Energy's Digital Revolution
Emerging Platform Leaders

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Photo by Maria Carrasco Rodriguez

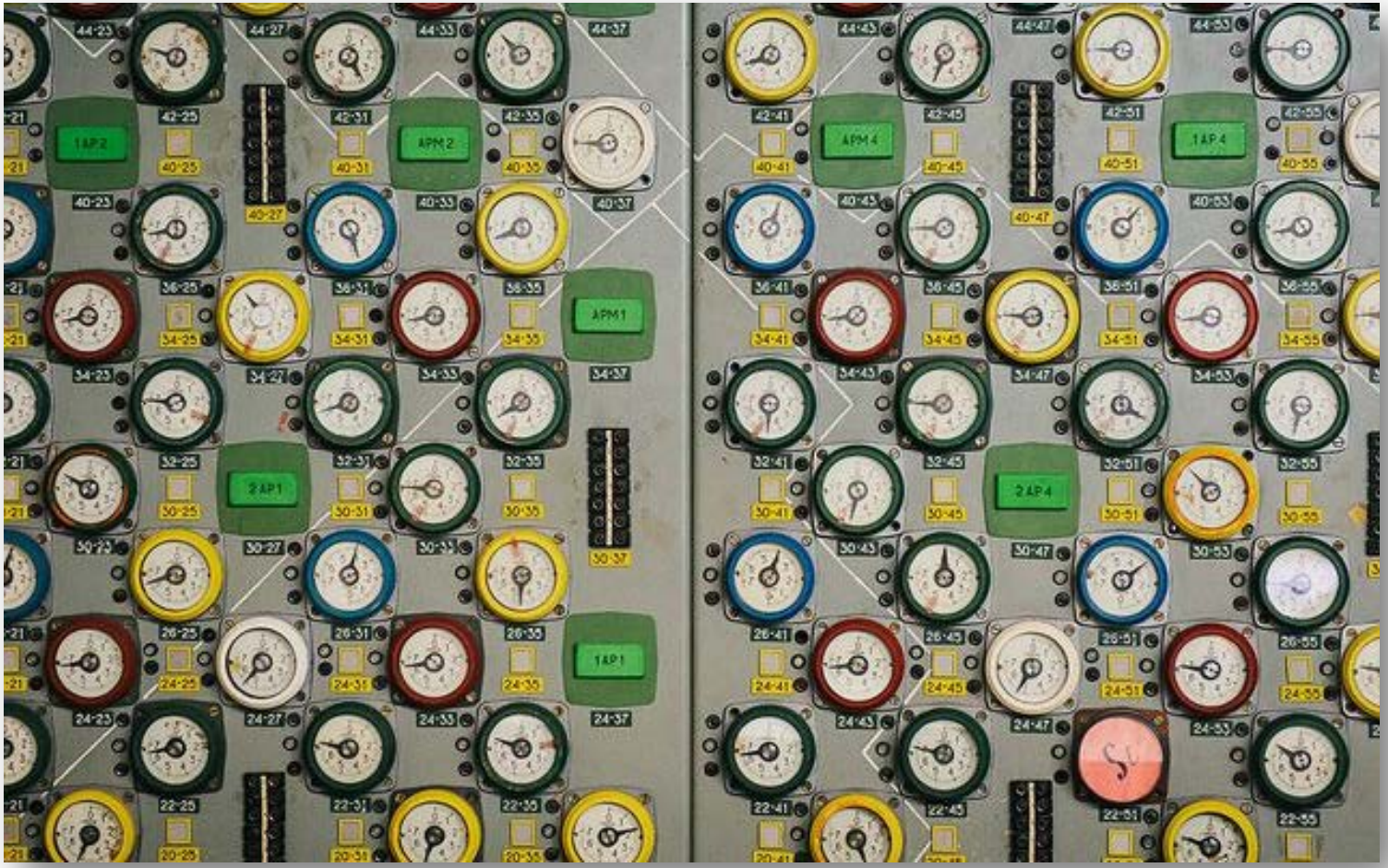
Information failures = Market failures

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 СмдяСояd

Spectrum of information availability

Consequences of scarcity	*Consequences of greater abundance*
High transaction costs	Lower transaction costs
Reactive	Predictive
Error prone	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

