Restoring the Nuclear Option in the U.S.: A Real Options Approach

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Agenda

- New Cost Claims for Nuclear Power
- The Nuclear Plant Investment Opportunity
- Using Real Options to Value the Plant

Limited Presentation Time

Presentation Will Stress Real Option Concepts Over Numbers

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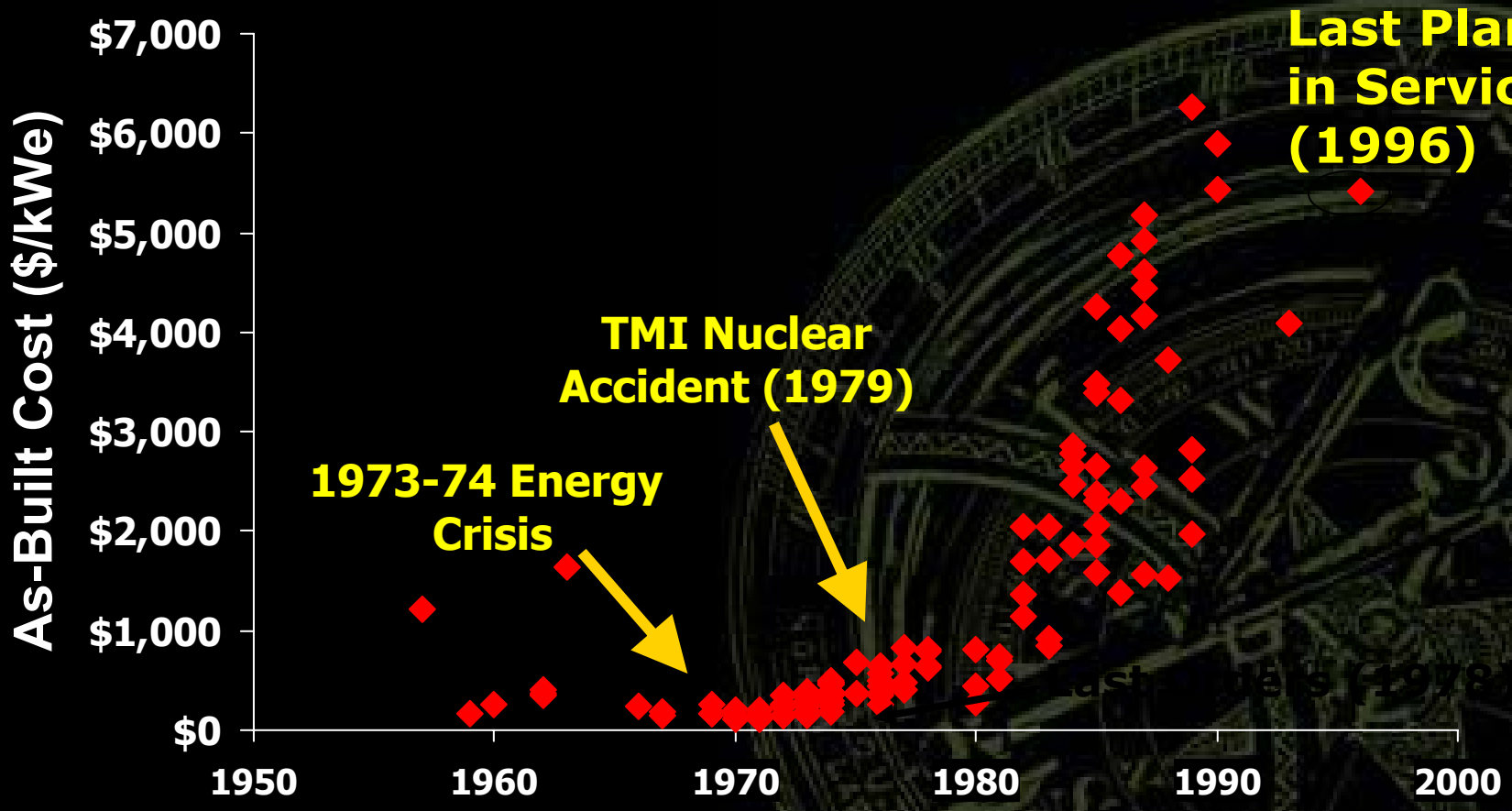
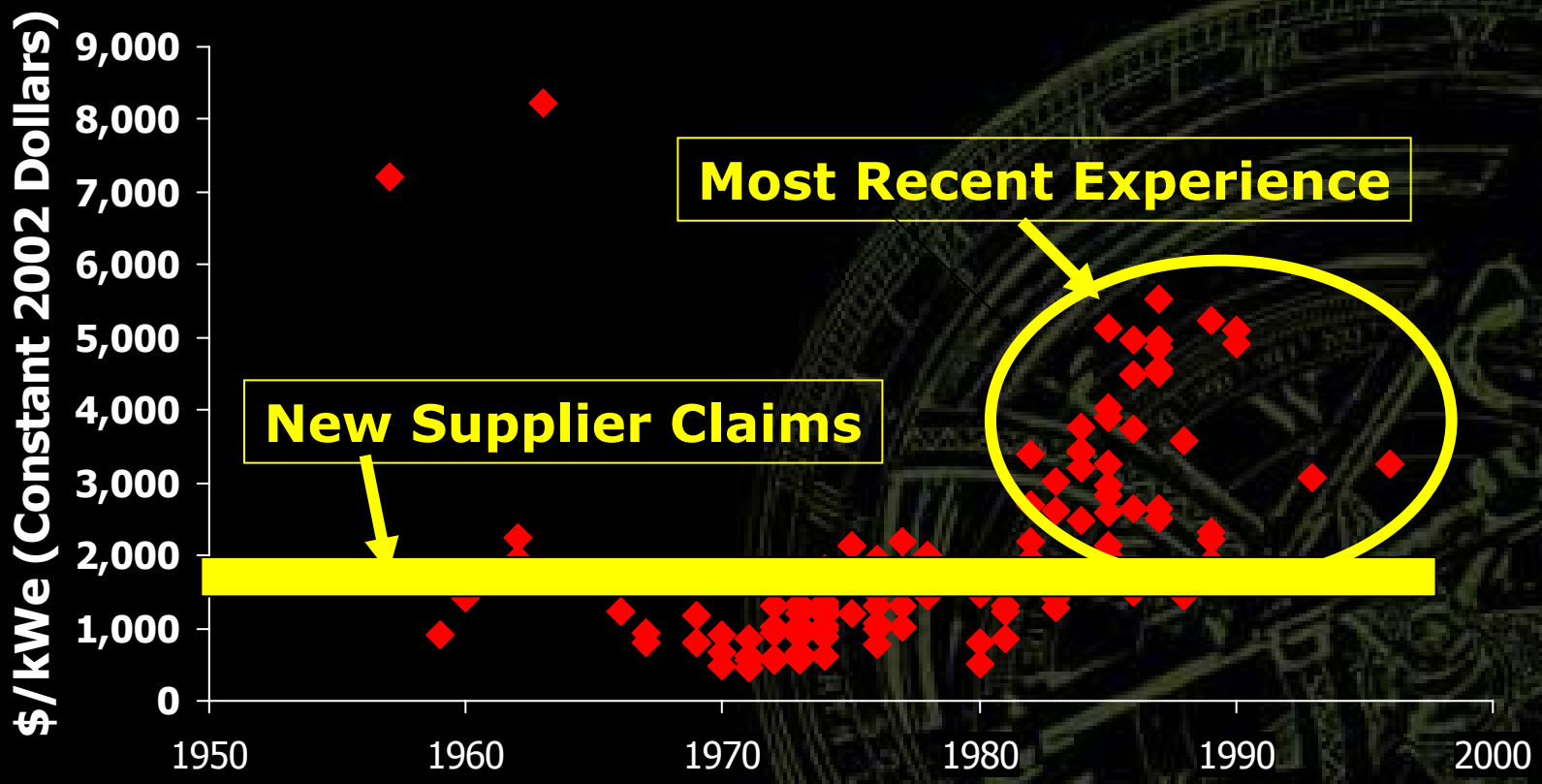
Nuclear Power Was Priced Out of the U.S. Power Markets



Do New Capital Cost Claims Restore Nuclear Competitiveness ?



