ADRES

Automated Demand Response

and Energy Savings Solution

Winn Energy Controls, Inc.

Agenda

ADRES Presentation - 20 Minutes

- **Company Background** — **1 minutes**
- **Clients and Representative Projects** — **1 minute**
- **ADRES Solution (Hardware, Communications and Software platform)** — **4 minutes**
    1. **Communication Board**
    2. **Relay IO Board**
    3. **ADRESpro Web Based HMI**
- **Installation Support** — **2 minute**
    1. **Installation Manuals**
    2. **Wiring Diagrams**
    3. **ADRESpro software User Guides**
    4. **ADRESpro software tutorials**
- **ADRES Solutions Applications Micro-grid (Generators, Lift Stations, etc.)** — **2 minutes**
- **ADRES Built-In Measurement and Verification** — **2 minutes**
- **ADRES Solution Live Demonstration Generator Unit** — **5 minutes**
    1. **Map**
    2. **Navigation Tree**
    3. **Monitor, Trend, Schedule, Configure, and Contacts Tab Panel**
    4. **Alarms, Service, Maintenance and Performance Tab Panel**
- **ADRES Digital LTE Cellular DOD Cyber Security** — **3 minutes**

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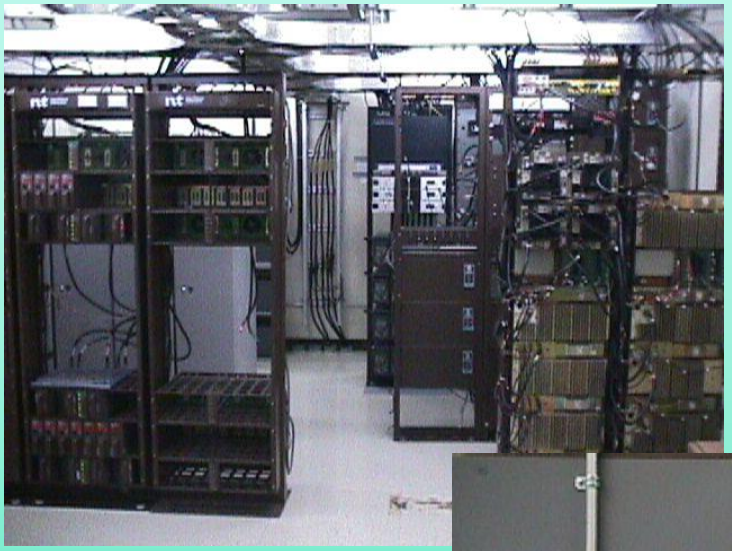
ADRES Automated Demand Response and Energy Savings Solution

Company Background

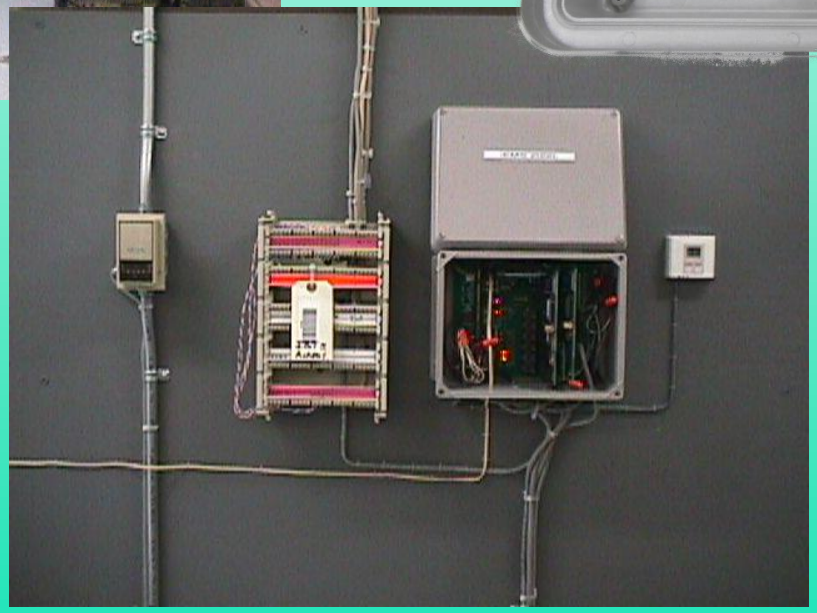
- **Winn Energy Controls, Inc.**
  - California Corporation, Incorporated 1994
  - Privately Owned, Closely Held
  - Over 6,000 Controls Delivered.
  - All Six Engineers and Key Personnel US Born
- **Partial End User Client List**

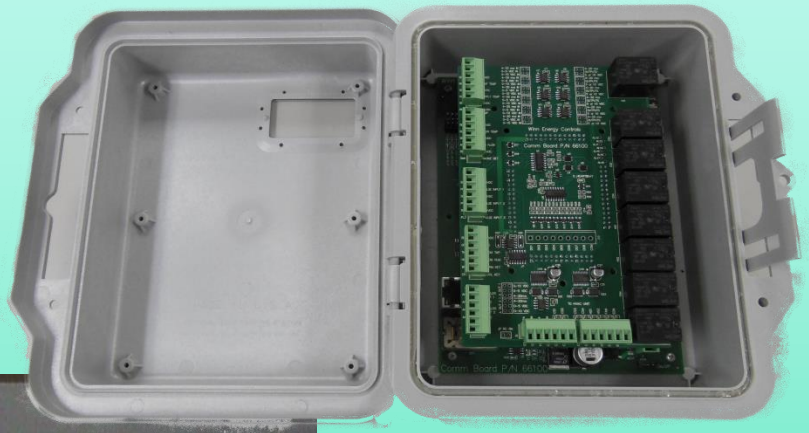
ADRES Automated Demand Response and Energy Savings Solution

ADRES Cell Site Installations



Cellular Repeaters





ADRES Installation

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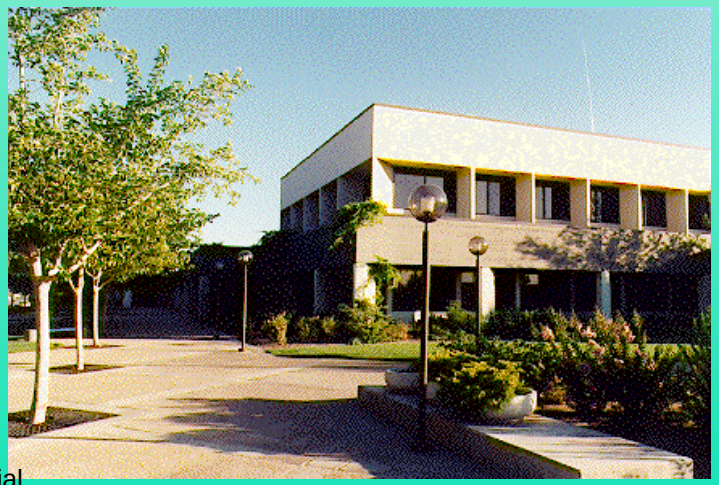
City of Lancaster Project
Guaranteed Savings Project



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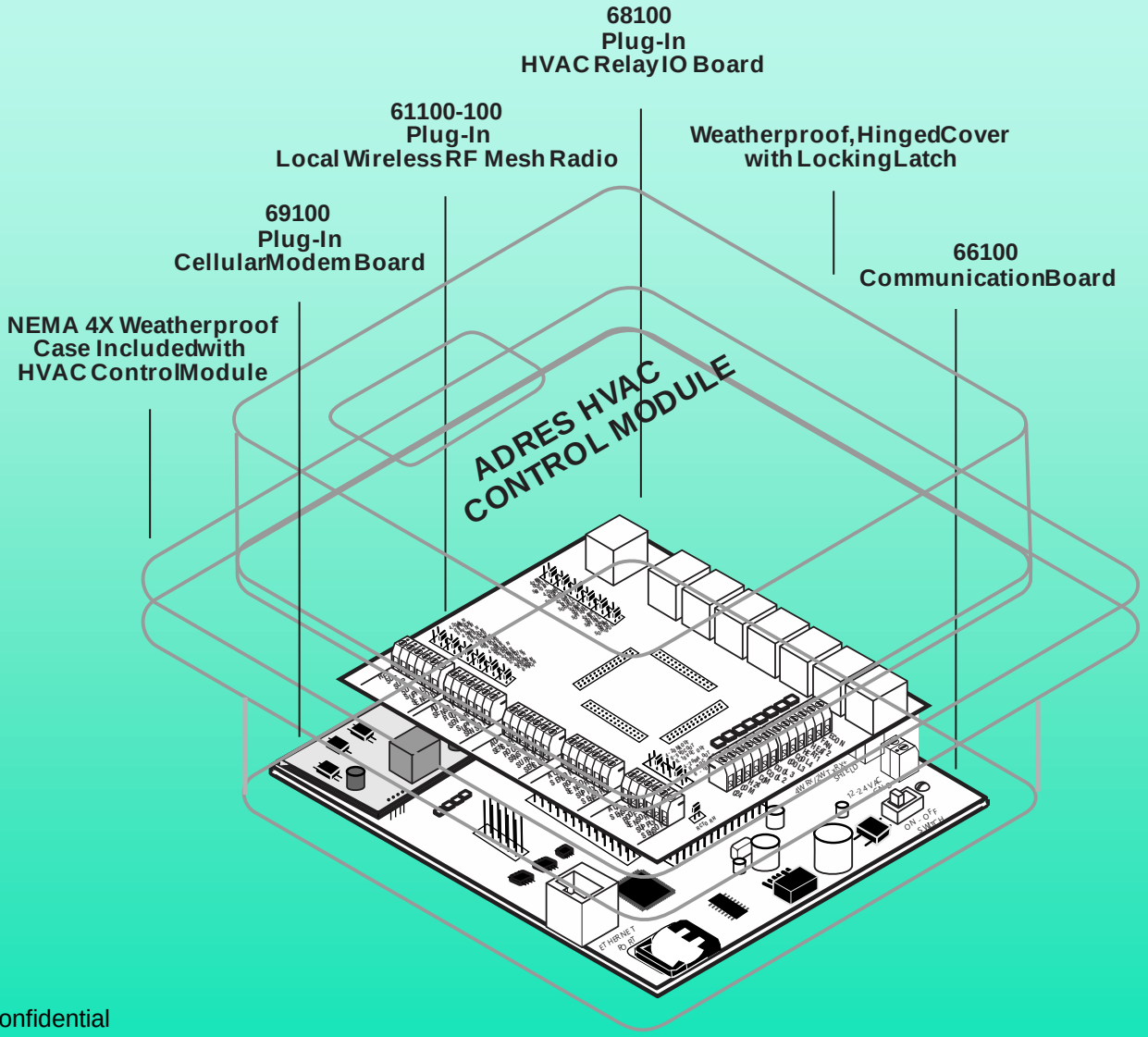
ADRES Controller Communication and Relay I/O Board



