TCO Model, huh, yeah
What is it good for?

CLOUD →

← COLO

OCP →
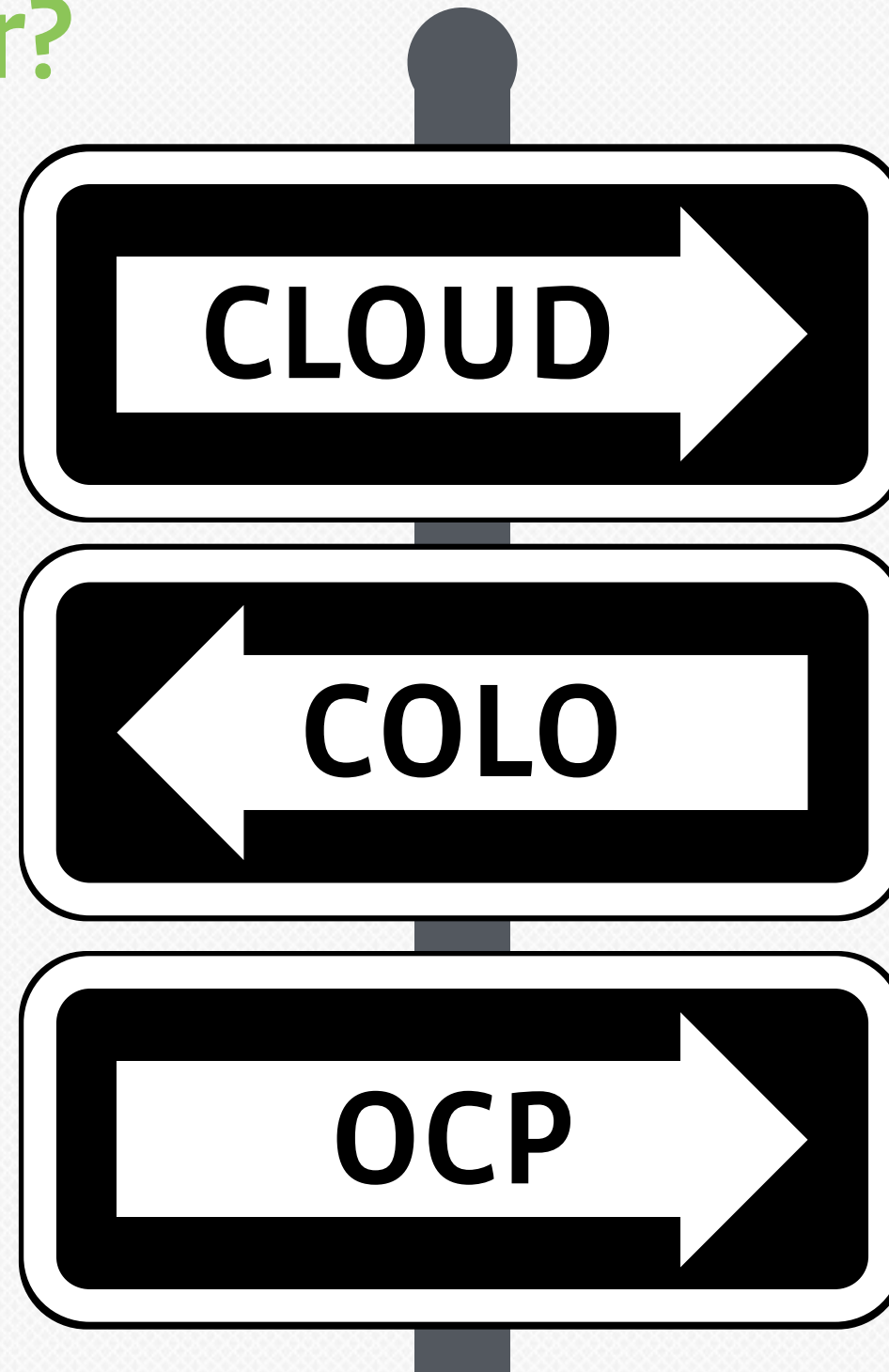
Fat **5.5g** **8%** Saturates **2.4g** **12%** Salt **0.7g** **12%**

line daily amount

ving contains

refrigerated

Display until	Use by	Weight
25.06.09	05.07.09	300g

12 mins

cut to a size

14 mins

cut to a size

Ingredients

Oats, Water, Pork Fat, Onion, Pork Rind, Pork Shoulder, Pork Liver, Rusk (Wheat Starch, Salt), Salt, Pimento, Seasoning (Rusk, Spices).

