



Event next week:



Chehalem Parks & Recreation Aquatic Center Building Tour

- ▶ **When:**
 - Wednesday, May 23, 2018 from 2-6 pm in Newberg
 - ▶ Training & tour of Aquatic Center 2-4 pm (CEUs available for members!)
 - ▶ Optional happy hour at Chehalem Winery 4-6 pm (food and first drink included in registration)
- ▶ **Presenters:**
 - Jacob James, Nexant
 - Gary Gripp, Anderson Poolworks
 - Rob Hall, Energy Trust of Oregon
- ▶ Register at www.aeecrc.org/events



This event is generously co-sponsored by Energy Trust of Oregon and Anderson Poolworks.

Upcoming events:



Mark your calendars:

- ▶ September 19, 2018 - Energy Engineering Forum at EcoTrust
 - ▶ Emily Pearce - Waypoint Group - How to Engage the Commercial Real Estate Community for Energy Efficiency Programs
- ▶ October 25, 2018 - Building Tour (Located TBD)
- ▶ November 21, 2018 - Energy Engineering Forum at EcoTrust
- ▶ December 4, 2018 - AEE Columbia River Chapter Holiday Party

www.aeecrc.org

Check frequently for event registration and updates, membership information, and chapter news.



Energy Efficiency Trends in the Cannabis
Industry

Energy Engineering Forum
May 16, 2018

Agenda



- Legal Status
- Local Support
- Energy Use Overview
- Grow Room Energy Balance
- Energy Analysis Techniques
- Energy Efficiency Measures
- Barriers to Energy Efficiency
- Conclusions



- Measure 91
- Home Grow / Personal Possession
 - Four plants per property
- Regulated Growers and Retailers
 - Indoor
 - Micro Tier I: up to 625 SF
 - Micro Tier II: 626 SF to 1,250 SF
 - Tier I: 1,251 SF to 5,000 SF
 - Tier II: 5,001 SF to 10,000 SF
 - Outdoor
 - Micro Tier I: up to 2,500 SF
 - Micro Tier II: 2,501 SF to 5,000 SF
 - Tier I: 5,001 SF to 20,000 SF
 - Tier II: 20,001 SF to 40,000 SF