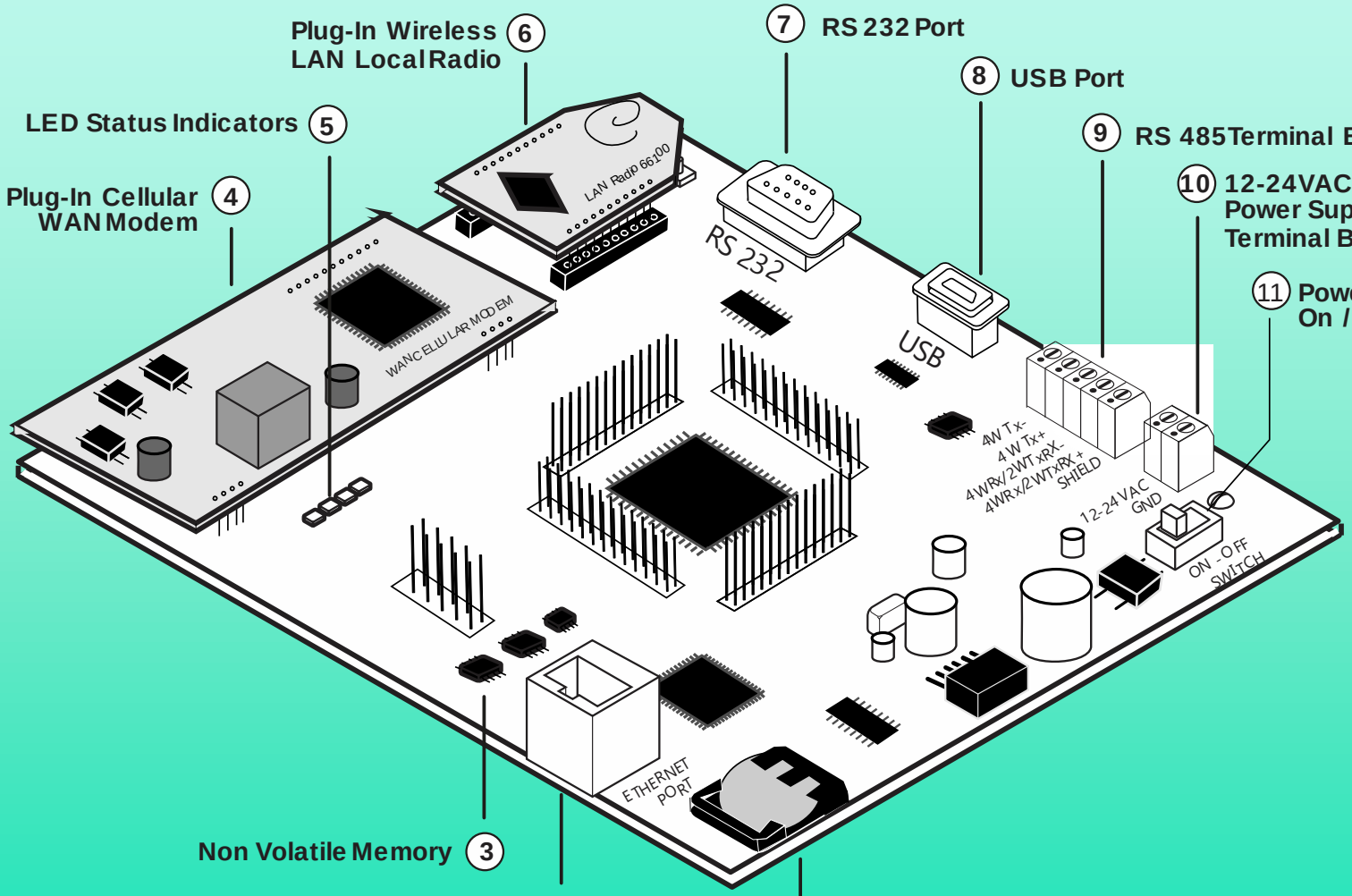
ADRES Communication Board

ADRES Communication Board Capabilities:

- 32 Bit Mircocontroller, Surface Mounted – USA Mfg. / USA Built (Arizona Plant).
- RTOS - Custom Real Time Operating System - No Linux or Open Source Code
- Hardwired Ethernet
- Hardwired RS232
- Hardwired USB
- Hardwired RS485 2 or 4 wire jumper selectable
- Optional LTE Cellular (FIPS140 Compliant)
- Optional Fiber Optic
- Satellite GPS Time and Location
- Optional LCD Display
- Battery Backed Real Time Clock
- 1 Plus Year Data Storage in 15 Minute Increments with Day, Date, Time Stamp
- Over-the-air firmware update capability
- Plugin Relay IO Expansion Board
- Remotely accessible Power On/Off to peripherals
- Optional Video Camera
- Custom Sensor Integration
- Other custom configurations available

ADRES Automated Demand Response and Energy Savings Solution

ADRES Controller Communication Board



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ADRES Automated Demand Response and Energy Savings Solution

ADRES Relay IO Expansion Board

ADRES Relay, Input and Output Control Board Capabilities

- Eight (8) Form C pilot relays (Contacts rated 10 Amp 250 VAC)
- Two (2) Analog Outputs - Jumper Selectable for 0-5 VDC, 0-10 VDC or 4-20 MA.
- Eight (8) Analog Inputs - Jumper Selectable for 0-5 VDC, 0-10 VDC or 4-20 MA.
- Eight (8) Digital Inputs
- Eight (8) Digital Outputs - Open Collector
- Three (3) Sub-meter Inputs - Pulse Counting
- Custom Configurations Available
- Optimized Control Logic for each Pre-Defined Application
  - Generator
  - Lift Station
  - Utility Grid Recloser
  - Cap Bank Control
  - Breaker and Switchgear Control
  - Chiller
  - Boiler
  - HVAC RTU
  - HVAC Air Handler
  - HVAC VAV Box
  - Solar and Battery Storage
  - Wind Turbine
  - Solar Thermal