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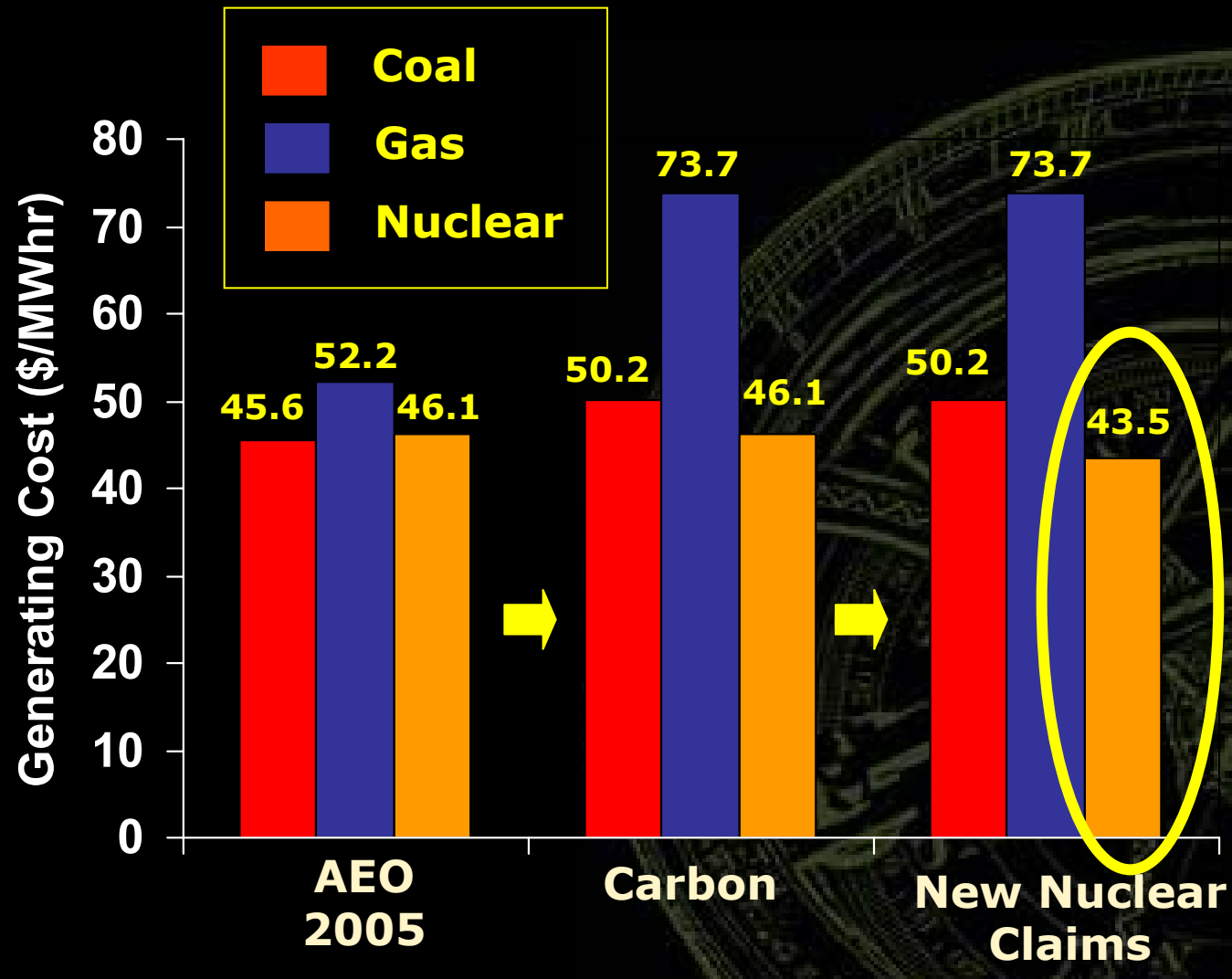
Impact of New Nuclear Supplier Claims ($/Mwhr)



A Nuclear Plant Opportunity Was Identified in Texas

- Increasing natural gas prices have Texas Gulf Coast petrochemical firms interested in nuclear plant
- TIACT/DOE commissioned nuclear plant feasibility study (under Nuclear 2010 Initiative)
- EnergyPath & Sandia National Laboratory prime contractors

Real Data Becomes Available!

