

# Variable Refrigerant Flow (VRF) Application Sheet

## Optergy Enterprise + Proton

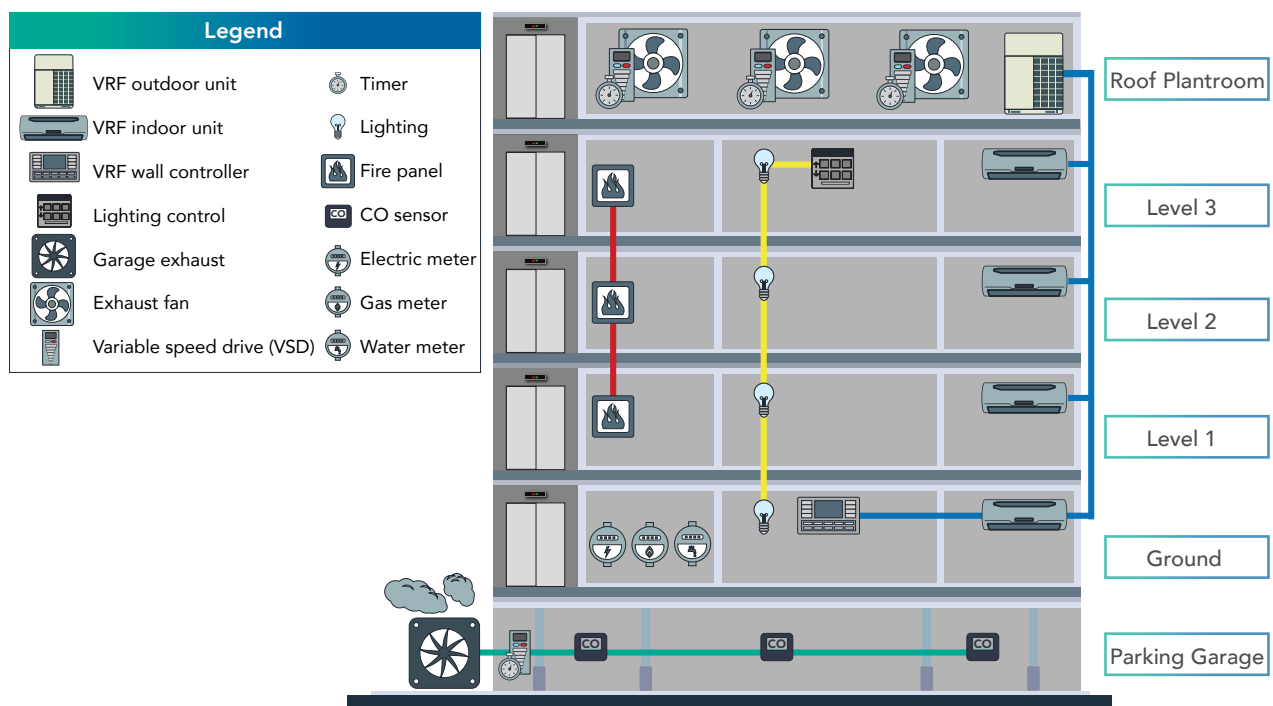
### Description

In the small/medium sized building environment where air conditioning is required, it is common for Variable Refrigerant Flow (VRF) systems to be installed to maintain internal building conditions. VRF systems operate with multiple indoor air-conditioning units connected to a single outdoor condensing unit. Depending on each zone's condition, the refrigerant volume is varied to each indoor unit. These types of refrigerant systems are managed by their manufacturers proprietary controls which are typically mounted on the wall with small screen and buttons allowing basic functionality.

VRF systems work well, however building owners have limited ability to improve on the VRF manufacturer's default settings. In small/medium sized buildings where VRF's are typically installed, all other operational systems are installed with basic timers and are independent of each other. These independent systems include (but not limited to):

- VRF systems
- Outside air fans
- Fire alarms
- Lighting control
- Elevator/Lifts
- General exhaust fans
- Toilet exhaust fans
- Kitchen exhaust fans
- CO monitoring and garage fan control
- Perimeter heating
- Auxiliary monitoring systems
- Electrical meters
- Gas meters
- Water meters

### Building with VRF and Siloed Systems

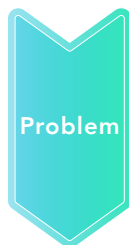


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## Typical VRF Building Environment

Systems integration is typical in larger buildings with central heating, cooling and ventilation systems (HVAC), however is lacking in buildings with VRF systems. Historically, integrated systems have been too expensive to install on a smaller scale making integration impossible for building owners to justify. This left controls and automation contractors with little interest in offering integrated solutions which involve VRF systems.

The problem with this legacy approach is when building systems are operated independently, building owners do not have remote access and end up with multiple systems that need to be operated locally. Lack of integration causes issues with:



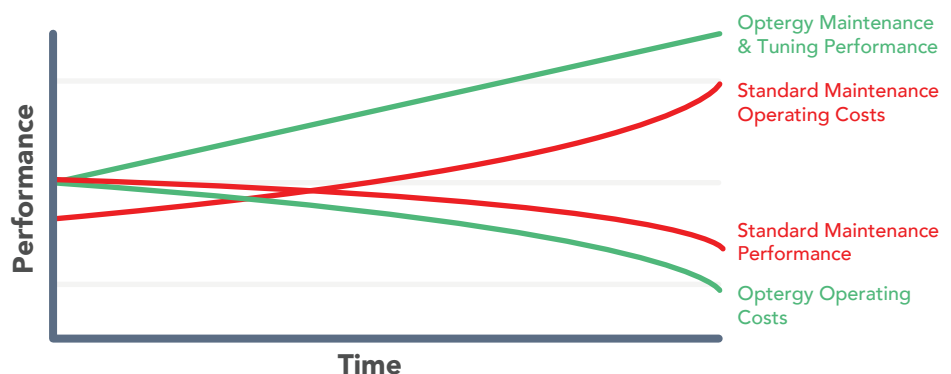
- Remote connectivity
- Adjustability
- Visibility
- Insight/diagnostic ability
- Analysis
- Reporting



- An overall lack of control over building operations
- Lack of control over comfort conditions
- Increased operational expenses including -
  - > Time lost traveling to site
  - > Increased energy/water/gas costs
  - > Increased maintenance costs

To reduce risk and frustration from uncomfortable occupants, integration is what's needed to assure the whole building operates correctly with control placed back into the hands of the building owner.

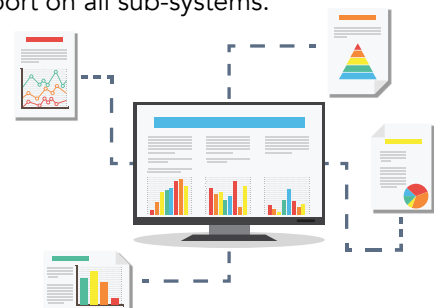
### Building Performance & Operating Costs Over Time



## A Brighter Future with Optergy

To remove the risks, frustration and lack of control of building outcomes, it is necessary to have one system that can intelligently communicate, integrate, monitor, control, alarm and report on all sub-systems.

