# 2015 Oregon Schools Infrastructure Initiative

## Catalogs

Energy-use & Infrastructure data for all Oregon schools to aid in optimization, prioritization, and planning.

## Unlocks

Over $30M in existing school budgets each year via direct energy-cost savings. Higher savings will be realized by the schools most in need.

## Empowers

Local school staff & contractors to optimize and maintain their own HVAC systems and equipment, stimulating school communities across the state.

## Implements

Top-tier Energy Efficiency Measures (EEMs) and Retro-Commissioning (RCx) for schools in most need, with a Carbon offset equivalent of over 25,600 cars.

**"...commissioning is arguably the single-most cost-effective strategy for reducing energy, costs, and greenhouse gas emissions in buildings today."**

**- Mills et. al, 2009**

HVAC = Heating, Ventilating, and Air Conditioning

**Sharpenergy.net/HVAC-initiative.html**

# 2015 Oregon Schools Infrastructure Initiative

## Oregon is home to over 1,200 school communities

**Presently, there is no database of our Schools' HVAC or Seismic Infrastructure, and no accounting of Energy-use or Carbon footprint.**

**The majority of our schools have fixable HVAC problems that are weighting school budgets and costing tax-payers over $33M/year.**

**The 2015 Oregon Schools Infrastructure Initiative is a plan to fix this, and to quickly free up $30M every year in local school budgets.**

Sharpenergy.net/HVAC-initiative.html

**2015 Oregon School Infrastructure Initiative Finances** (Rev 4.10.15)

Key Assumptions:

- 1,250 K-12 schools in Oregon with 60,000 $ft^2$ average per school (CISF, audits & ODOE)
- $1.30 average energy cost for every $ft^2$ (projection per audits & ODOE)
- Statewide K-12 Schools Energy Costs = 1250 x 60,000 x 1.30 = $97M/year (broadbrush; program will verify)

Modeled Phasing, Costs and Savings -

**Year 1 (Phase 1)**

a) Regional teams are allocated $1,600 per school to verify Building areas, HVAC systems & utility-meters; and to confirm the already cataloged RVS Seismic Reliability. The gathered information will be combined with Utility & GIS data to allow accurate Phase 1 cataloging, and Phase 2 prioritization.
Project budget = $1.6k x1250 = $2M (12 month program)

b) Schools identified as lacking basic fan or pump scheduling are provided web-based time-clocks, and those with boilers lacking damper control are provided automatic flue dampers. Regional teams provide installation assistance for school staff and local contractors at no cost to the schools. Assumes 35% school inclusion with 1,100 units needed.
Project budget = $3M equipment and installation assistance
Savings (1 year payback) = $3M

c) *Optional* Installation of display screens in school lobbies to show facility energy-use & trends on editable pgs. Provide educational materials to help foster understanding of, and appreciation for, energy consumption and systems maintenance. 80% school inclusion expected. Monthly data entry to update both state database & school displays.
Project budget= .80 included x 1250 schools x $2k = $2M
Savings (1.5%) = .80 x .015 x $97M = $1.2M

**Year 2 (Phase 2)**

d) Top-tier schools identified in the Phase 1a) cataloging are entered into a Self-RCx program. Technical assistance and procedural guidelines are provided for local contractors and off-duty school staff to perform the work, learn the systems, and be able to perform ongoing maintenance. Schools are budgeted at $20k each, which will help cover required repairs. Priority maintenance lists will be generated for each school. 60% school inclusion expected.
Project budget = .60 x 1250 x $20k =$15M
Savings (17% savings for Top-tiers) = .60 x .17 x$97M = $10M/year

e) Verify proper installation and operation of Phase 1 and 2 items, evaluate program impact. Educational materials and assistance will be provided to assist schools in implementing effective ongoing maintenance plans.
Project budget = 1250 x .8k = $1M

**2-yr Initiative Totals** - **1st Year** 1-time Cost = $ 7M (incl.display option) Savings to schools= $ 4M annually
**2nd Year** 1-time Cost = $ 15M additional Savings to schools= $ 10M annually
**One time Costs = $ 22M** **Ongoing Annual Savings to Schools = $ 14M each year**
GreenHouse Gas Emissions Reduction - 60,000 metric tons (equivalent to removing 13,000 cars from Oregon roads)

**Year 3 & 4 (Phase 3) proposal** assumes 30% school participation averaging $100k worth of projects (including RCx) each.
Project budget = .30 x 1250 x 100k = $38M
Savings (2yr payback EEMs) = $19M/year

