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Risk Mitigation Benefits of Energy Efficiency

2013 ACEEE Conference on Energy Efficiency as a Resource

Dan Bakal, Ceres

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Ceres mobilizes a powerful network of investors, companies and public interest groups to accelerate and expand the adoption of sustainable business practices and solutions to build a healthy global economy.

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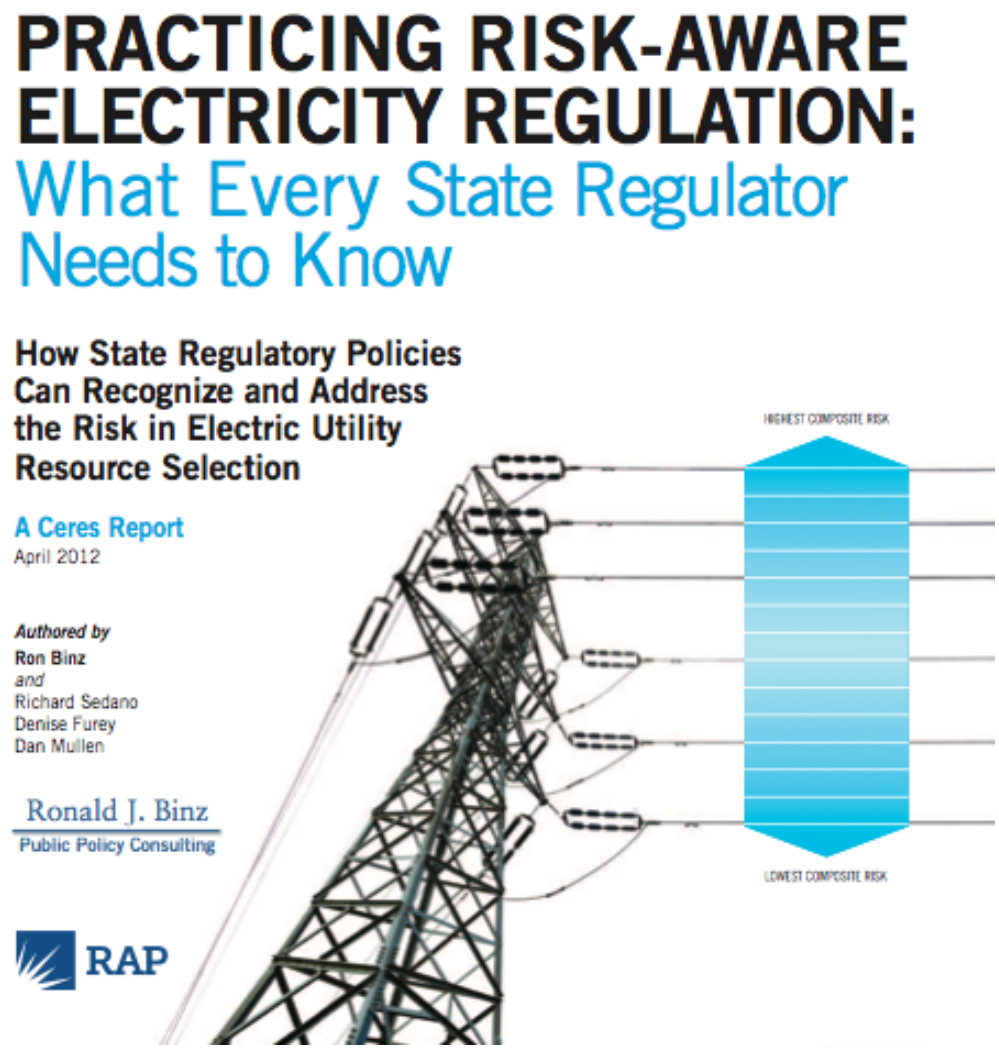
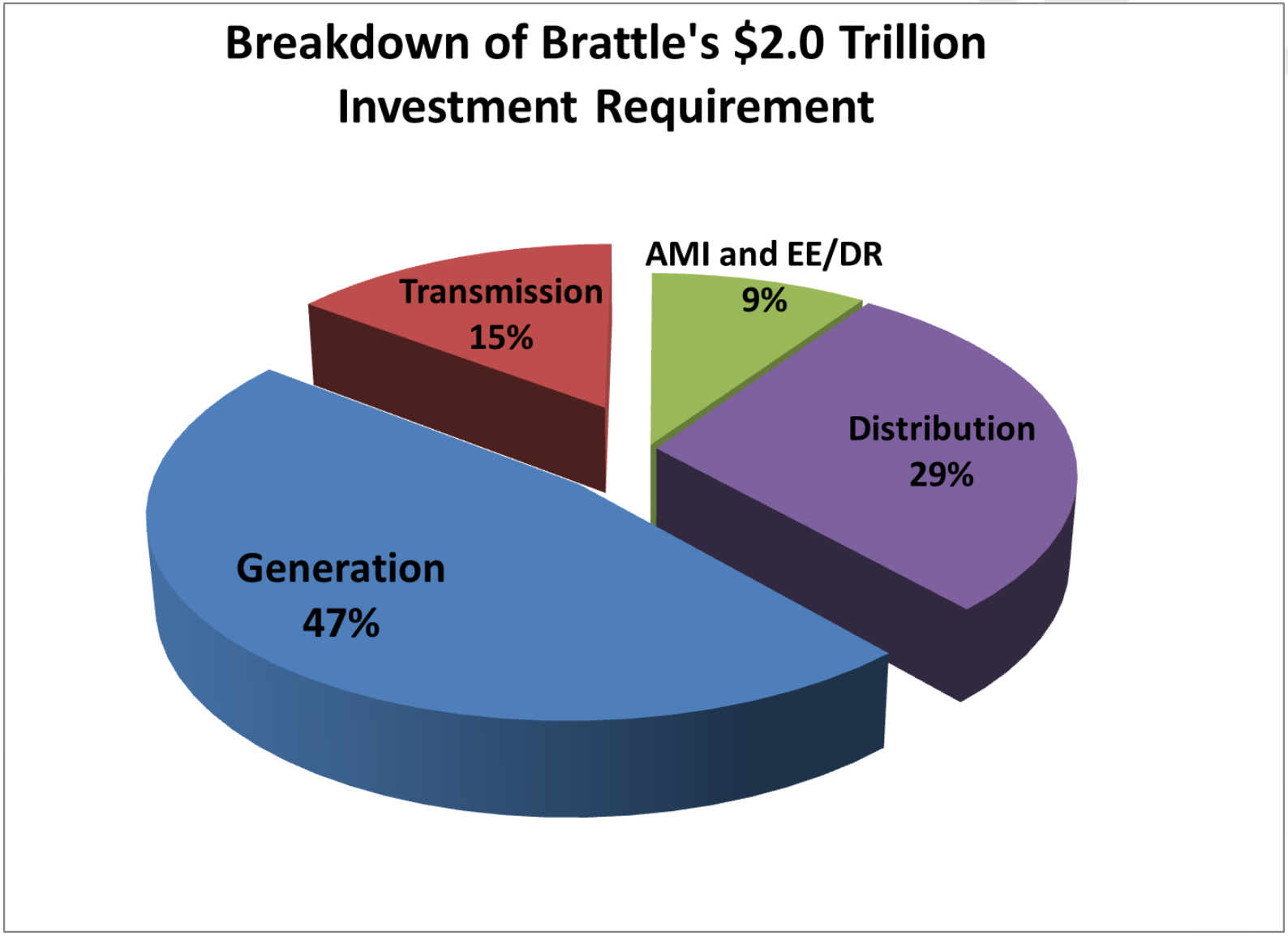
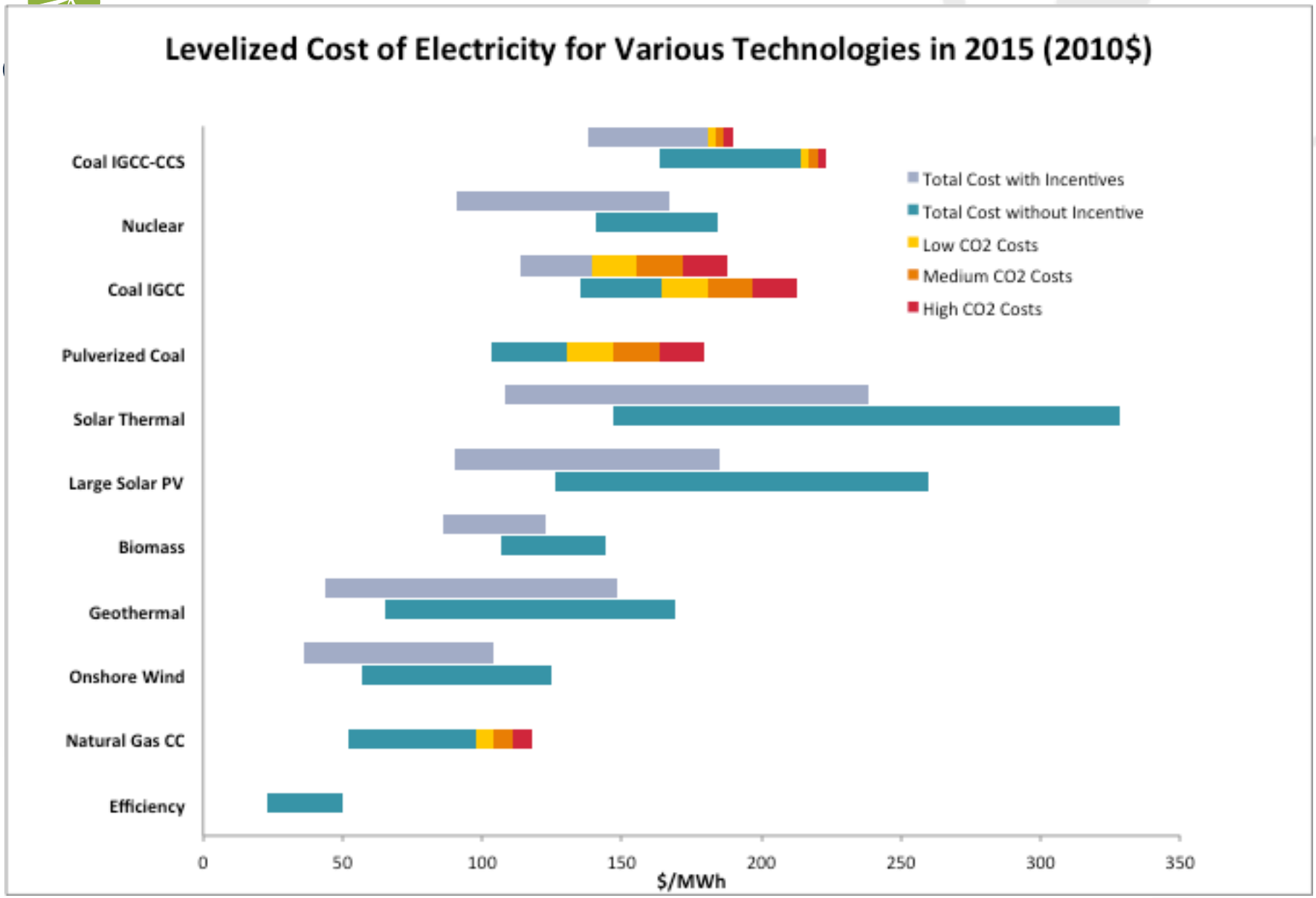


