SENTINEL
DATA CENTERS

Overbuilt & Overbought?

Current Trends in Data Center Provisioning

NANOG65 | October 5, 2015 | Montreal, CAN

Comparing Low Resiliency Solutions

Low Resiliency Deployments

Source: Linkis.com/David Chernicoff

Low Resiliency Deployments

Source: Linkis.com/David Chernicoff

Low Resiliency Deployments

A New Product /
A Fundamental Question

N=N ?

Comparing “N”s

2 basic questions regarding the risk of downtime/ failure for any given system:

1. How often?
2. **For how long?**

MTTR is Hugely Impactful to Uptime

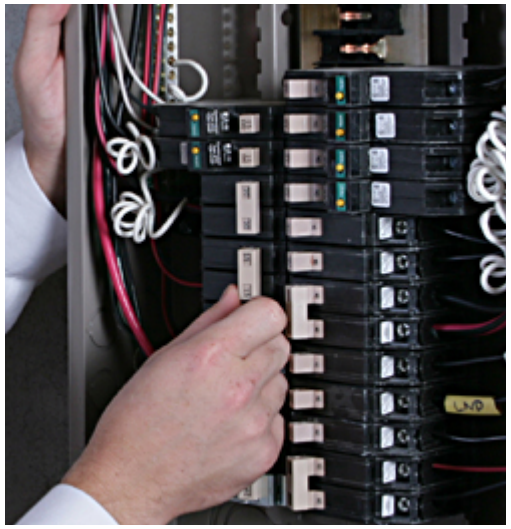
Probability of Unplanned Interruption at Any Time

		MTTR (Days)							
		0.25	0.5	1	2	10	30	60	90
MTBF (Years)	2	0.03%	0.07%	0.14%	0.27%	1.36%	4.03%	7.89%	11.60%
	3	0.02%	0.05%	0.09%	0.18%	0.91%	2.70%	5.33%	7.89%
	4	0.02%	0.03%	0.07%	0.14%	0.68%	2.03%	4.03%	5.98%
	5	0.01%	0.03%	0.05%	0.11%	0.55%	1.63%	3.23%	4.81%
	6	0.01%	0.02%	0.05%	0.09%	0.46%	1.36%	2.70%	4.03%
	7	0.01%	0.02%	0.04%	0.08%	0.39%	1.17%	2.32%	3.46%

Risk w/ Failure of Fast-Repair Items w/ < 1 Day Time To Restore

Risk w/ Failure of Long-Lead Equipment (i.e. X-Former, MV Breaker, Chiller)

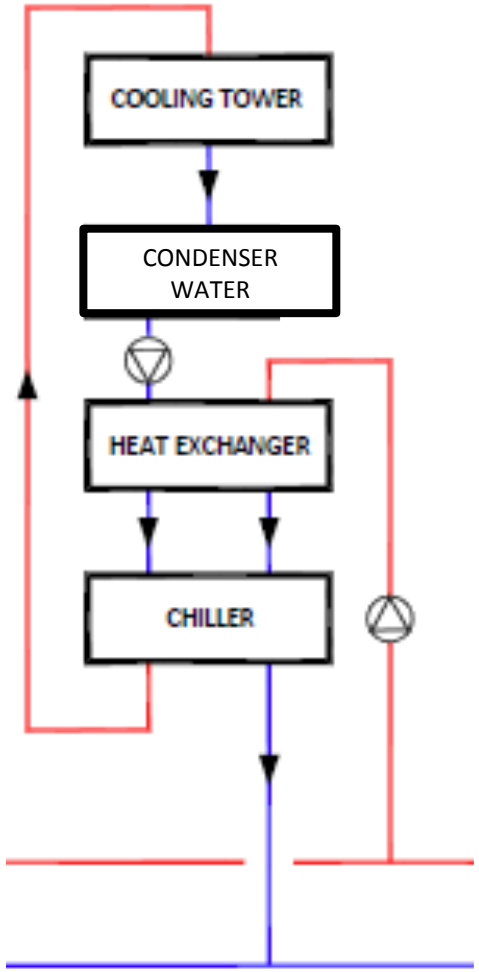
Can MTTR Vary That Much?



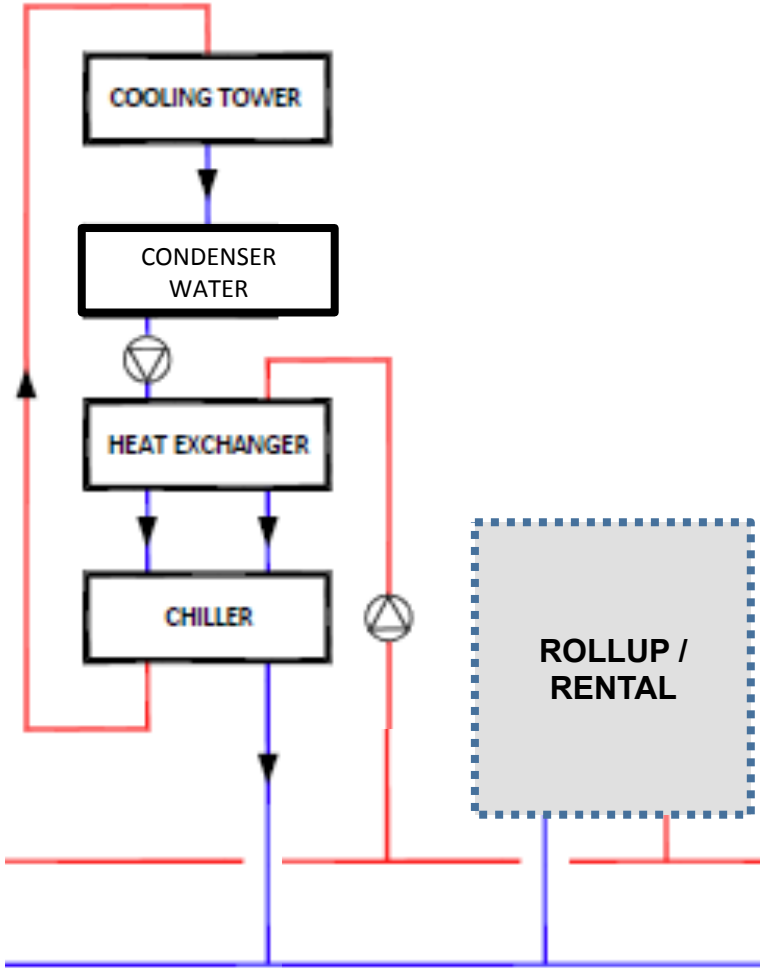
Tools Available

- Equipment Selection
- Spare Parts on Site
- Appropriate Staffing on Site / Operating Culture
- Short-Duration Vendor Response
- Bypass to Utility
- Taps for Rental/Roll-Up
- Selective Redundancy
- Etc.

Vocabulary Pitfalls



“Tier 1”
“N”
Time to Restore Failure = Weeks/Months



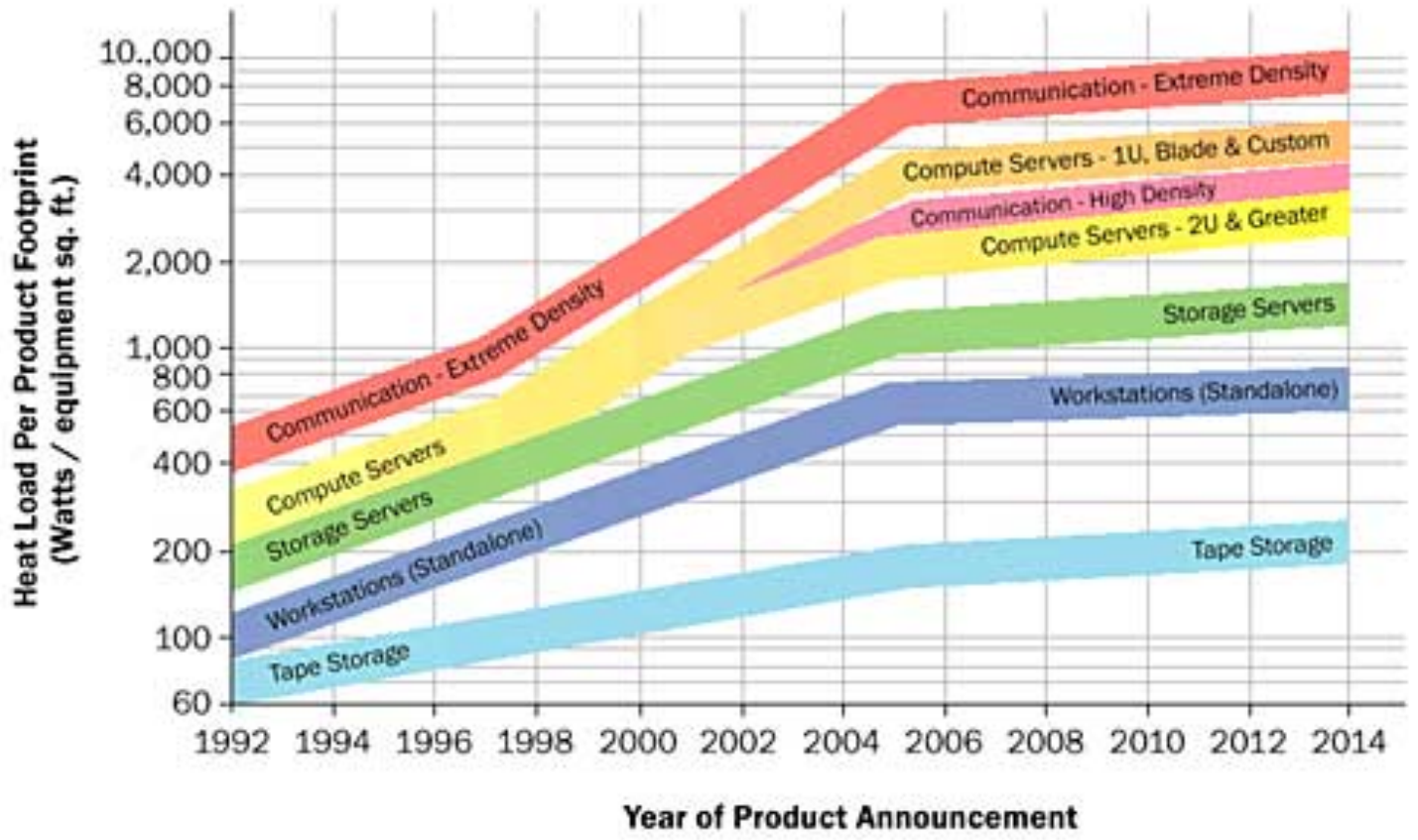
“Tier 1”
“N”
Time to Restore Failure = Days