**4-yr Initiative Totals** - 2nd Biennium 1-time Cost = $ 23M Additional Savings to schools = $ 19M annually
1st Biennium 1-time Cost = $ 22M Savings to schools = $ 14M annually
**Estimated NPV= $250M** **One time Costs = $ 61M** **Ongoing Annual Savings to Schools = $ 33M each year**
GreenHouse Gas Emissions Reduction - 122,000 metric tons (equivalent to removing 25,600 cars from Oregon roads)

Notes: 1) Development & Administration Costs of $500k are assumed to be included in 1-time costs; 2) GHGE reductions per EPA website Calculator
3) EPA, SEC, PECI document average of 15% for schools with RCx; 17% savings assumed here for top-tier schools

## The 2015 Oregon School Infrastructure Initiative (revised 4.10.15)

Catalogs energy, occupancy, seismic and other important Infrastructure data for all Oregon schools
Unlocks over $33M in existing school budgets *each year* via direct energy-cost savings
Empowers local school staff and contractors to optimize and maintain their own HVAC systems and equipment
Implements Top-tier Energy Efficiency Measures (EEMs) and Retro-Commissioning (RCx) for schools most in need

Statewide School facility energy-use will be reduced by 25-30%, with the greatest savings to the communities whose schools are in most need (those wasting the most energy).

State schools will realize healthier and more comfortable learning environments, along with average 10-year longer HVAC equipment lives due to proper maintenance.

EEM Installation and Retro-Commissioning (RCx) programs will generate clean-energy jobs and economic development in all regions of the State, while empowering school staff and community contractors to do the work.

Public-service organizations could use the Initiative as a platform for developing truly impacting education, maintenance and culture-shift programs.

Greenhouse Gas Emission reductions will be equal to removing over 25,600 cars from Oregon roads.

## Initiative years 1&2 (a proposal for 2015 legislature):

**a) Catalog,** for the first time, a consistent & accurate infrastructure database for all Oregon School buildings including their energy use, occupancy, seismic reliability and HVAC condition. This information will help school boards and Legislature make informed policy and funding decisions. Statewide school energy-use baselines and ongoing monitoring platforms will be established. Gathered data can be used for the legislated SB540 schools database.

**b) Provide cost-saving equipment** and installation assistance for schools (and their contractors) to install immediate-payback measures identified while cataloging. Grants will be provided for guided local installation of boiler flue dampers and HVAC equipment time-clocks at no cost to the schools. This item will provide an immediate State-wide energy-use impact, while freeing up finances via direct energy-cost savings for the schools most in need.

**c) *Optional* Install School lobby display screens** showing facility energy-use and demand on editable dashboard pages. Provide educational materials to help foster understanding of, and appreciation for, energy consumption, environmental awareness, and systems maintenance. Monthly utility data could be used to update both the State database and the new school display screens.

**d) Empower guided self-Retro-commissioning (sRCx)** for schools identified as top priorities during cataloging. Local contractors and off-hour school staff will be paid for guided performance of optimizing their own HVAC systems. Technical assistance and a modest repair budget will be included. Significant energy savings, indoor air quality improvements and longer HVAC equipment lives will all be realized.

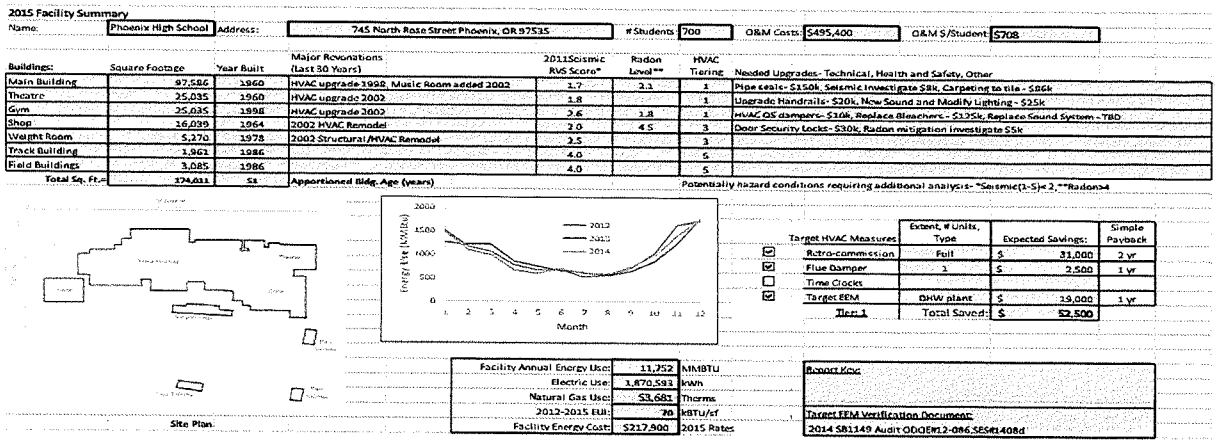
**e) *Optional* Incentivize Utility Providers** to 1) Provide assembled historical utility data for the cataloging process, as well as ongoing energy monitoring, 2) Install internet-connected Smart-meters at all Oregon schools, and provide free energy monitoring & cost-reduction consultation, 3) Sell their utilities to K-12 schools at lowest-tier rates.

