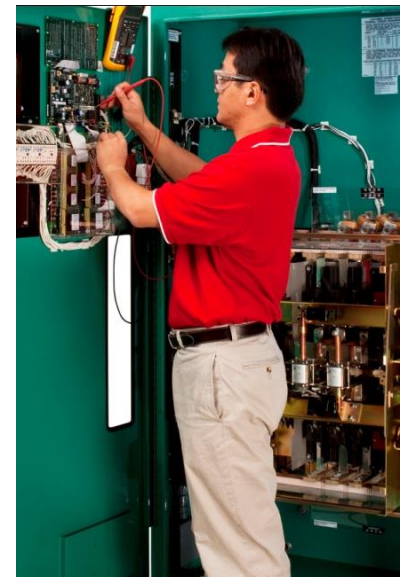




**Power
Generation**

Data Center Continuous (DCC) rated generator sets

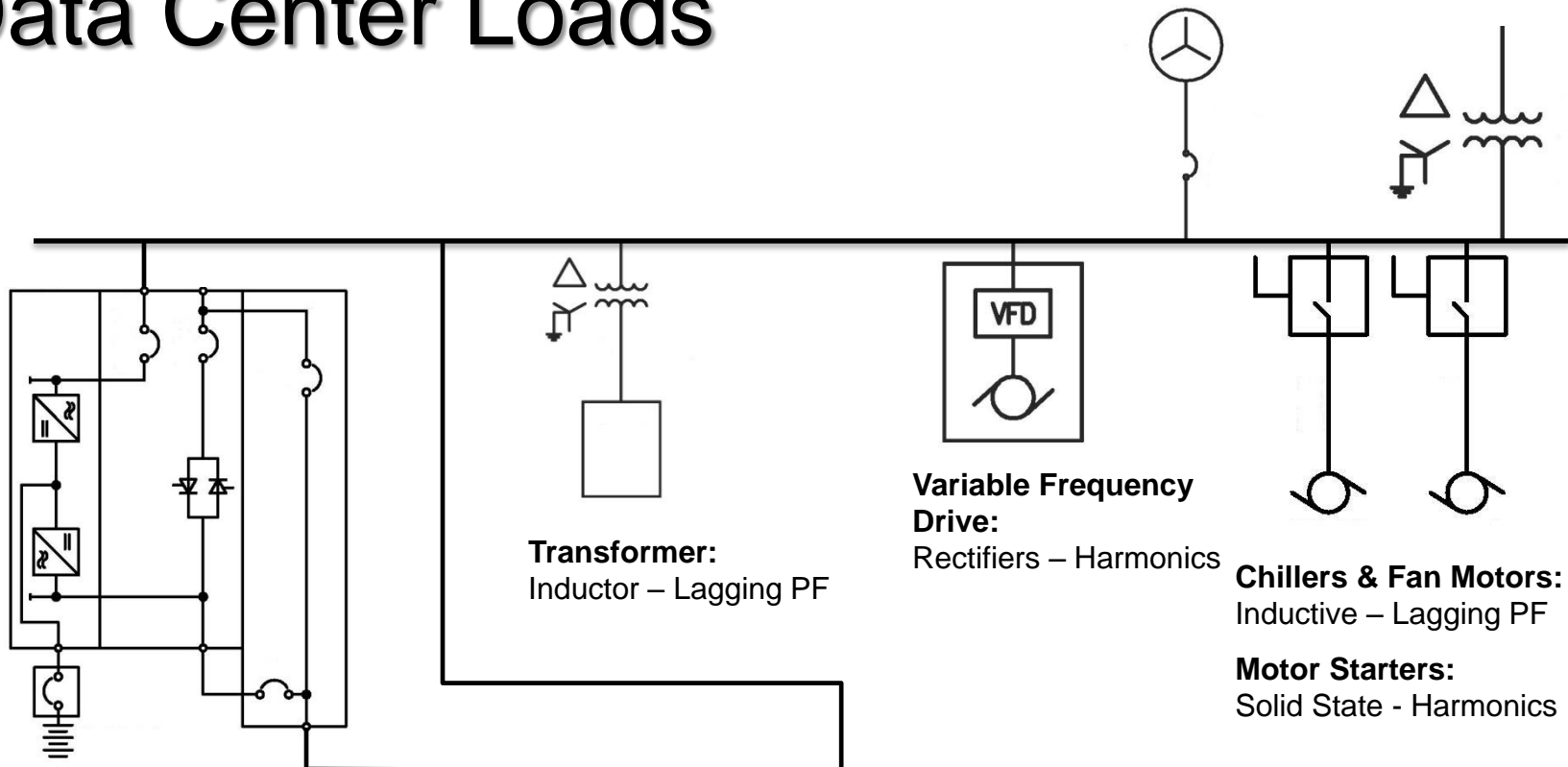


Content

- Data Center Loads
- Genset Ratings – Definitions
- Feature Benefits
- DCC Rated Gensets - Rating Definition, Rating Card, Available Products, Factory Options
- CPG Alternators vs Data Center Loads
- DCC Rated Gensets vs Ratings
- Tier Levels



Data Center Loads



UPS:
Rectifiers - Harmonics
Capacitive Filters – Leading PF

Transformer:
Inductor – Lagging PF

Variable Frequency Drive:
Rectifiers – Harmonics

Chillers & Fan Motors:
Inductive – Lagging PF

Motor Starters:
Solid State - Harmonics



IT Load:
SMPS – Leading PF

Genset Ratings – Definitions

- ISO 8528 **Part 1** defines these ratings
 - Continuous Operating Power (**COP**)
 - Unlimited Time Prime Power (**PRP**)
 - Limited Time Prime Power (**LTP**)
 - Emergency Standby Power (**ESP**)

DCC Rating - Feature Benefits

Improves data center power system reliability

by avoiding under utilization of generators in normal use of the power system – No need to overdesign

