Energy Efficiency in the Public Sector: K-12 School Districts

Crystal McDonald, Policy Advisor
New Hampshire High Performance Schools Summit
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Overview

• Weatherization & Intergovernmental Programs (WIP)
• Partnerships and Technical Assistance Team
• Energy Impact
• Engagement with K-12 School Districts
• Energy Champions
• Tools & Resources
WIP Mission & Structure

WIP Mission

• WIP is part of EERE’s “all of the above” national energy strategy to create greater energy affordability, security and resiliency.

• WIP’s mission is to enable strategic investments in energy efficiency and renewable energy technologies and innovative practices across the U.S. by a wide range of government, community and business stakeholders, in partnership with state and local organizations.

• WIP supports DOE’s strategic objective to lower energy costs while expanding energy choices for all American communities. WIP’s near-term activities produce almost immediate results, saving taxpayer dollars, making full use of domestic energy resources, boosting local economic development and job creation, cutting energy waste, improving energy independence and security, and furthering the development of energy infrastructure.
The Partnerships and Technical Assistance (P&TA) Team cultivates diverse partnerships, provides technical assistance and assists state and local governments to help them:

- **Develop an Energy Plan**
  - Local Energy Planning
  - State Energy Planning

- **Design and Implement Energy Programs**
  - Low-Income Communities
  - Wastewater Infrastructure
  - Outdoor Lighting
  - Energy Efficiency for K-12 Schools
  - Public-Private Partnerships

- **Pay for Energy Infrastructure**
  - EE Finance 101
  - ESPCs, QECBs, PACE, RLFs

- **Access and Use Energy Data**
  - Benchmarking
  - Data Disclosure & Transparency
  - Evaluation, Measurement, & Verification (EM&V)

The P&TA Team serves as the nexus of state and local governments to catalyze lead-by-example programs by:

- Developing tools and solutions to barriers facing state and local government utilization of efficiency and renewable energy;

- Convening and creating peer exchanges to showcase public-sector leadership and effective public-private partnerships; and

- Providing information from leading technical experts.

**Resulting Benefits:** P&TA supports the energy priorities of state and local governments to save taxpayer dollars and make full use of domestic energy resources, boost economic development and job creation, cut energy waste, improve energy independence and security, and further develop energy infrastructure.
The goal of the Better Buildings Challenge (BBC) is to improve the efficiency of American commercial, institutional, and multifamily buildings and industrial plants by 20% or more over 10 years. WIP’s P&TA Team manages the BBC public sector (state, city and K-12) partners.

**WHAT ARE THE RESULTS SO FAR?**

Public Sector Better Buildings Challenge Partners are having a tremendous impact!

- **Energy Saved:** 45 trillion Btus
- **Dollars Saved:** $420 million
- **Avoided carbon emissions:** 2.9 million tons
- **Water Saved:** 1.5 billion gallons

*Cumulative results through 2016*
K-12 School District Facilities

CHALLENGE
• > 50 million students
• ~ 130,000 school buildings
• 1,000 hours and 200 school days
• Utility expenditures ~ $10 billion

OPPORTUNITY
• Manage energy costs and maintain healthy learning environments
• Leverage STEM academic requirements, learning labs
• Redirect utility expenditures back into the classrooms
Energy Uses in a Typical Building

Key Areas of Energy Consumption in Educational Facilities

Source: U.S. Energy Information Administration
McKinley Technology High School is one of five specialized secondary schools in the district. Show More
McKinley Tech HS – Energy Benchmarks

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Size (FT²)</th>
<th>EUI (KBTU/SF/YR)</th>
<th>Annual Energy Cost</th>
<th>Annual GHG Emissions (Tons)</th>
<th>Gas as % of Energy Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>282,200</td>
<td>87</td>
<td>$610,754.51</td>
<td>3,127.24</td>
<td>14.81%</td>
</tr>
</tbody>
</table>
Their mission is to provide an all inclusive instructional program to students that foster maximum academic achievement, enabling them to enjoy lifelong learning while becoming productive citizens. Show More
Dunbar High School – Energy Benchmarks

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Size (ft²)</th>
<th>EUI (KBTU/SF/YR)</th>
<th>Annual Energy Cost</th>
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</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>283,000</td>
<td>44</td>
<td>$393,023.29</td>
<td>1,996.13</td>
<td>3.9%</td>
</tr>
</tbody>
</table>

![Graph of Energy Consumption]

KW vs Time (3AM to 12AM)
**Energy Matters**

<table>
<thead>
<tr>
<th>Building</th>
<th>Size (Sq Ft)</th>
<th>Energy Use Intensity (KBtU/Sq Ft)</th>
<th>Annual Energy Cost</th>
<th>Annual GHG Emissions (Tons)</th>
<th>EnergyStar Score</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>
Energy Champions

Governance, Program & Policy
- Program Administration, Policy, Legislators, Commissioners, Superintendents, School Board Members

Facilities Mgmt. & Operations
- Energy Managers, Engineers, Architects, Technicians, Sustainability Coordinators

Support Services
- IT/Data Systems, Public Relations, Human Resources, Finance, Accounting

Partner Involvement
- Occupants, Customers, Consultants, Vendors

Support Services
Contact

Crystal McDonald
Better Buildings Challenge
K-12 Sector Lead
202-287-1799
Crystal.McDonald@ee.doe.gov
APPENDIX: Tools & Resources
DOE Contacts for Education Resources

