

What are our **Strategic Energy Choices?**

- **Energy efficiency** driven by high energy costs driven by increasing primary energy costs and new construction.
- **Energy efficiency** programs driven by proactive design, increasing primary energy costs and less new construction.

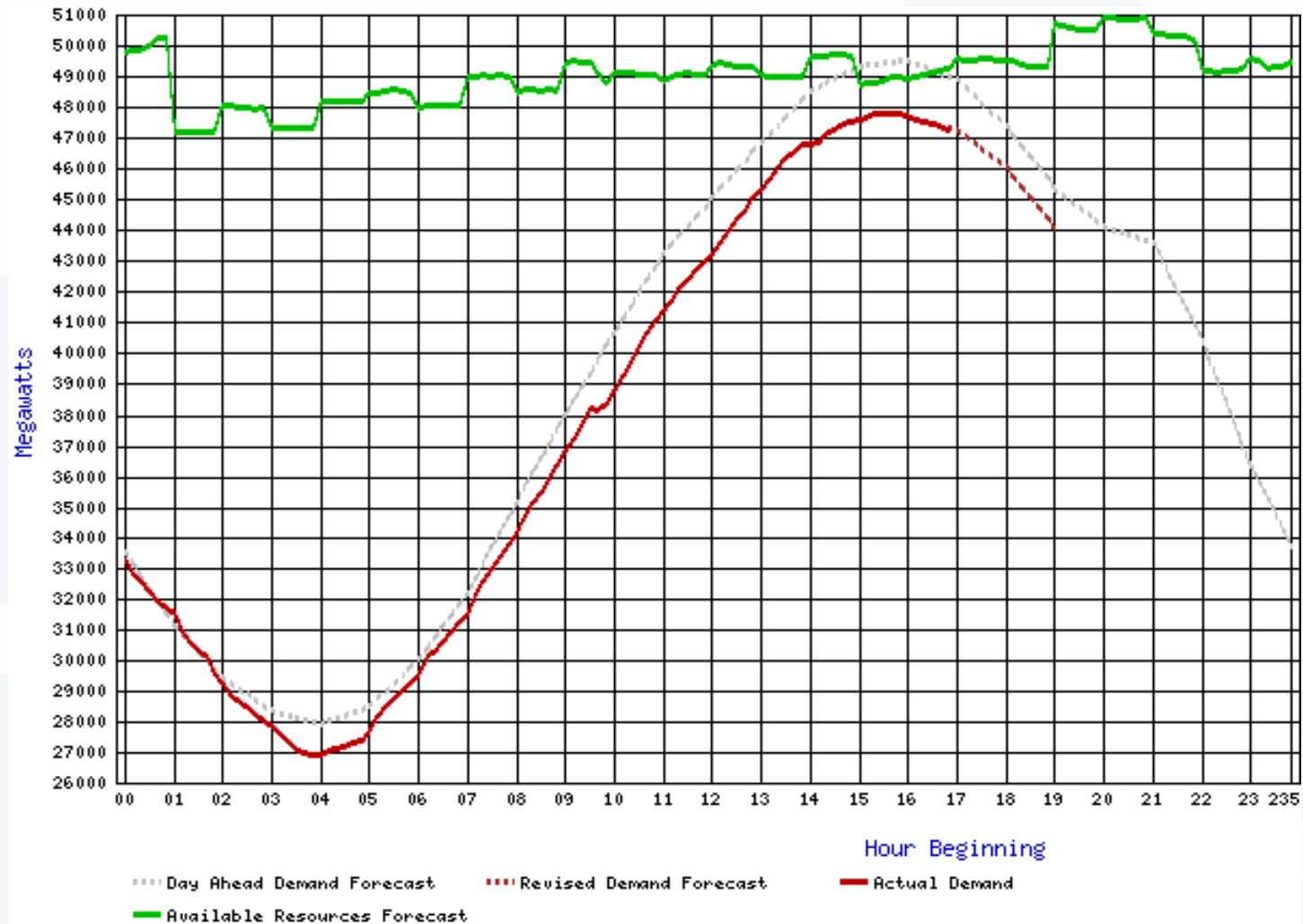
• **Energy Efficiency** is inevitable!