Context: High Stakes

- U.S. power industry is entering a “build cycle” with much higher investment levels
  - Brattle: $2T by 2030 (~2x recent levels)
- Causes
  - Aging infrastructure
  - New transmission requirements
  - Demand side and smart grid
  - Air and water regulation much stronger
  - Fuel economics
- Challenges to utilities
  - Flat load growth
  - Distributed generation
  - Uncertain economy
  - Financial metrics less forgiving than 1980s

Brattle's Investment Projection




Levelized Cost of Electricity for Various Technologies in 2015 (2010$)
Coal IGCC-CCS
Nuclear
Coal IGCC
Pulverized Coal
Solar Thermal
Large Solar PV
Biomass
Geothermal
Onshore Wind
Natural Gas CC
Efficiency
Total Cost with Incentives
Total Cost without Incentive
Low CO2 Costs
Medium CO2 Costs
High CO2 Costs
0
50
100
150
200
250
300
350
$/MWh

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Notes

- *Unadjusted 2010 cost estimates were used for consistency*
- *Costs for wind and photovoltaics have fallen sharply in last two years (faster than these 2010 estimates)*
- *Cost of nuclear power has risen post-Fukushima (more than these 2010 estimates)*

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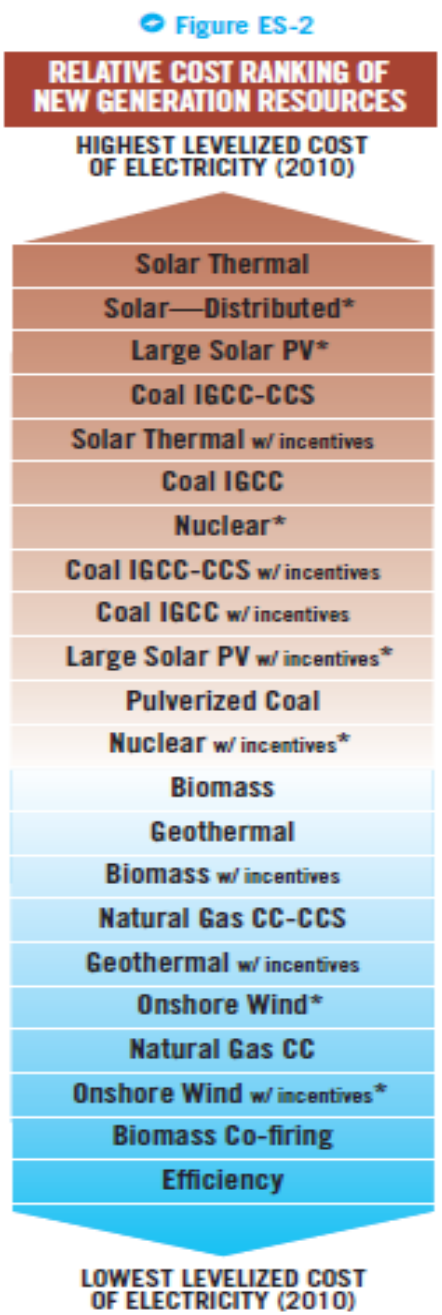
Figure ES-2

RELATIVE COST RANKING OF NEW GENERATION RESOURCES



New Power Generation Risks

- **Initial Cost Risk**: includes unplanned cost increases, delays and imprudent utility actions
- **Fuel and Operating Cost Risk**: includes fuel cost and availability, as well as O&M cost risks
- **New Regulation Risk**: includes air and water quality rules, waste disposal, land use, and zoning
- **Carbon Price Risk**: includes state or federal limits on greenhouse gas emissions
- **Water Constraint Risk**: includes the availability and cost of cooling and process water
- **Capital Shock Risk**: includes availability and cost of capital, and risk to firm due to project size
- **Planning Risk**: includes risk of inaccurate load forecasts, competitive pressure

RELATIVE RISK EXPOSURE OF NEW GENERATION RESOURCES							
Resource	Initial Cost Risk	Fuel, O&M Cost Risk	New Regulation Risk	Carbon Price Risk	Water Constraint Risk	Capital Shock Risk	Planning Risk
Biomass	Medium	Medium	Medium	Medium	High	Medium	Medium
Biomass w/ incentives	Medium	Medium	Medium	Medium	High	Low	Medium
Biomass Co-firing	Low	Low	Medium	Low	High	Low	Low
Coal IGCC	High	Medium	Medium	Medium	High	Medium	Medium
Coal IGCC w/ incentives	High	Medium	Medium	Medium	High	Low	Medium
Coal IGCC-CCS	High	Medium	Medium	Low	High	High	High
Coal IGCC-CCS w/ incentives	High	Medium	Medium	Low	High	Medium	High
Efficiency	Low	None	Low	None	None	Low	None
Geothermal	Medium	None	Medium	None	High	Medium	Medium
Geothermal w/ incentives	Medium	None	Medium	None	High	Low	Medium
Large Solar PV	Low	None	Low	None	None	Medium	Low
Large Solar PV w/ incentives	Low	None	Low	None	None	Low	Low
Natural Gas CC	Medium	High	Medium	Medium	Medium	Medium	Medium
Natural Gas CC-CCS	High	Medium	Medium	Low	High	High	Medium
Nuclear	Very High	Medium	High	None	High	Very High	High
Nuclear w/ incentives	Very High	Medium	High	None	High	High	Medium
Onshore Wind	Low	None	Low	None	None	Low	Low
Onshore Wind w/ incentives	Low	None	Low	None	None	None	Low
Pulverized Coal	Medium	Medium	High	Very High	High	Medium	Medium
Solar - Distributed	Low	None	Low	None	None	Low	Low
Solar Thermal	Medium	None	Low	None	High	Medium	Medium
Solar Thermal w/ incentives	Medium	None	Low	None	High	Low	Medium

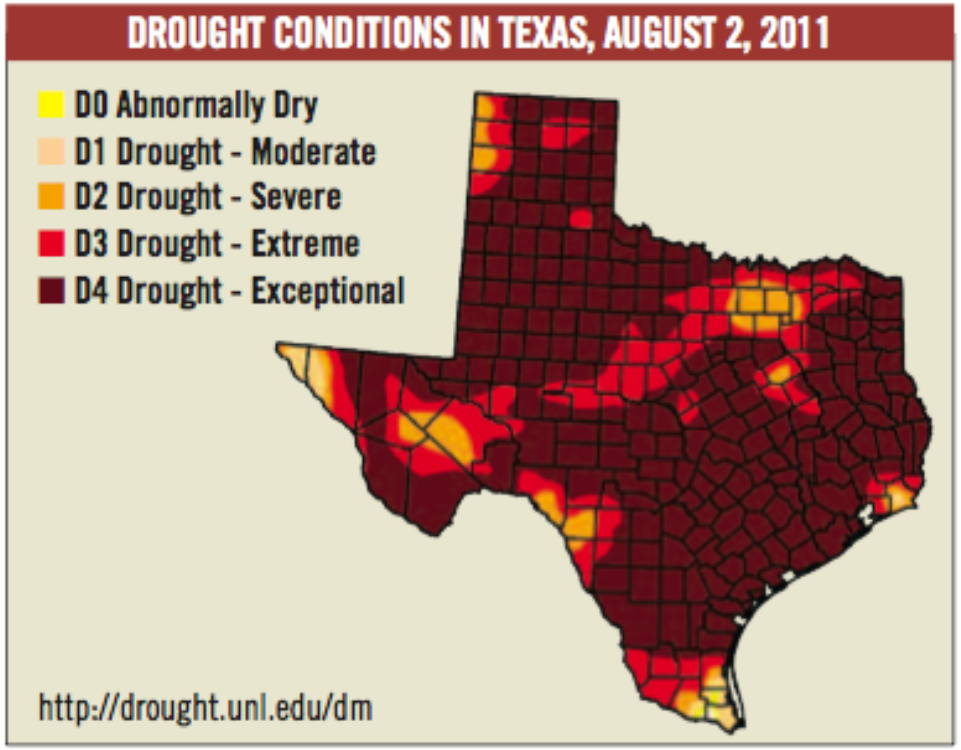
Initial Cost Risk

- Levy Nuclear Power Plant (FL)
  - Original: $4-6B, 2016
  - Last Estimate: $24B, 2024
  - Expected to add $50/mo. to average residential bill
  - Update: Cancelled, $1.5 billion spent
- Kemper IGCC (MS)
  - Original: $2.5B, 2012
  - Today: $4.7B, 2015, almost $1B not recovered from ratepayers
- Edwardsport IGCC (IN)
  - Original: $2B
  - Today: $3.3B, capped at $2.6B ($700M disallowance for Duke)
  - 14% rate hike
- Plant Vogtle (GA)
  - ~$900M overruns (disputed among partners)
  - 1980s: 1200% cost overruns, $19B disallowance

