The Changing Nature of Demand in the Energy Sector and its Impact on Equipment

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ELFA Equipment Financing Conference

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Outline

- We consider 3 (somewhat arbitrarily-chosen) eras: Prior to 2008, 2008-2014, and the Future.
- We consider “energy” to be coal, natural gas, oil, and electricity.
- Prior to 2008, demand for energy grew steadily.
- Between 2008-2014, demand growth stopped, and in many cases per capita consumption started falling.
- The change in trajectory is a result of many factors, most of which are likely to persist for some time.

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Implications

- As a result, the equipment landscape is likely to change significantly, both for existing equipment and for future demand for equipment.
- The changing nature of demand is likely to impact:
  - Economic useful life of equipment
  - Obsolescence adjustments in appraisals
  - Residual values
  - The types of equipment in demand
  - Likely areas for future growth

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The World as it Was: Prior to 2008

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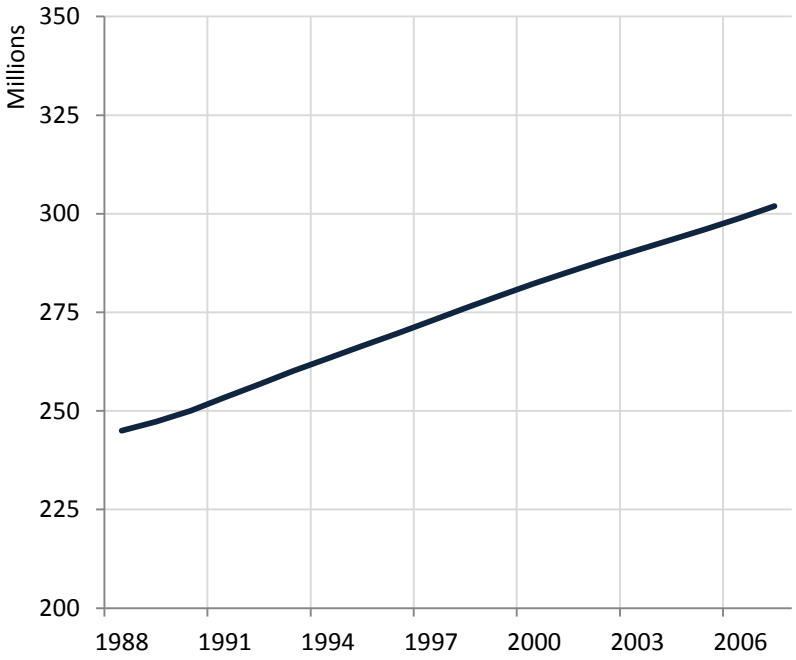
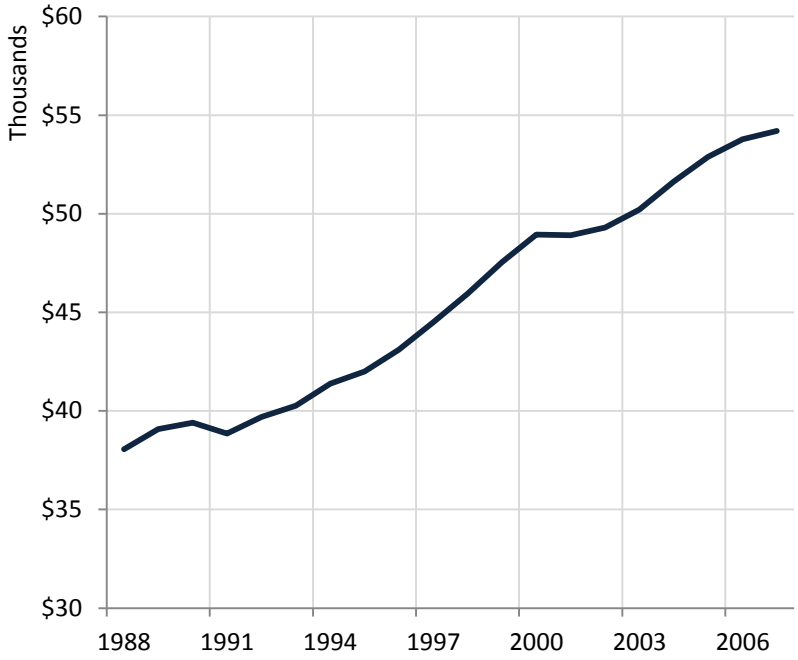
Steady Growth