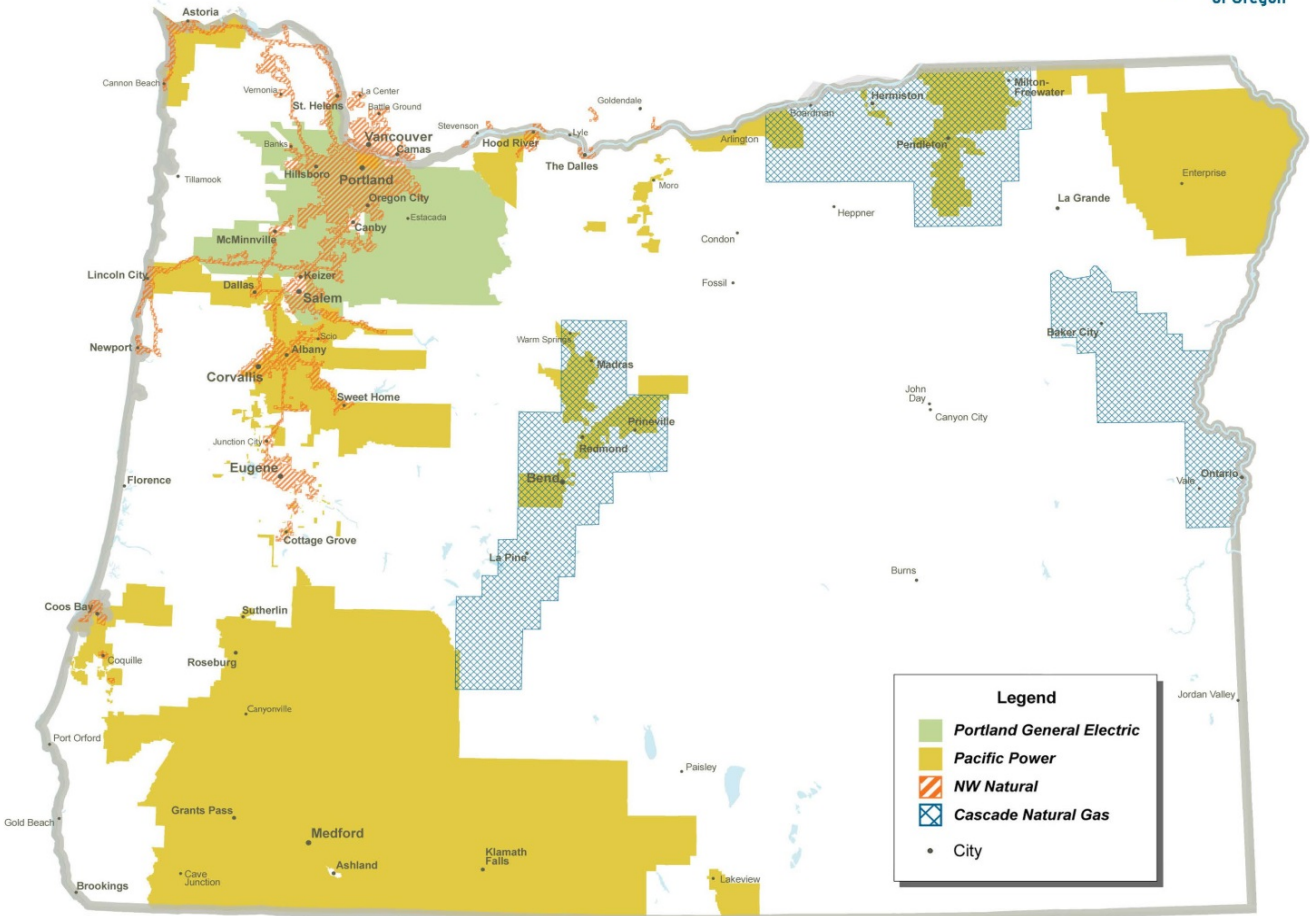
➤ Buildings Codes Division

- All spaces that are conditioned (cannabis) are regulated unless specifically exempted
- Cannabis production facilities must comply with all provisions of OEEESC 2014, including the economizer requirement.

➤ City of Portland Guide

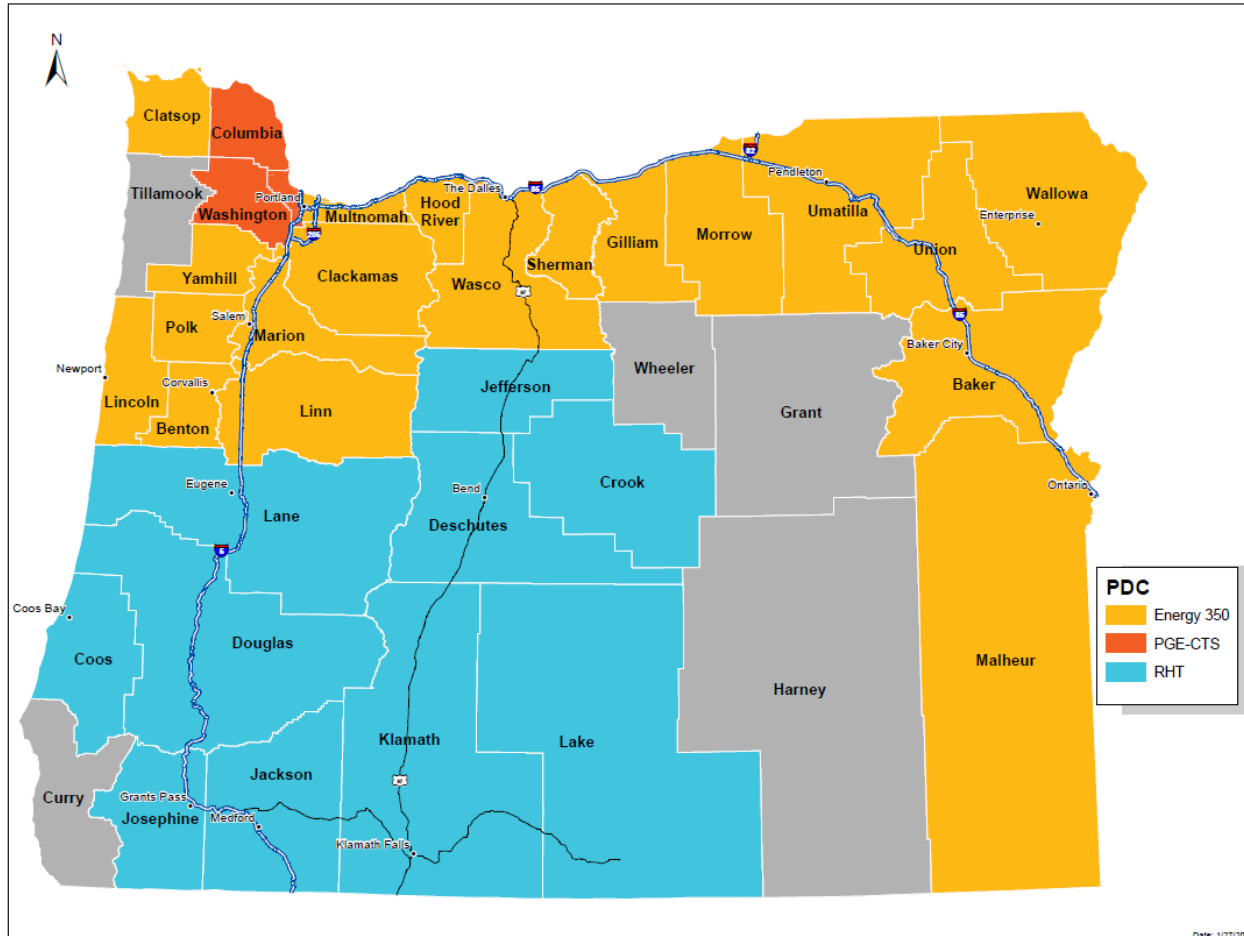
- Production rooms must have continuous or automated intermittent ventilation
- 3 compliance paths