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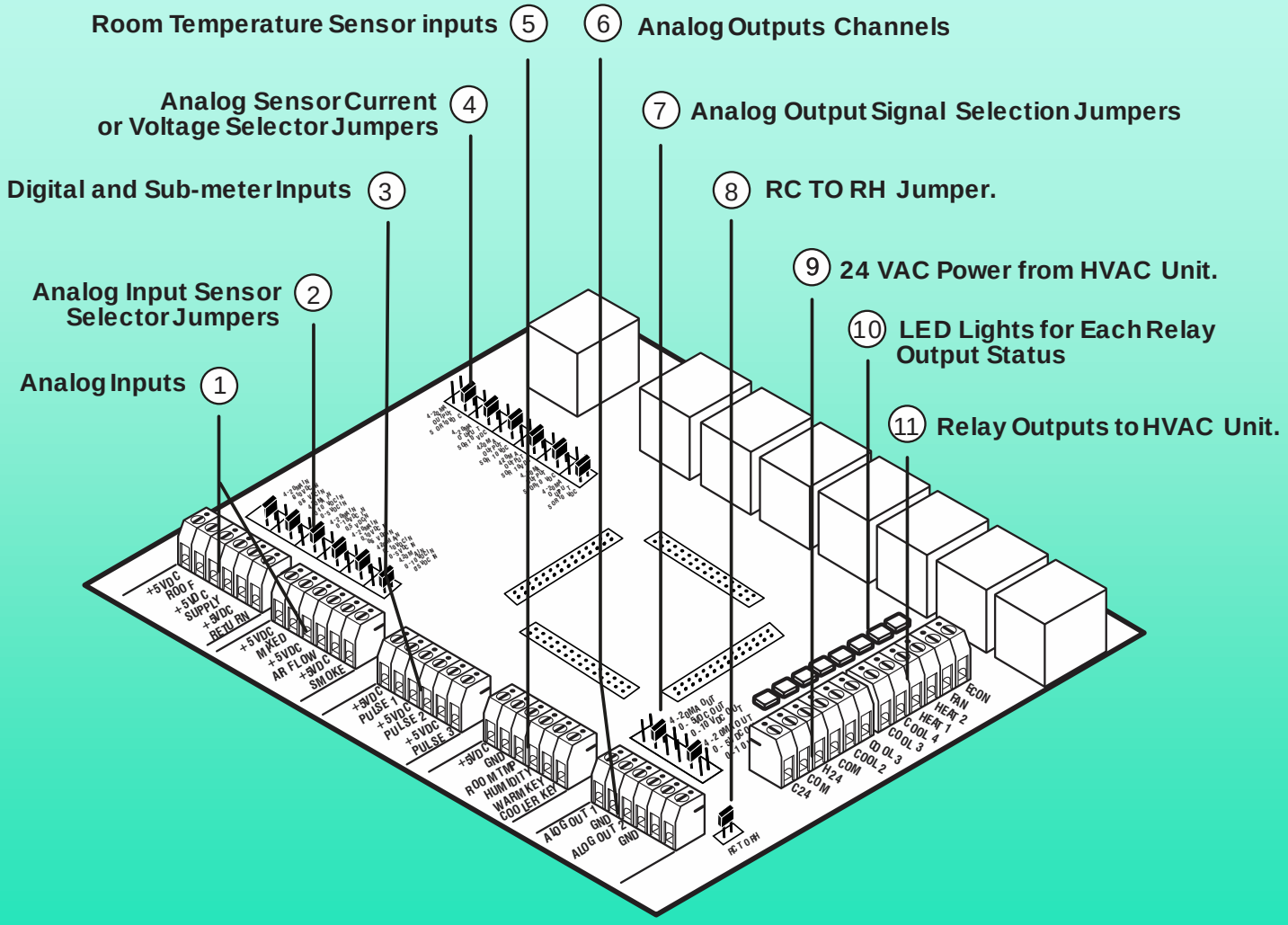
ADRES Controller Relay I/O Board



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ADRES Server or PC Computer Software Features

ADRESpro Application Program Server and Web Interface

- Microsoft 2012R2 Server based Operating System.
- Microsoft Sql Server Database Compatible.
- ODBC Compliant Application.
- Single downloadable installation file set with User's Guide.
- On-line operator and user training demonstration and tutorials.
- User expandable and configurable.
- Real-time automated M&V reporting.
- Historical data monitoring, logging and reporting.
- Automatic generation of management reports.
- Automatic alarm and alert reporting.
- ADRES Controllers can be used with other HMI software

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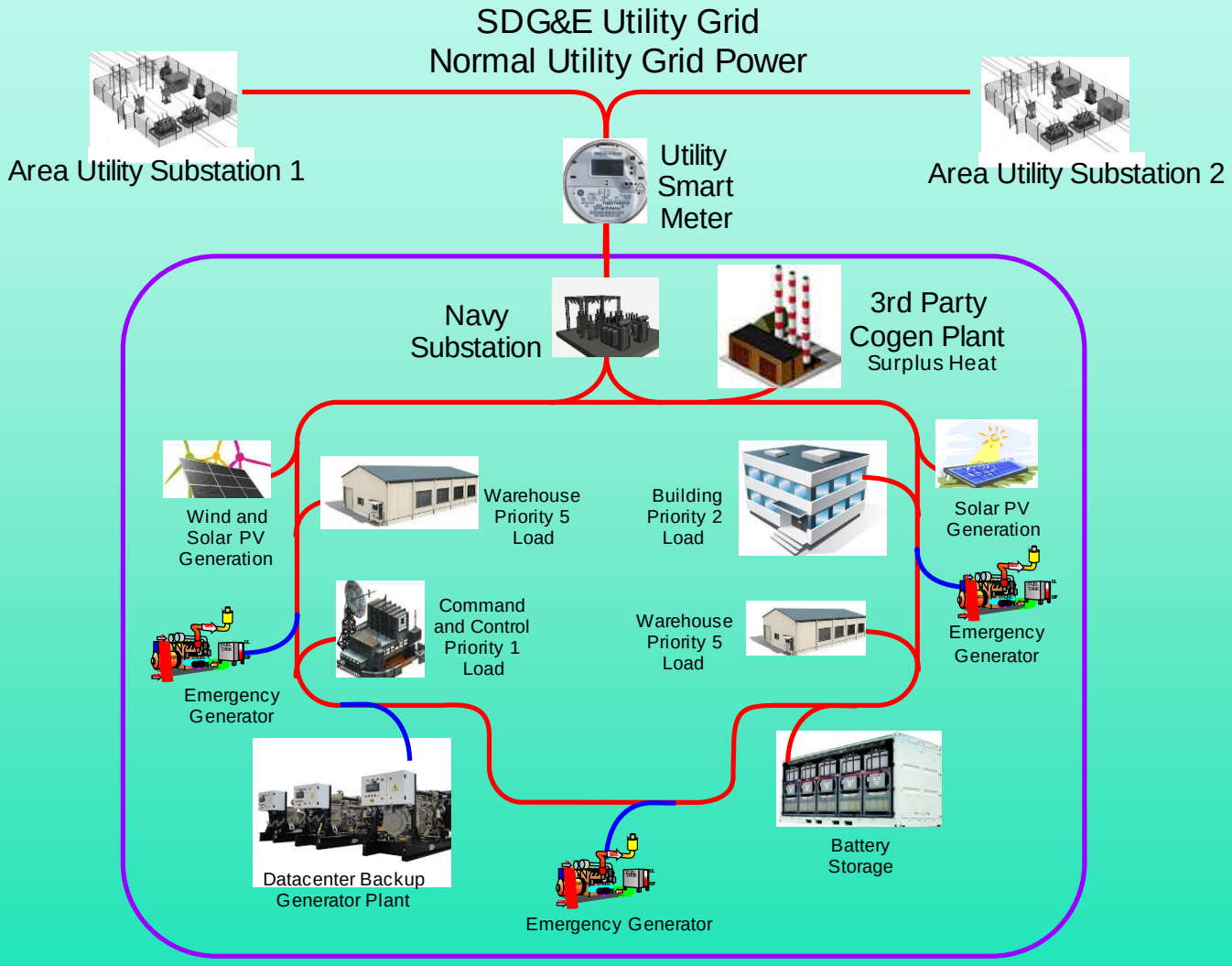
Navy Base Micro-grid Example
Normal Utility Power



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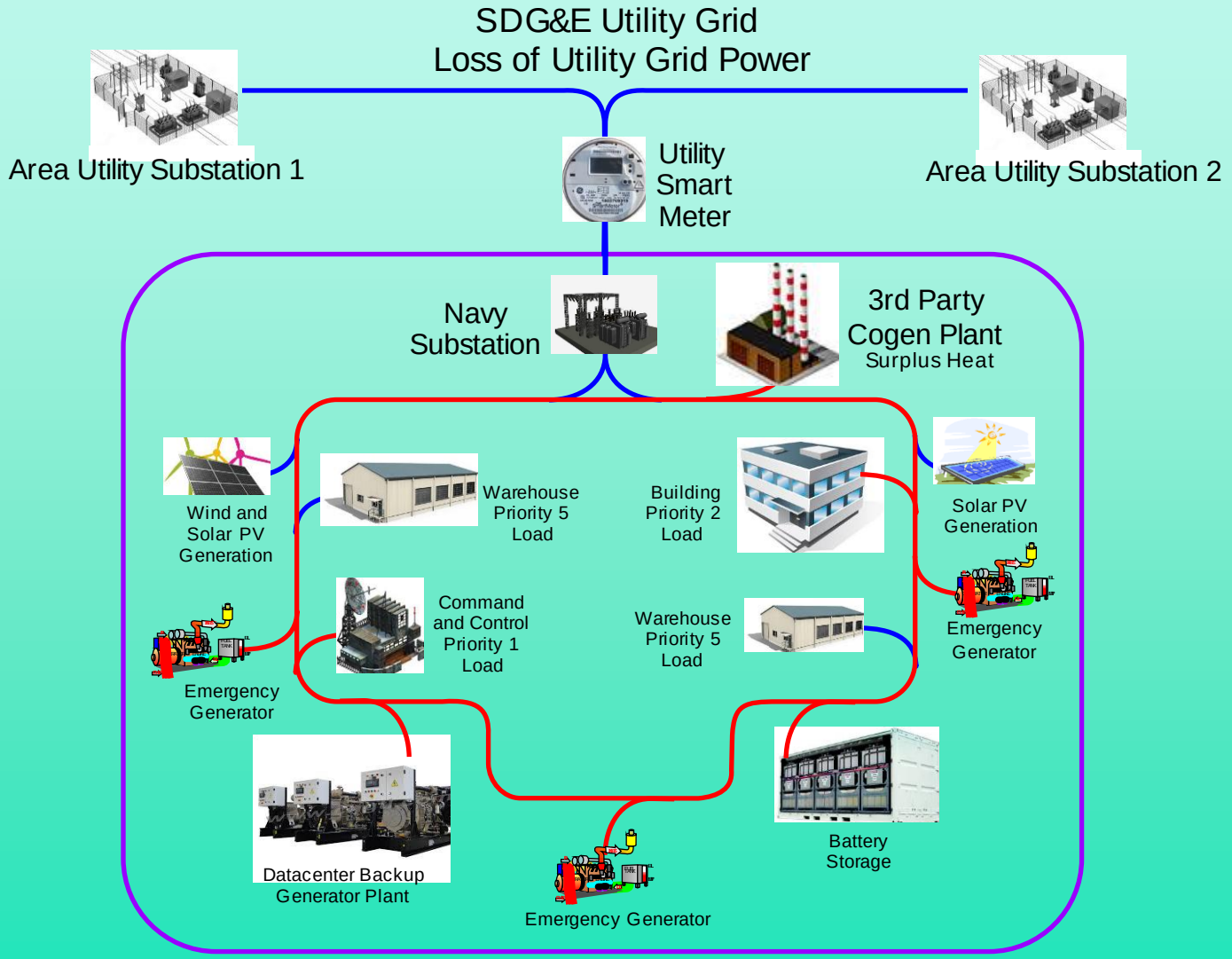
Navy Base Micro-grid Example
Loss of Utility Power



