

# Cost Allocation (NEMA)

## Gain Visibility to Improve Energy Cost Accountability

EcoStruxure Power Digital Application

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EcoStruxure™ Power



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# Overview

## Context of Application

“If you can’t measure it, you can’t improve it.” Studies show that buildings or facilities with sub-metering and cost allocation use less energy than those that allocate energy cost by area (ft<sup>2</sup> or m<sup>2</sup>) or other non-metered allocation methods. Typically, a 10 to 20% reduction in usage can be achieved due to behavior change and conservation. This in turn requires that occupants or cost centers are provided with the right information to make the right decisions.

## Problem to Solve

**The facility manager needs to:**

- Gain insight into which departments, processes, buildings, or floors are contributing to energy costs.
- Improve energy accountability by allocating costs to departments or tenants.
- Identify key areas for energy savings opportunities.

## Purpose of Application

**Encourage energy efficient behavior:** you can encourage energy efficient behavior by allocating energy cost by department, business unit, area, floor, or building.

**Find the biggest energy savings opportunities:** before initiating an energy savings project, you need to understand which load type, business unit, area, floor, or building provides the biggest savings opportunities.

# Application Outcomes

## Reports

**Multiple Billing Report:** provides an energy cost breakdown for each tenant, area, department, or building.

Schneider Electric Multiple Billing Report			
Date of Meter Reading: 2015-03-01 12:00:00 AM - 2015-04-01 12:00:00 AM (Server Local)			
Virtual Meter	ABC Soft		
Devices	Victoria_Keeleing_meth_7650 (24 %)		
Rate	Example Rate - Basic		
	Number of Units	Unit Cost	Cost (\$)
Energy Consumption Charge			
Victoria_Keeleing_meth_7650 (24 %) 44,829.32 kWh	44,829.32 kWh	\$0.00762	3,408.81
Peak Demand Charge			
(PDC) Peak Rate @ 2015-03-01 2:00 PM	61.17 kW	\$0.89	54.44
Victoria_Keeleing_meth_7650 (24 %) \$1.17 kW			
Processing Fee			20.00
Total (\$)			3,483.25


Multiple Billing Report

**Billing Summary Report:** provides a summary view of the Multiple Billing Report.

Schneider Electric Billing Summary Report			
Billing Period: 2015-03-01 12:00:00 AM - 2015-04-01 12:00:00 AM (Server Local)			
Tenant	Units	Unit Cost	Cost
ABC Soft	Energy Consumption Charge		
Victoria_Keeleing_meth_7650 (24 %)	44,829.32 kWh	\$0.00762	3,408.81
Peak Demand Charge			
(PDC) Peak Rate @ 2015-03-01 2:00 PM	61.17 kW	\$0.89	54.44
Processing Fee			20.00
Total			\$3,483.25
ACME Technology	Energy Consumption Charge		
Victoria_Keeleing_meth_7650 (24 %)	30,000.00 kWh	\$0.00762	2,286.00
Peak Demand Charge			
(PDC) Peak Rate @ 2015-03-01 2:00 PM	100.00 kW	\$0.89	89.00
Processing Fee			20.00
Total			\$2,395.00
Alpha Co.	Energy Consumption Charge		
Victoria_Keeleing_meth_7650 (24 %)	20,000.00 kWh	\$0.00762	1,524.00
Peak Demand Charge			
(PDC) Peak Rate @ 2015-03-01 2:00 PM	50.00 kW	\$0.89	44.50
Processing Fee			20.00
Total			\$1,588.50
Bravo Financial	Energy Consumption Charge		
Victoria_Keeleing_meth_7650 (24 %)	10,000.00 kWh	\$0.00762	76.20
Peak Demand Charge			
(PDC) Peak Rate @ 2015-03-01 2:00 PM	20.00 kW	\$0.89	17.80
Processing Fee			20.00
Total			\$114.00
Gamma Inc.	Energy Consumption Charge		
Victoria_Keeleing_meth_7650 (24 %)	5,000.00 kWh	\$0.00762	38.10
Peak Demand Charge			
(PDC) Peak Rate @ 2015-03-01 2:00 PM	10.00 kW	\$0.89	8.90
Processing Fee			20.00
Total			\$67.00
Grand Total			\$7,538.75

Billing Summary Report

**Energy Billing by IT Customer:** provides information regarding energy usage for customers within a colocation data center facility. This report template also allows you to export billing information (for CSV export) and troubleshoot the billing system.