ENERGY TRUST OF OREGON SERVICE TERRITORY



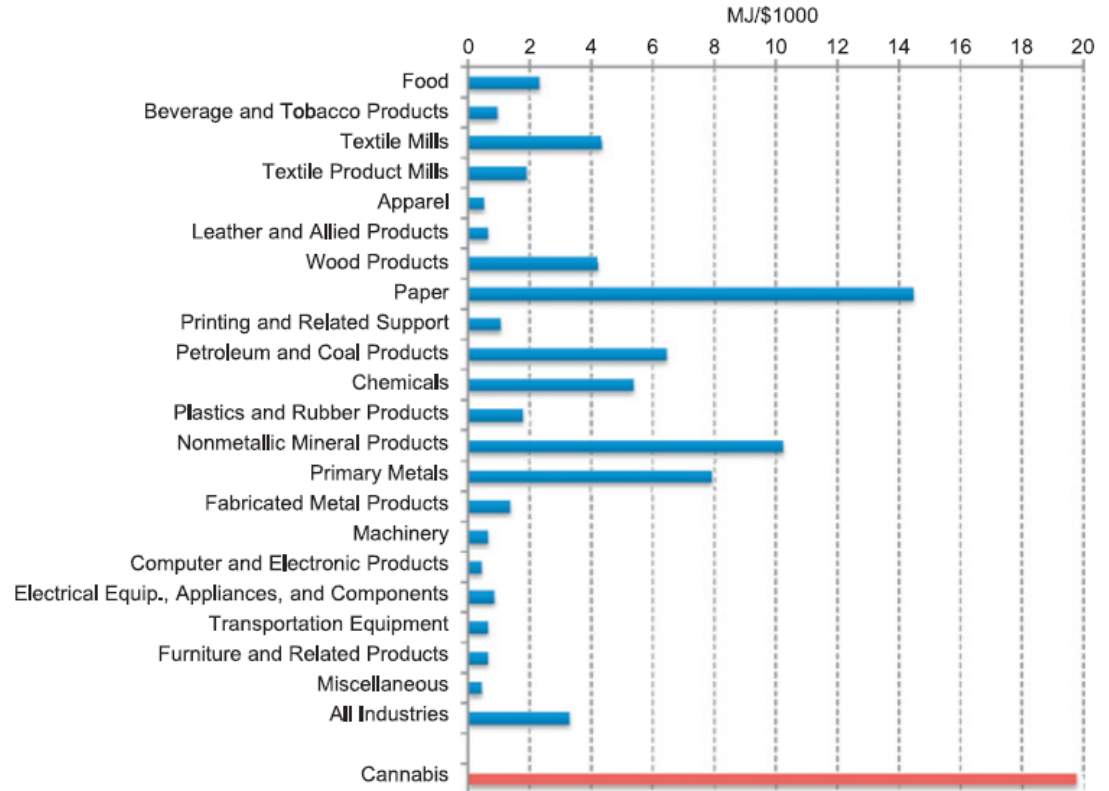
Legend

- Portland General Electric
- Pacific Power
- NW Natural
- Cascade Natural Gas
- City



Energy Use Overview

- Highest relative energy costs
- EUI > 1,000 kBtu/SF
 - CBECS Median Office Building = 67 kBtu/SF
- 50% of Colorado's load growth in 2015
- 50% increase in per-capita residential energy use in Humboldt County when California legalized medical
- Energy can represent 50% of the overall production costs
- 1 joint = 18 pints of beer