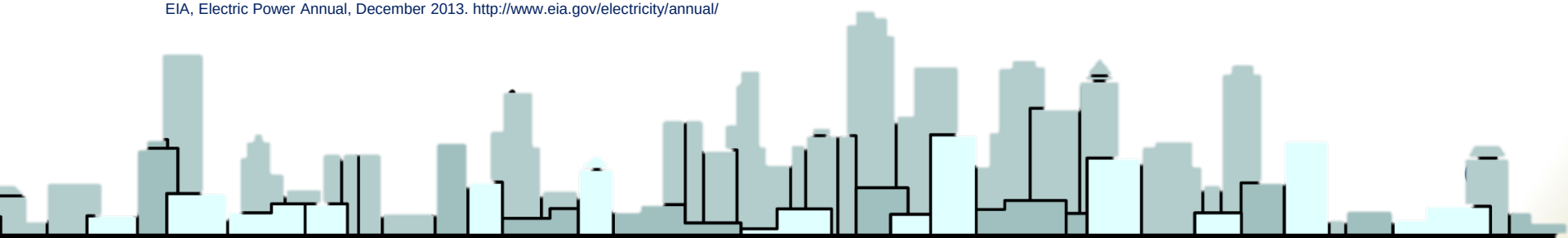
$364 billion US spend on electricity

125,000,000 Housing units

5,000,000 Commercial buildings

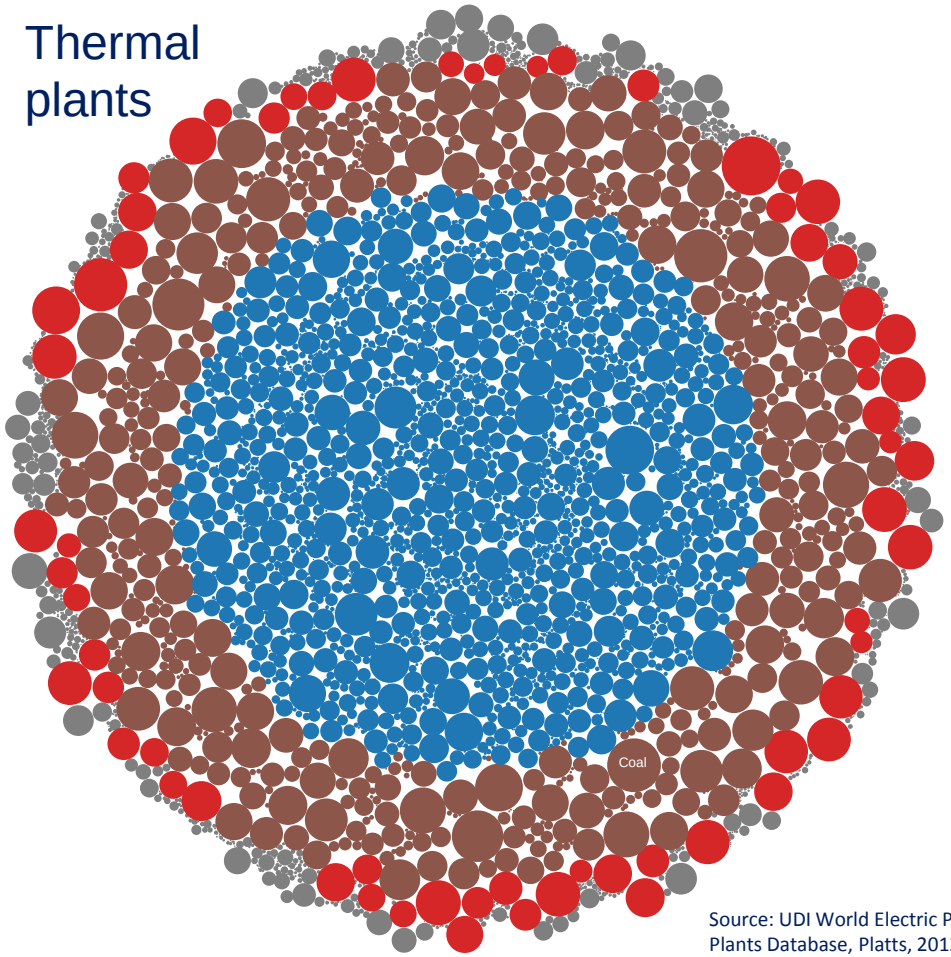
350,000 Large industrial facilities

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*



	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

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

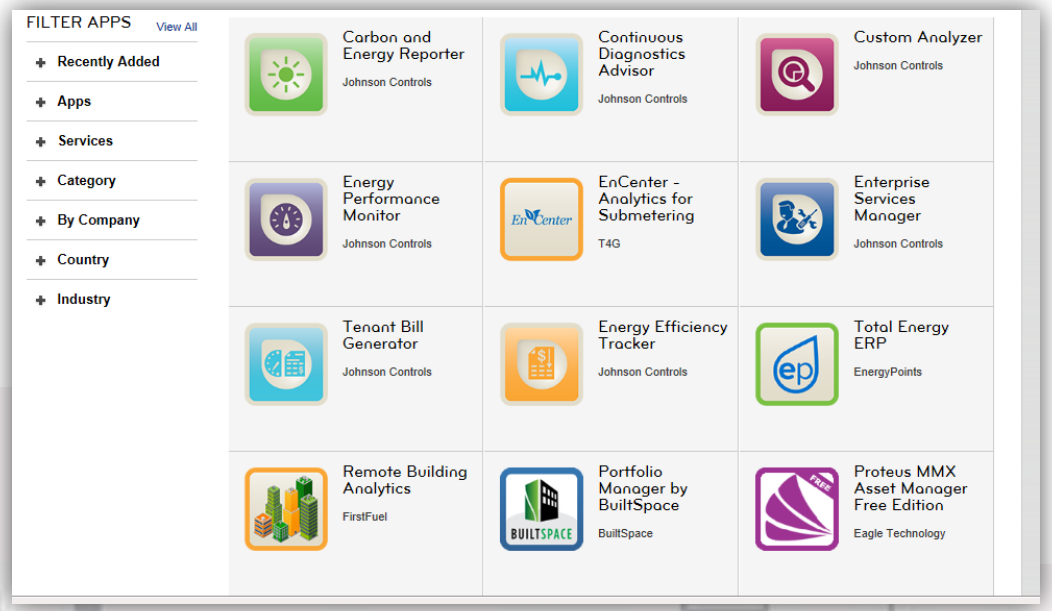
Speed	Customer quote within 24 hours
Lower cost	Reduce inefficient truck rolls
Greater reach	From offices in the Bay Area can size systems in Indiana or India

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



- 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

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Wave of “energy intelligence” startups

Twenty-two new companies launched since 2003

Source: CGE platform database, 2014

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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