



GRAND RAPIDS 2030 DISTRICT  
CANNABIS  
WEBINAR SERIES

**TWEAKING THE MARGINS:  
HOW CONTROLS SET YOU UP FOR  
A BETTER YIELD AND A LEANER  
OPERATING BUDGET**

Brandy Keen | Surna



Sponsored By:



***foresight***

[fsmgmt.co](http://fsmgmt.co)



# INTRODUCTIONS

## **Moderator:**

Gillian Giem, Program Manager,  
Grand Rapids 2030 District

## **Speaker:**

Brandy Keen, Co-Founder/Senior Technical Advisor,  
Surna

GRAND RAPIDS  
**2030**  
DISTRICT®





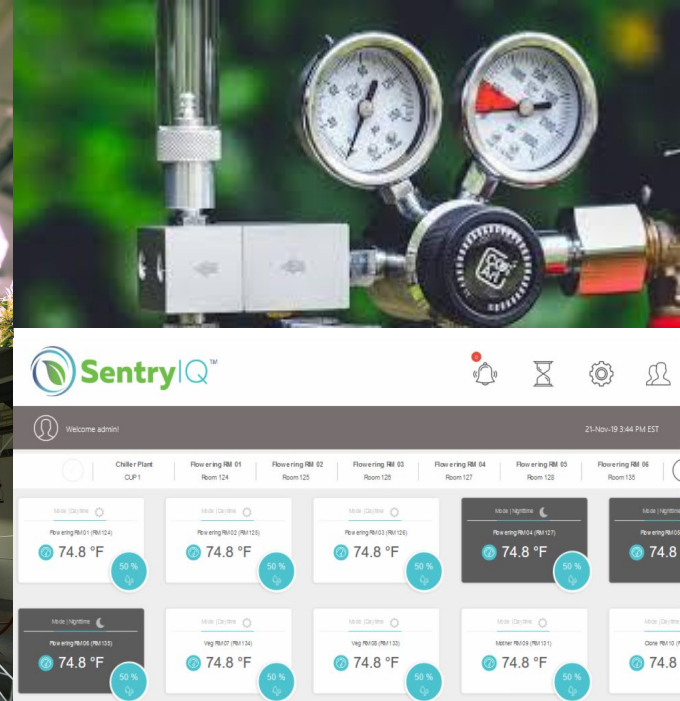
# CONTROLS AND AUTOMATION

- Controls: Enabling critical functions in the facility
- Data Collection: Collecting data relevant to critical functions in the facility
- Automation: Performance of critical functions in the facility



# MOST COMMONLY CONTROLLED

- Lighting
- HVAC
- CO<sub>2</sub>
- Alarms
- Irrigation







# LEVELS OF SOPHISTICATION

What's Out There?

## Basic



On/off  
Limited data collection

## Intermediate



Modulating  
Some data collection

## Advanced



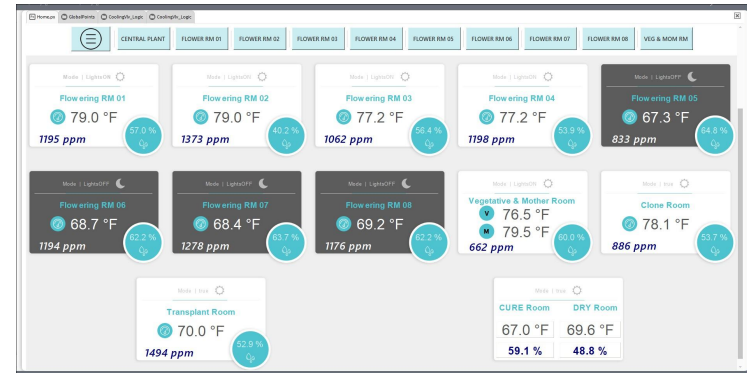
Modulating  
Full data collection  
Analytics

In general, controls will remove the “human” element from cultivation operations, minimizing the impact of mistakes and ensuring what’s supposed to happen, happens; when and how it’s supposed to happen.



