安全 節能 綠機房

台達關鍵基礎架構事業部
業務經理 張明章

機房安全 Tier介紹

Uptime Institute

Uptime Institute is recognized worldwide for the creation and administration of the Tier Standards & Certifications for Data Center Design, Construction, and Operational Sustainability.

Tier Classifications

- Tier I – Basic Capacity 基本容量
- Tier II – Redundant Components 設備備援
- Tier III – Concurrently Maintainable 同時可維護
  - Applies to Each and Every component and path 應用到每一個設備及路徑
- Tier IV – Fault Tolerant 故障容錯
  - Considers a single event, but consequential impact 考量單點故障，但及其間接性的影響

Uptime Institute™

ATD TIER
Barry Chang
Accredited Tier Designer
5 March 2015
1145 UPTIME INSTITUTE

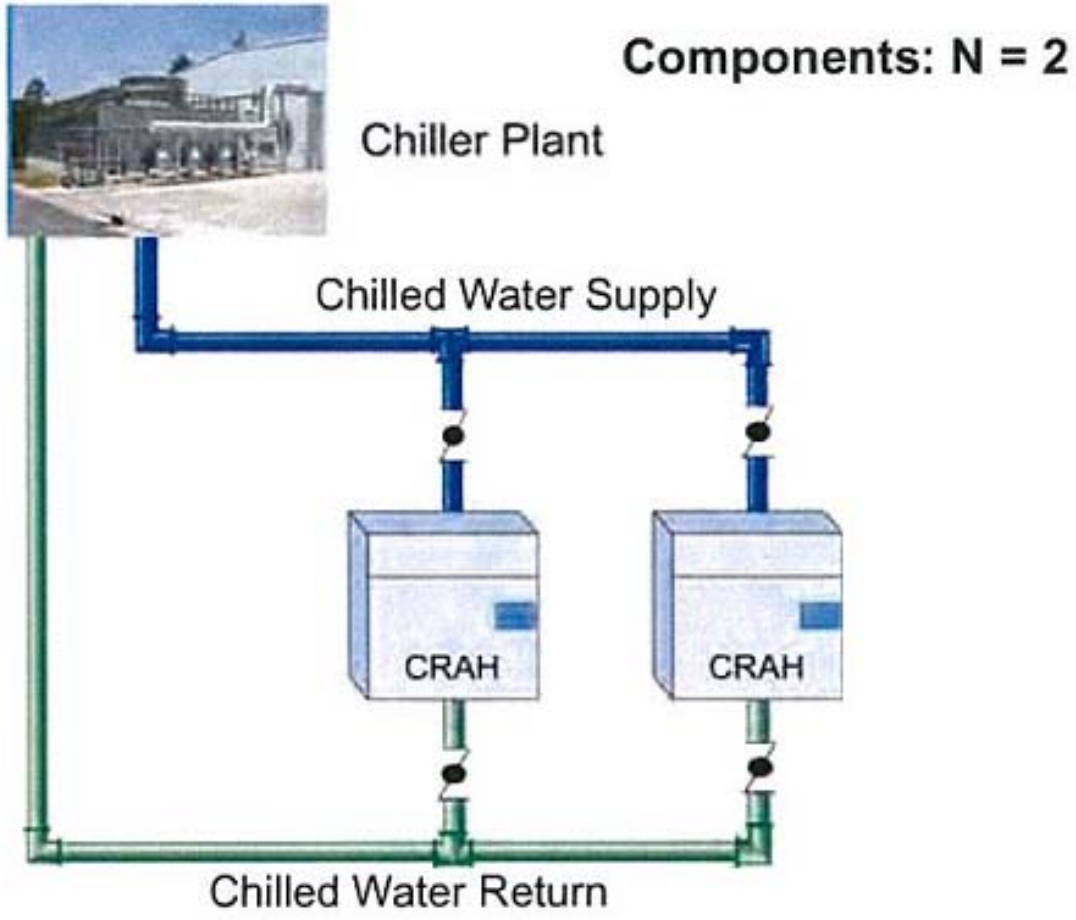
Tier I – Basic Capacity

Summary

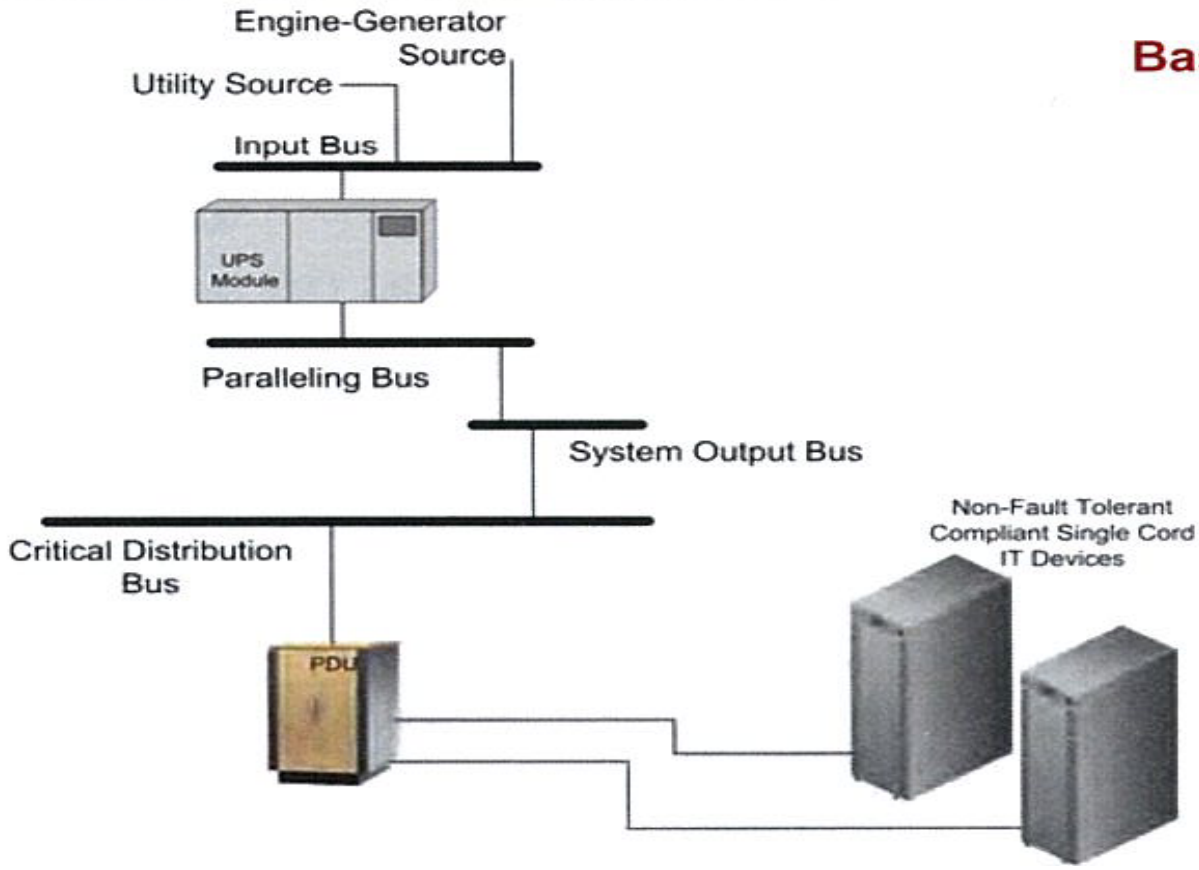
- Space, Power, and Cooling Systems allocated for Critical Environment (需有發電機、UPS、空調系統)
- Non-redundant capacity components (“N” only)
- Single distribution path

