

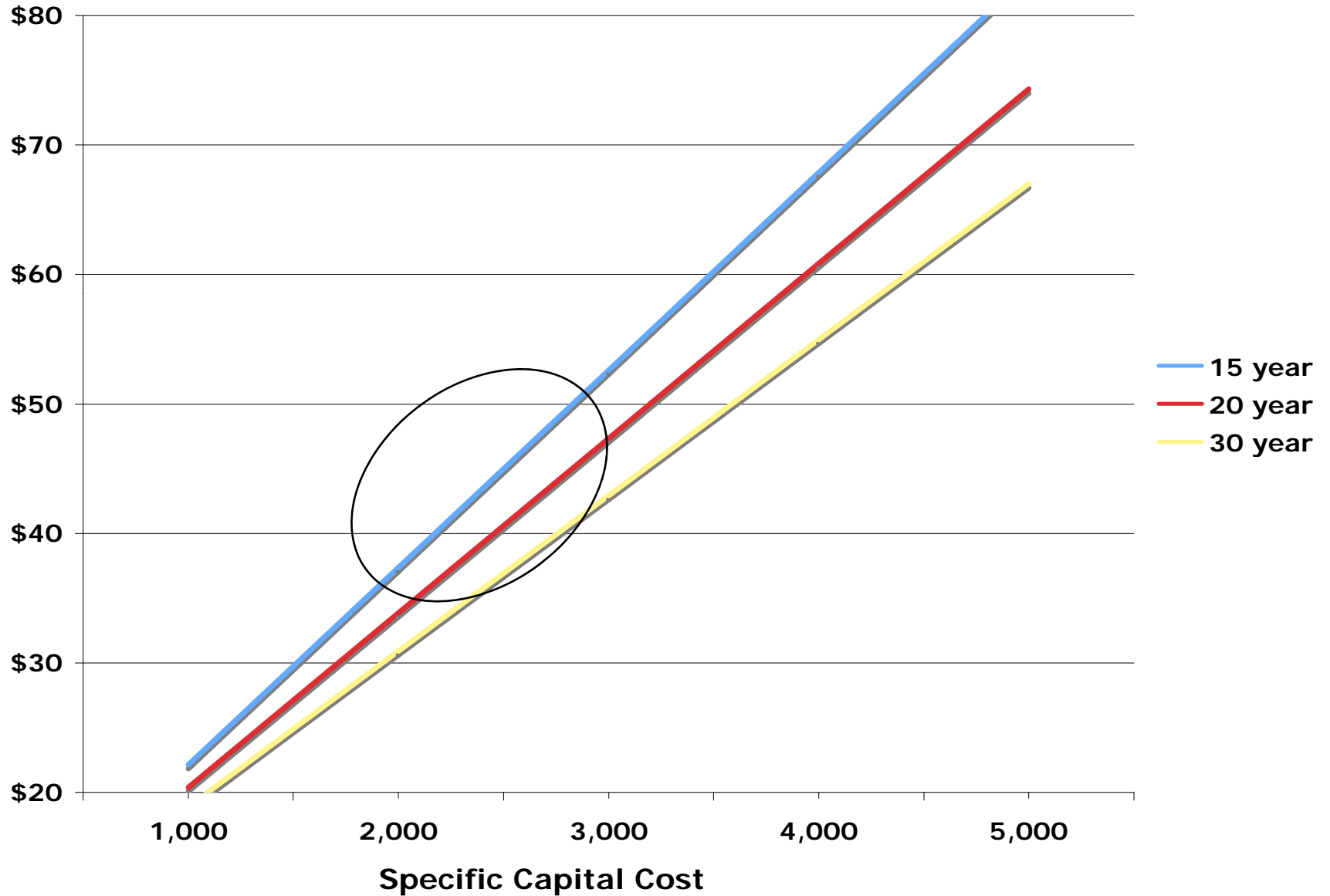
Market Requirements for a New Powerplant Technology

Eric Ingersoll

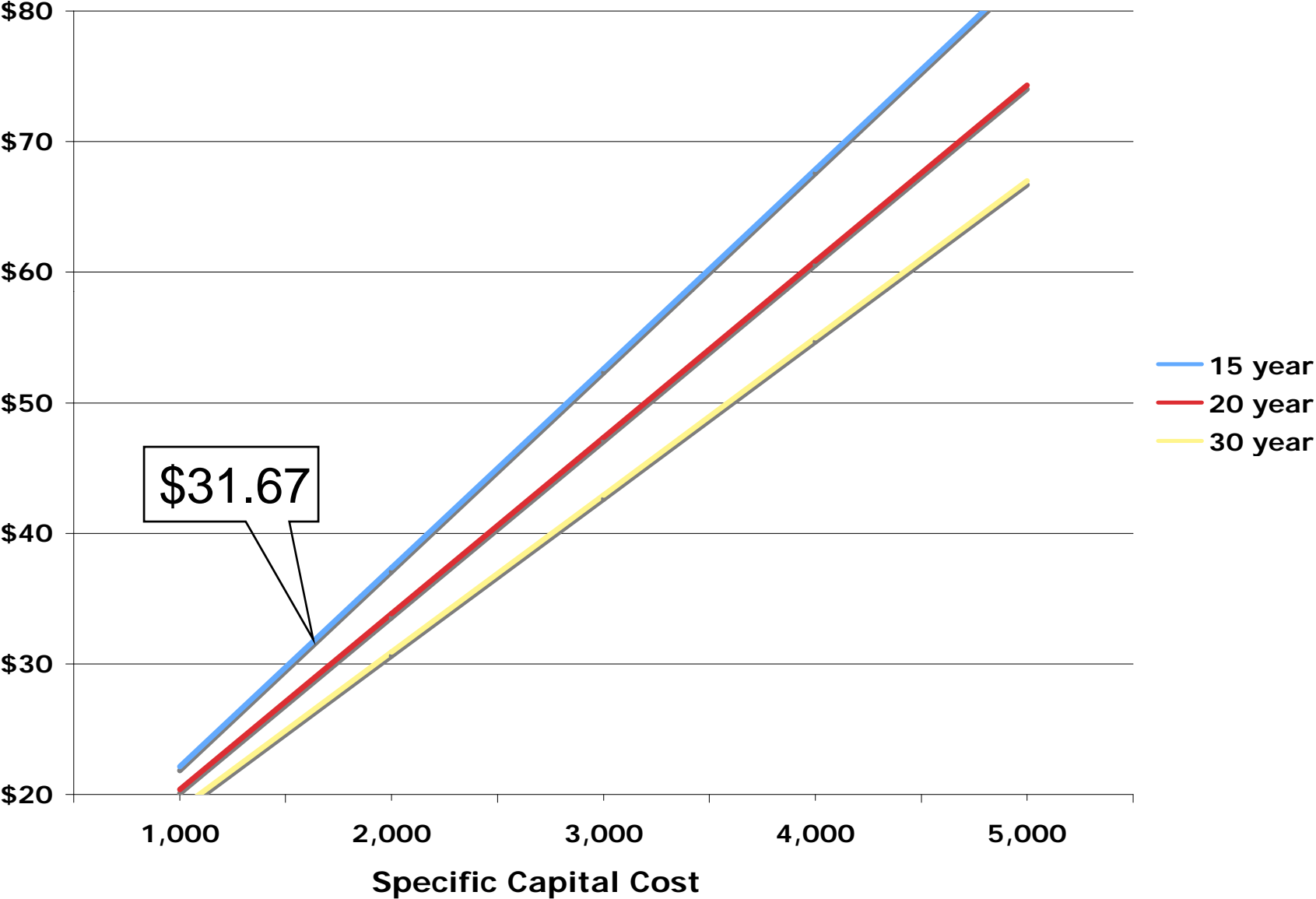
Market Demands

- Cost Engineering
- Risk Management

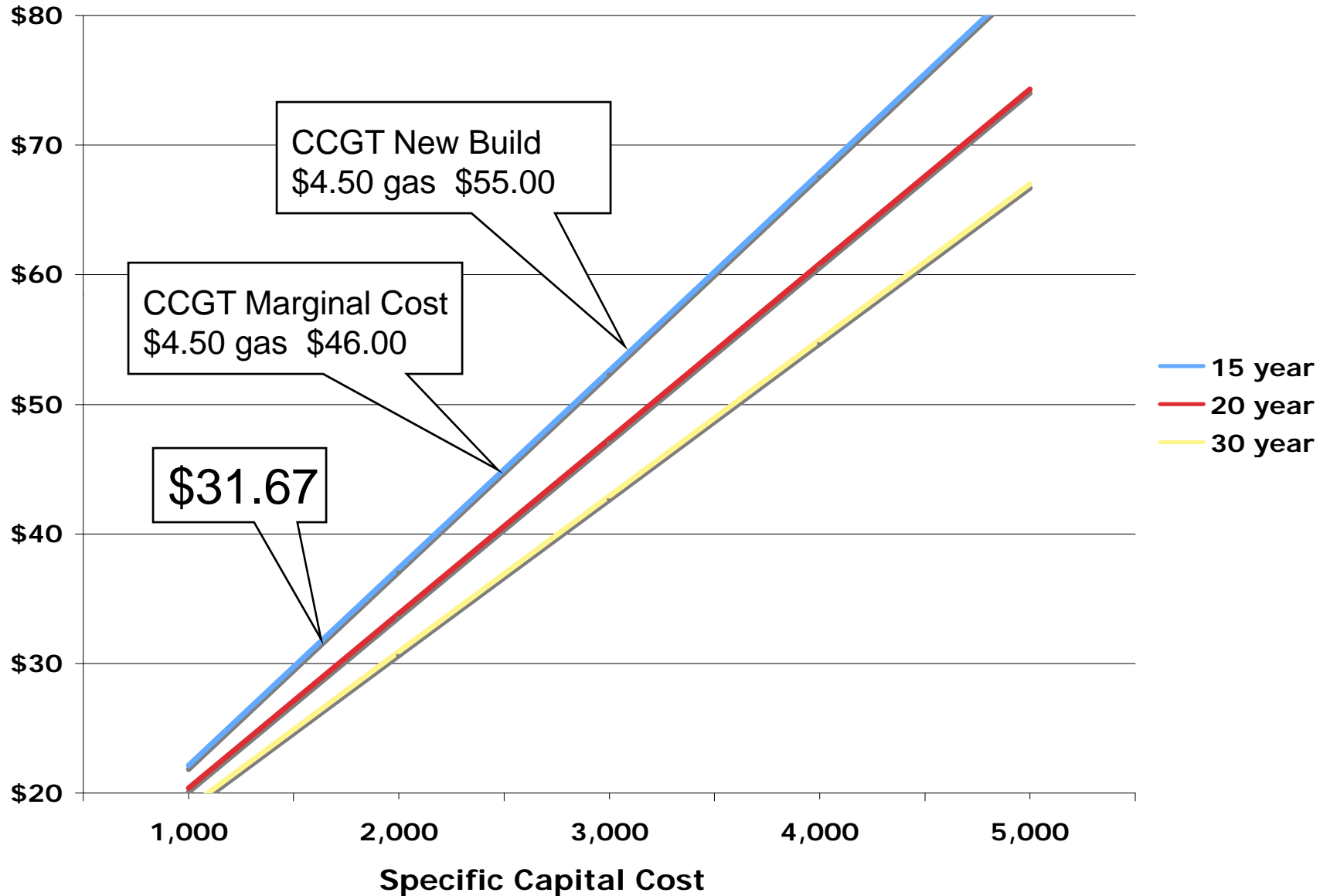
CapEx vs COE



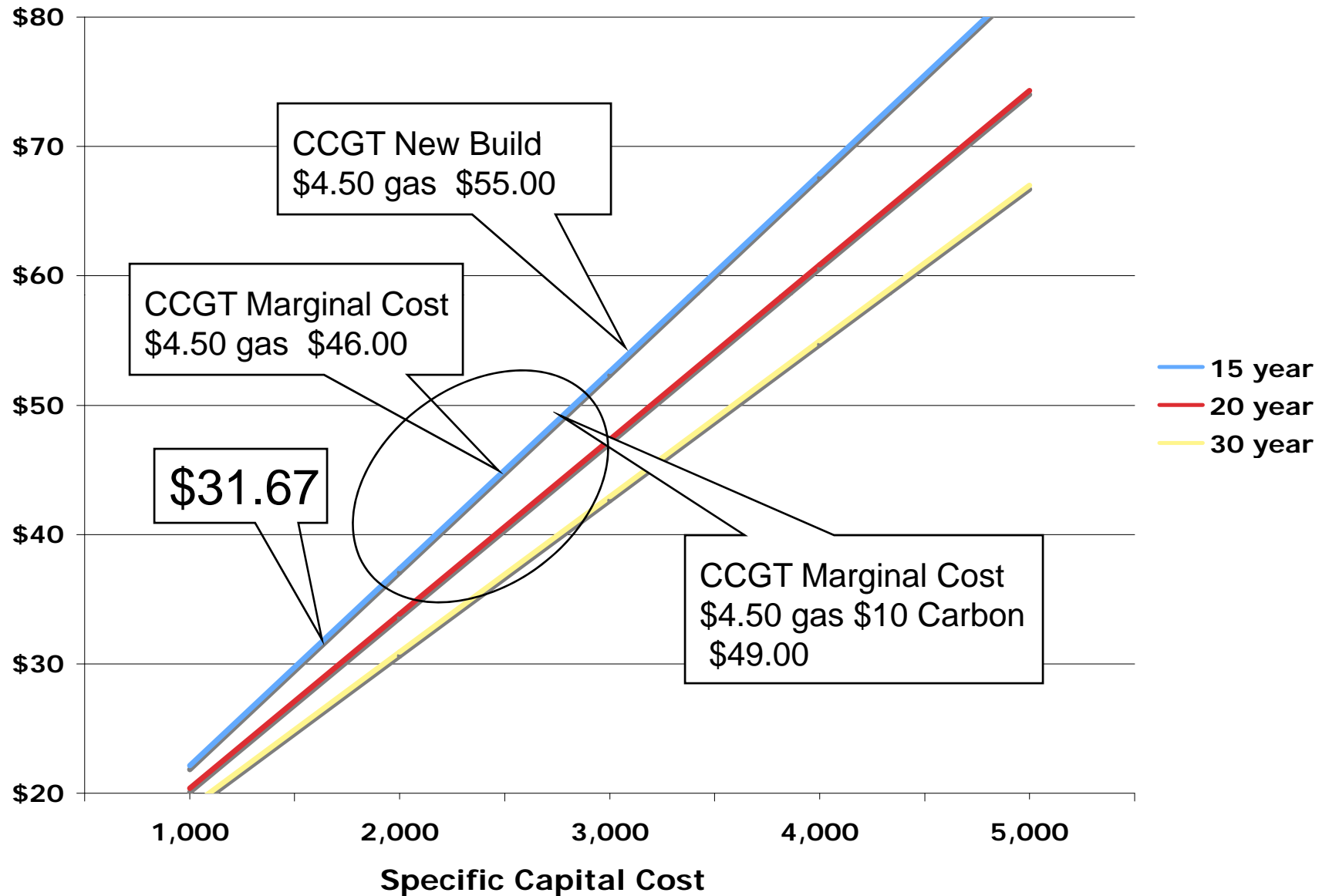
Average Electricity Price Texas 2009



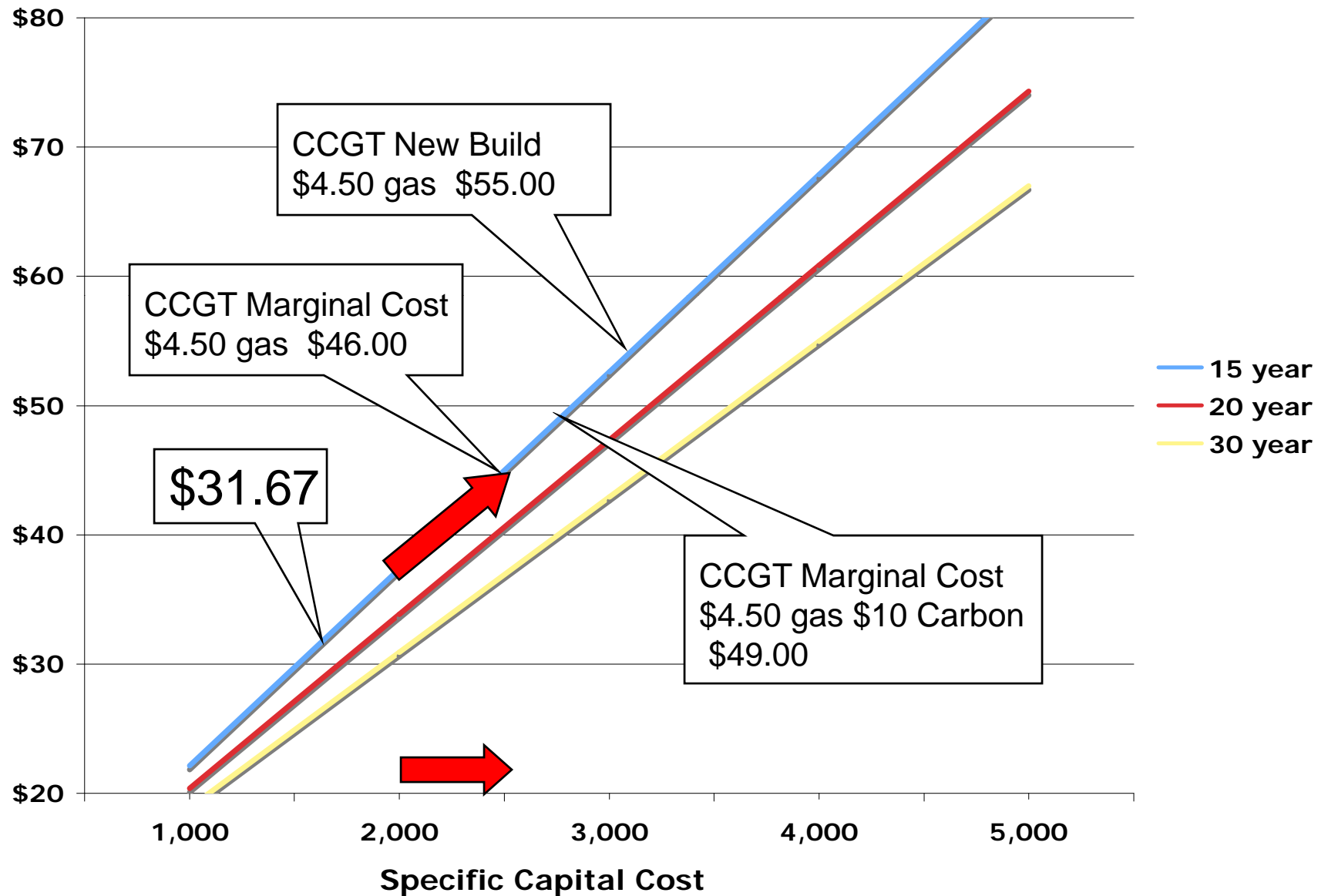
Gas CCGT Sets the Price Ceiling



Carbon Doesn't Help That Much



Construction Interest Can Affect Competitive Position (5 yr construction @ 10% adds ~25% to Plant Cost)



Returns Must Be Robust

- We can't assume:
 - Gas will get expensive again
 - Carbon will have a (high) price
 - That existing coal will go away
 - That there won't be 100+ GW of wind

Cost-Reduction Learning Curve

- Can we get on it?
- Can we design it so that it goes the right way? (down)
- How much does each step cost?
 - \$1B or \$10M for each step
 - Cumulative MW \neq cumulative units
- Are we counting on vendors giving up their profits to make the learning curve happen?

De-Concentrate Risk

- Smaller plants:
 - Fewer decision makers-faster decisions
 - Smaller consequences of failure
 - Avoid customers getting fired
 - Avoid customer company bankruptcy
 - Lower inherent reliability requirements
 - Lower exposure to market risks

Investors, Developers

- Can't take some risks:
 - Proliferation
 - Spent fuel
 - Terrorism
- In the business of taking other risks:
 - Development
 - Fuel price
 - Market
 - Regulatory (some)
 - Technology (some)

Challenges

- Get benefits of smaller (factory produced) units AND keep operating costs low (data center as model?)
- Achieve cost reduction AND a profitable value chain to support scale up
- Benefit from market and regulatory evolution BUT not require it to get started