THE FUTURE OF THE UTILITY INDUSTRY

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Based on input from Mark Gabriel, Black & Veatch

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TOPICS

- Discussion of industry issues and trends
  - What keeps you awake at night?
- Results of the Strategic Directions Survey
  - Do these results resonate with your organization?
- Carbon and capacity issues and rulings
  - What does it mean to your organization?
- Being smart about smart grid
  - Are you planning or not ready?
- Preparing for a Black Swan?
  - Can you be ready?

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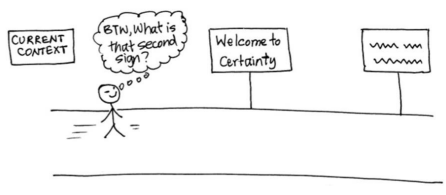
HOPING FOR CERTAINTY?



We seek certainty, but uncertainty is the norm

Doubt is not a pleasant condition, but certainty is absurd.
—Voltaire

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TOP MARKET DEVELOPMENTS
INDUSTRY IN TRANSFORMATION

- **Lingering recession, expanding environmental mandates and growing public policy uncertainty**
- **Aging infrastructure, environmental upgrades, and water quality concerns among other issues will continue to require significant capital investments**
- **"Rethinking" of the optimal industry structure**
- **Changes may be transformational and disruptive. And, may include further consolidation, new business models, updated operating practices, and new technologies**

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INDUSTRY PLAYBOOK
2012 AND BEYOND

Redefine boundaries
- Legislative solutions—e.g. rate design, save-a-watt, state and federal incentives
- "Smart"- enabled products and services—energy management, distributed gen, Water conservation and re-use
- Water utilities about to enter consolidation phase

Invest
- In core business—generation, T&D?
- Along value chain—upstream, downstream
- In new technologies (renewables, smart programs)

Grow the traditional business
- Stay on message: reliable & affordable
- Continue to invest: power generation, water infrastructure, power and water transmission, gas transmission and distribution

Reduce Costs
- Asset management solutions
- Sourcing models
- Capital and O&M project prioritization and "re-casing"
- Technology enablement
- Operational efficiency

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WHAT IS KEEPING YOU AWAKE AT NIGHT?

- EPA regulations
- The polemics of power sources
- Capacity needs
- Utility financial pressure
- Movement to gas (and fracking)
- Technical potential versus reality
- Economic conditions

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INDUSTRY OVERVIEW

THE TOP 10 ISSUES

THREE-YEAR COMPARISON OF THE TOP 10 ISSUES

2009/2010		2011		2012	
Reliability	**4.05**	**(Economic) regulation**	**4.20**	**Aging infrastructure**	**4.44**
(Economic) regulation	**3.93**	**Aging infrastructure**	**4.19**	**Reliability**	**4.44**
Aging work force	**3.93**	**Reliability**	**4.16**	**Environment**	**4.31**
Environment	3.81	Technology	4.03	Long term investment	4.27
Long term investment	3.81	Environment	3.92	Technology	4.18
Aging infrastructure	3.75	Long term investment	3.76	Security	4.15
Technology	3.55	Aging work force	3.75	Aging work force	4.06
Security	3.37	Fuel policy	3.64	Fuel policy	4.04
Market structure	3.32	Security	3.52	Economic regulation	4.02
Fuel policy	3.31	Market structure	3.40	Market structure	3.94

Source: Black & Veatch
Each year survey participants are asked to rate on a scale of 1 to 5, where 1 indicates "very unimportant" and 5 indicates "very important," each of the above listed long-term issues within the electric utility industry. The chart above reflects the average rating of each during the past three years.

Reliability, aging infrastructure and the environment are the top issues industry-wide

INDUSTRY OVERVIEW

THE TOP ENVIRONMENTAL CONCERNS

THREE-YEAR COMPARISON OF TOP ENVIRONMENTAL CONCERNS

2009/2010		2011		2012	
Carbon emissions legislation	**4.17**	**Carbon emissions legislation**	**3.88**	**Carbon emissions legislation**	**4.13**
Water Supply	**3.16**	**Water Supply**	**3.86**	**Water Supply**	**3.76**
NOx	**3.00**	**Nuclear fuel disposal/ storage**	**3.86**	**Physical carbon emissions**	**3.73**
Mercury	3.00	Nuclear Safety	3.81	Mercury	3.70
SO_2	2.98	Water effluent	3.39	Nuclear fuel disposal/ storage	3.65
Particulates	2.82	Physical carbon emissions	3.33	Water effluent	3.63
Water effluent	2.78	Coal handling & ash disposal	3.32	Particulates	3.59
Coal production	2.71	Mercury	3.26	NOx	3.59
Nuclear fuel disposal/ storage	2.70	NOx	3.25	Nuclear Safety	3.58
Coal transportation	2.65	SO_2	3.23	SO_2	3.54
Site remediation	2.54	Particulates	3.17	Coal handling & ash disposal	3.49
		Site remediation	3.08	Coal production	3.27
		Coal production	3.03	Site remediation	3.23
		Coal transportation	2.70	Coal transportation	2.94