- ➢ 單一設備故障或維修保養時，機房資訊系統需停機
- ➢ 單一另件(管、線、開關…)故障或保養時，機房資訊系統需停機

Tier I – Basic Capacity



Tier I – Basic Capacity



Basic Capacity

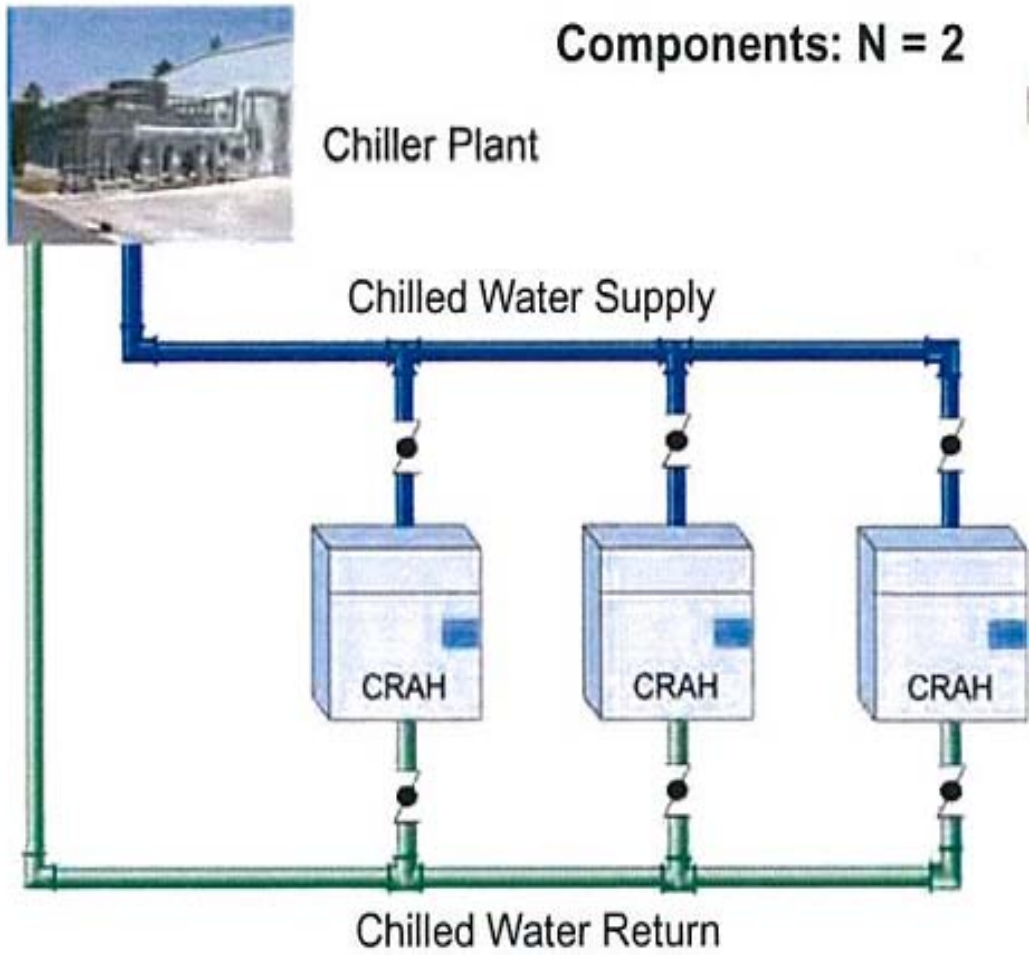
Tier II: Redundant Capacity

Summary

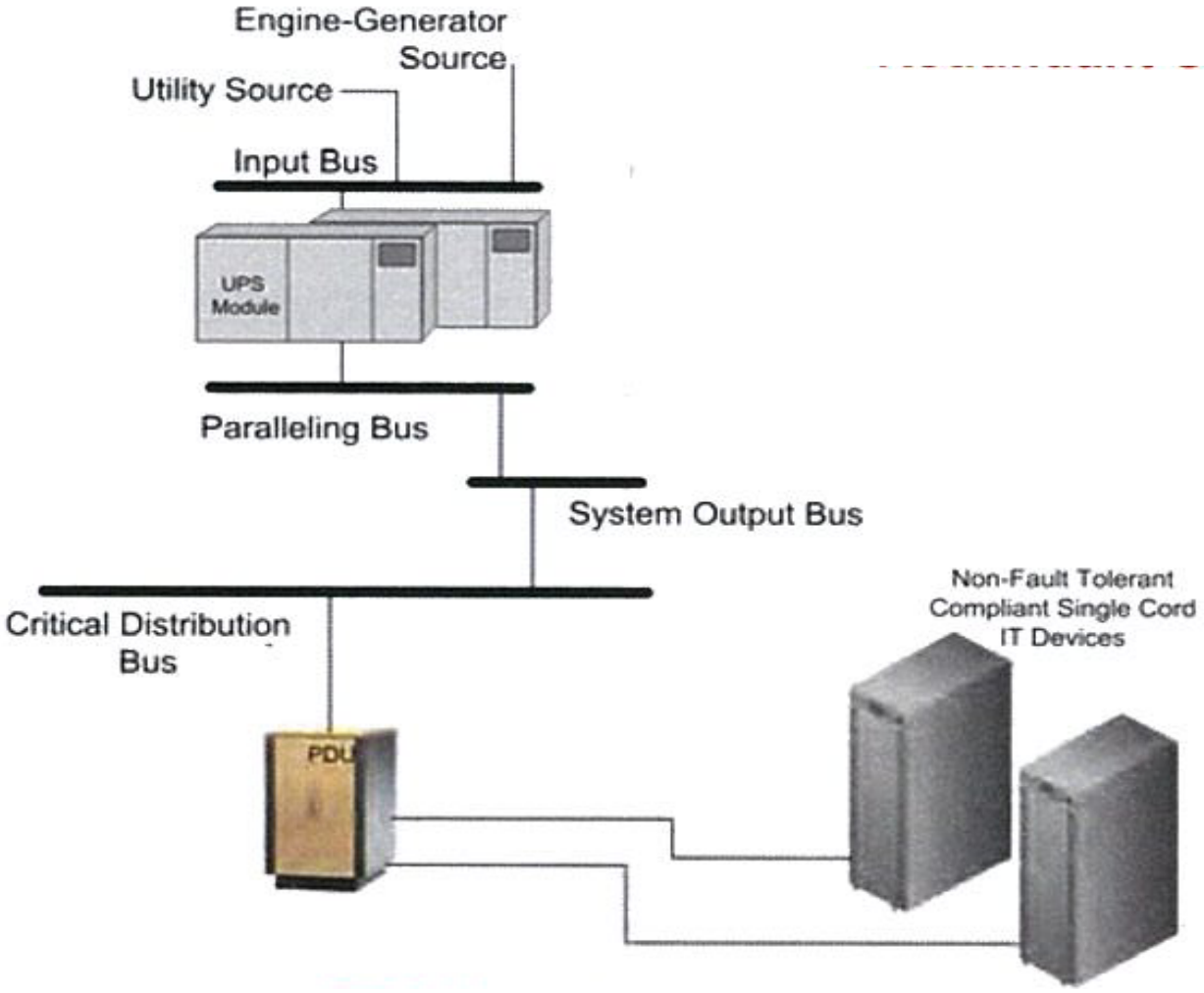
- Redundant capacity components (N+R)
  (發電機、UPS、空調設備需有備援機組)
- Single distribution path