Key Takeaways

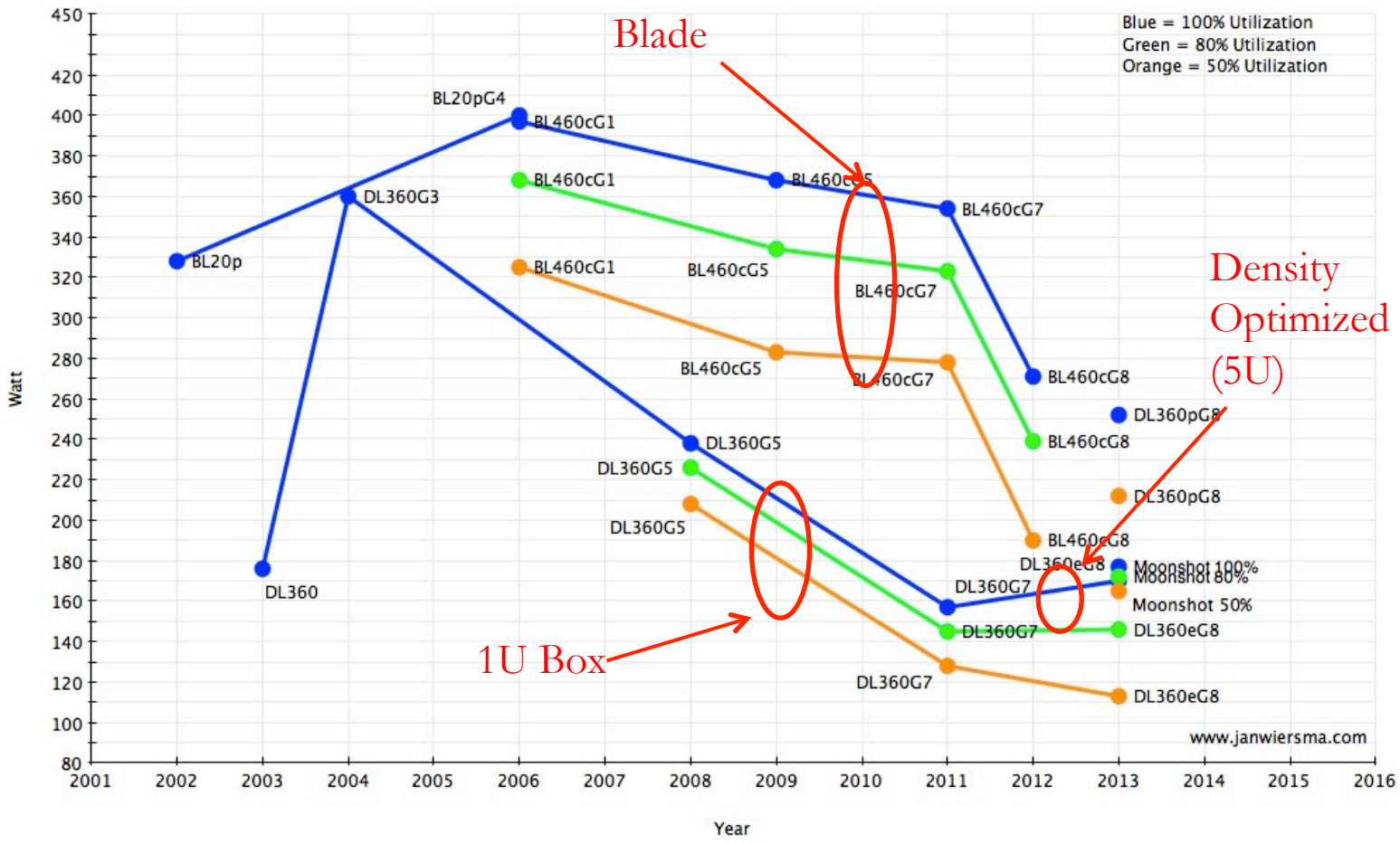
- Low resiliency designs are becoming part of the data center landscape
- Don’t rely on existing vocabulary
- Guide design based on specific tolerances for outage frequency and, more importantly, duration
- Seek low cost ways to improve MTTR performance
- Push facilities teams & providers to think holistically
- Incorporate restoration timeframes into SLAs?

Stranded Density

Conventional Wisdom: 2007

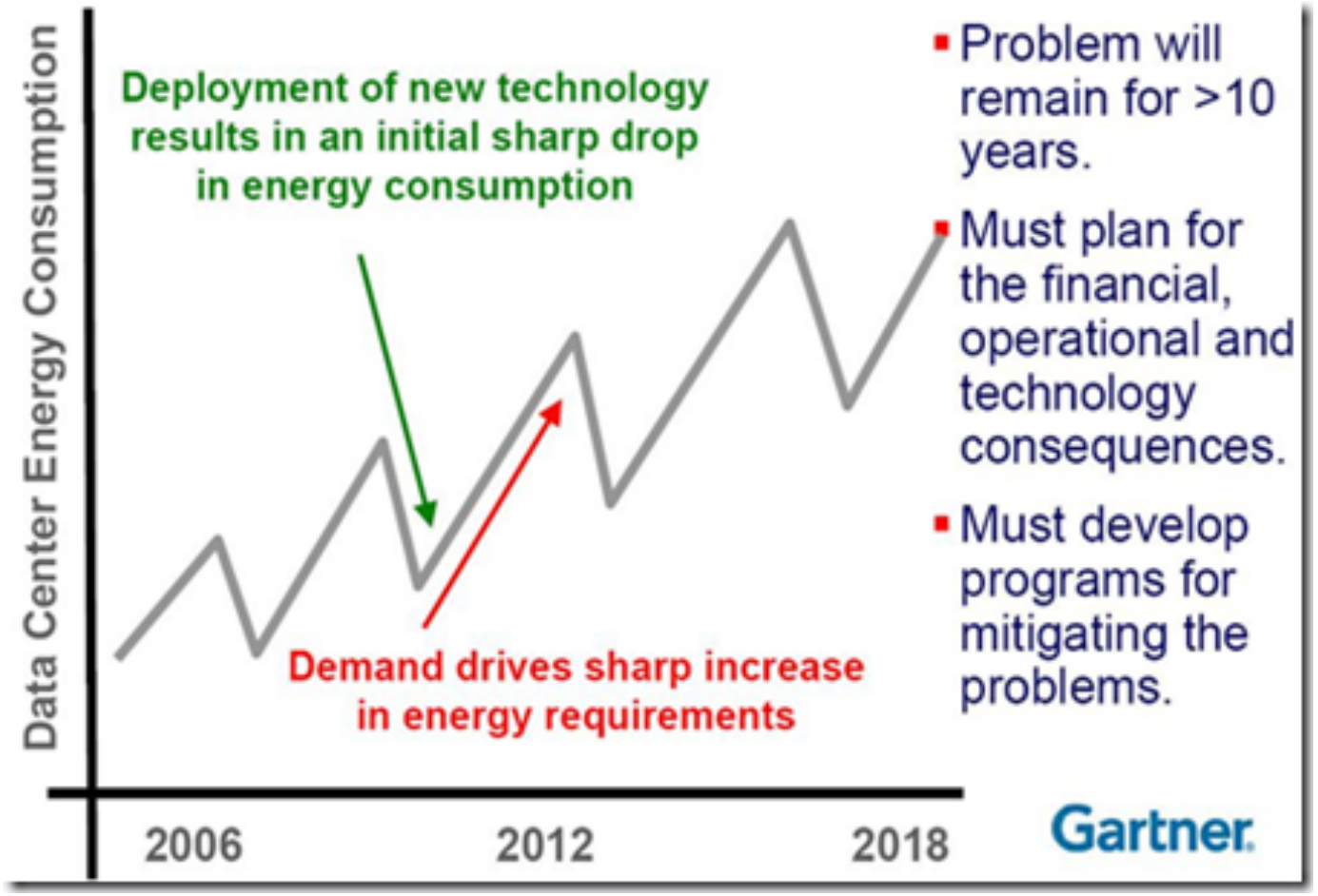


Some Real Data (HP)

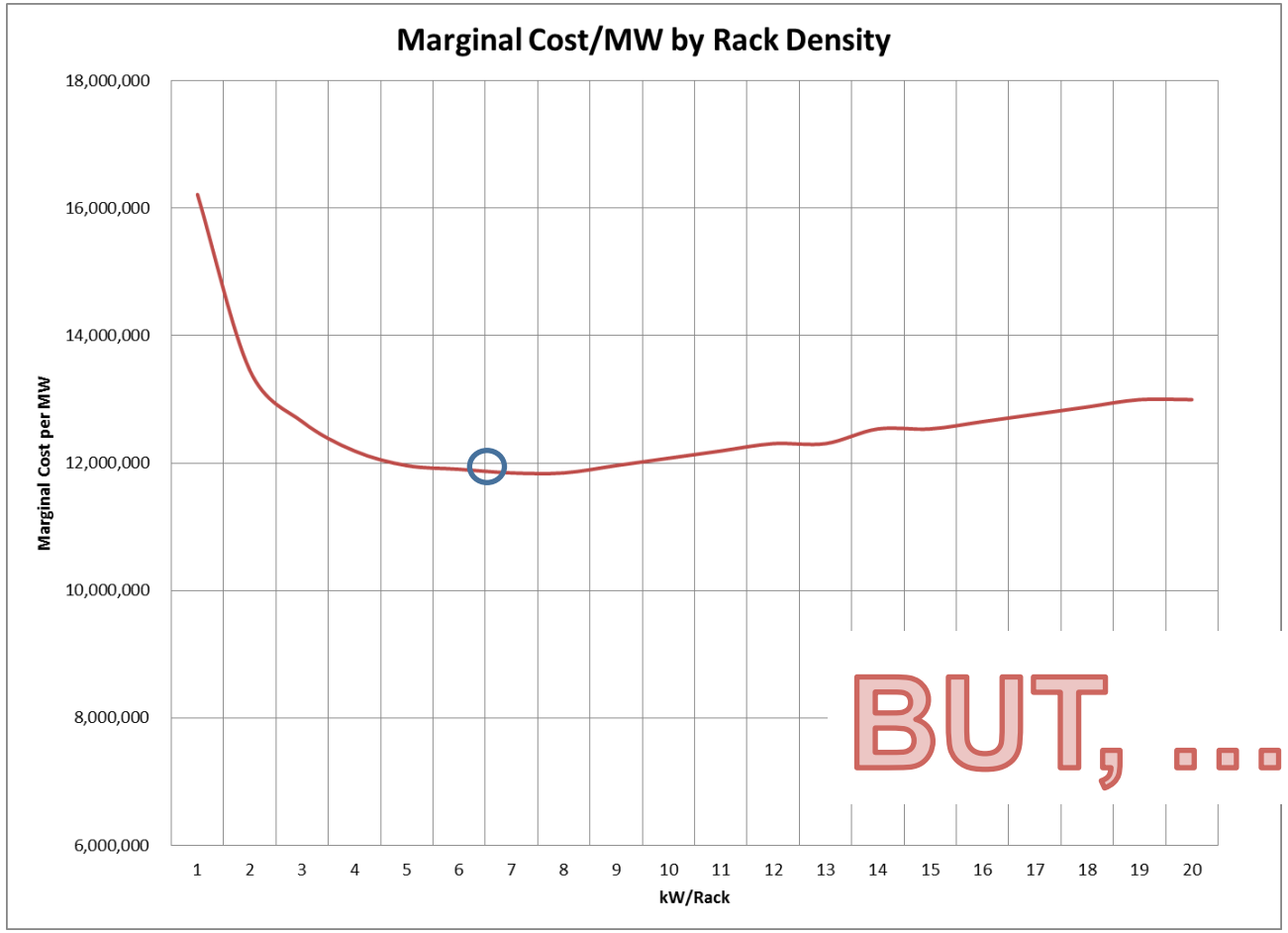


Source: http://datacenterpulse.org/blogs/jan.wiersma/where_rack_density_trend_going

