

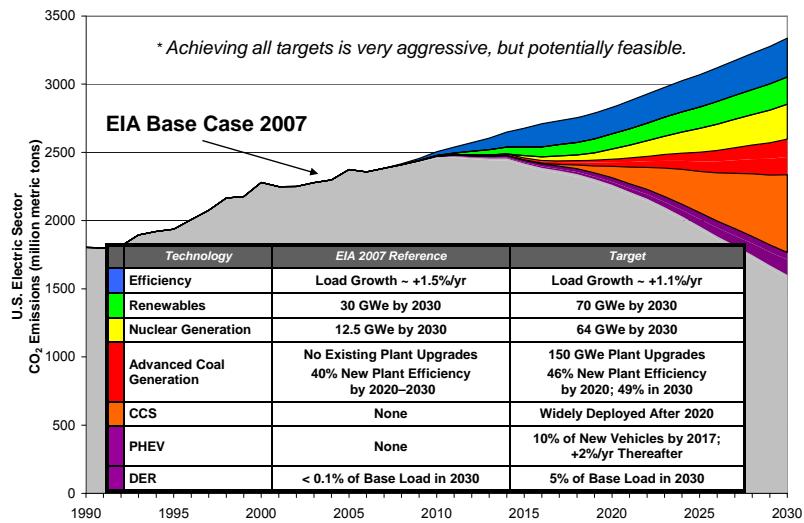
The Power to Reduce CO₂ Emissions *The Full Portfolio*

Kathryn Trudell
Electric Power Research Institute

The Bottom Line

- There is the potential for the electricity sector to reduce CO₂ emissions substantially, but it requires significant investment in technology research, development and demonstration projects.
- “The Full Portfolio” of technologies with low or zero emissions, and significant improvements to the sector’s energy efficiency can accomplish this at much reduced costs to the overall economy.
- Reducing electric sector emissions will make cleaner energy available to other economic sectors such as industry and transportation through increased electrification .
- The economic and environmental benefits of a full portfolio of low-emitting technologies far outweigh the costs of RD&D investment.

EPRI PRISM (2007) CO₂ Reductions ... Technical Potential*

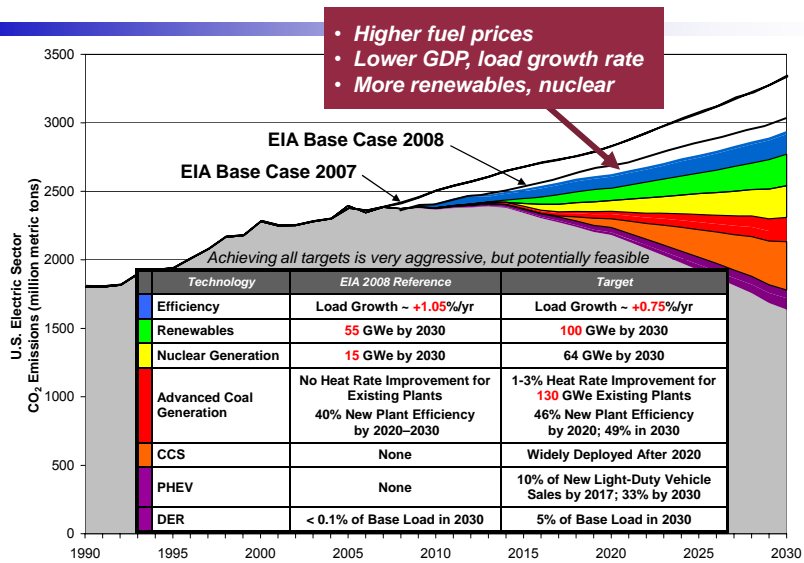


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EPRI Prism – 2008 EIA with Energy Bill



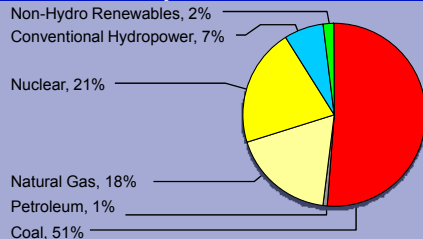
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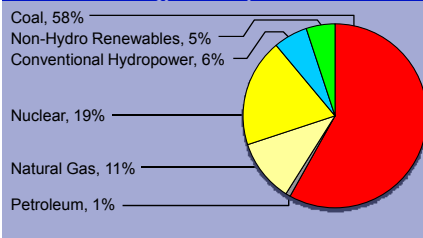
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Generation Mix

