

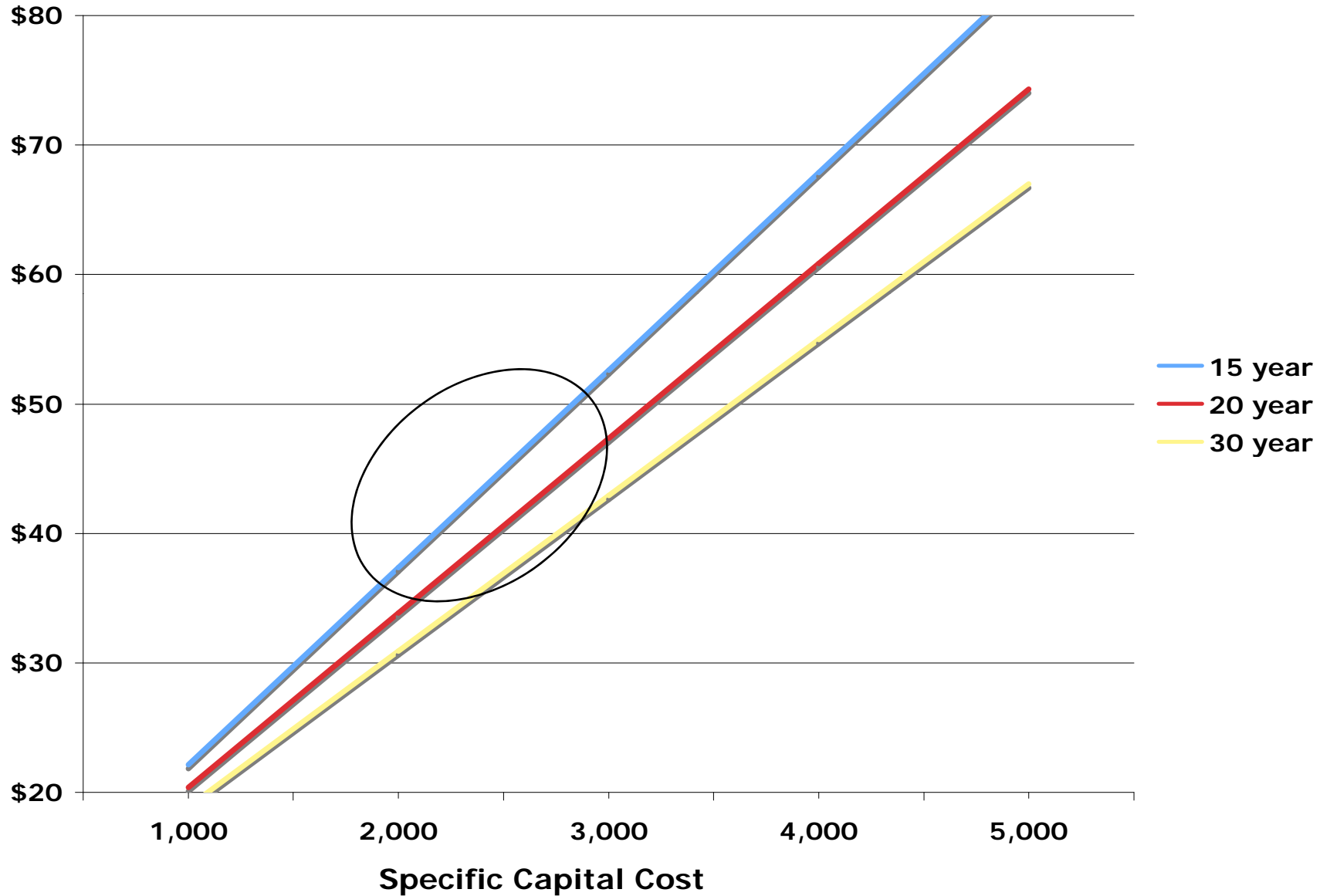
# Market Requirements for a New Powerplant Technology