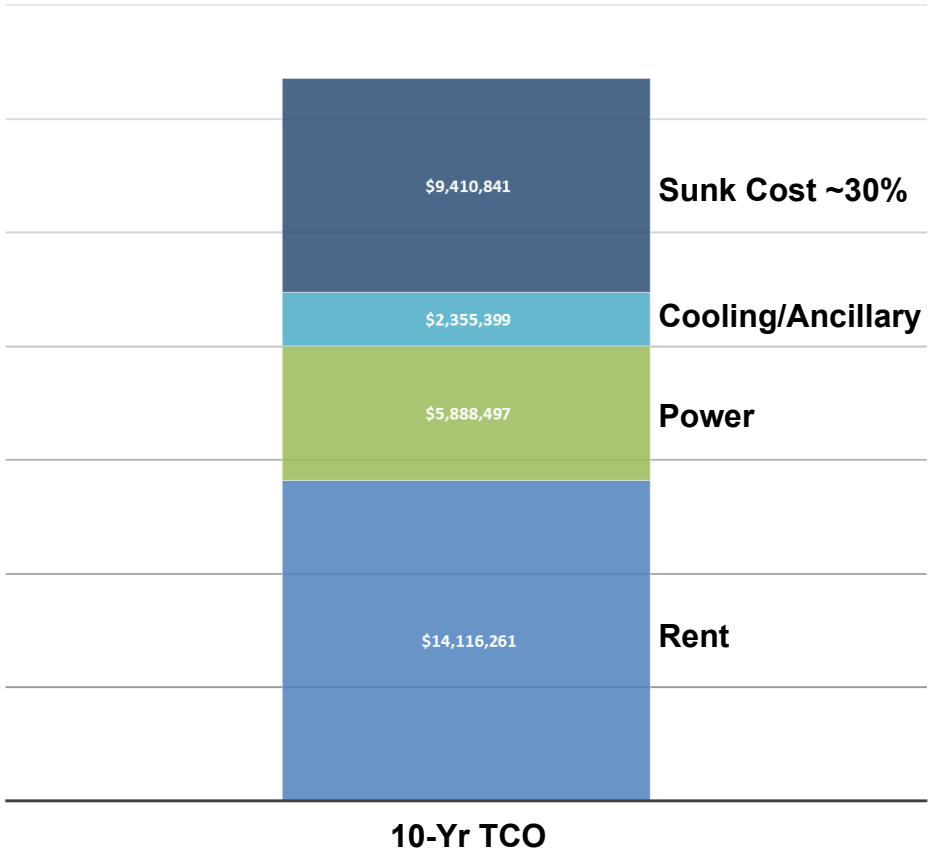
Uncertainty



Density is Cheaper, To a Point

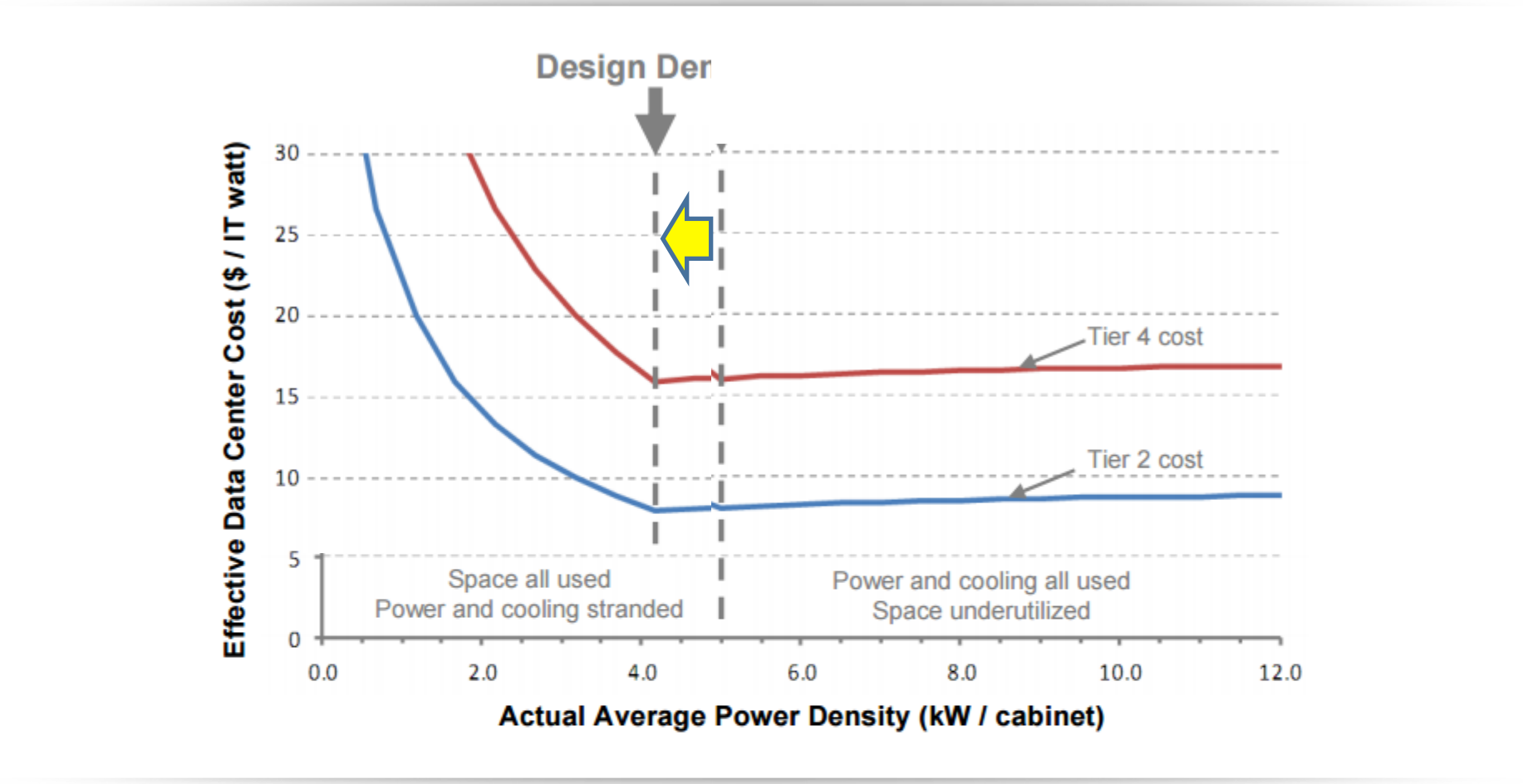


…Stranded Density is Expensive…



1MW TCO at 60% Utilization (Wholesale or Equivalent)

