



E Q U I N I X

Battle of the Datacenters

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Entering a new market can be daunting

- **Why**
 - More business
 - Lower cost
 - Improve performance
- **What**
 - Peering
 - Transit buy/sell
- **When**
- **Where**
- **Who**
- **How**

*Source: Greenpeace Clicking Clean Report, 2015

Colocation provider makes it sound really complicated



But in the end of the day, it's really simple

- **Space**
- **Power**
- **Interconnect**

What should you be looking for?

- **Space & Power**
 - Commodity Service
 - Green is the new differentiator
- **Interconnection is key**
 - On site/campus network providers/carriers
 - On site/campus cloud providers
 - On site/campus exchanges
 - Intra site connectivity cost
 - Intra campus connectivity cost
 - Off site connectivity cost

Turning Potential Difference into Heat

- **Equinix and its customers converted 2200GWh of Electricity into heat in 2014 globally***
 - And pushed some photons around
 - That's roughly 70 EJ (if my maths is correct... Exa = 10^{18}),
 - Enough to heat 17000 km³ of water by 1°C
 - (For reference, Death star's super laser produces 10^{32} joules)
- **Still more efficient than most people trying to push photons out of their back room**
 - Economies of scale in cooling and switchgear

*Source: Greenpeace Clicking Clean Report, 2015

Equinix is focused on being green

- **Energy Cleanliness**

- Renewable Sources of Energy
- Equinix has committed to 100% Clean and Renewable Energy

- **Energy Efficiency**

- Lowering PUE
- Reduced 13,500kW/year since 2011
 - Equivalent of ~ 72,500 metric tons in CO2 emissions.
 - 14,500 cars off the road, or 11,000 U.S. homes per year.