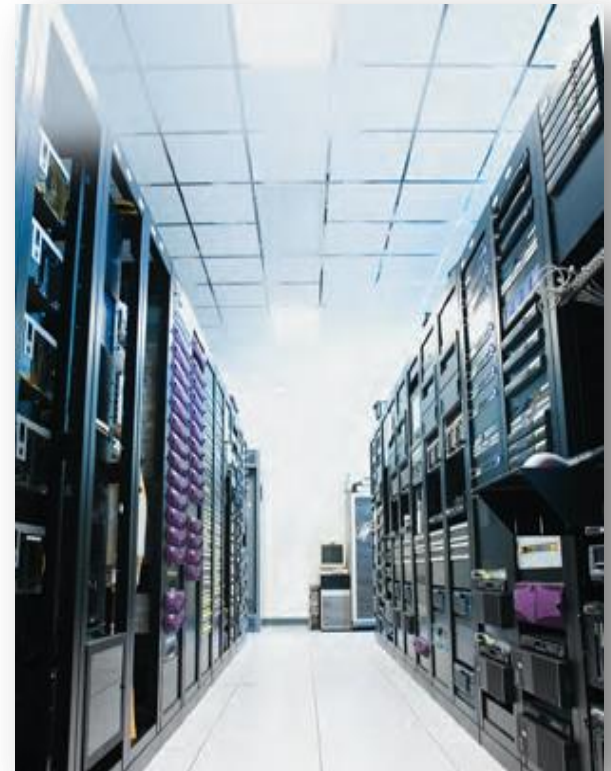
DCC rated gensets can be loaded to 100% of the DCC rating

- Provides the ability to **optimize a data center power system design** with a Continuous Duty genset that can be loaded to 100% of its rating for Unlimited Hours
 - **DCC Duty rating: Unlimited hours of operation at 100% DCC rating – 100% Load Factor**

DCC Rating - Definition

- Data Center Continuous (DCC) Duty Rating:

Is defined as the maximum power which the generator is capable of delivering **continuously** to a constant or varying electrical load for **unlimited hours** in a data center application



Global Model Range

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**Power
Generation**

NOVEMBER 2012

Model Name	Standby Ratings		DCC Ratings		Engine Model	Standard Alternator	Standard Controller	Emissions Compliance EU/TAL/EPA	ATS** 400 Volt, 3 Phase
	kW	kVA	kW	kVA					
50 Hz Range									
C1400 D5	1120	1400	1000	1250	KTA50G3	PI734B	3.3		OTPC-3000
C1675 D5	1340	1675	1120	1400	KTA50G8	PI734D	3.3		OTPC-3000
C1675 D5A	1340	1675	1200	1500	KTA50GS8	PI734D	3.3		OTPC-3000
C1760 D5e	1408	1760	1280	1600	QSK60GS3	PI734D	3201	2g	OTPC-3000
C2000 D5e	1600	2000	1460	1825	QSK60GS3	PI734F	3201	2g	OTPC-3000
C2000 D5	1650	2063	1500	1875	QSK60G3	PI734F	3201		OTPC-3000
C2250 D5	1800	2250	1600	2000	QSK60G4	PI734G	3201		OTPC-4000
C2500 D5A	2000	2500	1800	2250	QSK60G8	LVS1804R	3201	4g	OTPC-4000
C2750 D5	2200	2750	2000	2500	QSK78G9	MVSI804R	3.3	4g	OTPC-4000
C3000 D5	2400	3000	2200	2750	QSK78G9	MVSI804S	3.3	4g	RFQ
C3300 D5 ⁽³⁾	2660	3325	2400	3000	QSK78G6	LVS1804S	3201		RFQ
DQGAN	1120	1400	1020	1275	QSK50G4	PI734B	3.3	T2/2g	OTPCJ-4000
DQGAH	1232	1540	1120	1400	QSK50G4	PI734D	3.3	T2/2g	RFQ
DQGAK	1232	1540	1120	1400	QSK50G4UR	PI734D	3.3		RFQ
DQGAJ	1269	1700	1232	1540	QSK50G4UR	PI734F	3.3		RFQ
DQGAG	1360	1700	1232	1540	QSK50G4	PI734D	3.3	T2/2g	RFQ
DQGAM	1460	1825	1320	1650	QSK50G7	PI734F	3.3	T2	RFQ
DQKAH	1600	2000	1460	1825	QSK60G11	PI734F	3.3	T2/2g	RFQ
DQKAG	1800	2250	1600	2000	QSK60G11	PI734F	3.3	T2/2g	RFQ
DQKAJ	2000	2500	1800	2250	QSK60G18	LVS1804S	3.3	T2/2g	



**Power
Generation**

Model Name	Engine Model	Data Center Continuous	
		kVA	kW
C400 D5e	QSX15-G8	364	291
C450 D5e	QSX15-G8	409	327
C500 D5e	QSX15-G8	455	364
C550 D5e	QSX15-G8	500	400
C700 D5	VTA28-G5	640	512
C825 D5A	VTA28-G6	750	600
C825 D5	QSK23-G3	750	600
C900 D5	QSK23-G3	820	656
C1000 D5	QST30-G3	939	751
C1100 D5	QST30-G4	1000	800
C1100 D5B	KTA38-G5	1029	823

DCC Rated Genset - Spec/Data Sheet

- Dedicated Spec Sheets and Data Sheets w/DCC rating definition available in:-
- <https://powersuite.cummins.com>
- Spec Sheet and the Data Sheet together can be supplied as official confirmation of our rating

DCC Rated Genset – Spec. Sheets

- Select **DCC Model** from “*Ratings Card*” - Example: **50Hz, DQKAG**
- Select **Generator Sets** in “Power Suite” browse menu
- Select either 50 or 60 Hz - Diesel
- Locate Model under “Model” column & left click

Power Suite

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50Hz Diesel Set Index

Show Queue    

Standby Rating		Prime Rating		Continuous Rating		Spec. Sheet	Model	Engine Model	Add to Queue
kW	kVA	kW	kVA	kW	kVA				
1800	2250	1600	2000	1320	1650	S-1383	DQKD	QSK60-G4	
2000	2500					S-1383	DQKH	QSK60-G8	
2250	1800	1825	1460	1400	1120	S-1644	DQKAG	QSK60-G11 NR2	

Browse

Technical Documents 

Generator Sets 

> [50Hz Diesel](#)

> [60Hz Diesel](#)



DCC Rated Gensets – What it is!