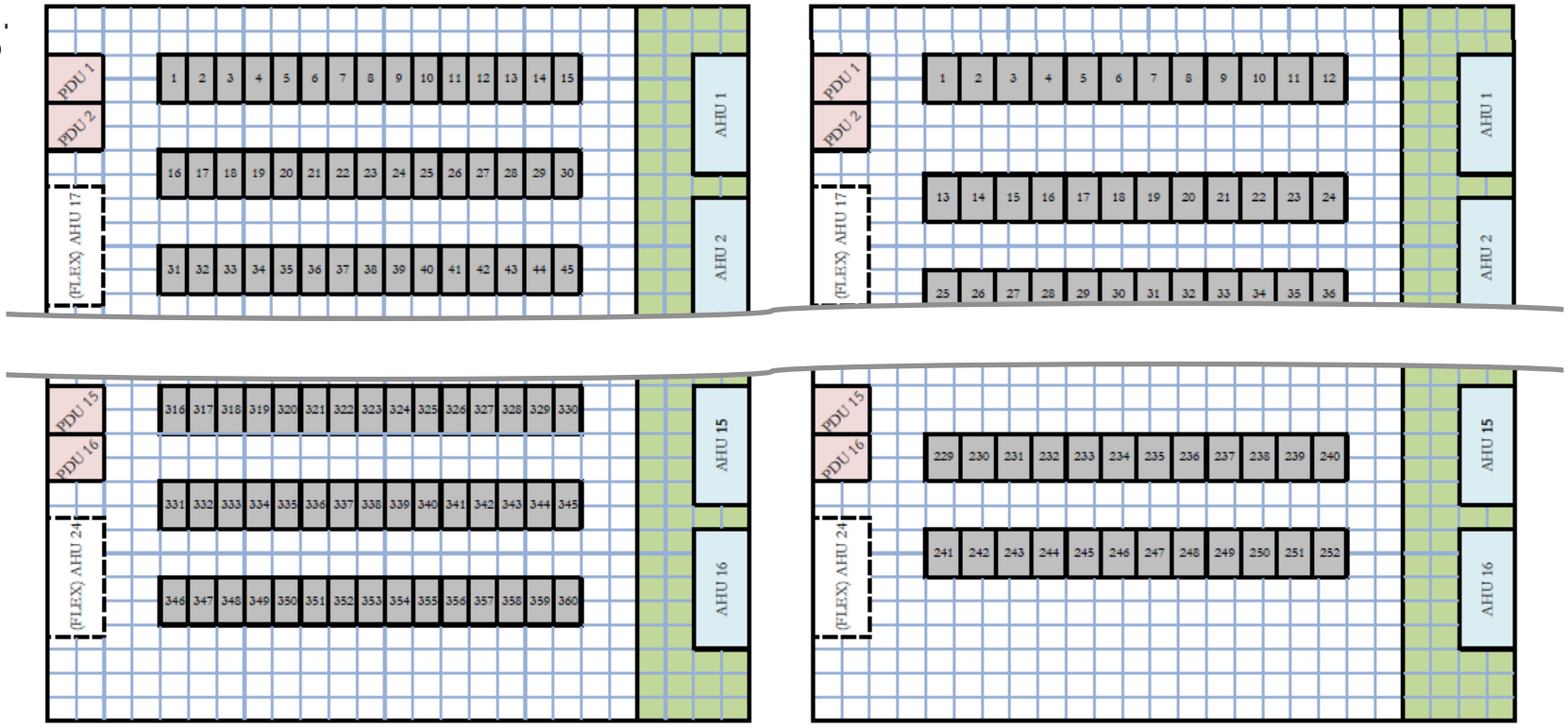
… And Often Matters More



Source: Neil Rasmussen, Schneider Electric

An Aside: Oversized Cabinets/Aisles

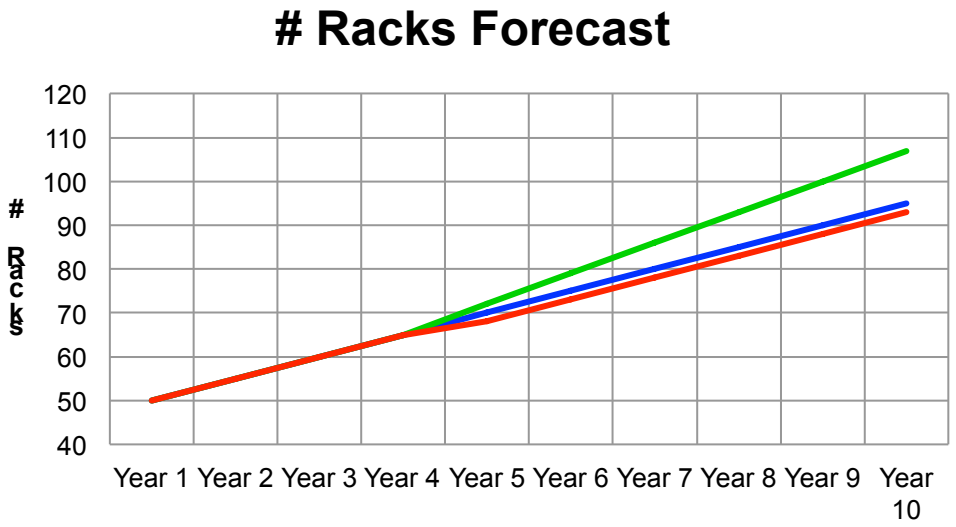
- Use s

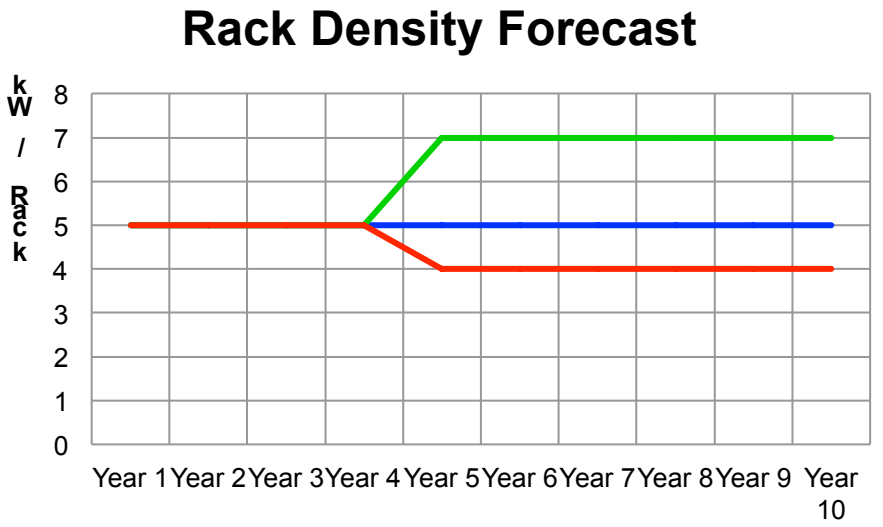


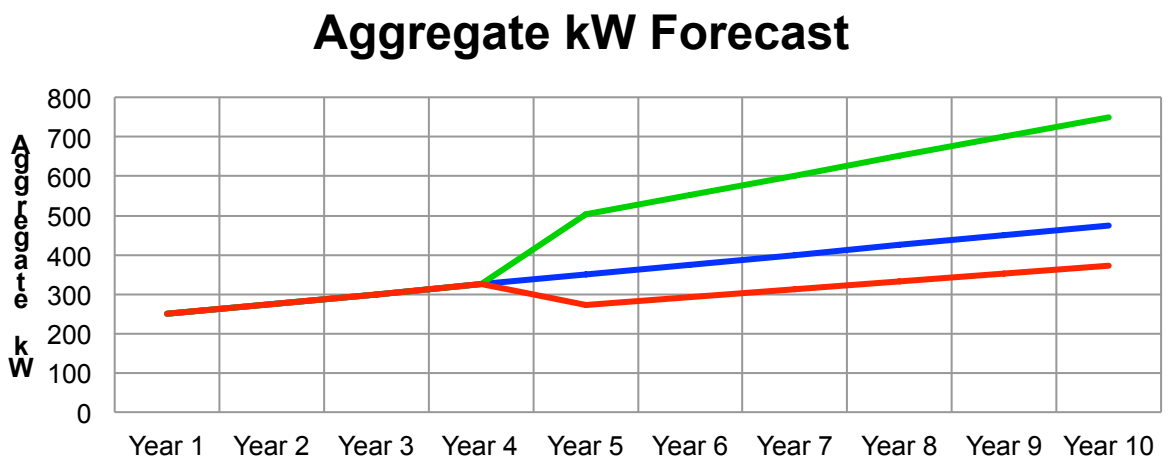
10ksf / 2MW / 200wpsf
5.5kW/Rack

10ksf / 2MW / 200wpsf
8.3kW/Rack

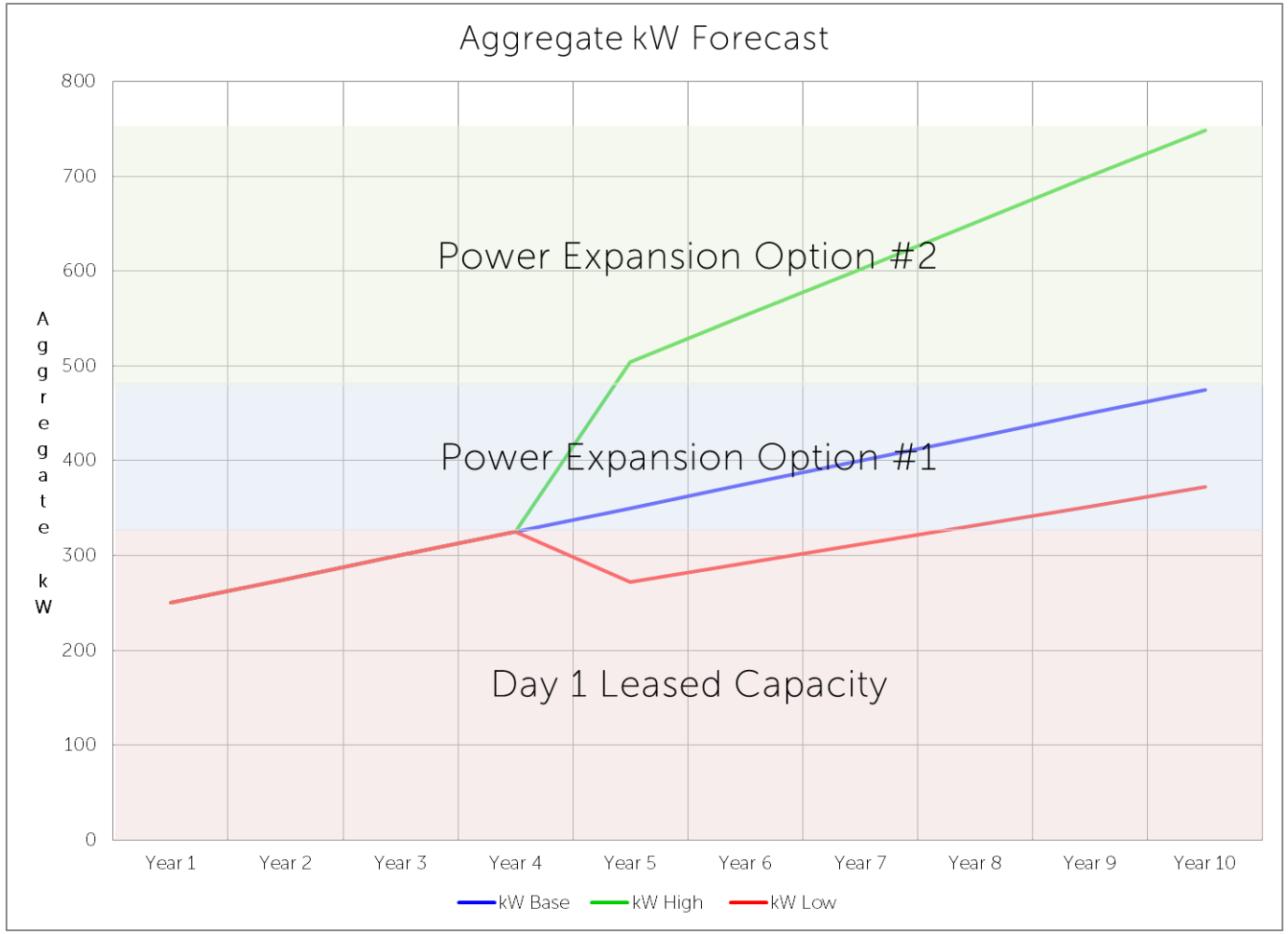
Procurement in Context of Uncertainty



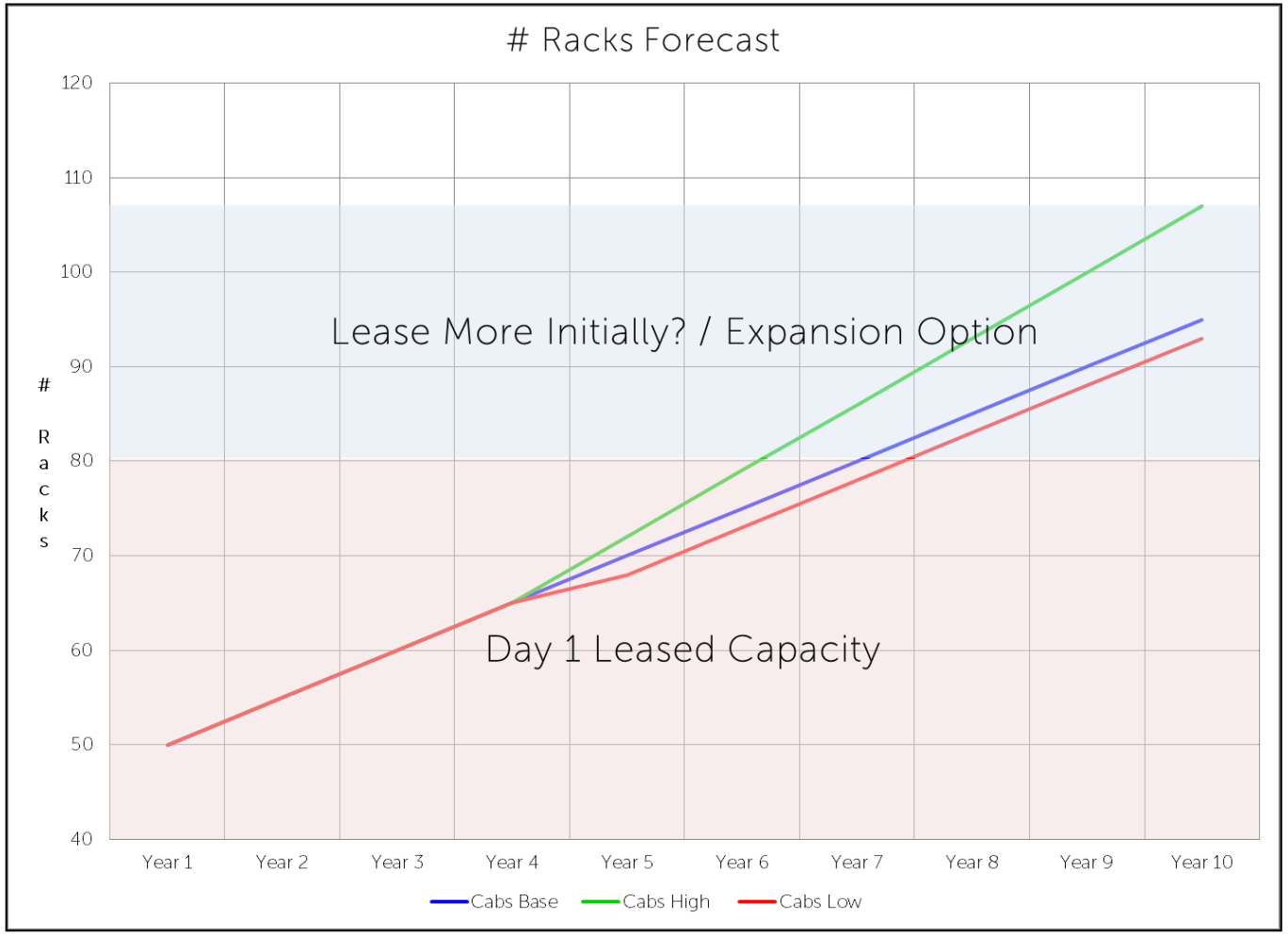




Buy for Lowest Power Capacity / Structure Options



If Inexpensive, Consider More Space



Key Takeaways

- Uncertainty regarding load growth remains high
- Stranded power can dominate all other variables
- Model power demand sensitivities in detail
- Err on the side of lower density – failure costs less!
- Seek providers that can provide optionality on power and understand that space is cheap!
- Don’t let the NANOG guys buy the cabinets!!!

THANK YOU

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SENTINEL DATA CENTERS

Panel Discussion

- Josh Rabina, Co-President, Sentinel Data Centers
- Todd Schreiber, Director of Data Center Strategy, Architecture, and Software, Bloomberg LP,
- Jason van Gaal, CEO of ROOT Data Center
- Don Beaty, Founder of DLB Associates

IT in Quebec

NANOG 2015, Montreal

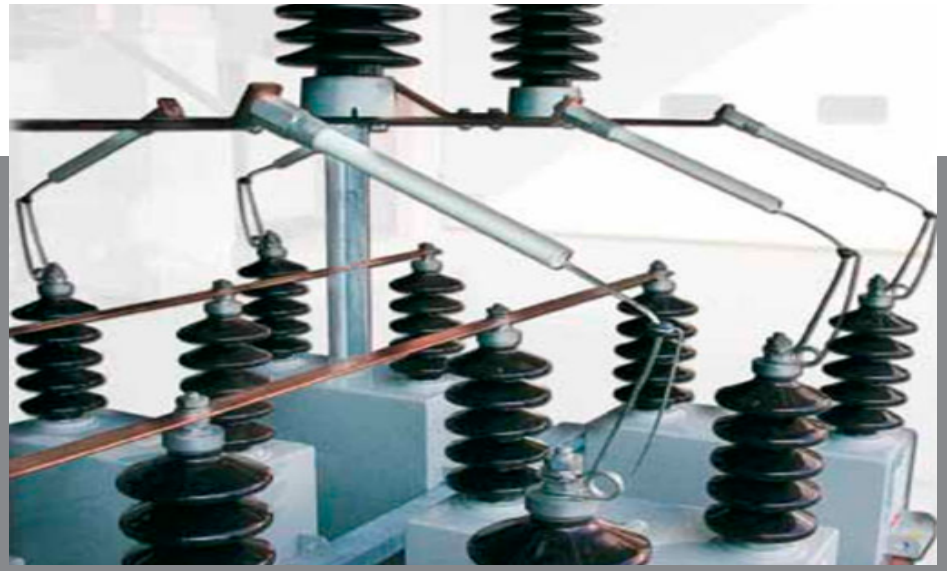
Octobre 5, 2015

2012 – 2015 :

- *Increase in US based companies DC build;*
- *Available power;*
- *Utility and government awareness*
- *Connectivity growth*
- *Larger Data Centre being built*

Subjects

- Quebec’s Attributes
- Fibre Connectivity
- Geographical Possibilities & Weather
- Political Situation
- Montreal – Drummundville - Bromont
- Questions



