# *KINARD MIDDLE SCHOOL*
# *&*
# *ROBERTS K-8 MIDDLE SCHOOL*

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# Kinard MS

Architect:  RBB Architects

Photographer: Fred Fuhrmeister



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# Roberts K - 8

Main Entryway

# Kinard & Roberts
# Fast Facts

- Kinard size – 112,735 Square Feet (800 + students)
- Roberts size – 105,875 square feet (688 students)
- Designed – 2004/2005
- Constructed – Spring 2005 thru June 2006
- Occupied Fall 2006
- Kinard Construction Cost - $17,000,000 ($150.80/SF)
- Kinard 5th High Performance/Sustainable School in Colorado-4th in PSD

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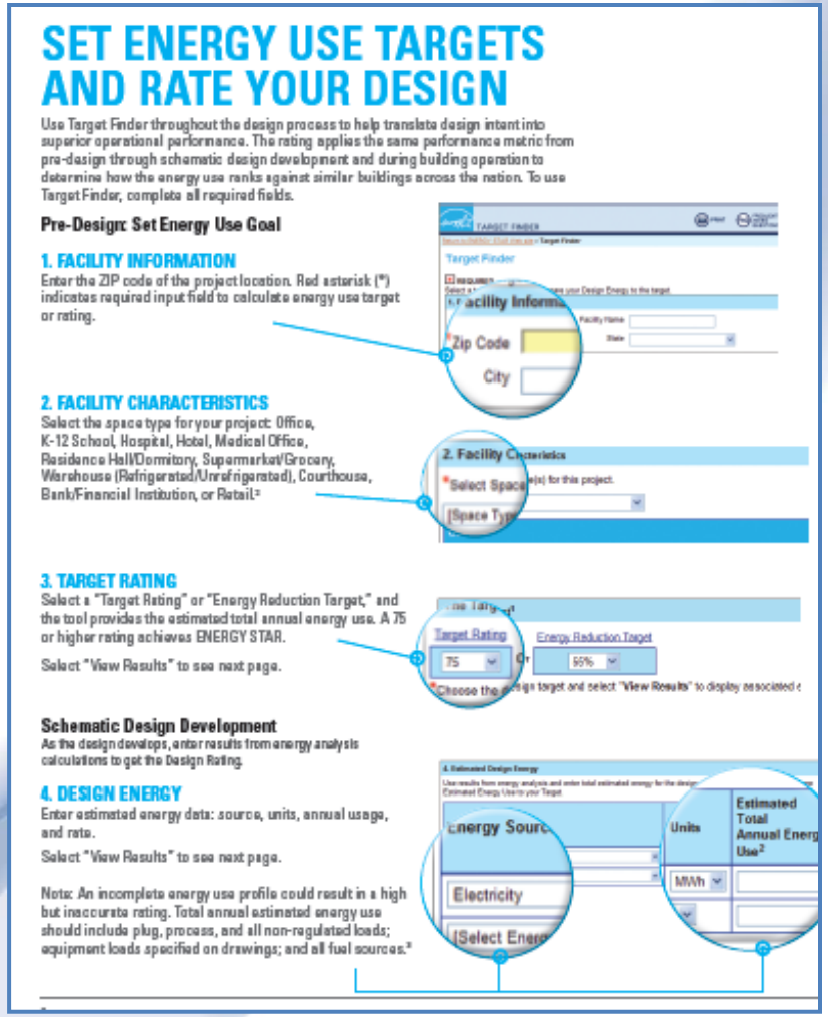
# Kinard Designed to Earn The ENERGY STAR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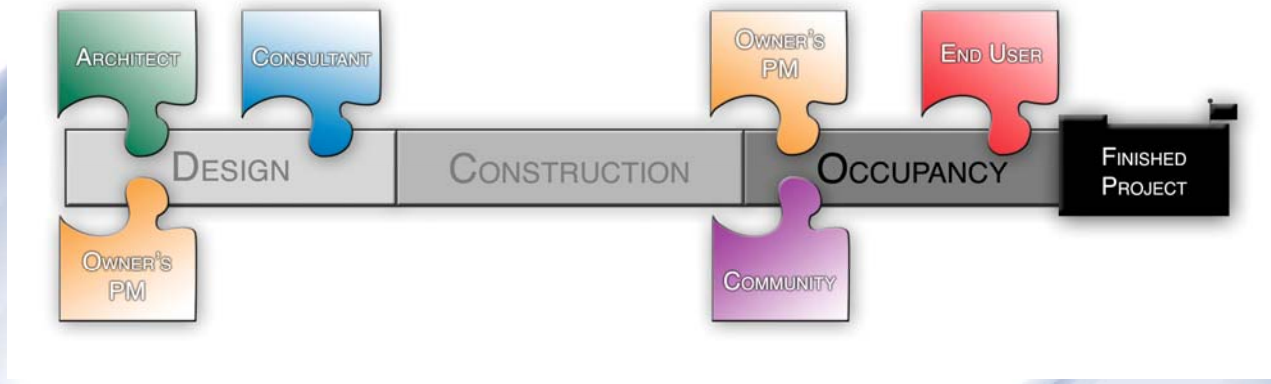
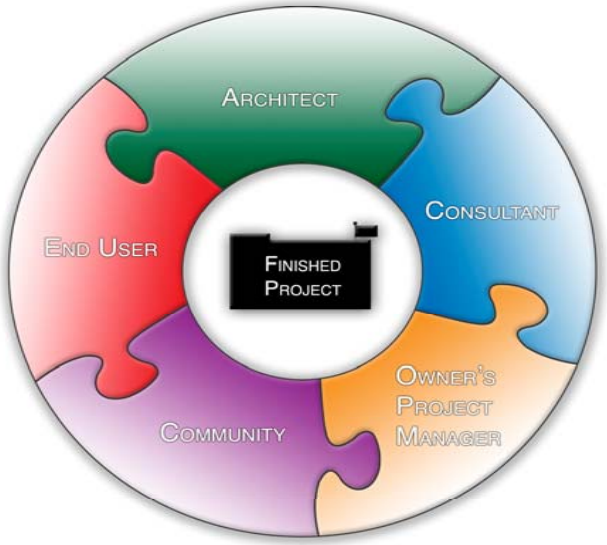
# Traditional Design vs. Integrated Design