U.S. Population Growth



U.S. GDP Per Capita



The population continued to grow, but the economy grew even faster

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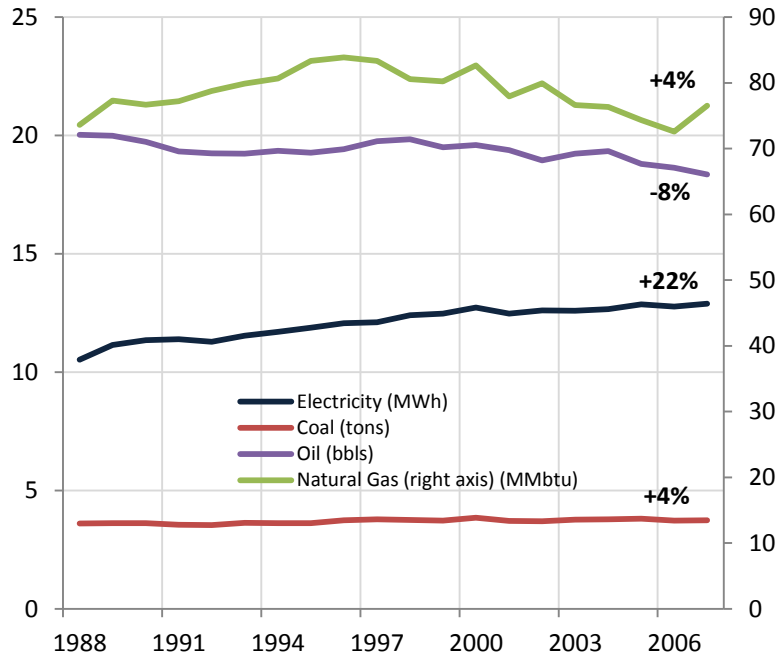
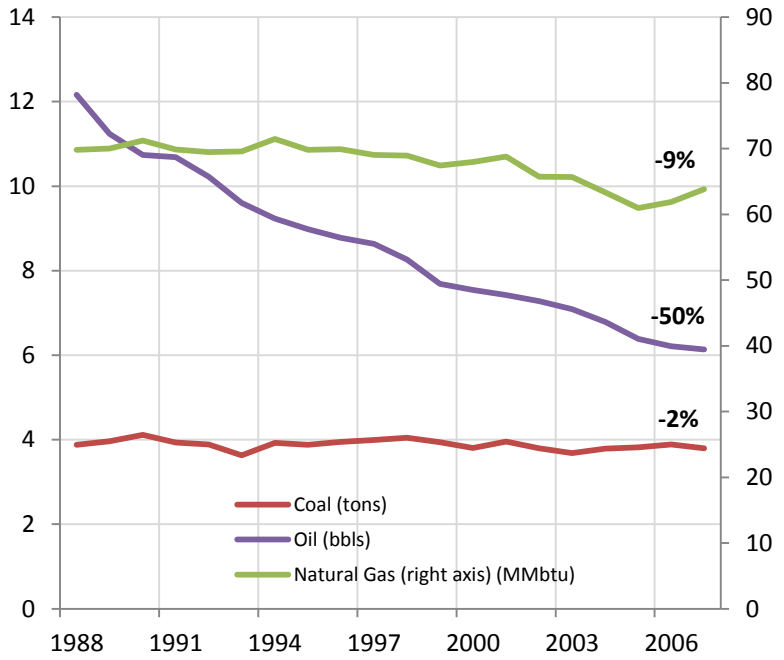
Growth in Energy Consumption