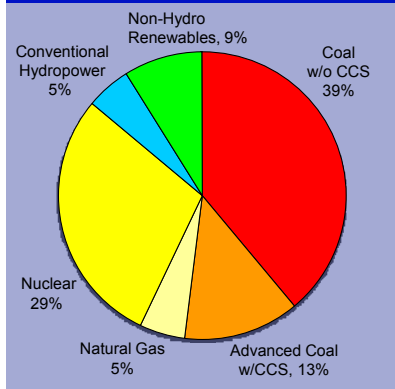
2007 U.S. Electricity Generation Mix



EIA 2008 with Energy Bill - Projection for 2030



EPRI "Prism" Projected 2030 Generation Mix

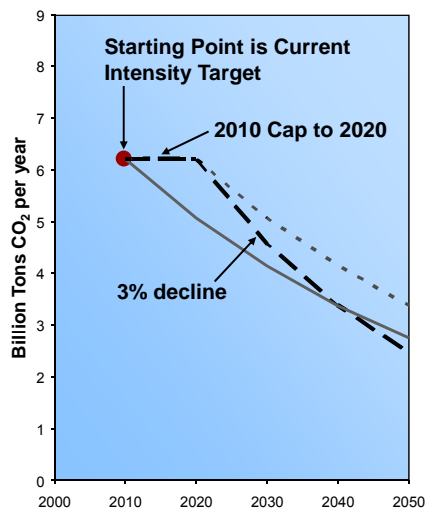


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Assumed U.S. Economy-Wide CO₂ Constraint



- PRISM electric sector CO₂ profile most closely modeled by economy-wide constraint which:

- Caps emissions at 2010 levels until 2020
- Requires 3% decline beginning in 2020

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Electricity Technology Scenarios

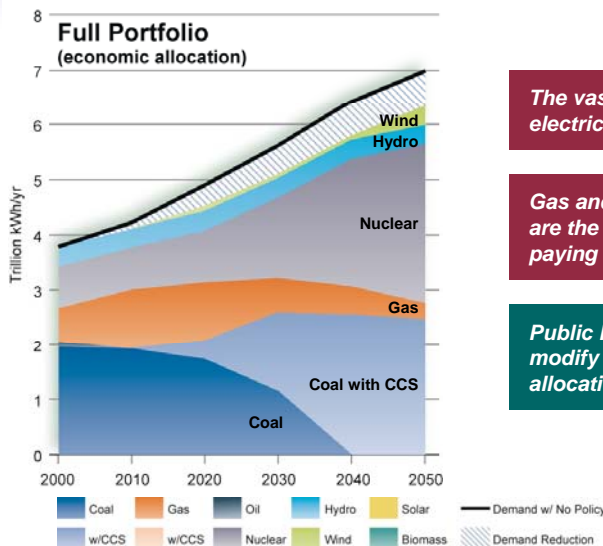
	Full Portfolio	Limited Portfolio
Supply-Side		
Carbon Capture and Storage (CCS)	Available	Unavailable
New Nuclear	Production Can Expand	Existing Production Levels ~100 GW
Renewables	Costs Decline	Costs Decline Slower
New Coal and Gas	Improvements	Improvements
Demand-Side		
Plug-in Hybrid Electric Vehicles (PHEV)	Available	Unavailable
End-Use Efficiency	Accelerated Improvements	Improvements

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U.S. Electric Generation – Full Portfolio