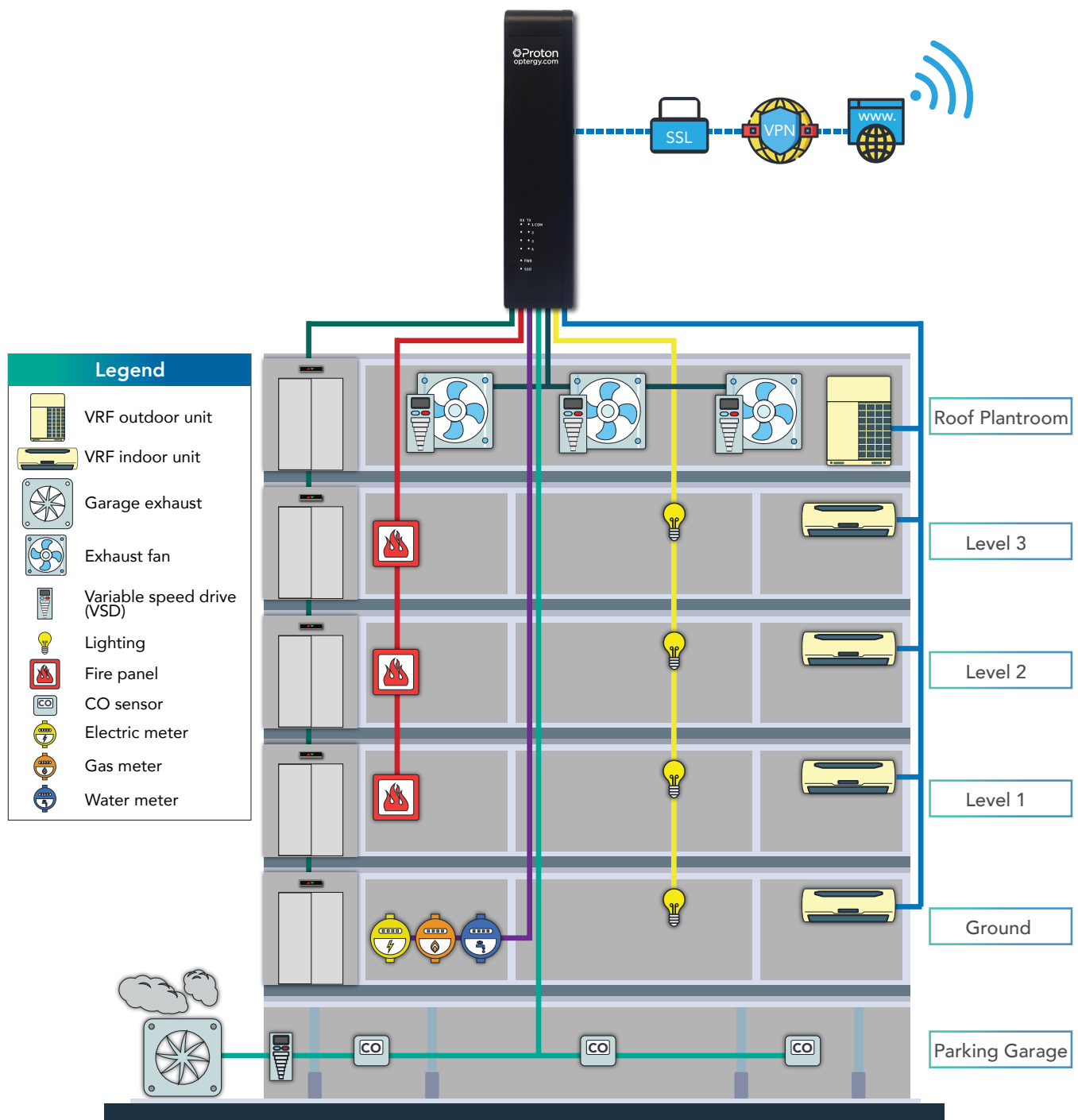
To enable integration, smart monitoring and control and energy efficiency for small/medium size buildings, Optergy developed economical software with built-in applications for easy configuration and fast project delivery. Using Optergy software gives contractors, consultants and building owners an easy and smart solution for their small and medium sized buildings.



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## Optergy Smart Monitoring & Control

Using Optergy's versatile and application rich interface, a basic building with VRF and disparate systems can be turned into a smart building with energy efficient control and monitoring.



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## Solutions

Integration using Optergy's built-in tools and applications enables the following smart solutions to be delivered in a VRF building environment:

### Control

- VRF (heating/cool)
- Ventilation
- Smart strategies leveraging integrated systems such as motion sensors, reed switches, security systems
- Limit setpoints
- Reset setpoints
- Mode control
- Occupancy based scheduling
- Economy cycles
- CO2 control of economy cycles
- CO control of parking garage
- Automated optimum start
- Automated demand management
- Pumping systems
- Lighting

### Billing

- Automated utilities billing
- Electricity
- Gas
- Water
- Thermal (chilled/hot)
- Automated after hours A/C and lighting billing

### Monitoring

- VRF (heating/cooling)
- Elevators/Lifts
- Fire alarm systems
- Security systems
- Ventilation
- Subsoil systems
- Pumping systems
- Server rooms
- Metering
- Smart Alarming with notification
- Temperature
- Humidity
- CO2 level
- Lux level

### Energy

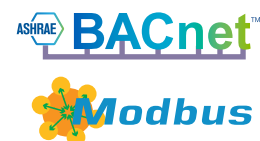
- Electricity
- Gas
- Water
- Thermal (hot/chilled)
- Submetering with hierarchy
- Automated reporting
- Automated email reporting CSV/PDF
- Automated meter reading



## Features and Tools

BACnet and Modbus communications are standard and enable integration of multiple building sub-systems. Contractor friendly built-in tools include:

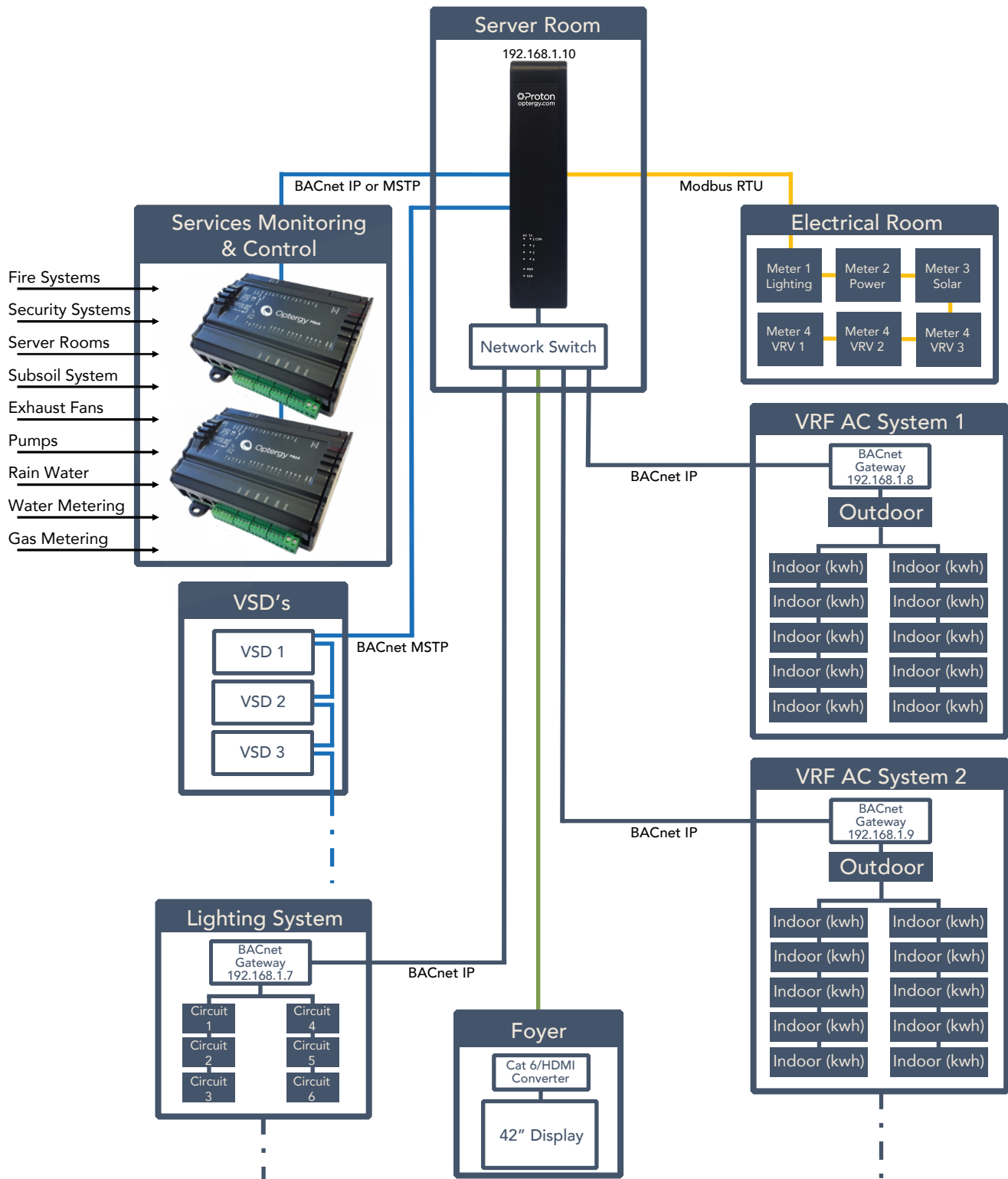
- Graphic display tool with live display editor
- BACnet device configuration
- Modbus device configuration
- Programming tool using function logic blocks live
- Diagnostic templates
- Dashboard wizard
- Automatic backup
- Remote file manager
- Secure Remote Access (SSL & VPN)





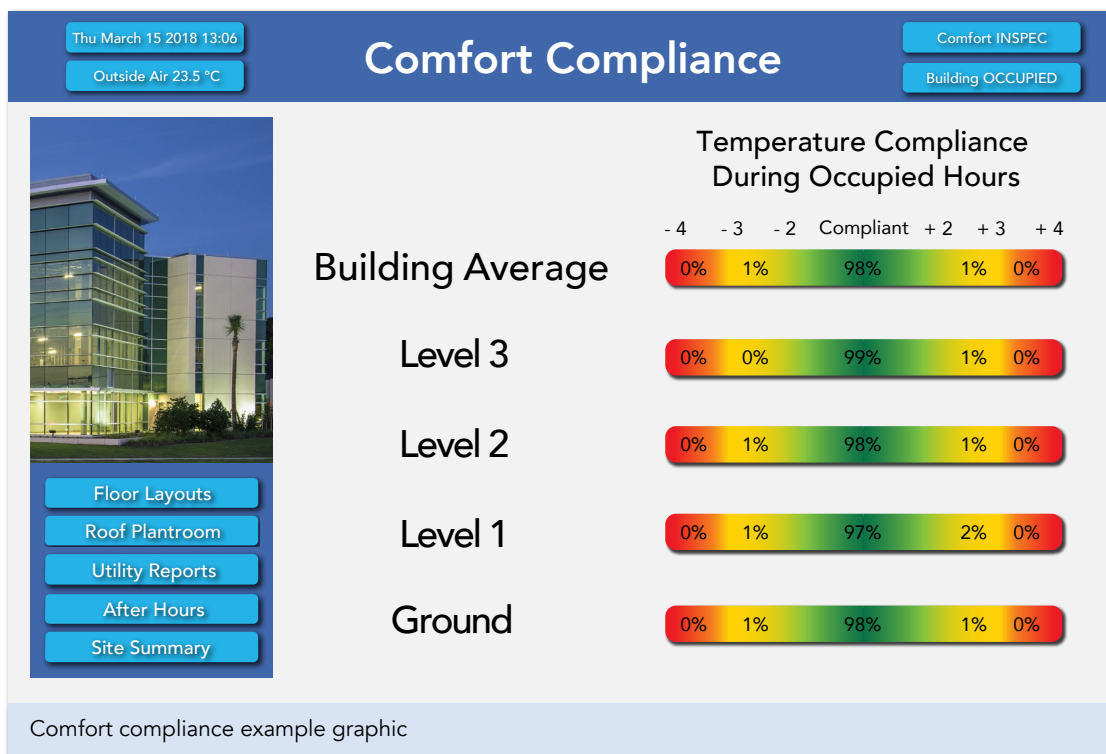
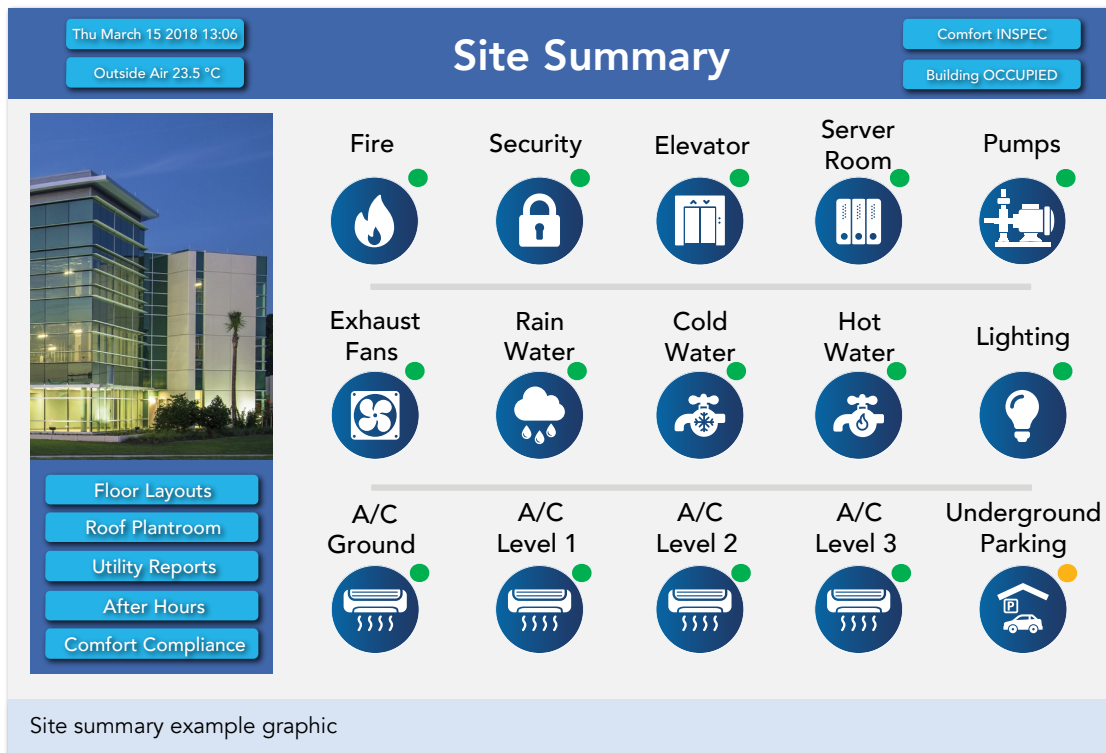
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## Detailed Network Architecture Example



