

Cost Allocation (IEC)

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 (ft² or m²) 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_Kesling_msh1_7850 (24 %)		
Rate	Example Rate - Basic		
Energy Consumption Charge Victoria_Kesling_msh1_7850 (24 %)	44,829.32 kWh	\$0.05782	2,588.81
Peak Demand Charge (ABC Soft Peak @ 2015-03-01 2:00 PM) Victoria_Kesling_msh1_7850 (24 %)	61.17 kW	\$0.89	54.53
Processing Fee			20.00
Total (\$)			3,168.12

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	Items	Units	Unit Cost	Cost
ABC Soft	Energy Consumption Charge Victoria_Kesling_msh1_7850 (24 %)	44,829.32 kWh	\$0.05782	2,588.81
ABC Soft	Peak Demand Charge (ABC Soft Peak @ 2015-03-01 2:00 PM) Victoria_Kesling_msh1_7850 (24 %)	61.17 kW	\$0.89	54.53
	Processing Fee			20.00
Total				\$3,168.12
ACME Technology	Energy Consumption Charge ACME_Technology_msh1_7850 (24 %)	39,065.78 kWh	\$0.05782	2,248.17
ACME Technology	Peak Demand Charge (ACME Tech Peak @ 2015-03-01 2:00 PM) ACME_Technology_msh1_7850 (24 %)	108.20 kW	\$0.89	96.23
	Processing Fee			20.00
Total				\$2,364.40
Alpha Co.	Energy Consumption Charge Alpha_Kesling_msh1_7850 (24 %)	29,852.88 kWh	\$0.05782	1,726.84
Alpha Co.	Peak Demand Charge (Alpha Co. Peak @ 2015-03-01 2:00 PM) Alpha_Kesling_msh1_7850 (24 %)	84.12 kW	\$0.89	74.84
	Processing Fee			20.00
Total				\$1,821.68
Omega Products	Energy Consumption Charge Omega_Kesling_msh1_7850 (24 %)	26,889.82 kWh	\$0.05782	1,554.81
Omega Products	Peak Demand Charge (Omega Products Peak @ 2015-03-01 2:00 PM) Omega_Kesling_msh1_7850 (24 %)	95.19 kW	\$0.89	84.84
	Processing Fee			20.00
Total				\$1,659.65
Pinnacle Inc	Energy Consumption Charge Pinnacle_Kesling_msh1_7850 (24 %)	16,729.88 kWh	\$0.05782	968.84
Pinnacle Inc	Peak Demand Charge (Pinnacle Inc Peak @ 2015-03-01 2:00 PM) Pinnacle_Kesling_msh1_7850 (24 %)	55.82 kW	\$0.89	49.68
	Processing Fee			20.00
Total				\$1,038.52
Grand Total				\$12,052.37

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.

Schneider Electric Energy by IT Customer Data Center
Peak Demand Timestamp: Calculated by Customer 5/28/2015 11:00:00 AM - 6/4/2015 12:00:00 AM (Server Local)

Customer	Billing ID	Time Range	Energy (kWh)	Peak Demand (kW)	Peak Current (A)	Peak Timestamp
IT Customer 1	5C1001	5/28/2015 - 6/4/2015	11,659.2*	69.4	238.9	5/28/2015 12:15:00
Rack						
Rack 01_0001		5/28/2015 - 6/4/2015	201.6*	1.2	5.6	
Circuit						
PDU A1 Ph1 C1 S1		5/28/2015 - 6/4/2015	100.8*	0.6	2.8	
PDU B1 Ph1 C1 S1		5/28/2015 - 6/4/2015	100.8*	0.6	2.8	
Rack						
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