The vast majority of electricity supply is CO₂-free

Gas and non-captured coal are the only supply options paying a CO₂ cost

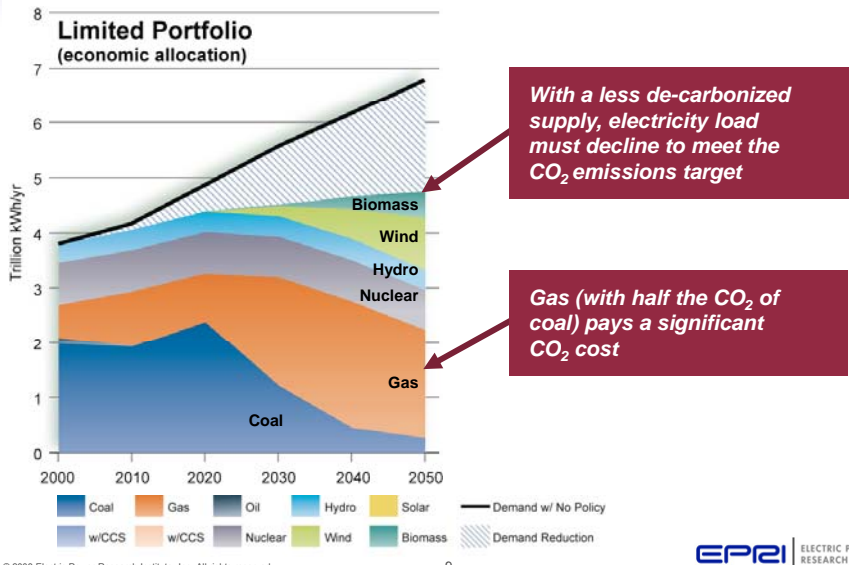
Public Policy (RPS) can modify this economic allocation

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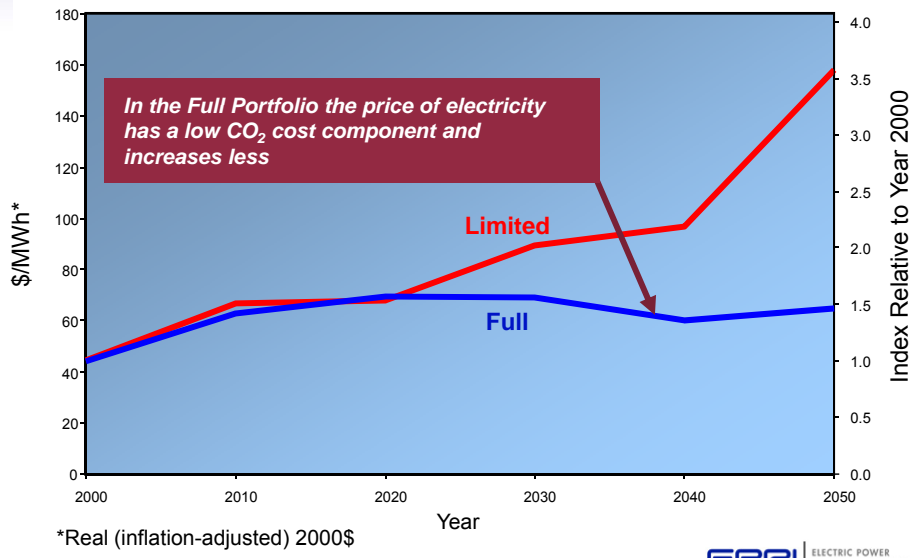
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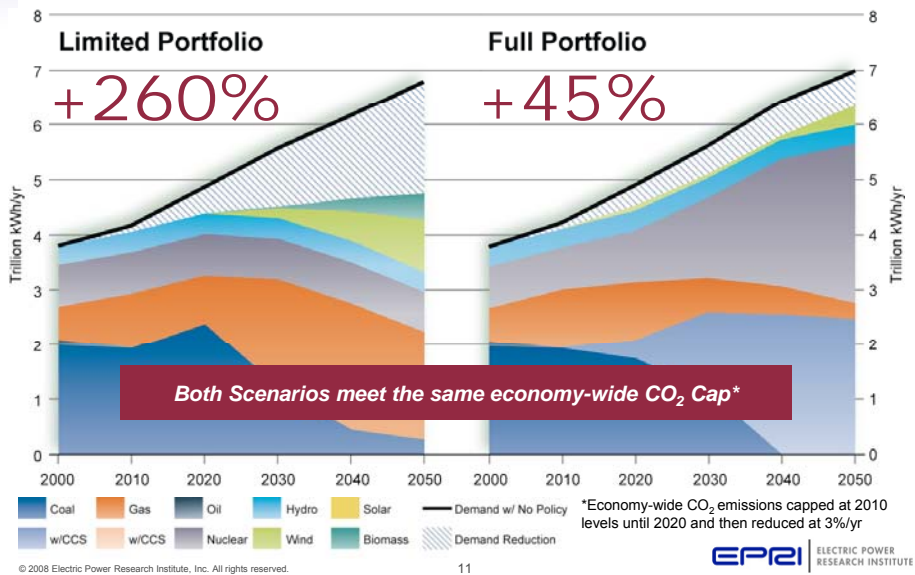
U.S. Electric Generation – Limited Portfolio