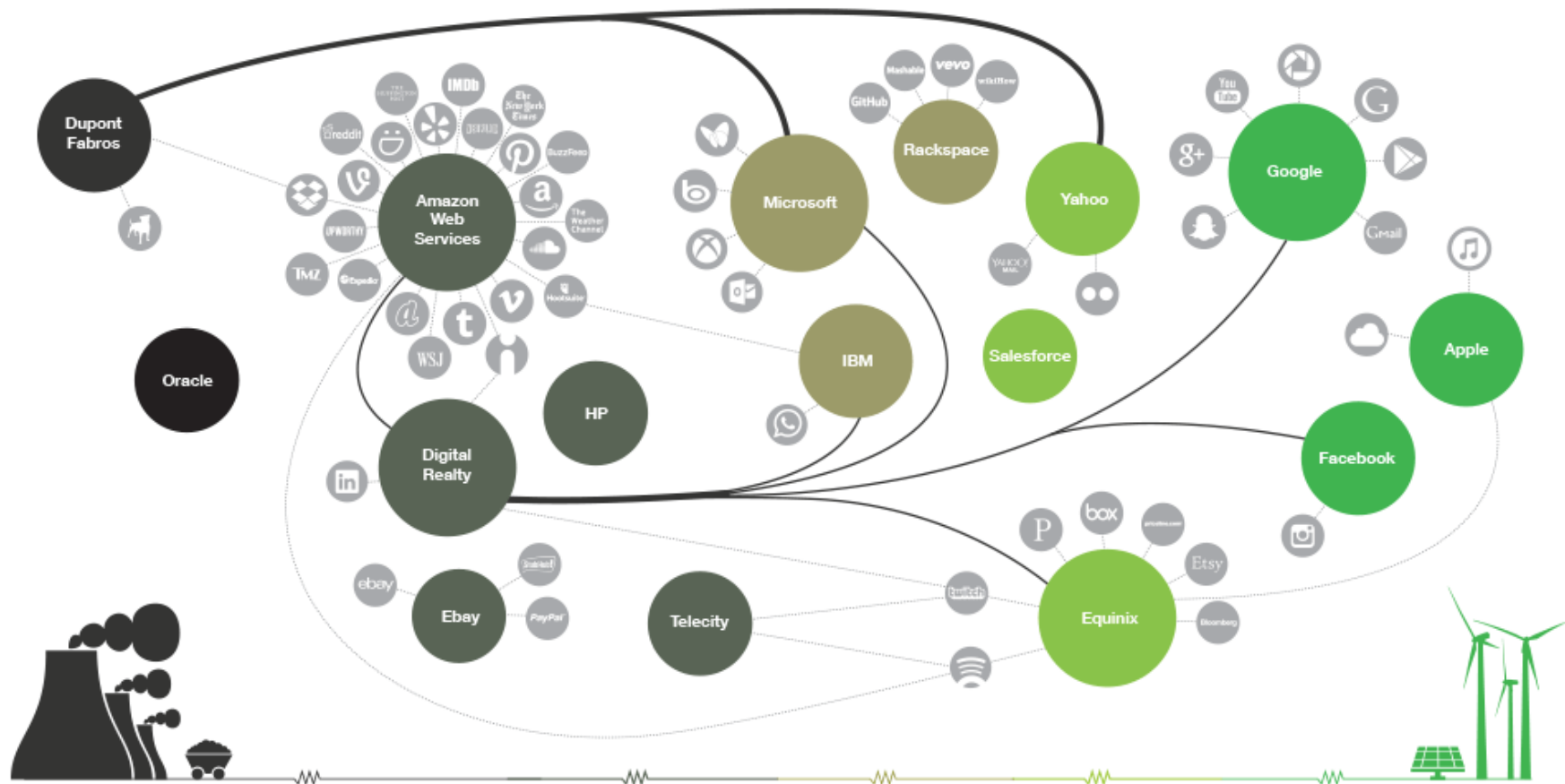
- **Other Green Features**

- Water Recycling

Green Certifications and Awards



Is your online world clean or dirty?



Stuck in dirty energy past:

Efficiency only, using mostly dirty energy, have taken few or no steps to switch to renewables

Middle of the Road: Taking steps toward a greener internet, but not leading the way.

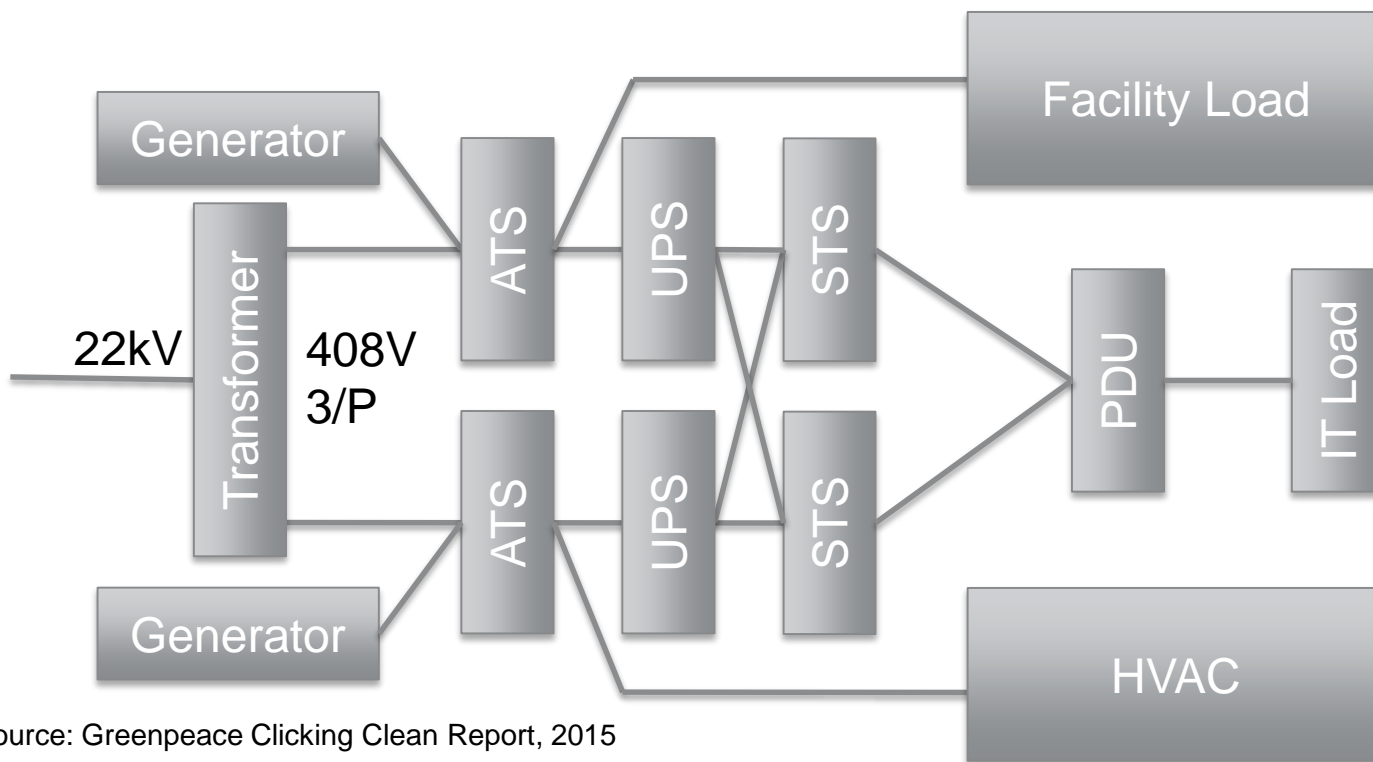
Green Internet Innovators:

Committed to 100% renewable energy.
Their leadership is helping to make our
lives, online and offline, greener.