- Better Buildings   Crystal McDonald, Crystal.Mcdonald@ee.doe.gov – Better Buildings Challenge, K-12 Sector Lead
- Fuel Cells/Vehicles  James Kast, James.Kast@EE.DOE.Gov, Fuel Cells Technologies Office
- Geothermal   Arlene Anderson, Arlene.Anderson@ee.doe.gov, Geothermal Technologies Office
- Science Bowl   Jan Tyler, Jan.tyler@science.doe.gov – National Science Bowl National Coordinator
- Solar Decathlon   Linda Silverman, Linda.Silverman@ee.doe.gov, Solar Decathlon Director
- SunShot Initiative Dave Rench-McCauley, Dave.Rench-McCauley@ee.doe.gov, Solar Energy Technologies Office
- Wind   Amber Passmore, Amber.Passmore@EE.DOE.Gov, Wind Energy Technologies Office Education Program
Follow Solar Decathlon!

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- **Vimeo**  [https://vimeo.com/channels/solardecathlon](https://vimeo.com/channels/solardecathlon)
Solar Resources for Green Ribbon Schools

• High school and more advanced students
  ❖ PV Online Training (electric code focused) - http://www.pvonlinetraining.org/
  ❖ Solar in Your Community Challenge – www.solarinyourcommunity.org

• College students and current professionals
  ❖ GEARED - www.gearedusa.org

• Local-level solar resources
  ❖ SunShot’s Solar Energy Resources Center - http://energy.gov/eere/sunshot/solar-energy-resource-center
  ❖ SolSmart - http://www.gosparc.org/

Stay updated: http://www.energy.gov/eere/sunshot/sunshot-initiative
• See interactive animations of how a Wind Turbine Works at energy.gov (http://energy.gov/eere/wind/animation-how-wind-turbine-works)
• Visit the Open Energy Information (OpenEI) Wind for Schools Portal to access data from turbines at U.S. schools and find educational resources for all grade-levels (http://en.openei.org/wiki/Wind_for_Schools_Portal)
• Learn more about wind energy challenges and competitions for middle and high schools through Kid Wind (http://www.kidwind.org/)
• Collegiate Wind Competition: http://energy.gov/eere/collegiatewindcompetition
• See what future career opportunities may exist in wind energy by visiting the Wind Career Maps (http://energy.gov/eere/wind/wind-career-map)
GTO Initiatives & Education

• GTO Reduce costs and risks of geothermal development
  o GTO Programs:
    – Hydrothermal;
    – Enhanced Geothermal Systems;
    – Low-Temperature and Coproduced
      ▪ Deep Direct-Use
      ▪ Ground Source Heat Pump Systems
    – Systems Analysis

  ▪ Student Design Competitions
Celebrate National Hydrogen & Fuel Cell Day on 10/8 (Held on its very own atomic-weight-day)

Learn more: energy.gov/eere/fuelcells
• The U.S. Department of Energy (DOE) National Science Bowl® (NSB) seeks to encourage middle and high school students to expand their knowledge of math and science, expose students to careers relevant to DOE’s mission, and raise the visibility of academic achievement in the sciences through a nationally prestigious academic event.

• Teams of four students each face off in a fast-paced question-and-answer format where contestants are quizzed on their knowledge of math and a range of science disciplines including biology, chemistry, Earth and space science, physics and energy (including DOE-related questions.)

• Each year, the NSB attracts more than 14,000 students nationwide. At the high school level, the 2017 National Science Bowl involved more than 9,000 students and at the middle school level, more than 5,000 competitors.
Zero Energy Schools Accelerator

www.zeroenergy.org

**Accelerator Goals**

- **Identify** strategies to overcome barriers to building ZE K-12 schools and realizing the associated health, savings, and resiliency benefits
- **Share** solutions, resources, and technologies that help schools achieve ZE goals
- **Develop** replicable road maps to build ZE schools and achieve associated benefits
- **Increase** visibility and replication of best practice approaches and successful models

**Implementing partners**

- State of Minnesota
- State of California
- State of Maryland
- Adams12 Five Star Schools
- Arlington Public Schools
- Boulder Valley School District
- Douglas County School District
- SFUSD
- Baltimore City Public Schools
- ACPS

**National partners**

- American Society of Heating, Refrigerating and Air-Conditioning Engineers
- Association for Learning Environments
- National Association of State Energy Officials
- New Buildings Institute
- Rocky Mountain Institute
- GEO-NII

- National Energy Education Development Project
- Southern California Edison
- Collaborative for High Performance Schools
- Green Ribbon Schools
K-12 School Districts are Eligible

**Known** – Still large potential for industrial/commercial energy savings, historic improvement focus has been on ad hoc projects, low hanging fruit

**We believe** - Best way to achieve the fullest EE potential is to adopt programs & policies that improve energy performance on a continuing basis

**Value of 50001 Ready Program** – Positions your organization to achieve and sustain energy and cost savings through informed systematic decision making

**What is 50001 Ready?**

- DOE program assisting and recognizing organizations for adopting a culture of continuous energy performance improvement
- Self-attesting, no certifications, no external audits, do-it-yourself with DOE free online resources
- Online energy management tools and guidance, can be rebranded/repurposed if desired

Participants are eligible for technical assistance. Contact Crystal Mcdonald at crystal.mcdonald@ee.doe.gov for more information.