Warranty:

2yrs Unlimited as standard

Power Output: **100%** of
Data Center Continuous
Rating of the generator

Duration: **Continuous** for
the duration of the outage
for Unlimited Hours

Compliance:
Uptime Tier III & IV

DCC Rated Gensets – What it is

Data Center Continuous (DCC) rating is a new rating to compliment our Stand-by, Prime & Continuous ratings as defined by ISO 8528-1

Data Center Continuous (DCC) rating is designed for data center applications



CPG Alternators vs Data Center Loads

- Robust by design to handle the effects (heating) of harmonic currents created by non-linear Data Center loads such as UPS Systems, VFDs
- “Subtransient Reactance” values of 12% or less to minimize the susceptibility to overheating and for greater compatibility to non-linear loads
- Maximum of 5% total harmonic distortion from no load to full load (linear load) and no more than 3% distortion for any one harmonic to minimize alternator contribution to harmonics
- Fast Voltage and Frequency recovery negating the impact of their dip upon loading

CPG Alternators vs Data Center Loads

- Ability to absorb reverse kVARs due to leading PF data center loads

CPG Alternators can safely absorb kVARs up to 25% of the alternator's rated kVAR output capability. For example 2500 kVA, 0.8 PF rated alternator has a kVAR output capability of 1500 kVARs. This alternator has the capability to absorb $(0.25) * 1500 = 375$ kVARs

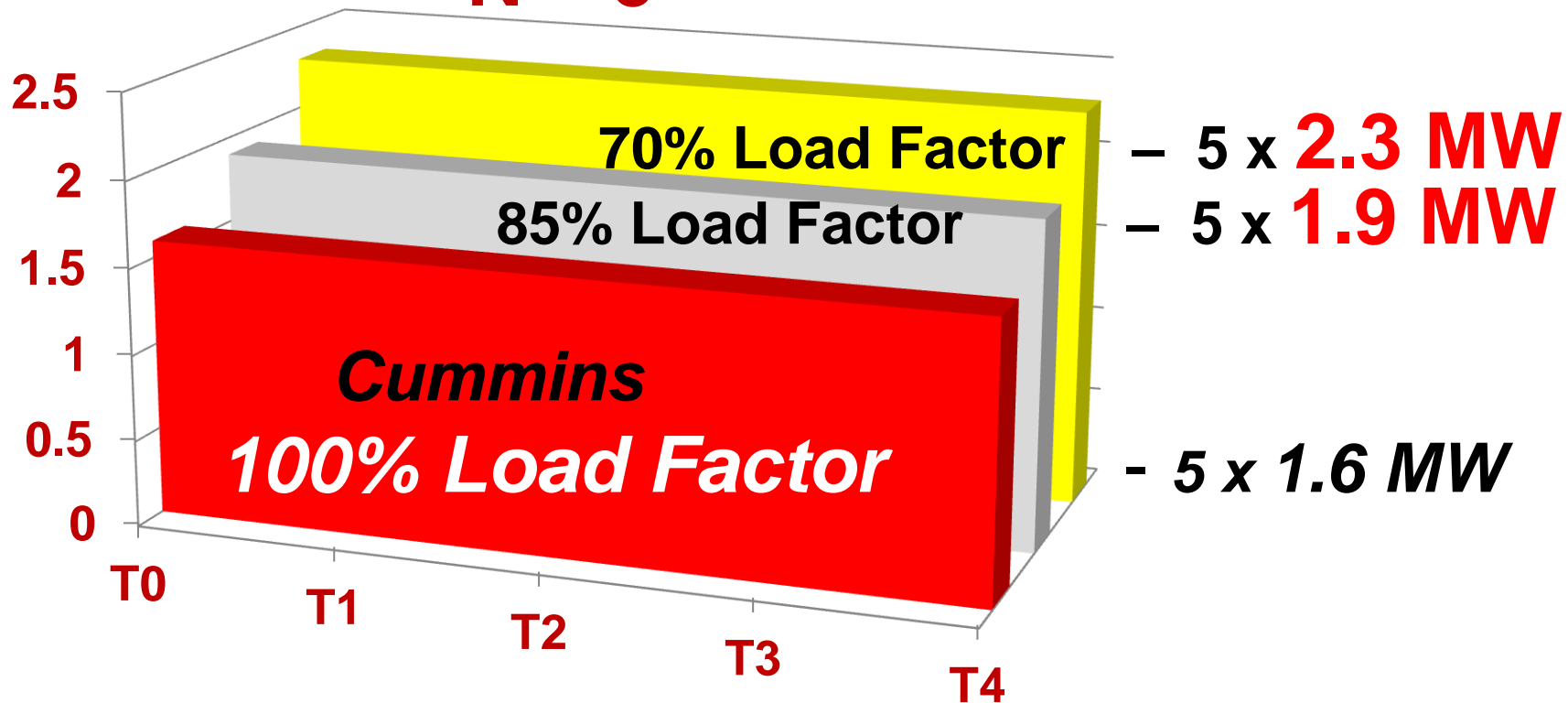
- ❖ kVARs resulting from leading PF loads may be referred to as “reverse kVARs” or “negative kVARs”