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Daily Residential Load Profile



Residential Load

- Lighting 15 %
- Space heating and cooling 50%
- Water heating 20%
- Appliances and electronics 25%

A simple investment in lighting

	incandescent	compact florescent
cost for light bulbs		
lumens	850	830
watts	60	13
life in hours	1000	8000
bulb cost	\$0.25	\$1.50
bulb cost for 30 years	\$12.00	\$9.00
cost for electric generators		
peaking generator cost*	\$27.00	\$5.85
base load generator cost**	\$112.50	\$24.38

What would you do?

- Capacity costs
 - \$124 for a 60 Watt 850 lumen incandescent light bulb
 - Or
 - \$33 for a 13 Watt 830 lumen CF light bulb
- By the way a CFL saves energy too!

GAO

United States General Accounting Office

Report to the Chairman, Subcommittee
on Investigations and Oversight,
Committee on Science, Space, and
Technology, House of Representatives

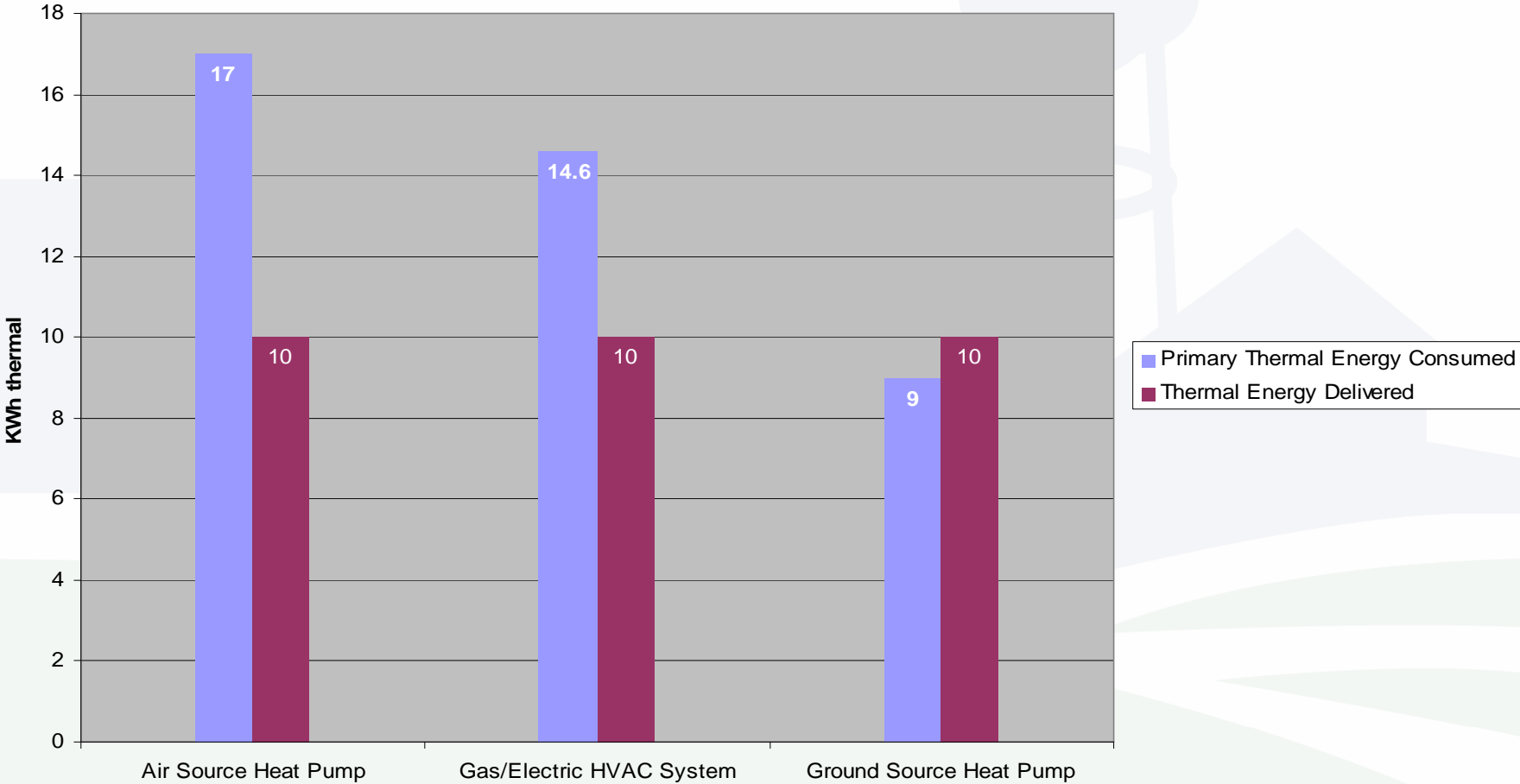
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June 1994