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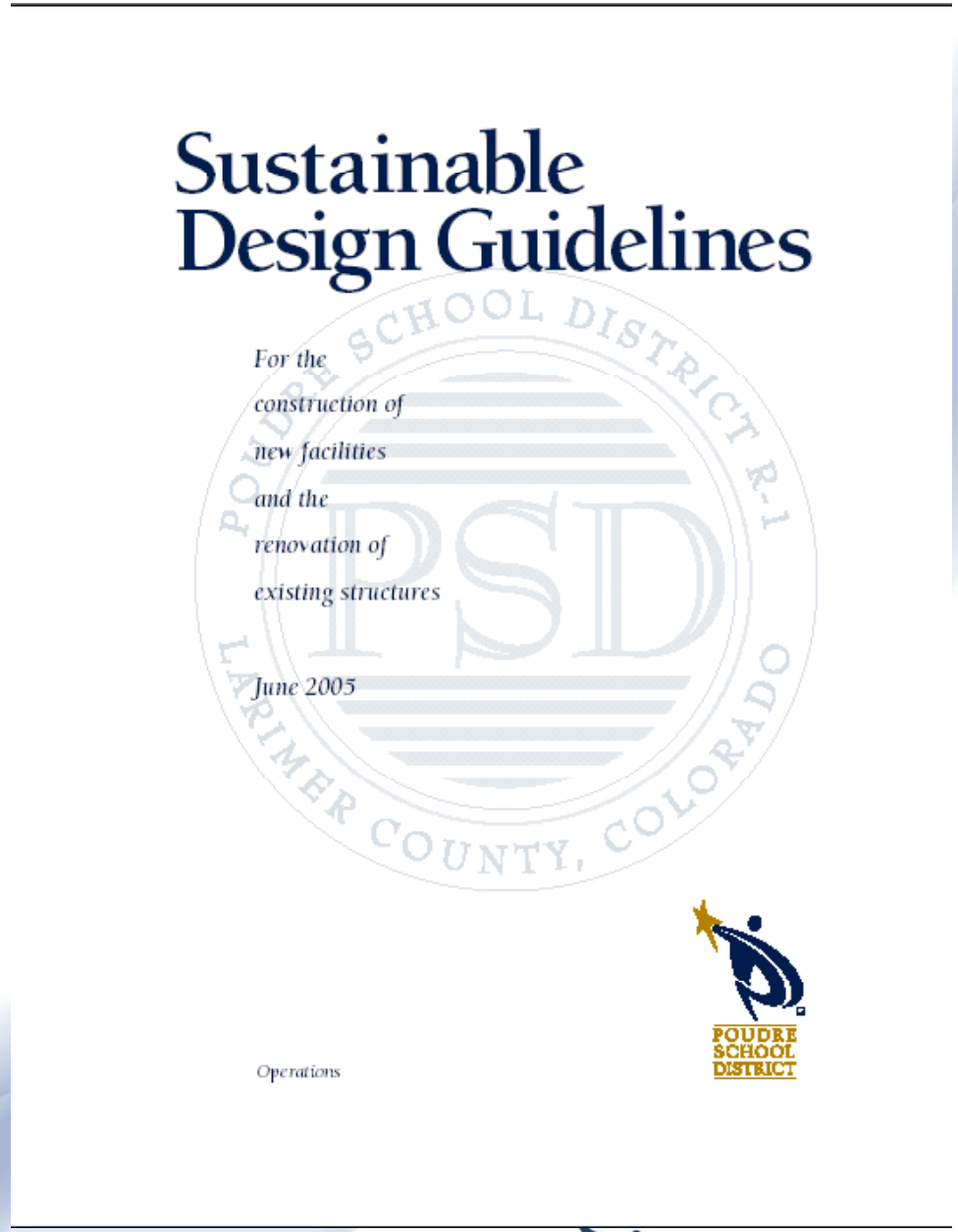
## Integrated Design:

- Involve <u>All</u> Stakeholders at all stages
- Buildings That Teach: Great Educational Opportunity
- Materials & Resource Consumption
- Building Components & Systems
- Impact on Natural Resources



# Kinard MS Sustainable Strategies

- "Micro-Loaded" Building
- Building Transparency
- Operable Windows
- Non-toxic Materials
- Daylighting / Controls
- Occupancy Sensors
- $CO^2$ Sensors
- Electronic Ballasts
- T-8 & T-5 Lamps
- Variable Frequency Drive Motors
- HVAC Reheat System
- Super Insulation
- Ground Source Heat Pump System
- Energy Management System

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3” Sprayed-On Polyurethane Insulation

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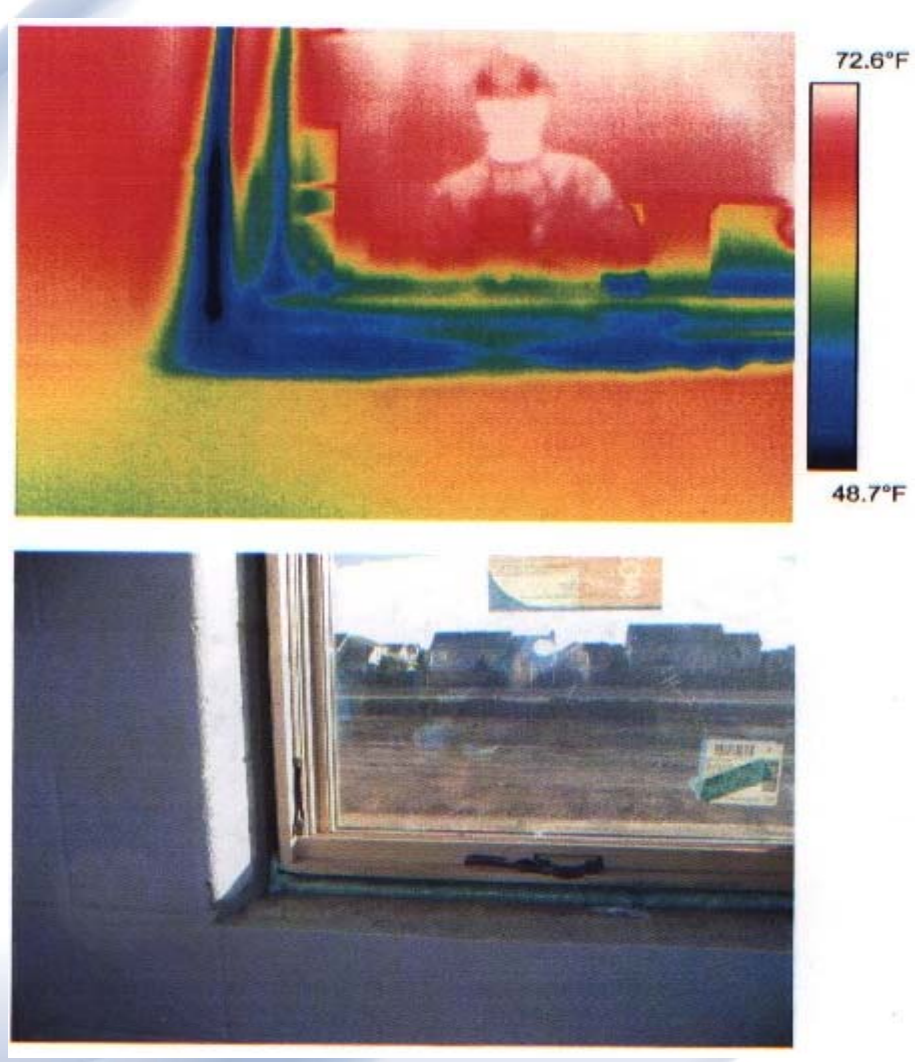
# Infrared Camera

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## *Kinard GSHP System*

- 100 Wells (300’ deep)
- 72 Heat Pumps


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# Roberts K-8 GSHP System

- 264 Wells (300’ deep)
- 66 Heat Pumps

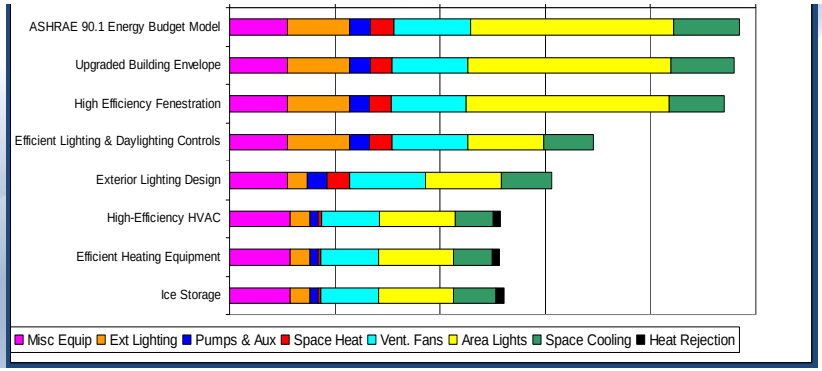
# Lake Kinard-Summer 2005

# Energy Modeling for Design Decisions and Accountability

The following table shows the energy comparison of the final design building and the budget building energy use.

| | ASHRAE 90.1 Energy Cost Budget | Actual Design Energy Cost |
|---|---|---|
| Annual Electric Energy (kWh) | 725,180 | 535,302 |
| Average Electric Demand (kW) | 315 | 236 |
| Annual Natural Gas (MBtu) | 1,728 | 1,433 |
| Energy Use Index (kBtu/ft$^2$) | 36.2 | 28.1 |
| Electric Energy Cost | $13,053 | $9,635 |
| Electric Demand Cost | $17,258 | $12,938 |
| Natural Gas Cost | $11,350 | $9,415 |
| Total Annual Energy Cost | $41,661 | $31,988 |
| Fraction of Energy Budget | 100% | 77% |

As can be seen, the actual design has 77% of the energy cost of a similar building meeting the ASHRAE 90.1 Standard.