Source: Greenpeace Clicking Clean Report, 2015

Understanding Efficiency

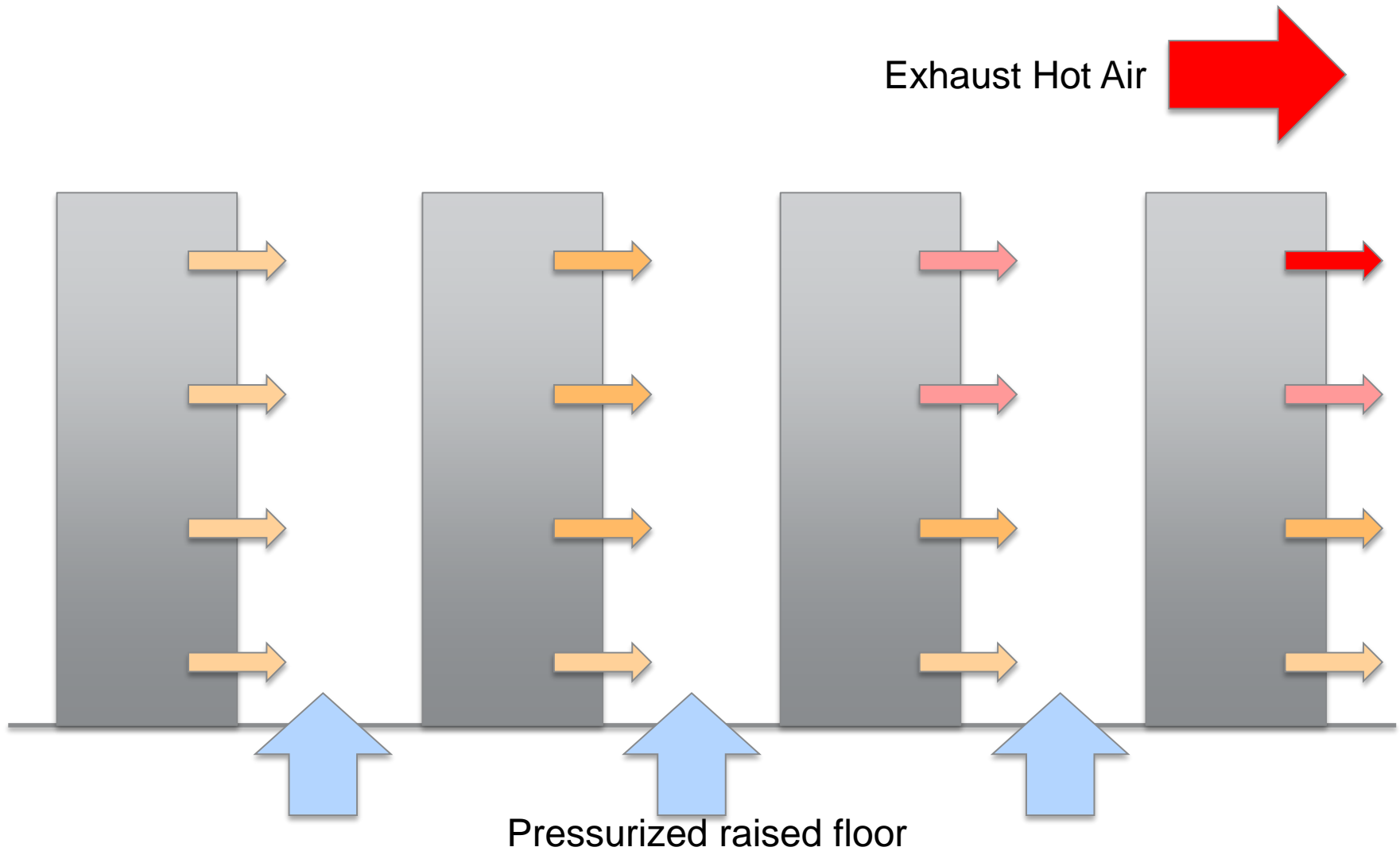
- **PUE = 1**
 - Power Usage Effectiveness = Total Facility Energy/IT Equipment Energy
- **Unfortunately, there's a lot of overhead in the business...**