Annual Per Capita Energy Consumption



Increasing Consumption

Annual Per Capita Energy Production



Decreasing Domestic Production

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A Predictable Result

- The result of increasing per capita consumption and decreasing per capita production was entirely predictable:
  - Energy demand growth outstripped population growth
  - Prices increased
  - **Increased prices induced investments in additional supply, which increased demand for equipment**

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Equipment Economics

- "Equipment" in economic terms converts stocks (e.g., fuels) into flows (e.g., electricity).
  - A Cobb-Douglas style production function assumes output is a function of labor, capital, and productivity ($Y=AK^{\alpha}L^{\beta}$)
    - "K" (capital) is equipment
  - As demand for output (electricity, oil, gas, etc) increases, the demand for equipment (generators, rigs, pipelines, etc) increases, and the value/price of equipment increases; investment is stimulated
- It's important to recognize the two aspects of demand:
  - Demand for more overall output (more quantity)
  - Demand for more efficient output (more quantity per unit input); this is technological innovation or productivity

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A Period of Transition & Adjustment
2008 – 2014

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Equipment Economics

- In response to the favorable economic environment prior to 2008, investments in new energy-related equipment began to enter operation.
  - Power generation equipment
  - Drilling equipment
  - Pipelines
  - Fuel handling equipment

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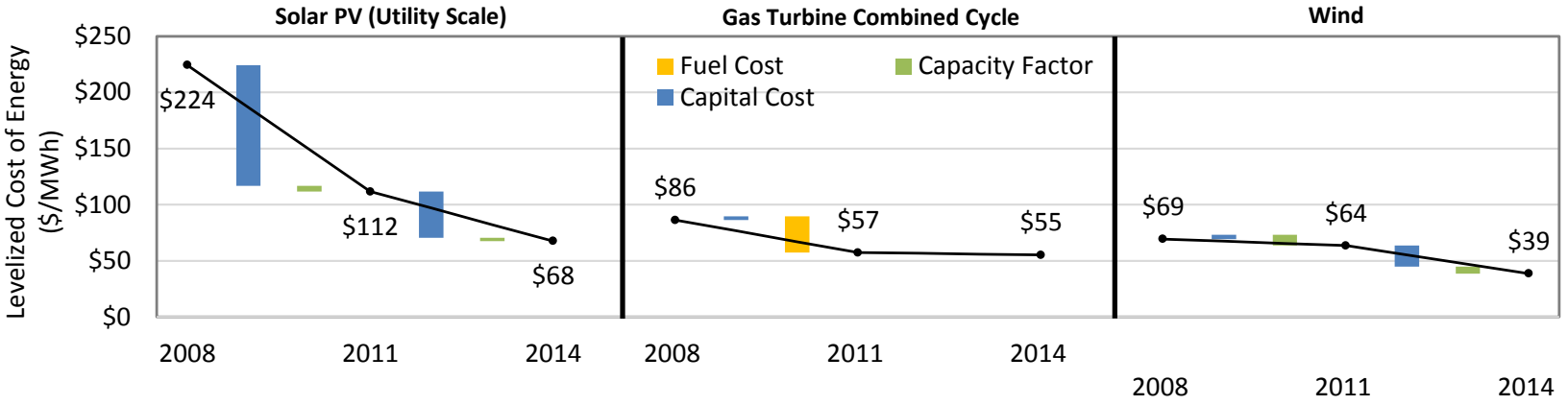
Enormous Change Followed

- Consider power generation.
- Investments in production and technological innovation have pushed prices down.



- Solar panel prices have plummeted and wind turbine costs have fallen, even as their efficiency has increased.