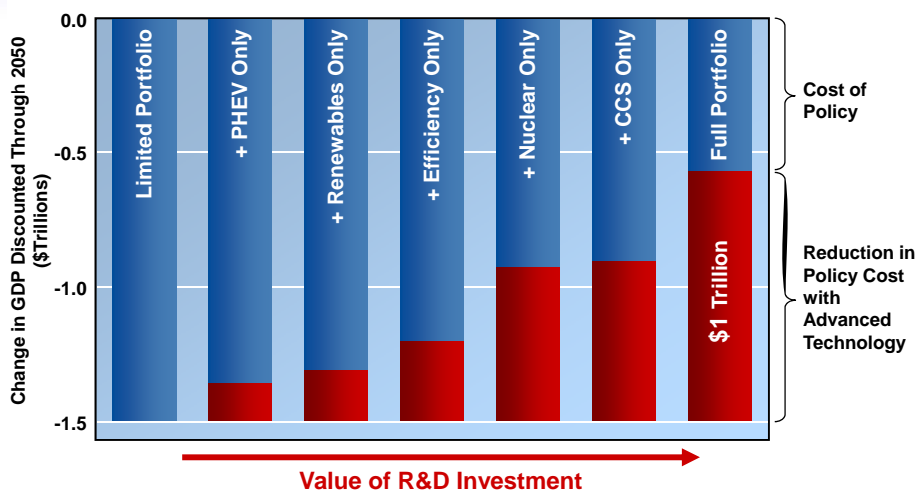
Wholesale Electricity Price



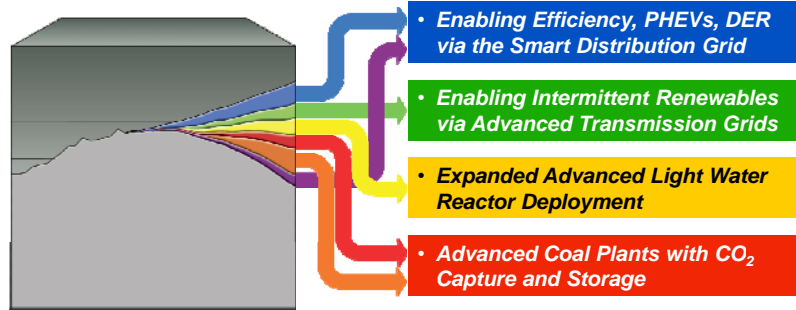
Increase in Real Electricity Prices... 2000 to 2050



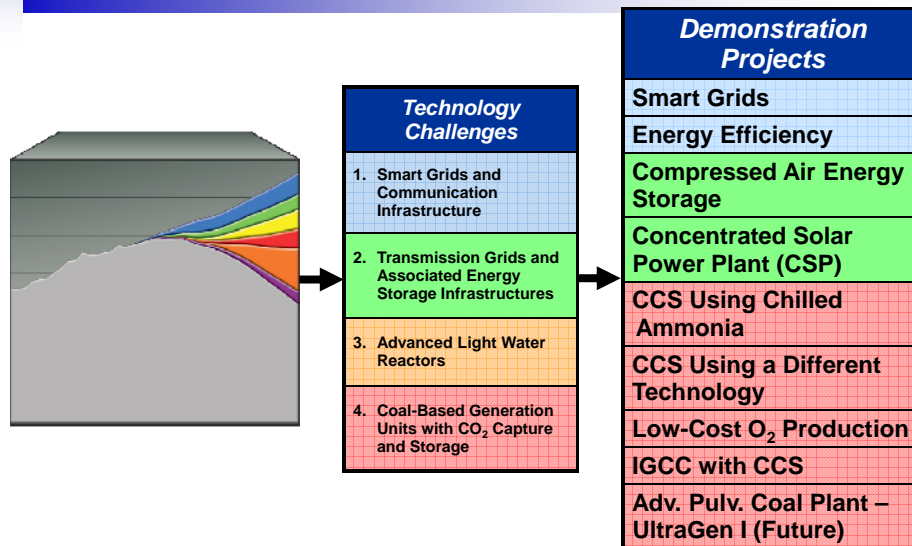
Full Technology Portfolio Reduces Costs of a CO₂ Emissions Reduction Policy by 60%