GEOHERMAL ENERGY

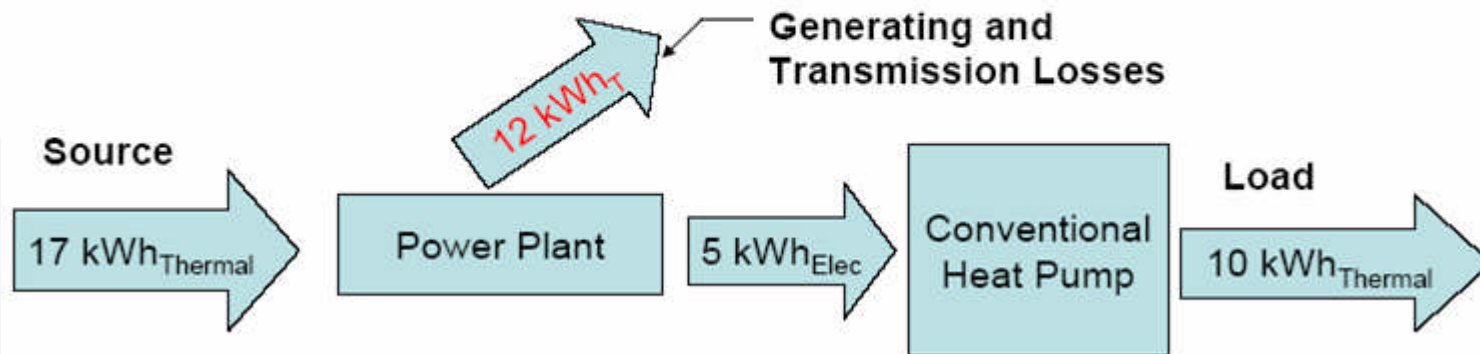
Outlook Limited for Some Uses but Promising for Geothermal Heat Pumps

Comparison of Primary Energy Input versus Energy Output as delivered by Various HVAC Technologies



