



Assessment Report

EcoStruxure IT Expert

Schneider-Electric IT United States – Generic Company

This is your personalized EcoStruxure IT Expert report containing key metrics and insights for the assessment period.

<https://schneider-electric.com/ecostruxure>

Life Is On

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Executive Summary

March 15 to March 31, 2018

The data in this report represents the combined collection of data and analysis from the EcoStruxure IT Expert installation in the Generic Company, Inc. data center during the assessment period.

Summary

Of the 32 UPS assets we discovered in the Generic Company, Inc. environment, 9 require action.



There are 3 single phase UPS that are past end of life at five years or older.

Single phase UPS devices 5 years or older should be replaced. We recommend a review of the items plugged into these UPS devices to get a better understanding whether important assets are at risk.

APC's standard warranty for single phase UPSs is 3 years for the hardware. APC ends support on single phase UPSs after 5 years.



There are 9 batteries that require action.

There are 5 batteries that have elevated temperatures, 1 battery reporting it's between three and five years old, and 3 batteries older than five years.

The UPSs with these batteries installed should be validated to make sure they are not protecting critical processes that would go down with the next power failure.

The recommended battery temperature is 77 F ambient temperature. For every 15 F above ambient temperature of 77 F, the life expectancy of the battery will be reduced by 50 percent.

APC's standard warranty on batteries is 2 years. The standard battery can last between 3 and 5 years depending on the environment.



Cost Savings in Storage Optimization

There is significant savings in storage optimization. Deleting unused VMs and orphaned files, and trimming thin-provisioned disks could add significant savings to your storage spend and extend the life of your current storage solutions.



Updates to Software and Platform

The Hypervisor and many of the guest operating systems are several versions behind current releases. To maximize your stability and to avoid software end of life support issues, consider keeping your software releases up to date and patched with the current releases by the software manufacturers.

Actionable Items

- **There is a potential for \$330,734 in storage savings with the use of thick to thin disk provisioning.**
- **There are 159 VMs powered off, consuming 23.33 TB of disk space and costing \$139,978.**
Unused VMs are defined as VMs that have been powered off for longer than 30 days. There are no unused VMs deployed.
- **Orphaned files are consuming 612.11 GB of disk space, at an approximate cost of \$3,673.**
Disk is estimated at \$6/GB. The oldest orphaned file is dated September 13, 2014.
Orphaned files are VMs, virtual disk drives, or files not associated with VMware vCenter or any VMs currently deployed in the data center. These are resources that can typically be deleted.
- **There are 37 unsupported operating systems deployed in the data center.**
These operating systems are old and no longer carry support by their manufacturers.
- **All the hosts are running older versions of vSphere.**
Consider upgrading to the current VMware vSphere release to reduce your attack surface and increase stability. Two of the hosts do not support the most recent version of VMware vSphere and will require upgrades or replacements to continue supporting VMware vSphere in the future.
- **Three UPS units are older than 5 years and are no longer supported.**
These UPS units might not support the load if the power fails. Determine what is plugged into these UPS units to prevent a critical failure in the event of a power failure.
- **Two UPS units are 3 - 5 years old.**
Extended warranties are recommended.
- **Five UPS units have battery temperatures above recommended levels.**
The life expectancy of these batteries may be diminished. Consider switching to LiOn UPS units that can operate in higher temperatures. Determine what is plugged into these UPSs to prevent failure of susceptible IT gear.
- **Knowledge Base Articles**
There are seven knowledge base articles (KBA) that apply to the current virtual environment:
One critical, three High Severity, one Medium Severity, and two Low Severity.