- 單一設備故障或維修保養時，機房資訊系統不需停機
- 單一另件(管、線、開關...)故障或保養時，機房資訊系統需停機

Tier II: Redundant Capacity



Tier II: Redundant Capacity



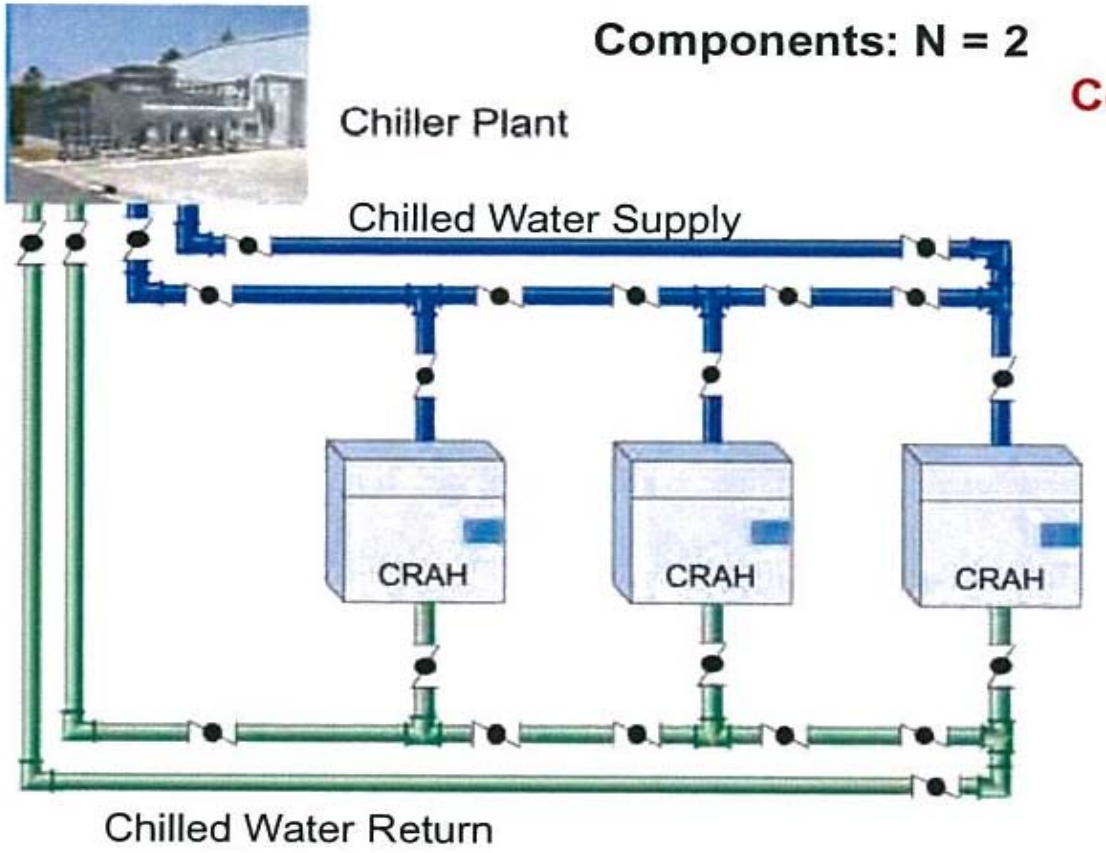
Tier III: Concurrently Maintainable

Summary

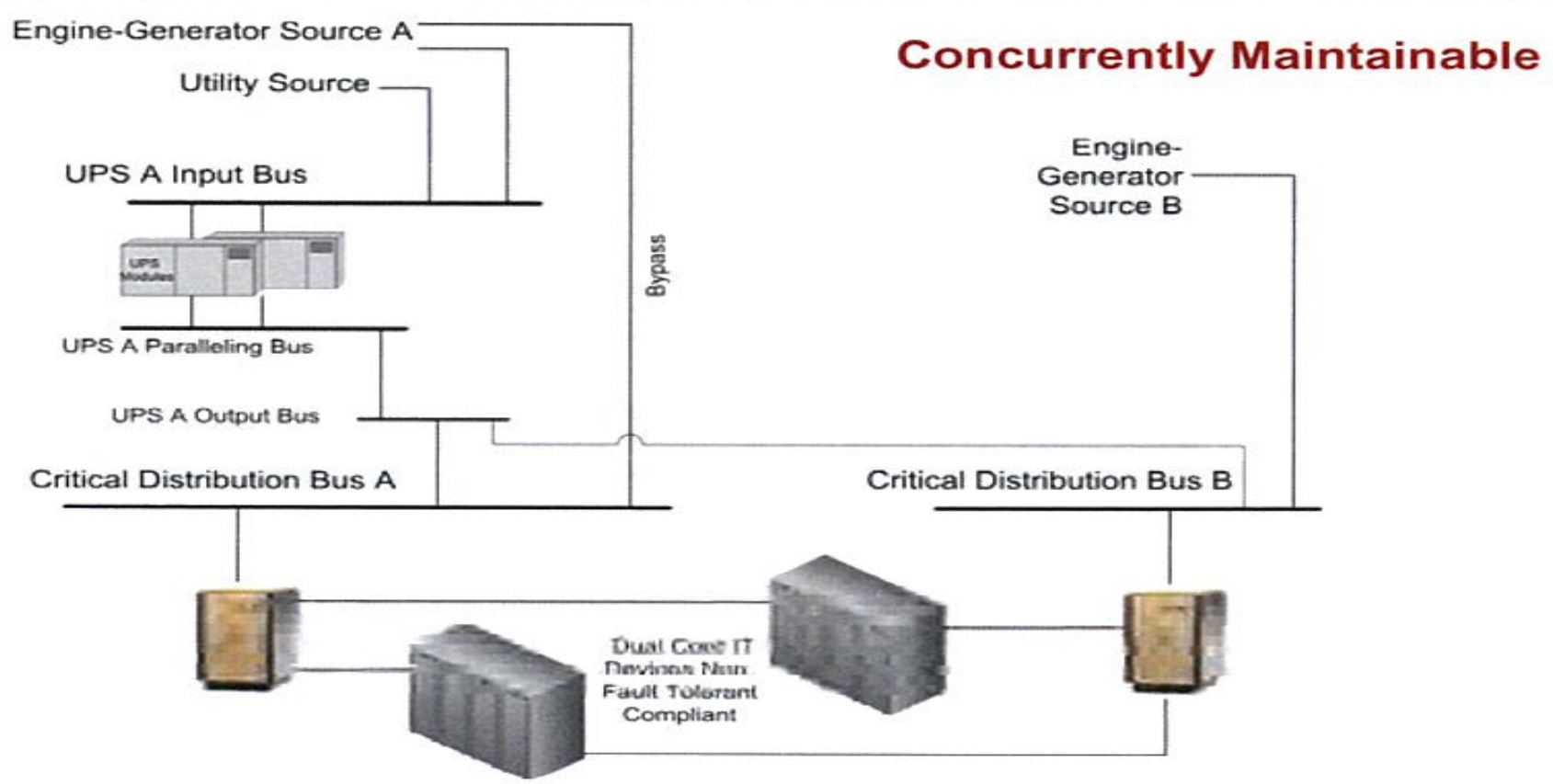
- Redundant capacity components and independent distribution paths
- Maintenance or replacement of each and every distribution and capacity component
- No shutdown for planned equipment work or replacement

- ➢ 單一設備故障或維修保養時，機房資訊系統不需停機
- ➢ 單一另件(管、線、開關...)故障或保養時，機房資訊系統不需停機
- ➢ 非預期性設備或另件故障，可能影響資訊機房正常運作

