



The head in the  
clouds but both  
feet on the  
ground

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Energize the  
future

## Scale of data

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- Bit : 0 or 1, the fundamental particle of the computer universe
- Byte (B) : 8 bits, minimal quantity to write a letter.
- Kilobyte (KB) : 1000 or  $2^{10}$  bytes. 1 page of text = 2 KB.
- Megabyte (MB) : 1000 KB or  $2^{20}$  bytes. All Shakespeare = 5 MB.
- Gigabyte (GB) : 1000 MB or  $2^{30}$  bytes. 1 movie of 2 hrs = 2 GB.
- Terabyte (TB) : 1000 GB or  $2^{40}$  bytes. The whole library of the American Congress = 15 TB.
- Petabyte (PB) : 1000 TB or  $2^{50}$  bytes. All the letters mailed in the United States in one year or 1 hour of transactions on Google.
- Exabyte (EB) : 1000 PB or  $2^{60}$  bytes. 10 millions of copies of The Economist.
- Zettabyte (ZB) : 1000 EB or  $2^{70}$  bytes. **1,8 ZB of "data" has been created last year**
- Yottabyte (YB) : 1000 ZB or  $2^{80}$  bytes. Too big ?.....not for a long time !

And the data created doubles every 18 months !

# WHY ?



## Entreprises go digital

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- Data analyst or data miners will be more and more important :
  - Wal-Mart & Pop Tarts.
  - IBM invested 12 billion in the last years and is supposed to open 6 data mining centres with 4000 employees all around the world.

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**Cloud**

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## What's in the cloud ?

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**Social networks ( Facebook, Twitter, LinkedIn, etc...).**

**E-business ( Amazon, Ebay, etc...).**

**Online gaming (Xbox, Playstation, Wii, etc...).**

**Business restructuring (economy of scale , software paid on usage, investment converted in operating cost ).**

**Mobility ( iPhone, Android, IPad, Nexus, Surface etc...).**

**Television ( Google TV, Apple TV, Netflix, etc...).**

**Sensors & monitoring**

## Individuals go digital

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- **United Nations predict that in 2016, 3,4 billions of people will use internet (45% of the global population).**
- **Gartner predicted that consumer digital storage needs will grow from 0.3 exabytes in 2011 to 4.1 zettabytes in 2016.**
- **Consumers will store 36 percent of their digital content in the cloud by 2016. This compares with a mere 7 percent of consumer data housed in cloud storage in 2011.**

# What is the real cloud ?



**SuperNAP, Las  
Vegas 407 000 pc,  
250 MW**



An aerial photograph of a large industrial facility, likely a data center. The main building has a white, corrugated metal roof and is surrounded by a parking lot with several cars. There are other smaller buildings and a large blue cylindrical tank visible in the background. The text is overlaid on the left side of the image.