Recommended Next Steps

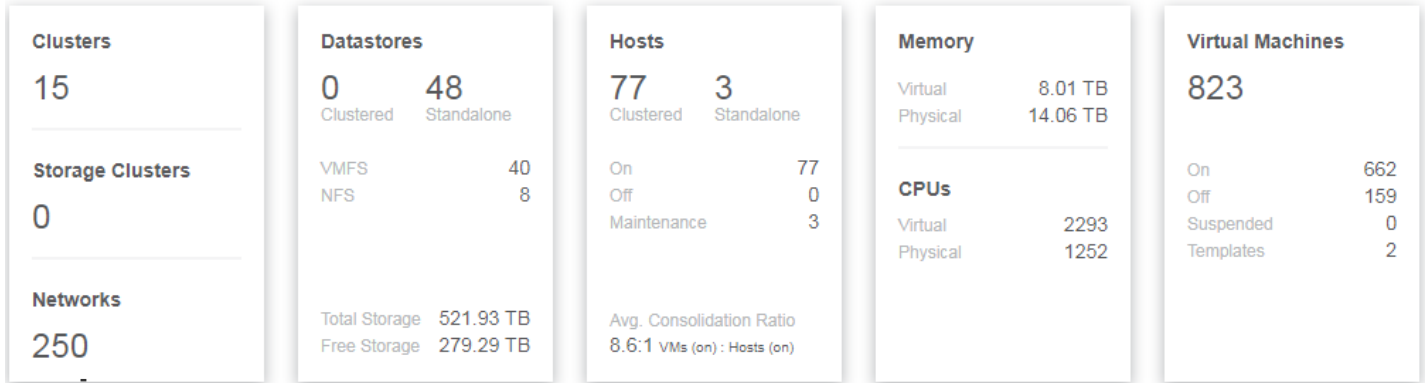
1. Get extended warranties for the 25 UPS between 3 and 5 years old. Budget for battery replacements for these units over the next 12 – 18 months.
2. Replace the 4 UPS that are between 4 and 7 years old.
3. Run a self-test on the 24 UPS that are between 2 and 3 years old to validate the runtime.
4. Replace the 4 batteries that are approaching end of life.
5. Replace the 5 batteries with elevated temperatures, or replace these UPS with LiOn UPS units.
6. Perform a cooling assessment in the areas that have UPSs with elevated battery temperatures.

Virtual Data Center Summary

We compared current vCenters to identify attributes and details about your data centers.

Both Virtual CPU (vCPU) to Physical CPU (pCPU) and Virtual RAM (vRAM) to Physical RAM (pRAM) ratios are extremely low.

Total resources observed by vCenter including Power On and Power Off



Source: vCenter Summary Card

Many organizations measure their efficiency by reviewing consolidation ratios of Powered n VMs per physical host. Each vCenter and cluster represents different opportunities for optimization

vCenters	62	Clusters	Networks	Datastores	Total Hosts	Powered On Hosts	Powered On VMs	Ratio VM-Hosts
Demo	1	15	250	48	80	77	69	8.6:1

Deeper analysis of Physical and Virtual CPUs and Physical and Virtual Memory gives a better view of the efficiency of the data center and potential areas for improvement.

vCenters	Powered On Hosts	Powered On VMs	Physical CPU Cores	Virtual CPUs	Virtual to Physical Ratio	Physical Memory	Virtual Memory	Virtual to Physical Memory
Demo	77	69	1252	2293	1.83:1	14.06 TB	8.01 TB	0.57:1

Low Memory Ratios indicate that systems are over provisioned with RAM.

Source: vCenter Summary Card

Storage Summary

Thick to Thin Provisioned Volumes

Many virtual machines have pre-allocated storage space within their virtual disks using Thick Provisioning. These VMs are consuming storage resources without any data.

You can gain storage capacity and reduce the future purchase of storage by converting these VMs from Thick Provisioned to Thin Provisioned.

Not all workloads are candidates for Thin-Provisioning. High disk write applications will benefit from Thick Provisioned volumes. Applications that have anticipated growth may also benefit from pre-allocation of storage.

Potential Savings (606 VMs)

Only VMs with VMware tools running



Savings Opportunity (606 VMs)

Only VMs with VMware tools running

$$55.12 \text{ TB} \times \$6 \text{ Price per GB} = \$330,734$$

Thick Virtual Disks

303

Thin Virtual Disks

929

Growth Rate for Thin Disks

-334.86 GB/day

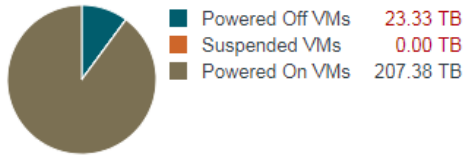
VM Name	Severity	VM State	Potential Space Savings (GB)	Provisioned Space (GB)	Committed Space (GB)	Guest Used Space (GB)	Guest Free Space (GB)	Unpartitioned Space (GB)	Virtual Disks
VM-241329	Need Attention	Powered On	37.88	53.69	53.69	15.81	37.35	0.53	1
VM-243316	Need Attention	Powered On	302.8	302.8	302.8	0	0	302.8	3
VM-242441	Need Attention	Powered On	149.66	1568.95	1568.95	1419.29	149.55	0.11	2
VM-283221	Need Attention	Powered On	101.91	139.59	139.59	37.68	101.54	0.37	2
VM-235018	Need Attention	Powered On	180.45	343.6	343.6	163.14	180.08	0.38	3
VM-250011	Need Attention	Powered On	38.74	53.69	53.69	14.95	38.21	0.53	1
VM-230171	Need Attention	Powered On	39.93	53.69	53.69	13.76	39.4	0.53	1
VM-240002	Need Attention	Powered On	63.11	85.9	85.2	22.09	63.18	0.63	4
VM-245313	Need Attention	Powered On	1078.97	1356.33	1356.33	277.36	1078.48	0.49	2
VM-231117	Need Attention	Powered On	12.02	12.88	12.88	0.86	11.68	0.34	2
VM-231120	Need Attention	Powered On	92.02	161.06	161.06	69.04	91.44	0.58	2
VM-250073	Need Attention	Powered On	40.38	53.69	53.69	13.31	39.85	0.53	1
VM-253329	Need Attention	Powered On	328.55	1482.84	1481.76	1153.21	327.97	1.66	4
VM-248844	Need Attention	Powered On	154.75	171.14	171.14	16.39	123.04	31.7	11
VM-248825	Need Attention	Powered On	38.11	53.69	53.69	15.57	37.59	0.53	1
VM-239961	Need Attention	Powered On	93.69	107.37	107.37	13.69	93.16	0.53	2
VM-241616	Need Attention	Powered On	98.47	107.37	107.37	8.91	72.55	25.92	1