Eric Ingersoll

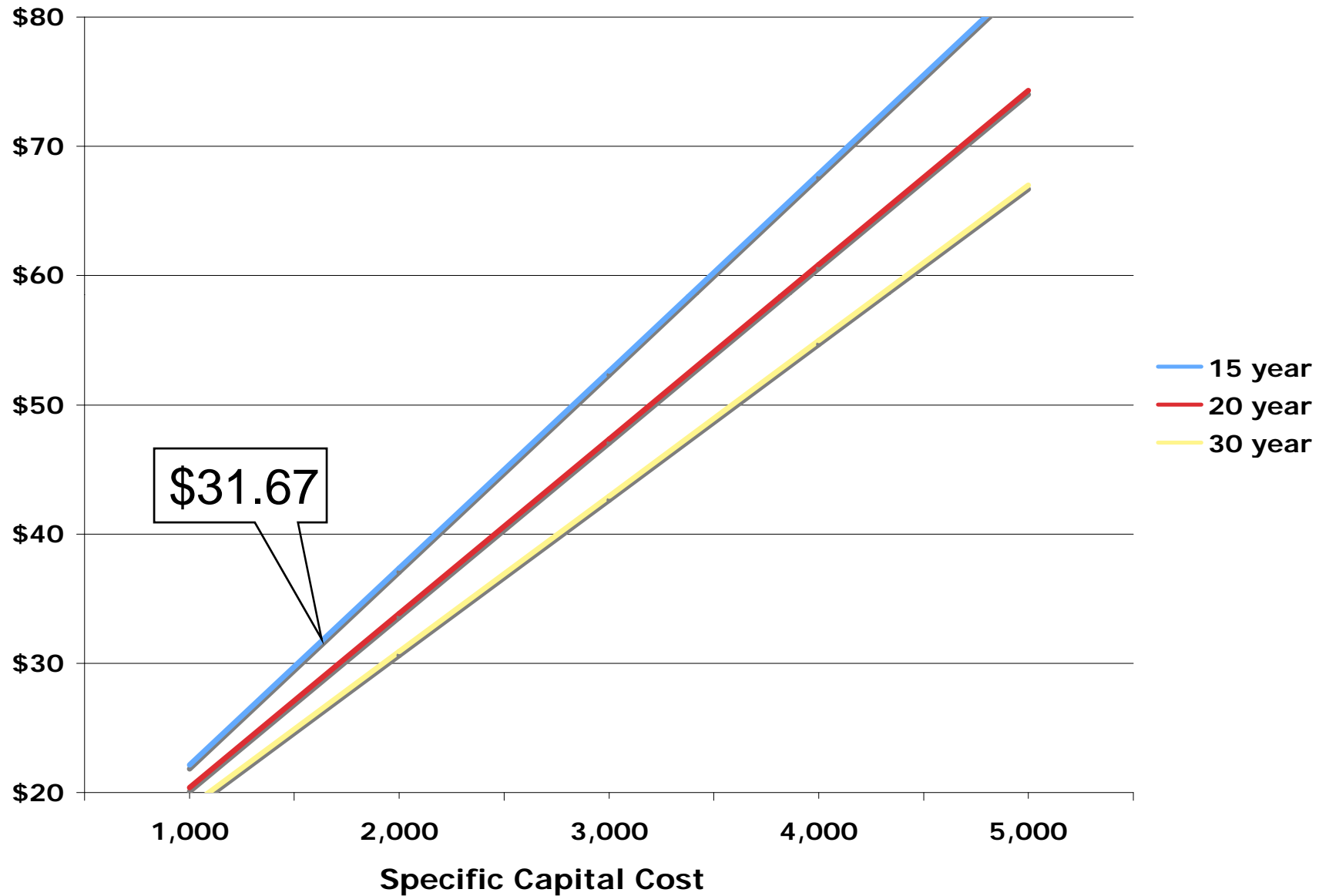
# Market Demands

- Cost Engineering