Water Constraint Risk

- Black & Veatch survey (2011): Water mgmt is #1 business issue facing sector

- Risks
  - Drought (France '03, Southern Co. '08, India '10)
  - High intake temps (Connecticut '12, '13)
  - Water rights (TX: 10% installed capacity at risk)



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Cost

Figure ES-2

RELATIVE COST RANKING OF NEW GENERATION RESOURCES

HIGHEST LEVELIZED COST OF ELECTRICITY (2010)

- Solar Thermal
- Solar—Distributed*
- Large Solar PV*
- Coal IGCC-CCS
- Solar Thermal w/ incentives
- Coal IGCC
- Nuclear*
- Coal IGCC-CCS w/ incentives
- Coal IGCC w/ incentives
- Large Solar PV w/ incentives*
- Pulverized Coal
- Nuclear w/ incentives*
- Biomass
- Geothermal
- Biomass w/ incentives
- Natural Gas CC-CCS
- Geothermal w/ incentives
- Onshore Wind*
- Natural Gas CC
- Onshore Wind w/ incentives*
- Biomass Co-firing
- Efficiency

LOWEST LEVELIZED COST OF ELECTRICITY (2010)

Figure ES-3

RELATIVE RISK RANKING OF NEW GENERATION RESOURCES

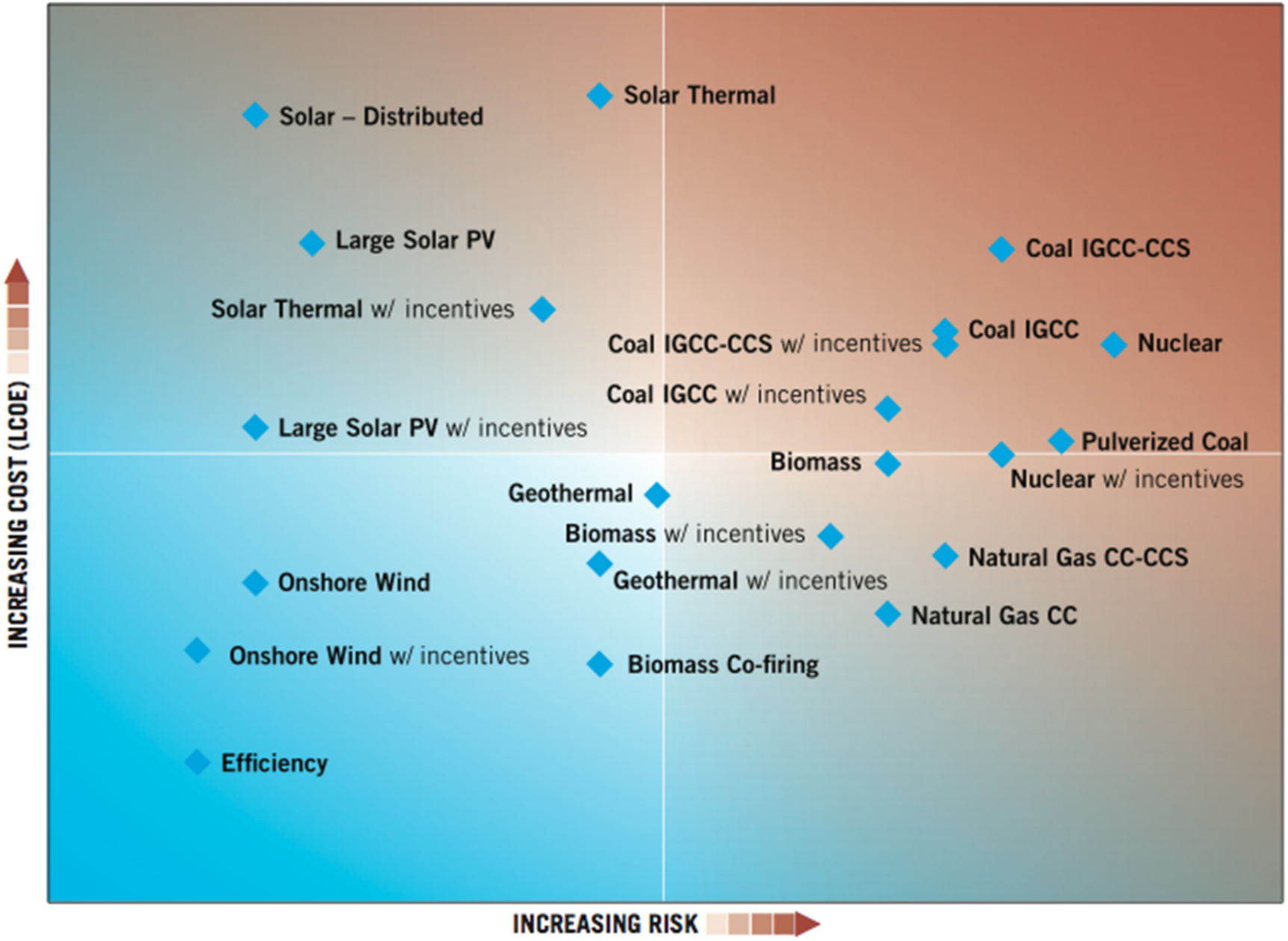
HIGHEST COMPOSITE RISK

- Nuclear
- Pulverized Coal
- Coal IGCC-CCS
- Nuclear w/ incentives
- Coal IGCC
- Coal IGCC-CCS w/ incentives
- Natural Gas CC-CCS
- Biomass
- Coal IGCC w/ incentives
- Natural Gas CC
- Biomass w/ incentives
- Geothermal
- Biomass Co-firing
- Geothermal w/ incentives
- Solar Thermal
- Solar Thermal w/ incentives
- Large Solar PV
- Large Solar PV w/ incentives
- Onshore Wind
- Solar—Distributed
- Efficiency