Unused VMs

Unused VMs are defined as VMs that have been powered off for longer than 30 days. There are no unused VMs deployed.

There are 159 VMs powered off, consuming 23.33 TB of disk space and costing \$139,978 (at \$6 per GB).

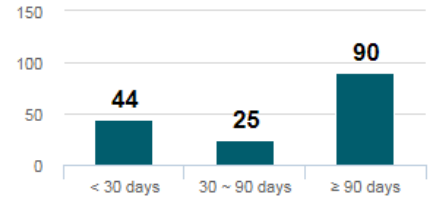
Used Space (821 VMs)
Including Powered On VMs



Savings Opportunity (159 VMs)

$$23.33 \text{ TB} \times \$ \boxed{6} \text{ Price per GB} = \$139,978$$

VMs Not Used for (159 VMs)

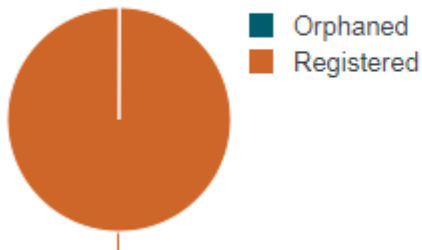


Orphaned Files

Orphaned Files are VMs, Virtual Disk Drives, or files not associated with VMware vCenter or any VMs currently deployed in the datacenter. These are resources that can typically be deleted.

Orphaned files are consuming 610 GB of disk space, at an approximate cost of \$3,673 if disk is estimated at \$6/GB. The oldest Orphaned File is dated September 13, 2014.