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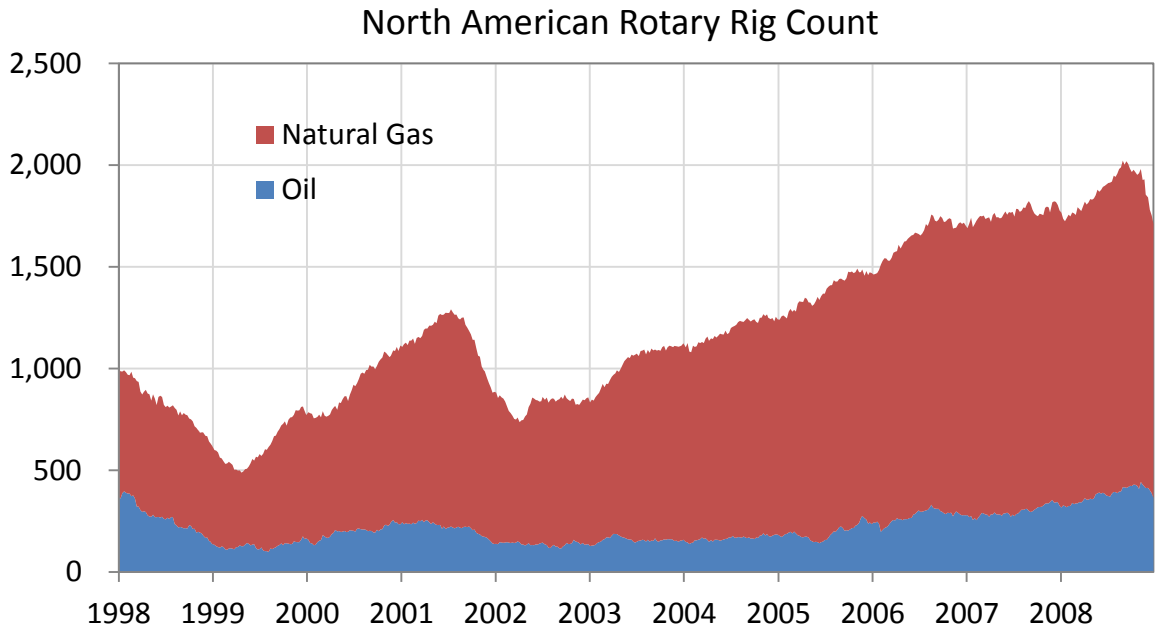
Enormous Change Followed

- Consider gas and oil.
- Favorable investment conditions and technological innovation caused rig counts to soar.