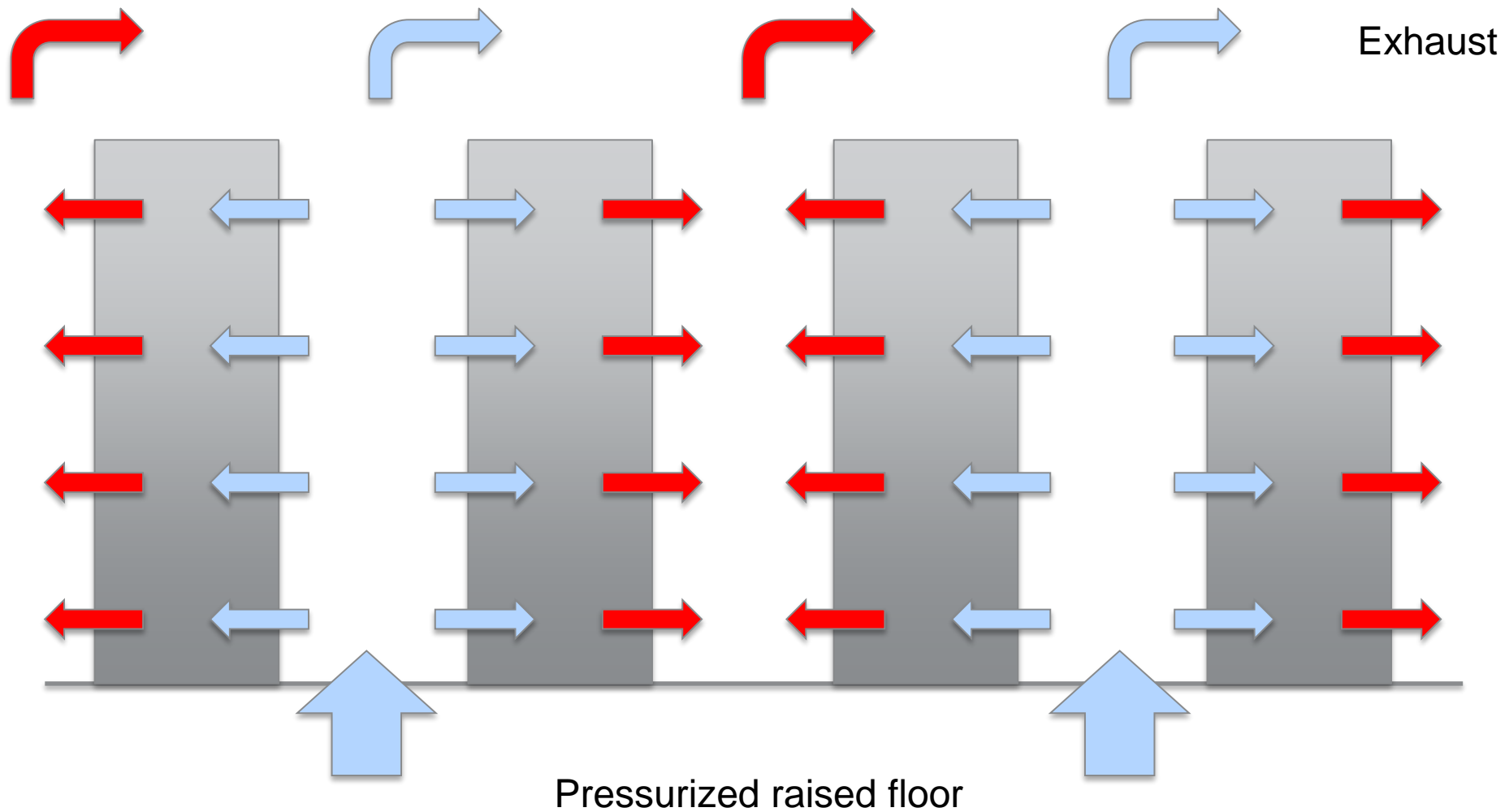
Equinix
Published
PUE target
~ 1.29 to 1.43*