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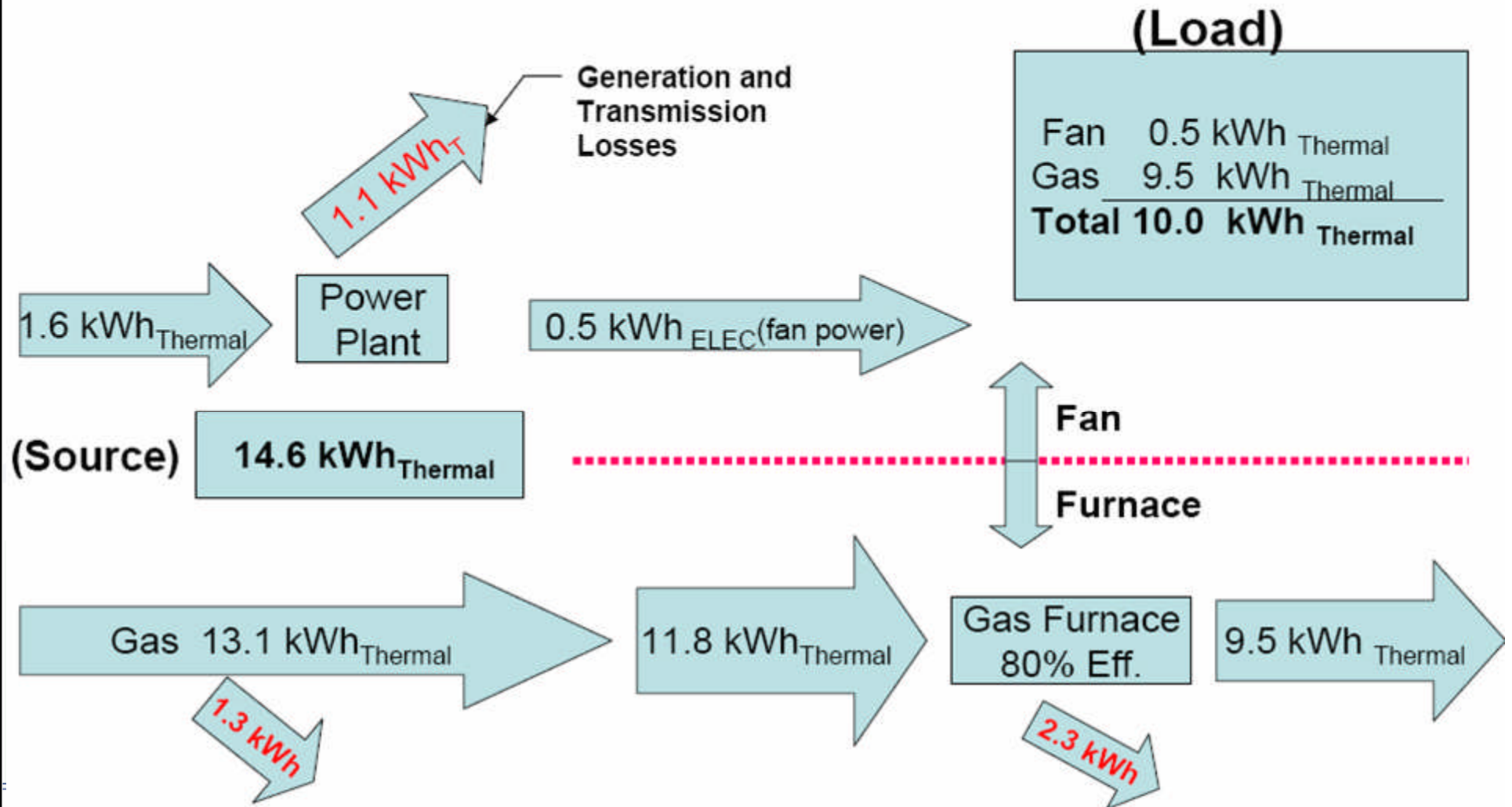
Air Source Heat Pump



The required input energy to deliver 10 kWh of heat to a home using an air-source heat pump would be 17 kWh. About 70% of the input energy is lost during the generation and transmission process of a typical fossil-fuel power plant. The air-source heat pump will deliver a COP of 2 when defrost and auxiliary heat penalties are properly applied.