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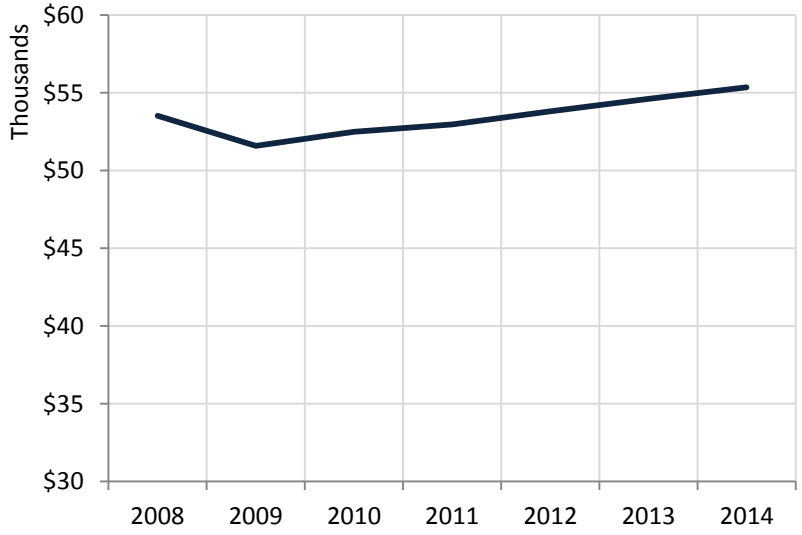
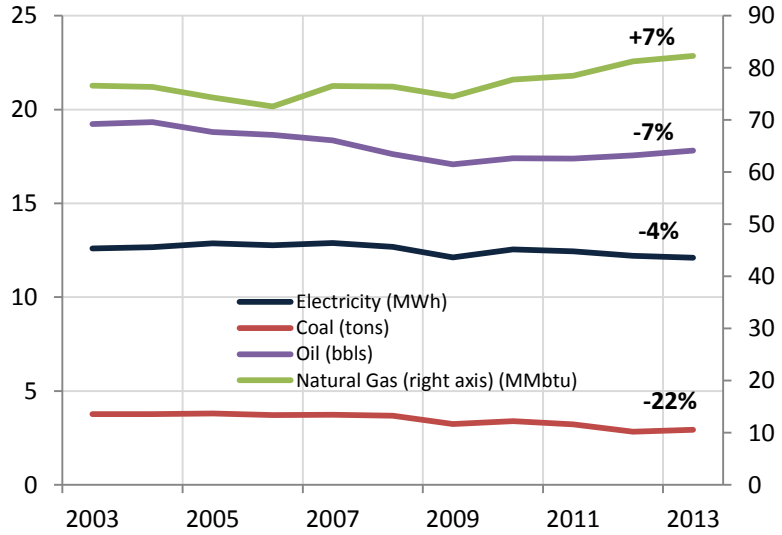
Unfortunate Timing

- The problem was that all of this new equipment was emerging just as energy demand was stalling.

U.S. GDP Per Capita



Annual Per Capita Energy Consumption



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Policy Responses

- Policy responses during the recession, however, doubled down on equipment investment:
  - Stimulus (ARRA, bonus depreciation, ITC)
  - Environmental policy changes increased incentives for renewable power while creating an “artificial” need for replacement of coal and oil
- As a result, some equipment investment (and therefore increased production) continued to increase in spite of weak demand.

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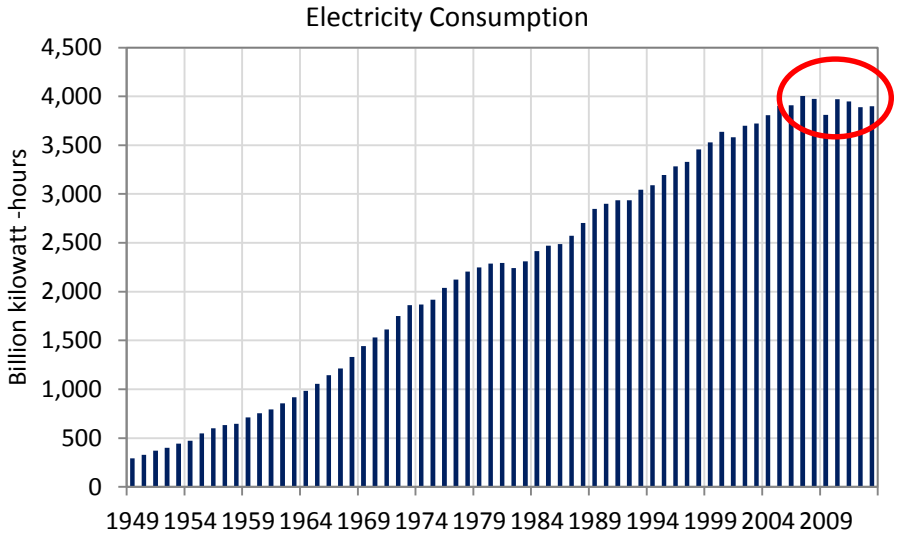
Weak Demand

- To be fair, just *how* weak demand was had many fooled.
- Since 1949, electricity demand (as a general proxy for energy) had never declined two years in a row. After 2008, it did that twice in the space of five years.