- Risk Management

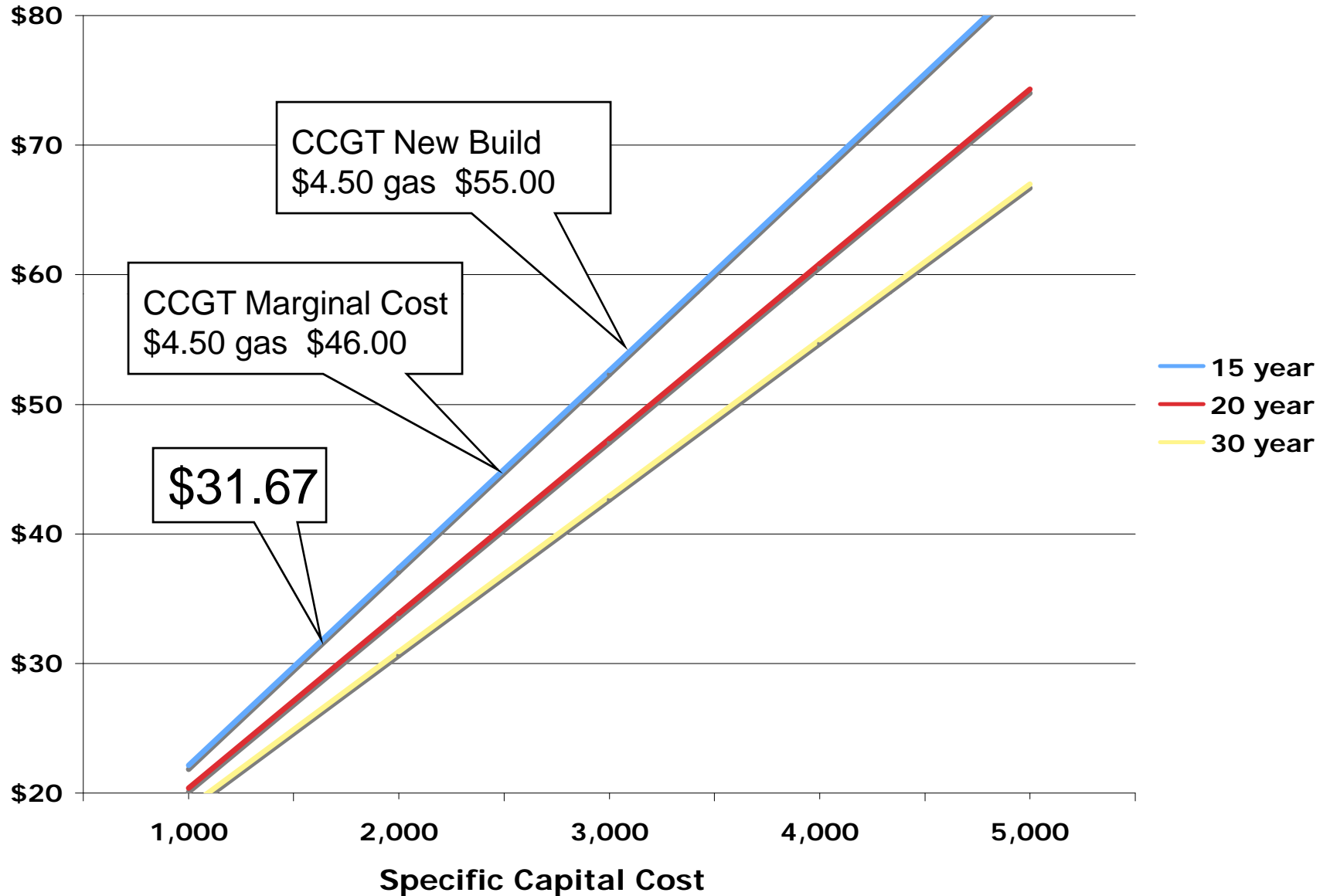
# CapEx vs COE



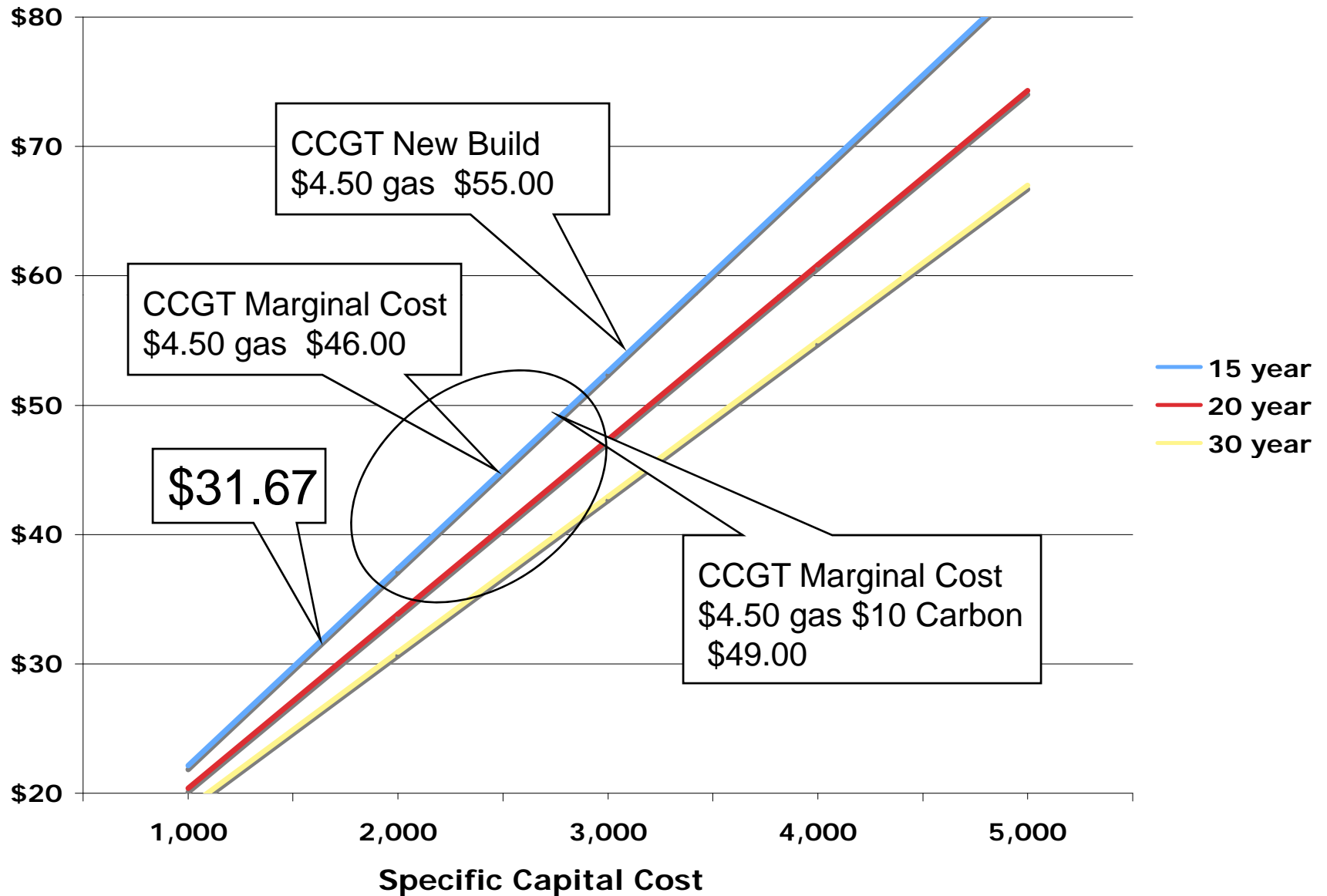