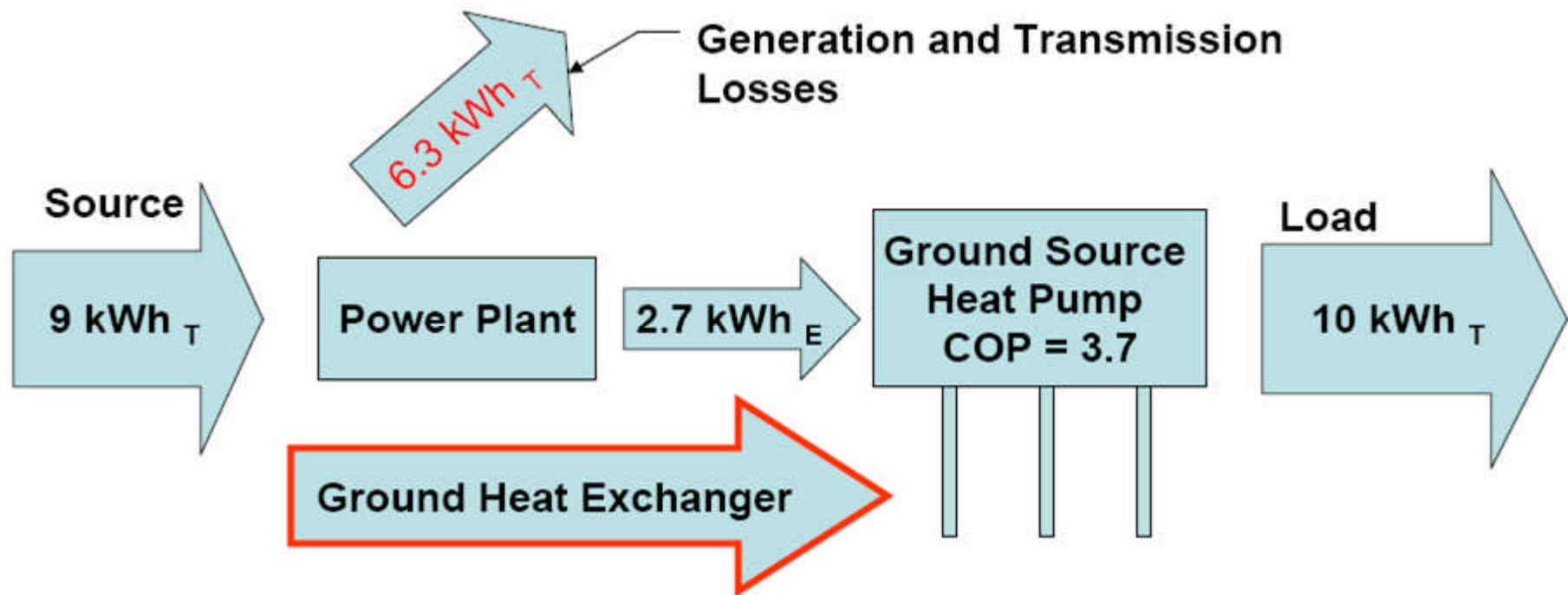
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Gas/Electric HVAC System



The natural gas system loses about 10% in the transmission process and another 10 to 20% at the furnace. Electricity is also needed for the furnace fans. The total required to deliver 10 kWh to the building is 14.6 from the source. This is an overall efficiency of 68% source to delivered.

Ground Source Heat Pump



GSHP require only 9 kWh_T from the source to provide 10 kWh_T to the building since they can provide a COP of 3.7