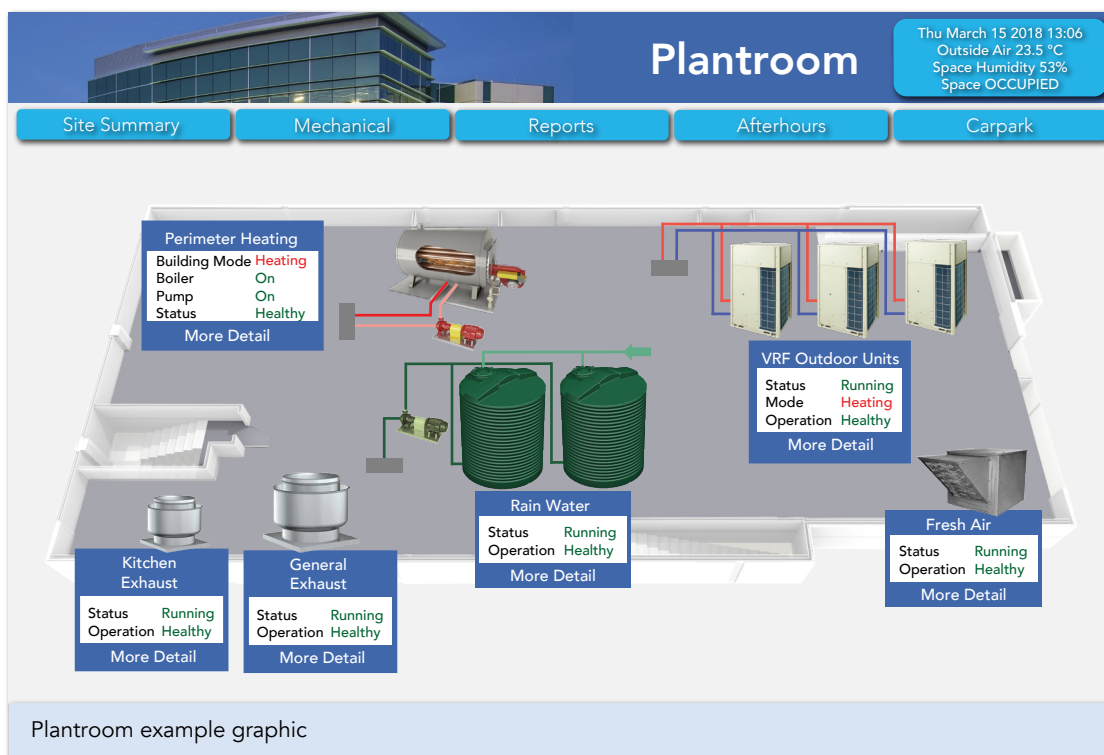
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## Example Displays