DCC Rated Gensets vs ISO Standby Rating or Rating with average load level

Site Load = 8.0 MW

N = 5

MW

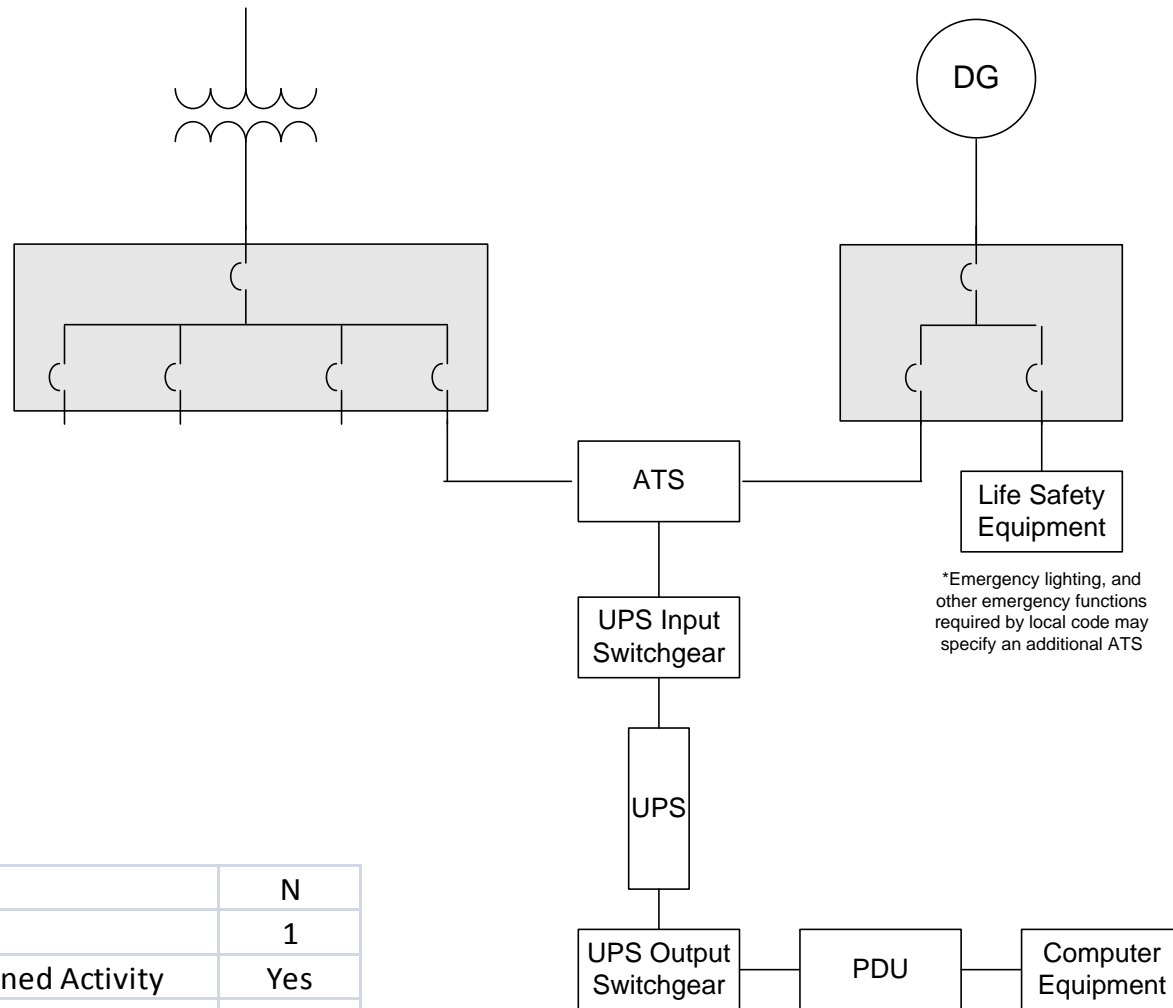


Tier Levels

What is the Tier Level

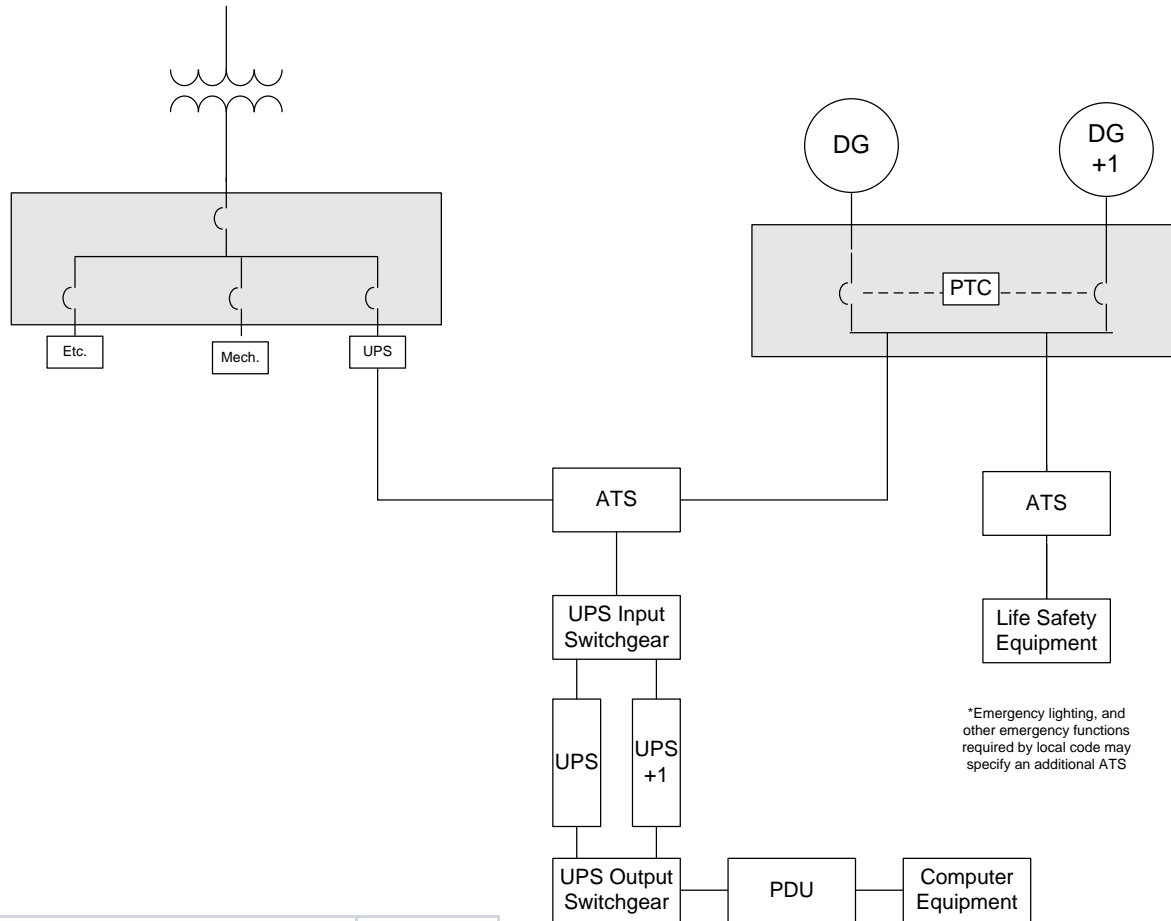
- Common language of Data Center Infrastructure
- Different Data Centers – Different Requirements
- Different Topology – Different Availability
- Redundant Systems
- Redundant power supply path
- Concurrently Maintainable and Fault Tolerant