Cash Flow Comparison of Annual Operating Costs of Various HVAC Systems

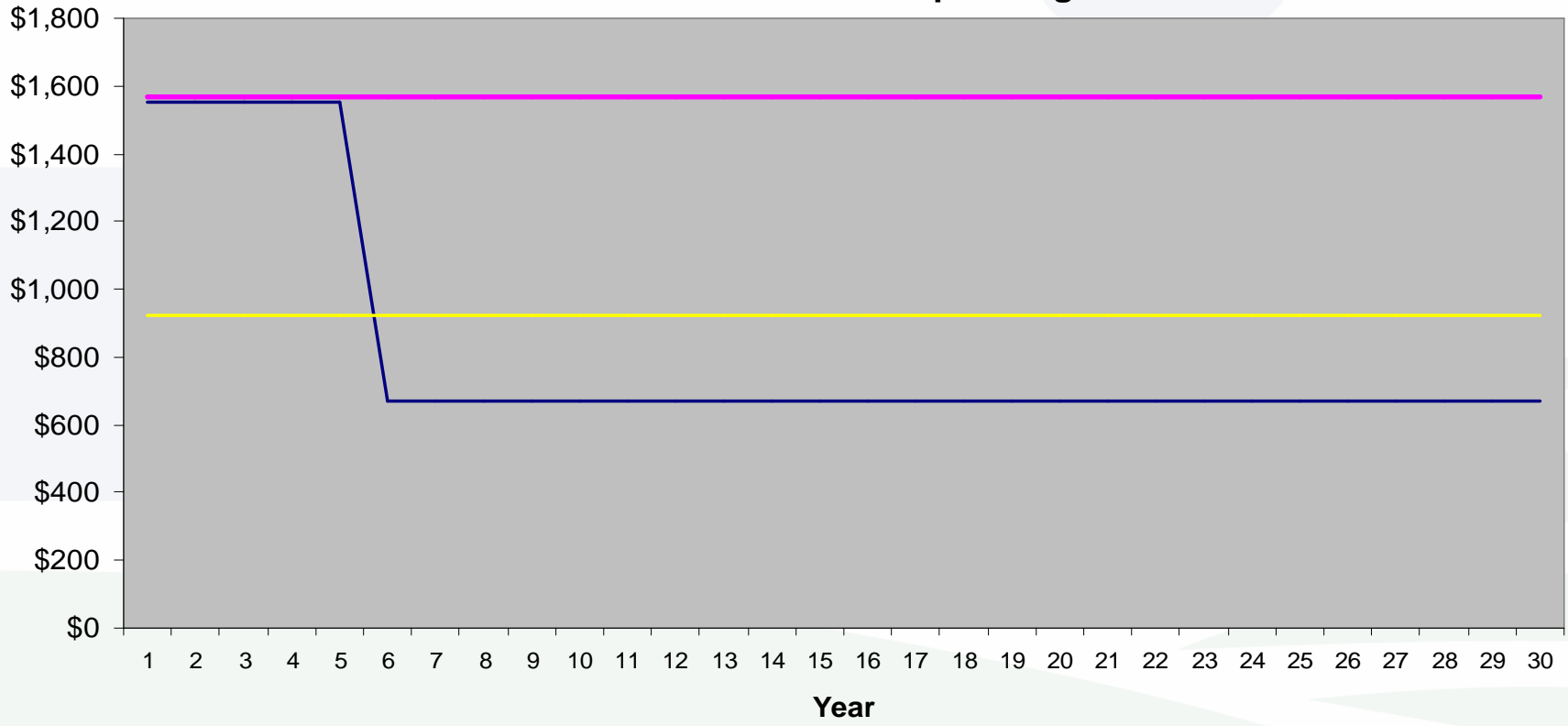


□ Annual Geo-loop costs □ Annual Natural Gas costs □ Annual resistance heat costs □ Annual Propane Cost



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Annual Life Cycle Comparison of Heat Pump Operating and GeoLoop System Financing Costs versus Natural Gas/Electric HVAC Operating Cost



— Geo cost with 60 month loop debt — Natural gas cost — Geo cost with 360 month loop debt



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A Policy Proposal

- Make 30 year financing available to distribution cooperatives for utility owned geothermal ground source loops to minimize initial cost barrier to installation of geothermal systems in order to reduce need for new generation and to better use existing and new generation.

Why a Rural Development Utilities Program?

- Coop ownership and long term financing can ameliorate consumer resistance to high up front costs (often double the cost of an air source heat pump or Gas/Electric HVAC.)
- Pioneers among the electric cooperatives are ready to implement.
- Electric cooperatives have the business acumen to develop the widespread acceptance & commercialization of the technology.
- Displaces the need for RD financing of new generating plants.



- Job creation using existing skills and tools.

Peak Demand and Energy Efficiency

- Summer Peaks dominated by air conditioning
- DSM controls on air conditioning and water heaters
- 10 SEER vs 15 SEER reduces point demand by 33%
- Further reduction in demand if we heat water with heat rejected by AC

Rural Development's Programs

- Housing & Community Facilities
 - Business and Cooperative
 - Utilities

Housing & Community Facilities

- **Single-Family Housing**
 - Rural Housing Guaranteed Loan
 - Rural Housing Direct Loan
 - Housing Repair & Rehabilitation Loan
 - Housing Repair & Rehabilitation Grant
 - Self-Help Technical Assistance Grant
 - Mutual Self-Help Loans
 - Rural Housing Site Loans
 - Individual Water & Waste Grants
 - Housing Application Packaging Grants
 - Homes for Sale
- **Multi-Family Housing**
 - Farm Labor Housing Loans and Grants
 - Rural Rental Housing
 - Housing Preservation Grant
 - Guaranteed Rental Housing
 - Rental Assistance Program
- **Community Facilities Programs**
 - Direct & Guaranteed Loans
 - Grants



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Business and Industry

Business and Industry Guaranteed Loan (B&I) Program
Intermediary Relending Program (IRP)
Rural Business Enterprise Grant (RBEG) Program
Rural Business Opportunity Grant (RBOG) Program
Rural Economic Development Loan and Grant (REDLG)
Renewable Energy and Energy Efficiency Program
(REEEP)