*Source: Greenpeace Clicking Clean Report, 2015

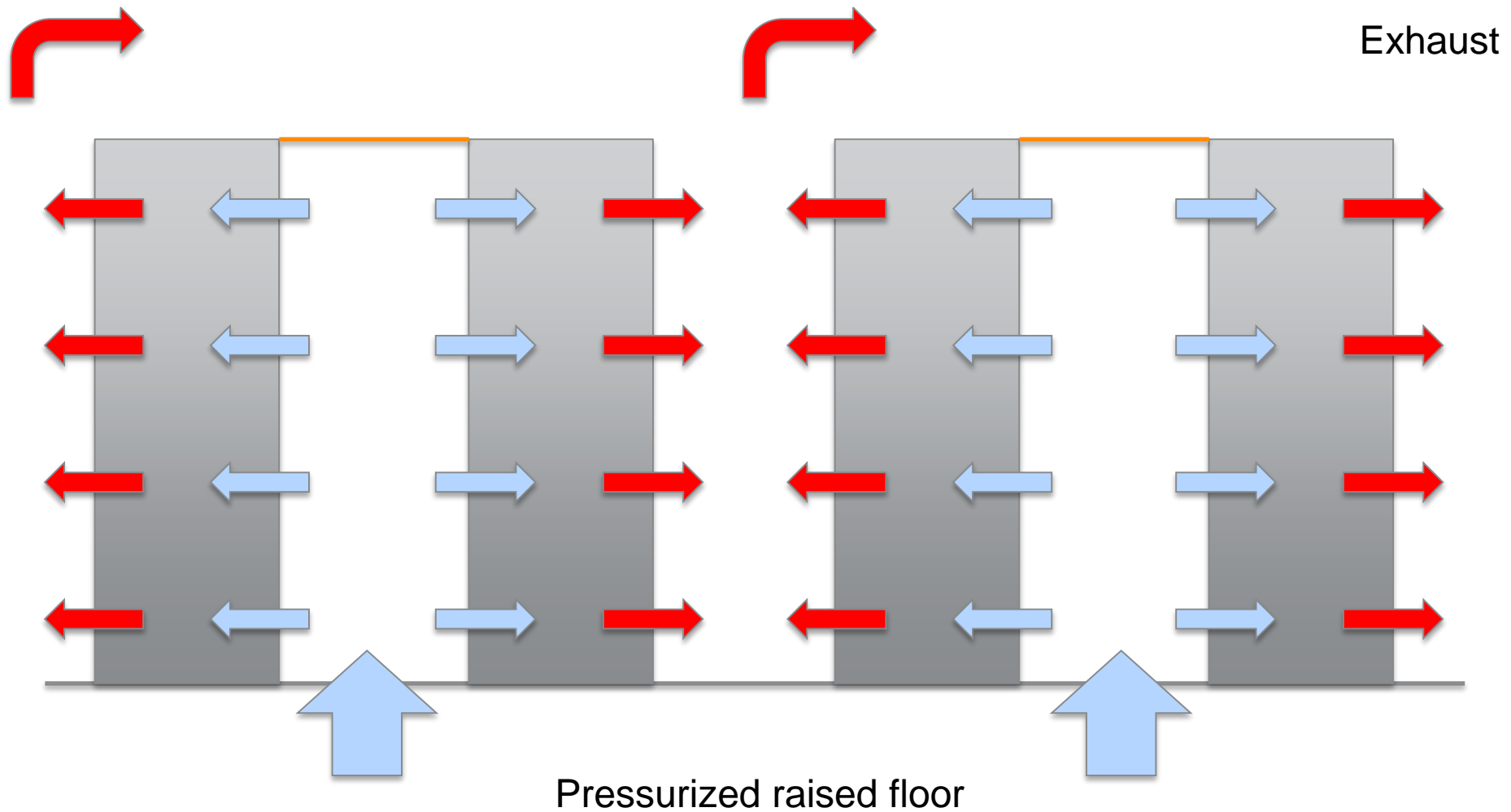
Once upon a time...



Hot Aisle/Cold Aisle



Hot/Cold Aisle Containment



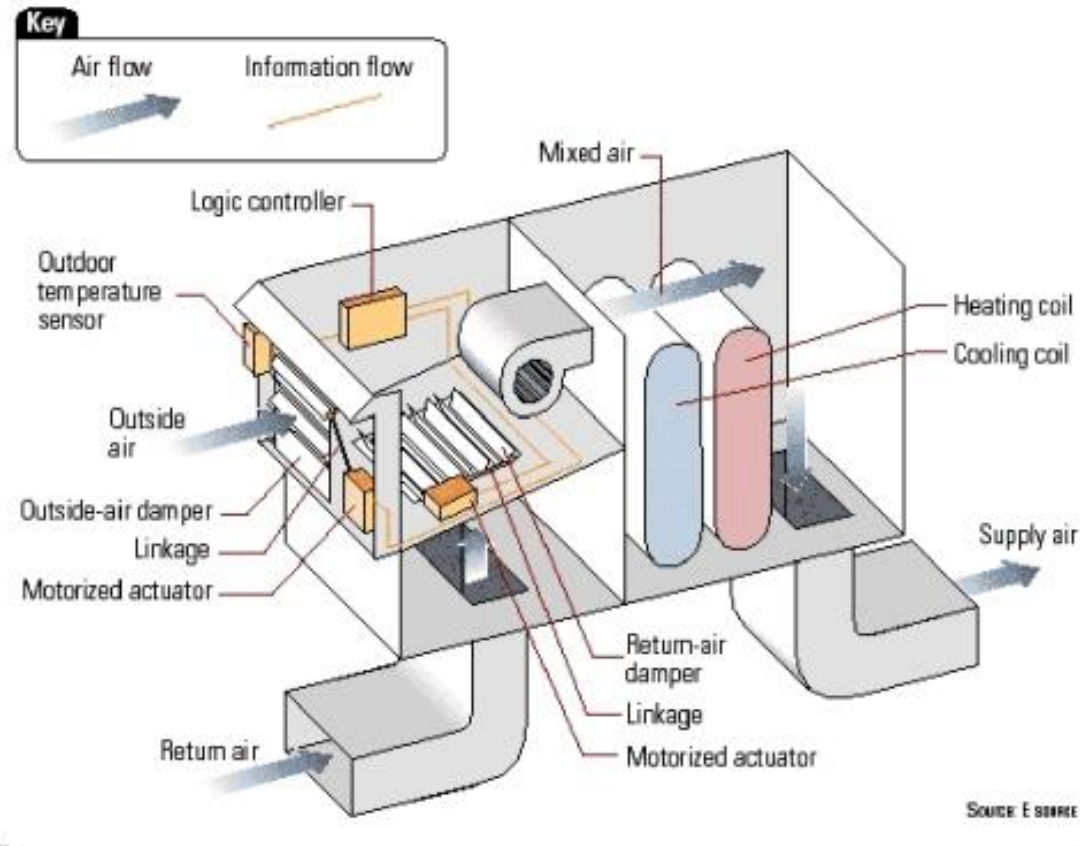
Hot Aisle Containment at ME1



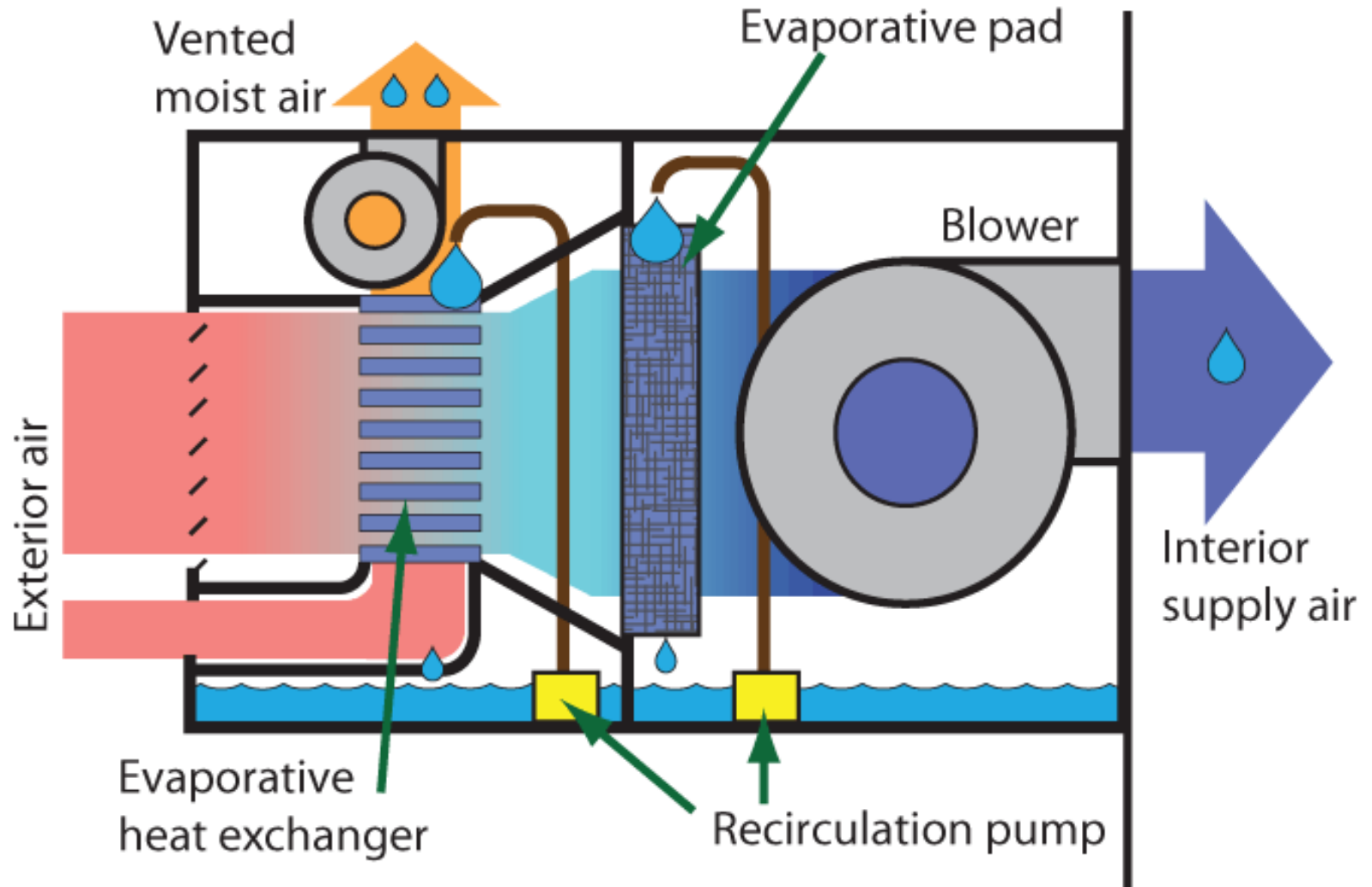
Free Cooling

Figure 1: The components of an economizer

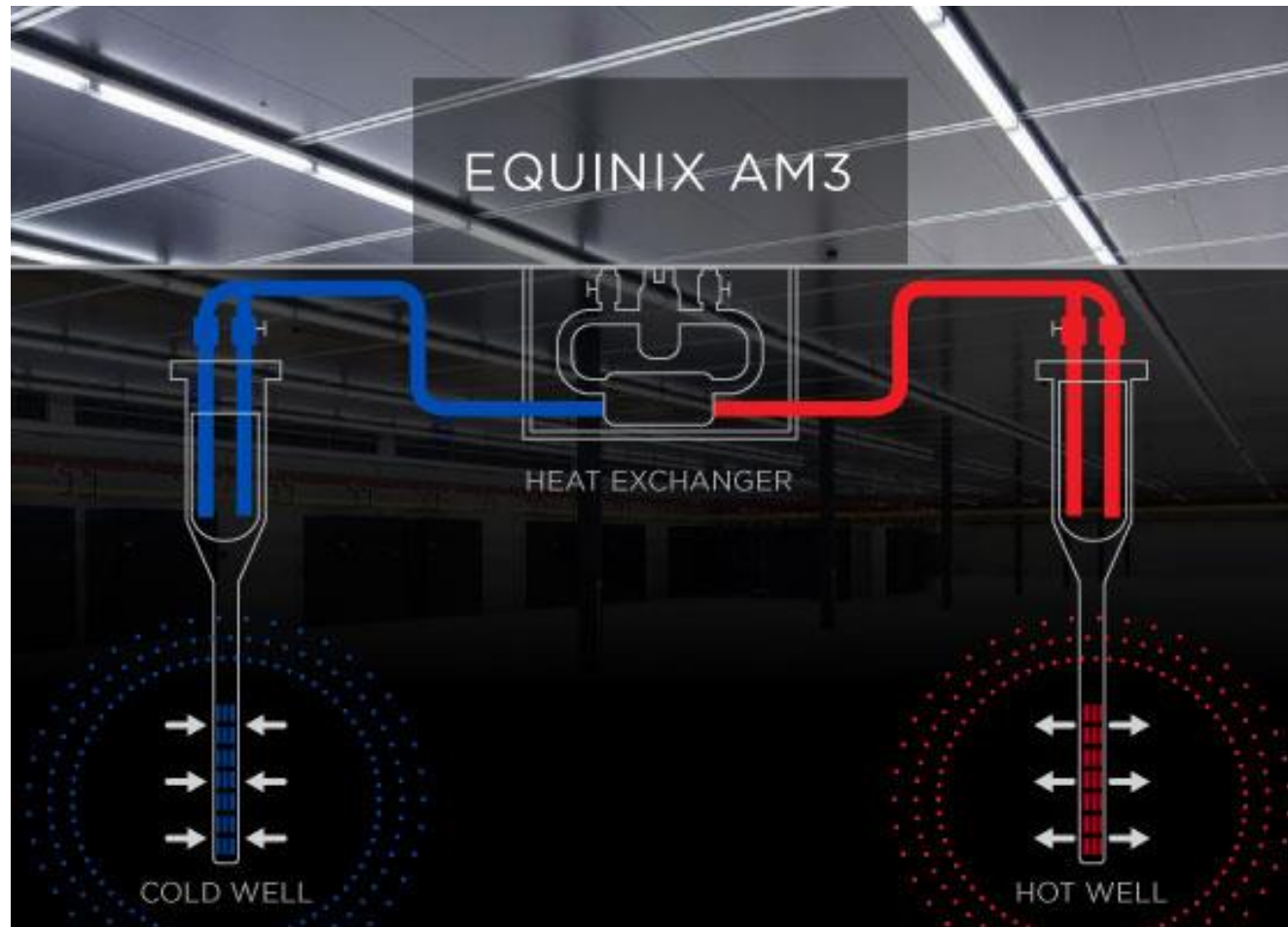
An economizer is simply a collection of dampers, sensors, actuators, and logic devices that together decide how much outside air to bring into a building.