Quebec's Attributes

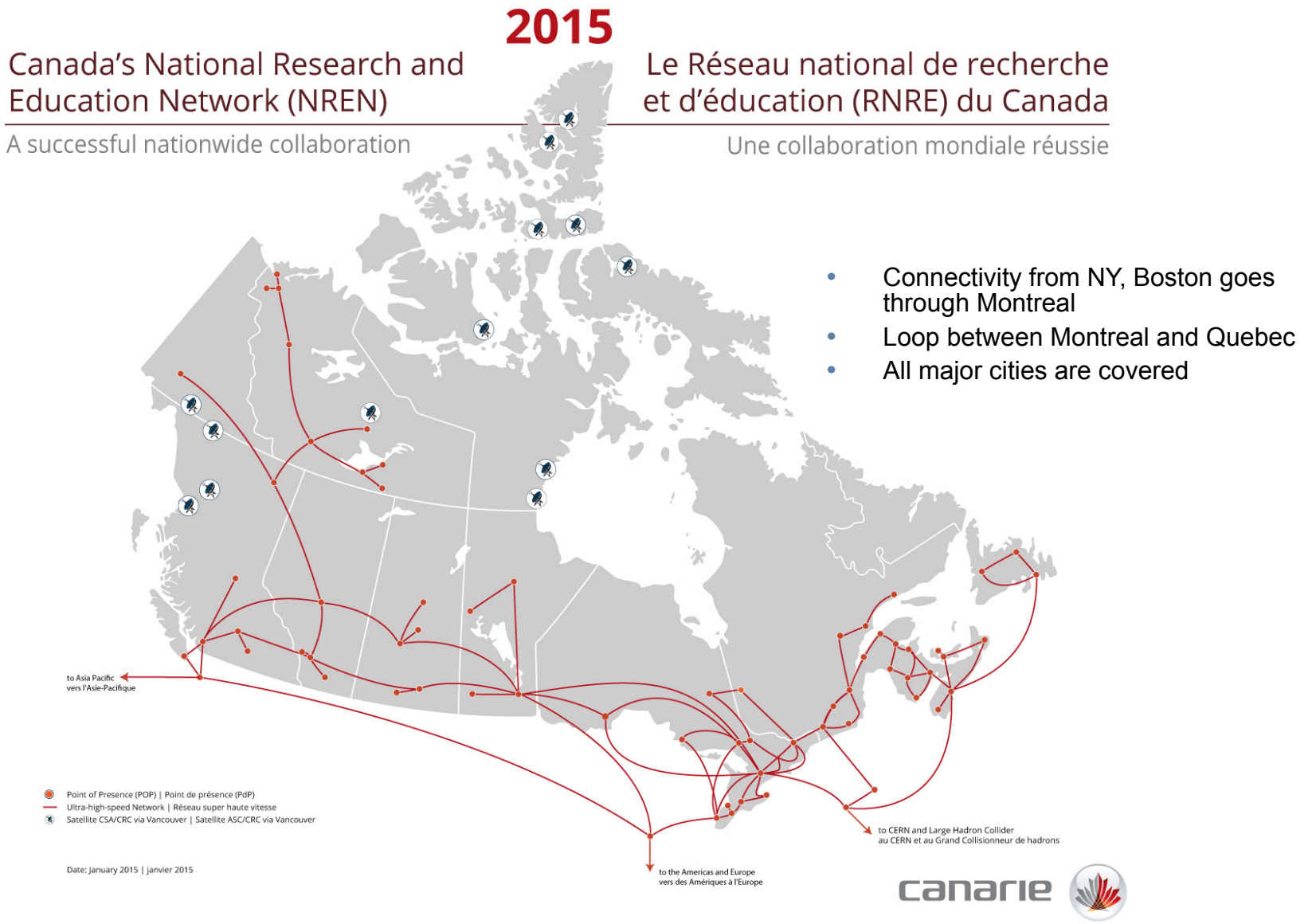
Quebec's Attributes

- Utility Power
  - 36 643 MW of available clean and renewable power. 99% comes from hydro-electrical production for a population of 8.21 M. 1000 MW of over production available. (In comparison, New-England has 31 000 MW of power 78% of which comes from Natural Gas and Nuclear* , pop. 14.5 M)
- IT Business Centres
  - Greater Montreal Area;
  - Quebec;
  - Drummundville
- Major Hub
  - Downtown Montreal
  - Direct International Connectivity through certain providers (i.e. TATA communications)
- Business Bilingual

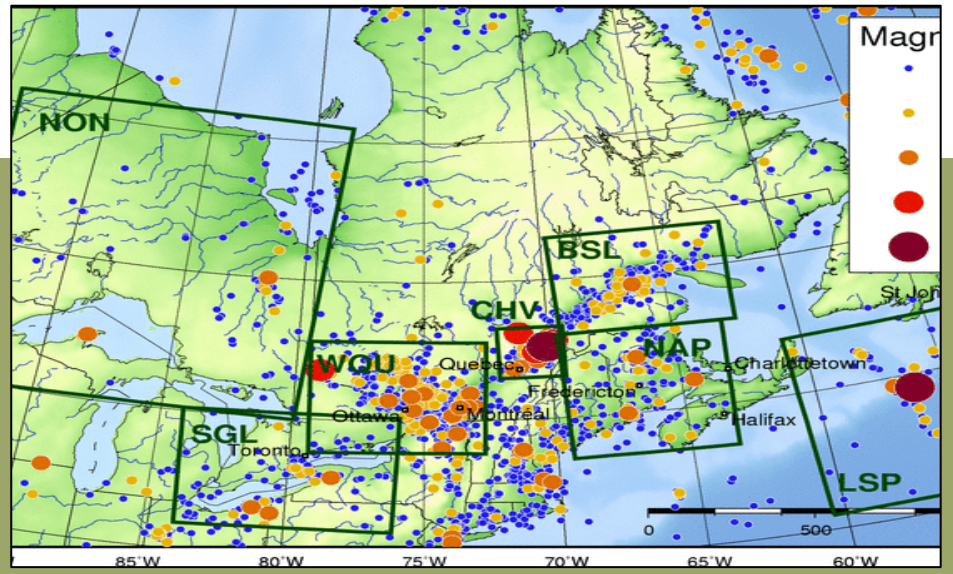
* Source : ISO New England - New England Power Grid 2014–2015 Profile

Fibre Connectivity

Fibre Connectivity



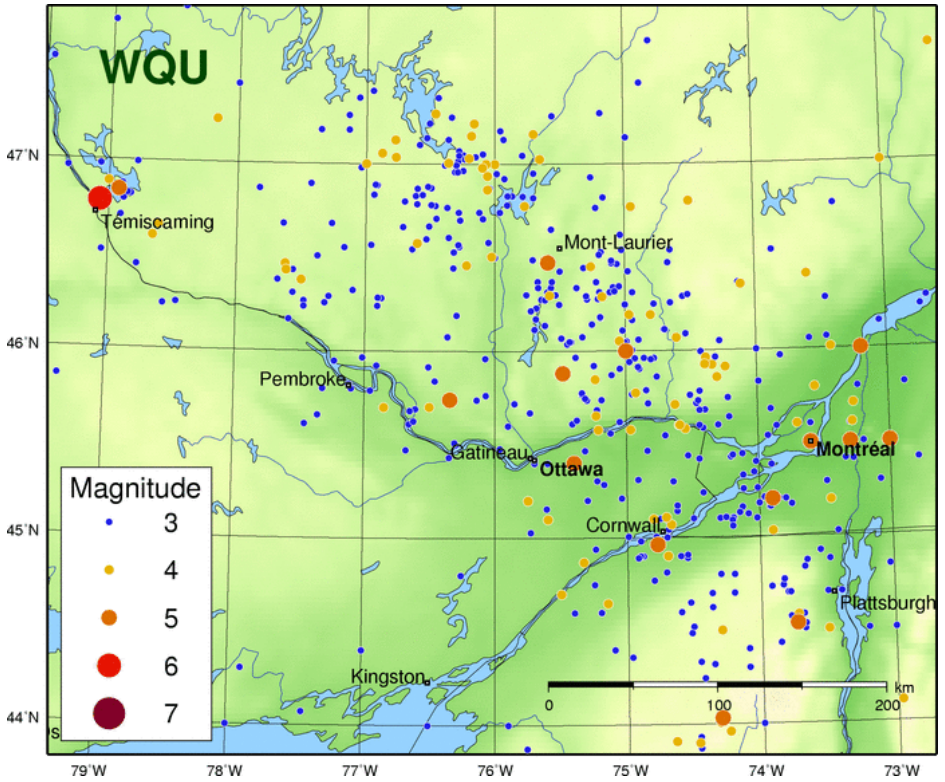
- Connectivity from NY, Boston goes through Montreal
- Loop between Montreal and Quebec
- All major cities are covered

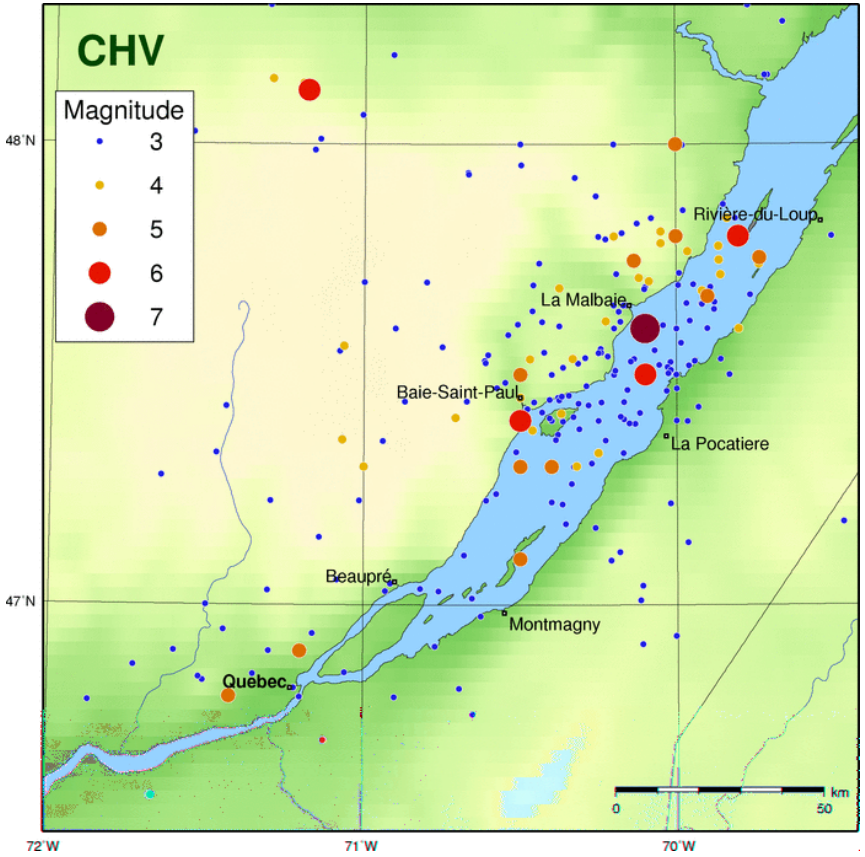


Geographical & Weather

Geographical Situation

- Historical Seismic Zones
  - Which region is affected by earthquake.
  - Over the years and earthquakes were registered and zones affected were compiled.