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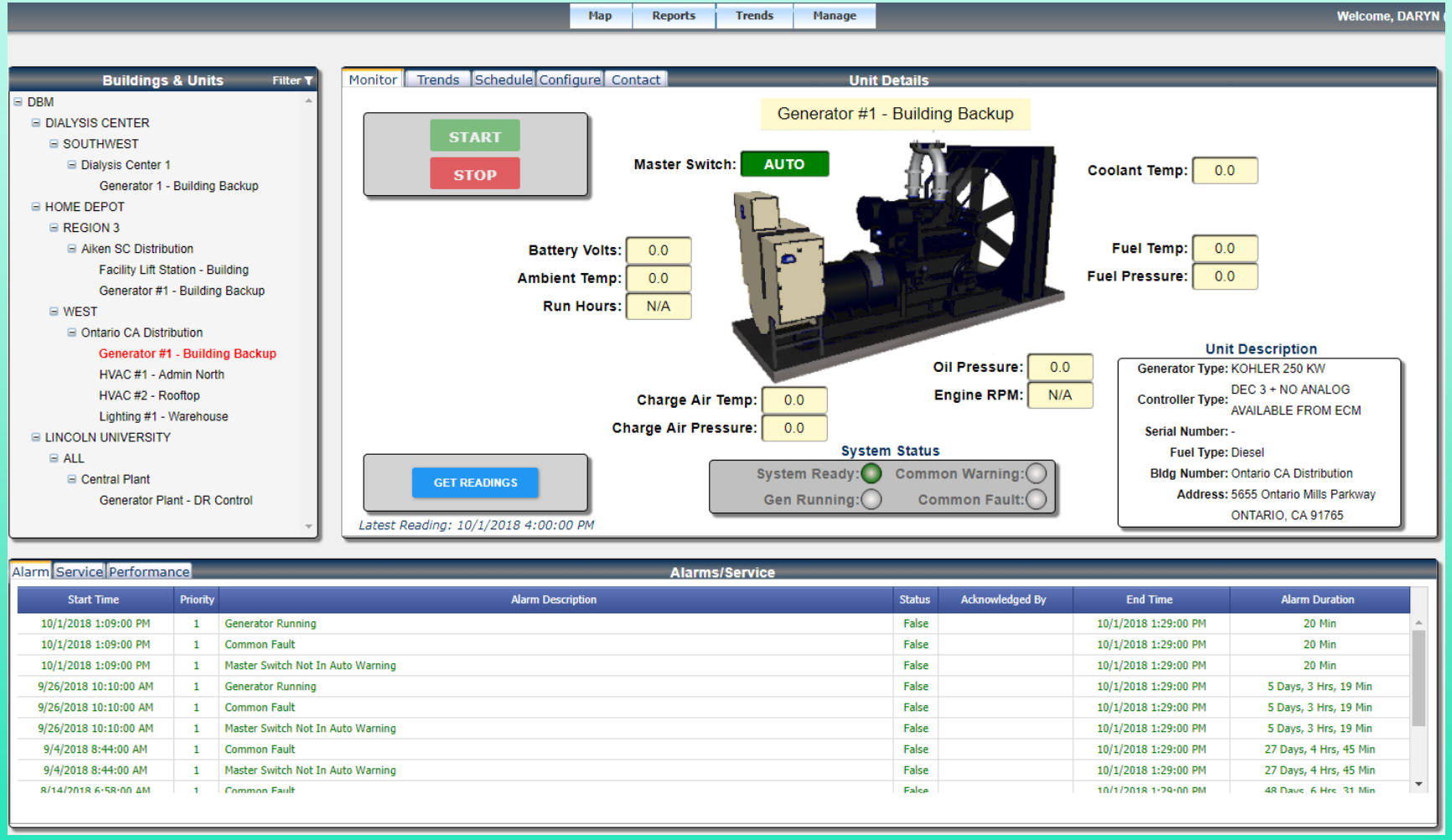
ADRES Web HMI
Emergency Generator



Start Time	Priority	Alarm Description	Status	Acknowledged By	End Time	Alarm Duration
10/1/2018 1:09:00 PM	1	Generator Running	False		10/1/2018 1:29:00 PM	20 Min
10/1/2018 1:09:00 PM	1	Common Fault	False		10/1/2018 1:29:00 PM	20 Min
10/1/2018 1:09:00 PM	1	Master Switch Not In Auto Warning	False		10/1/2018 1:29:00 PM	20 Min
9/26/2018 10:10:00 AM	1	Generator Running	False		10/1/2018 1:29:00 PM	5 Days, 3 Hrs, 19 Min
9/26/2018 10:10:00 AM	1	Common Fault	False		10/1/2018 1:29:00 PM	5 Days, 3 Hrs, 19 Min
9/26/2018 10:10:00 AM	1	Master Switch Not In Auto Warning	False		10/1/2018 1:29:00 PM	5 Days, 3 Hrs, 19 Min
9/4/2018 8:44:00 AM	1	Common Fault	False		10/1/2018 1:29:00 PM	27 Days, 4 Hrs, 45 Min
9/4/2018 8:44:00 AM	1	Master Switch Not In Auto Warning	False		10/1/2018 1:29:00 PM	27 Days, 4 Hrs, 45 Min
8/14/2018 6:58:00 AM	1	Common Fault	False		10/1/2018 1:29:00 PM	48 Days, 6 Hrs, 31 Min

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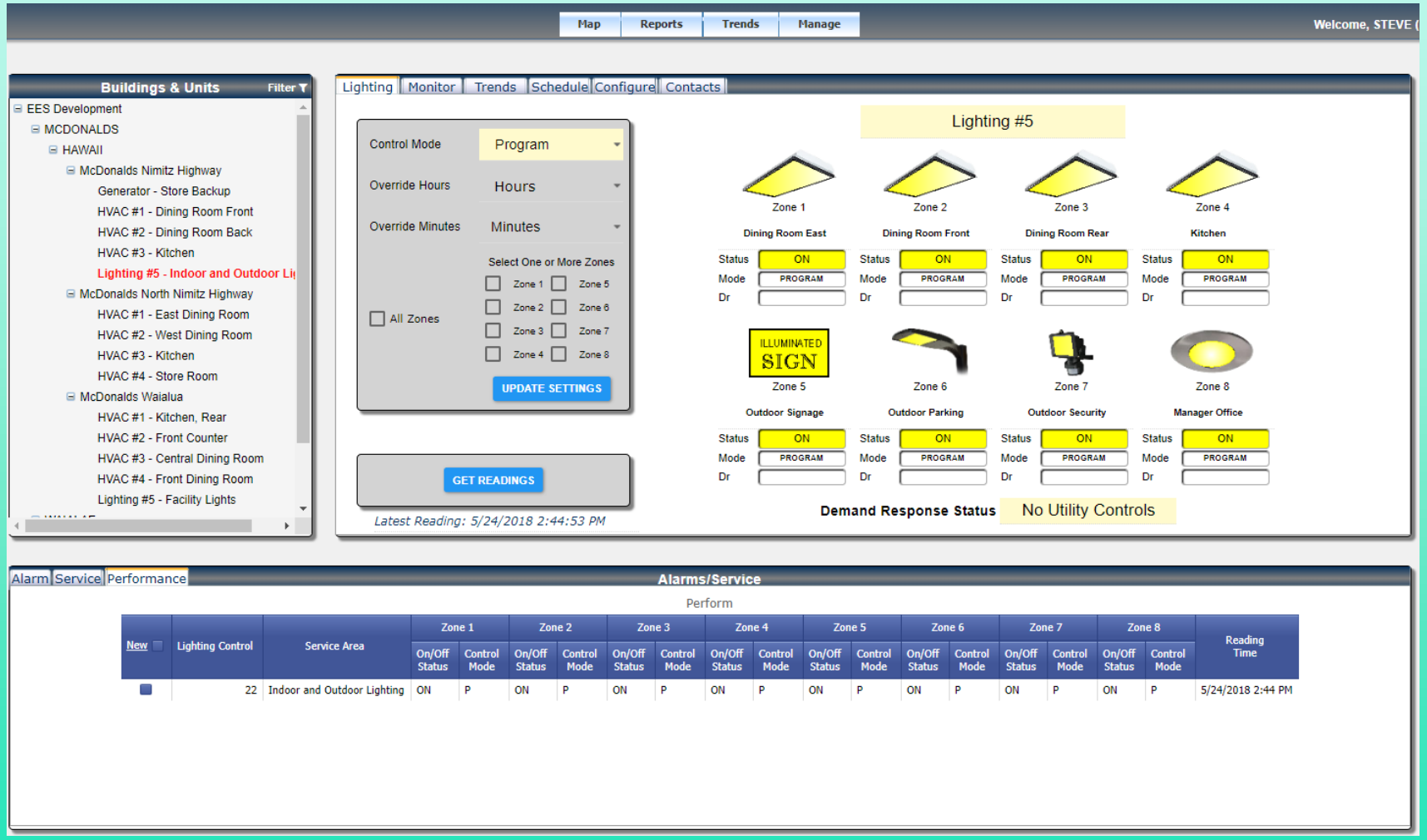
ADRES Web HMI Lighting Control