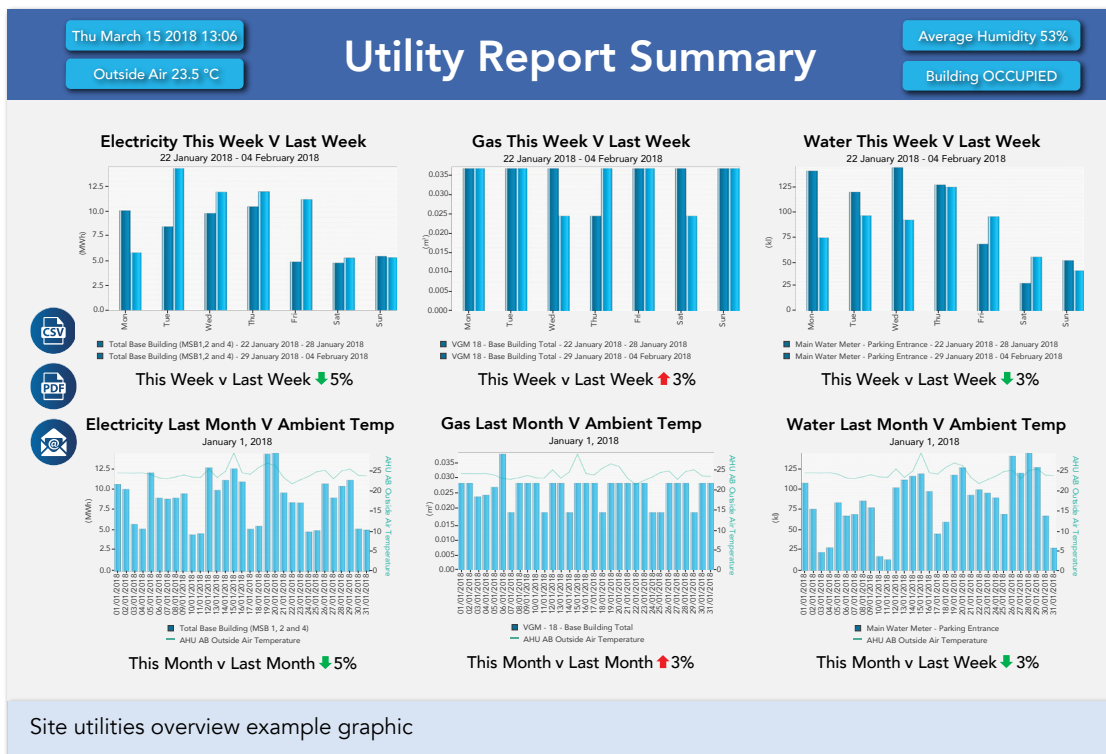
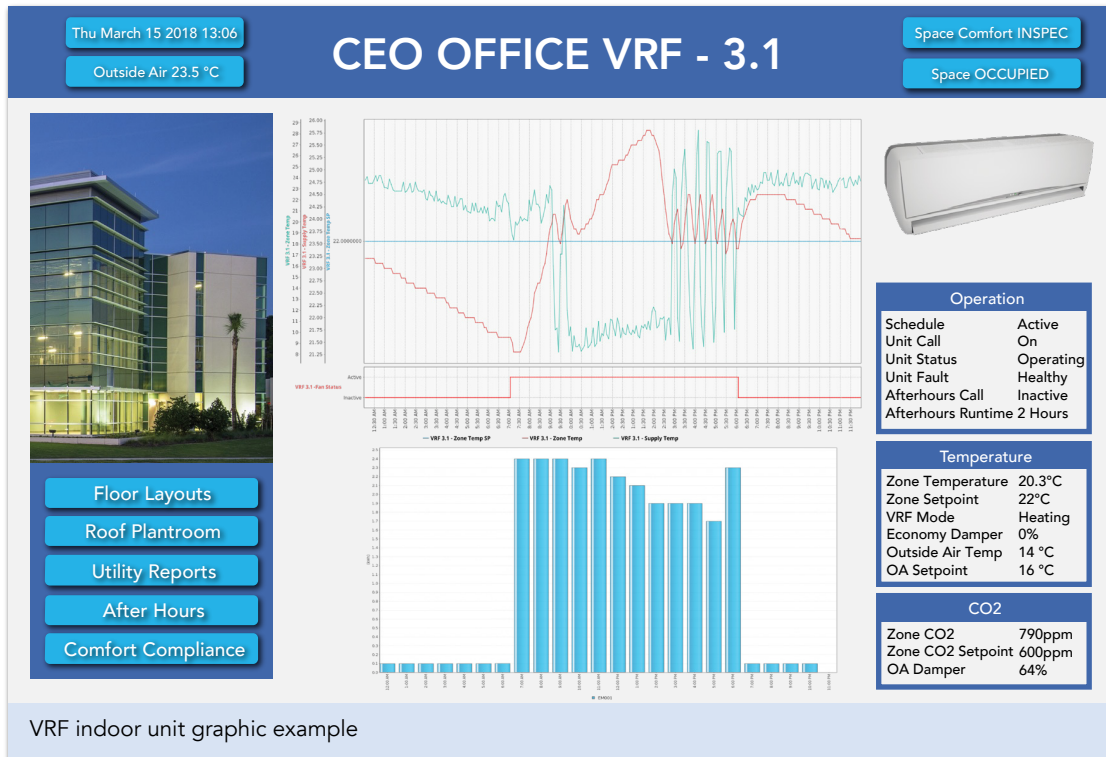
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## Example Displays



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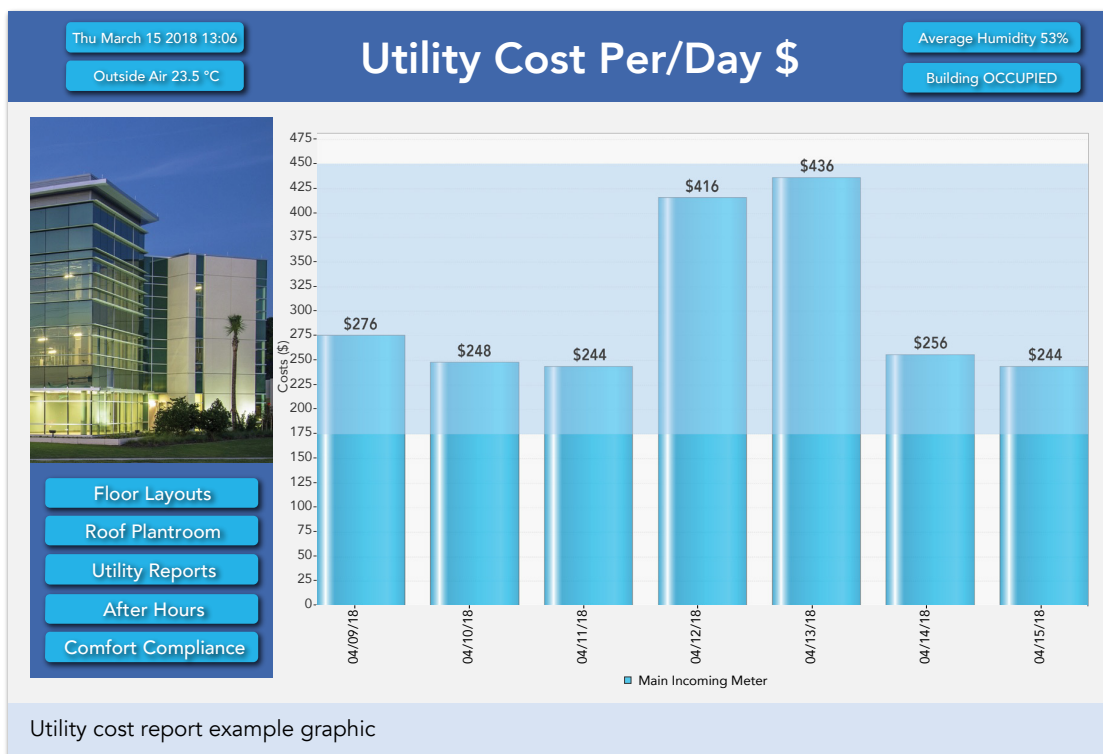
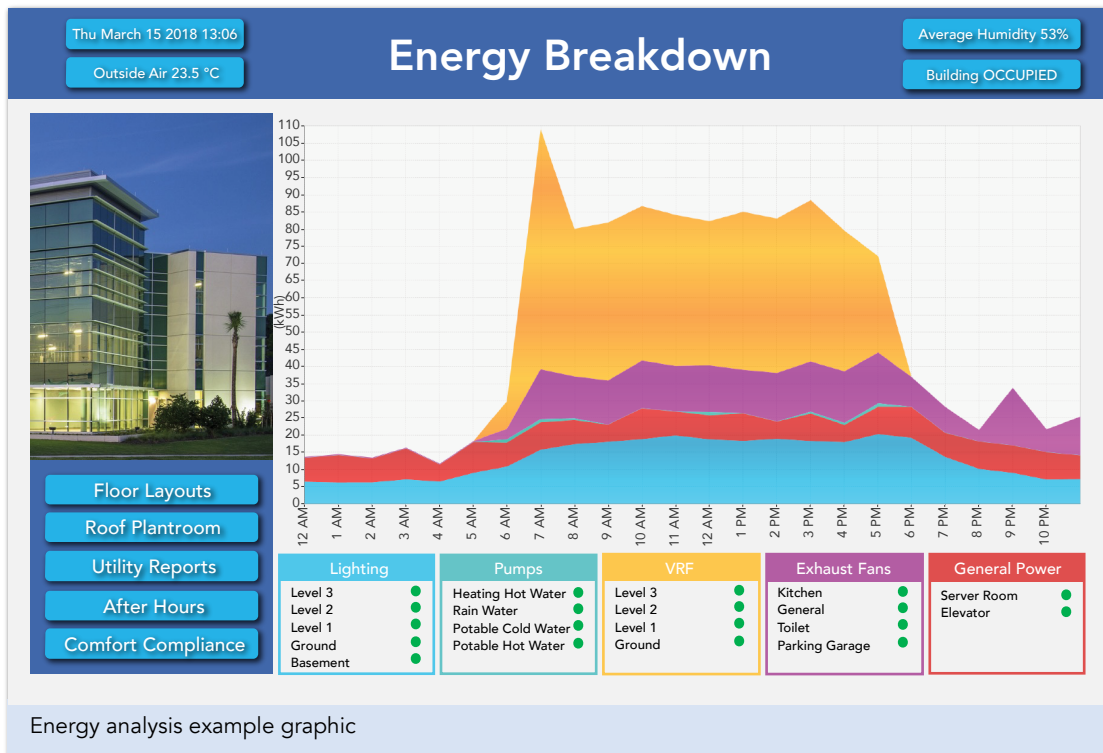
## Example Displays