Tier I – Basic Capacity



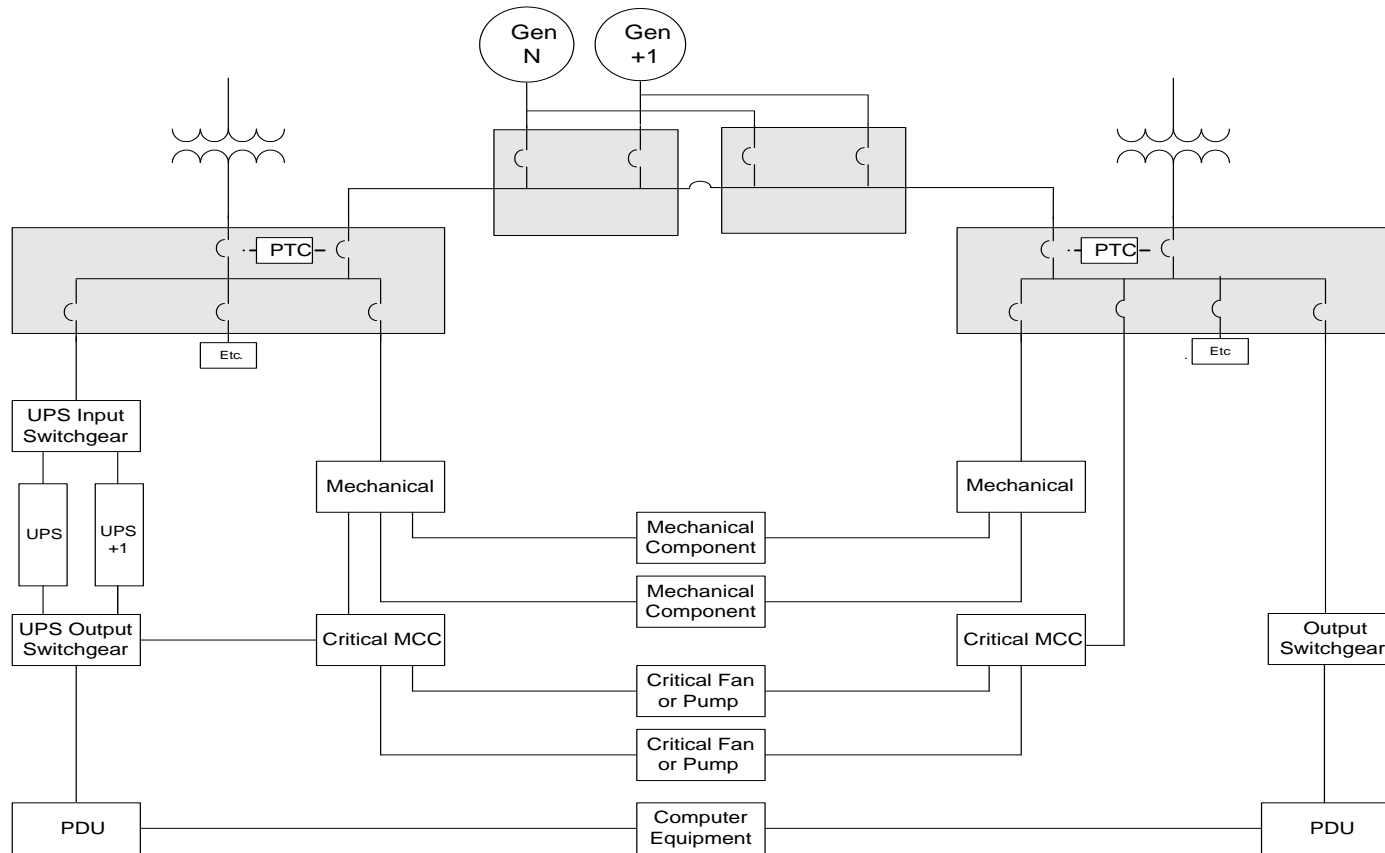
Capacity	N
Distribution Paths	1
Disruption from Planned Activity	Yes
Disruption from Unplanned Activity	Yes

Tier II – Redundant Components



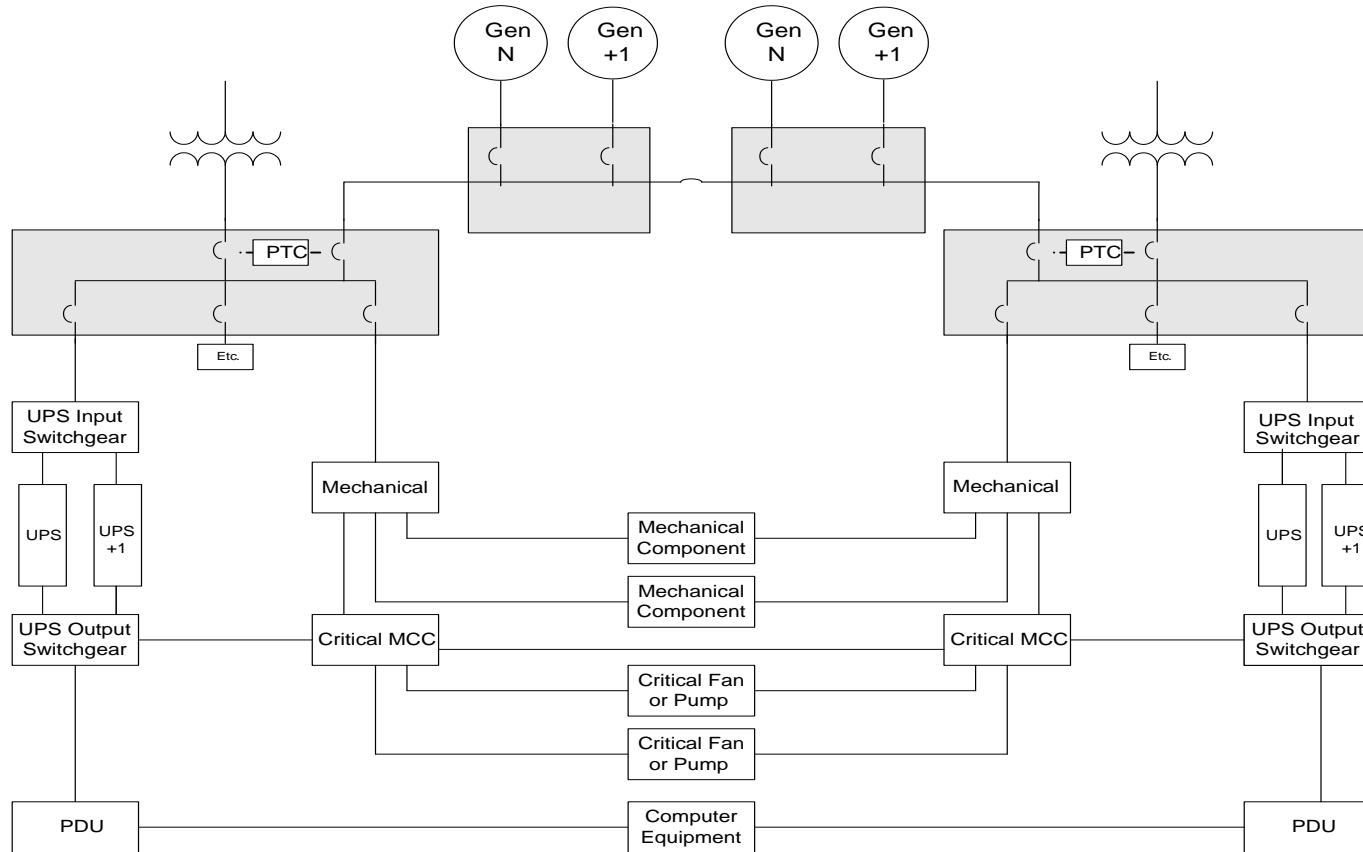
Capacity	N + 1
Distribution Paths	1
Disruption from Planned Activity	Yes
Disruption from Unplanned Activity	Yes