**Microsoft,  
Quincy WA  
470 000 pc,  
13.5 MW**



**NAP of the  
Americas Miami,  
750 000 pc, 15 MW**

# Lakeside Technology Center, Chicago

1 100 000 pc,  
100 MW

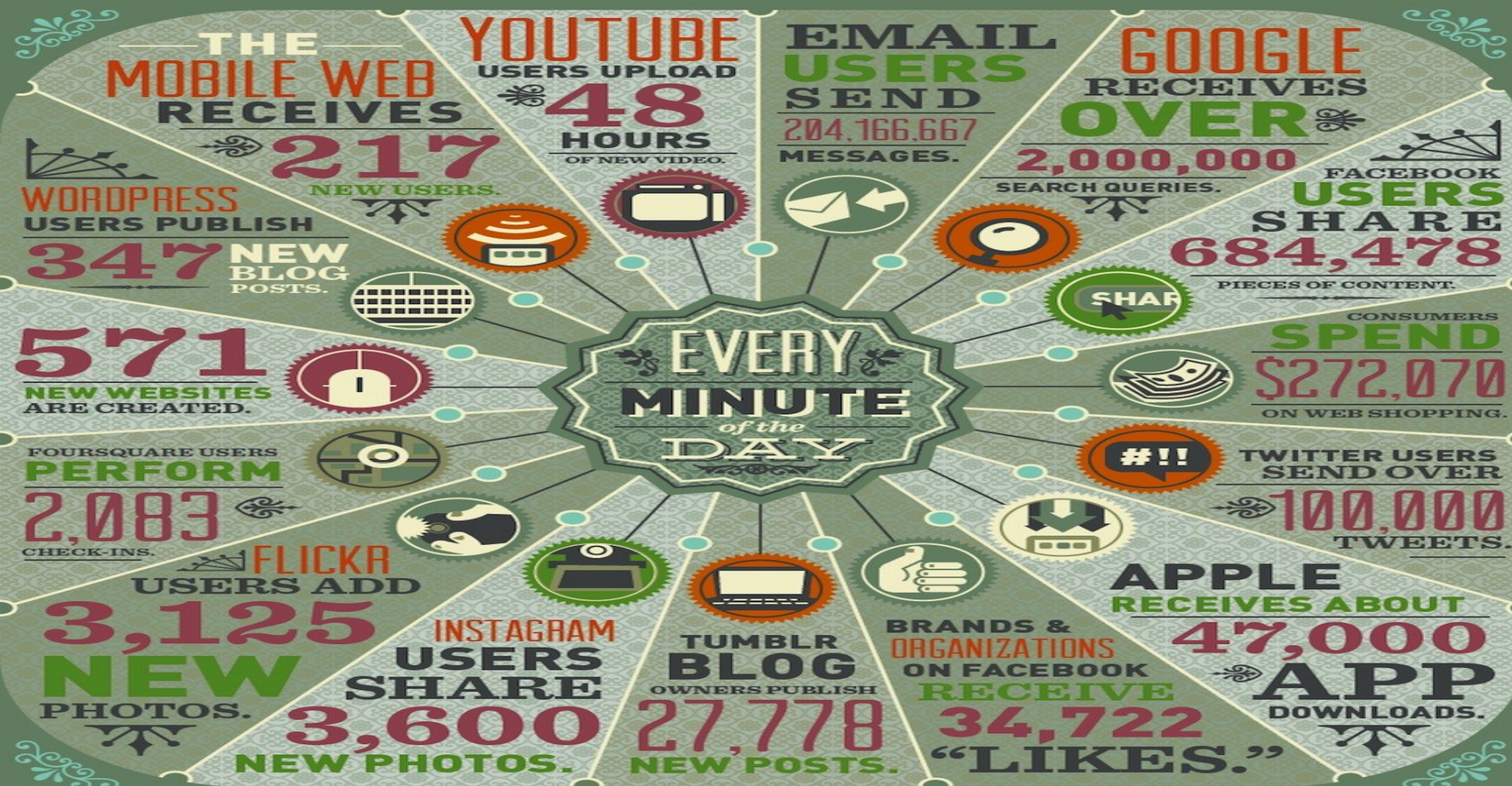






**Facebook Lulea  
data center  
900 000 sq.ft.  
120 MW**





### WITH NO SIGNS OF SLOWING, THE DATA KEEPS GROWING

These are just some of the more common ways that Internet users add to the big data pool. In truth, depending on the niche of business you're in, there are virtually countless other sources of relevant data to pay attention to. Consider the following:

The global Internet population grew 6.59 percent from 2010 to 2011 and now represents