Space Used by Virtual Disks

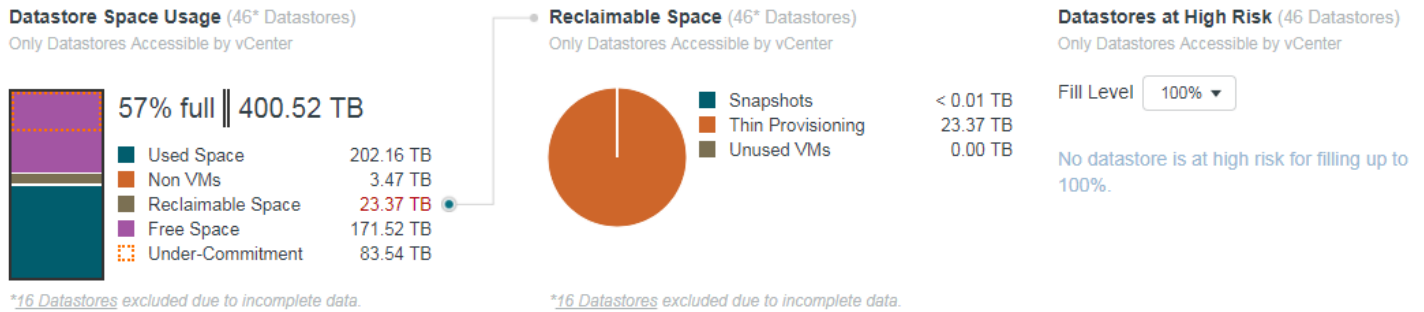


Savings Opportunity

$$612.11 \text{ GB} \times \$ \boxed{6} \text{ Price per GB} = \$3,673$$

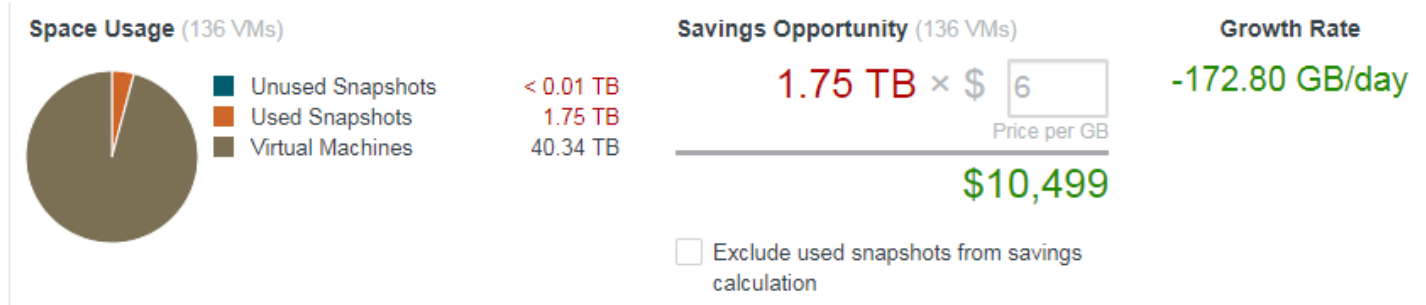
Datstore Space Usage

The current infrastructure has 48 datastores providing 400.52 TB of available storage and is 57% full. Of this space, only 23.37 TB of storage is reclaimable through Thin-Provisioning Dead Space Reclamation. 16 datastores were excluded from this report due to inaccessible data due to permissions.



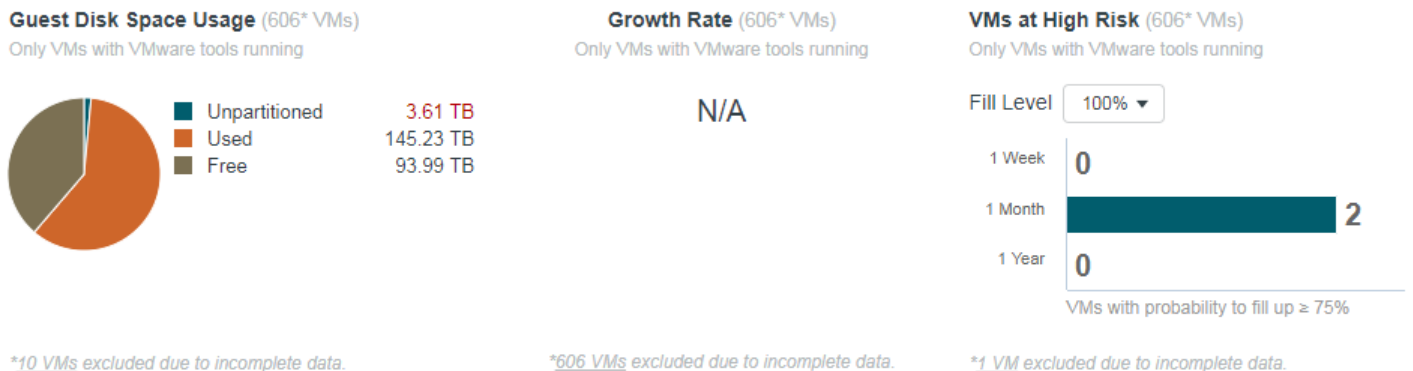
Recoverable Snapshot Storage

Your environment has 1.75 TB of snapshot disk space. There are opportunities to reclaim disk space if snapshots are no longer needed. The oldest snapshot is from Nov 17, 2016.



Guest Disk Space Usage

Of 606 virtual machines deployed, two VMs have the potential to run out of disk soon. There is also 3.61 TB of unpartitioned disk space allocated to guests.



These virtual machines have a significant amount of unpartitioned disk space.

VM Name	Guest Free Space	Risk to Full in 1 Week	Guest Used Space	Unpartitioned Space	Average Growth Rate	Guest Partition
▶ VM-122301	802.70 GB	Low	1.15 TB	1.08 TB		6
▶ VM-122398	56.52 GB	Low	88.48 GB	520.01 GB		2
▶ VM-640366	56.80 GB	Low	523.19 GB	470.01 GB		2
▶ VM-485516	15.90 GB	Low	84.10 GB	370.00 GB		1
▶ VM-665483	10.16 GB	Low	159.74 GB	125.10 GB		1
▶ VM-122319	10.47 GB	Low	39.52 GB	111.00 GB		1
▶ VM-122605	10.68 GB	Low	139.32 GB	80.00 GB		1

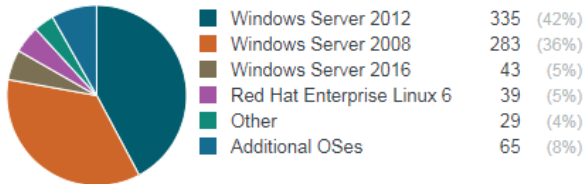
Workload (VM) Operating System Summary

Of the Guest OS Instances identified, 37 VMs are running an unsupported VM from the OS Manufacturer. These OS Instances include twenty servers running Windows 2003 and fourteen servers running Debian Linux 6, two Redhat 4.x servers and one Windows XP guest.