# Energy by IT Customer

## Data Center

Peak Demand Timestamp: Calculated by Customer

5/28/2015 12:00:00 AM - 6/4/2015 12:00:00 AM (Server Local)

### Customer Detail

Customer	Billing Id	Time Range	Energy (kWh)	Peak Demand (kW)	Peak Current (A)	Peak Timestamp
IT Customer 1	SC1001	5/28/2015 - 6/4/2015	11,659.2*	69.4	238.9	5/28/2015 12:15:00
Rack						
		Time Range	Energy (kWh)	Consistent Demand (kW)	Consistent Current (A)	
Rack 01_0001		5/28/2015 - 6/4/2015	201.6*	1.2	5.6	
Circuit						
		Time Range	Energy (kWh)	Consistent Demand (kW)	Consistent Current (A)	
PDU A1 Ph1 C1 C1		5/28/2015 - 6/4/2015	100.8*	0.6	2.8	
PDU B1 Ph1 C1 C1		5/28/2015 - 6/4/2015	100.8*	0.6	2.8	
Rack						
		Time Range	Energy (kWh)	Consistent Demand (kW)	Consistent Current (A)	
Rack 01_0002		5/28/2015 - 6/4/2015	235.2*	1.4	6.6	

\* Value estimated

\*\*\* Value based on incomplete data

\*\*\*\* Expected value missing

Energy Billing by IT Customer

## Cloud-Based Analytics and Services

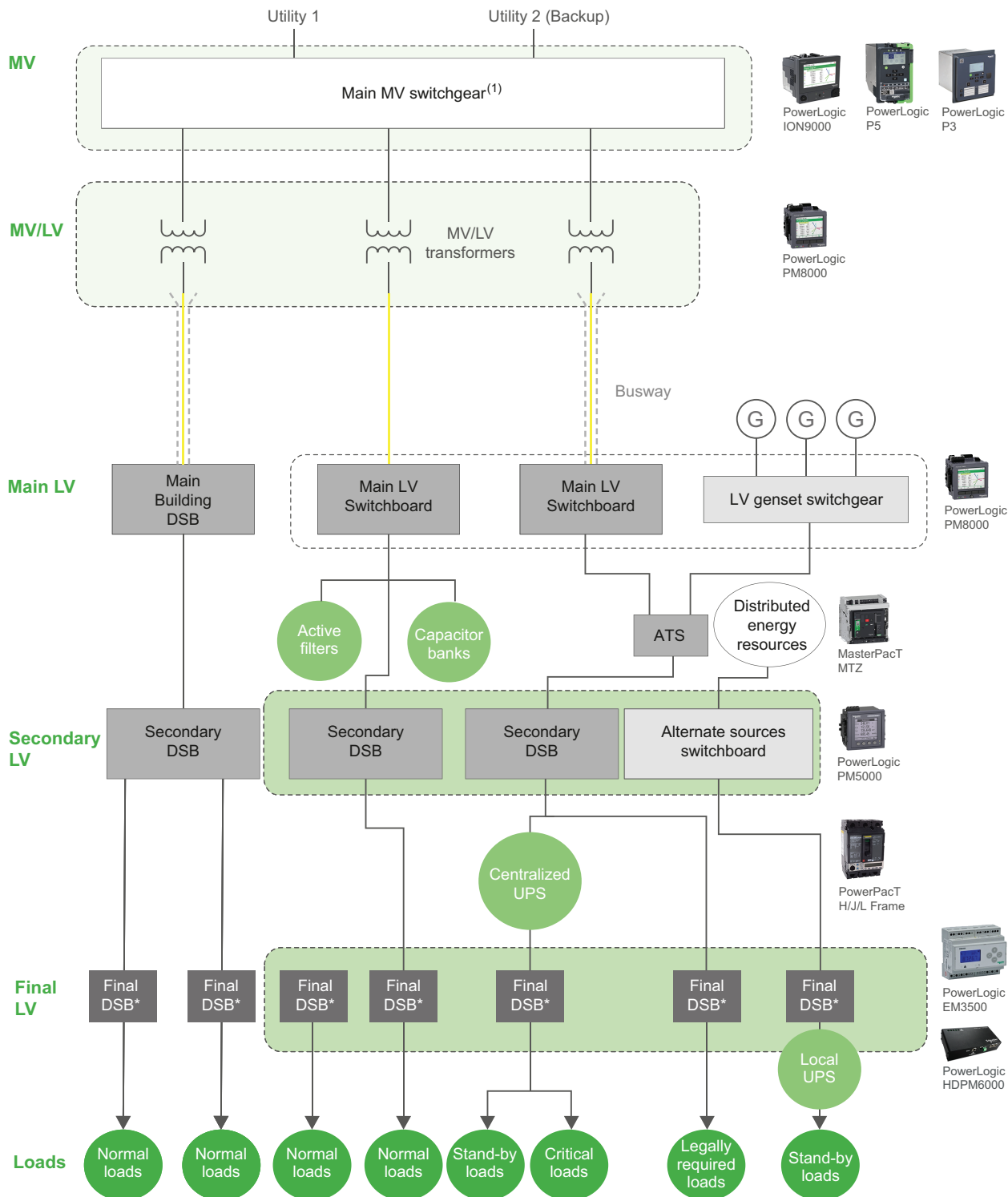
As an option, EcoStruxure Service Plan powered by EcoStruxure Power Advisor provides data quality analytics with recommendations from our Schneider Electric service experts.