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Colorado State Director for USDA Rural Development
Michael E. (Mike) Bennett



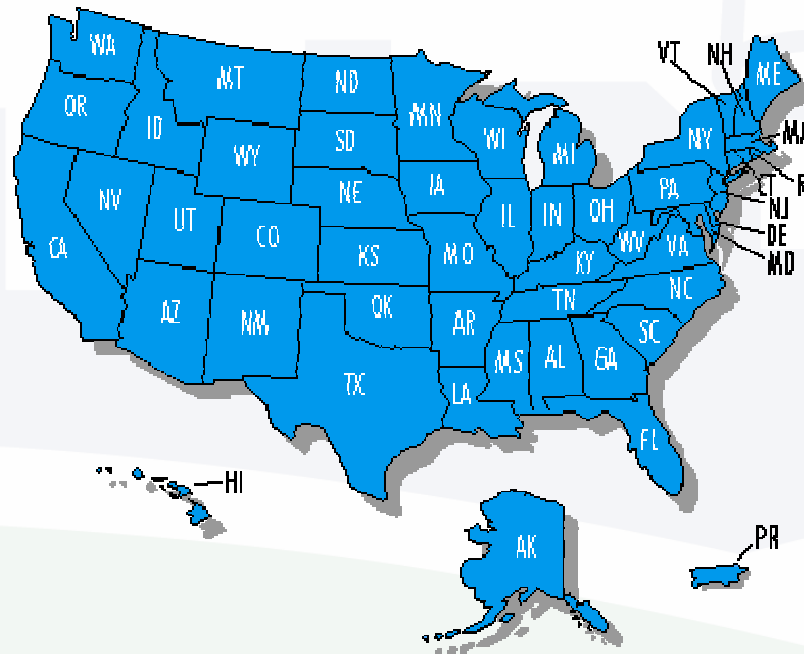
Welcome to the website of Colorado USDA Rural
Development

<http://www.rurdev.usda.gov/co/index.htm>



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Rural Development State Offices



http://www.rurdev.usda.gov/recd_map.html



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Title I - Rural Electrification

SEC. 2. GENERAL AUTHORITY OF THE SECRETARY OF AGRICULTURE.

(a) LOANS. – The Secretary of Agriculture (referred to in this Act as the ‘Secretary’) is authorized and empowered to make loans in the several States and Territories of the United States for rural electrification and the purpose of *furnishing and improving electric and telephone service* in rural areas, as provided in this Act, and for the purpose of assisting borrowers *to implement demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems.*