Nutrition

Typical Composition	Each serving contains	100g (3½oz) contains
Energy	405kJ/100kcal	940kJ/225kcal
Protein	4.4g	10.3g
Carbohydrate	7.3g	16.9g
of which sugars	0.5g	1.2g
Fat	5.5g	12.9g
of which saturates	2.4g	5.50
mono-unsaturates		
poly-unsaturates		

Detail Inputs

SERVER	STORAGE	NW	DC OPEX	COLO OPEX
CLOUD SERVER	CLOUD STORAGE	CLOUD NW	DC CAPEX	LABOR

MOVING PARTS

PINCH POINTS
WATCH YOUR
HANDS

จำกัดความเร็ว กม./ชม.
SPEED LIMIT Km./Hr.

รถบรรทุกลากจูง รถ 3 ล้อเครื่อง — 45

รถบรรทุก รถโดยสาร — 60

รถยนต์อื่น รถจักรยานยนต์ — 80

กทม.

Global Input Variables

			Cluster Input Variables					
Cost of capital (%/year)	10.00%	*capital*	Servers / cluster	4000	*server_count*	Storage Servers / cluster	1,000	*stg_server_count*
Avg PUE - Custom DC	1.15	*pue_avg*	Cluster ingress (GB/mo)	100000	*cluster_in*	Server spares/ replication factor	1.05	*server_replication*
Max PUE - Custom DC	1.40	*pue_max*	Cluster egress (GB/mo)	100000	*cluster_out*	Storage spares/ replication factor	2.5	*stg_replication*
Network power %	5%	*nw_pwr*						

Results

	Servers ($/yr)	Network ($/yr)	Opex ($/yr)	Short-term (3yr) Capex ($/yr)	Long-term (6-18yr) Capex ($/yr)	NPV (3 yr term)	NPV (18 yr term)
Cloud servers	$19,432,855	$87,000	*incl*	*incl*	*incl*	$48,542,991	$160,090,378
Servers in a Colo	$7,766,667	$2,118,667	$3,925,832	$626,667	$196,858	$41,889,538	$129,966,743
Servers in a DC	$7,766,667	$2,118,667	$5,177,054	$626,667	$1,632,803	N/A	$163,725,800

Interim Results & Inputs

| Item	NRE ($)	Unit cost	Extended cost ($)	Amorization life (yr)	Extended power (W)	Perf benchmark (i.e., SPEC, GB)	Amortized cost ($/yr)	Performance normalized cost ($/yr)
Server	$5,000,000	$2,575	$15,300,000	3	800,000	1	$5,100,000	$5,100,000
Cloud Server	$4,792,000	$464	$6,649,120	3	N/A	0.4	$2,216,373	$5,277,079
Storage server	$0	$8,000	$8,000,000	3	400,000	49,152	$2,666,667	$2,666,667
Cloud storage	$0	$0.72	$35,389,440	1	N/A	49,152	$35,389,440	$14,155,776
Network	$0	$6,356,000	$6,356,000	3	60,000	N/A	$2,118,667	$2,118,667
Cloud network	N/A	$87,000	$87000	1	N/A	N/A	$87,000	$87,000
Universal items								
Rack	$500,000	$2,850	$1,181,150	6	N/A	N/A	$196,858	N/A
Cluster infrastructure	$0	$1,000,000	$1,000,000	3	N/A	N/A	$333,333	N/A
HWOps labor	$0	$545,000	$545,000	1	N/A	N/A	$545,000	N/A
Colo-specific items								
Space, power, uplift	$0	$2,683	$3,380,832	1	N/A	N/A	$3,380,832	N/A
DC-specific items								