Tier III - Concurrently Maintainable



Capacity	N + 1
Distribution Paths	1 Active, 1 Alternate
Disruption from Planned Activity	No
Disruption from Unplanned Activity	Yes

Tier IV – Fault Tolerant



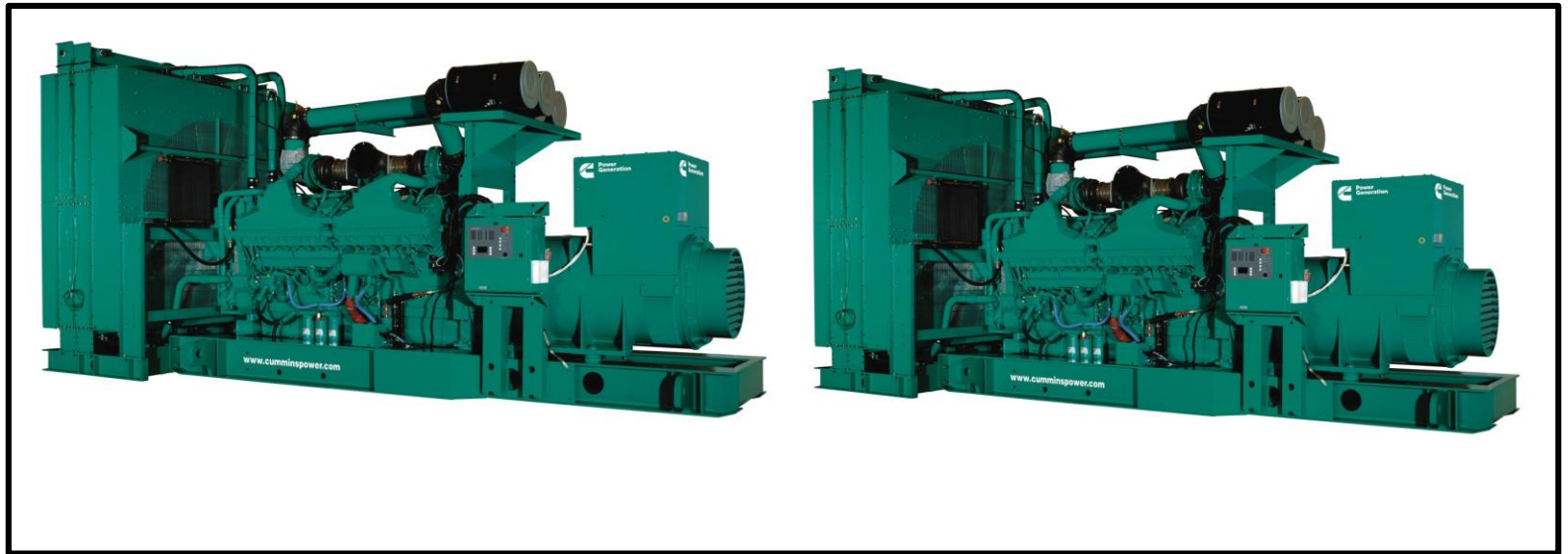
Capacity	2N (N after any failure)
Distribution Paths	2 Simultaneously Active
Disruption from Planned Activity	No
Disruption from Unplanned Activity	No

Tier Levels & Gen Sets

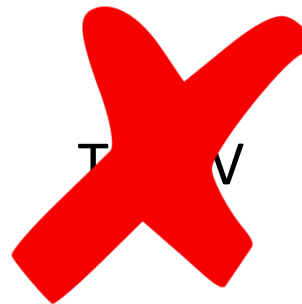
Standby & Prime Power Gen Sets	Tier II
Continuous Power & DCC Gen Sets	Tier III & IV
Concurrently Maintainable	Tier III
Automatic Response in Failures and Operation	Tier IV