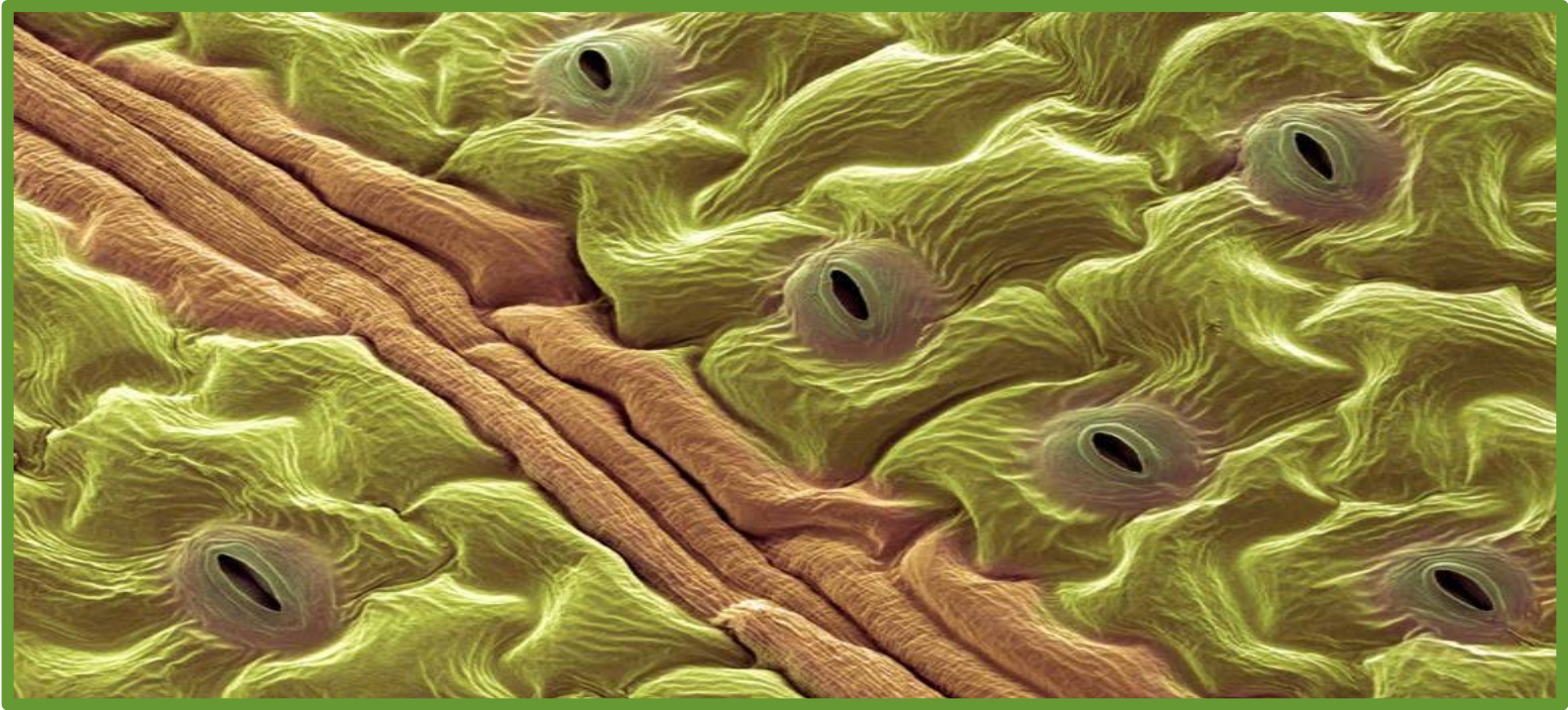


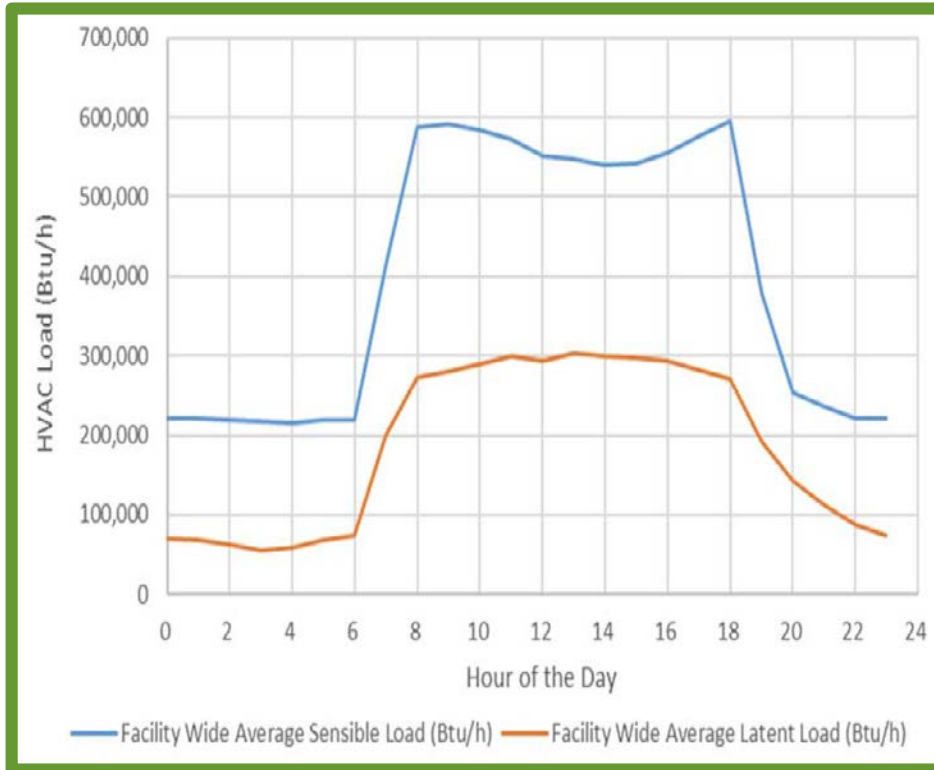
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➤ Hourly energy model

