A Deep Dive into Energy-Efficient School Design
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Dan Hess, Dull Olson Weekes—IBI Group Architects, Inc.
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Energy Trust of Oregon: Incentives & Resources for Energy-Efficient Schools
About

• Independent nonprofit
• Serving 1.5 million customers of Portland General Electric, Pacific Power, NW Natural and Cascade Natural Gas
• Providing access to affordable energy
• Generating homegrown, renewable power
• Building a stronger Oregon and SW Washington
A clean energy power plant

• 368 average megawatts saved
• 110 aMW generated
• 28.2 million annual therms saved
• Enough energy to power 370,000 homes and heat 55,000 homes for a year
• Avoided 8.4 million tons of carbon dioxide
Energy Trust service territory
Eligibility

• Oregon customer of Portland General Electric, Pacific Power, NW Natural or Cascade Natural Gas

• Pay or plan to pay the public purposes charge

• Located in Oregon

• Commercial, institutional, industrial or multifamily building
Case Study:
Parkrose District Bond Projects
Parkrose bond projects & sustainability: Background and history

- Bond planning process: Community engagement
- Approach: Analysis and verification
- Goals: Longevity and efficiency of systems
Overriding goal:
Focus on energy efficiency

Approach:
• Community Engagement
• Community Support
• Community Oversight
Energy Trust New Buildings
Incentives & Resources
Projects served:

- New construction
- Major renovation
- Tenant build-out
- Additions or expansions
## Incentives & resources

<table>
<thead>
<tr>
<th>Design Solutions</th>
<th>Installation Incentives</th>
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<tbody>
<tr>
<td>• Early design assistance</td>
<td>• System-by-system options:</td>
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<tr>
<td>• Energy modeling</td>
<td>• Standard equipment</td>
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<td>• Commissioning</td>
<td>• Lighting &amp; HVAC calculators</td>
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<td>• Special measures</td>
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<td>• Whole-building approaches:</td>
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<td>• Modeled savings</td>
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<td>• LEED®</td>
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<td>• Market solutions</td>
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</table>
Design solutions

• Early design assistance: up to $2,500 for projects in schematic design or earlier

• Energy modeling: up to $25,000 to offset the costs of whole-building energy modeling

• Commissioning: offsets costs commissioning energy-efficient systems
System-by-system options

<table>
<thead>
<tr>
<th>Standard equipment</th>
<th>Lighting &amp; HVAC</th>
<th>Special Measures</th>
</tr>
</thead>
</table>
| • Incentives for installing equipment that meets specific energy-efficiency criteria. | • Excel-based tools for calculating savings and incentives.  
• Lighting calculated based on reduction of lighting power density in an interior space.  
• HVAC calculated based on percent efficiency above current code requirements. | • Incentives for energy-efficient equipment or systems that exceed code requirements, but do not fit within the current incentive structure. |
## Whole-building approaches

<table>
<thead>
<tr>
<th>Modeled Savings</th>
<th>LEED</th>
<th>Market Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Incentives based on savings beyond code as determined by a whole-building energy model</td>
<td>• Incentives for projects that achieve any level of LEED certification from the U.S. Green Building Council</td>
<td>• Incentive packages tailored to specific building types</td>
</tr>
<tr>
<td></td>
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<td>• Six options for small commercial buildings under 70,000 square feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A special incentive package for data centers</td>
</tr>
</tbody>
</table>
Case Study:
Parkrose Middle School
Setting sustainability goals

The Parkrose approach for a LEED® Gold school:

• Process: Community engagement
• Goal: Community support
• Results: Community oversight
What resonated in Parkrose

• Good for the children—a healthy school:
  • Indoor air quality
  • Low-emission materials
  • Daylight

• Good for the school district—a common sense approach to the bottom line:
  • Energy efficiency
  • Renewable energy
  • Commissioning and verification
What resonated, cont.