The Cost of Power

- Is power a significant % of infrastructure cost?
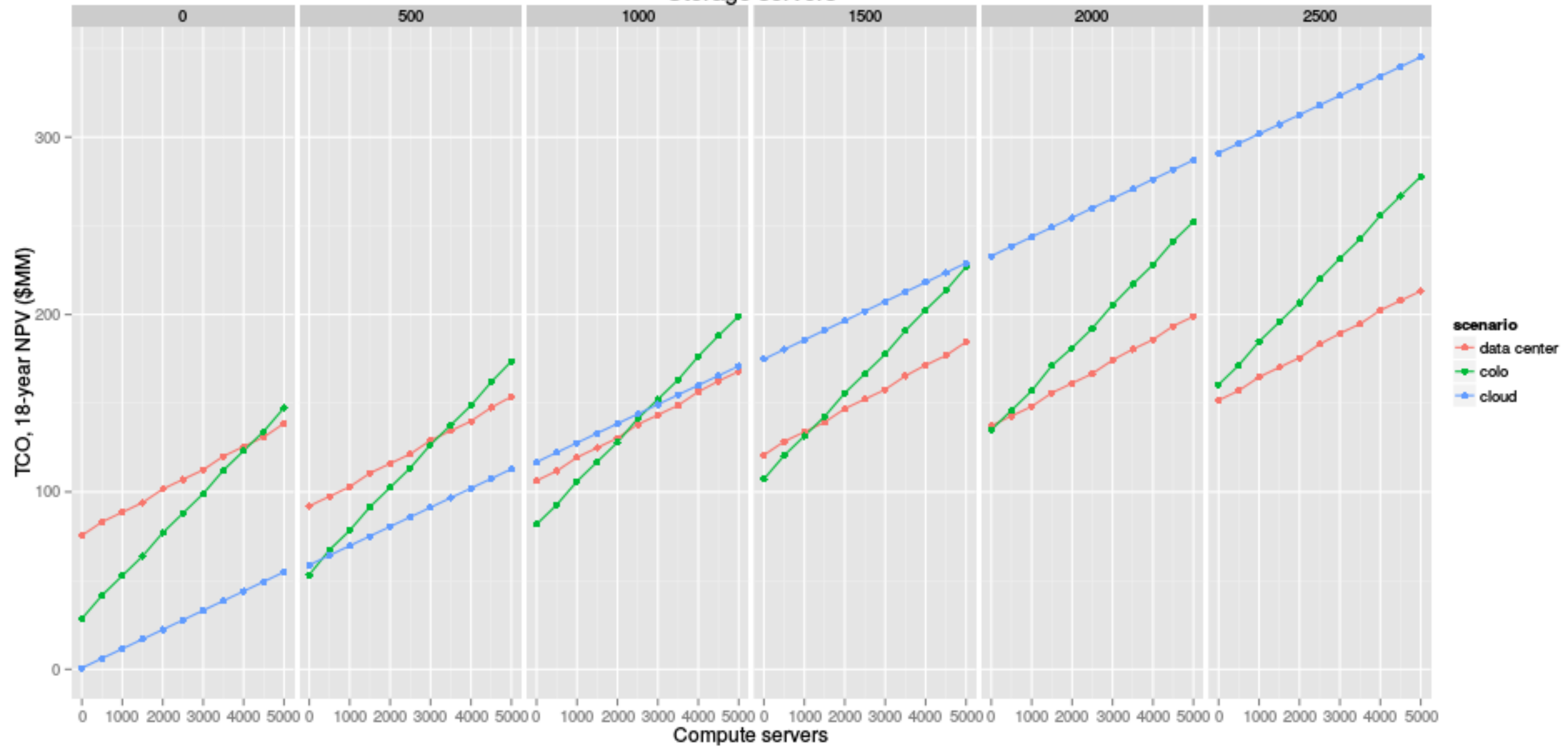 - 4000 Compute Servers (200W)
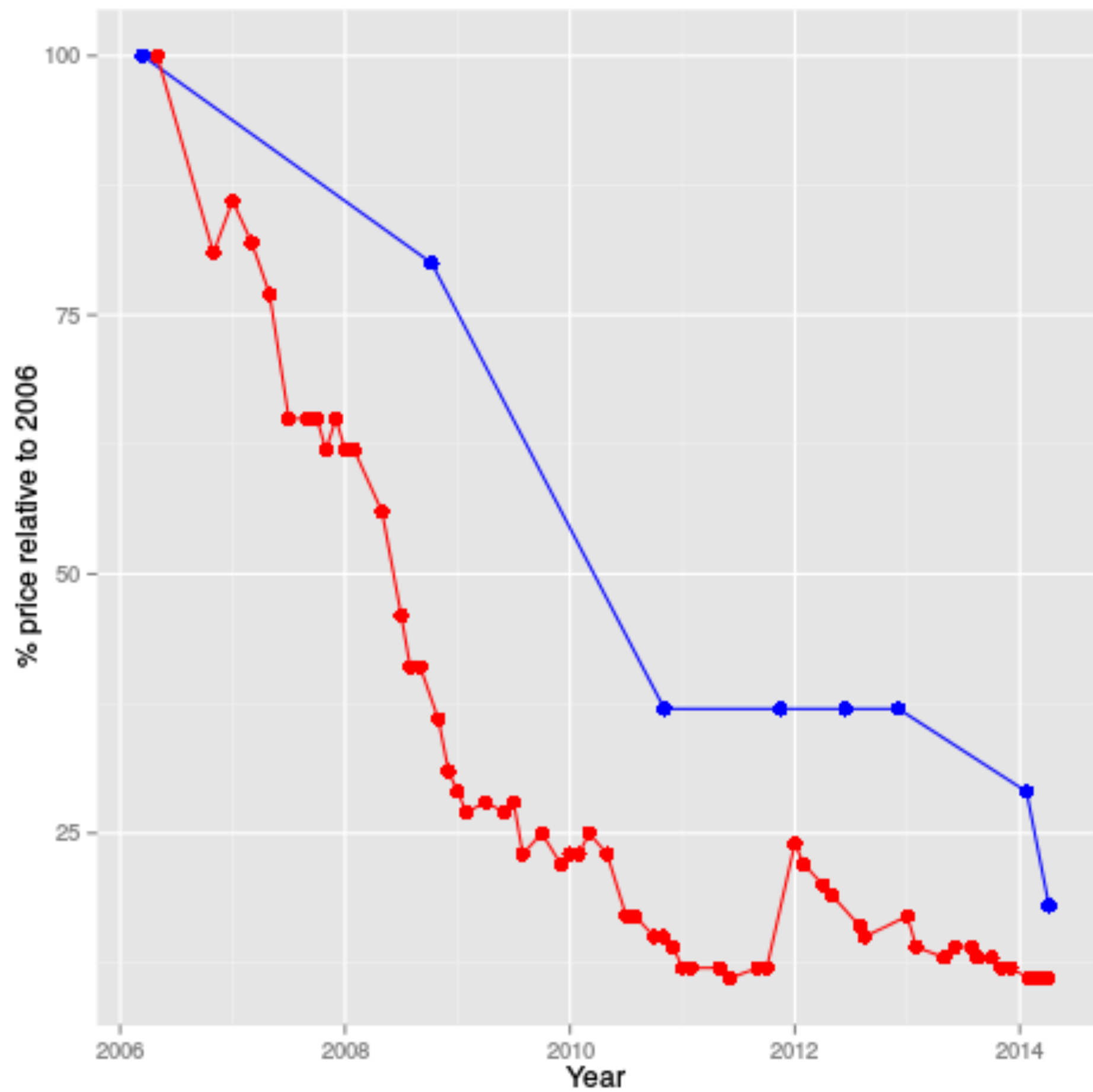 - 625 Storage Servers (400W)