New	Lighting Control	Service Area	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		Zone 6		Zone 7		Zone 8		Reading Time
			On/Off Status	Control Mode	On/Off Status	Control Mode	On/Off Status	Control Mode	On/Off Status	Control Mode	On/Off Status	Control Mode	On/Off Status	Control Mode	On/Off Status	Control Mode	On/Off Status	Control Mode	
	22	Indoor and Outdoor Lighting	ON	P	ON	P	ON	P	ON	P	ON	P	ON	P	ON	P	ON	P	5/24/2018 2:44 PM

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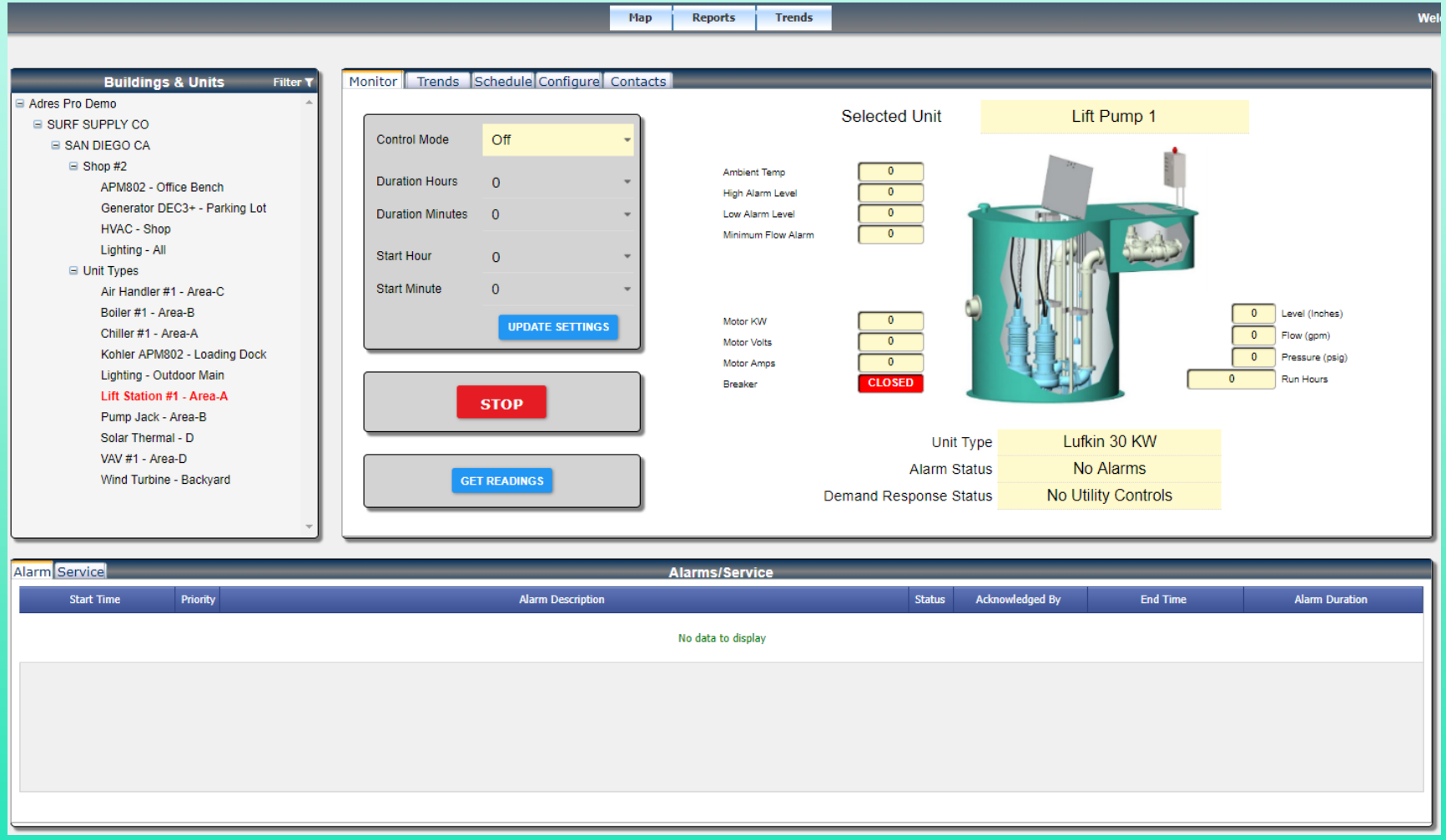
ADRES Web HMI Lift Station



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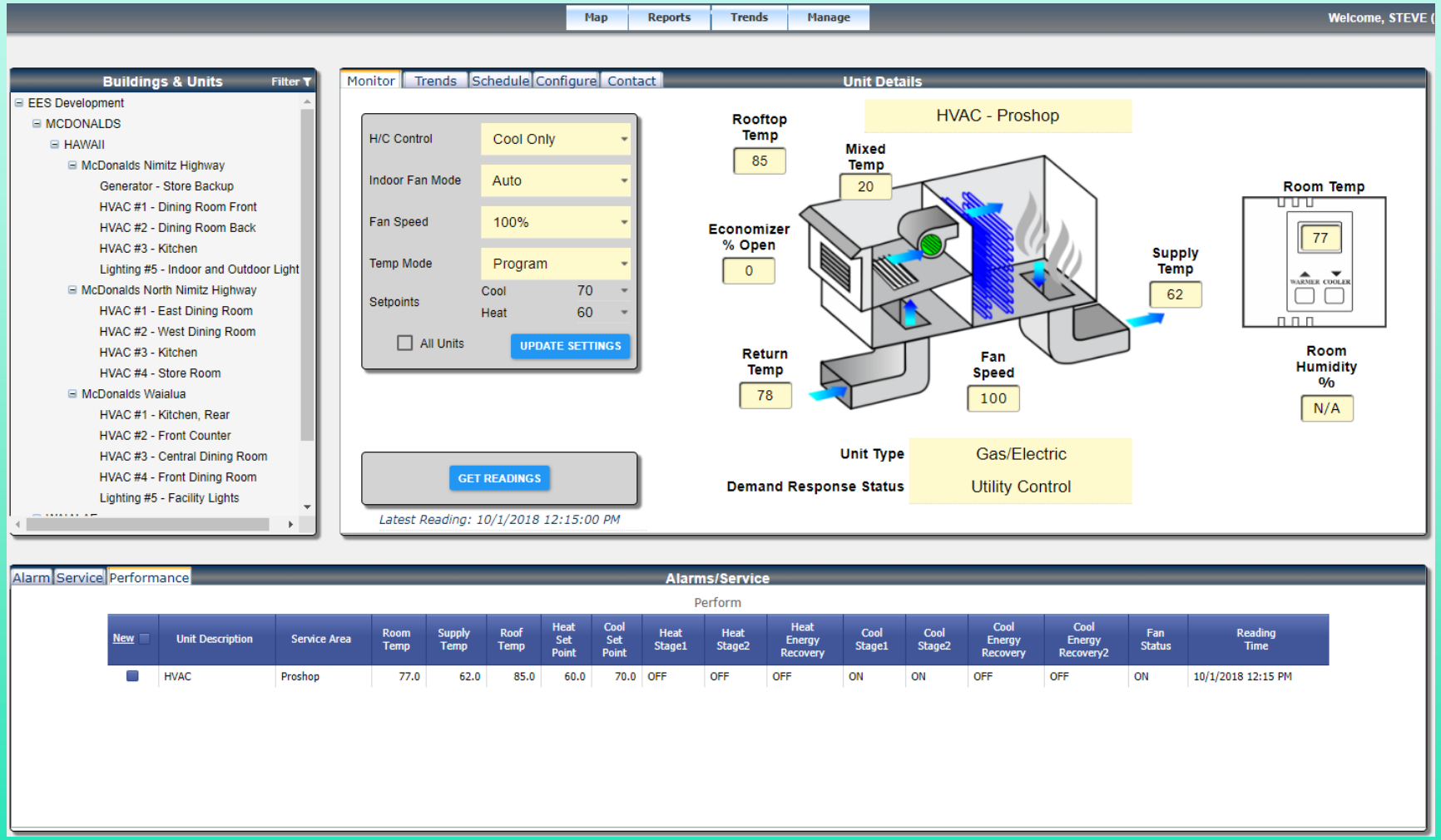
ADRES Web HMI Packaged HVAC Unit