Transition to Low-Emissions Technologies

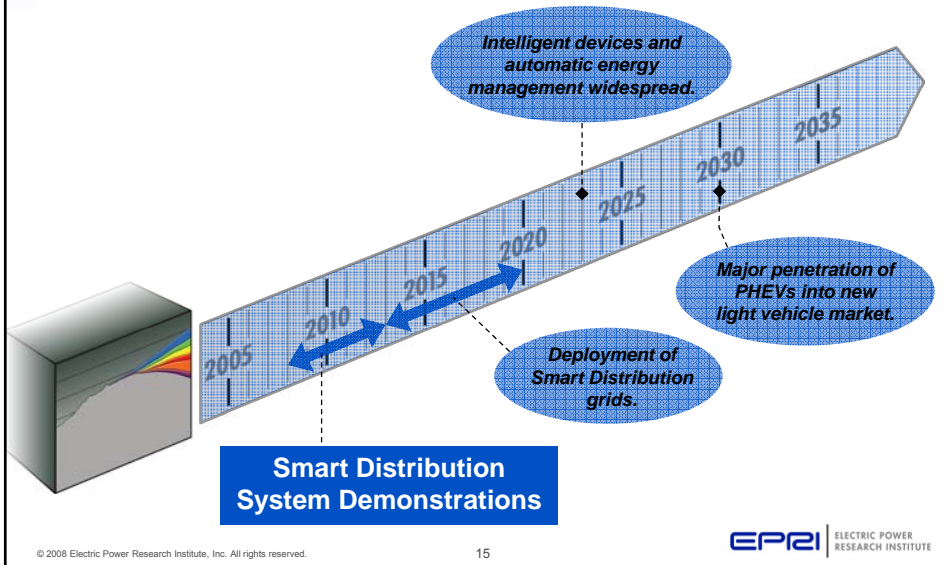


Analysis to Action



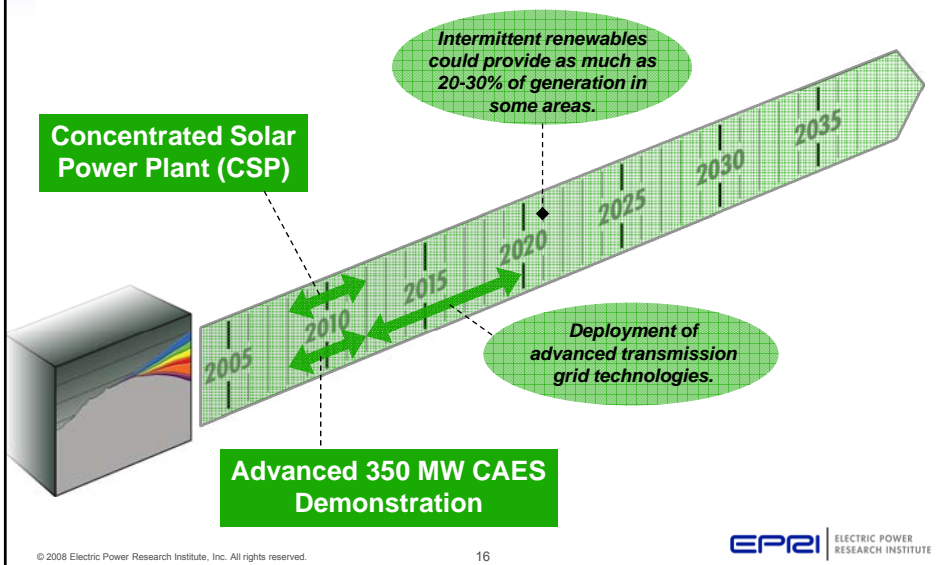
Building for the Future

Enabling Efficiency, PHEVs, DER via the Smart Distribution Grid



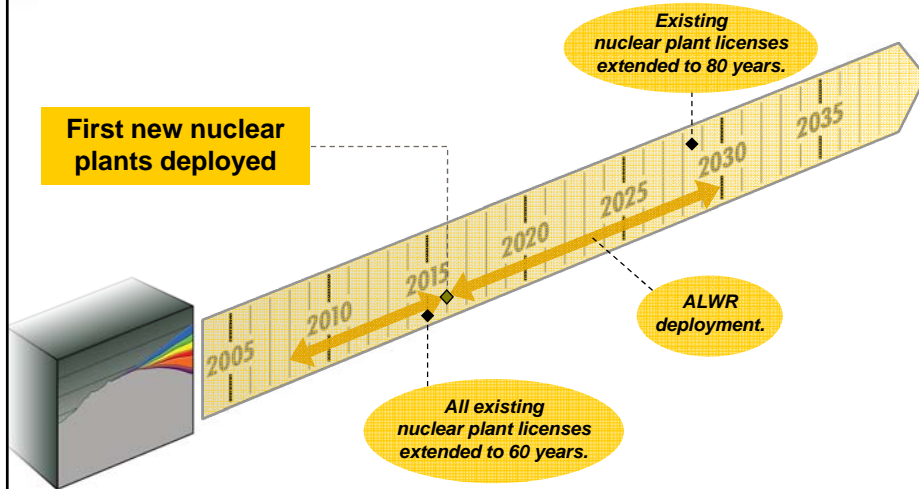
Building for the Future

Enabling Intermittent Renewables via Advanced Transmission Grids



Building for the Future