  - 1.5MW
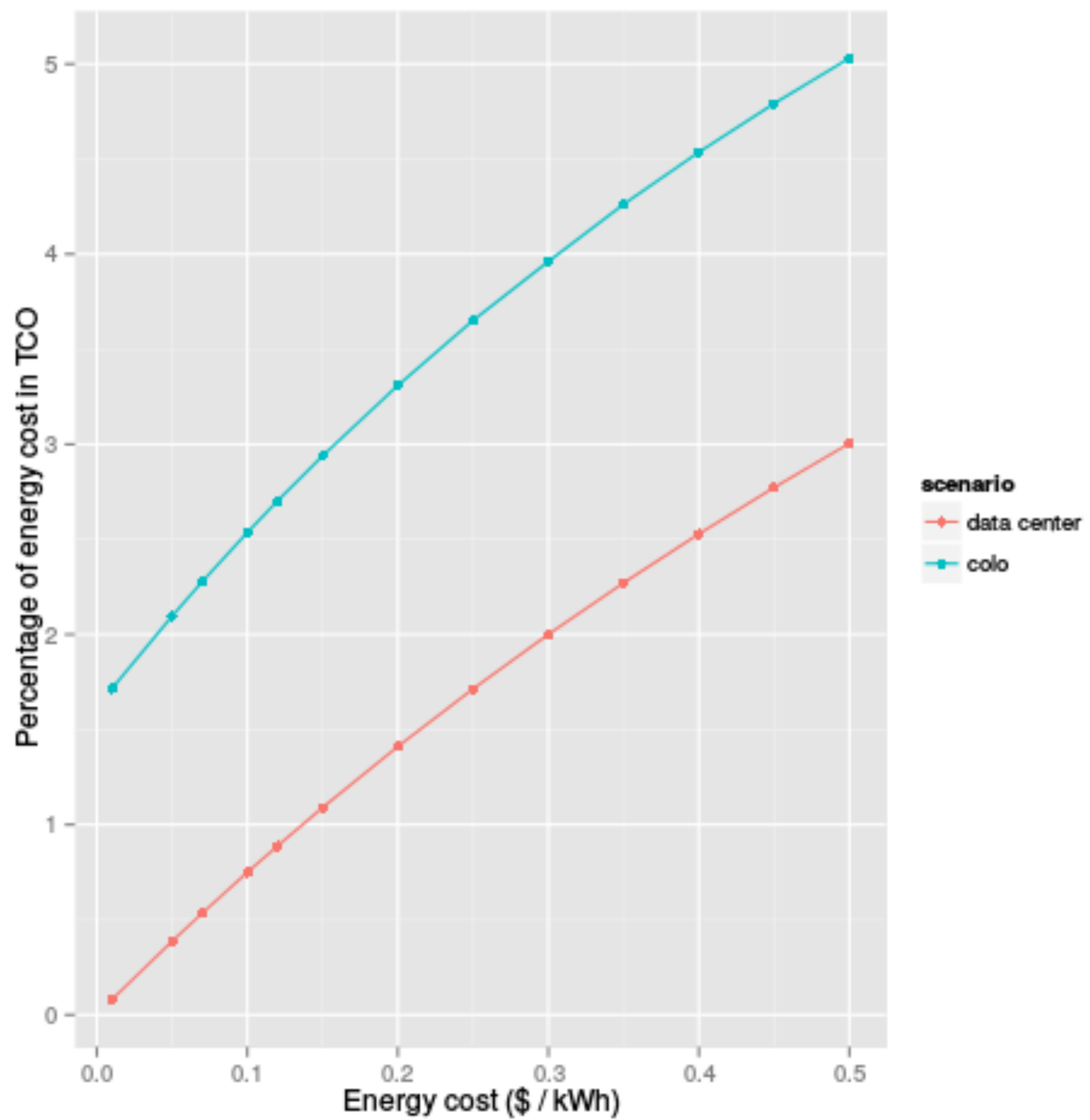
Cloud vs. Colo vs. Custom

- What is the effect of cluster size?
  - Vary compute and storage server counts

Master the Model

- Endless use cases
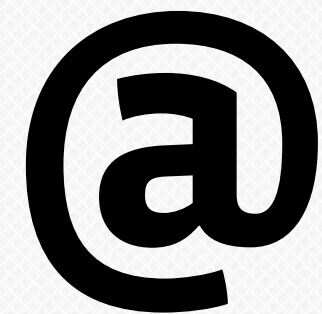- Requires modification
- Guide for decision making

TCO to Go

@CoolanCo

facebook.com/coolanalytics

amir@coolan.com