An additional risk is that twenty nine VMs were excluded from this inventory due to not running VMware Tools, not reporting their OS type to vCenter, or are virtual appliances.

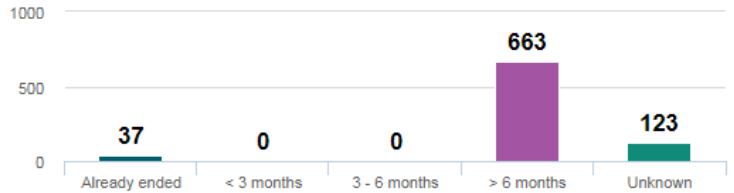
Guest OS inventory

Guest OS Breakdown (823* VMs)



**29 VMs excluded due to incomplete data.*

End of Support (823 VMs)



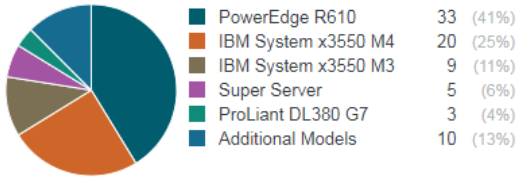
Legacy Guest OS Instance pose a security risk and should be replaced.

Source: Operating System Inventory Card

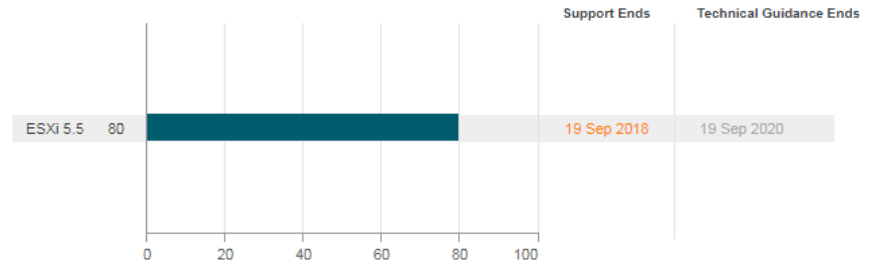
Host Hardware Summary

All 80 hosts are running versions of VMware vSphere 5.5. Support for VMware 5.5 ends on Sept 19, 2018.
 15 of the discovered hosts are not supported by VMware 6.0.
 51 of the discovered hosts are not supported by VMware 6.5.

Server Models (80 Hosts)



Hypervisor Releases (80 Hosts)



Tip: hover each colored bar to view details by build.

The following make and models are not found in the VMware ESXi 6.5 hardware compatibility matrix. The remaining incompatible hosts can be found in the HCL, but may have incompatible components or firmware.

Host Name	Server Model	Hardware Compatibility	CPU Series	ESXi Version	ESX Support by VMware	CPUs	CPU Cores
Host-1037817	Super Server	Not in HCL	Intel(R) Xeon(R) CPU E5-2699 v4 @ 2.20GHz	5.5 U3a	Supported	2	44
Host-1038953	Super Server	Not in HCL	Intel(R) Xeon(R) CPU E5-2699 v4 @ 2.20GHz	5.5 U3a	Supported	2	44
Host-1180936	Super Server	Not in HCL	Intel(R) Xeon(R) CPU E5-2699 v4 @ 2.20GHz	5.5 U3 VMMSA-2018-0004.3	Supported	2	44
Host-1328731	Super Server	Not in HCL	Intel(R) Xeon(R) CPU E5-2687W v4 @ 3.00GHz	5.5 U3a	Supported	2	24
Host-1328766	Super Server	Not in HCL	Intel(R) Xeon(R) CPU E5-2687W v4 @ 3.00GHz	5.5 U3a	Supported	2	24

Service Packs and KBAs

The data center has one critical service packs requiring application.

There are 3 High Severity, 1 Medium, and 2 Low severity service packs and knowledge base articles (KBA) that can be applied.