## 2.1 BILLION PEOPLE.

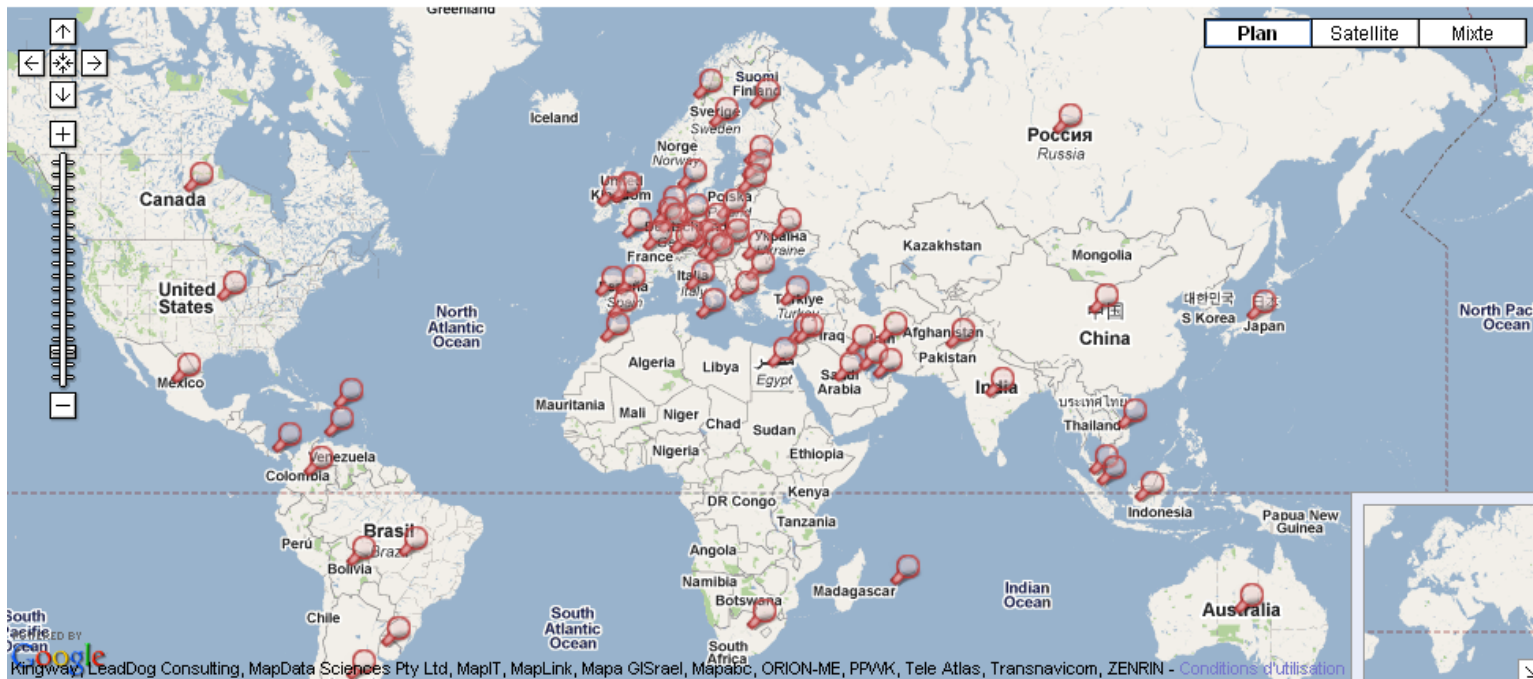
These users are real, and they are out there leaving data trails everywhere they go. The team at Domo can help you make sense of this seemingly insurmountable heap of data, with solutions that help executives and managers bring all of their critical information together in one intuitive interface, and then use that insight to transform the way they run their business. To learn more, visit [www.domo.com](http://www.domo.com).



# Sites 2012

## Data Center Map

Welcome to Data Center Map - your guide to the global data center market, with focus on colocation, IP transit and various hosting services. Navigate through the map below, browse through our text-based index, use our search function or **request a quote** via our quote service.