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# Kinard Natural Daylighting

- North / South translucent clerestory gym design
- Pyramidal ceilings around solatubes in classrooms
- LightLouver for 6 south science classrooms
- Daylighting throughout school support spaces
- Open loop control with PLC Multipoint sensors

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# Design Impacts

- DPS Design Standards –20 Deg. for Heating & 100 Deg. for Cooling
- PSD Design Standards-5 Deg. for Heating & 90 Deg. for Cooling
- DPS Includes Several Redundancy's
- PSD Does Not
- Overall Impact to Mechanical System Sizing & Energy Performance
- Though Cx of Building Mechanical & Electrical/Lighting Systems

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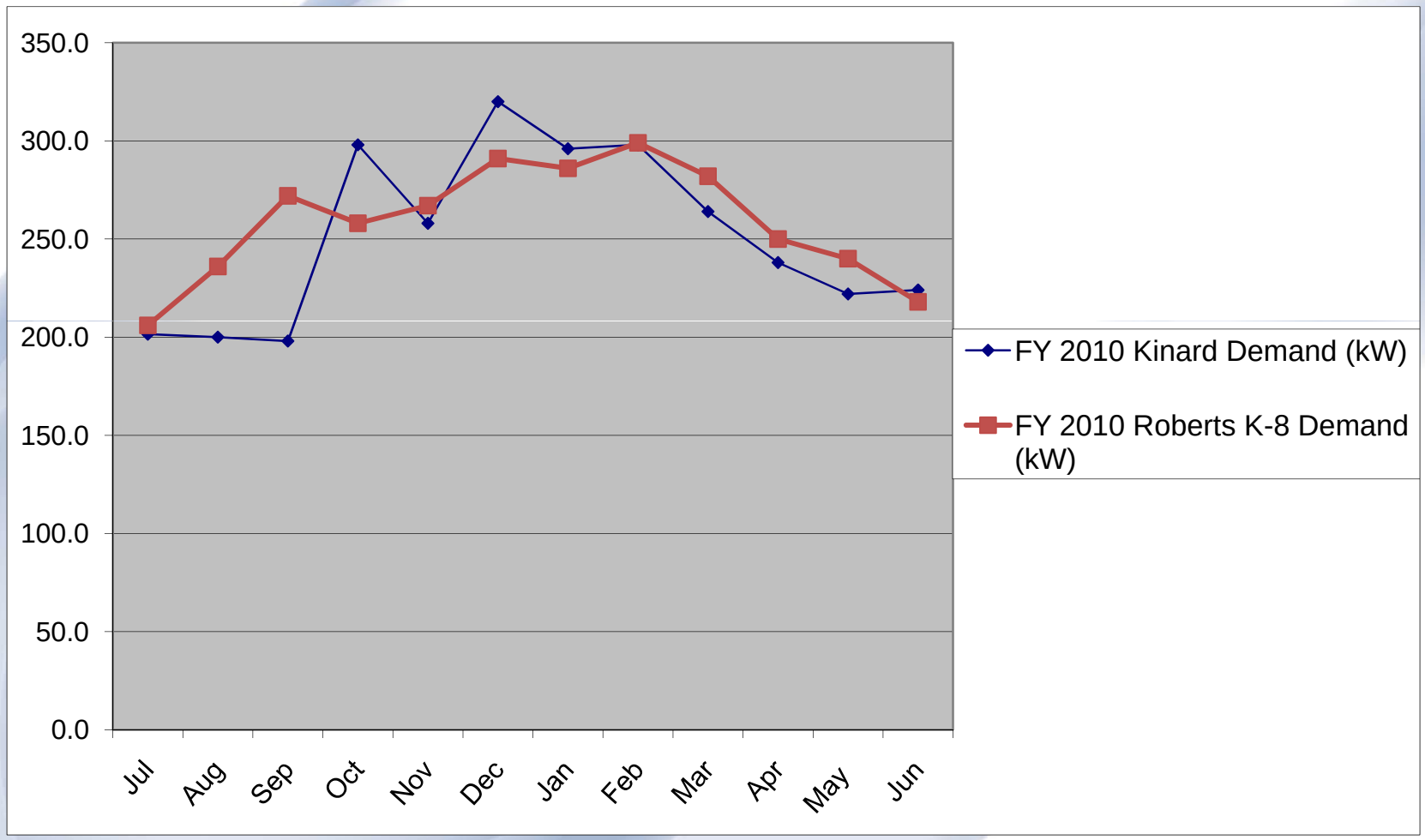
# Electric Demand - KW