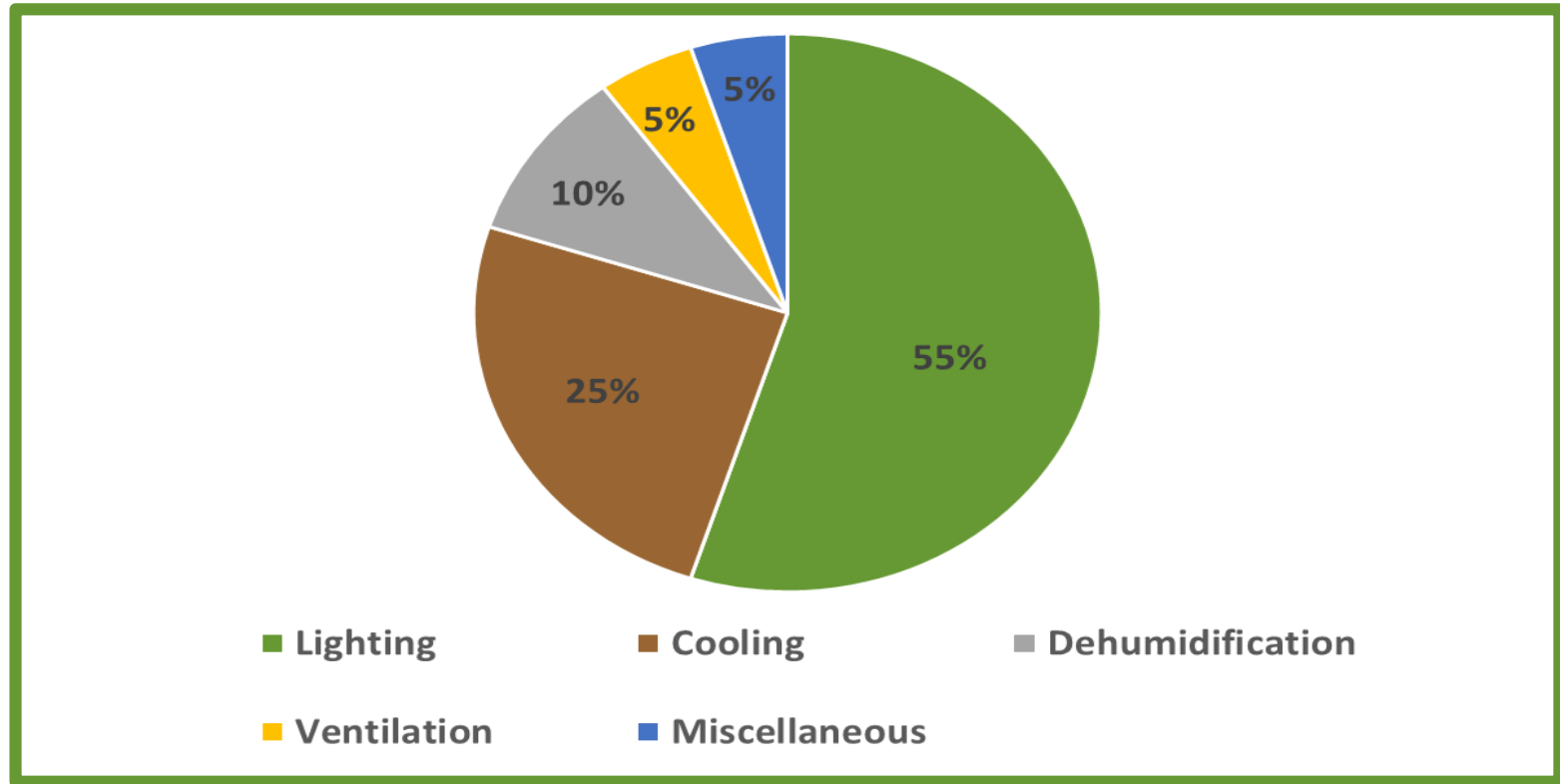
- Energy balance
- Lights-on, lights-of, and transition loads
- Evapotranspiration

$$ET_{sz} = \frac{0.408\Delta (R_n - G) + \gamma \frac{C_n}{T + 273} u_2 (e_s^o - e_a)}{\Delta + \gamma(1 + C_d u_2)}$$

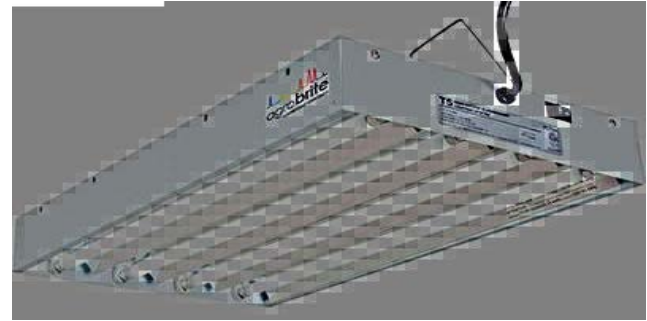
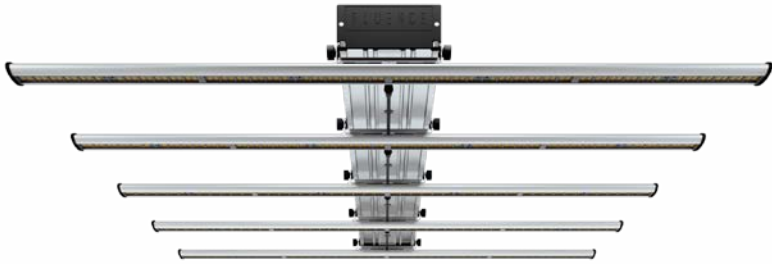
Equation 4.