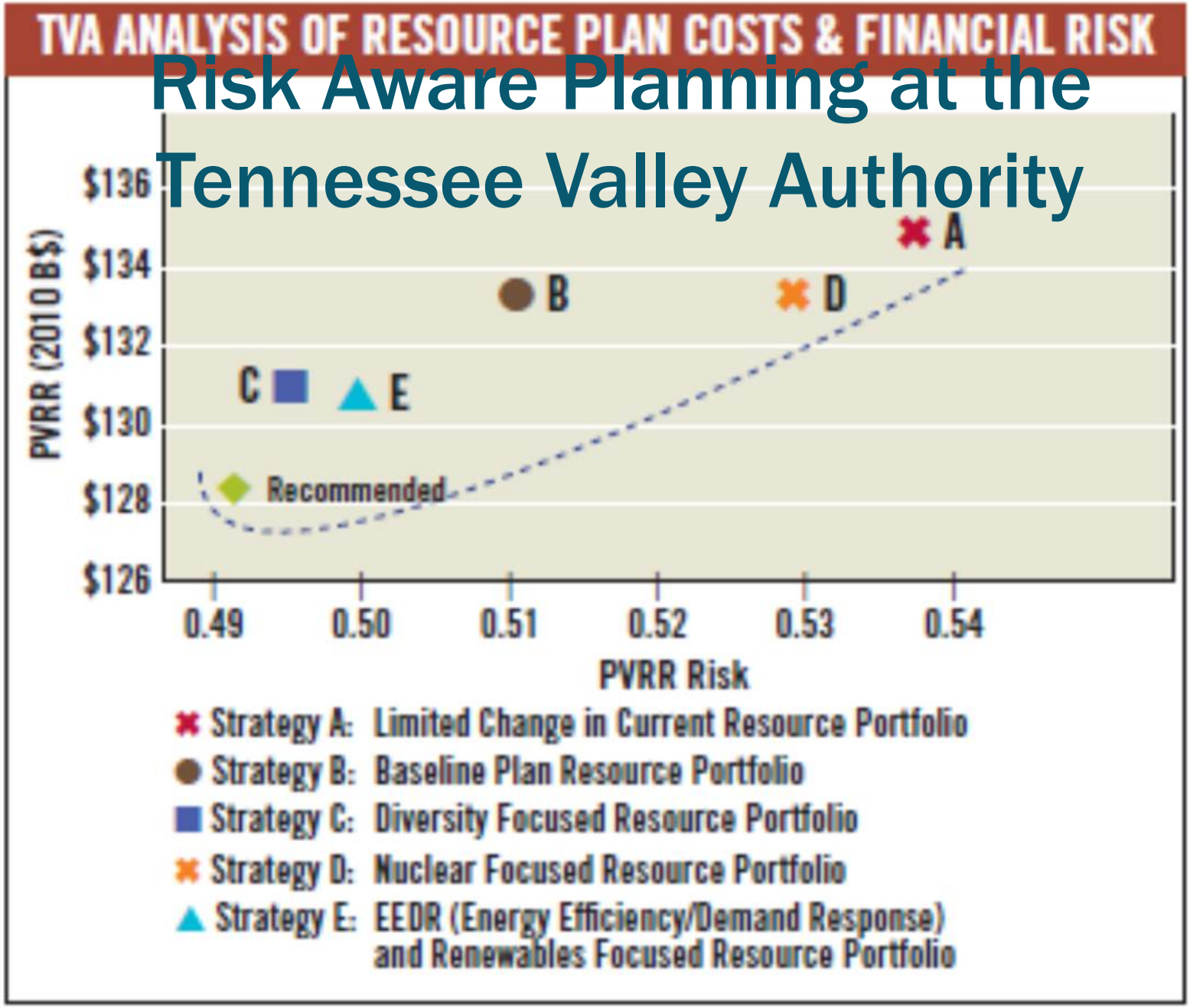
LOWEST COMPOSITE RISK

Risk

PROJECTED UTILITY GENERATION RESOURCES IN 2015
Relative Cost and Relative Risk



Risk Aware Planning at the Tennessee Valley Authority



OH: Bill Savings from EERS

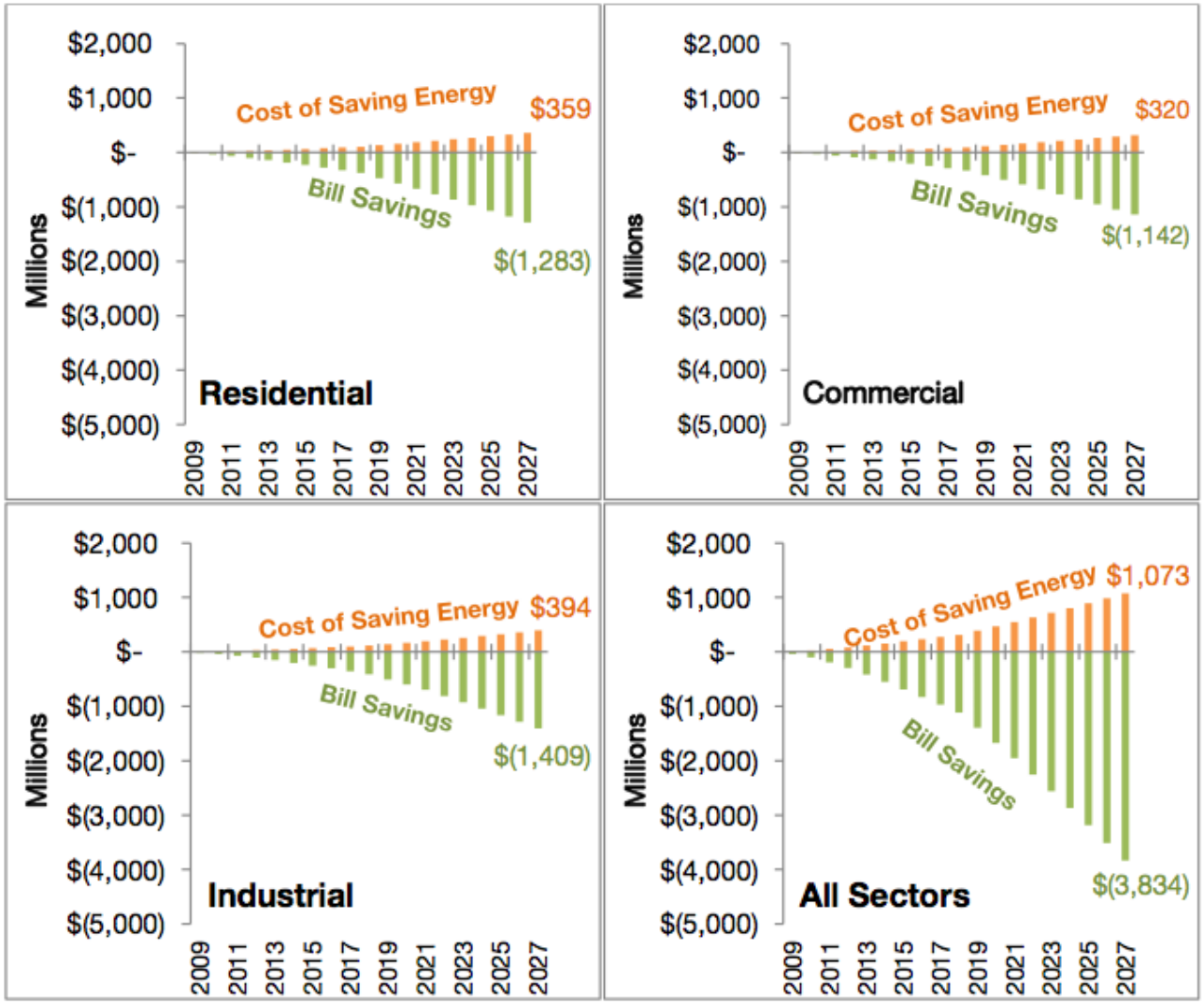


Figure 5: Annual Costs and Bill Savings
from SB221 Energy Efficiency Resource Standard