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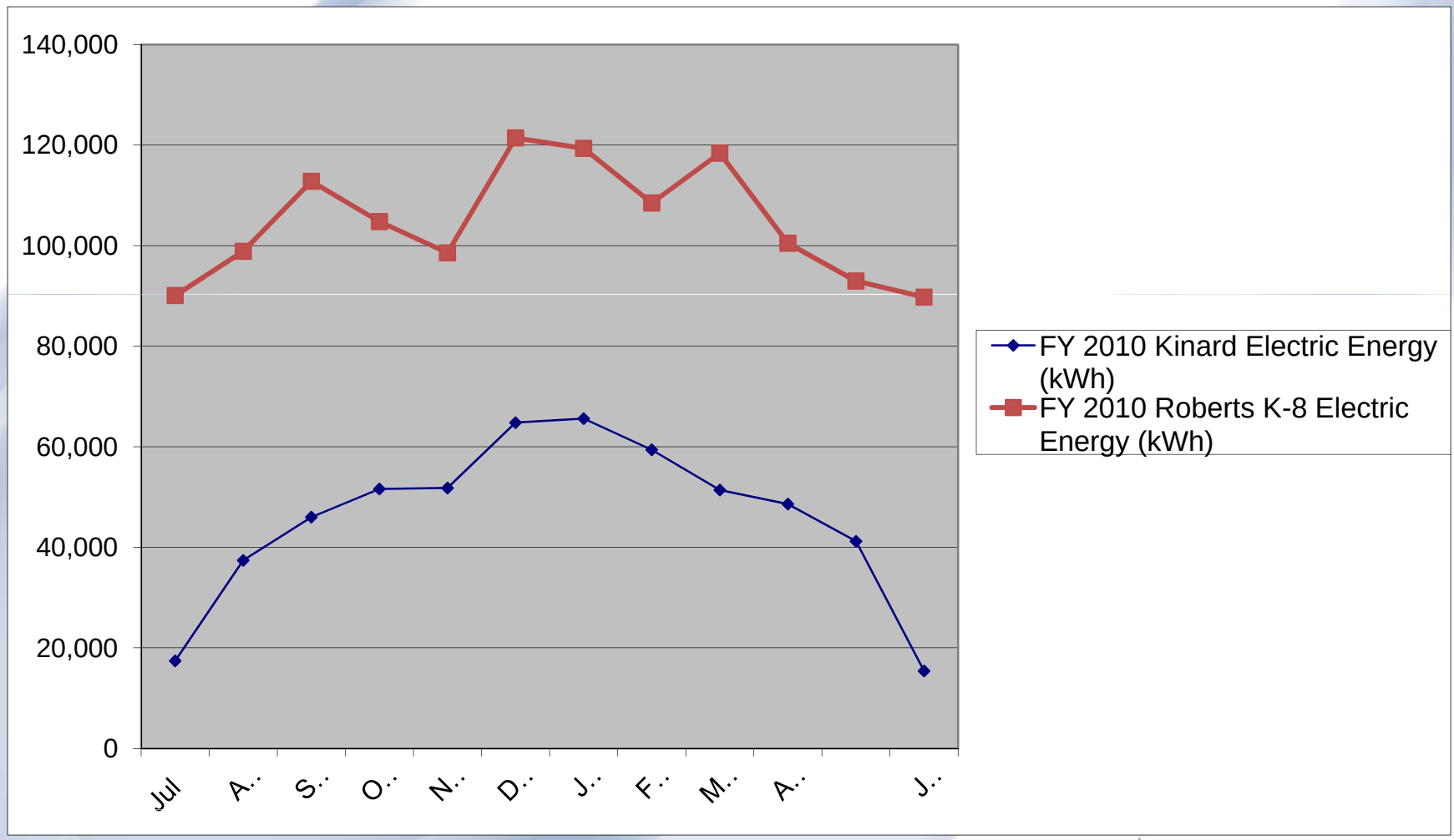
# Electric Usage – KWH