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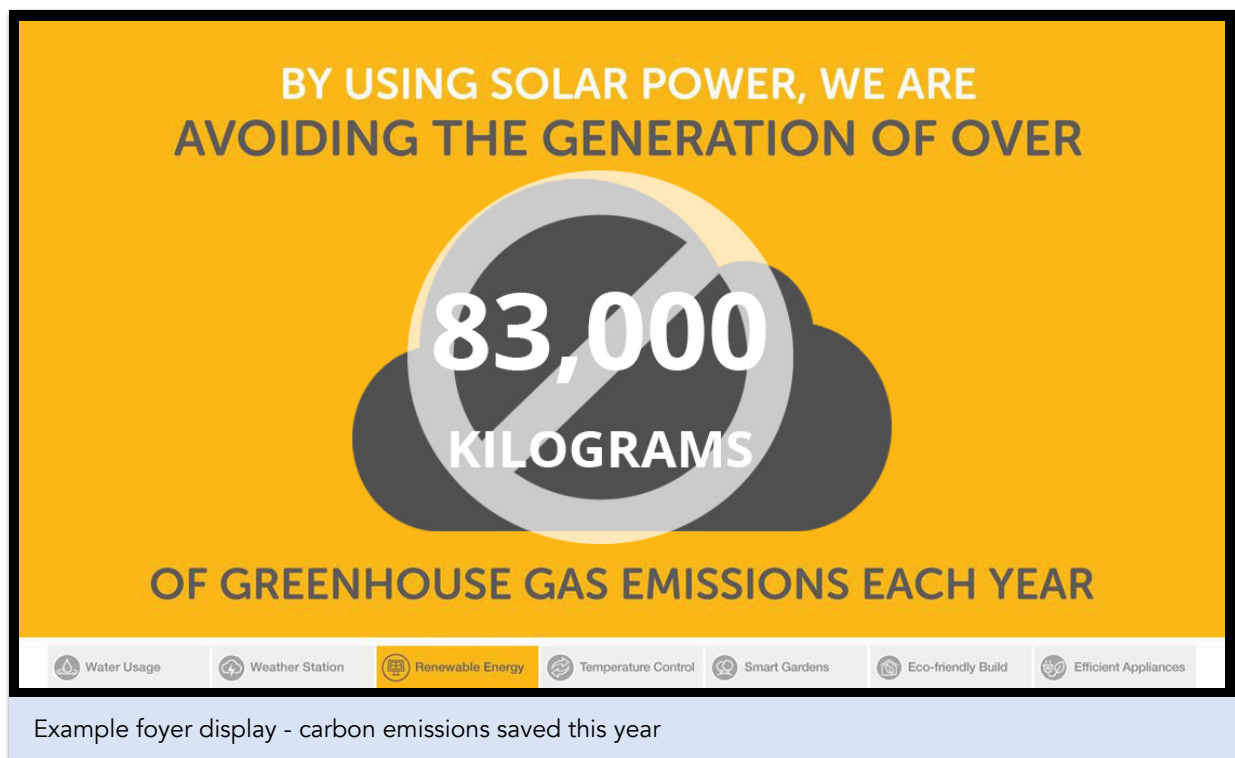
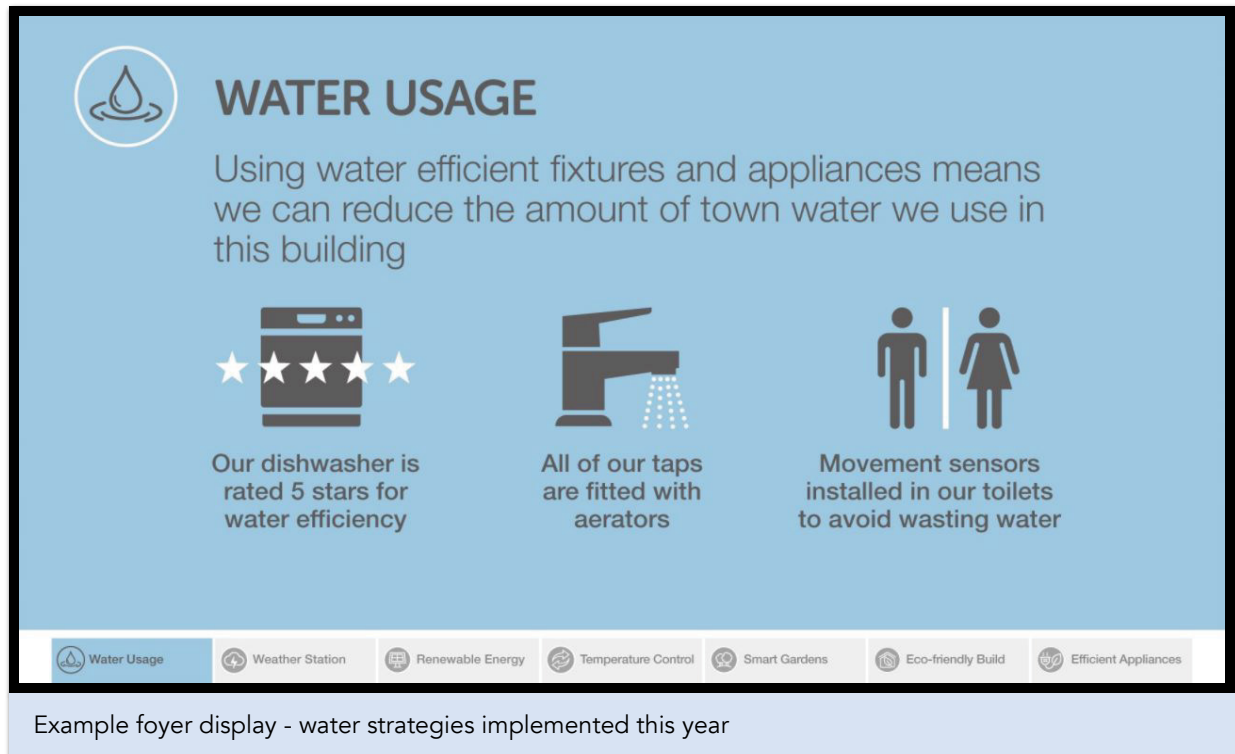
## Example Displays