EcoStruxure Power Advisor Data Quality Report

# Electrical Architecture

The following diagram details the areas of the architecture where the connected products should be installed in order to implement the Cost Allocation application:



\* DSB = Distribution Switchboard



# Digital Architecture

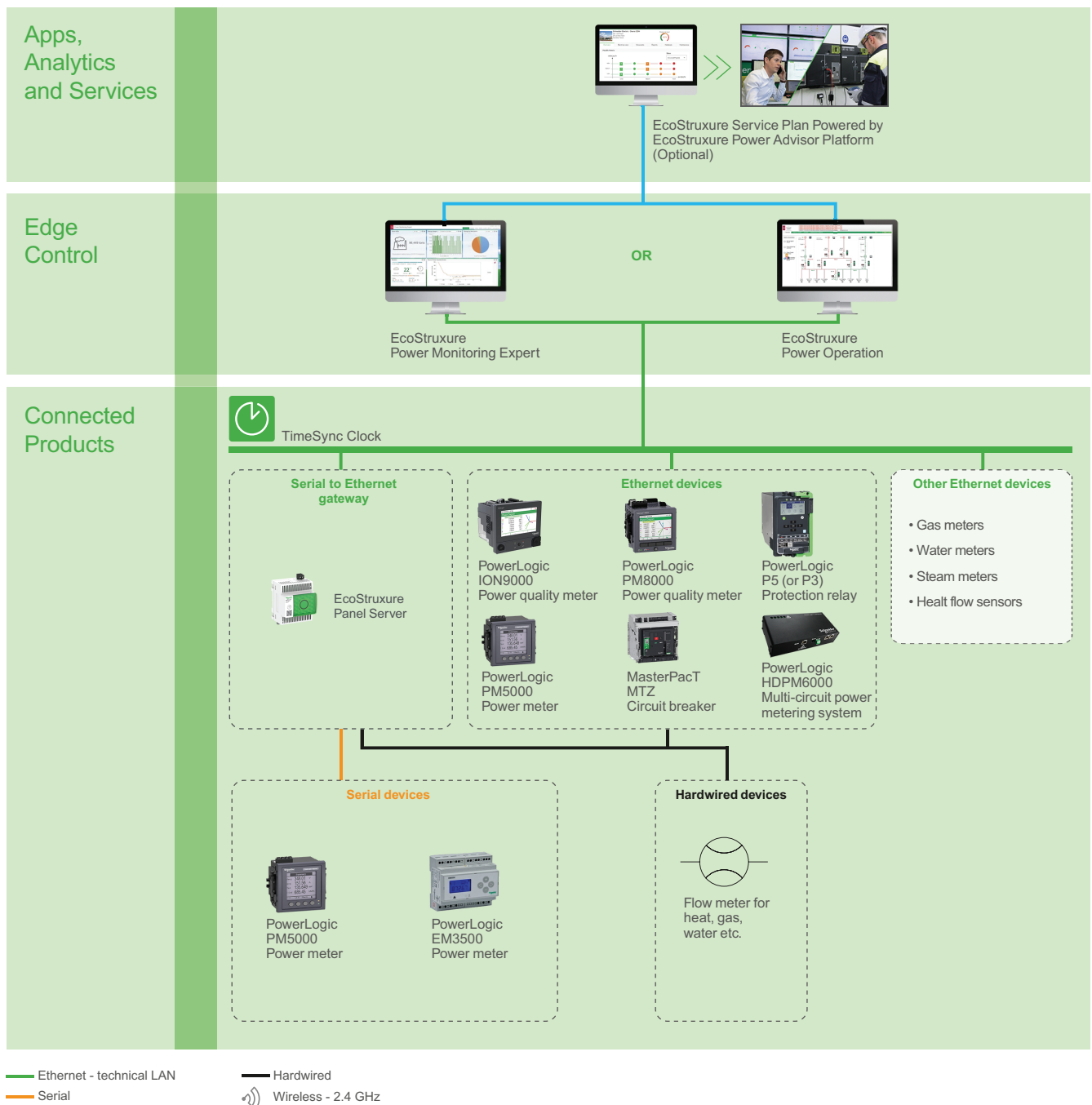
In this architecture, the data is collected from connected products either directly over Ethernet or via gateways (such as the EcoStruxure Panel Server). This data is then recorded and processed by the Edge Control software (EcoStruxure Power Monitoring Expert or Power Operation) for on-premise visualization, analysis, and reporting.