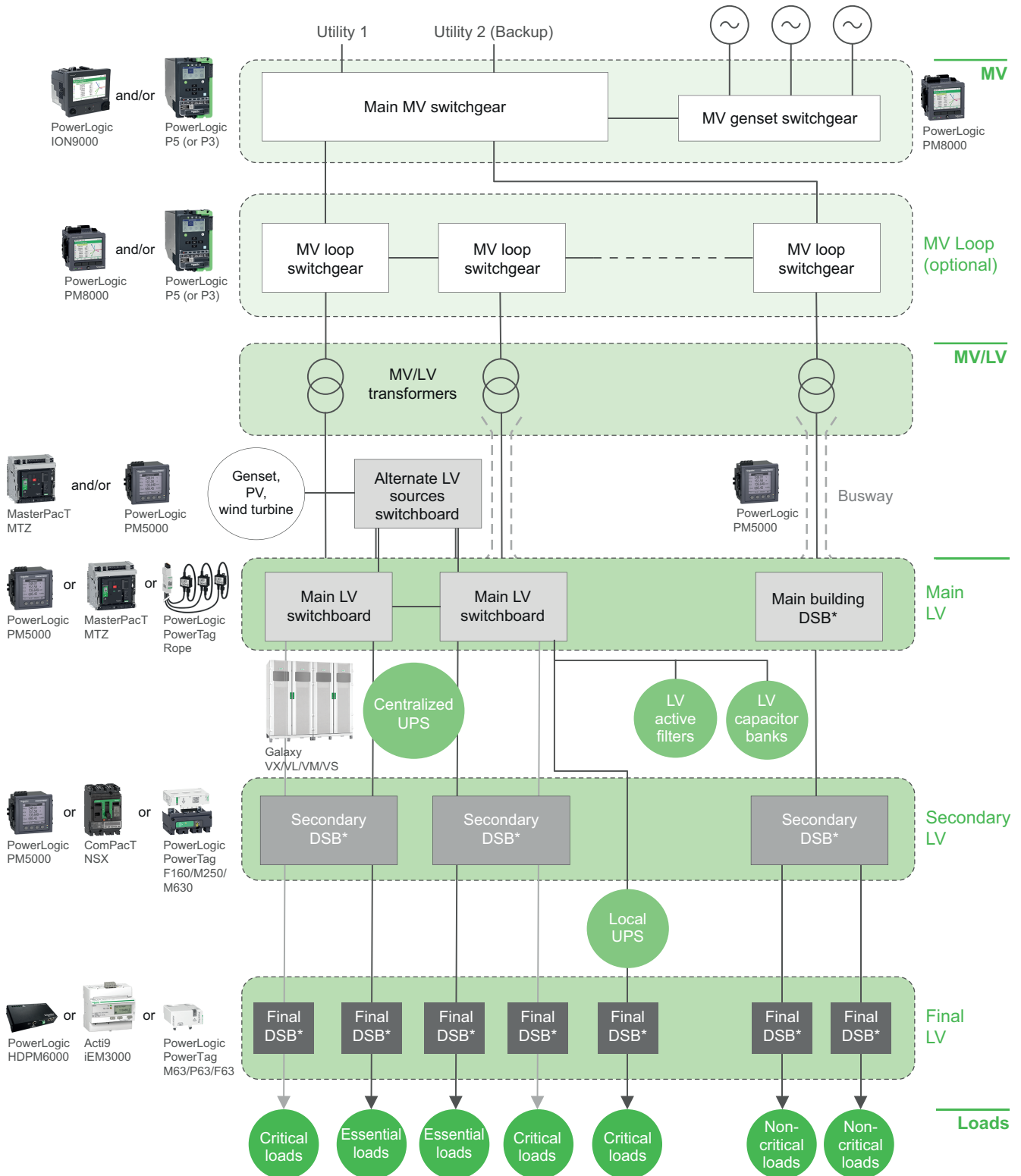
As an option, EcoStruxure Service Plan powered by EcoStruxure Power Advisor provides data quality analytics with recommendations from our Schneider Electric service experts.