## Initiative years 3 & 4 (a proposal for 2017 legislature):

**a) Finance construction of top-tier EEMs** that show simple paybacks of 2 years or less. These EEMs might already be documented by the school's, or may be identified in the cataloging process. Technical support for their implementation will be provided. All funded schools are to perform Self-RCx (d above) to assure savings persistence.

# Possible Report Formats:

## School-



2015 Facility Summary

Name: Phoenix High School | Address: 745 North Rose Street Phoenix, OR 97535 | # Students: 700 | O&M Costs: $495,400 | O&M $/Student: $708

| Buildings: | Square Footage | Year Built | Major Renovations (last 30 Years) | 2011Seismic RVS Score* | Radon Level** | HVAC Tiering | Needed Upgrades- Technical, Health and Safety, Other |
|---|---|---|---|---|---|---|---|
| Main Building | 97,586 | 1960 | HVAC upgrade 1998, Music Room added 2002 | 1.7 | 2.1 | 1 | Pipe seals- $150k, Seismic Investigate $8k, Carpeting to tile - $86k |
| Theatre | 25,035 | 1960 | HVAC upgrade 2002 | 1.8 | | 1 | Upgrade Handrails- $20k, New Sound and Modify Lighting - $25k |
| Gym | 25,035 | 1998 | HVAC upgrade 2002 | 2.6 | 1.8 | 1 | HVAC OS dampers- $10k, Replace Bleachers - $135k, Replace Sound System - TBD |
| Shop | 16,099 | 1964 | 2002 HVAC Remodel | 2.0 | 4.5 | 3 | Door Security Locks- $30k, Radon mitigation investigate $5k |
| Weight Room | 5,270 | 1978 | 2002 Structural/HVAC Remodel | 2.5 | | 3 | |
| Track Building | 1,961 | 1986 | | 4.0 | | 6 | |
| Field Buildings | 3,085 | 1986 | | 4.0 | | 5 | |
| Total Sq. Ft.= | 174,031 | 51 | Apportioned Bldg. Age (years) | | | | Potentially hazard conditions requiring additional analysis- *Seismic(1-5)< 2, **Radon>4 |

Site Plan




| Target HVAC Measures | Extent, # Units, Type | Expected Savings: | Simple Payback |
|---|---|---|---|
| Retro-commission | Full | $ 31,000 | 2 yr |
| Flue Damper | 1 | $ 2,500 | 1 yr |
| Time Clocks | | | |
| Target EEM | DHW plant | $ 19,000 | 1 yr |
| Tier 1 | Total Saved: | $ 52,500 | |

| | | |
|---|---|---|
| Facility Annual Energy Use: | 11,752 | MMBTU |
| Electric Use: | 1,870,593 | kWh |
| Natural Gas Use: | 53,681 | Therms |
| 2012-2015 EUI: | 70 | kBTU/sf |
| Facility Energy Cost: | $217,900 | 2015 Rates |

Report Key

Target EEM Verification Document:

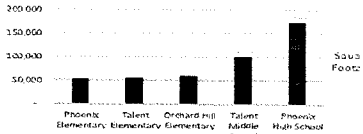
2014 SB1149 Audit ODOEM12-086,SE5#1408d

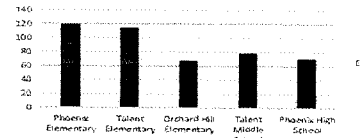
## District-

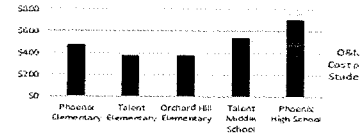
School District: Phoenix-Talent | Office Address: 401 West Fourth Street Phoenix, OR 97535 | Anticipated SB1149 Funds:

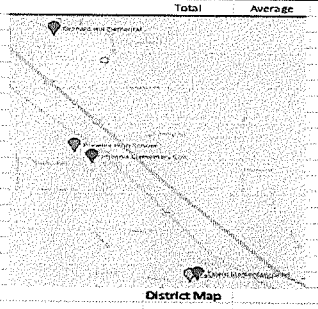
Educational Service District: Southern Oregon | County: Jackson

| Facilities | Square Feet | Average Age | # of Students | EUI* | O&M Costs | O&M Cost/Student | HVAC Tier | Needed Upgrades |
|---|---|---|---|---|---|---|---|---|
| Phoenix Elementary | 54,100 | 50 | 390 | 120 | $185,900 | $477 | 1 | a,f,r |
| Talent Elementary | 57,200 | 50 | 519 | 115 | $196,700 | $379 | 1 | a,f,r,s |
| Orchard Hill Elementary | 60,100 | 33 | 435 | 68 | $164,300 | $378 | 2 | |
| Talent Middle School | 100,700 | 48 | 595 | 79 | $221,600 | $541 | 1 | r,s |
| Phoenix High School | 174,000 | 51 | 700 | 70 | $495,400 | $708 | 1 | a,d,f |
| | | | | | | | | |
| | 446,100 | 49 | 2639 | 90 | $1,363,900 | $497 | | |
| | Total | Average | Total | Average | Total | Average | | |




*ODOE EUI Targets (Western):

| | |
|---|---|
| Elementary | 37.8 - 43.2 kBTU/sf-yr |
| Middle School | 39.9 - 45.6 kBtu/sf-yr |
| High School | 44.8 - 51.2 kBtu/sf-yr |

Upgrade Key (see specific facility for details/cost):

a.Seismic Evaluation, b.Radon Mitigation, c.Fire Protection

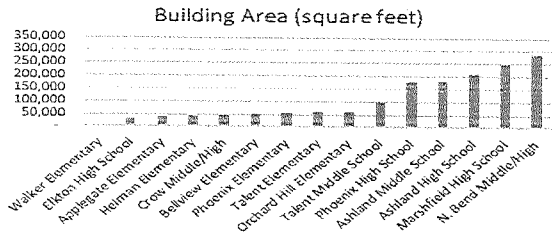
d.Air Quality, e.Shell Security, f.Roof Upgrade, g.Window Replac

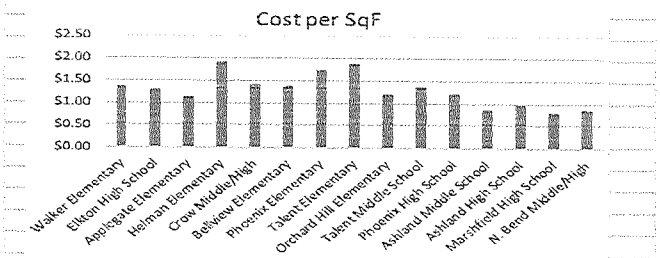
h. etc etc

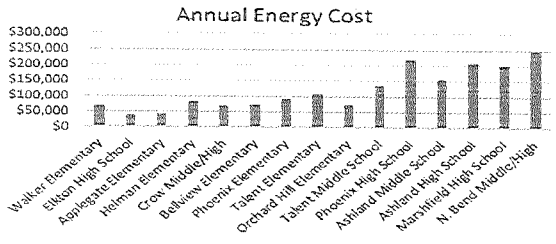
i. etc

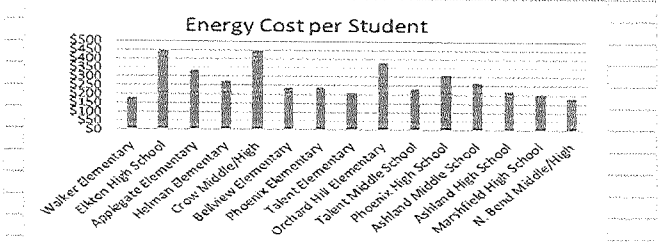
| | |
|---|---|
| Last Bond Year/Price: | 2012/$602,000 |
| Purpose: | OSBA FlexFund Program |
| Total Bond Indebtedness: | $10,000,000 |
| Total O&M Budget: | $664,161 |
| O&M Budget per Student: | $252 |
| Anticipated HVAC Savings: | $95,000 |