New	Unit Description	Service Area	Room Temp	Supply Temp	Roof Temp	Heat Set Point	Cool Set Point	Heat Stage1	Heat Stage2	Heat Energy Recovery	Cool Stage1	Cool Stage2	Cool Energy Recovery	Cool Energy Recovery2	Fan Status	Reading Time
	HVAC	Proshop	77.0	62.0	85.0	60.0	70.0	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	10/1/2018 12:15 PM

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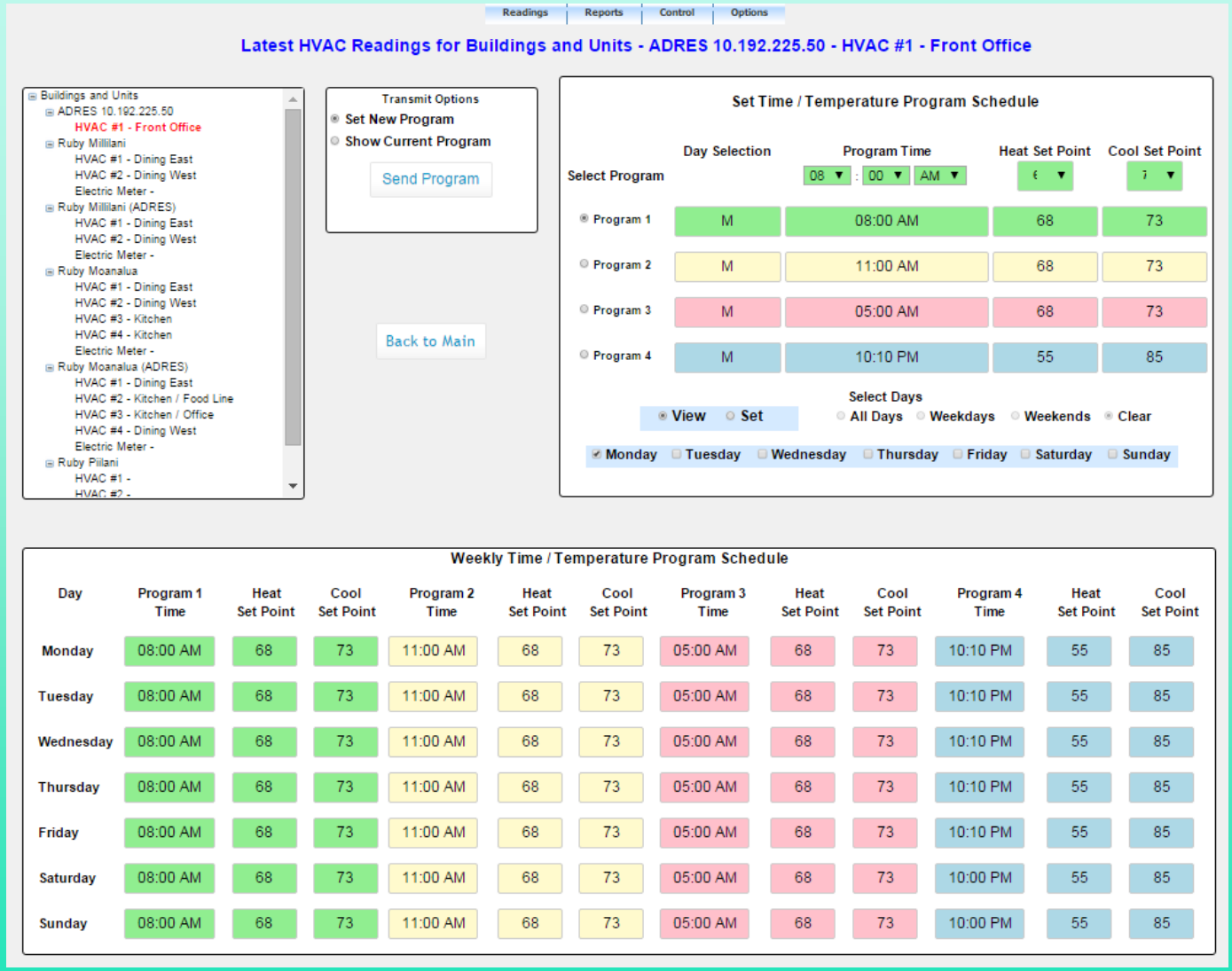
ADRESpro Web HMI
HVAC Weekly Program Schedule



Weekly Time / Temperature Program Schedule

Day	Program 1 Time	Heat Set Point	Cool Set Point	Program 2 Time	Heat Set Point	Cool Set Point	Program 3 Time	Heat Set Point	Cool Set Point	Program 4 Time	Heat Set Point	Cool Set Point
Monday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:10 PM	55	85
Tuesday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:10 PM	55	85
Wednesday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:10 PM	55	85
Thursday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:10 PM	55	85
Friday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:10 PM	55	85
Saturday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:00 PM	55	85
Sunday	08:00 AM	68	73	11:00 AM	68	73	05:00 AM	68	73	10:00 PM	55	85

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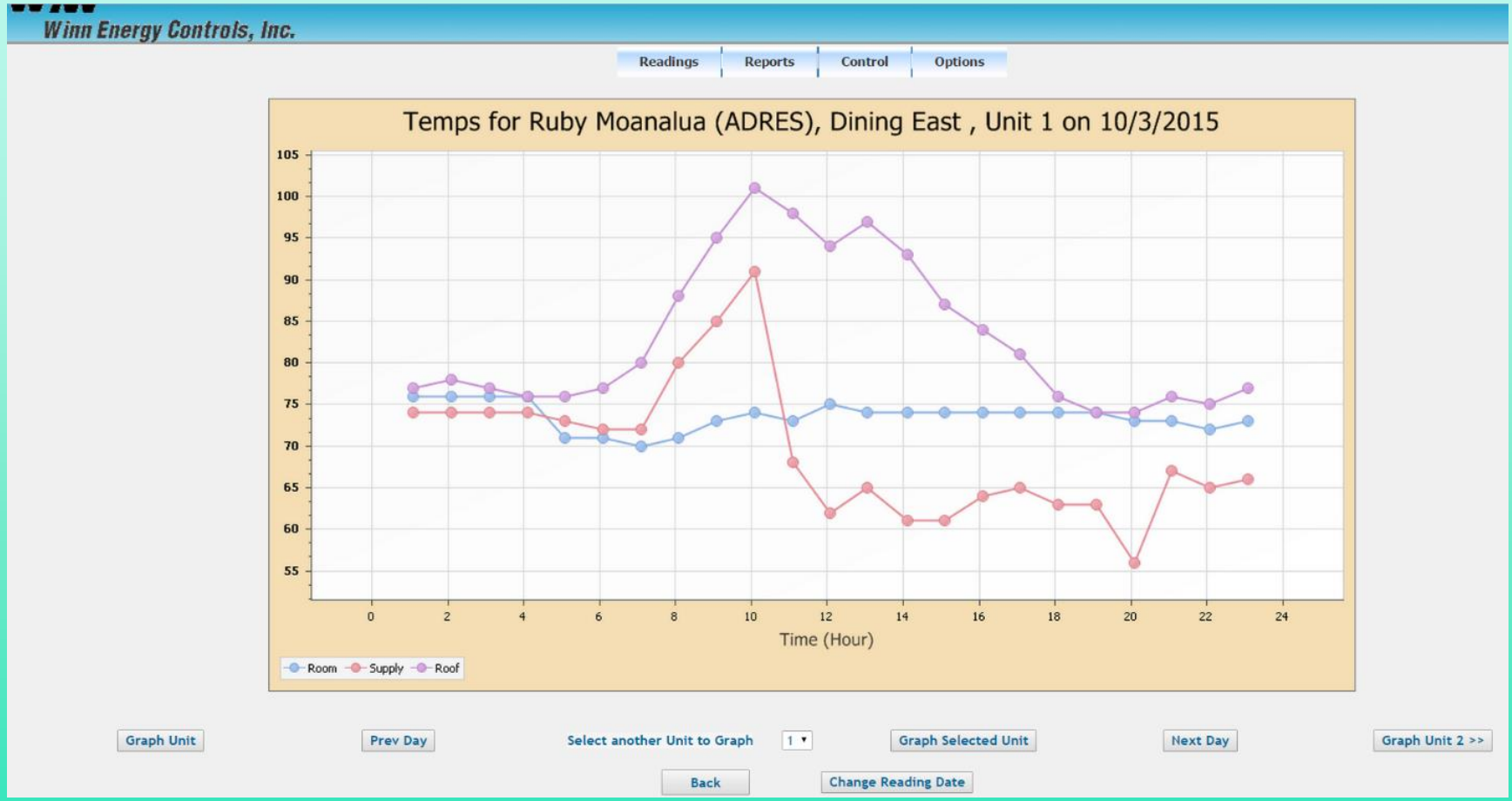
ADRES Web HMI Graphing and Trending