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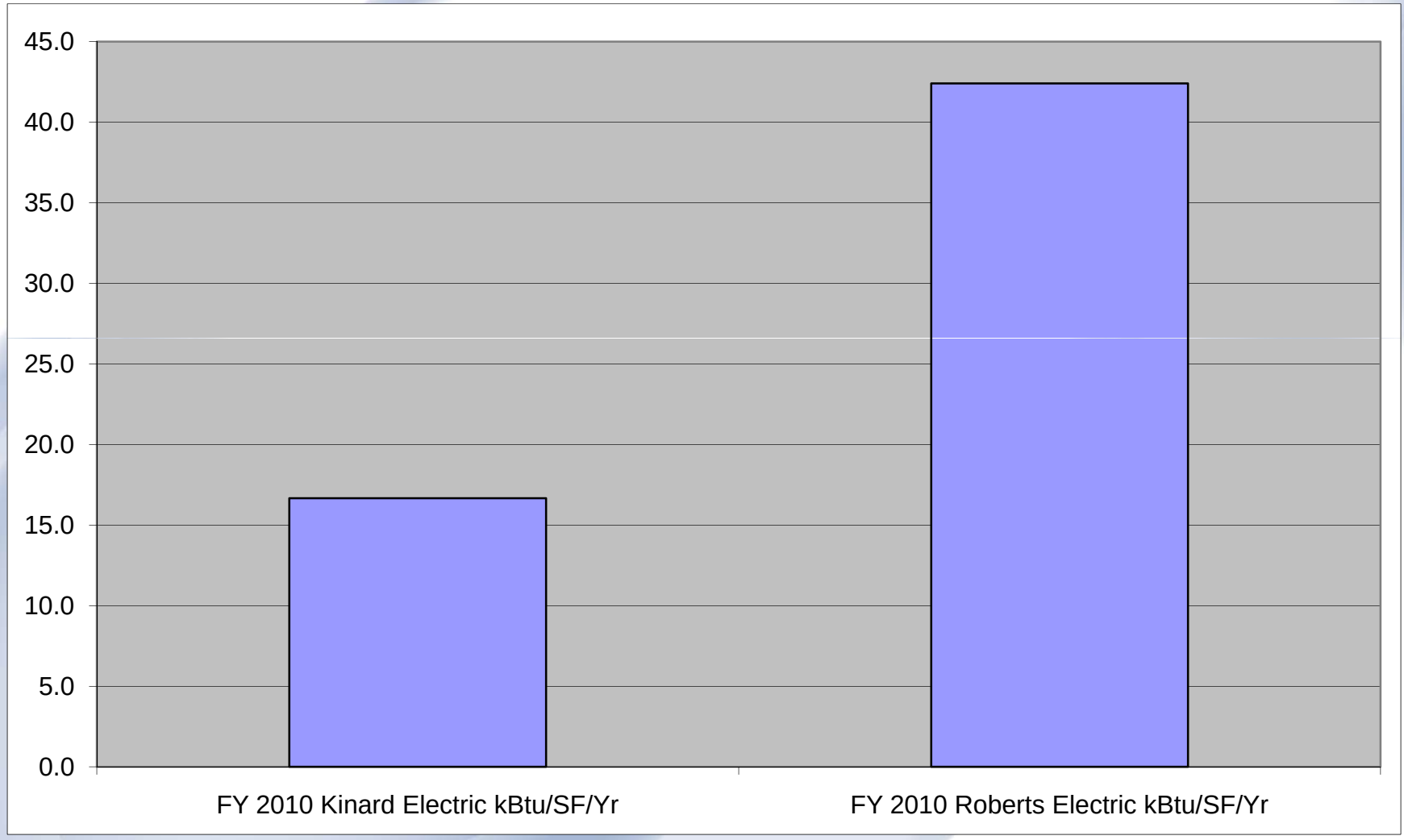
# Electric kBtu/Sq.Ft./Yr.