# BUILDING MANAGEMENT SYSTEMS (BMS)

- Used in a number of industrial applications and large scale buildings
  - Airports
  - Hospitals
  - Manufacturing
- Not widely used in cultivation operations
  - Controls largely limited to on/off (entry level)





# DASHBOARDS ARE NOT CONTROLS

- Satisfied/not satisfied - send signal to “turn on” or “turn off”
- Displays room parameters
- Generally acceptable for lighting, irrigation, CO<sub>2</sub>
- Common dashboards unacceptable for high quality HVAC systems
  - Do not actually control modulating functions
  - Do not display or provide all relevant information
  - Not capable of performing full controls sequence of operations



# OPERATING EXPENSE BENEFITS

## FOR LIGHTING





# BENEFITS FOR OPEX - LIGHTING

- Saving money with basic systems
  - Stage lighting on/off to reduce peak demand
- Saving even more money with more sophisticated systems
  - Stage lighting based on optimal PPFD for plant growth stage (based on timing or lighting sensor)



# BENEFITS FOR OPEX- LIGHTING CONT'D

- Saving even more money with more sophisticated systems
  - LED lighting can be adjusted incrementally
    - Provides a consistent PPF

Note: Not generally advised for HID lighting





# OPERATING EXPENSE BENEFITS

## FOR HVAC





# BENEFITS FOR OPEX - HVAC

- Saving money with basic systems
  - Ensuring that set points are appropriate for the photoperiod (removing human element)
  - Staging equipment
  - Knowing when something is out of whack





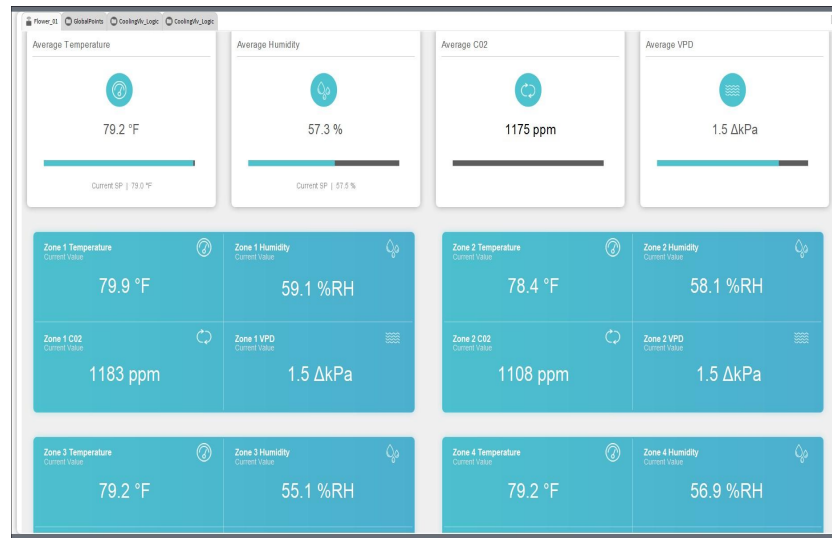
# BENEFITS FOR OPEX - HVAC CONT'D

- Saving even more money with more sophisticated systems
  - More sophisticated HVAC systems
  - Modulate all functions (cruise control vs. stop and go traffic)
  - Extreme precision



# BENEFITS FOR OPEX - HVAC CONT'D

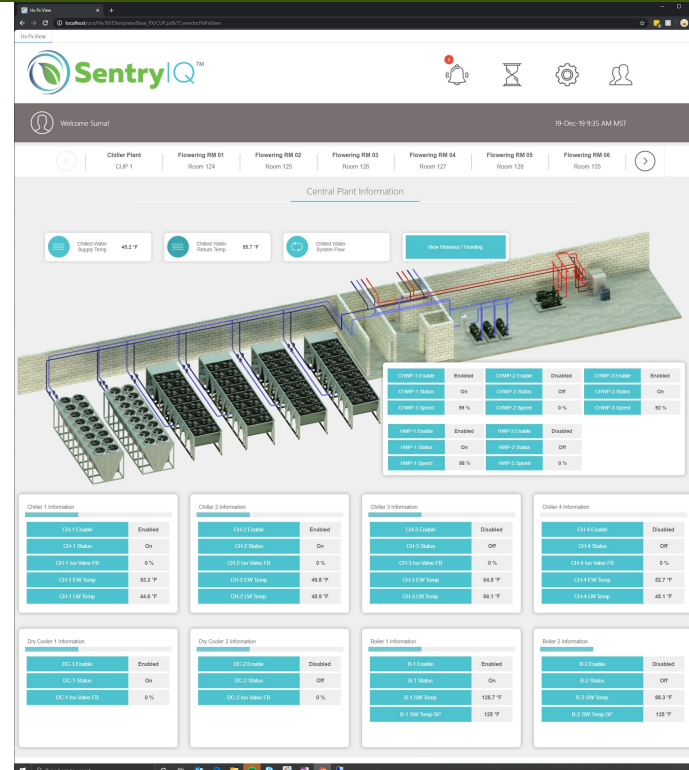
- Saving even more money with more sophisticated systems
  - Utilize multiple sensors to ensure homogeneity





# BENEFITS FOR OPEX - HVAC CONT'D

- Saving even more money with more sophisticated systems
  - Operating status and energy use of each piece of equipment