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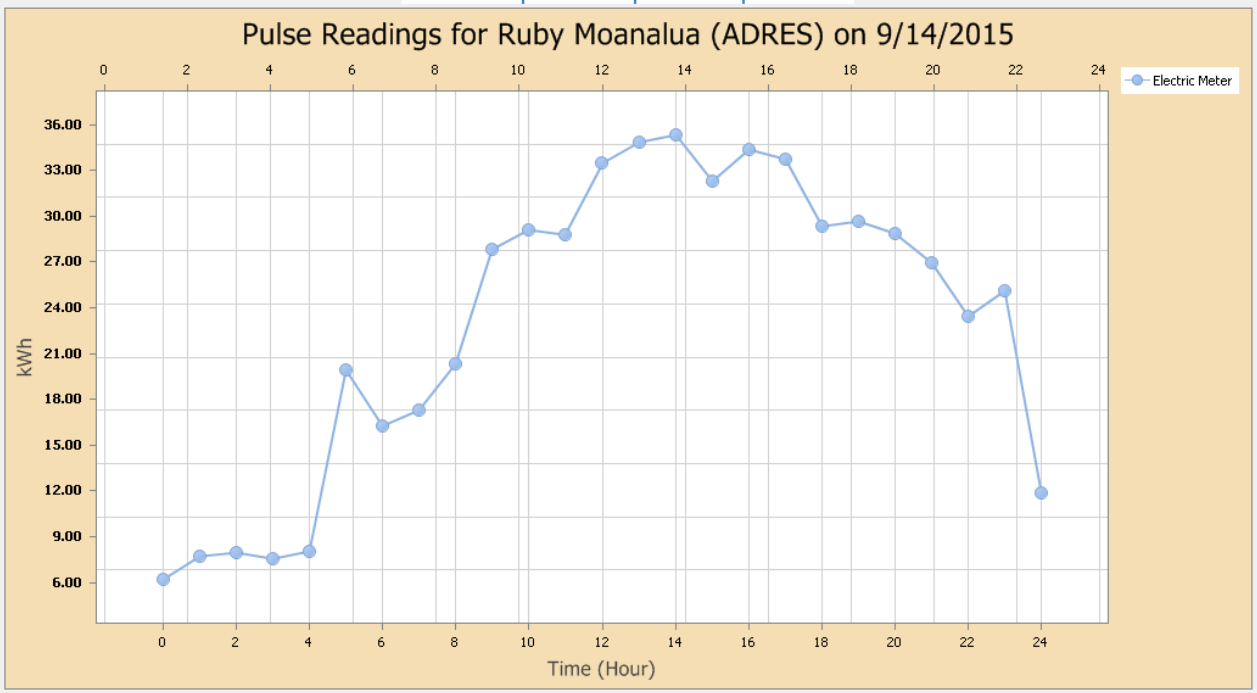
ADRES Web HMI
Submeter Graphing and Trending

Winn Energy Controls, Inc.

Readings | Reports | Control | Options



Previous Day | Back | Next Day

ADRES Automated Demand Response and Energy Savings Solution

ADRES Web HMI Submeter Reporting

Readings | Reports | Control | Options

Channel	Description	Reading	Pulses	Reading Time
1	Electric Meter	387,646.1 kWh	63,548,541	10/3/2015 12:00 AM
1	Electric Meter	387,647.1 kWh	63,548,700	10/3/2015 12:15 AM
1	Electric Meter	387,647.7 kWh	63,548,799	10/3/2015 12:30 AM
1	Electric Meter	387,648.7 kWh	63,548,966	10/3/2015 12:45 AM
1	Electric Meter	387,649.3 kWh	63,549,058	10/3/2015 1:00 AM
1	Electric Meter	387,650.3 kWh	63,549,224	10/3/2015 1:15 AM
1	Electric Meter	387,650.8 kWh	63,549,316	10/3/2015 1:30 AM
1	Electric Meter	387,651.8 kWh	63,549,483	10/3/2015 1:45 AM
1	Electric Meter	387,652.4 kWh	63,549,575	10/3/2015 2:00 AM
1	Electric Meter	387,653.4 kWh	63,549,738	10/3/2015 2:15 AM
1	Electric Meter	387,654.1 kWh	63,549,853	10/3/2015 2:30 AM
1	Electric Meter	387,655.2 kWh	63,550,040	10/3/2015 2:45 AM
1	Electric Meter	387,655.8 kWh	63,550,131	10/3/2015 3:00 AM
1	Electric Meter	387,656.8 kWh	63,550,299	10/3/2015 3:15 AM
1	Electric Meter	387,657.4 kWh	63,550,390	10/3/2015 3:30 AM
1	Electric Meter	387,658.4 kWh	63,550,558	10/3/2015 3:45 AM
1	Electric Meter	387,659.2 kWh	63,550,682	10/3/2015 4:00 AM
1	Electric Meter	387,662.7 kWh	63,551,265	10/3/2015 4:15 AM
1	Electric Meter	387,666.1 kWh	63,551,814	10/3/2015 4:30 AM
1	Electric Meter	387,668.4 kWh	63,552,189	10/3/2015 4:45 AM

ack to Selection | Graph | Report Preview | PDF Report | Get Current Reading | Export to Excel

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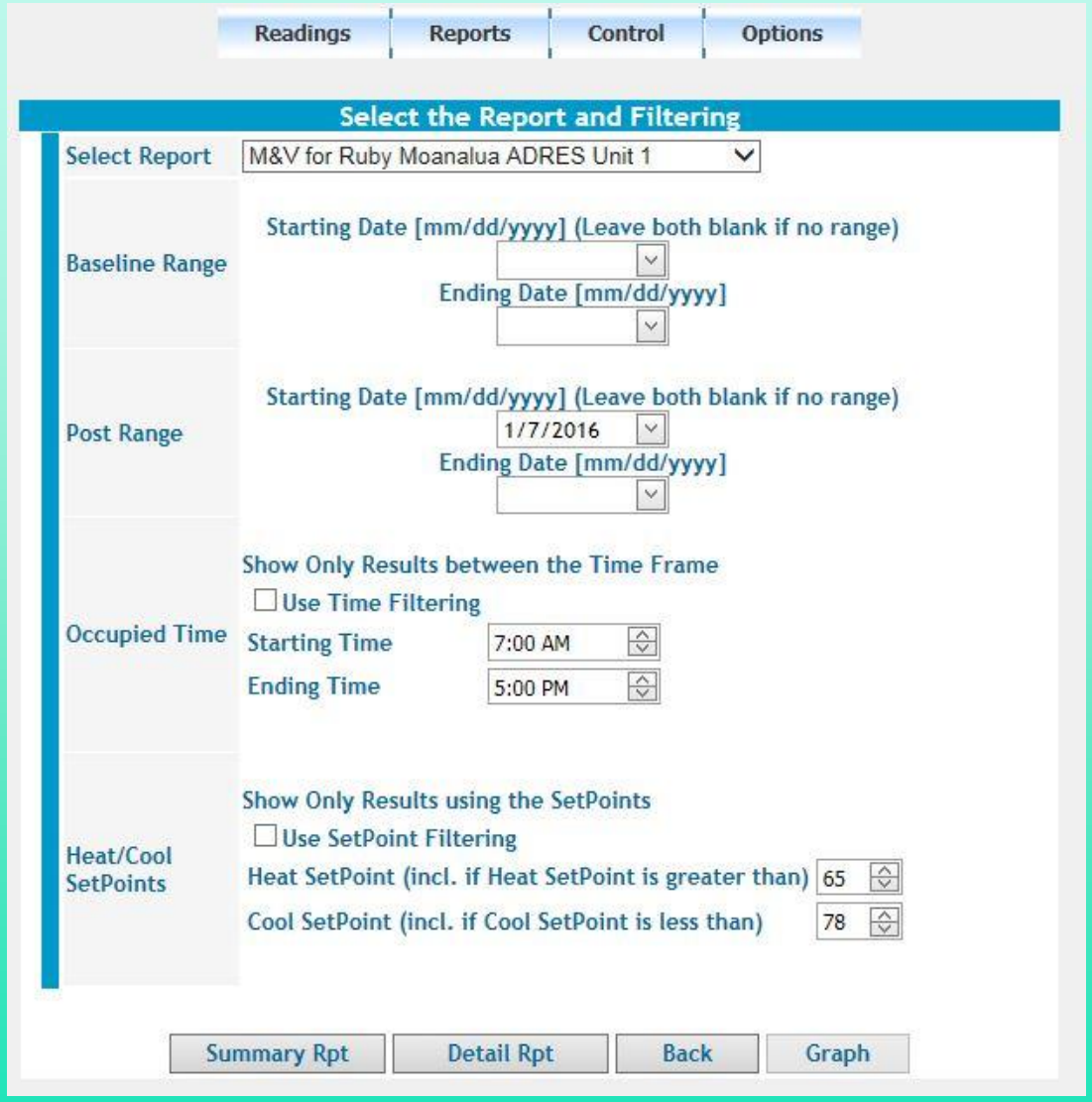
ADRES Web HMI
M&V Report Configure