Good for the future—a building that is good for the planet:

- Storm water quality
- Regional materials
- Recycled content
- Heat island effect
Parkrose Middle School design process

• Community goal-setting for sustainability

• Integrated design workshop
  • Energy Trust representative
  • Architect
  • Mechanical engineer
  • District staff

• LEED
  • Goal-setting
  • Cost-benefit analysis
  • Prioritization

• Energy modeling

• Incentive analysis
Beyond Parkrose middle school

Sustainability across the Parkrose school district:

• Integrated design approach on infrastructure projects
• Four elementary school upgrade projects ranging from $1 million to $4 million
• Energy Trust incentives on all projects
• A net-zero multipurpose room
<table>
<thead>
<tr>
<th>School</th>
<th>Electric savings (kWh)</th>
<th>Gas savings (therms)</th>
<th>Total incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescott ES</td>
<td>19,024</td>
<td>0</td>
<td>$12,750</td>
</tr>
<tr>
<td>Major reno/addition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russell Academy</td>
<td>3,366</td>
<td>151</td>
<td>$3,850</td>
</tr>
<tr>
<td>Major reno</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russell Academy</td>
<td>9,436</td>
<td>0</td>
<td>$1,470</td>
</tr>
<tr>
<td>Net zero MPR addition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sacramento ES</td>
<td>5,933</td>
<td>13,740</td>
<td>$28,460</td>
</tr>
<tr>
<td>Major reno/addition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaver ES</td>
<td>5,300</td>
<td>6,570</td>
<td>$15,825</td>
</tr>
<tr>
<td>Major reno</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaver ES</td>
<td>9,301</td>
<td>0</td>
<td>$1,438</td>
</tr>
<tr>
<td>Net zero MPR addition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkrose MS</td>
<td>88,166 (est)</td>
<td>14,480 (est)</td>
<td>$41,070 (est)</td>
</tr>
<tr>
<td>New construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>140,526</td>
<td>34,941</td>
<td>$104,863</td>
</tr>
</tbody>
</table>
Hey school, congratulations. You’re all set to deliver a higher efficiency education.
School incentives & requirements

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>INCENTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEST</td>
<td>“Good” requirements + six additional electives</td>
</tr>
<tr>
<td>BETTER</td>
<td>“Good” requirements + four to five electives</td>
</tr>
<tr>
<td>GOOD</td>
<td>15% reduction in lighting power density above current code requirements + 10% reduction in fan static pressure + two electives</td>
</tr>
</tbody>
</table>
School electives include:

- Exterior lighting
- Bi-level lighting in corridors
- Plug loads
- ENERGY STAR cooking equipment
- Variable frequency drives
- Domestic hot water
- Premium electives*
- Special measures**

*Visit our website for a full list of premium incentives
**Special measures refer to design features that are not specified here but may qualify for incentives.
Path to net zero

• Enhanced design and technical assistance
• Solar ready
• Installation incentives
• Commissioning
Net-zero multipurpose room—Shaver Elementary School
Shaver multipurpose room: key features

- R20 rigid insulation with R19 batts at walls
- R30 at roof
- R10 under slab
- Heat recovery ventilation
- Heating and cooling from radiant slab
- Air-to-water heat pump
- Skylights to maximize natural light
- 12-kilowatt, kW, solar electric array
Commercial Solar Incentives & Resources
Solar ready incentives

Incentives and technical guidance to reduce costs:
- Solar assessment
- Solar ready design
- Solar ready construction

Templates and tools to simplify the design process
# Solar electric incentives

<table>
<thead>
<tr>
<th>UTILITY</th>
<th>INCENTIVE</th>
<th>PROJECT MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGE</td>
<td>0-25 kW: $1.30/watt</td>
<td>$180,000</td>
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<tr>
<td></td>
<td>26-250 KW: $1.30-$0.72/watt</td>
<td></td>
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<tr>
<td>Pacific Power</td>
<td>0-35 kW: $0.90/watt</td>
<td>$80,000</td>
</tr>
<tr>
<td></td>
<td>36-200 kW: $0.90-$0.40/watt</td>
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Design challenges: When reality and dreams collide

- Integrating the energy model early in the design process
- Maintaining sustainable goals during value engineering
- Making sustainability visible—not just a plaque on the wall
- Training staff to lose old habits
Construction process

- Developing an integrated process between architect and contractor
- Importance of ongoing record keeping
- Managing subcontractors
- Expecting the unexpected/preparing for construction challenges
Thank You
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Anna Todd, Project Manager, atodd@toddconstruction.com, 503.620.7652