Tier III: Concurrently Maintainable



Tier III: Concurrently Maintainable



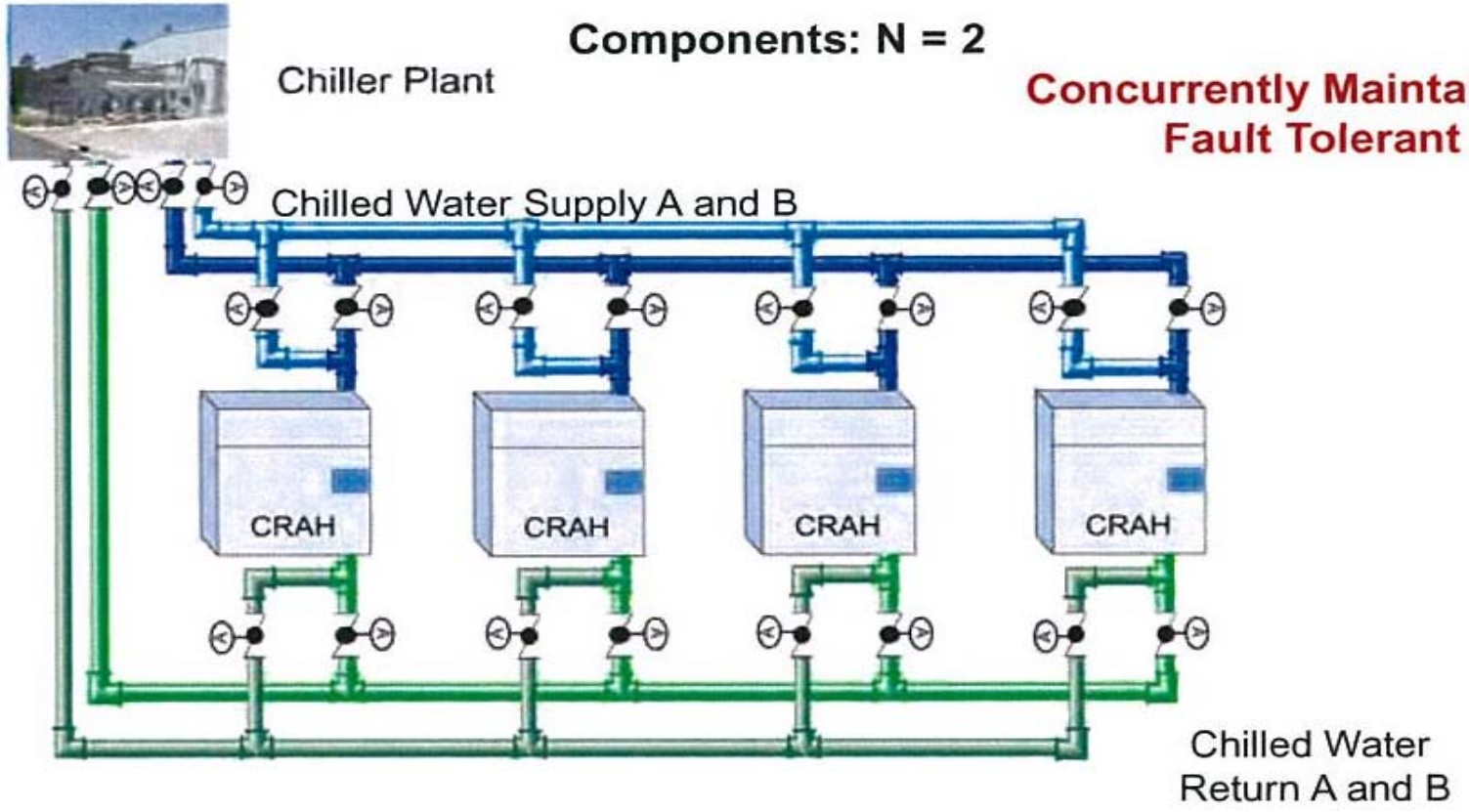
Tier IV: Fault Tolerant

Summary

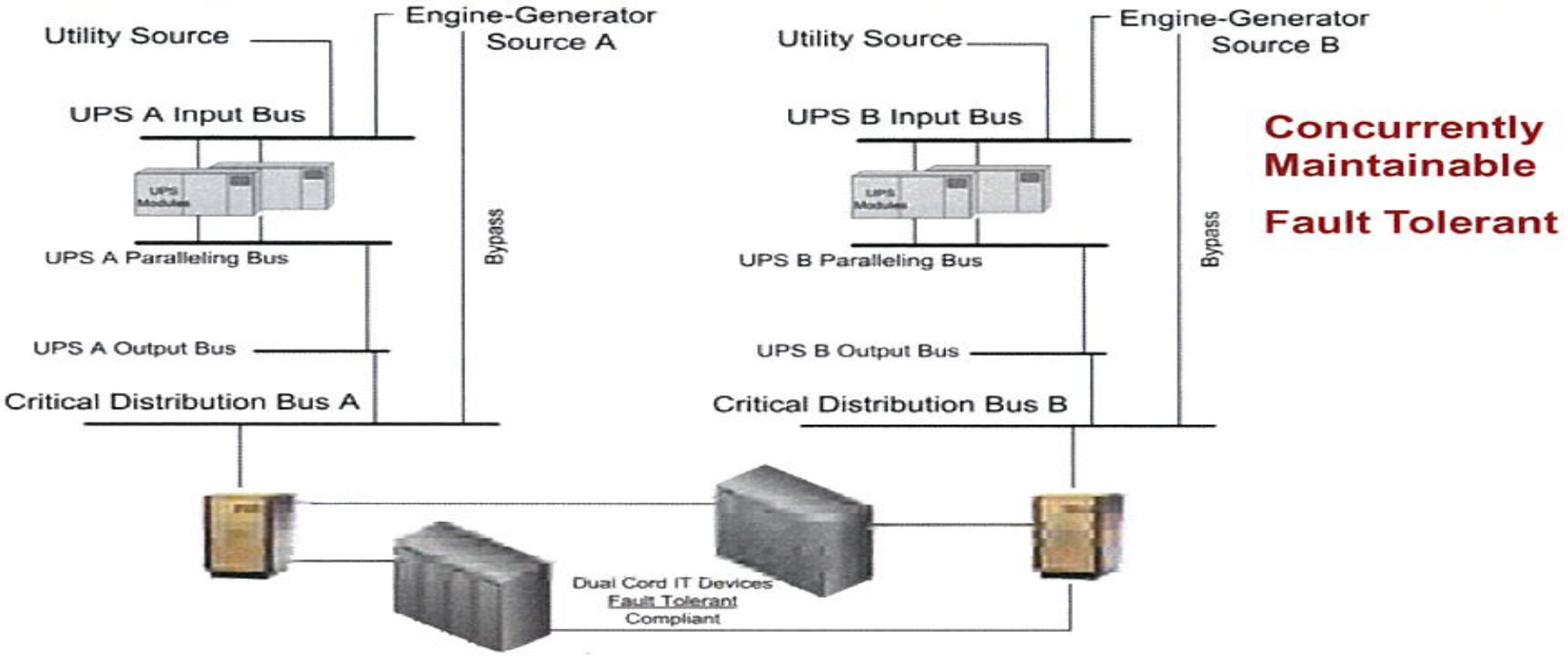
- Redundant, physically isolated (compartmentalization)
  - Redundant capacity components
  - Redundant independent active distribution paths
- Continuous Cooling for critical IT and UPS systems