ADRES Automated Demand Response and Energy Savings Solution

ADRES Web HMI
M&V Raw Data Report

Energy Savings Report Detail (HVAC)

Building: Ruby Moanalua (ADRES)

Unit:

Building Status: All

Select Days: All

Select Time: All

Baseline Range: 9/8/2015 12:00:00 AM to 9/12/2015 12:00:00 AM

PostRetro Range: All

M&V for Ruby Moanalua ADRES Unit 1

	Baseline Performance Data						Post Retrofit Performance Data						Read Details
	Total Bin Hours	Energy Consumption (kWh Avg)	Room Temperature (Deg F Avg)	Supply Temperature (Deg F Avg)	Return Temperature (Deg F Avg)	Delta Temp (Supply - Return) (Deg F Avg)	Total Bin Hours	Energy Consumption (kWh Avg)	Room Temperature (Deg F Avg)	Supply Temperature (Deg F Avg)	Return Temperature (Deg F Avg)	Delta Temp (Supply - Return) (Deg F Avg)	Reading Date
72	0.25	7.4	71.0	15.0	17.8	-2.75							9/11/2015 3:15 PM
73	0.75	24.4	72.0	47.0	54.0	-7.00							9/11/2015 4:00 PM
73	0.25	8.6	72.0	16.0	18.0	-2.00							9/11/2015 4:15 PM
78	0.75	24.7	71.0	51.0	53.3	-2.25							9/11/2015 5:00 PM
78	0.25	7.7	71.0	17.0	17.8	-0.75							9/11/2015 5:15 PM
76	0.75	22.5	71.0	51.0	53.3	-2.25							9/11/2015 6:00 PM
76	0.25	8.0	71.0	17.0	17.8	-0.75							9/11/2015 6:15 PM
85	0.75	24.0	72.0	53.0	54.0	-1.00							9/11/2015 7:00 PM
85	0.25	8.0	72.0	18.0	18.0	0.00							9/11/2015 7:15 PM
84	0.75	23.0	72.0	53.0	54.0	-1.00							9/11/2015 8:00 PM
84	0.25	7.3	72.0	18.0	18.0	0.00							9/11/2015 8:15 PM
73	0.75	22.4	73.0	47.0	54.8	-7.75							9/11/2015 9:00 PM
73	0.25	7.3	73.0	16.0	18.3	-2.25							9/11/2015 9:15 PM
72	0.75	20.1	73.0	47.0	54.8	-7.75							9/11/2015 10:00 PM
72	0.25	7.3	73.0	16.0	18.3	-2.25							9/11/2015 10:15 PM
73	0.75	17.4	72.0	47.0	54.0	-7.00							9/11/2015 11:00 PM
73	0.25	1.8	72.0	16.0	18.0	-2.00							9/11/2015 11:15 PM
72	0.75	6.3	71.0	47.0	53.3	-6.25							9/12/2015 12:00 AM
71							0.75	8.1	71.0	46.5	53.3	-6.75	9/15/2015 12:00 AM
71							0.25	2.0	71.0	15.5	17.8	-2.25	9/15/2015 12:15 AM
75							0.75	6.8	71.0	51.8	53.3	-1.50	9/15/2015 1:00 AM
75							0.25	2.2	71.0	17.3	17.8	-0.50	9/15/2015 1:15 AM
76							0.75	6.7	73.0	53.3	54.8	-1.50	9/15/2015 2:00 AM
76							0.25	2.4	73.0	17.8	18.3	-0.50	9/15/2015 2:15 AM
79							0.75	6.9	76.0	57.0	57.0	0.00	9/15/2015 3:00 AM

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ADRES Automated Demand Response and Energy Savings Solution

ADRES Web HMI M&V Summary Report

Energy Savings Report (HVAC)

M&V for Ruby Millilani

Filtering Criteria

Building Status: All
Select Days: All
Select Time: All

Baseline Range: All
Post Range: 7/1/2015 to 8/1/2015

Ambient Temp (BIN)	Baseline Performance Data						Post Retrofit Performance Data						Resulting Energy Saved			
	Total Bin Hours	Energy Consumption (kWh Avg)	Room Temperature (Deg F Avg)	Supply Temperature (Deg F Avg)	Return Temperature (Deg F Avg)	Delta Temp (Supply - Return) (Deg F Avg)	Total Bin Hours	Energy Consumption (kWh Avg)	Room Temperature (Deg F Avg)	Supply Temperature (Deg F Avg)	Return Temperature (Deg F Avg)	Delta Temp (Supply - Return) (Deg F Avg)	Efficiency Improvement	Energy Saved (kWh Avg)	Total Post Retrofit Hours	Total kWh Saved
0 - 4																
5 - 9																
10 - 14																
15 - 19																
20 - 24																
25 - 29																
30 - 34																
35 - 39																
40 - 44																
45 - 49																
50 - 54																
55 - 59																
60 - 64	9.00	6.3	70.6	67.0	70.6	-3.56	7.00	0.1	72.6	68.0	72.6	-4.57	4,769 %	6.2	7.00	43
65 - 69	62.00	6.9	71.5	68.0	71.5	-3.47	66.00	1.2	74.2	113.3	74.4	38.82	490 %	5.7	66.00	378
70 - 74	33.00	16.1	72.3	60.0	72.3	-12.33	169.50	6.8	74.9	166.5	75.0	91.44	138 %	9.4	169.50	1,585
75 - 79	15.00	20.4	71.9	62.0	71.9	-9.87	88.00	14.1	75.1	180.1	75.1	105.09	45 %	6.4	88.00	559
80 - 84	26.00	20.3	72.0	67.0	72.0	-4.96	65.75	16.9	75.3	179.1	75.3	103.76	20 %	3.5	65.75	227
85 - 89	34.00	23.0	72.1	70.0	72.1	-2.09	64.00	16.8	74.8	156.8	74.9	81.82	37 %	6.3	64.00	400
90 - 94	11.00	23.9	71.4	81.0	71.4	9.64	78.00	14.5	74.5	144.9	74.8	70.10	66 %	9.5	78.00	739
95 - 99							30.00	13.8	74.4	182.2	74.4	107.77				
100-104							4.00	11.8	74.8	203.0	74.8	128.25				
105-109																
110-114																
115-119																
Totals	190	117.0					572	95.8							538.25	3,931

Saturday, September 19, 2015 Page 1

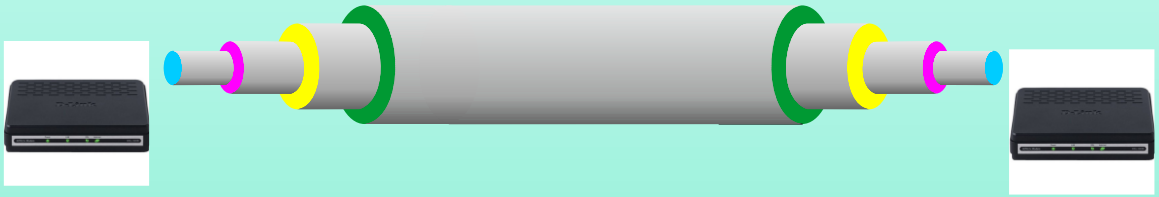
ADRES Digital LTE Solution

- Meets DOD RMF Cyber Security Requirements
- Only WEC to Carrier Point-to-Point connection, no commercial servers. Identical to current Point-to-Point T1 lines and backhaul.
- Carrier Point-to-Point connection between WEC SCADA CISCO ASA and Carrier.
- End Point Digital LTE Modem meets FIPS140 requirements.
- Only Modem Private non public routable IP Pool.
- M-to-M traffic isolated and segregated on digital LTE Cellular Network.
- LTE Modems managed by WEC Network Administrators only.
- Bulk Airtime Pricing.

ADRES Automated Demand Response and Energy Savings Solution

ADRES Digital LTE Cyber Security

Digital LTE Point to Point Connection
DOD RMF Cyber Secure Compliant



IP Connection Between DOD Server and Remote LTE Server, Laptop or ADRES or ADRES Sentry to PLC.

1. All communication is end-to-end Private Network
2. All LTE HMI and LTE PLCs have Private Ips.
3. IP Socket connection Initiated by Either Server, Remote LTE HMI or Remote LTE ADRES Controller.
4. Sending Request initiated using VPN Tunnel through Point-to-Point T1.
5. Connection in conformance with IPSec Standards.
6. Response using 509 Certificate Authentication (Rolling Keys).
7. Once connection established, communication encryption is described below:

- **First level security - LTE 16/32 bit Encription**
- **Second level security - AES 256 bit Encription**
- **Third level security - IPSec with Keys**
- **Fourth level security - RTOS on Host Micro**

End User Benefits

- **Typical 1-2 Year Return on Investment with implementation of the "Wireless" ADRES automated demand response and energy savings solution.**
- **Remote access via web browser, server or PC Computer to buildings for real-time or historical electric, gas and water consumption.**
- **Integrated alarm reporting system for end device controlled equipment including heating and air conditioning equipment, lighting and critical building and utility energy usage parameters.**
- **Modular and expandable platform for future growth applications.**
- **Database and trend analysis of equipment and performance.**
- **Optimum scheduling of equipment service based on actual equipment run hours.**

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