Source: Black & Veatch
Each year, survey participants are asked to rate the environmental concerns listed above on a scale of 1 to 5, where 1 indicates "least concerned" and 5 indicates "most concerned." Carbon emissions and water supply have been the top environmental concerns throughout the history of the Black & Veatch survey.

INDUSTRY OVERVIEW

TOP ENVIRONMENTAL TECHNOLOGIES

THREE-YEAR COMPARISON OF "ENVIRONMENTALLY FRIENDLY" TECHNOLOGY RANKINGS

2009/2010		2011		2012	
Nuclear energy	**4.19**	**Nuclear energy**	**3.87**	**Nuclear energy**	**3.84**
Natural gas	**3.29**	**Natural gas**	**3.75**	**Natural gas**	**3.84**
Wind power	**3.28**	**Hydroelectric**	**3.50**	**Hydroelectric**	**3.44**
Hydroelectric	3.23	Solar energy	3.42	Solar energy	3.40
Coal gasification	3.21	Wind power	3.25	Biomass	3.21
Solar energy	3.20	Coal gasification	3.24	Wind power	3.14
Biomass	3.11	Biomass	3.07	Coal gasification	2.98
Tidal generation	2.71	Tidal generation	3.00	Tidal generation	2.71

Source: Black & Veatch
Each year, survey participants are asked to rate on a scale of 1 to 5, where 1 means "least emphasis" and 5 means "most emphasis," where the industry should place its emphasis in environmentally friendly technologies. Nuclear has been the top-ranked technology since the survey's inception. Natural gas tied with nuclear this year, while wind power continues to slide down in rankings.

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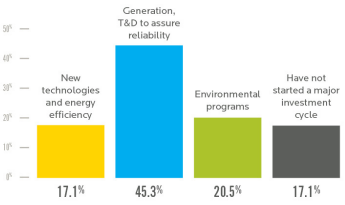
CUSTOMERS

RATES HAVE AND WILL CONTINUE TO RISE

AREA OF CONCENTRATION FOR MAJOR INVESTMENTS



Source: Black & Veatch
Survey participants were asked to select one of the above categories that best represents where their major investments are most concentrated.

More than 80% of utilities are embarking on a major investment cycle

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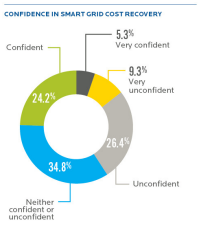
REGULATIONS

SMART GRID INITIATIVES PROVIDE EXAMPLE OF HOW ECONOMIC REGULATIONS INFLUENCE TECHNOLOGY INVESTMENTS

CONFIDENCE IN SMART GRID COST RECOVERY



Source: Black & Veatch
Survey participants were asked, "What is your level of confidence that utilities in your state will be able to recover the costs of smart grid in an effective and timely manner in the future?" More than one-third of utility participants are either "very unconfident" or "unconfident" in their ability to recover costs associated with smart grid investment.

Nearly 1 in 3 utilities are unconfident or very unconfident in their ability to recover smart grid costs

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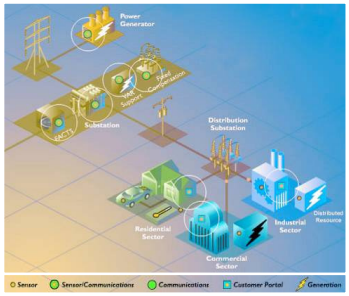
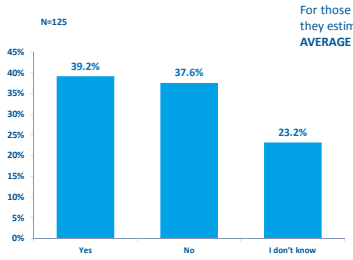
THE DESTINY OF INTELLIGENT INFRASTRUCTURE