Expanded Advanced Light Water Reactor Deployment



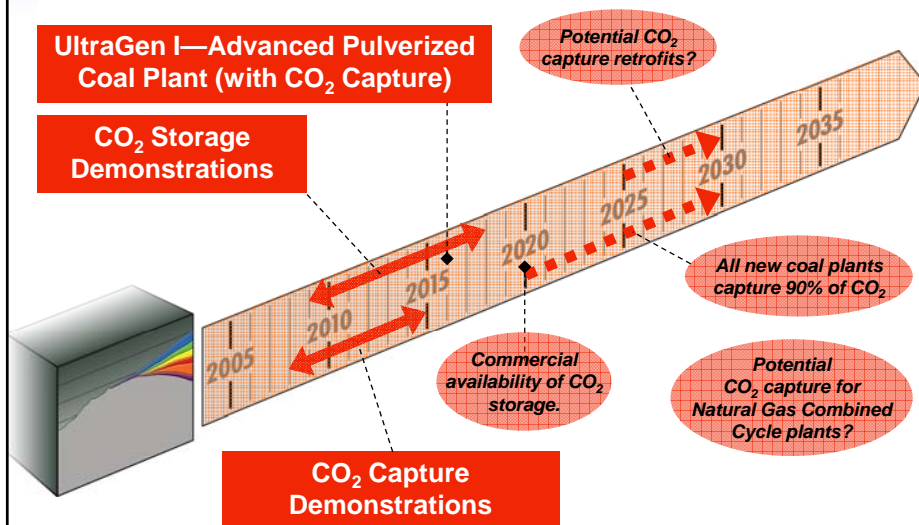
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Building for the Future

Advanced Coal Plants with CO₂ Capture and Storage

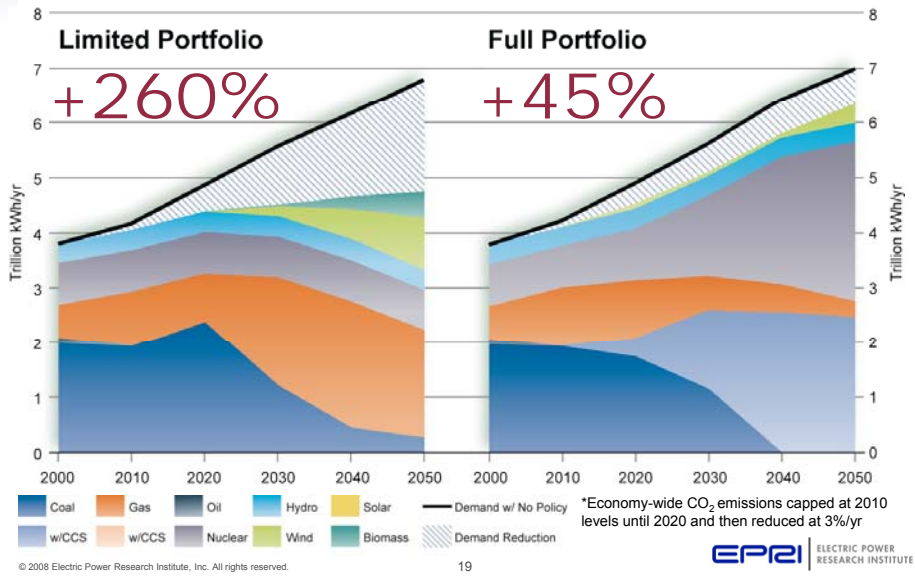


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The Full Portfolio: Lower CO₂, Lower Prices



Together...Shaping the Future of Electricity