Rates vs. Bills

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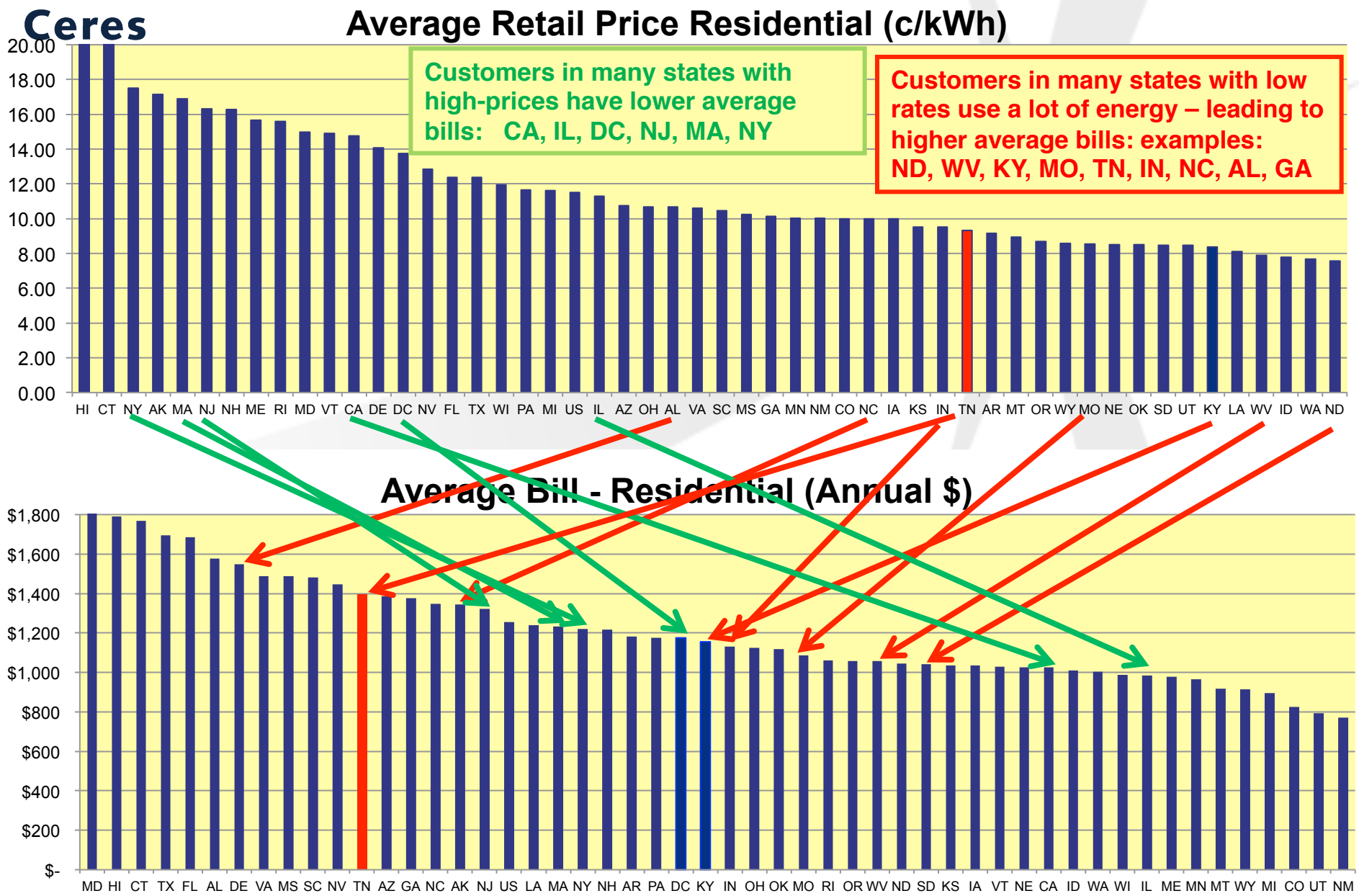
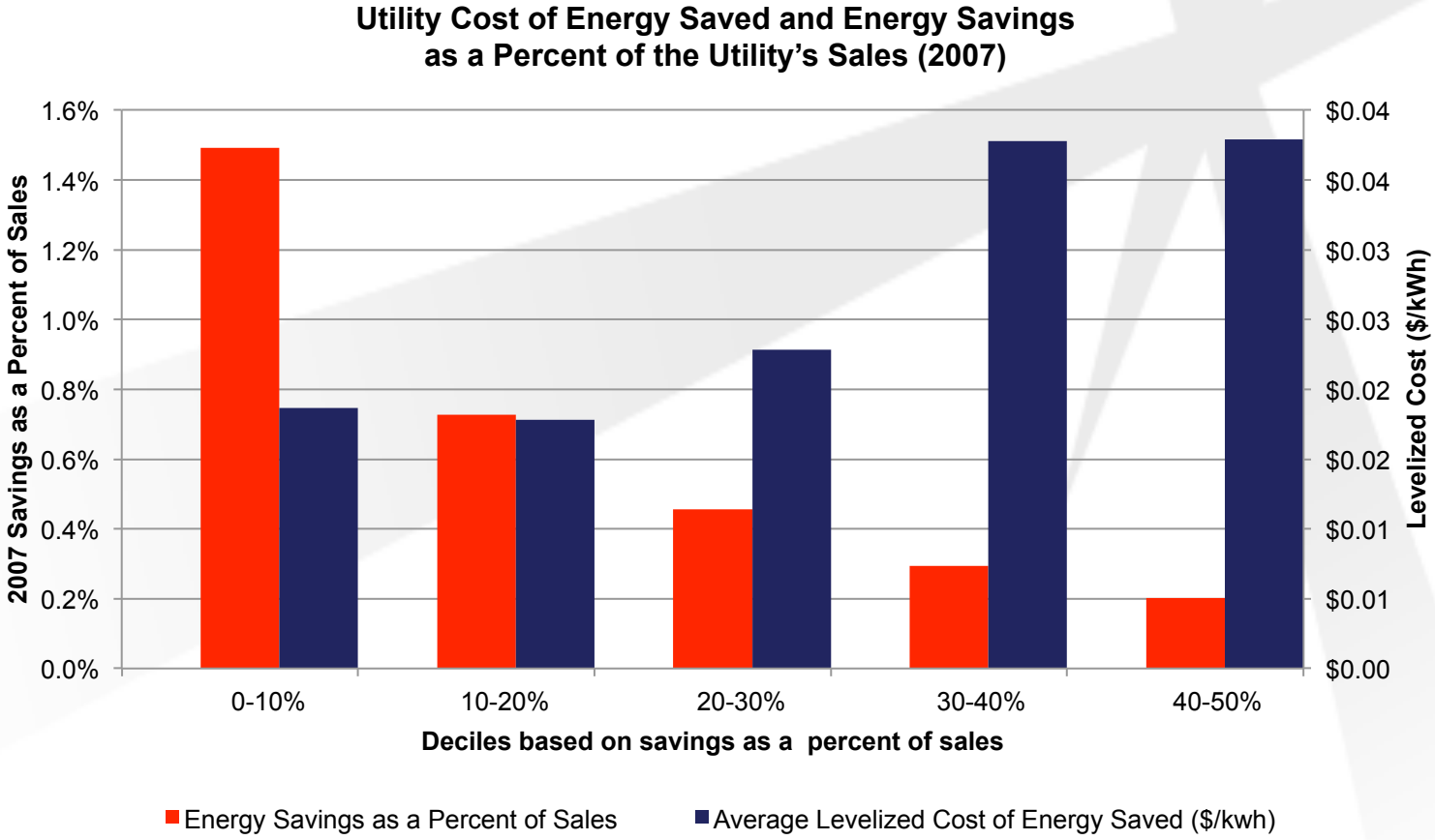
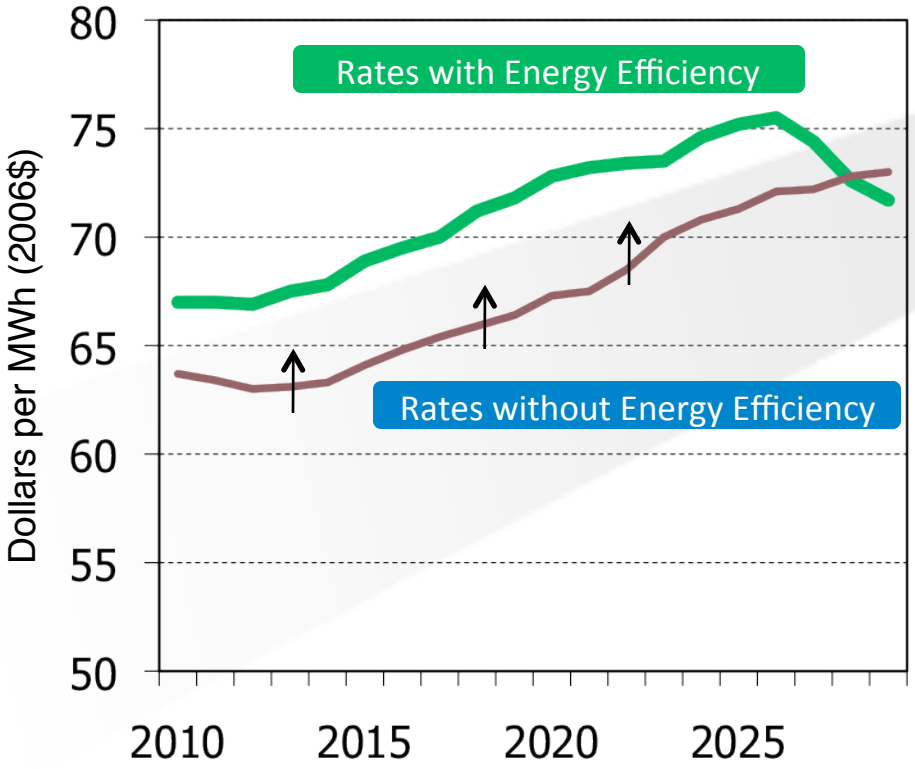