Compartmentalization

Gen Set Room

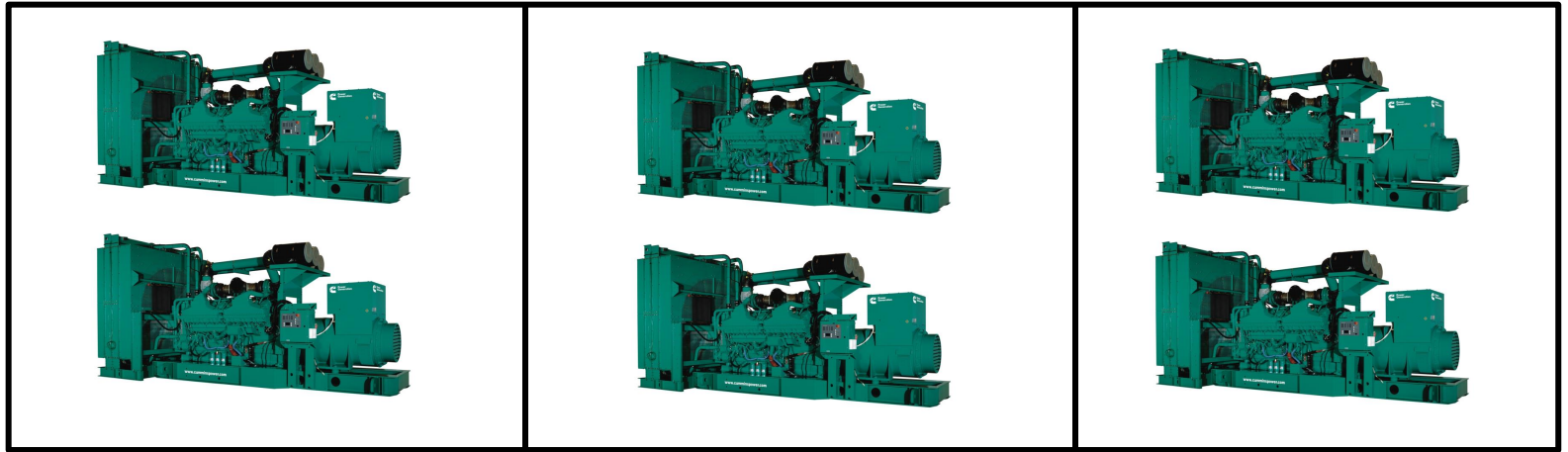


Gen Set N = 1

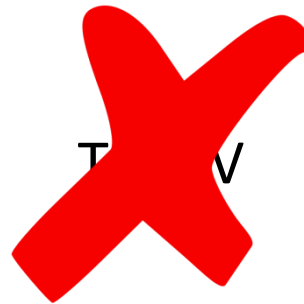


Compartmentalization

Gen Set Room

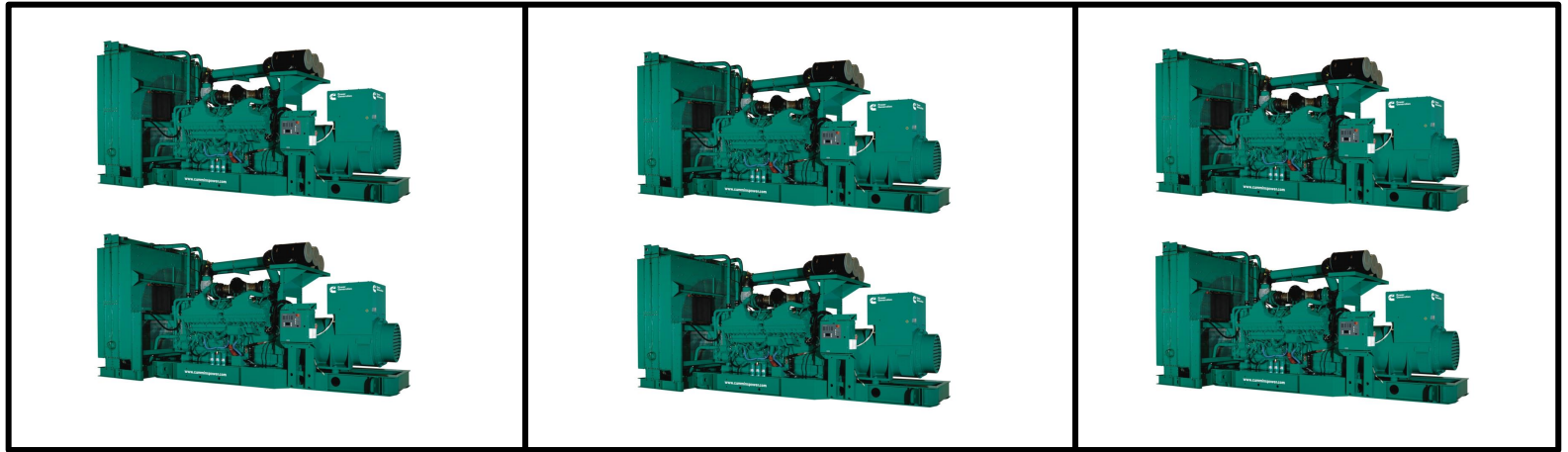


Chiller N = 4



Compartmentalization

Gen Set Room



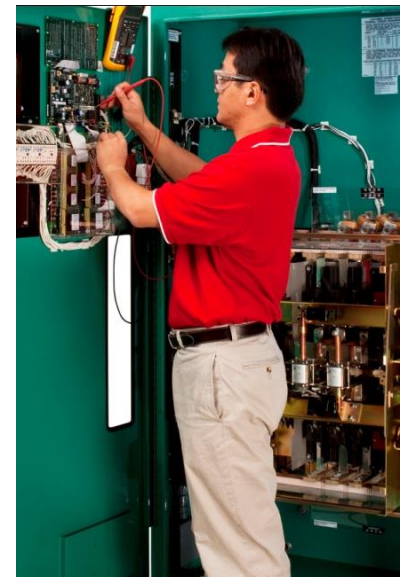
Chiller N = 4

Tier IV



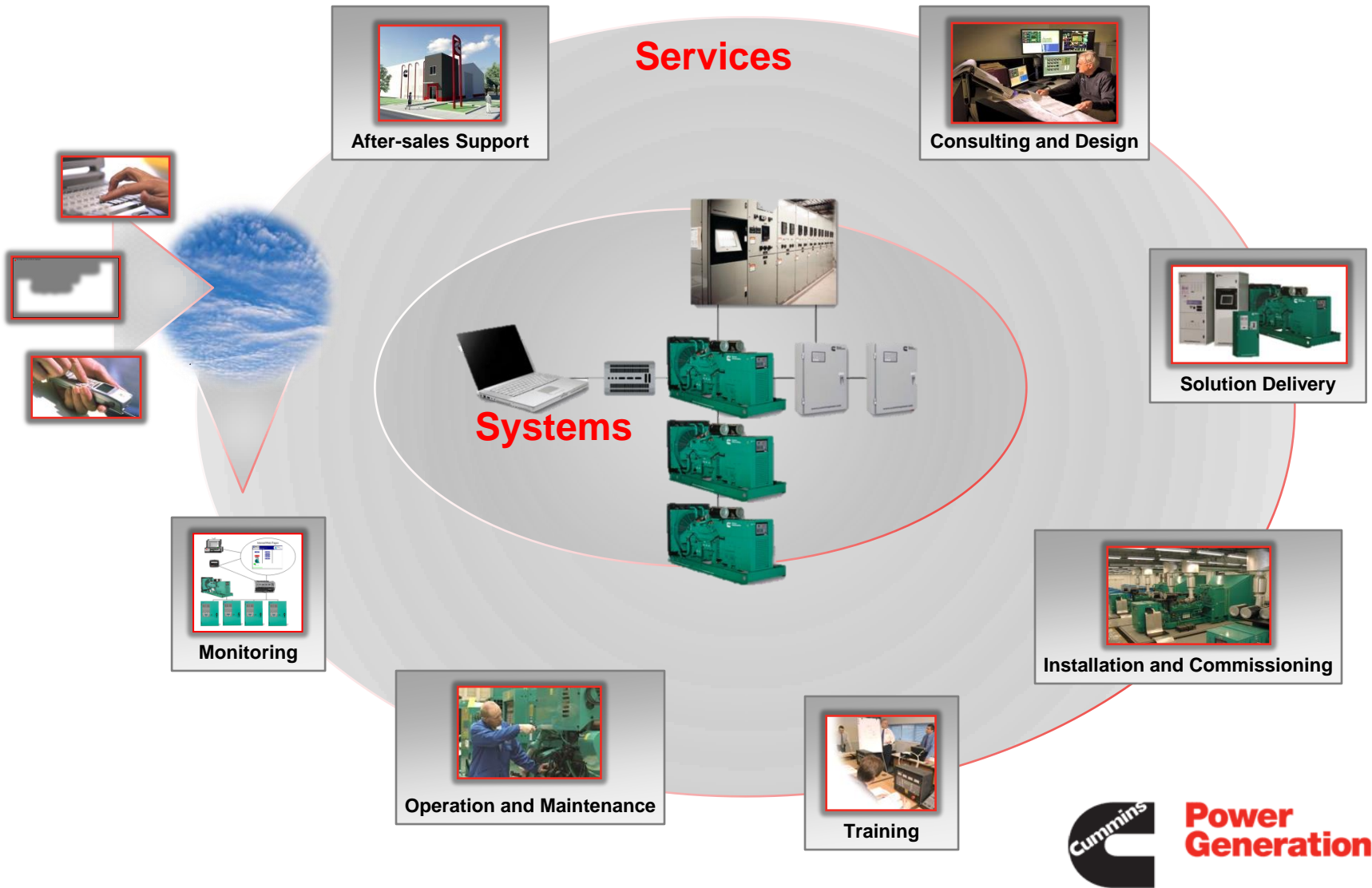
**Power
Generation**

Cummins: Power of One



Power of One: **Single Source for Solutions**

The **Power of One™** Means a **Single Source for Solutions.**

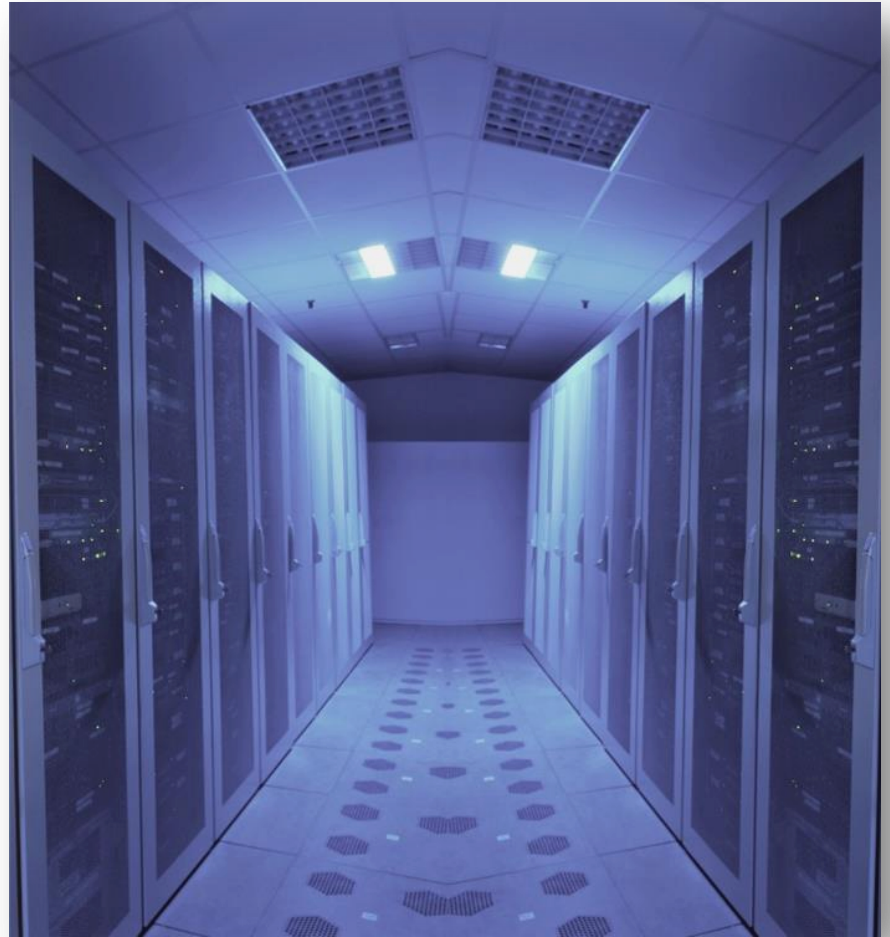


Advantages of the **Power of One™**

- Ensures the right people with critical skills and knowledge are available for **application support** on total power system design, deployment, performance and reliability
- Creates single source of supply for customers, simplifying ordering and **project management**
- Taking ownership of the entire system enables **better customer support**
 - One warranty
 - No finger pointing

Power of One: **Benefits to You**

- One** Supplier
- One** Architecture
- One** Design
- One** System
- One** Warranty
- Faster** Deployment
- Greater** Reliability
- Less** Downtime



Cummins Power Generation – Data Center Protection



- RELIABLE POWER is our business
- Global Perspective/Local Service
- World class hardware, all designed to work together

Power of One™