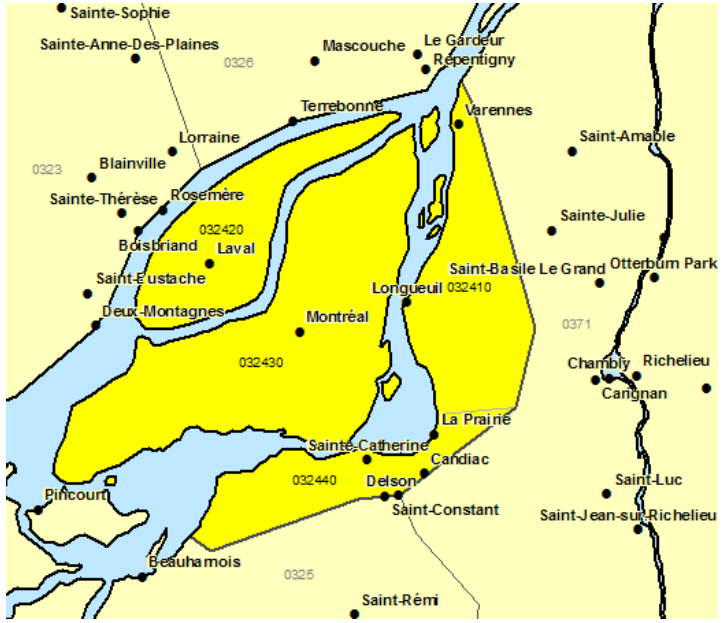


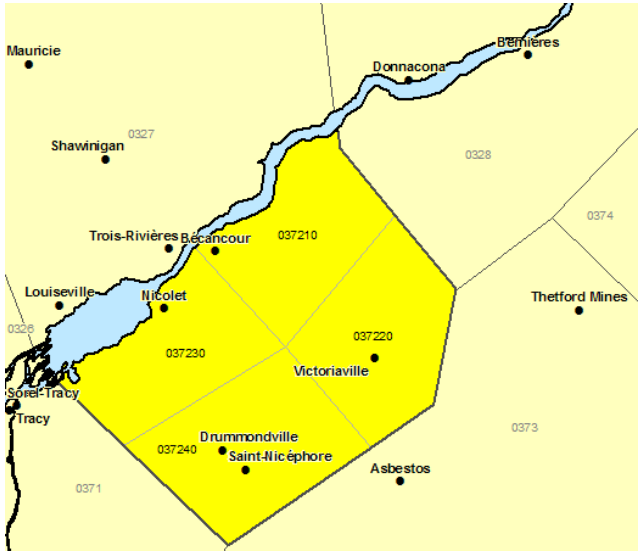


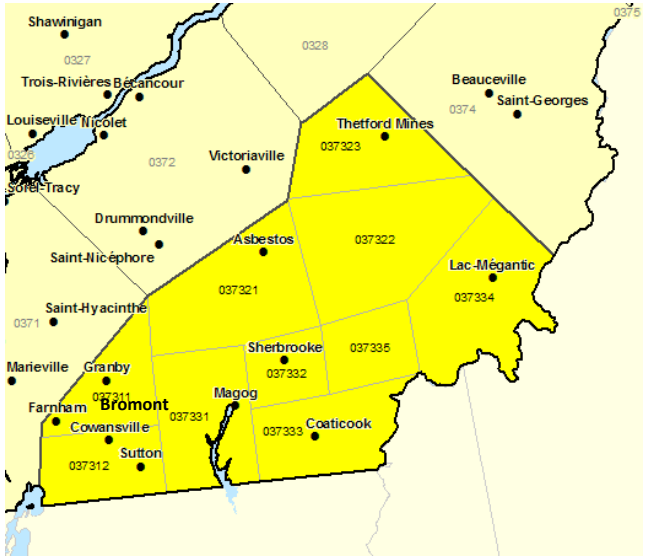
Weather Situation

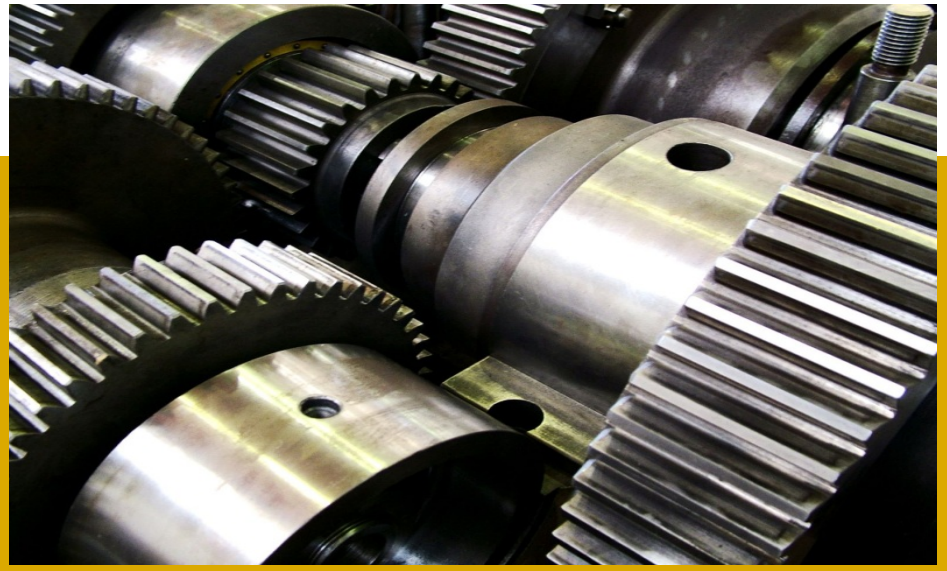
- Wide areas
- Different topologies from one region to another
- Not same weather pattern. (i.e. Ice Storm 1998, winter 2008, etc.)

Weather Situation









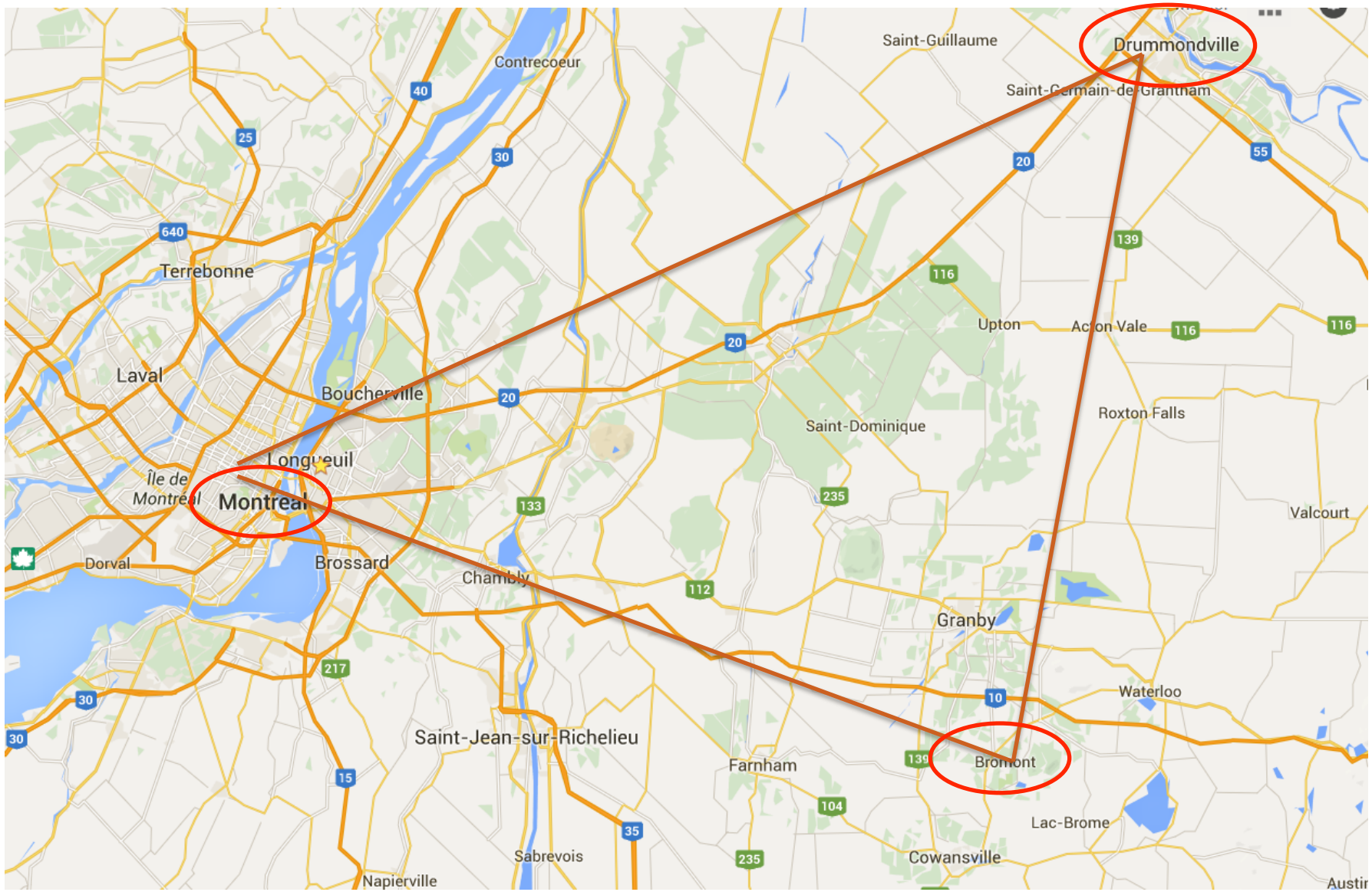
Political Situation

Political Situation

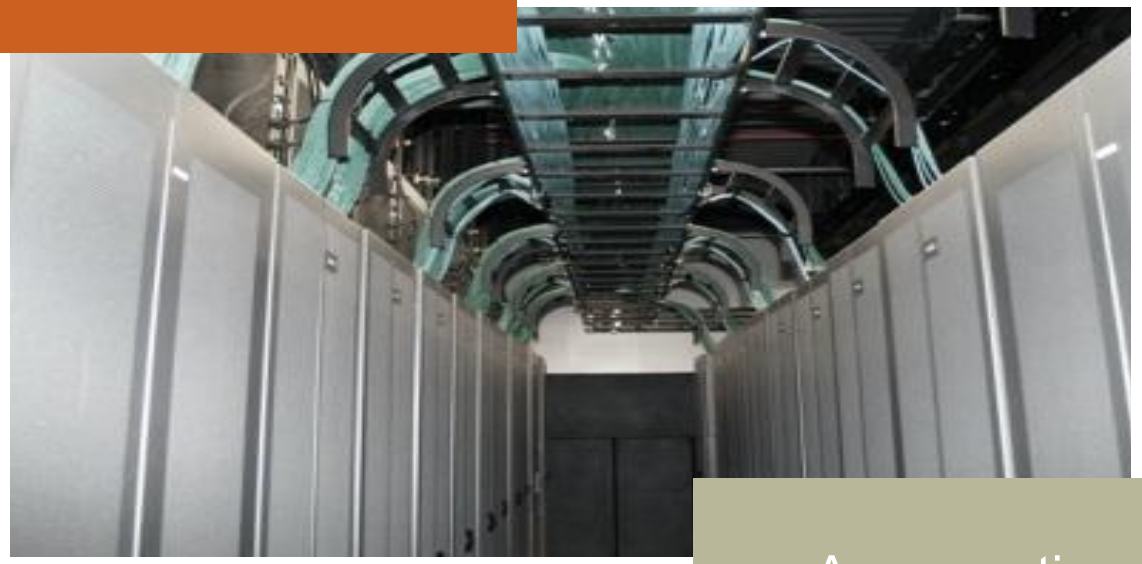
- Privacy
  - Rigourus Federal and Provincial laws protecting data
- Possible Hydro-Québec's grant if demand higher than 5MW (up to 20% credit on electric bill)
- Provincial Tax Incentive if investment 200M$ and above
- Strong technological economy

Location-Location-Location!!!

Location…


Saint-Guillaume
Drummondville
Contrecoeur
Saint-Germain-de-Grantham
Terrebonne
Upton
Acton Vale
Laval
Boucherville
Roxton Falls
Saint-Dominique
Longueuil
Île de Montréal
Montreal
Valcourt
Dorval
Brossard
Chambly
Granby
Waterloo
Saint-Jean-sur-Richelieu
Farnham
Bromont
Lac-Brome
Sabrevois
Cowansville
Napierville

Thanks for your attention



Any questions?

Data Center Efficiency for Computing Leaders

A Practical Approach

ROOT

Focus

Design

Build

Operate

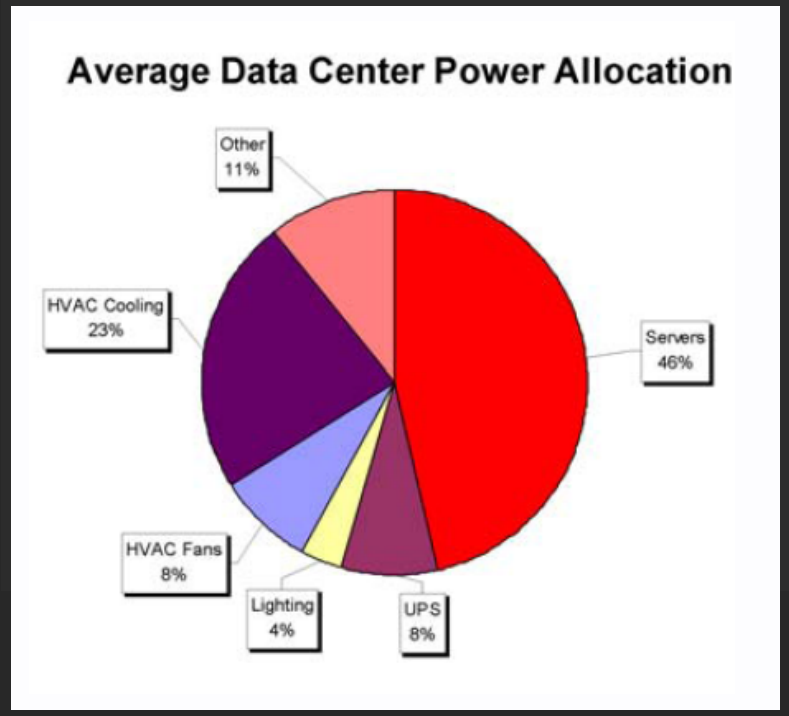
Focus

Design

Build

Operate

The Baseline



Historically only 48% of power entering a DC is consumed by servers.

The rest is wasted by inefficient mechanical and electrical systems

Step 1:
Make Sure Its F’ing Cold!! (Outside)

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- Common sense dictates the colder and dryer the climate the more free cooling hours you can achieve

Step 2:
Eliminate Waste

- ✘ wasteful Chilled Water
- ✘ fluid based heat transfer systems

Step 2: Eliminate Waste

DS, DX and Chilled Water Systems each have three heat exchangers

- Inefficiency in heat exchangers reduces free cooling threshold by 3-5ºC at each stage.

Step 2: Eliminate Waste

Example:
At ASHRAE TC 9.9 Standard Air Supply

Typical CW systems	Free cooling at 5ºC or less.
The most efficient CW systems	Free cooling at 15ºC.
Air-to-air heat exchangers	Free cooling achievable anywhere below 23ºC.

Single heat exchanger!

Step 3:
Keep It Tight

Keep the mixing outside of the data center!

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Traditional hot/cold aisle configuration:
AC supply to rack

Measured temperature differential:
5-10ºC

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Hot aisle containment
Rigid adherence to rack airflow management +
Flooded room design

→ Measured temperature differential:
0.2-0.3ºC in the worst location

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Adhere to ASHRAE Thermal Guidelines
at all points of Data Center

→ Annual free cooling hours:
Increase by 20-30%

Step 3: Keep It Tight

Keep the mixing outside of the data center!