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

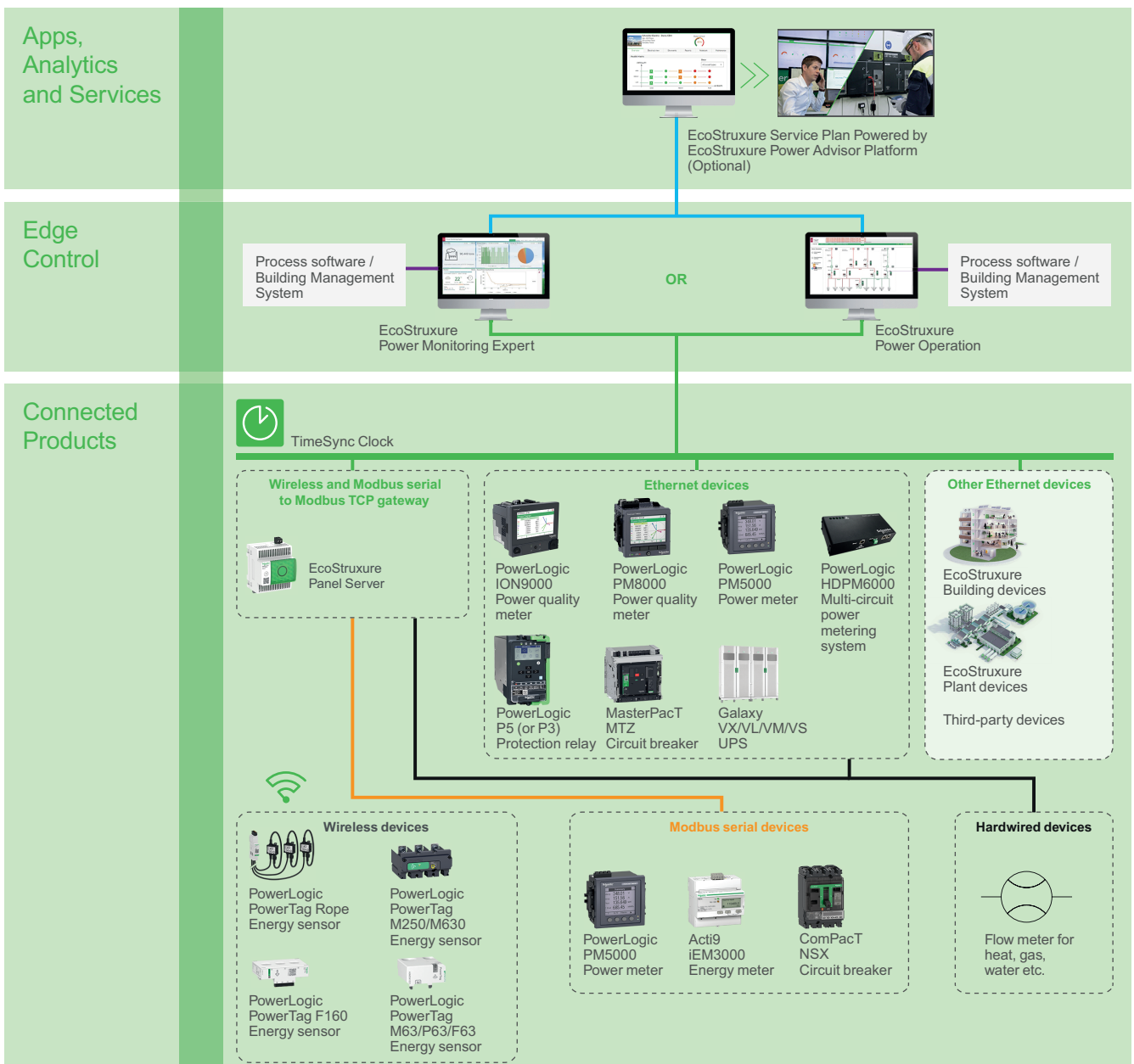
In this architecture, the data is collected from connected products either directly over Ethernet or via gateways (such as the EcoStruxure Panel Server). This data is then recorded and processed by the Edge Control software (EcoStruxure Power Monitoring Expert or Power Operation) for on-premise visualization,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