# BENEFITS FOR OPEX - HVAC CONT'D

- Maintenance (use less energy and/or avoid early failure)
- Operating adjustments to reduce energy use
- Perfect sequence of operations



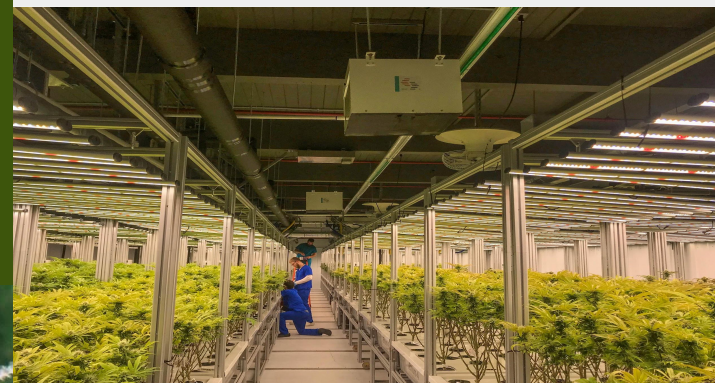
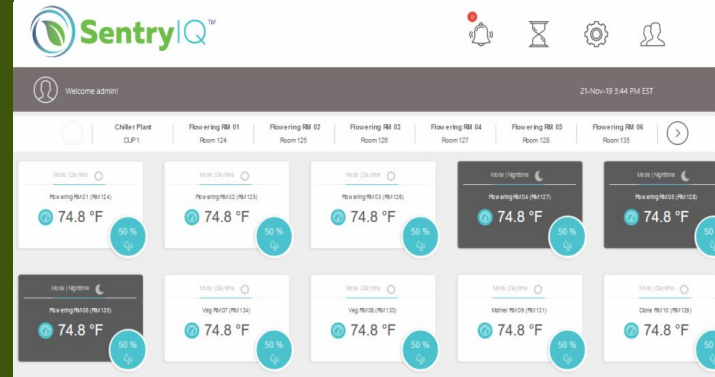


# OPERATING EXPENSE BENEFITS

FOR CO<sub>2</sub>

ALARMS

IRRIGATION/FERTIGATION





# BENEFITS FOR OPEX - CO2

- Maximize yield,  
minimize expenses
- Homogenize CO2 levels  
throughout grow
- Level out swings in PPM





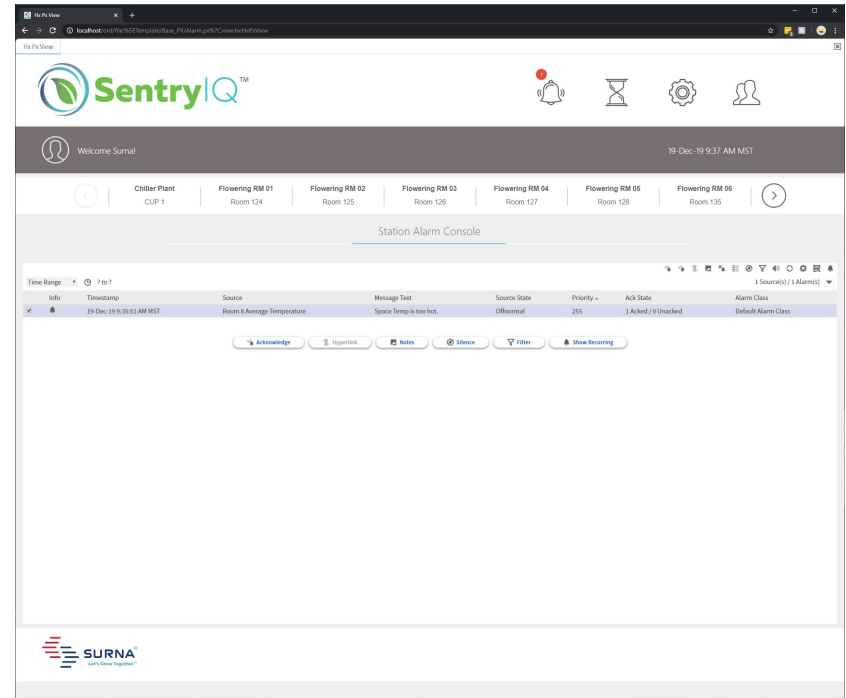
# BENEFITS FOR OPEX - ALARMS

- Saving money with basic systems
  - Understanding when something is wrong in the cultivation space
- Saving even more money with more sophisticated systems
  - Understanding when something is wrong with a piece of equipment, before it impacts the cultivation space
  - Maintain ahead of failure, improve longevity