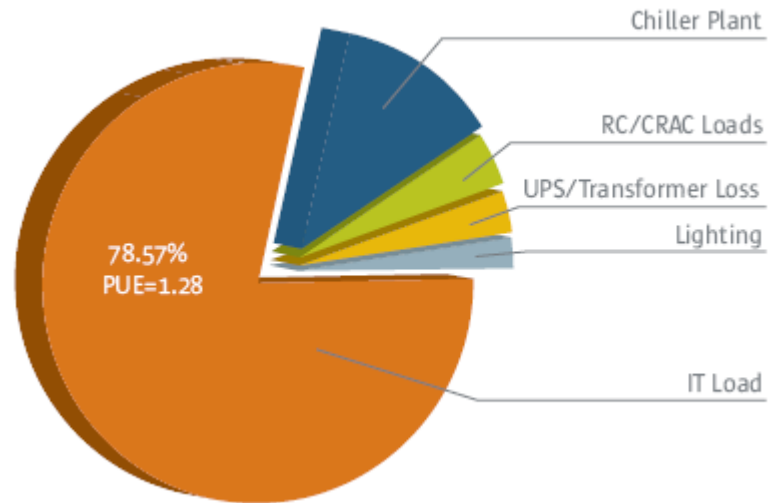
According to Data Center Map, there were approximately 1750 data center sites in 2010 and nearly 2500 in 2012.

# 2012 investment

Rank	\$US (billion) value of investment 2012		Data centers % of growth in 2011-2012	% growth in investment 2011-2012
1	Western USA	3.5	3 %	23 %
2	UK	3.35	5 %	25 %
3	China	3.1	28 %	44 %
4	Eastern USA	2.9	13 %	23 %
5	Central USA	2.8	12 %	50 %
6	Germany	2.6	16 %	26 %
7	France	1.95	7 %	10 %
8	Italy	1.95	13 %	35 %
9	Canada	1.9	10 %	8 %
10	Mexico	1.8	17 %	11 %
11	Benelux	1.55	14 %	16 %