7 OF 7 RESULTS ■ 1 CRITICAL ■ 3 HIGH ■ 1 MEDIUM SEVERITY ■ 2 LOW SEVERITY

SORT BY: SEVERITY | [NEWEST](#) | [OLDEST](#)

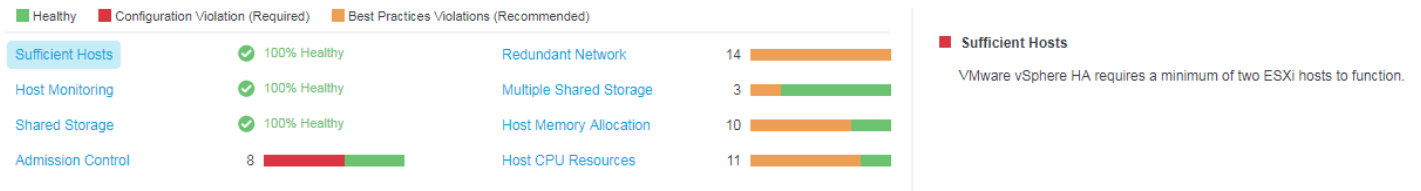
	HP Gen 8/9 lose access to device backing boot filesystem SOURCE: VMware UPDATED: 03/15/2018 APPLIES TO: 3 Hosts SYMPTOM: Connection Dropped
	Microsoft patches KB4088875 and KB4088878 may cause Windows 2008 R2 and Windows 7 virtual machines to lose IP address information SOURCE: VMware UPDATED: 03/19/2018 APPLIES TO: 14 Hosts 98 VMs SYMPTOM: Functional Loss/Error, Network Error
	VMware ESXi host loses network connectivity due to netGPheap memory leak SOURCE: VMware UPDATED: 03/19/2018 APPLIES TO: 40 Hosts SYMPTOM: Memory Error, Network Error
	VMware support for open-vm-tools SOURCE: VMware UPDATED: 03/13/2018 APPLIES TO: 1 VC 29 Hosts 14 VMs SYMPTOM: Informational
	Configuring disks to use VMware Paravirtual SCSI (PVSCSI) adapters SOURCE: VMware UPDATED: 03/13/2018 APPLIES TO: 1 VC 40 Hosts SYMPTOM: Informational
	Enabling serial-line logging for ESXi 5.x and 6.0 SOURCE: VMware UPDATED: 03/21/2018 APPLIES TO: 40 Hosts SYMPTOM: Informational, User Guide
	EVC and CPU Compatibility FAQ SOURCE: VMware UPDATED: 03/15/2018 APPLIES TO: 1 VC 40 Hosts SYMPTOM: User Guide

Management of KBA's and Service Packs is critical to maintaining environment stability and availability while also reducing the security risks on the platform. Consider keeping these patches and updates up to date.

Configuration Summary

High Availability environment is healthy. No changes are required for this small cluster configuration.

Configuration Summary (14 HA Clusters)



8 clusters are reporting Admission Control problems.

Cluster Name	HA Status	Host Count	Sufficient Hosts	Host Monitoring	Shared Storage	Admission Control	Admission Control Policy
Cluster-c1043015	Enabled	4	✓	✓	✓	✗	-
Cluster-c15197	Enabled	3	✓	✓	✓	✗	-
Cluster-c29004	Enabled	3	✓	✓	✓	✗	-
Cluster-c30742	Enabled	7	✓	✓	✓	✗	-
Cluster-c344303	Enabled	5	✓	✓	✓	✗	-
Cluster-c472963	Enabled	2	✓	✓	✓	✗	-
Cluster-c862031	Enabled	5	✓	✓	✓	✗	-
Cluster-c89014	Enabled	4	✓	✓	✓	✗	-
Cluster-c1512057	Enabled	3	✓	✓	✓	✓	25% Memory, 33% CPU Reserved
Cluster-c345585	Enabled	13	✓	✓	✓	✓	Tolerate 1 Host Failure
Cluster-c473761	Enabled	13	✓	✓	✓	✓	Tolerate 1 Host Failure
Cluster-c473805	Enabled	2	✓	✓	✓	✓	Tolerate 1 Host Failure
Cluster-c473820	Enabled	8	✓	✓	✓	✓	Tolerate 1 Host Failure
Cluster-c474501	Enabled	3	✓	✓	✓	✓	Tolerate 1 Host Failure
Cluster-c1221608	Not Enabled	2	✓	✓	✓	✗	-

Licenses

Your Current Support and Subscription from VMware allows for upgrades to the supported Hypervisor versions.

There is a large discrepancy between the number of licenses used versus the number of available licenses.

- This is possible if these are vCenter servers which have not been discovered during this assessment.
- It is also possible the customer currently has more licenses than they need so there may be opportunities to reduce the number of licenses during the renewal period and save money.