## Region-



## State-

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Southern Oregon ESD | Jackson | 2048 | Medford SD 549C | 419 | Washington Elementary School | | | | | | | | |
| Southern Oregon ESD | Jackson | 2048 | Medford SD 549C | 420 | Wilson Elementary School | | | | | | | | |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 2039 | Phoenix-Talent SD 4 | $10,000,000 | | | | | | | |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 3247 | Armadillo Technical Institute | | | | | | | | |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 370 | Orchard Hill Elementary School | 60,100 | 62 | $71,800 | $378 | 1 | | | |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 371 | Phoenix Elementary School | 54,100 | 120 | $93,400 | $477 | 1 | | | n/r |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 374 | Phoenix High School | 174,000 | 51 | 70 | $217,900 | $708 | 1 | | n/r |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 372 | Talent Elementary School | 57,200 | | 519 | $107,500 | $379 | 1 | | n/r |
| Southern Oregon ESD | Jackson | 2039 | Phoenix-Talent SD 4 | 373 | Talent Middle School | 100,700 | | 79 | $136,600 | $541 | 1 | | n/r |
| Southern Oregon ESD | Jackson | 2047 | Pinehurst SD 94 | 407 | Pinehurst Elementary School | | | | | | | | |
| Southern Oregon ESD | Jackson | 2045 | Prospect SD 59 | 3356 | Prospect Charter School | | | | | | | | |
| Southern Oregon ESD | Jackson | 2044 | Rogue River SD 35 | 4856 | Rivers Edge Academy Charter School | | | | | | | | |
| Southern Oregon ESD | Jackson | 2044 | Rogue River SD 35 | 389 | Rogue River Elementary School | | | | | | | | |
| Southern Oregon ESD | Jackson | 2044 | Rogue River SD 35 | 401 | Rogue River Junior/Senior High | | | | | | | | |
| Jefferson County ESD | Jefferson | 2052 | Ashwood SD 8 | 427 | Ashwood Elementary School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2052 | Black Butte SD 41 | 428 | Black Butte Elementary School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2050 | Culver SD 4 | 425 | Culver Elementary School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2050 | Culver SD 4 | 426 | Culver High School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2050 | Culver SD 4 | 1285 | Culver Middle School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2053 | Jefferson County SD 509J | 3458 | Big Muddy Elementary | | | | | | | | |
| Jefferson County ESD | Jefferson | 2053 | Jefferson County SD 509J | 429 | Buff Intermediate School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2053 | Jefferson County SD 509J | 1723 | Jefferson County Middle School | | | | | | | | |
| Jefferson County ESD | Jefferson | 2053 | Jefferson County SD 509J | 434 | Madras High School | | | | | | | | |

## District Summary-

| High School | Building Area (sf) | Average Building Age | # of Students | Facility Cost/ Student | EUI[1] | (Rank) | Seismic[2] | Hazards[3] | HVAC[4] | Shell[5] | Infrastructure Ranking[6] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Jefferson | 5,400 | 22 | 21 | $2,270 | 52 | (2) | 3 | 3 | 3 | 3 | 10 |
| McCloud | 31,700 | 55 | 9 | $23,660 | 74 | (1) | 1▪ | 1* | 1 | 2 | 4 |
| Happy Camp | 31,800 | 60 | 66 | $3,100 | 22 | (3) | 1▪ | 2Δ | 3 | 3 | 8 |
| Weed | 51,500 | 48 | 162 | $2,860 | 41 | (2) | 1▪ | 2Δ | 3 | 3 | 7 |
| Mt. Shasta | 53,400 | 52 | 321 | $1,360 | 48 | (2) | 1▪ | 2Δ | 3 | 3 | 7 |
| | 173,800 | 47.4 | 579 | $6,650 | | | | | | | |
| | Total | Average | Total | Average | | | | | | | |

Key

[1] Energy Use Index (Kbtu/sf)

[2] Seismic Reliability (1=worst, 3=best)

[3] Materials and Fire Hazards (1=worst, 3=best)

[4] HVAC Condition, Maintenance, Dependability (1=worst, 3=best)

[5] Shell Thermal and Security (1=worst, 3=best)

[6] Weighted Average of 5 Categories (1=worst, 10=best)

▪ Additional Structural Investigation Suggested

* 1000 gallon diesel fire tank on campus

Δ Minimum Abestos Remains