# BENEFITS FOR OPEX - ALARMS

- Saving even more money with more sophisticated systems
  - Understanding when something is wrong with a piece of equipment, before it impacts the cultivation space





# BENEFITS FOR OPEX - IRRIGATION/FERTIGATION

GRAND RAPIDS 2030 DISTRICT  
CANNABIS  
WEBINAR SERIES

- Saving money with basic systems
  - Reducing manpower associated with irrigation
- Saving even more money with more sophisticated systems
  - Reducing runoff
  - Reducing nutrient use



**ANALYTICS**

**MANUALLY OR THROUGH  
ANALYTICS COMPANIES**







- How to use analytics
  - Revenue and yields
  - Performance and yields of varying PPFD to maximize production
  - Understanding correlations between seemingly unrelated events



- More ways to use analytics
  - Reviewing anomalies when harvests are particularly good/bad to identify a pattern
  - Reviewing energy performance related to cultivation operations
  - Perfecting processes to boost yields



# ANALYTICS CONT'D

**Central Plant Information**

Chilled Water Supply Temp: 48.2 °F  
Chilled Water Return Temp: 68.7 °F  
Chilled Water System Flow: [Value]

CHW-1 Enable	CHW-1 Status	CHW-1 Speed	CHW-2 Enable	CHW-2 Status	CHW-2 Speed	CHW-3 Enable	CHW-3 Status	CHW-3 Speed
Enabled	On	88%	Disabled	Off	0%	Enabled	On	92%

HWP-1 Enable	HWP-1 Status	HWP-1 Speed	HWP-2 Enable	HWP-2 Status	HWP-2 Speed
Enabled	On	88%	Disabled	Off	0%

Chiller 1 Information	Chiller 2 Information	Chiller 3 Information	Chiller 4 Information
CH-1 Enable: Enabled	CH-2 Enable: Enabled	CH-3 Enable: Disabled	CH-4 Enable: Disabled
CH-1 Status: On	CH-2 Status: On	CH-3 Status: Off	CH-4 Status: Off
CH-1 Inlet Valve FB: 0%	CH-2 Inlet Valve FB: 0%	CH-3 Inlet Valve FB: 0%	CH-4 Inlet Valve FB: 0%
CH-1 EW Temp: 53.3 °F	CH-2 EW Temp: 48.8 °F	CH-3 EW Temp: 64.8 °F	CH-4 EW Temp: 62.7 °F
CH-1 LW Temp: 44.6 °F	CH-2 LW Temp: 45.9 °F	CH-3 LW Temp: 66.1 °F	CH-4 LW Temp: 45.1 °F

Dry Cooler 1 Information	Dry Cooler 2 Information	Boiler 1 Information	Boiler 2 Information
DC-1 Enable: Enabled	DC-2 Enable: Disabled	B-1 Enable: Enabled	B-2 Enable: Disabled
DC-1 Status: On	DC-2 Status: Off	B-1 Status: On	B-2 Status: Off
DC-1 Inlet Valve FB: 0%	DC-2 Inlet Valve FB: 0%	B-1 SW Temp: 128.7 °F	B-2 SW Temp: 88.3 °F
		B-1 SW Temp SP: 125 °F	B-2 SW Temp SP: 125 °F

## Central Plant

## Single Room

**Single Room Information**

Average Temperature: 79.2 °F (Current SP | 79.0 °F)

Average Humidity: 57.3 % (Current SP | 57.5 %)

Average CO2: 1175 ppm

Average VPD: 1.5 ΔkPa

Zone 1 Temperature	Zone 1 Humidity	Zone 2 Temperature	Zone 2 Humidity
79.9 °F	59.1 %RH	78.4 °F	58.1 %RH

Zone 1 CO2	Zone 1 VPD	Zone 2 CO2	Zone 2 VPD
1183 ppm	1.5 ΔkPa	1108 ppm	1.5 ΔkPa

Zone 3 Temperature	Zone 3 Humidity	Zone 4 Temperature	Zone 4 Humidity
79.2 °F	55.1 %RH	79.2 °F	56.9 %RH



# QUESTIONS?

Levi Lilly

levi.lilly@surna.com



Gillian Giem

gillian@usgbcwm.org

616-691-1243

GRAND RAPIDS

2030  
DISTRICT





GRAND RAPIDS 2030 DISTRICT  
**CANNABIS**  
WEBINAR SERIES

**MARK YOUR CALENDAR FOR  
UPCOMING CANNABIS ENERGY  
MANAGEMENT WEBINARS!**

Please fill out our 2 minute survey at the end of this  
webinar. Thank you!

Thank you to our Visionary Supporters!