- System response
- Dehumidifier & HVAC interaction

$$P_D = \frac{S - SHR_T(S + L)}{3,412(SHR_T - 1) - 970\eta_D}$$



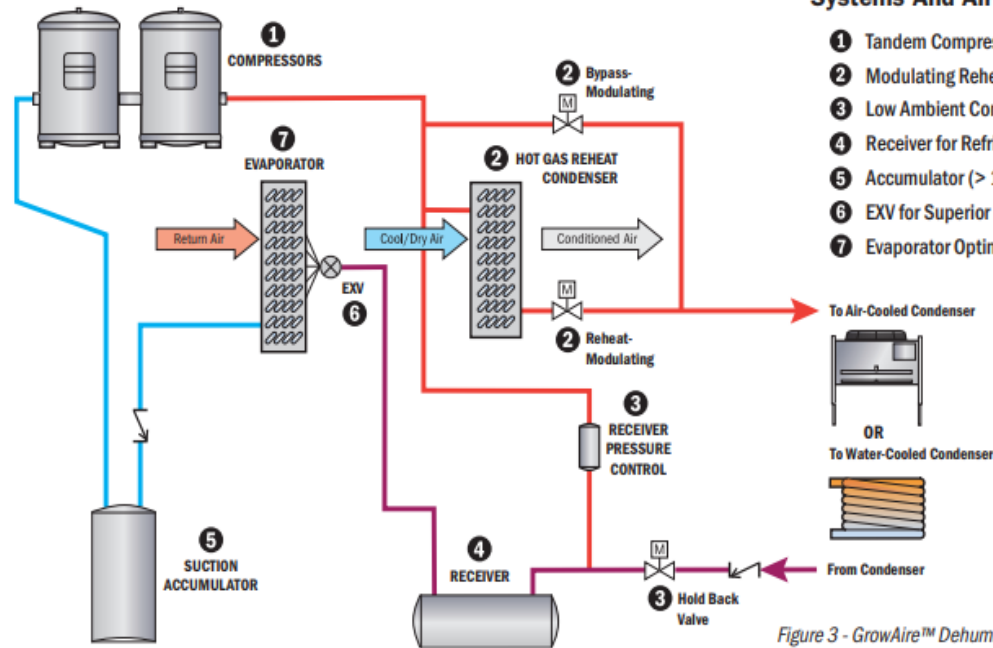
Energy Efficiency Measures - Lighting



Energy Efficiency Measures – High Efficiency Dehumidifiers



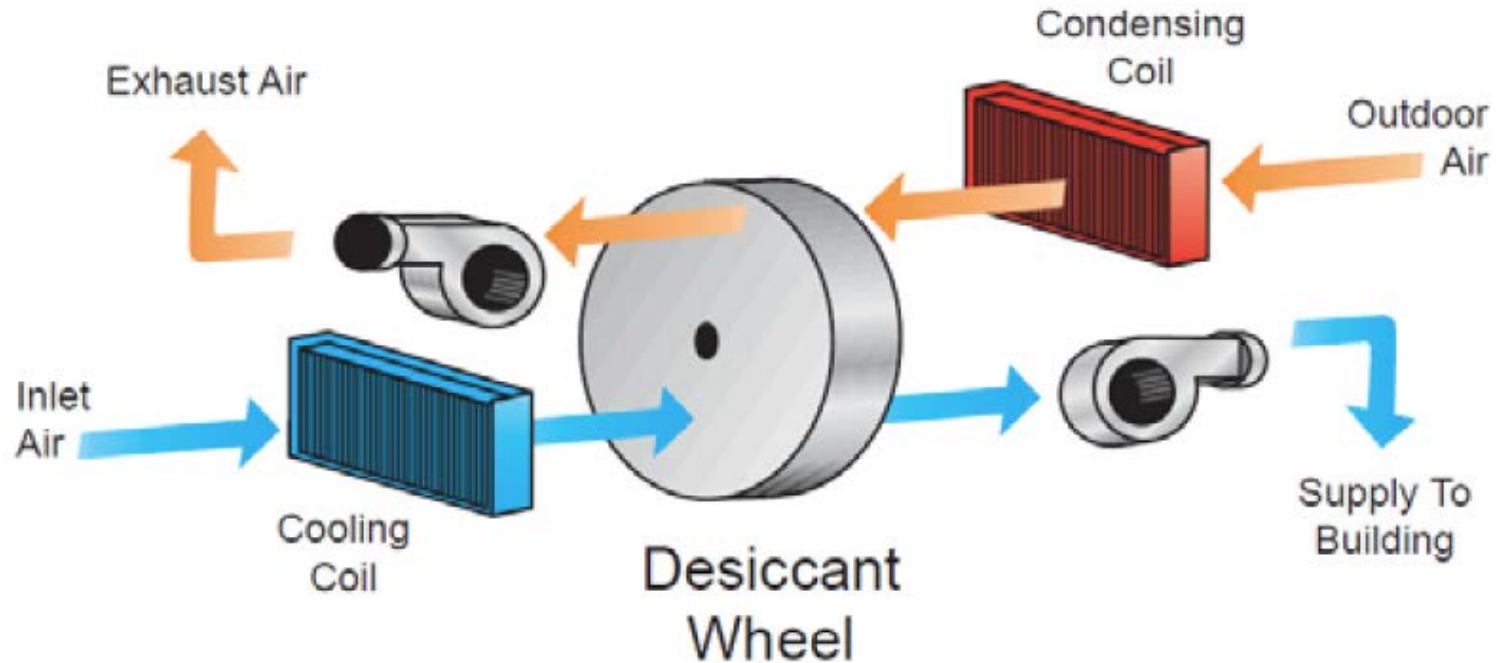
Dehumidification Schematic



Major Differences Between GrowAire™ Systems And Air Conditioners

- 1 Tandem Compressors
- 2 Modulating Reheat Valves and Hot Gas Reheat Coil
- 3 Low Ambient Control (Receiver Pressure and Hold Back Valves)
- 4 Receiver for Refrigerant
- 5 Accumulator (> 15 Ton)
- 6 EXV for Superior Evaporator Control
- 7 Evaporator Optimized for Humidity Removal