Other utility consumption inputs (WAGES) can also be directly acquired via Ethernet, via serial communication, or through hardwired signals from basic meters and sensors.

To include other process or equipment related data in the analyses, OPC or ETL can be used to acquire data from external process or building management software.

As an option, data from EcoStruxure Power Monitoring Expert or Power Operation can be passed on to the EcoStruxure Power Advisor platform and analyzed by experts as part of the EcoStruxure Service Plan.

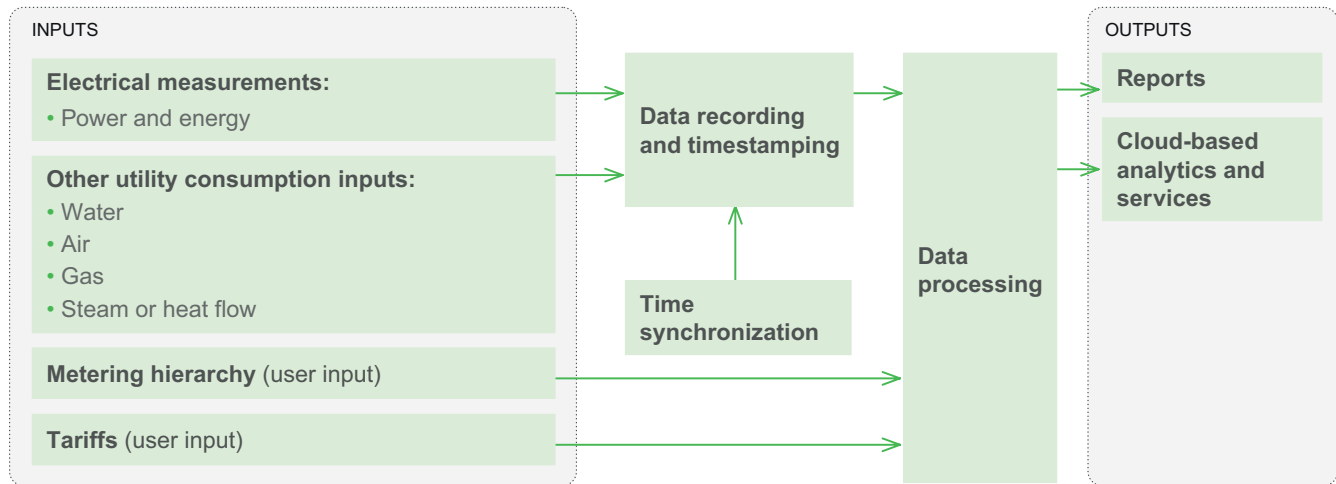
The recommended digital architecture for the application is shown below:



# System Description

## Data Flow

The Cost Allocation application can be broken down as follows:



## Inputs

The following data are required to implement the Cost Allocation application.