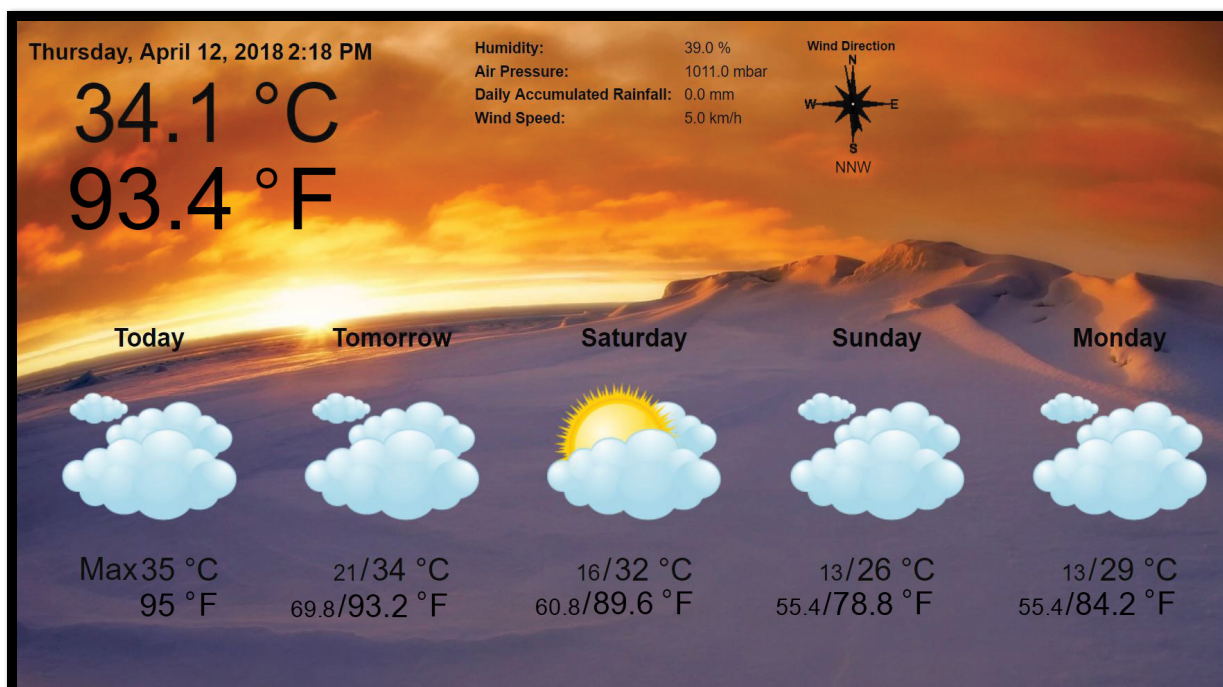
# Variable Refrigerant Flow (VRF) Application Sheet

## Example Dashboards



# Variable Refrigerant Flow (VRF) Application Sheet

## Weather Data



Example foyer display - weather

# Variable Refrigerant Flow (VRF) Application Sheet



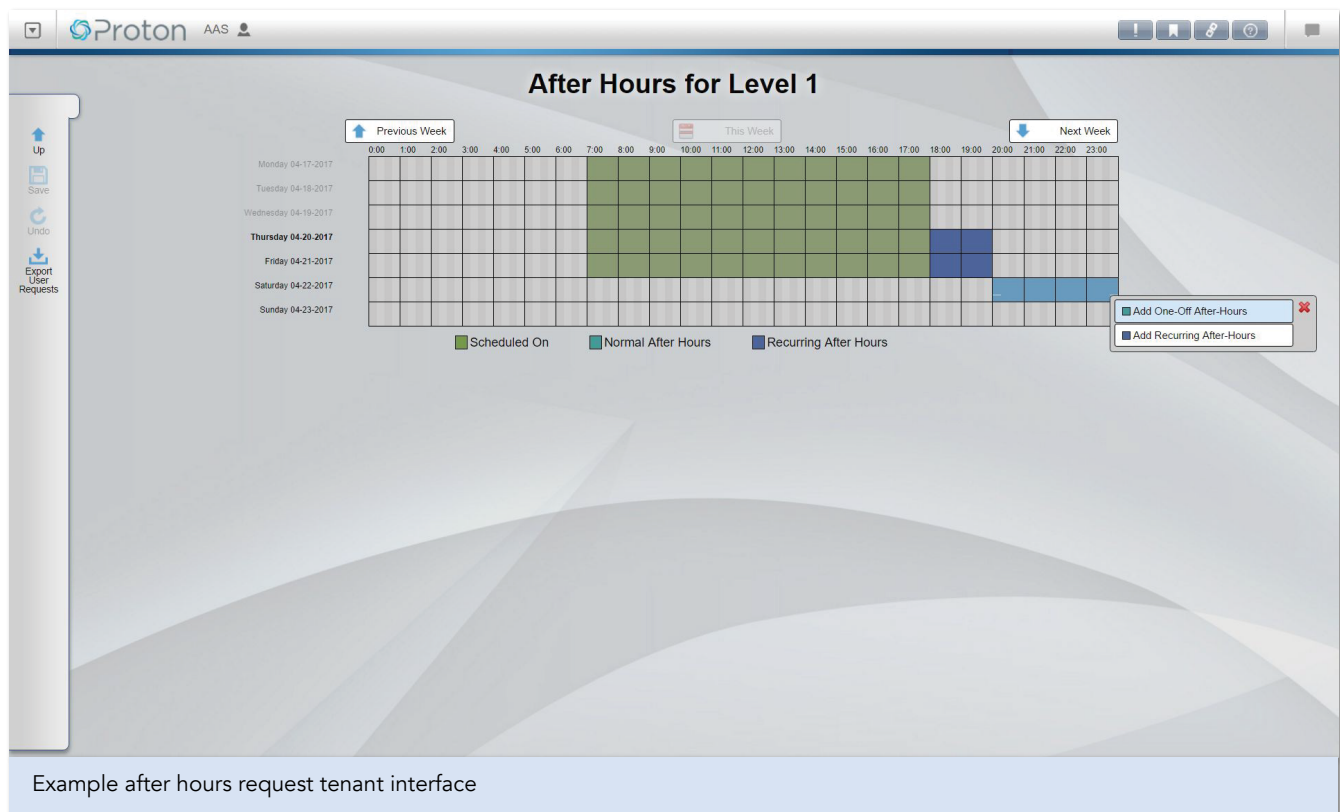
## After Hours Override & Billing

In a typical commercial building, there is a lease agreement between owner and tenant which defines the core operating hours of the building. If tenants require air-conditioning or lighting base-building services outside the lease agreements core hours, the building owner can recover the additional costs of operating the building outside of these core hours. To recover these costs the building owner can allow the tenants to activate after hours utilities such as air-conditioning and lighting when working late.