- $50 Billion* will be spent in next 5 years in T&D
- How SG will change load profile is critical
- The enabler for energy efficiency and demand response
- How customers interact with the system is key

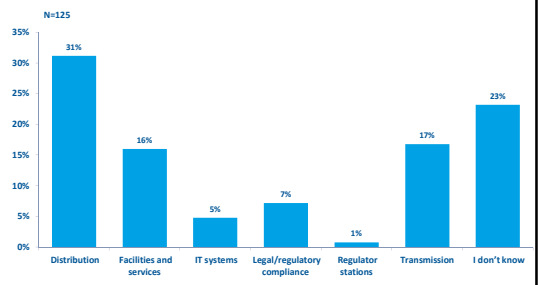
AGING INFRASTRUCTURE



For those who answered "Yes", they estimated it would take **AVERAGE 21** years to replace all.

Q20. Does your organization have aging infrastructure that currently needs to be replaced? If yes, what is the current duration of your replacement plan? *(Value Chain)*

ASSET THAT WILL RECEIVE THE LARGEST CAPITAL INVESTMENT



Q22. Which of the following functions in your organization will receive the largest percentage increase in capital investment over the next 5 years? (Select one) *(Value Chain)*

SIX MEGA-TRENDS UNIVERSALLY IMPACT THE ENERGY AND WATER INDUSTRY

IN A TWITTER WORLD HOW DO YOU MAKE A 40-YEAR INVESTMENT?

- Utility economic logic does not always apply
- Customers (and some regulators) do not have a sophisticated appreciation on how the system really operates.
- We must make long term decisions with limited information about changing technology.

MEGATREND: CARBON/CAPACITY CONFLICT

We're on track for the "train wreck" of regulations vs. carbon et al

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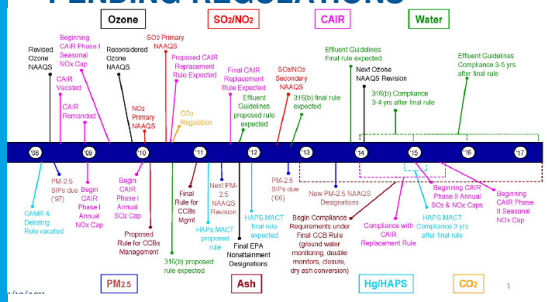
NEW GENERATION COSTS ESCALATE UNDER EPA'S PENDING REGULATIONS



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SOURCES & DRIVERS OF ENVIRONMENTAL REGULATIONS

CONGRESS

EXECUTIVE BRANCH

FEDERAL COURTS

"Vicious Circle" of Environmental Policy Uncertainty

POWER GENERATION

THE DYNAMIC AGE

CONTRASTING WORLD VIEWS

- Reality of system operations is generally ignored
- Reliability hangs in the balance
- A surge in demand, or a hot summer or cold winter may lead to significant shortages as economy improves.
- Timing of regulations impact various regions differently
- Belief, not engineering, leads the way

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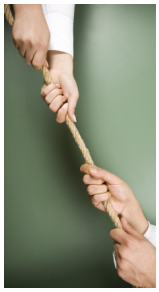

THE TUG OF WAR OVER WHAT THE NEW RULES REALLY MEAN

- NERC: EPA Rules Could Stress the Nation's Grid
- DOE: EPA rules will create no resource adequacy issues
- World Resources Institute: Cost predictions of EPA rules are overstated
- FERC: Conference raises reliability issues from EPA rule

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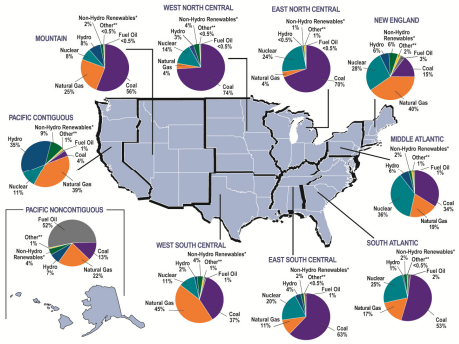
YOUR PERCEPTION DEPENDS ON YOUR LOCATION



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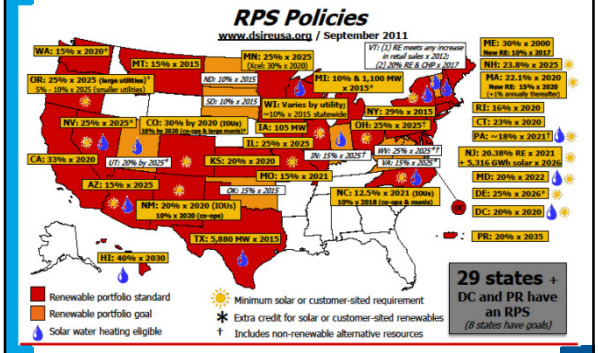
WILL WE SEE FEDERAL GHG REGULATIONS?