- ➢ 單一設備故障或維修保養時，機房資訊系統不需停機
- ➢ 單一另件(管、線、開關...)故障或保養時，機房資訊系統不需停機
- ➢ 非預期性設備或另件故障，不會影響資訊機房正常運作

Tier IV: Fault Tolerant



Tier IV: Fault Tolerant



Tier分級表

	Tier I	Tier II	Tier III	Tier IV
支援IT負載的基礎設施設備設計	N	N+1	N+1	當任何設備或另件故障後仍維持N
傳輸路徑	1	1	2 (1條日常運行1條備用)	2 (2條皆為主動運行)
系統運行同時可維護	否	否	是	是
故障容錯	否	否	否	是
基礎設施實體隔間	否	否	否	是
連續製冷	否	否	否	是

節能 綠機房

資料中心能耗指標等級

PUE 值至少須達 1.52 以下方能符合申請 LEED 的基本門檻

$$PUE = \frac{\text{資料中心總耗電}}{\text{IT設備總耗電}}$$

白金級	PUE < 1.25 DCiE >0.8
黃金級	PUE 1.25 ~1.43 DCiE 0.7 ~ 0.8
銀級	PUE 1.43 ~1.67 DCiE 0.6 ~ 0.7
銅級	PUE 1.67 ~2 DCiE 0.5 ~ 0.6
認可	PUE 2 ~ 2.5 DCiE 0.4 ~ 0.5
不認可	PUE >2.5 DCiE <0.4