cite-Rural Electrification Act with amendments

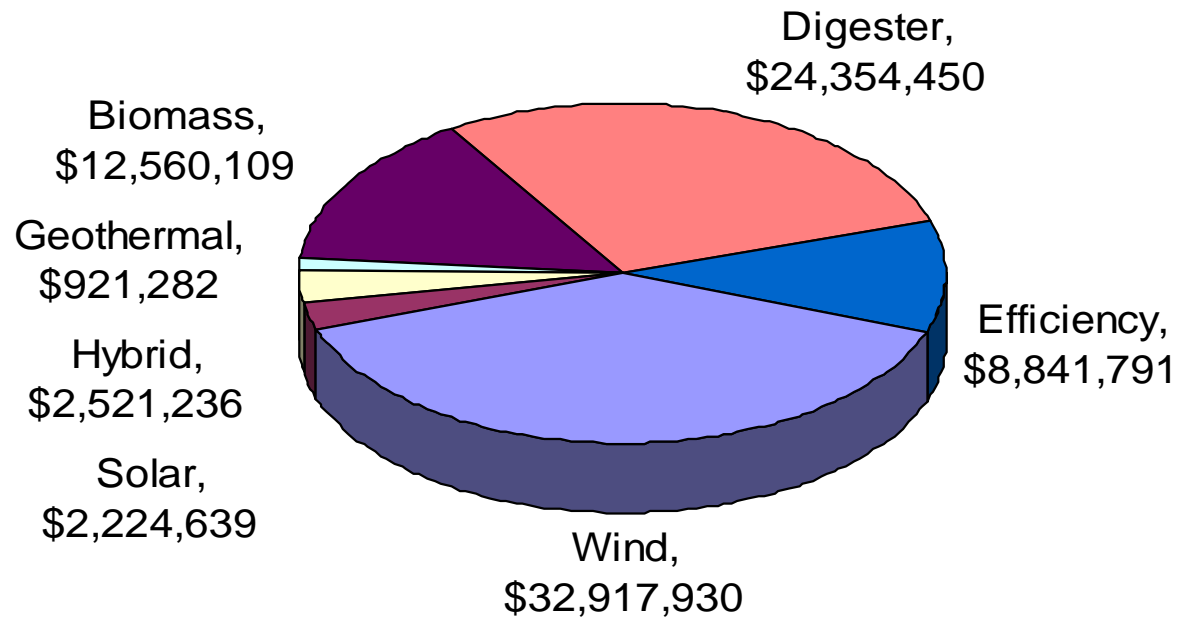


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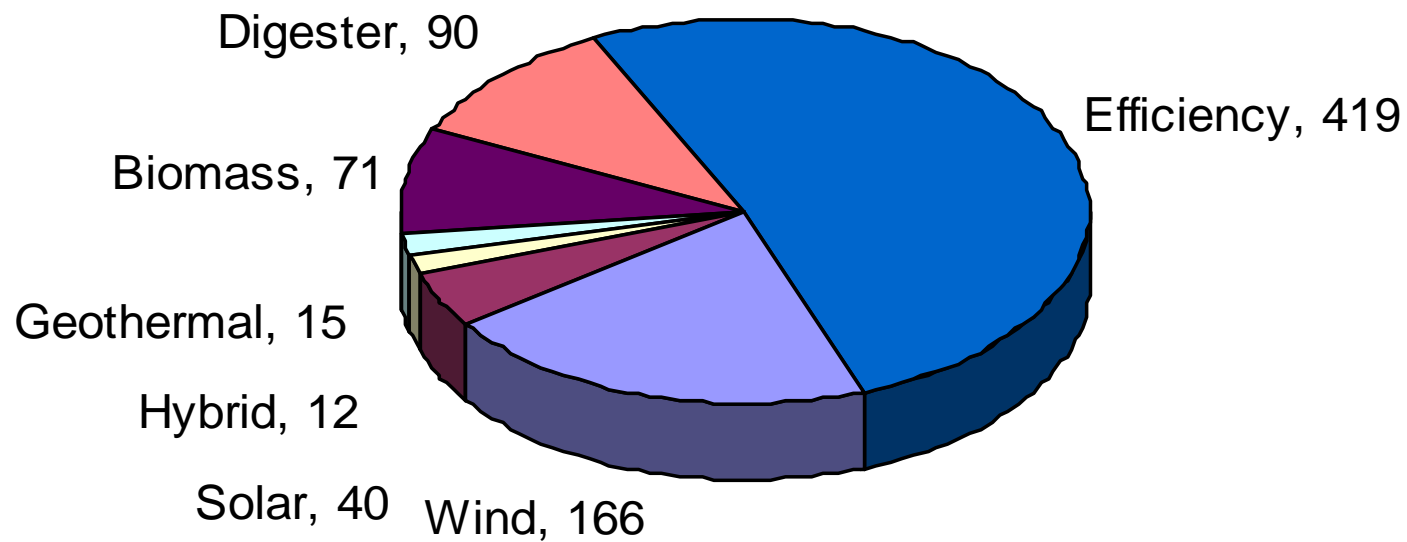
Utilities

- **Electric Programs**
 - Generation
 - Transmission
 - Distribution
 - Demand Side Management
 - Energy Conservation/Efficiency
 - Renewable Energy Systems

Section 9006 Award Dollars by Technology



Section 9006 Award Numbers by Technology



Factors Affecting Geographic Distribution

- State energy teams
 - energy project support infrastructure
- Level of involvement of State Office
 - outreach, networks, applicant support, decentralized approach
- State level incentive programs
 - RPS, grants, loans, rebates

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Credits

- Paul Boney
Delta Montrose Electric Association
- Tony Ahern and Staff
Buckeye Power, Inc
- Dr. James Bose
International Ground Source Heat Pump
Association

Georg A Shultz
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