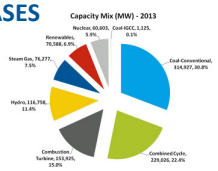


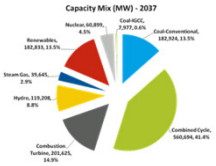
15 August 2012

POWER GENERATION

RPS AND COAL UNIT RETIREMENTS DRIVING CAPACITY INCREASES

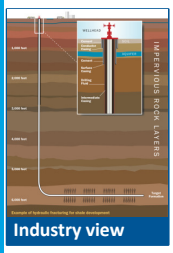
- Expect Nuclear deferrals and cancellations of new units to continue
- Coal unit retirements of 61.5 GW by 2020, driven primarily by EPA hazardous air pollutant requirements; Additional 70GW by 2037
- More than 380 GW of new natural gas capacity is expected before 2037





Data Label Legend: Technology, Capacity (MW), Share of Total (%)
Source: Black & Veatch Analysis

SHALE GAS FIELD OF DREAMS WILL BE IMPACTED BY EPA



Industry view

Anti-view

- **EPA Ties Fracking, Pollution**
- **Popular drilling technique blamed for tainting water supply in Wyoming Town**
- **Man-made earthquakes claimed in Oklahoma—including You Tube videos**

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SMART GRID FUTURE

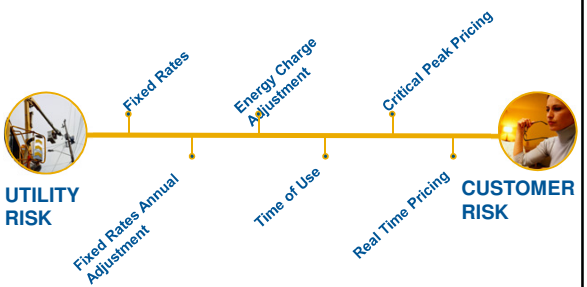
- Smart grid will continue to grow modestly
- Consumer participation initially low
- This will change as automation takes hold
- We may be building unrealistic expectations
- Utilities will gradually move to smart grid because it makes business sense
- Workforce, environment and overheads will be the drivers
- Utilities will not get significant benefits unless they make major process changes

THE DESTINY OF CUSTOMER ENGAGEMENT

- SQRA (security, quality, reliability, and availability) are at the core of this change
- Clients will demand the Burger King model of "have it your way"
- Systems to manage customer interaction will be required in new and challenging ways

CUSTOMERS GET CREATIVE AROUND THEIR ENERGY SUPPLIES AND SUPPLIERS

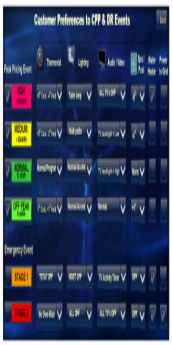
Customers want choice but not risk; customers do not necessarily make economic choices



HOME TECHNOLOGIES WILL DRIVE SMART GRID BENEFITS

- As of December, 2009 there are 285 million wireless devices in the U.S. up from 205 million in 2008

I, Senior Vice



WHAT OTHER TECHNOLOGIES ARE INCLUDED IN SMART GRID?

- **Advanced customer controls**
  - End-users defining operating parameters
  - "Choice" of electricity or gas
  - Optionality for operations between gas and electric
  - Demand response linkage

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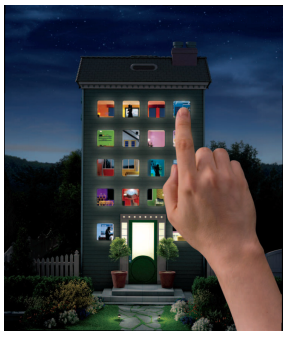
INTELLIGENT HOME OFFERING FROM TIME WARNER CABLE



- App driven home control
- $33 a month
- Energy management
- Home security
- Lighting
- Cameras

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METERS MAY NOT LOOK AS THEY DO TODAY

- Prepaid, pole top and inside mounted meters
- Eliminates 100 year old form factor
- Tamper proof

Plastics Design

Three phase meter

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OBSERVATIONS FROM SMART GRID THUS FAR

- **Most utility business cases are weak**
  - Over-estimate customer participation
  - Under-estimate operational impacts and savings
  - Rationale should be clear cut
  - Need better customer service link
- **Biggest mistakes**
  - Failure to properly assess impacts
  - Under communicating internally and externally
  - Failure to tie to overall business strategy

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PHEVS IMPACTS AND QUESTIONS

- The next big thing or…
- Major changes in consumer behavior
- Technical hurdles
- 1,000,000 by 2015?
- V 2 G or G 2 V?
- ISO/RTO predict the need for 3,700 new MW of capacity

Will the electric system be ready to manage a dynamic system?