PUE值 vs. 電費

台灣資料中心
PUE平均值

1.9 / 2.5

認可
PUE 2 ~ 2.5
DCiE 0.4 ~ 0.5

電費節省試算
100kw資料中心
PUE 2 → PUE 1.9

↓ PUE 0.1

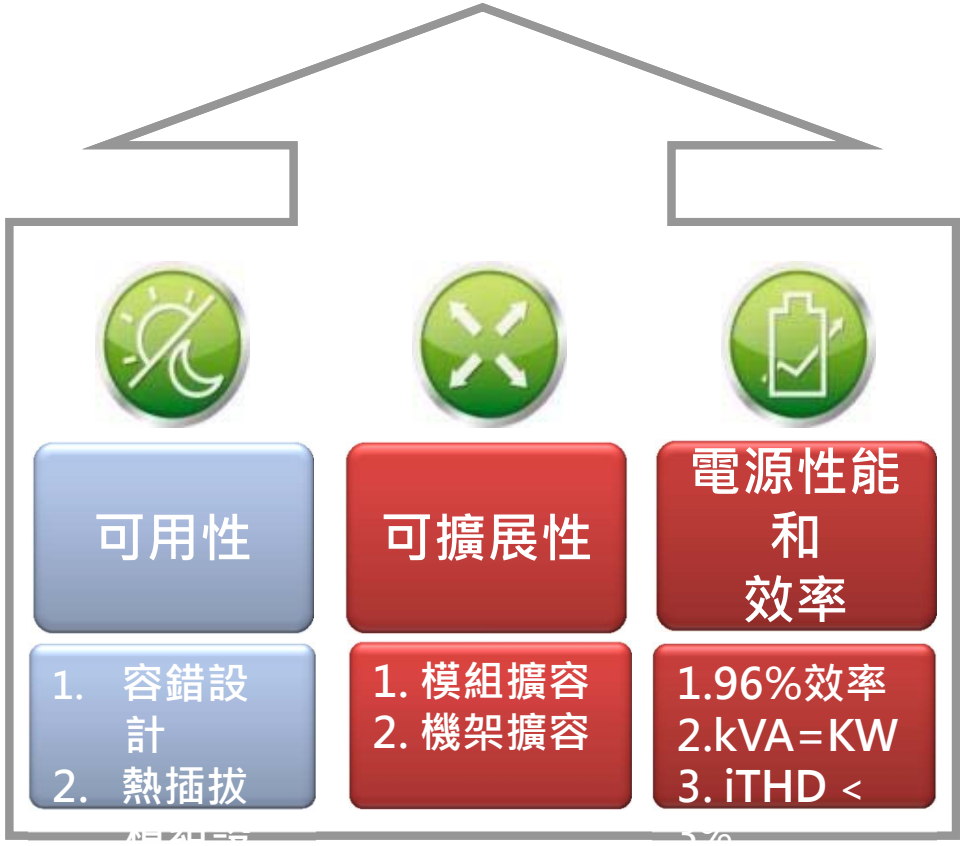
↓電費30萬 / 年

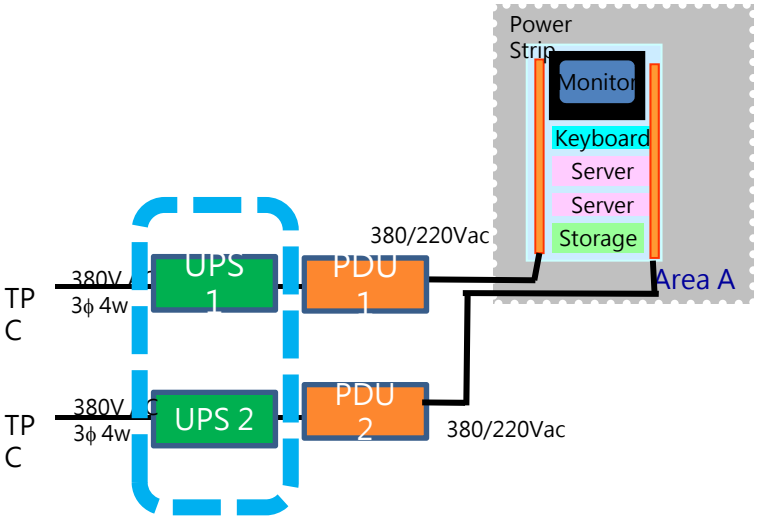
Source: 遠見雜誌&經濟部能源局


從哪省?
Save Money
Ctrl

高效率模組式UPS

最高級別可用性,對效率絕不妥協
符合彈性、快速、容易及節能要求





Product Overview

Modulon DPH is a fully-modular designed UPS ideal for data center

Availability

Ultimate availability to sustain continuity of mission critical operations.

1. ***Fault tolerance design*:** Redundancy for key components
2. ***Hot-swappable modular design:*** Easy maintenance to

Scalability