Figure 3 - GrowAire™ Dehumidification Schematic



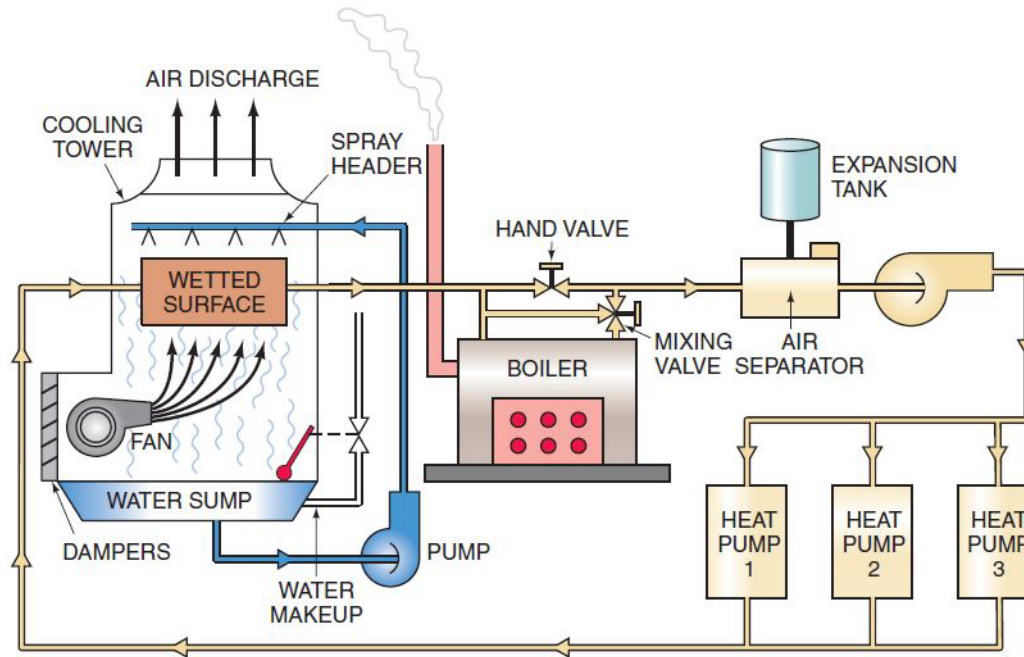
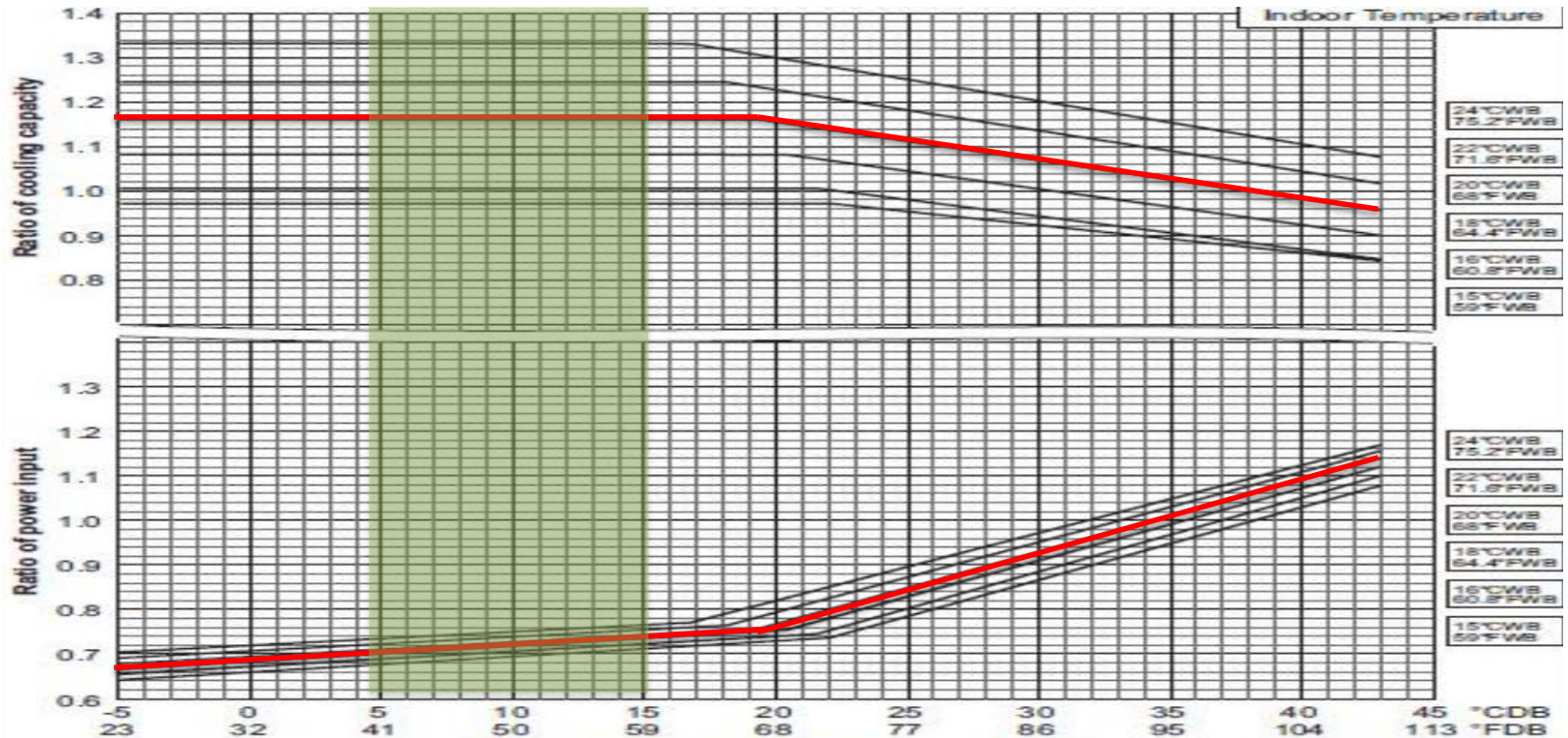