Cost of EE Declines with Investment

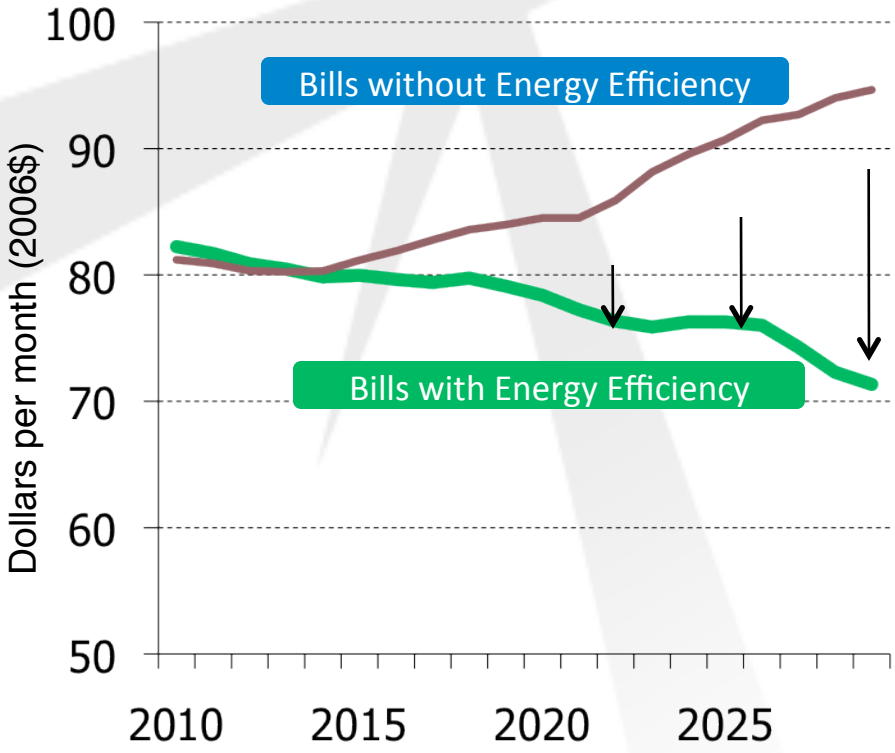


EE: Rates vs. Bills

Electricity* rates *may go up…



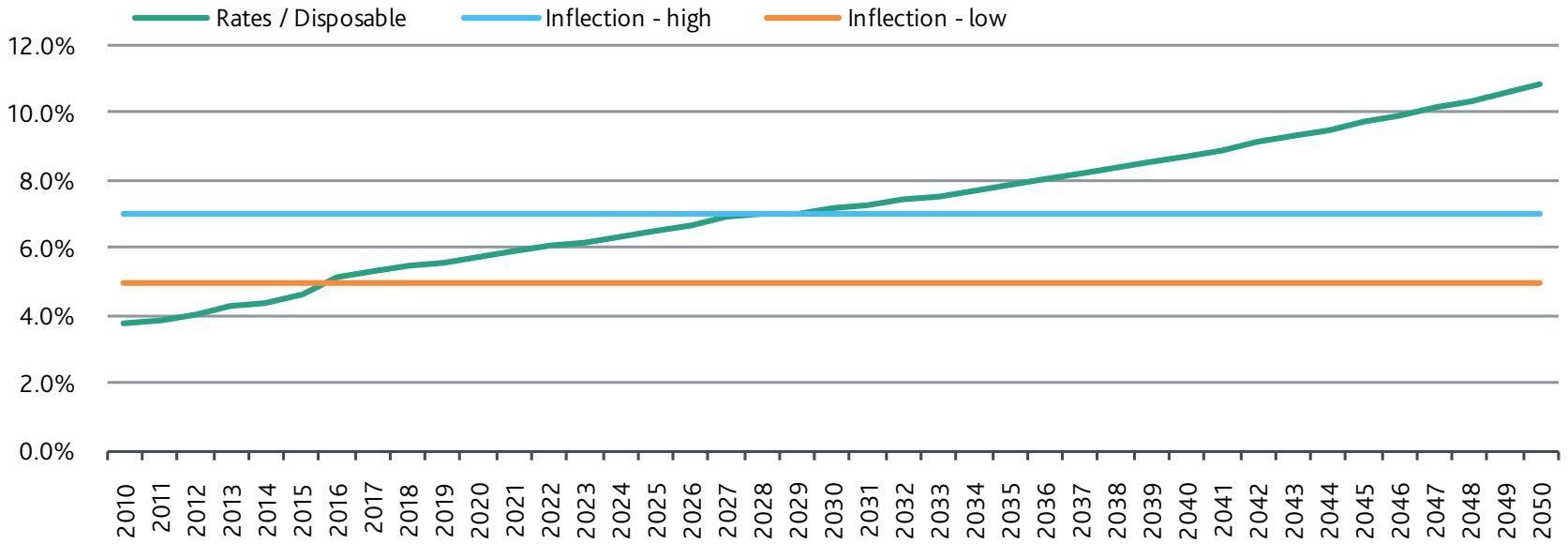
… but customer* bills *go down.



Moody's "Inflection Point"

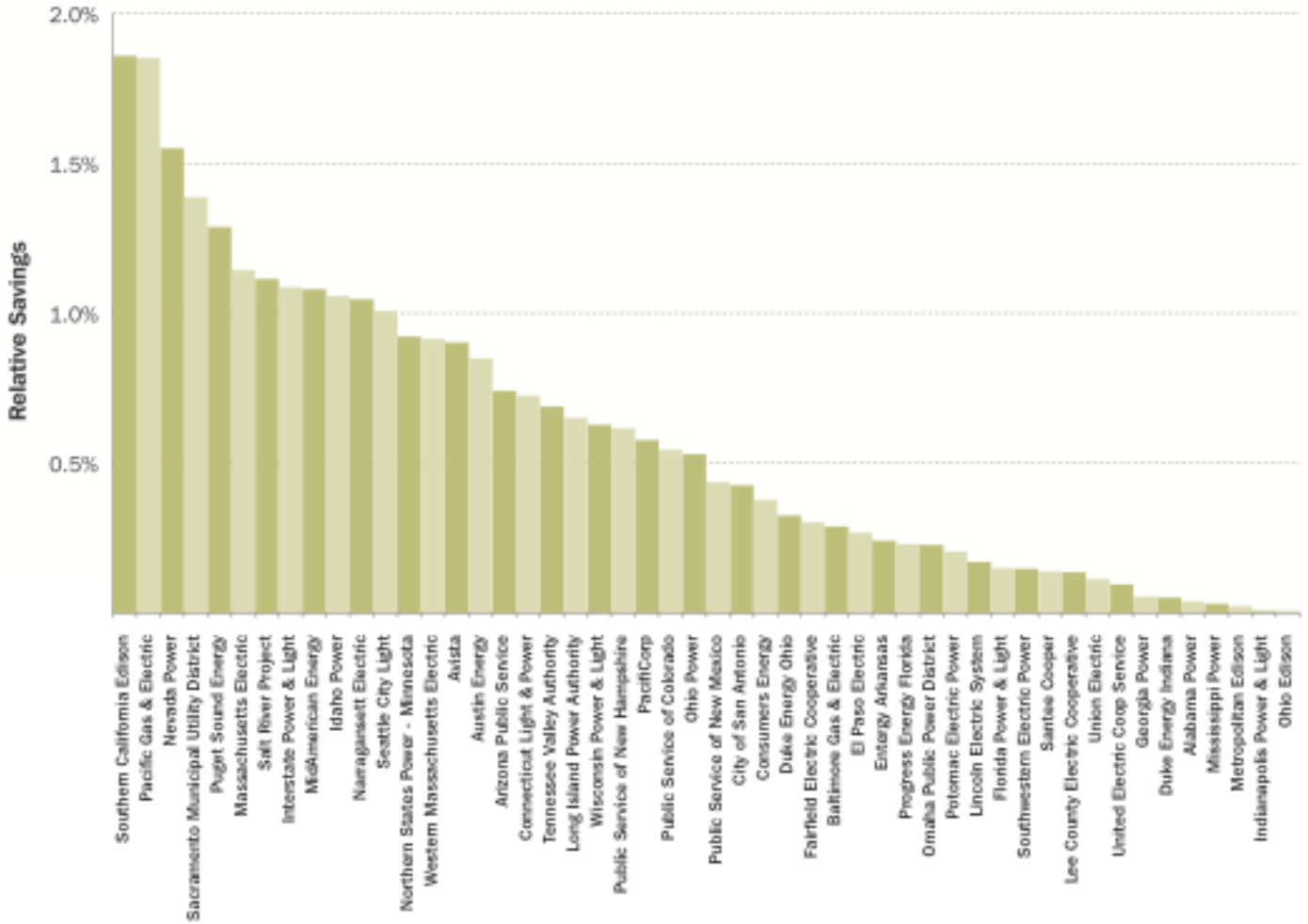
FIGURE 6

Potential inflection point



Source: Moody's

Energy Efficiency – Comparing Utilities



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[INSERT COMPELLING PERSONAL ANECDOTE HERE]

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Thank You!

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