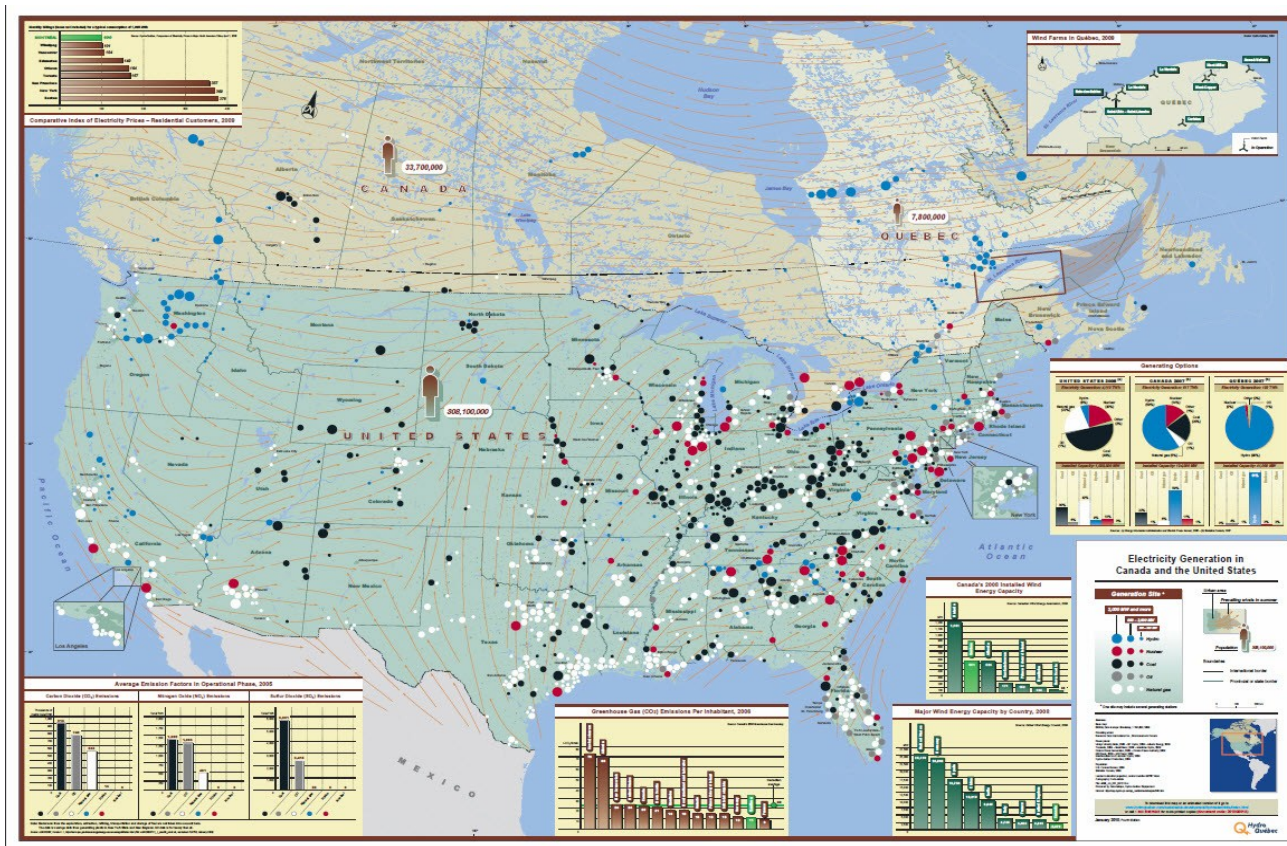
## PUE > 1,3 = inefficient



EPA has an Energy Star program for data centers.

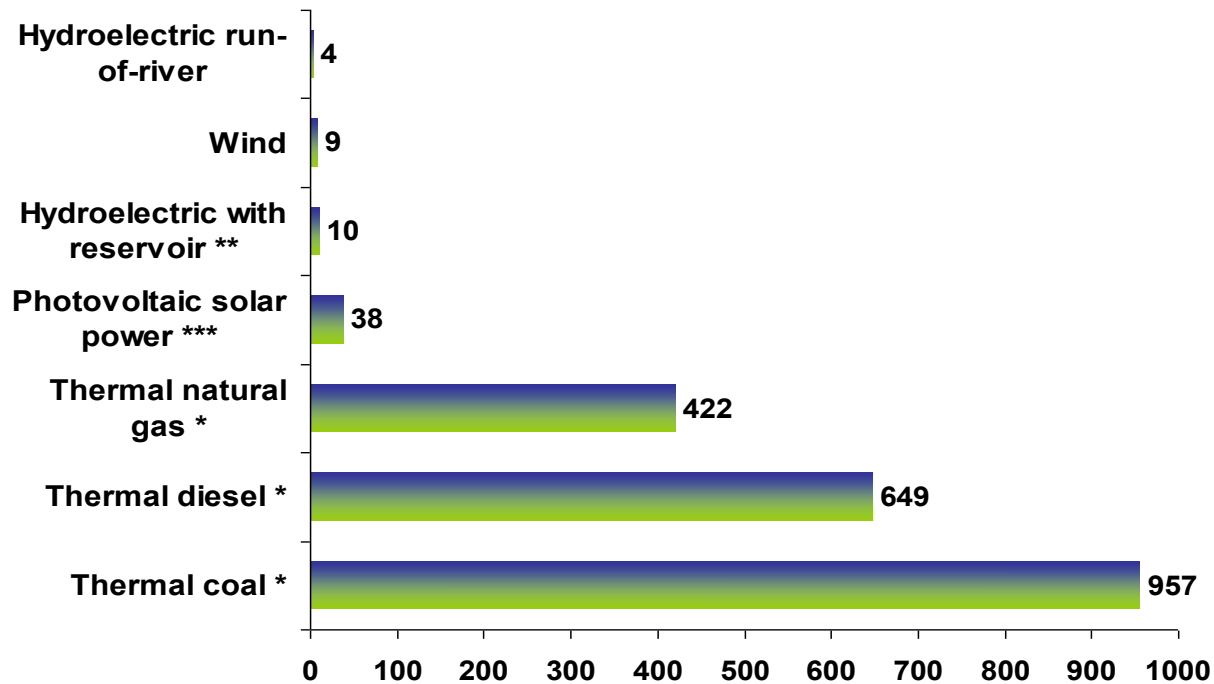
# Data centers must prioritize renewable power