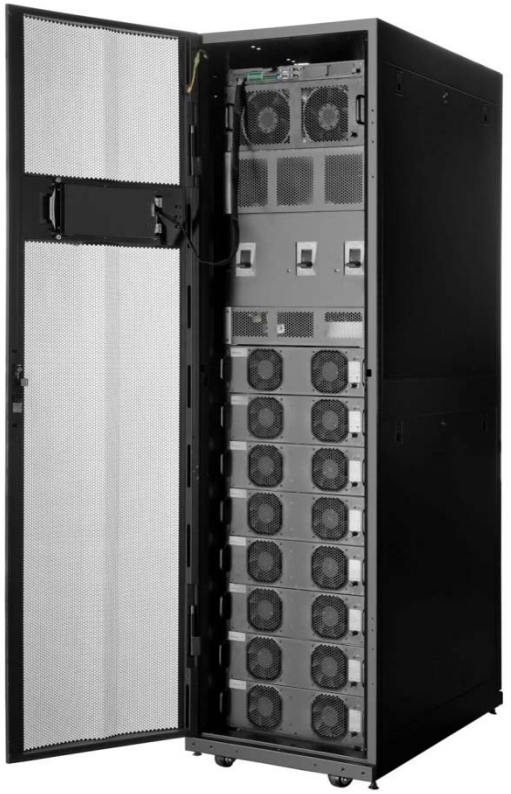
Seamless scale up to meet rapid business expansion.

1. ***Vertical expansion:*** Hot scalable in a rack up to 8 units
2. ***Horizontal expansion:*** Parallel expansion up to 4 units.

Power Performance & Efficiency

Leading power performance and efficiency to lower down operation cost.

1. ***AC-AC Efficiency:*** 96% at full load; 95% at 30% load
2. ***Fully-rated power factor:*** kVA=kW (O/P pf = 1)
2. ***Low iTHD <***

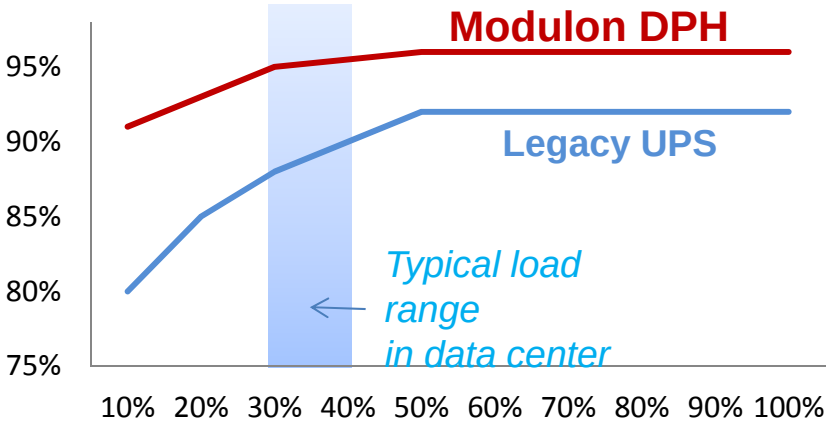


Leading Power Efficiency

High power efficiency across a wide load range results in marked energy cost savings.