Upon activation, the user signals the system that they need a period of 30 minutes (adjustable) of air-conditioning and/or lighting (or any other service). The system will log the start time, check that the equipment is not normally scheduled on at the requested time, and also check that the equipment is running.

Multiple tenants can be authorized to initiate the after hours event, and the events can be scheduled in advance (configurable number of days in advance).

Bills can then be generated automatically, report of usage, and the appropriate tenants contacted automatically by email. The bill itself can be configured to reflect property management branding, bill-to address, tax, charges (including time of use, demand, block, flat), custom header, pay to options, and automatic email distribution.



# Variable Refrigerant Flow (VRF) Application Sheet



## After Hours Override & Billing

### Activation

- Pushbutton
- BACnet data point
- Mobile application
- Schedule in advance
- On demand (+/- 30min)

### Fees

- Min charge \$/hr
- Optional surcharge
- Minimum duration
- Schedule is linked

### Tenants

- Billing date options
- Automatic notification
- Automatic distribution
- Custom logo



### After Hour Requests Level 1

Oberix Inc					
Requested By	Date(s) Covered	Time	Specific Days	Exclusions	Public Holidays
Admin	22/09/2017 - 22/09/2017	5:00 PM - 8:00 PM	Thursday Friday		yes
Steven Guzelimian	22/09/2017 - 22/09/2017	5:00 PM - 8:00 PM			yes

Example after hours request log capturing who requested after hours, date, start and end times, exclusions and public holidays



### After Hours Invoice

Miss VM Ware  
VM Ware  
Level 29, 201 Elizabeth Street  
Sydney nsw 2000  
Australia

Tax Invoice	
Invoice #:	B16-562
Issue Date:	01/01/2016
Total Amount Payable:	\$174.48
Due Date:	31/01/2016
Total Amount Payable After Due Date:	\$174.48

### Invoice Charges Breakdown

Seq. No	Floor	Suite	A/C Zone	Event Start	Event End	Actual Duration	Billable Duration	Rate (\$ / hr)	Amount
121	7		Level 7 South	18/12/2015 7:13:58 AM	18/12/2015 8:00:00 AM	00:46:02	00:46:02	\$55.00	\$42.20
122	7		Level 7 South	19/12/2015 5:23:57 PM	19/12/2015 6:25:57 PM	01:02:00	01:02:00	\$55.00	\$56.83
123	7		Level 7 South	27/12/2015 2:32:55 PM	27/12/2015 3:37:55 PM	01:05:00	01:05:00	\$55.00	\$59.58

### Surcharges

Surcharge \$0.00

### Total Charges

Total Before GST: \$158.61  
GST: \$15.86  
Total Amount Payable: \$174.48

Example after hours invoice



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## Utility Billing

Utilities such as electricity, gas, water and thermal (chilled & hot) can be easily metered/sub-metered and assigned to tenants for billing based on usage. Tenants that occupy multiple spaces can have multiple meters contribute to a single final bill per utility type. The bill itself can be configured to reflect property management branding, tariff charges, how to pay options and configured for automatic email distribution.

### Simple Billing Configuration Workflow

- STEP 1 - Create space
- STEP 2 - Create meter/meter hierarchy
- STEP 3 - Create tenant
- STEP 4 - Create facility manager
- STEP 5 - Create tariff
- STEP 6 - Assign meters to spaces
- STEP 7 - Assign tenants and facility managers to spaces
- STEP 8 - Configure billing parameters
- STEP 9 - Configure notifications

### Spaces

- Link to tenants
- Link to meters

### Tenants

- Billing date options
- Automatic notification
- Automatic distribution
- Custom logo

### Tariffs and Fees

- Time of use charge
- Peak demand charge
- Flat charge
- Block charge
- Additional fees
- Payment options
- Late fee



### Energy Invoice Electricity account

Mr Nicholas Heydon  
House (39058251906)  
10/46  
Hillcrest Road  
Quakers Hill New South Wales 2763  
Australia

Tax Invoice  
Invoice Number: C18-09  
Issue Date: 02/03/2018  
Total Amount Payable: \$313.83  
Due Date: 03/05/2018  
Total Amount Payable After Due Date: \$313.83

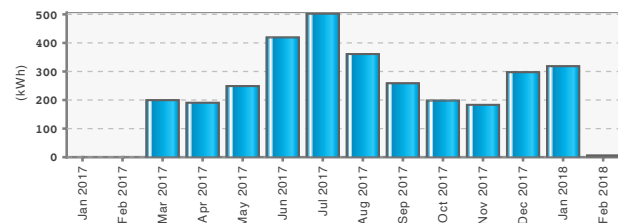
### Meter Summary

Meter	Days Covered By Invoice	Previous Reading	Current Reading	Usage
Main Incoming Meter (1)	96 days	2,335.2 kWh 10/26/2017 12:00 AM	3,139.3 kWh 01/30/2018 12:00 AM	804.1 kWh

### Your Overall Picture

Average Usage Per Day  
8.38 kWh

Same Time Last Year  
Not Available



### Invoice Charges Breakdown

Supply Period - Thursday, October 26, 2017 to Monday, January 29, 2018

Flat Rate Charge Details			
Description	Rate	Usage	Charge
Nicholas Heydon Home - Main Incoming Meter (1)	0.29 / kWh	804.1 kWh	\$233.19

### Additional Fees And Charges

Daily Supply Charge - \$0.7747 Per Day

\$80.64

### Total Usage and Supply Charges

Total Amount Payable:

\$313.83

### How To Pay



Online Payment  
Use your credit or debit card to pay online at  
nick@payme.com or call 123456789



Report Generated Wednesday, February 07, 2018 11:43 AM

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Example utility bill



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## Prebuilt Applications

Optergy's software combines Building Automation, Energy Management and Tenancy applications enabling integration of building systems into one single platform. The system has over 50 built-in applications requiring only configuration. Optergy helps contractors integrate small/medium sized building subsystems into a single user interface fast, saving time, effort and cost.

Optergy smart energy monitoring and control helps building owners and operators justify and apply smart building technologies for their small/medium sized buildings. Optergy ensures easy access to buildings remotely, standardization across buildings, optimum utility consumption and comfort conditions for occupants all at the same time.

### Saves Time



### Less Effort



### Saves Money



Optergy's built-in applications include:

