

Energy's Digital Revolution

Emerging Platform Leaders

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Information failures = Market failures

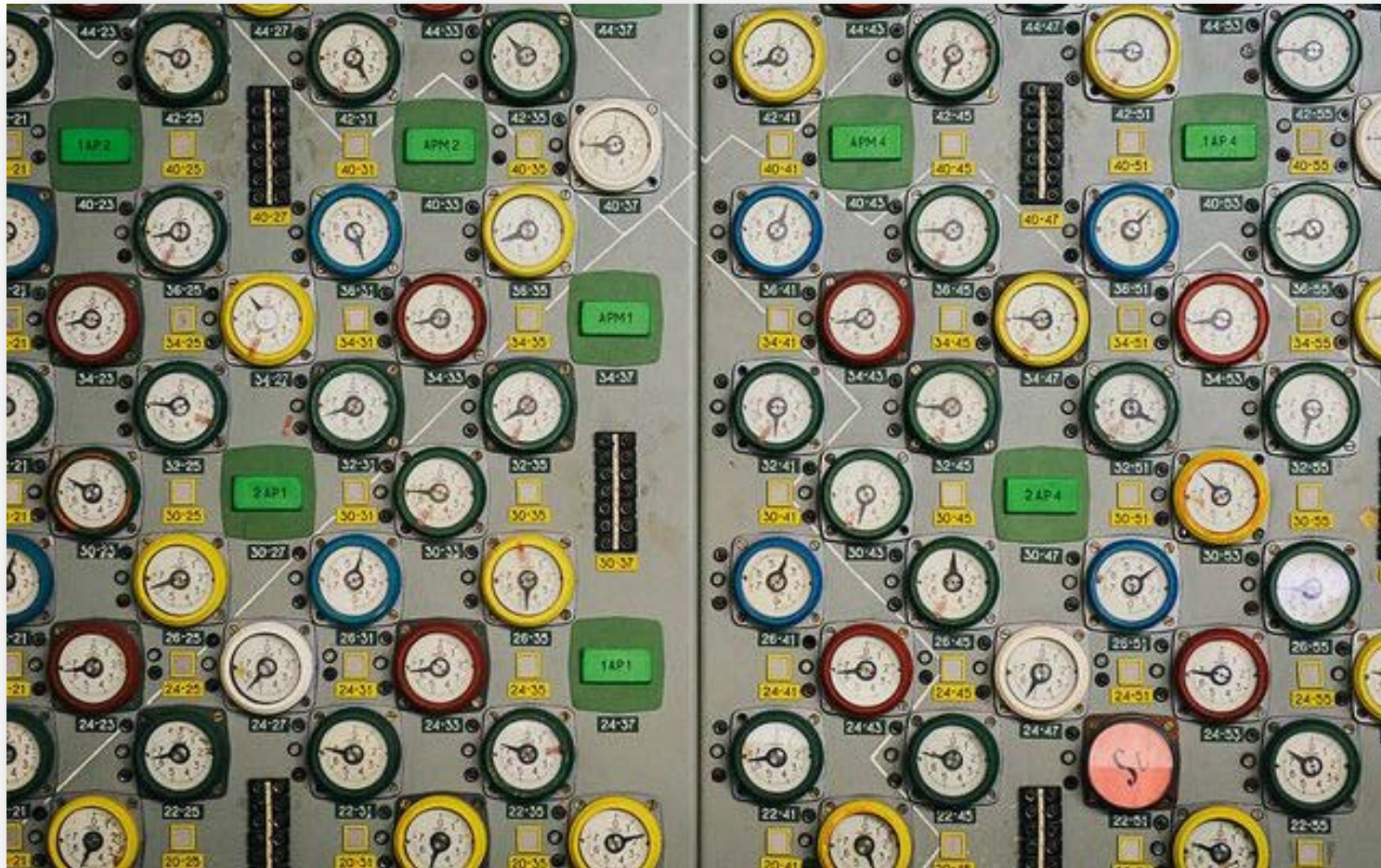


Information failure exists when:

- some, or all, of the participants in an economic exchange do not have *perfect knowledge*
- one participant in an economic exchange knows more than the other, i.e. the problem of *asymmetric*, or unbalanced, information

Energy sector and information failures

Power plant control room



Chernobyl NPP, Control Room No. 2 by СмдЯСояд

Spectrum of information availability



Consequences of scarcity

High transaction costs

Reactive

Error prone



Consequences of greater abundance

Lower transaction costs

Predictive

Less error prone

Forces reshaping energy markets

Information about energy is dramatically expanding



Source: John Canny, "Designing with Data", UC Berkeley, EECS, July 2013

New dynamics

1. Volume and velocity of data growing at
 - machine level
 - facility level
 - fleet level
 - network level
2. Expanded monitoring/automation
3. Shift from the reactive to the predictive
4. Rise of matching platforms
5. Experimentation with app stores

Perspective of scale... US quick energy facts

\$364 billion

US spend on electricity

125,000,000

Housing units

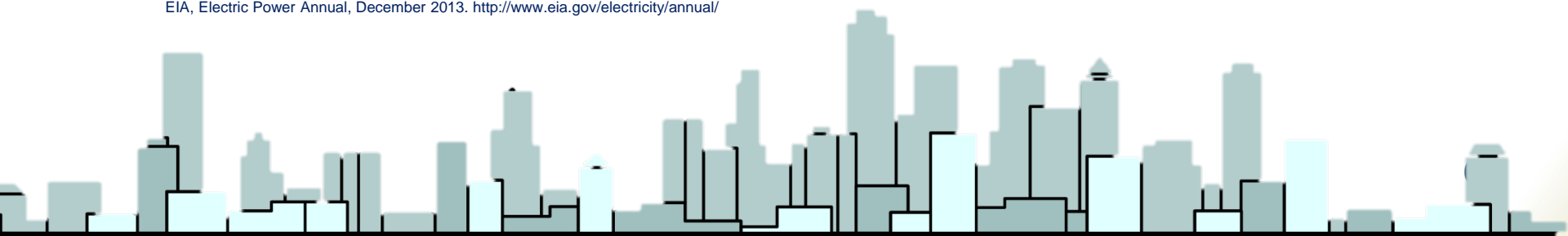
5,000,000

Commercial buildings

350,000

Large industrial facilities

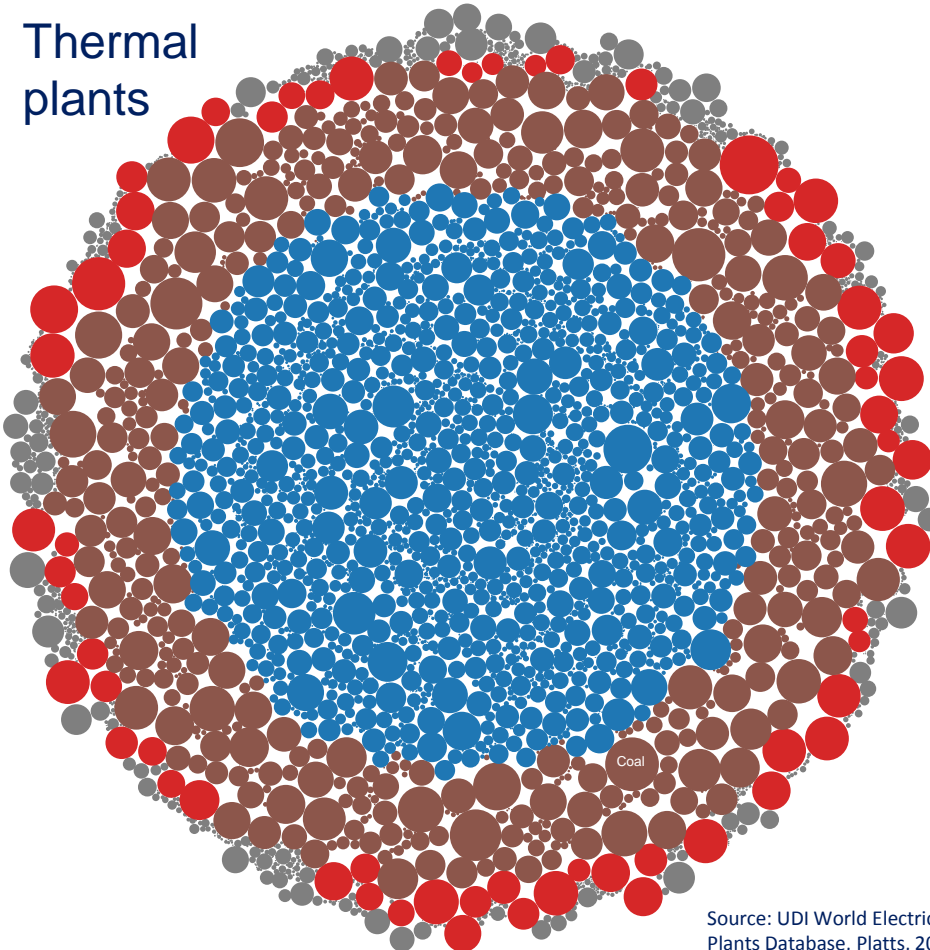
Source: Revenue from Retail Sales of Electricity to Ultimate Customers by End-Use Sector, EIA, Electric Power Annual, December 2013. <http://www.eia.gov/electricity/annual/>



US thermal power plant fleet

12 million man-hours to service annually*


Thermal plants



■	334,916	1,308
■	355,423	6,538
■	106,581	103
■	63,338	4,016
	860,257	11,965

Source: UDI World Electric Power Plants Database, Platts, 2012

Buildings = major source of energy demand

An aerial photograph of a city grid with numerous buildings. Overlaid on the buildings are 3D bar charts of various colors (yellow, green, orange, red, black) representing energy demand. The bars vary in height and are clustered together, indicating high energy density in certain areas. A large body of water is visible on the right side of the image.

Residential and commercial buildings make up nearly 40% of U.S. energy consumption

Data sources

Emerging platforms tap different sources information



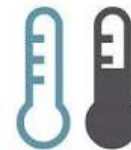
Utilities



Meters



Industrial facilities



Thermostats



Commercial



Other sensors



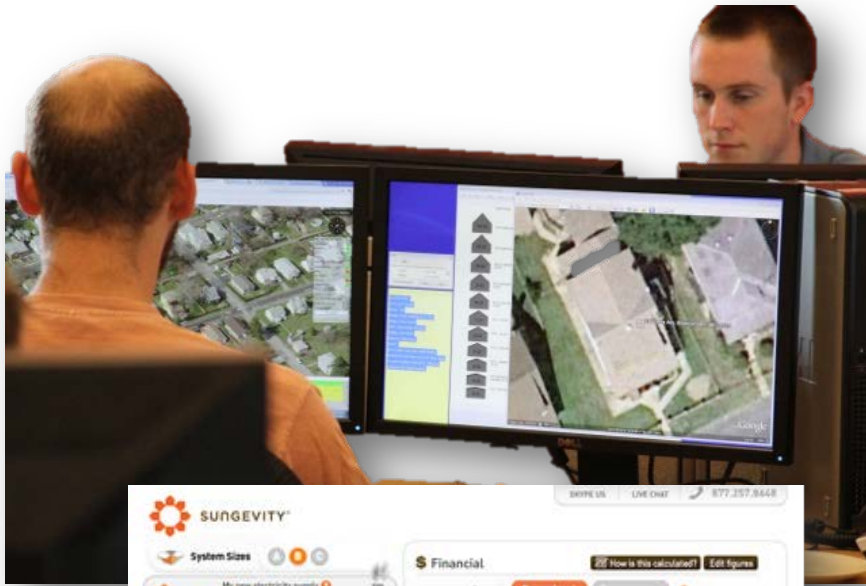
Residential



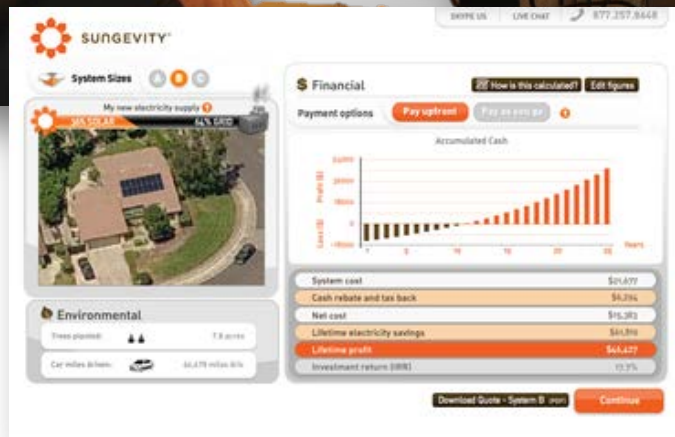
People

Supply-side platforms

Internet+ digital imaging = fewer truck rolls



“Solar designers” use satellite imagery and a sophisticated set of algorithms to remotely design solar panel systems.



Benefits

Speed

Customer quote within 24 hours

Lower cost

Reduce inefficient truck rolls

Greater reach

From offices in the Bay Area can size systems in Indiana or India

Source: Craig Rubens, “Sungevity: Where Solar Rooftops Meet the Internet” Gigaom, April 21, 2008.

Demand-side platforms

Commercial and residential building control systems

Johnson Controls' cloud-based apps store

FILTER APPS <small>View All</small>			
+ Recently Added	Carbon and Energy Reporter Johnson Controls	Continuous Diagnostics Advisor Johnson Controls	Custom Analyzer Johnson Controls
+ Apps	Energy Performance Monitor Johnson Controls	EnCenter - Analytics for Submetering T4G	Enterprise Services Manager Johnson Controls
+ Services	Tenant Bill Generator Johnson Controls	Energy Efficiency Tracker Johnson Controls	Total Energy ERP EnergyPoints
+ Category	Remote Building Analytics FirstFuel	Portfolio Manager by BuiltSpace BuiltSpace	Proteus MMX Asset Manager Free Edition Eagle Technology
+ By Company			
+ Country			
+ Industry			

- Review the performance of one piece of equipment, an entire building, or compare hundreds of facilities around the world.
- Pinpoint equipment that's wasting energy
- Monitor and report on carbon emissions and energy efficiency

Wave of “energy intelligence” startups

Twenty-two new companies launched since 2003



Strategic questions

- Where are the greatest opportunities for platform companies to grow in the energy sector?
- Are there strong network effects around energy supply or demand that new platform companies can exploit?
- Are there regulatory impediments that slow the growth of platform plays?



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