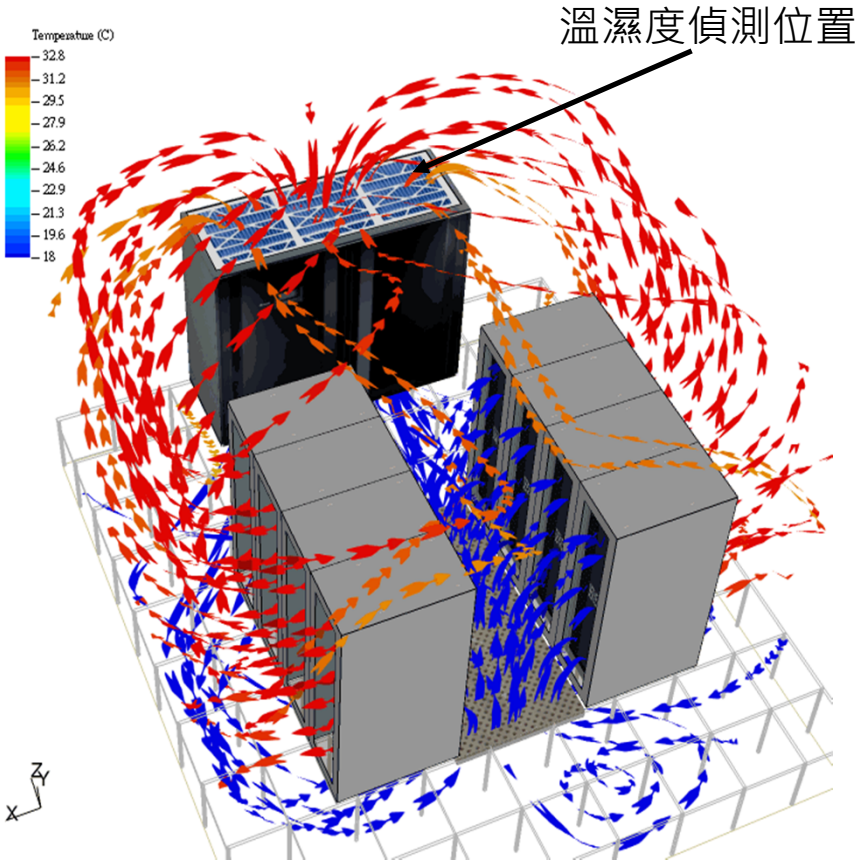
AC-AC Efficiency

- 95% at light load 30%
- 96% at 50% load or above

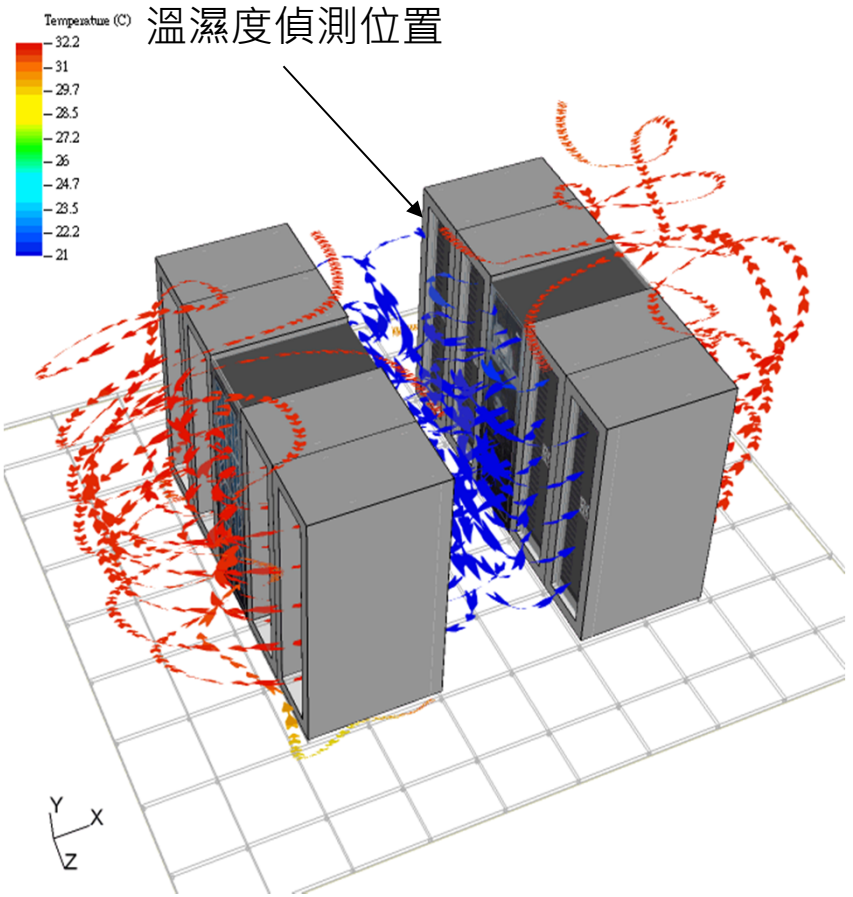


Savings per year =
(1kW/0.96 – 1kW/0.92) x (1+40% additional cooling) x 24 hrs x 365 days x Electricity cost / kWh

機櫃式空調系統



機房級佈置



列間空調

High Efficiency

Energy-saving EC/DC fans

DC Fan

EC Fan

Fan speed can be adjusted based on IT loading.

整體解決方案

高效率模組化 UPS　　機櫃式空調　高通風量機櫃

模組式機房解決方案

- 模組化設計，提高設備使用率
- 氣流管理，提高空調系統效率
  - 冷熱通道、通道封閉
  - 依密度作空間規劃
  - 縮短空調循環路徑
- 調整溫度設定，降低冰水系統能源消耗
- 變頻系統導入，包括冰機系統、冷卻水塔、送水馬達等
- 採用自然冷卻，包括水及空氣自然冷卻方式
- 採用高效率產品

Smarter, Greener, Together