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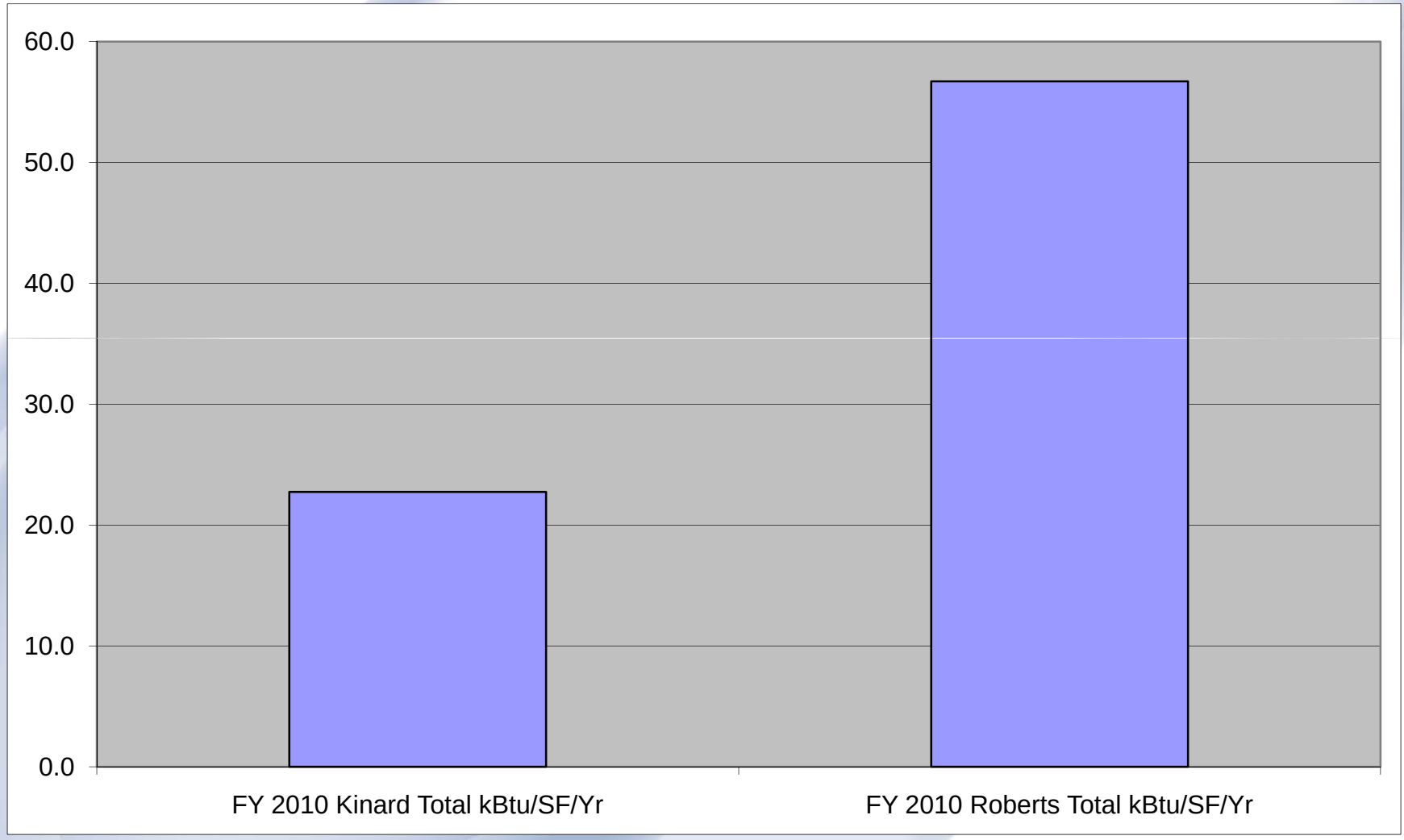
# Total kBtu/Sq.Ft./Yr.

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# “Got to Be Blue to Be Green”


First ENERGY STAR labeled building that had also achieved “Designed to Earn the ENERGY STAR”for its design plans:
Kinard Junior High School, Fort Collins, CO


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