortgage costs

Economics

- SHELL: $15,000
- MECH.: $10,000
- APPLIANCE: $5,000
- SOLAR: $15,000

$45,000 INCREMENTAL IMPROVEMENTS

$200 INCREMENTAL MONTHLY MORTGAGE

$190 SAVED ENERGY COSTS

$40 TAX SAVINGS
System for Ventilating, Heating, Cooling, and Hot Water