## Electrical Measurements

The following electrical measurements are collected at each point of interest in the electrical distribution, from Medium Voltage, to Low Voltage, down to Final Distribution.

- Power values (kW, kVAR, kVA)
- Energy values (kWh, kVARh, kVAh)

These data may be acquired from:

- **Power/energy meters** such as PowerLogic ION9000, PM8000, PM5000, HDPM6000



PowerLogic  
ION9000



PowerLogic  
PM8000



PowerLogic  
PM5000



PowerLogic  
HDPM6000

- **Devices with embedded metering** such as PowerLogic P5/P3, MasterPacT MTZ, and PowerPacT H/J/L protection devices



PowerLogic  
P5



PowerLogic  
P3



MasterPacT  
MTZ



PowerPacT  
H/J/L

- **Third-party devices (via Modbus)**

## Other Utility Consumption Inputs

The following utilities can be monitored:

- Water
- Air
- Gas
- Steam or heat flow

They can be acquired via digital/analog inputs on meters or directly via Modbus from third-party devices.

## Metering Hierarchy (User Input)

Metering hierarchy correlates tenants, areas, departments, or buildings with the appropriate metering devices.

## Tariffs (User Input)

To convert energy consumption into cost, you need to configure the rate file for all relevant tariffs.

## Data Recording and Timestamping

For the Cost Allocation application, a timestamp accuracy of  $\pm 1$  second is sufficient.

**Advanced power meters** such as the PowerLogic ION9000, PM8000, HDPM6000, and some PowerLogic PM5000 models (PM53xx and PM55xx) can timestamp and record onboard energy measurements as well as connected equipment states. EcoStruxure Power Monitoring Expert or Power Operation can then retrieve the records with their original timestamp.



PowerLogic  
ION9000



PowerLogic  
PM8000



PowerLogic  
HDPM6000



PowerLogic  
PM5000

**For other devices** (PowerLogic P5/P3, MasterPacT MTZ, entry-level PowerLogic PM5000 models, etc.) energy measurements and equipment states are acquired by the connected products and then recorded and timestamped by EcoStruxure Power Monitoring Expert or Power Operation.



PowerLogic  
P5



PowerLogic  
P3



MasterPacT  
MTZ



PowerLogic  
PM5000



EcoStruxure  
Power Monitoring Expert



EcoStruxure  
Power Operation

When acquiring data from other customer systems, timestamps can also be imported through OPC<sup>1</sup> or ETL<sup>2</sup>.

For a comprehensive overview of device recording and timestamping capabilities, refer to Data Recording and Time Synchronization Capabilities of EcoStruxure Power Connected Products.

## Time Synchronization

For consistent timestamping of all the data, the date and time should be accurately distributed to connected products and data loggers.

Time synchronization can be performed through various technologies (PTP, NTP, SNTP, etc.). An external master clock may be required and can be connected to a GPS antenna to reach the expected time precision.



TimeSync Clock

1. OPC = Open Platform Communications
2. ETL = The EcoStruxure Extract Transform Load (ETL) engine is a companion application for EcoStruxure Power Monitoring Expert and Power Operation. It is used to extract historical data from one application (Schneider Electric or third-party), then transform that data so it can be loaded into another application.

## Data Processing

The recorded energy data is converted to energy cost using the information in the rate file. It is then allocated to tenants, areas, departments, or buildings based on the metering hierarchy.

Cost allocation data processing is embedded in the optional Billing Module of EcoStruxure Power Monitoring Expert or Power Operation.



EcoStruxure  
Power Monitoring Expert



EcoStruxure  
Power Operation

## Outputs

The Billing Module of EcoStruxure Power Monitoring Expert or Power Operation must be deployed to benefit from the following reports.

## Reports

The following reports can be generated and displayed on-demand or automatically generated and sent by email:

### Billing Reports

- **Multiple Billing Report** Provides an energy cost breakdown for each tenant, area, department, or building.