- The public will expect a level of service and information unlike that which has been provided previously

Mark Gabriel, Senior Vice President

TECHNOLOGY DRIVES MANY LONGER TERM TRENDS

TECHNOLOGY
- Hydro-fracking
- Smart Grid
- Energy storage
- NGVs, EVs
- Info/data management
- Cyber threats

REGULATION
- 4P pollutants
- GHG controls
- Renewables mandates
- Security
- Rate push-back

ECONOMICS
- Shifting cost relationships
- Constrained capital
- Economies of scale
- Stratified credit markets
- Slow economic recovery

MARKETS
- Longer term demand trends
- Lower gas volatility
- Coal plant retirements
- "Policy" markets
- Water supply

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DESTINY OF INTELLIGENT INFRASTRUCTURE/ DESTINY OF DEMOGRAPHICS

AGING INFRASTRUCTURE

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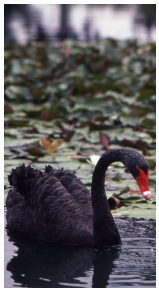
THE DESTINY OF BUSINESS MODEL EVOLUTION

- Mergers will likely continue through the next decade
- Increases in the cost of generation and infrastructure will require new partnerships across industry lines
- Customers will demand new engagements with the industry
- Financial community will drive many of the changes as they seek to reduce risk



THE BLACK SWAN THEORY*

The disproportionate role of high-impact, hard to predict, and rare events that are beyond the realm of normal expectations

The non-computability of the probability of the consequential rare events using scientific methods

The psychological biases that make people individually and collectively blind to uncertainty and unaware of the massive role of the rare event in historical affairs

*Adapted from the Book *The Black Swan: The Impact of the Highly Improbable* by Nassim Nicholas Taleb

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11/7/2012

OUR INDUSTRY IS FAMOUS FOR BLACK SWAN EVENTS

Event	Impact
• New York Blackout ('68)	• EPRI and R&D
• Three Mile Island	• Killed nuclear business
• Enron	• Killed trading business
• California Crisis	• Governor Davis ousted
• Deregulation	• Killed R&D

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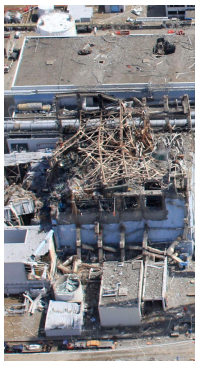
16 March 2011



ARE WE PREPARED FOR THE NEXT BLACK SWAN EVENT?

- Major cyber attack on the smart grid
- Shale gas explosion
- Solar flare disruption of communications system
- Demand spikes + hot summer
- Demand spikes + cold winter

Can we be?

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WILDCARDS

ECONOMIC CONDITIONS
Resurgence of economy increases demand at a time when coal plants are being shut down and/or retrofitted

NATURAL GAS
Prices spike due to weather, increased industrial demand, more natural gas vehicles, pipeline congestion and/or other competing uses

WATER
Regulations and aging infrastructure

POLITICS

Verrrry predictable…

Agility is an strategic asset

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COMPANIES THAT "OWN" MARKETS ARE NOT IMMUNE NOR DOES IT MEAN COLLAPSE IS INEVITABLE

- Kodak had a 90% market share, 50,000 employees across consumer, industrial and film industries. They invented the digital camera. They declared bankruptcy this year.

Western Union sent its last telegram January 25, 2007. Its revenue today is $5.3 billion

WE MUST WATCH THE TRENDS AND CONTINUOUSLY EVOLVE

- Bottled water sells for more than gasoline—and uses 12 million barrels of oil annually. Water utilities (along with Coke and Pepsi) ignored this trend.
- AAA, made famous by roadside service (now offered free with all new cars) and maps (now all on line) struggled to reinvent itself.

"STAY FLEXIBLE, MY FRIEND"