# Average Electricity Price Texas 2009



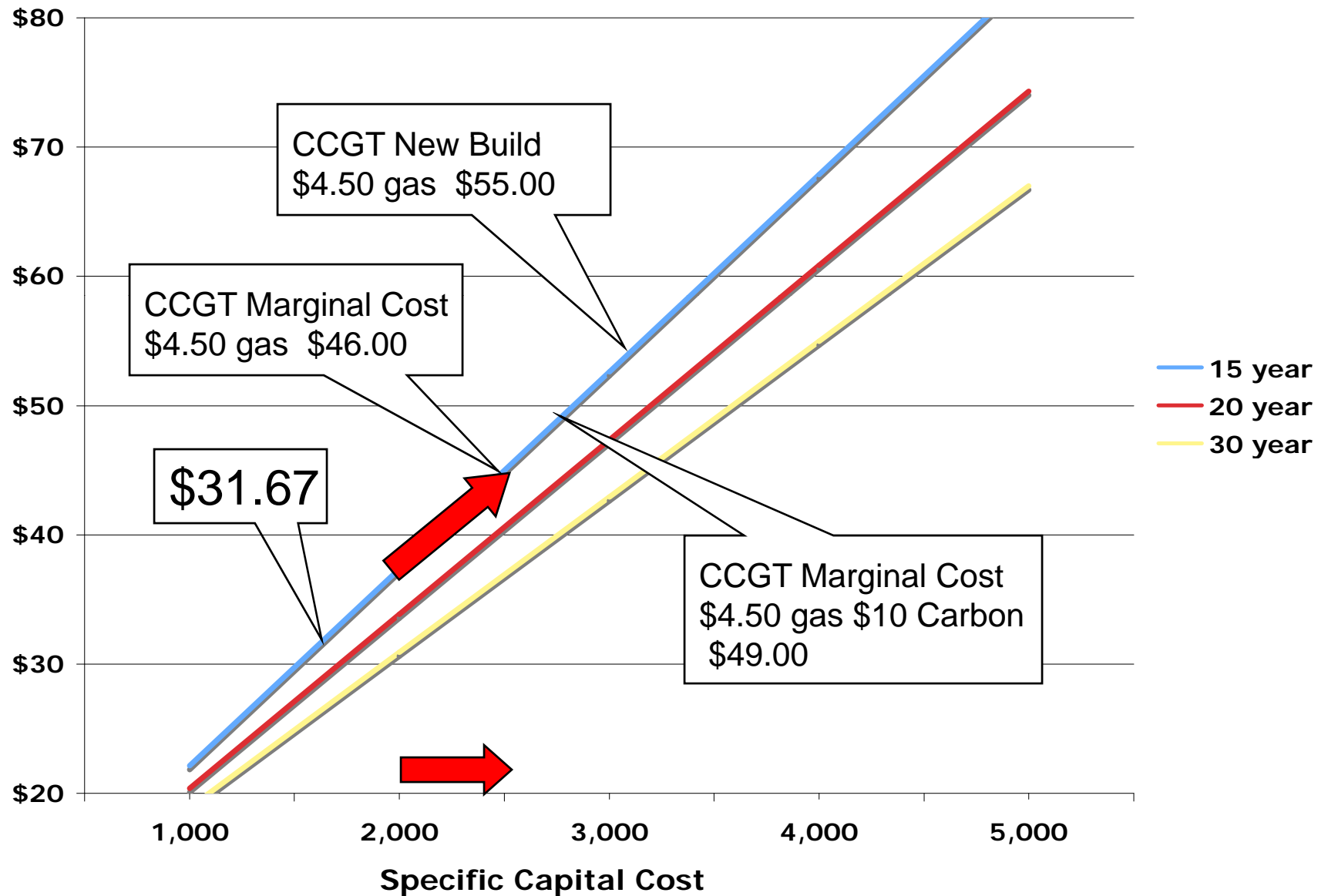
# Gas CCGT Sets the Price Ceiling



# 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