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Drilling Down on Demand

- It's important to distinguish between the two types of declining demand for energy that we see:
  - A reduction in the demand for *any* energy
    - A reduction in the demand for goods and services produced with energy
  - A reduction in the amount of energy needed for a particular purpose
    - A reduction in the energy input required to produce a given level of output

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Declining Demand

- Both incentives and technological improvements have interacted to reduce aggregate demand for energy.
- Some demand for energy is lower because demand for end products is lower (energy is not an end in itself).
  - Traditional economic forces, like a recessionary reduction in demand
- Some demand for energy is lower because it is being produced/used more efficiently and we are occasionally paid for *not* using it.
  - This is new, and important to understand when considering demand for energy
  - Distributed generation (rooftop solar)
  - Energy efficiency
  - Electricity demand response

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Example: “Negawatts”

- Rather than turn on very expensive generation during times of peak demand, markets can offer to pay some consumers to reduce their electricity consumption and thereby reduce the market clearing price charged to all consumers. No additional generating equipment is necessary.
- Technological improvements and policy changes facilitate this:
  - Real-time metering
  - Competitive power market designs
  - Distributed generation
- PJM demand response and energy efficiency participation has gone from 700 MW (2008/09) to 20,000 MW (2015/16).
  - By comparison, PJM has roughly 30,000 MW of nuclear capacity.
- So is demand reduced or merely shifted or deferred?

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Where Do We Go From Here?
2015 and Beyond

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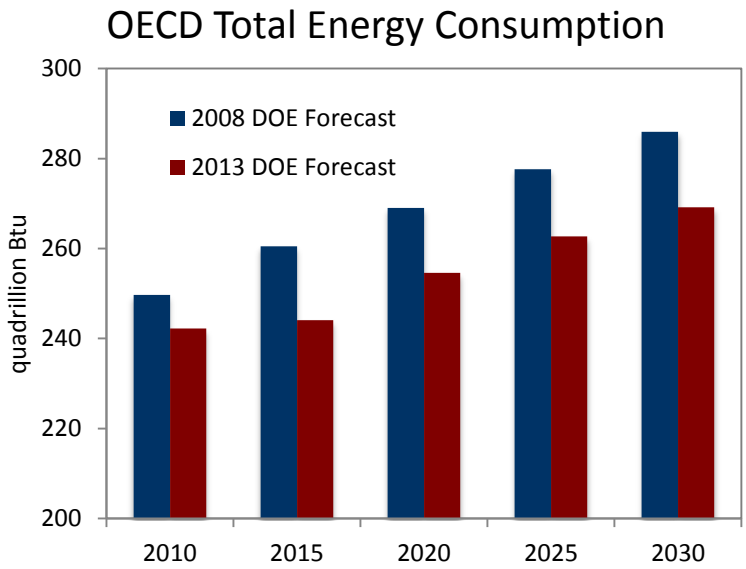
Excess Supply

- We are literally awash in energy.
- Growth rates need to “catch down” to demand.
- It’s not just the U.S.; global demand for energy has slowed:



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Energy Efficiency

- There is a heightened and growing interest in efficiency across multiple forms of energy:
  - Rising CAFE standards
  - The Clean Power Plan incorporates energy efficiency directly as a compliance option
  - Federal and state incentives continue to be targeted to efficiency improvements
  - Electric power market design continues to evolve toward greater incorporation of demand-side factors

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Conclusions, Implications & Opportunities

- This is not a “new paradigm”; this is market forces doing what they normally do.
- High demand led to high prices, which encouraged both conservation (energy efficiency) and increased investment in supply.
- Increased supply and moderated demand return the system to equilibrium.

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Conclusions, Implications & Opportunities

- Adjustment here may be more extreme, ironically, because of the various efforts to avoid it
  - Government stimulus activity incentivizing investments that weren't otherwise economic
  - Encouraging more efficiency than would otherwise have been justified
- But adjustment will occur and that will shake up the landscape
- "You can avoid reality, but you cannot avoid the consequences of avoiding reality."