World Energy Council calculates that 40 % of GHG emissions comes from the production of electricity



# CO2 Emissions (g/kWh)

## Life Cycle Analysis\*



\* CO<sub>2</sub> produced by technologies used in northeastern North America, including facility construction and operation and any fuel supplies required.

\*\* Estimated gross emissions from the Romaine complex. Net emissions will be lower.

\*\*\* Emissions mainly associated with the manufacture of solar panels.

## Data centers must prioritize renewable power

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Green star network animation

[Simulation.mp4](#)

## Hydro-Québec perspective

	Model A	Model B	Model C
Power	2 MW	5,7 MW	50 MW
Rate paid	5,75 ¢/ kWh	5,25 ¢/kWh	4,5 ¢/kWh
Wealth creation (Employee/MW)	12	4,9	1,5

# Hydro-Québec perspective

## Gross value creation break down

Type A data center 5,75 ¢/kWh	Gross value creation per job ( \$ )	Gross value creation per job ( % )
Added value for each job*	70 310 \$/yr	42,7 %
Added value for the electricity fees	35 040 \$/yr	21,3 %
Added value for telecommunications	6 170 \$/yr	3,7 %
Added value for operating fees	22 960 \$/yr	14 %
Added value for all other building fees	30 110 \$/yr	18,3 %
<b>TOTAL</b>	164 590 \$/yr	100,0 %
Minus renewable electricity procurement cost at 10 ¢/kWh	- 58 400 \$/yr	
<b>NET TOTAL</b>	106 190 \$/yr	

# Hydro-Québec perspective

## Gross value creation break down

Type B data center 5,25 ¢/kWh	Gross value creation per job ( \$ )	Gross value creation per job ( % )
Added value for each job*	70 616 \$/yr	26,9 %
Added value for the electricity fees	84 260 \$/yr	32 %
Added value for telecommunications	15 389 \$/yr	5,9 %
Added value for operating fees	40 108 \$/yr	15,2 %
Added value for all other building fees	52 621 \$/yr	20 %
<b>TOTAL</b>	<b>262 994 \$/yr</b>	<b>100,0 %</b>
Minus renewable electricity procurement cost at 10 ¢/kWh	- 160 495 \$/yr	
<b>NET TOTAL</b>	<b>102 499 \$/yr</b>	

# Hydro-Québec perspective

## Gross value creation break down

Type C data center 4,5 ¢/kWh	Gross value creation per job ( \$ )	Gross value creation per job ( % )
Added value for each job*	67 722 \$/yr	15,5 %
Added value for the electricity fees	249 660 \$/yr	57,2 %
Added value for telecommunications	47 062 \$/yr	10,8 %
Added value for operating fees	44 368 \$/yr	10,1 %
Added value for all other building fees	27 890 \$/yr	6,4 %
<b>TOTAL</b>	<b>436 702 \$/yr</b>	<b>100,0 %</b>
Minus renewable electricity procurement cost at 10 ¢/kWh	- 554 800 \$/yr	
<b>NET TOTAL</b>	<b>-118 098 \$/yr</b>	



## Conclusion

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- **Growth :**
  - 35 billion investment in 2012
  - 5.5 millions of sq.ft built in 2009-2010
  
- **Energy :**
  - Inevitable raise of electricity demand while production is mainly non environmentally friendly.

**Customers and institutions must request that their data are stored in a renewable energy powered data center**