Direct/Indirect Evaporative Cooling



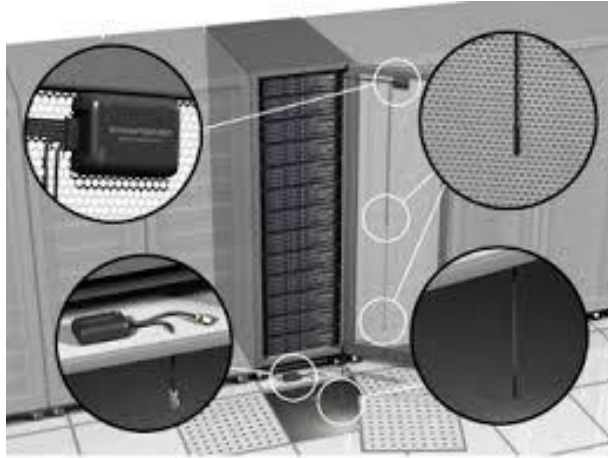
Aquifer Thermal Storage System



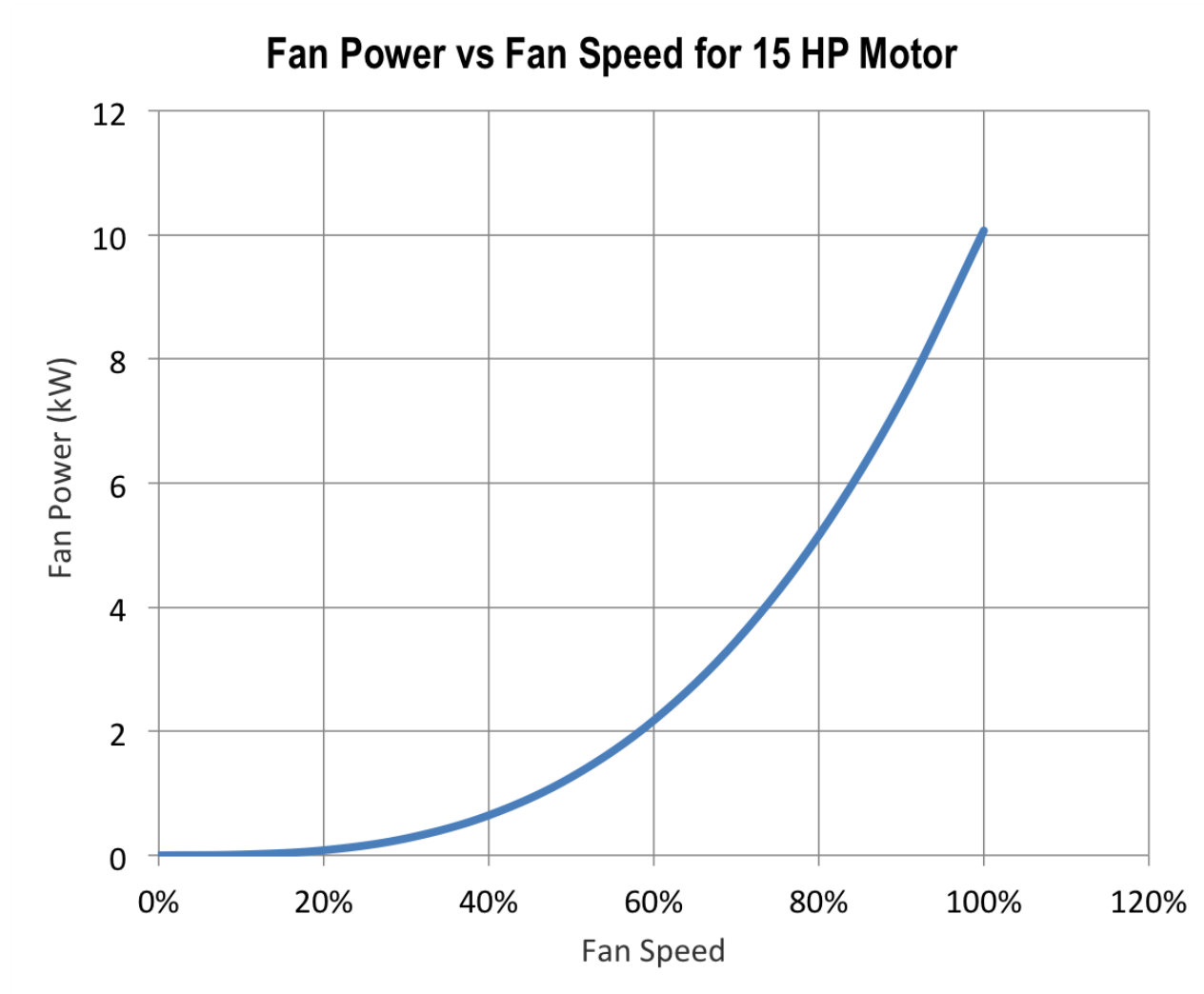
Deep Lake Water Cooling



Granular Temperature Control System



Variable speed drives for CRAC unit



Other stuff

- Energy Efficient Lighting
- Adaptive Control Systems
- Waste Heat Recycling
- Green Rooftops/Water Collection and Recycling
- Fuel Cells
- Solar Panels





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Thank you

<http://www.equinix.com/company/green/green-data-centers/>