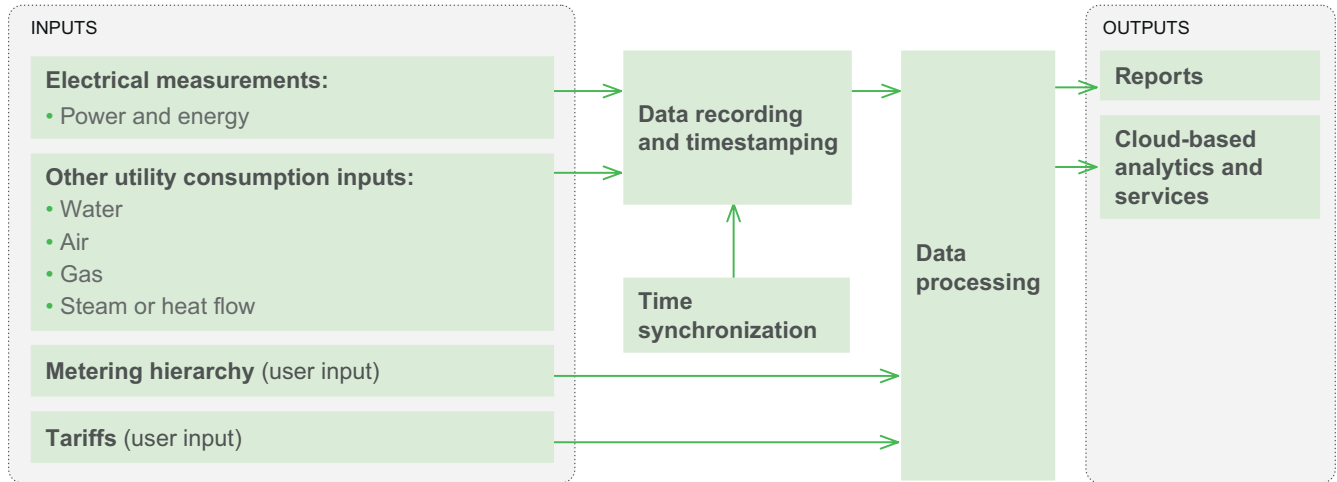


- Ethernet - public LAN/WAN
- Ethernet - technical LAN
- Serial
- Hardwired
- OPC / ETL
- 📶 Wireless - 2.4 GHz

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, PowerTag, Acti9 iEM3000



PowerLogic ION9000



PowerLogic PM8000



PowerLogic PM5000



PowerLogic HDPM6000



Acti9 iEM3000



PowerLogic PowerTag

- **Devices with embedded metering** such as PowerLogic P5/P3, MasterPacT MTZ, and ComPacT NSX protection devices, or Galaxy VX/VL/VM/VS UPS



PowerLogic
P5



PowerLogic
P3



MasterPacT
MTZ



ComPacT
NSX



Galaxy
VX/VL/VM/VS

- **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 ± 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. 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, Galaxy VX/VL/VM/VS, entry-level PowerLogic PM5000 models, Acti9 iEM3000, PowerLogic PowerTag, etc.) energy measurements 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



Galaxy VX/VL/VM/VS



PowerLogic PM5000



Acti9 iEM3000



PowerLogic PowerTag



EcoStruxure Power Monitoring Expert



EcoStruxure Power Operation

When acquiring data from other customer systems, timestamps can also be imported through OPC¹ or ETL².

For a comprehensive overview of device recording and timestamping capabilities, refer to 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.

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.

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

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.

	Number of Units	Unit Cost	Cost (\$)
Energy Consumption Charge			
Virtual Meter	44,829.22 kWh	\$0.0072	3,229.81
Devices	81.17 kW	\$0.00	698.31
Rate			20.00
Processing Fee			
Total (\$)			3,168.12

Multiple Billing Report

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

Customer	Item	Units	Unit Cost	Cost
JACO Tech	Energy Consumption Charge	44,820.23 kWh	\$0.0192	\$,860.83
JACO Tech	Peak Demand Charge	10.00 kW	\$0.0192	\$,192.00
JACO Tech	Processing Fee			\$0.00
JACO Tech	Total			\$,1,052.83
JACO Technology	Energy Consumption Charge	55,000.78 kWh	\$0.0192	\$,1,056.12
JACO Technology	Peak Demand Charge	100.23 kW	\$0.0192	\$,192.43
JACO Technology	Processing Fee			\$0.00
JACO Technology	Total			\$,1,248.55
JACO Co.	Energy Consumption Charge	29,902.88 kWh	\$0.0192	\$,574.29
JACO Co.	Peak Demand Charge	54.12 kW	\$0.0192	\$,103.93
JACO Co.	Processing Fee			\$0.00
JACO Co.	Total			\$,678.22
Omega Fibersol	Energy Consumption Charge	20,000.00 kWh	\$0.0192	\$,384.00
Omega Fibersol	Peak Demand Charge	82.79 kW	\$0.0192	\$,159.06
Omega Fibersol	Processing Fee			\$0.00
Omega Fibersol	Total			\$,543.06
Paradeis Inc	Energy Consumption Charge	18,700.00 kWh	\$0.0192	\$,357.12
Paradeis Inc	Peak Demand Charge	33.80 kW	\$0.0192	\$,648.96
Paradeis Inc	Processing Fee			\$0.00
Paradeis Inc	Total			\$,1,006.08
Grand Total				\$,12,223.83

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.

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 A3 Ph1 01 C1 01		5/28/2015 - 6/4/2015	100.8*	0.6	2.8	
PDU B3 Ph1 01 C1 01		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	

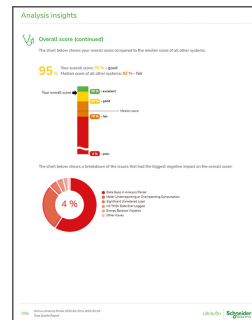
Energy by IT Customer

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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