License Editions in vCenter	Total Licenses Available	Licenses Used
VMware vSphere 6.0 Standard	320	166
Totals	320	166

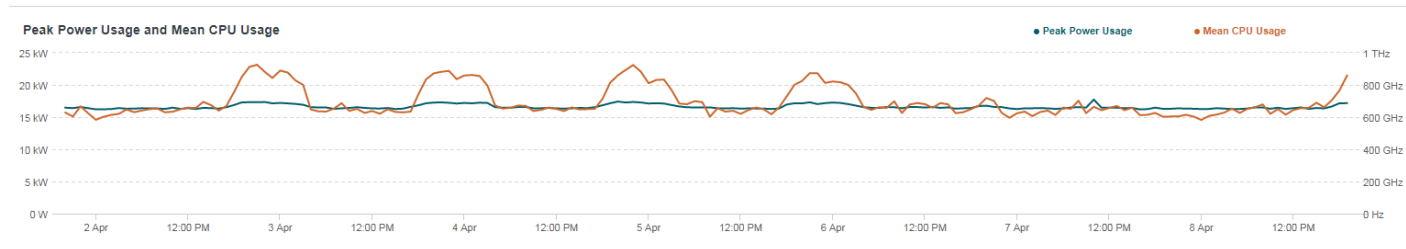
Aggregate Power Consumption

The primary vCenter lists 80 Active hosts. These hosts are consuming an average of 16.18 kW of power, providing an average CPU usage of 530.94 GHz and a peak of 925.38 GHz.

At your current average usage, an average of 16.18 kW per host or 1521 Watts per CPU is being consumed across the data center.

Power usage is steady and may be an indicator of a steady workload with minimal variation in peak and average CPU load or underutilized resources.

Hosts	CPUs	CPU Cores	Power Usage		CPU Usage	
			Peak	Mean	Peak	Mean
80	166	1252	17.72 kW	16.18 kW	925.38 GHz	530.94 GHz



Source: Aggregate Power Consumption

Critical Infrastructure Summary

- **6 'Lost Communication' reported**
One device reported one lost communication alert during the assessment period.
- **3 UPS units have batteries nearing end of life.**
To be sure your aging system maintains its availability, contact Schneider Electric to discuss potential upgrades or replacements.
See the Battery section for more details.
- **Alarms**
74 alarms generated

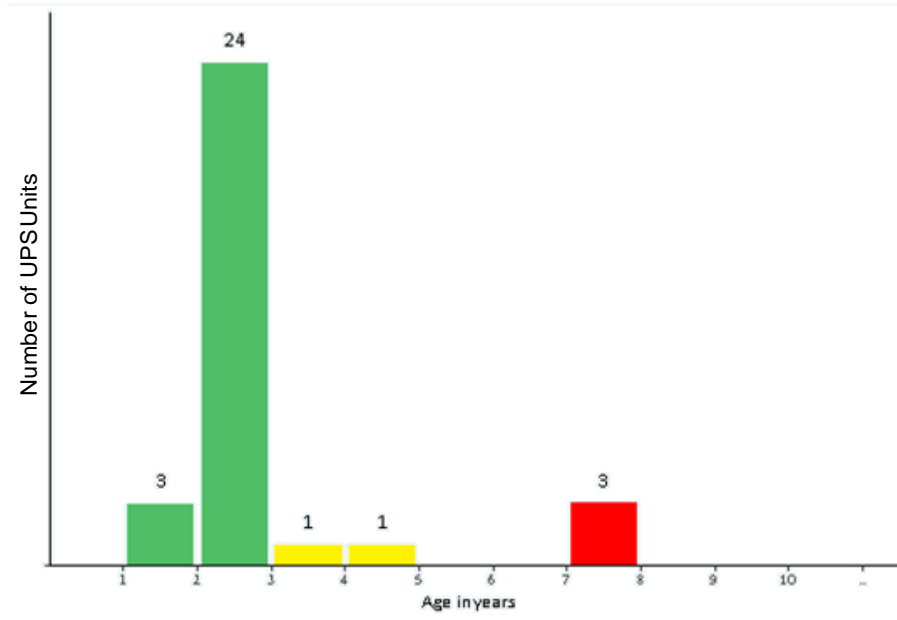
UPS

You have connected a total of 32 UPS units. 32 of your UPS units can report their age. The average age of these UPS units is 3.2 years.

Three UPS units are over 5 years old and are no longer supported.

Two UPS units are 3 – 5 years old. Extended warranties are recommended.