Added Benefits

- ✓ No raised floor = No dust, debris, fire hazards and loading restrictions
- ✓ Allow for high density cooling of 35-40kW/rack

Hot aisle containment
Rigid adherence to rack airflow management + Flooded room design

→ Measured temperature differential: **0.2-0.3ºC** in the worst location

Adhere to ASHRAE Thermal Guidelines
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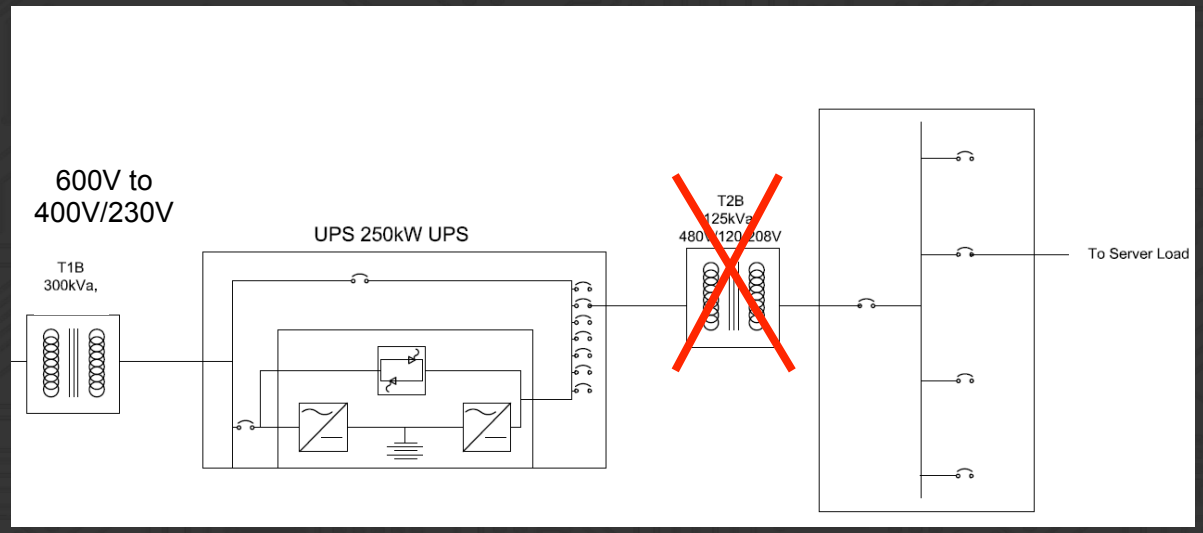
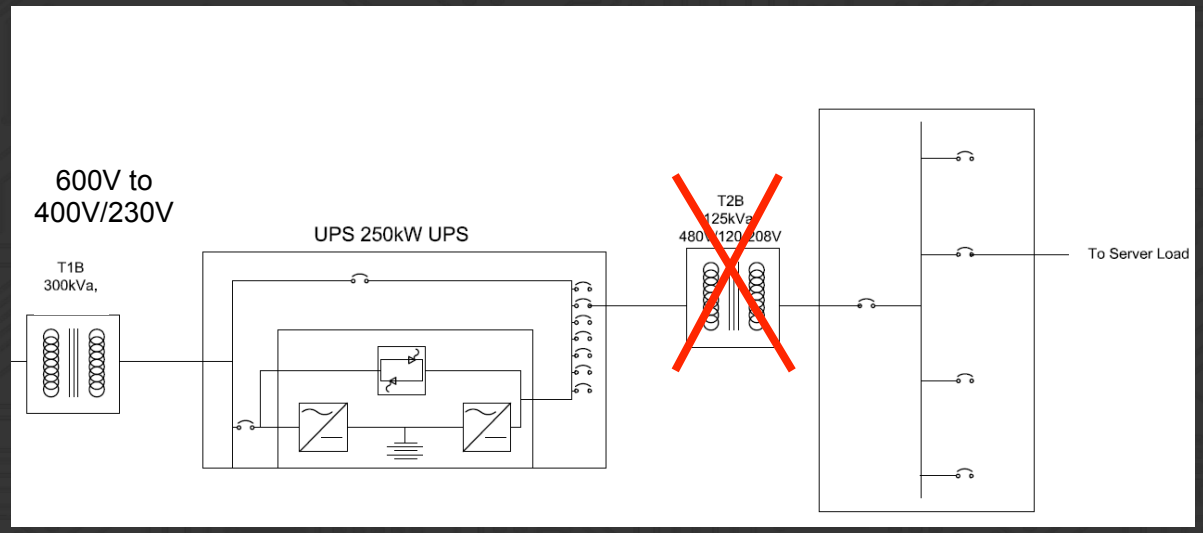
Step 4:
Up the Base (Voltage)!



Step 4:
Up the Base (Voltage)!



Added Benefits

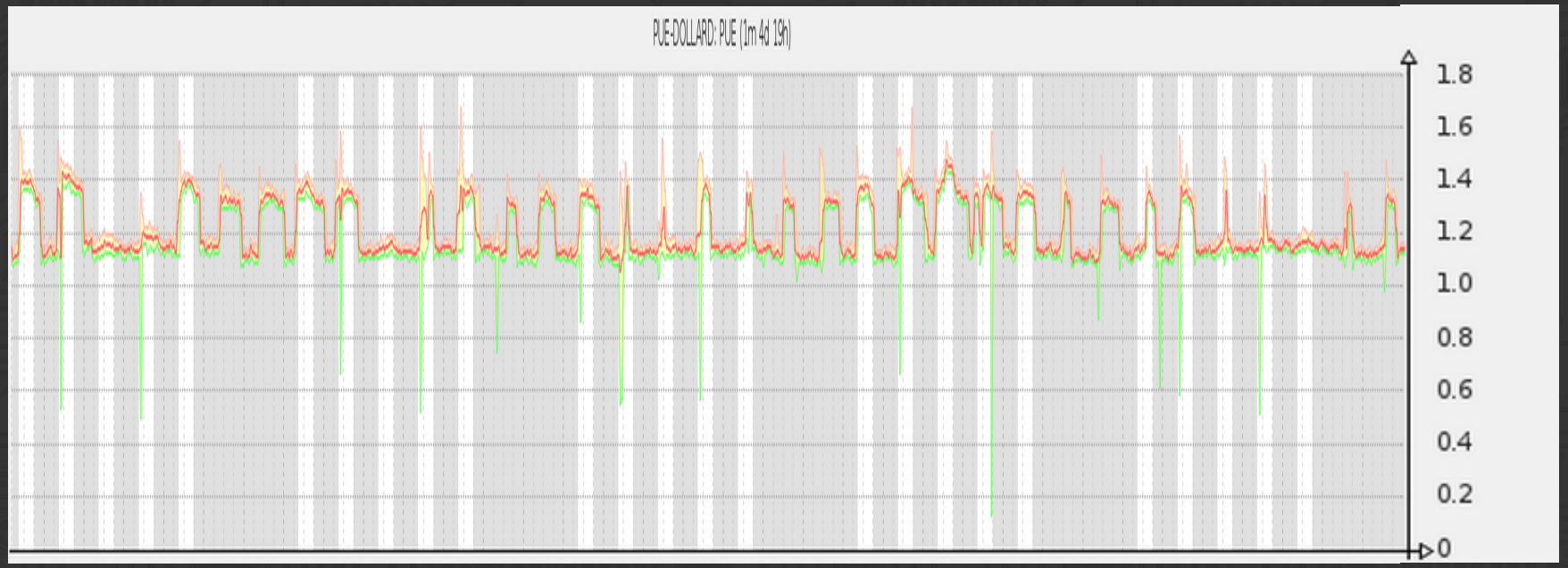
- ✓ Reduced CAPEX
- ✓ Increased power distribution density

Step 5:
The Low-Hanging Fruit

- ✓ CSL-3 rated transformers
- ✓ Flexible UPS technology
- ✓ LED/High E T8 lights
- ✓ Mist or IR Instead of Steam Humidifier

Case Study / Application

✓ Application of principle yields a PUE of less than 1.2



Summary

- ✓ Make sure its f'ing Cold! (outside)
- ✓ Eliminate Waste
- ✓ Keep it Tight
- ✓ Up Da Base (Voltage)
- ✓ Go after the Low Hanging Fruit

Thank you!

If you have any questions about the presentation,
feel free to reach out. jvangaal@rootdatacenter.com

ROOT

cloud.ca

October 5, 2015

Cloud Adoption in Canada: the importance of regional clouds

operated by CloudOps cloud.ca @cloud_dot_ca

Why and What?

Assess cloud usage by Canadian organizations

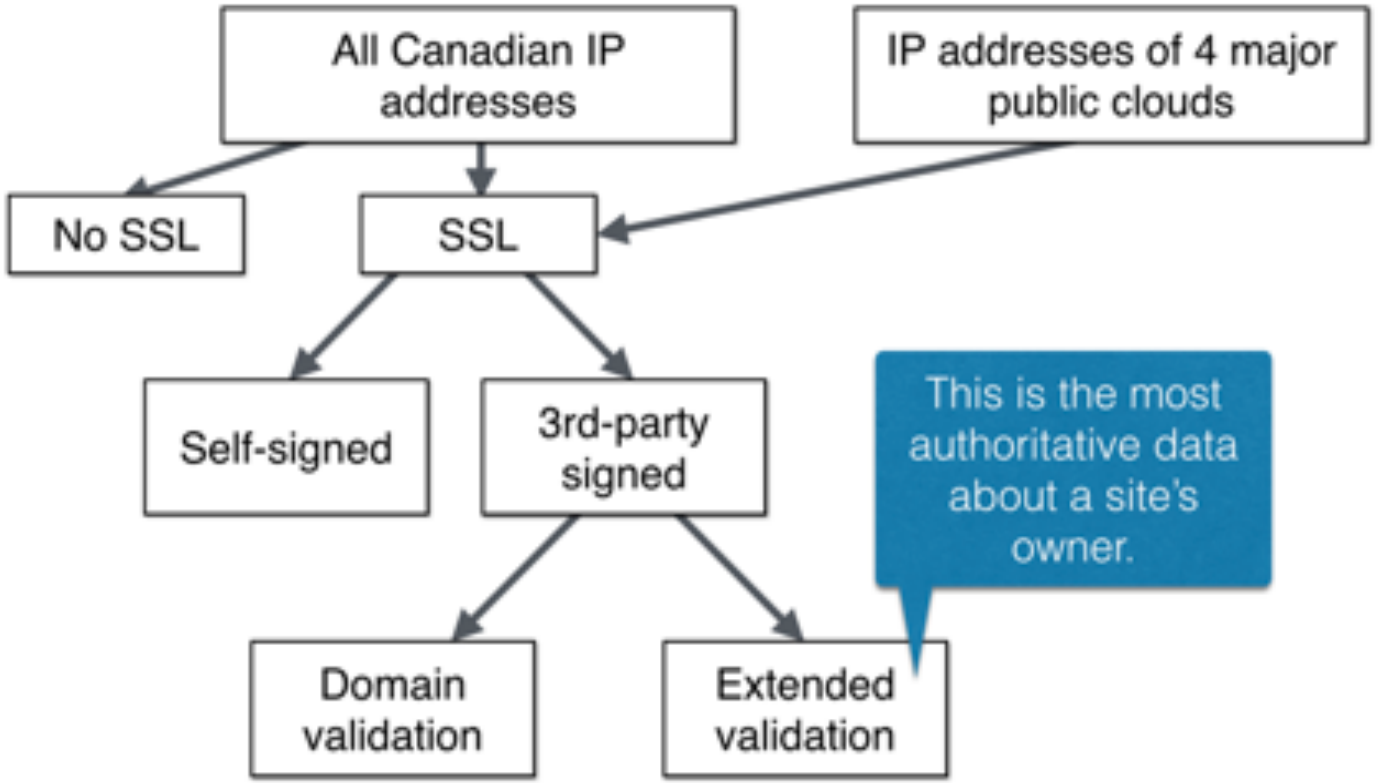
Cloud adoption: domestic versus foreign infrastructure