Description	Units	Unit Cost	Cost (\$)
Energy Consumption Charge	44,829.32 kWh	\$0.00762	3,398.81
Peak Demand Charge	81.17 kW	\$8.89	721.21
Processing Fee			20.00
<b>Total (\$)</b>			<b>4,140.02</b>

Multiple Billing Report


- **Billing Summary Report** Provides a summary view of Multiple Billing Report.

Tenant	Description	Units	Unit Cost	Cost (\$)
ABC Soft	Energy Consumption Charge	44,829.32 kWh	\$0.00762	3,398.81
ABC Soft	Peak Demand Charge	81.17 kW	\$8.89	721.21
ABC Soft	Processing Fee			20.00
ABC Soft	<b>Total</b>			<b>4,140.02</b>
Victoria_Keating_mah_7650	Energy Consumption Charge	29,862.89 kWh	\$0.00762	2,276.89
Victoria_Keating_mah_7650	Peak Demand Charge	54.12 kW	\$8.89	479.89
Victoria_Keating_mah_7650	Processing Fee			20.00
Victoria_Keating_mah_7650	<b>Total</b>			<b>2,776.78</b>
ABC Soft	Energy Consumption Charge	15,720.51 kWh	\$0.00762	1,198.89
ABC Soft	Peak Demand Charge	33.92 kW	\$8.89	301.89
ABC Soft	Processing Fee			20.00
ABC Soft	<b>Total</b>			<b>1,520.78</b>
Victoria_Keating_mah_7650	Energy Consumption Charge	20,000.00 kWh	\$0.00762	1,524.00
Victoria_Keating_mah_7650	Peak Demand Charge	67.72 kW	\$8.89	599.89
Victoria_Keating_mah_7650	Processing Fee			20.00
Victoria_Keating_mah_7650	<b>Total</b>			<b>2,143.89</b>
<b>Grand Total</b>				<b>12,823.53</b>

Billing Summary Report

IT Billing Reports

- **Energy by IT Customer** Provides information regarding energy usage for users within the data center facility to allocate branch circuit consumption to users and IT racks. It also provides exporting of billing system information (for CSV export) and troubleshooting of the billing system.



Energy by IT Customer  
Data Center

Peak Demand Timestamp: Calculated by Customer: 5/28/2015 12:00:00 AM - 6/4/2015 12:00:00 AM (Server Local)

Customer Detail						
Customer	Billing Id	Time Range	Energy (kWh)	Peak Demand (kW)	Peak Current (A)	Peak Timestamp
IT Customer 1	SC1001	5/28/2015 - 6/4/2015	11,659.2*	69.4	238.9	5/28/2015 12:15:00

Rack	Time Range	Energy (kWh)	Consistent Demand (kW)	Consistent Current (A)
Rack 01_0001	5/28/2015 - 6/4/2015	201.4*	1.2	5.6

Circuit	Time Range	Energy (kWh)	Consistent Demand (kW)	Consistent Current (A)
PDU A1 Pnl 01 C1 01	5/28/2015 - 6/4/2015	100.8*	0.6	2.8
PDU B1 Pnl 01 C1 01	5/28/2015 - 6/4/2015	100.6*	0.6	2.8

Rack	Time Range	Energy (kWh)	Consistent Demand (kW)	Consistent Current (A)
Rack 01_0002	5/28/2015 - 6/4/2015	233.2*	1.4	6.6

\* Value estimated

\*\* Value based on incomplete data

\*\*\* Expected value missing

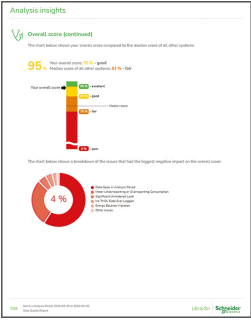
Energy by IT Customer

Cloud-Based Analytics and Services

As an option, EcoStruxure Service Plan powered by EcoStruxure Power Advisor provides data quality analytics with recommendations from our Schneider Electric service experts.



EcoStruxure Service Plan Powered by EcoStruxure Power Advisor



EcoStruxure Power Advisor Data Quality Report - Overall Score

For further information, refer to Data Quality Management.



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