UPS age

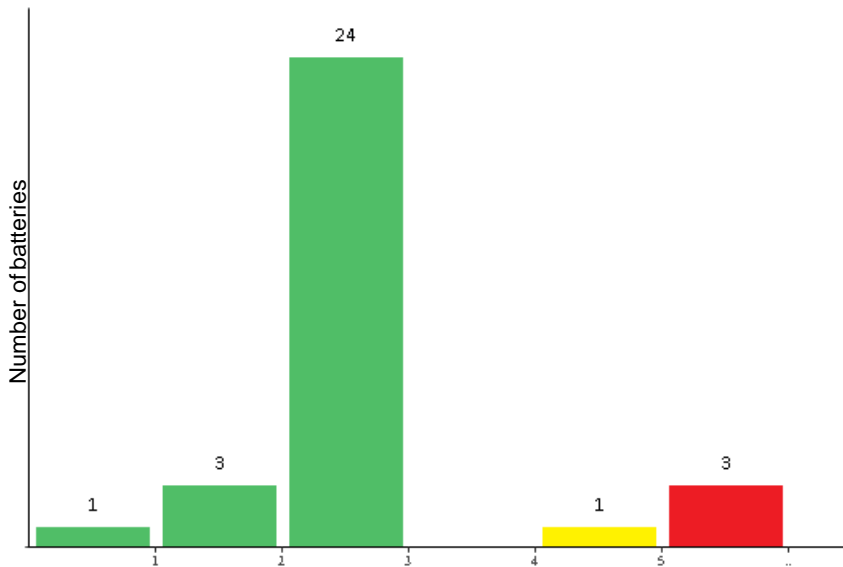


Batteries

The average age of your UPS batteries is 3 years.

3 UPS units have batteries older than the recommended 5 years. These batteries may need to be replaced very soon.

Battery age



UPS units with aging batteries

Unit	Model	IP	Age in years
UPS-IT-1	Smart-UPS 7000	xxx.xxx.2.1	6.0
UPS-IT-2	Smart-UPS 7000	xxx.xxx.2.2	5.5
UPS-Sales-1	Smart-UPS 3000	xxx.xxx.2.3	6.0
UPS-Fin-1	Smart-UPS 3000 XLM	xxx.xxx.2.4	4.5

Battery Temperature

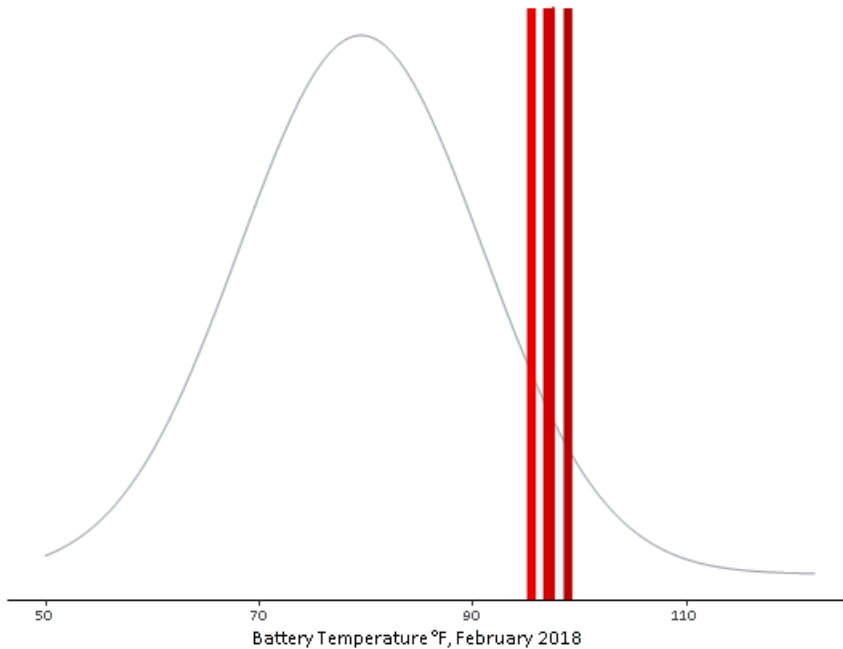
Batteries are vulnerable to environmental conditions, especially temperature.

There are 5 batteries that have elevated temperatures.

Battery life expectancy is estimated at five years. A general rule to remember is that for every 15°F above the ambient temperature of 77°F, the life expectancy of the battery will be reduced by 50 percent.

See how the battery temperatures of your UPS units (colored lines) compare with the average of all UPS units connected to EcoStruxure IT (gray line).

Battery temperature - Single phase UPS units



Single phase UPS units with the hottest batteries

Unit	Model	Ip	Mean °F
UPS-IT-1	Smart-UPS 7000	xxx.xxx.2.1	98.9
DataCloset-1	Smart-UPS 750	xxx.xxx.5.17	97.2
DataCloset-2	Smart-UPS 750	xxx.xxx.5.12	97.2
UPS-Fin-2	Smart-UPS 750	xxx.xxx.2.10	97.0
UPS-Fin-3	Smart-UPS 750	xxx.xxx.2.17	95.5