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Conclusions, Implications & Opportunities

- Economic Useful Life
  - For some equipment, *economic* useful life may drop because it is no longer economically viable
    - Nuclear, coal, drilling rigs
  - Some existing equipment may have an increased economic useful life as it is maintained to avoid the cost of replacement
- Residual Values
  - Enhanced focus on energy efficiency and investments in technological innovation may contribute to increased obsolescence adjustments for existing equipment
    - Solar, wind
    - Coal power plants and their supporting infrastructure may increasingly shift to intermittent operation from baseload for economic and environmental reasons

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Conclusions, Implications & Opportunities

- Opportunities exist in some areas:
  - Manufacturing equipment is likely to benefit from falling energy costs
  - Petrochemical and industrial equipment may benefit from low feedstock prices and geographic proximity to low-cost supply
  - Export-facing equipment has become more lucrative
    - Natural gas is still more expensive outside the U.S. than inside ($10-15/MMbtu vs $3/MMbtu)
    - LNG export terminals are being developed and several firms have now received export approval (four sites currently under construction)
    - Shell recently received approval to export minimally-processed crude oil (condensate), in what is likely the first of many such approvals

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Summary

- Energy demand has flattened across the board
- It is unlikely to return soon, as the economy needs to grow into the new capacity
- Energy efficiency remains attractive (metering, transmission, distributed generation)
- Significant energy export opportunities exist (transportation, terminals)
- Expect existing energy equipment portfolios to be shaken up

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Decision Analysis

- Quantitative Risk Analysis ("QRA")
- Electric and Fuel Market Studies
- Electric Market Forecasts
- Fuel Market Forecasts
- Statistical Analysis of Asset Performance
- Hedging Strategy Analysis
- Analysis of Capital Cost Uncertainty
- Default Analysis for Loan Guarantees
- Acquisition and Divestiture Advisory
- Valuation Litigation Support

Appraisal & Valuation

- Equipment Fair Market Value Appraisal
- Residual Value Determination
- Liquidation Value Determination
- Tax Analysis/Support
  - Alternative Energy Property Allocations
  - Business Combinations (SFAS 141)
  - Goodwill and Intangible Assets (SFAS 142)
  - Gain or Loss from Acquisition (IRC 1060)

Engineering Consulting

- Independent Engineer Analysis
- New Technology Commercialization
- Power Plant Operation and Maintenance
- Portfolio Management
- Feasibility Studies
- Expert Witness Testimony/Consulting

Asset Management

- Acquisition and Divestiture Support
- Operations Efficiency Analysis
- Outage Management
- On-Site Operations and Maintenance
- Environmental Compliance Review
- Permitting, Licensing, and Accounting

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Recent DAI Experience

ABENGOA BIOENERGY

15 million GPY

Appraisal of biodiesel production facility

October 2014

NXT CAPITAL

nrg

122 MW

Appraisal of wind power project for tax equity financing

October 2014

J.P.Morgan

ABENGOA SOLAR

250 MW

Appraisal to support purchase of member interests in solar thermal project

September 2013

citi LIBERTY INTERACTIVE

ARCLIGHT

192 MW

Appraisal to support sale of hydroelectric project

April 2013

PHILIP MORRIS CAPITAL CORPORATION

everpower™

150 MW

Appraisal to support acquisition of the Alta VI wind project

May 2012

Terra-Gen Power, LLC

SUNRUN

65 MW

Appraisal of multiple residential PV portfolios in three separate financings

September-October 2012

J.P.Morgan

WND WESTERN WIND ENERGY

C$364,000,000

Valuation of company assets for a Substantial Issuer Bid

August 2011

Fiberweb

$24,180,000

Appraisal services for a sale-and-lease back transaction

March 2011

GE

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