Figure 44-3 An open-loop, water-source heat pump with boiler and cooling tower to maintain the loop temperature

Energy Efficiency Measures – VRF





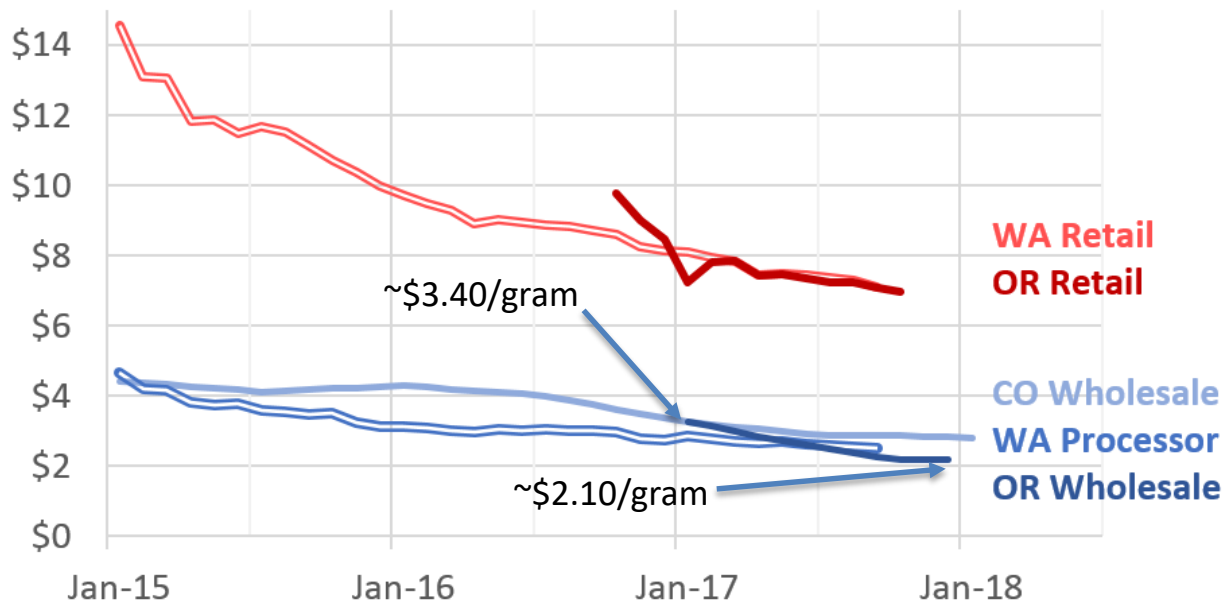
OREGON LIQUOR CONTROL COMMISSION
Marijuana License Applications
As of 8:00 AM May 11, 2018

Marijuana License Application Statistics as of May 11, 2018

	License Active	Approved Not Paid	Assigned	Ready For Assignment	Without Approved LUCS	Surrendered	Grand Total
Laboratory	22	1	10	0	0	4	37
Processor	163	0	145	59	20	9	396
Producer	992	15	543	336	70	50	2006
Retailer	552	3	103	50	14	35	757
Wholesaler	121	3	60	24	12	6	226
Research	0	0	2	0	1	0	3
Grand Total	1850	22	863	469	117	104	3425

Recreational Marijuana Prices

Price per Gram



Source: CO Dept of Revenue, Portland Business Journal, WA Econ and Rev Forecast Council, OLCC, Oregon Office of Economic Analysis

Barriers to Efficiency – Tradition