Adoption by province

Regional clouds versus mega clouds

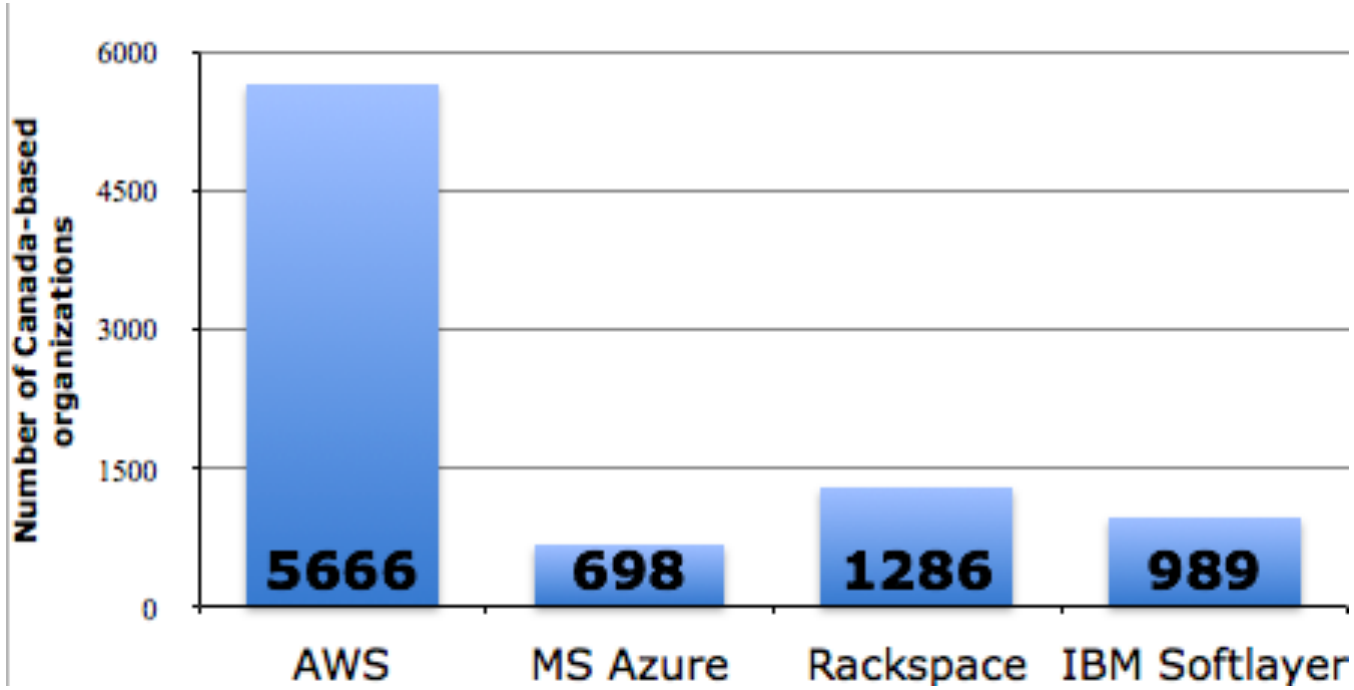
How?

Website monitoring by SSL certificates, IP addresses



The Results

89% of organizations located in Canada use an IP address that is geolocated in Canada as well. Of those that don't, more than 65% use Amazon Web Services:



Mega Clouds vs Canadian IPs by Region

	AWS	Azure	Rackspace	Softlayer	Canadian IPs
Ontario	8%	1%	2%	1%	88%
Quebec	**4%**	**1%**	**1%**	**0%**	**93%**
British Columbia	13%	1%	2%	0%	84%
Alberta	**4%**	**1%**	**1%**	**0%**	**93%**
Saskatchewan	3%	1%	1%	0%	96%
Manitoba	**6%**	**0%**	**5%**	**2%**	**88%**
Nova Scotia	5%	0%	3%	0%	92%
New Brunswick	**6%**	**0%**	**4%**	**0%**	**90%**
Newfoundland	11%	0%	0%	0%	90%
Prince Edward Island	**1%**	**0%**	**0%**	**0%**	**99%**
The Territories	2%	0%	0%	0%	98%

Future Industry Specific Reports

Banking

Government

Telcos

Political parties

Enterprise

Academia

Crown corporations

Importance of Regional Clouds

Jurisdiction matters

Speed of light

Sophistication of requirements

Governance

Privacy

Predictable Costs - Regional currency

Environmental impact

Conclusions

Quebec is behind BC in terms of adoption

Multi-cloud is the future

Aim for global study of mega cloud usage by country

Additional Ask -

Contribute to an OpenData project for all Public IP:443 hosted SSL Certs

What would you want to report on?

How will you use the data?

How would you want to access the data?

Interested to participate?

Please email me at **mpare@cloudops.com**

cloud.ca

Want to participate?

mpare@cloudops.com

Share your feedback

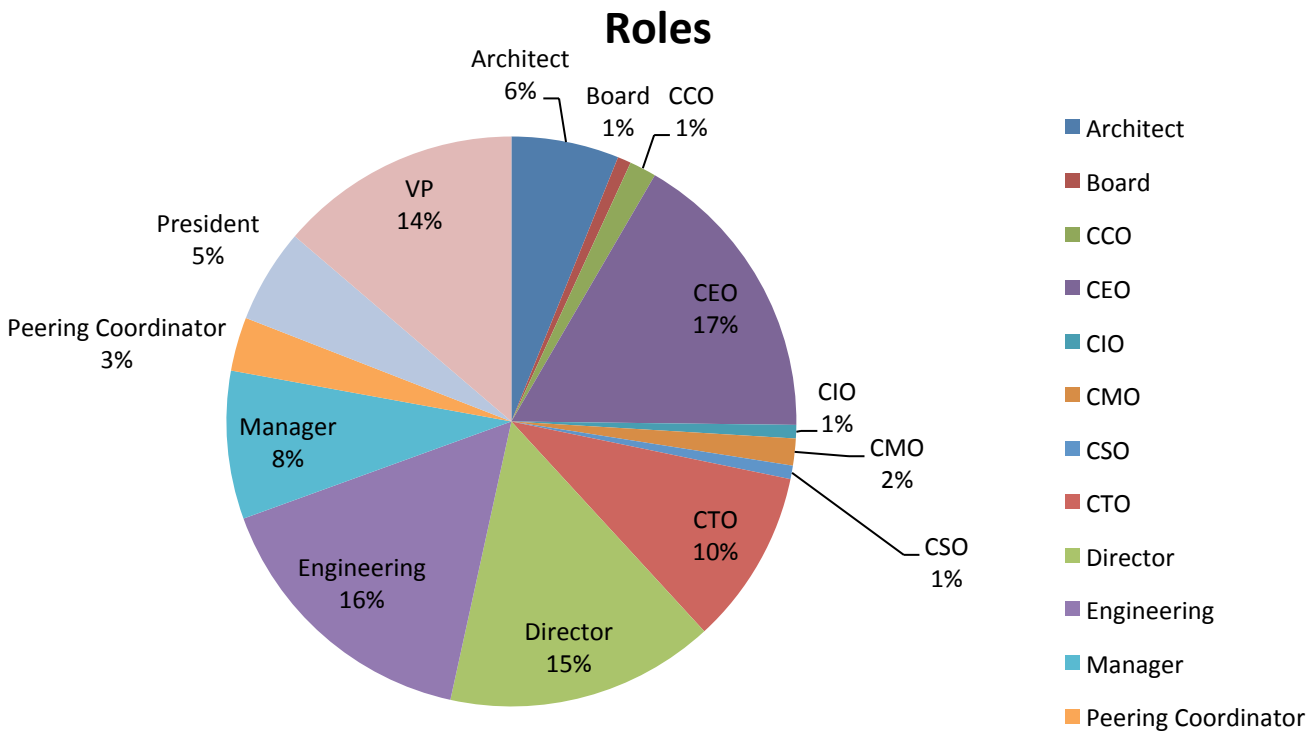
Open-IX Update 2015

OPEN-IX

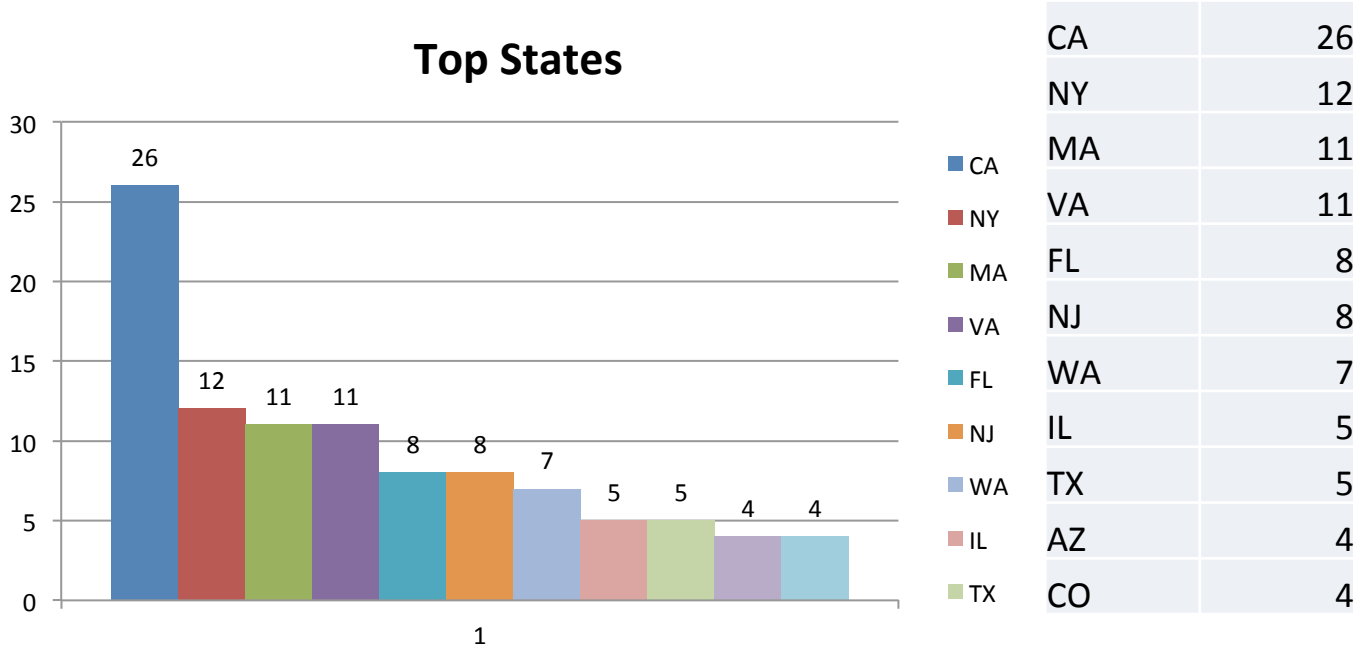
OPEN-IX Membership

- Total number of members as of Oct 1st
  - 161 Active – Via Official System
  - 196 Active – Official Roster
  - 100+ New Members this year!
  - 114 Expired Members ☹

Members by Title



Members' Top States



CA	26
NY	12
MA	11
VA	11
FL	8
NJ	8
WA	7
IL	5
TX	5
AZ	4
CO	4

OIX-1 Certification (5 IXPs)

- Completed: Five (5) MSAs, Six (6) IXP

COMPLETED (6)

Amsterdam Internet Exchange
- NY/NJ
- SF Bay Area
- Amsterdam

Florida Internet Exchange
- Miami, FL

London Internet Exchange
- VA/MD/DC

Deutscher Commercial Internet Exchange
- New York

OIX-2 Certification (27 DCs)

- Completed: 27 Data Centers, 14 Companies

CyrusOne
1. Dallas, TX
2. Houston, TX
3. Austin, TX
4. Cincinnati, OH
5. Cincinnati, OH
6. Phoenix, AZ

DIGITAL REALTY
Data Center Solutions
1. Los Angeles, CA
2. San Francisco, CA
3. Dallas, TX
4. New York, NY

QTS
1. Atlanta, GA
2. Suwanee, GA
3. Richmond, VA

DuPont Fabros Technology
1. Ashburn, VA
2. Piscataway, NJ

SENTINEL DATA CENTERS
1. Durham, NC
2. Somerset, NJ

Jaguar network
Leading your performance
1. Marseille, FRANCE

zayo
1. Atlanta, GA
2. Miami, FL

DATA BANK
1. Richardson, TX

CONTINUUM DATA CENTERS
1. Chicago, IL

edgeconnex
1. Houston, TX

DATAGRYD
DATA CENTERS | SIXTY HUDSON
1. New York, NY

evoswitch
NEXT GENERATION DATACENTERS
1. Manassas, VA

VANTAGE DATA CENTERS
1. Santa Clara, CA

SABEY Data Centers
1. New York, NY

Update Points - Priorities

- AGM Completed
- Membership Management
- Certification Management
- Transparency/Complaint Resolution
- Standards Expansion/Refresh/Rename
- Tools
- Education/Value Proposition
- Discussion

Standards Expansion/Refresh

- Single-corded line-up/reduced reliability
- Virtual peering and variants thereof
- Remote operated/lights out facilities
- Strengthen core standards
- Continue to add issues that impact a significant number of the constituents

Data Center Evaluation Tools

- Questionnaires – Go beyond design and operational compliance
- Technical and Non-Technical Aspects
  - Communication factors
  - Service factors
  - Turn-up Factors
  - Access factors
  - Networking factors
  - Energy factors
  - Human factors
  - Certification factors
- Different Format/Use
  - Generic
  - Open-IX Branded
  - Co-Branded

Discussion