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Supplier Data Much Improved; But Construction Cost Still an Uncertainty

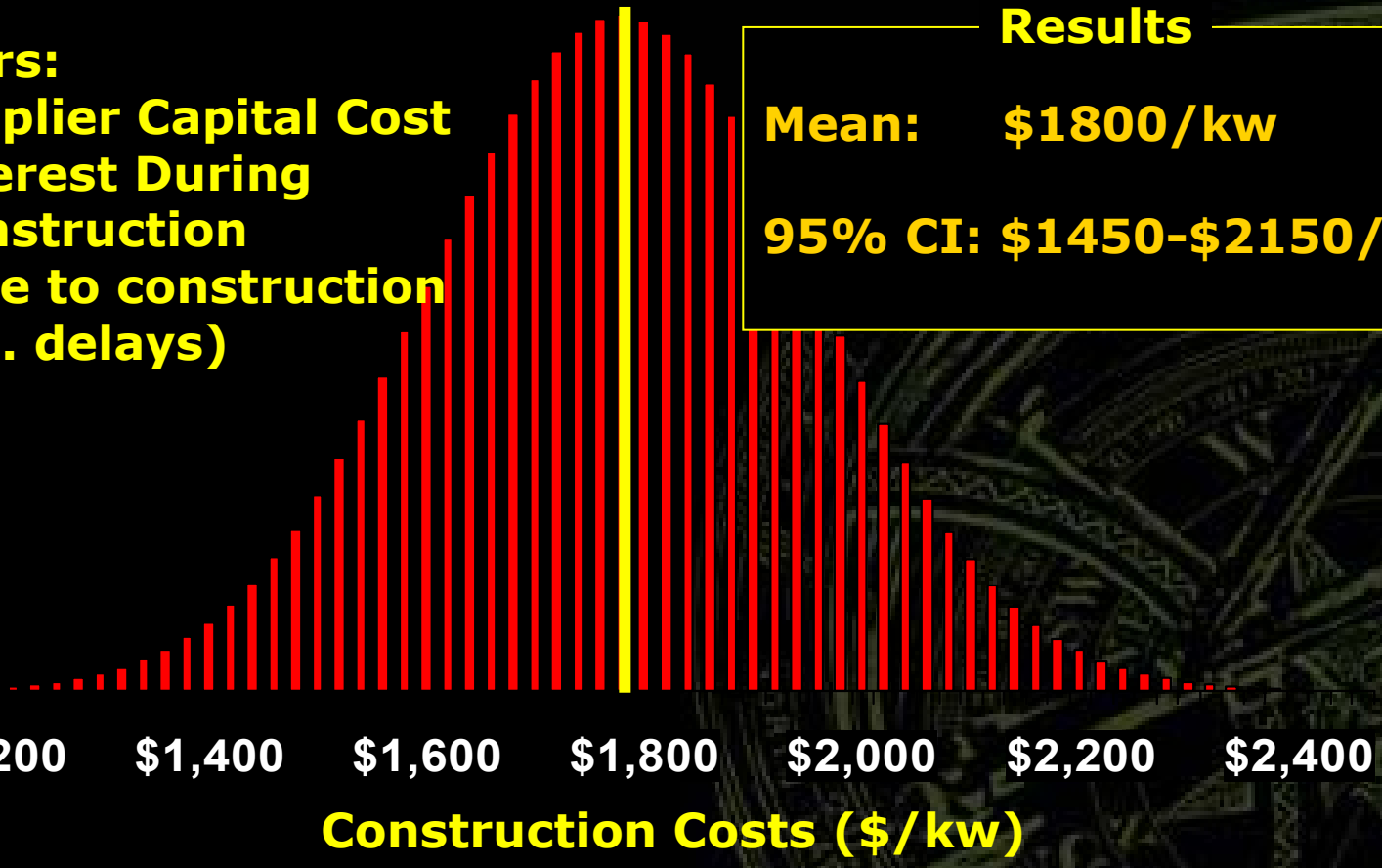
Factors:

- -Supplier Capital Cost
- -Interest During Construction
- -Time to construction (i.e. delays)

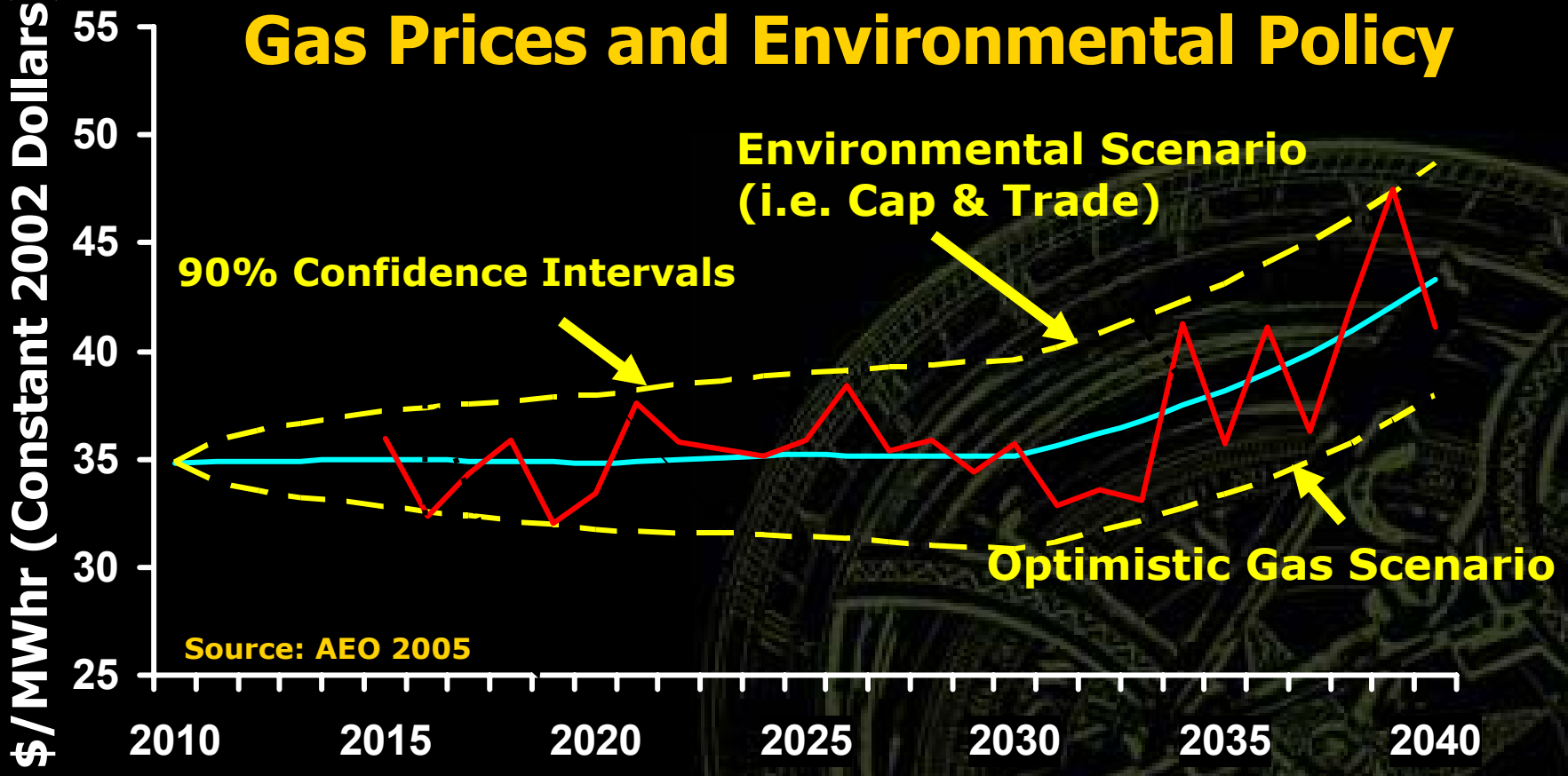
Results

Mean: $1800/kw

95% CI: $1450-$2150/kw

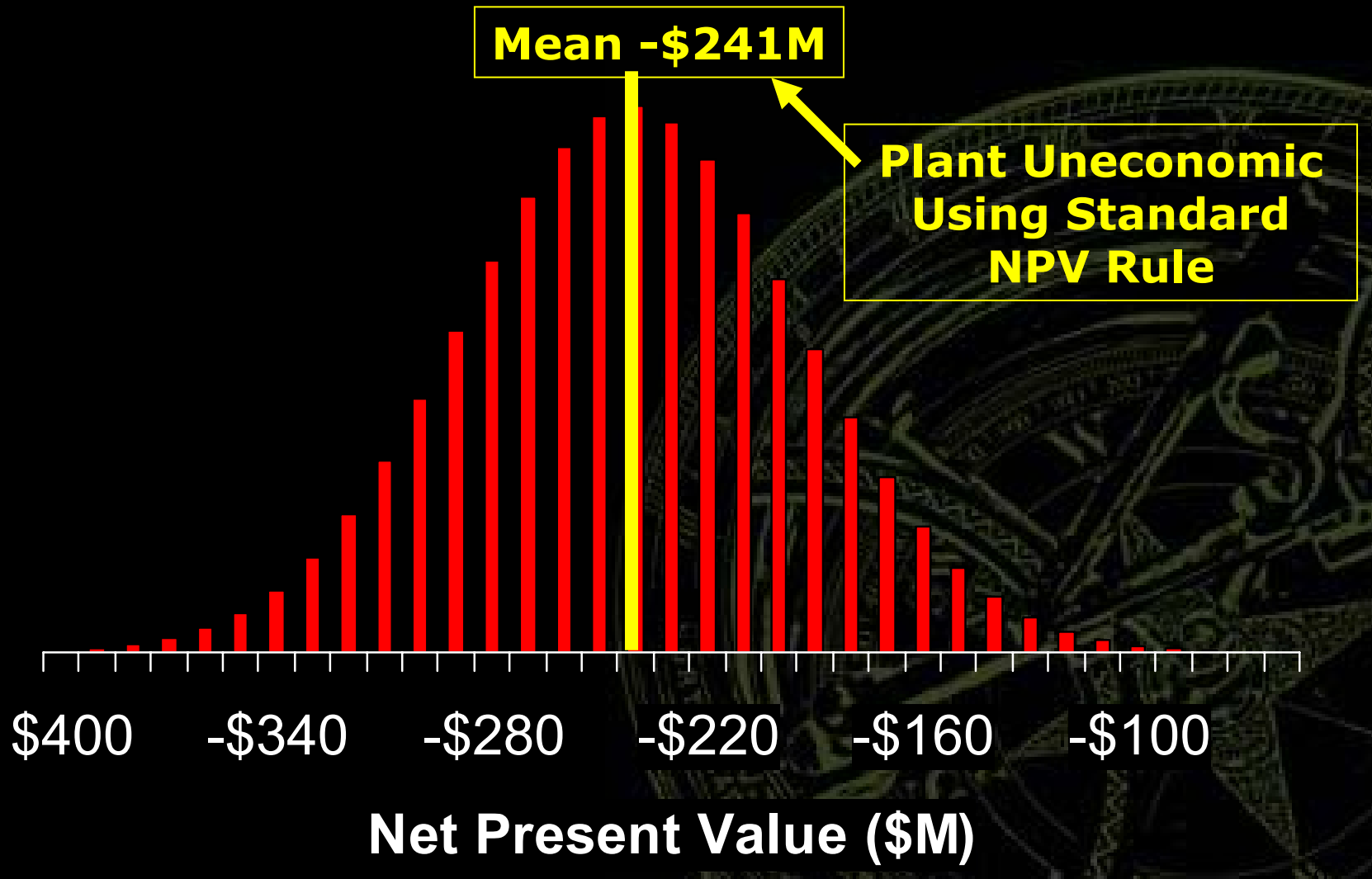


Future Electric Prices Affected By Natural Gas Prices and Environmental Policy



Electric Prices are Primary Reason for Plant Present Value Uncertainty

Simulation of Plant NPV



Plant Construction Schedule Has 3 Distinct Sequential Phases

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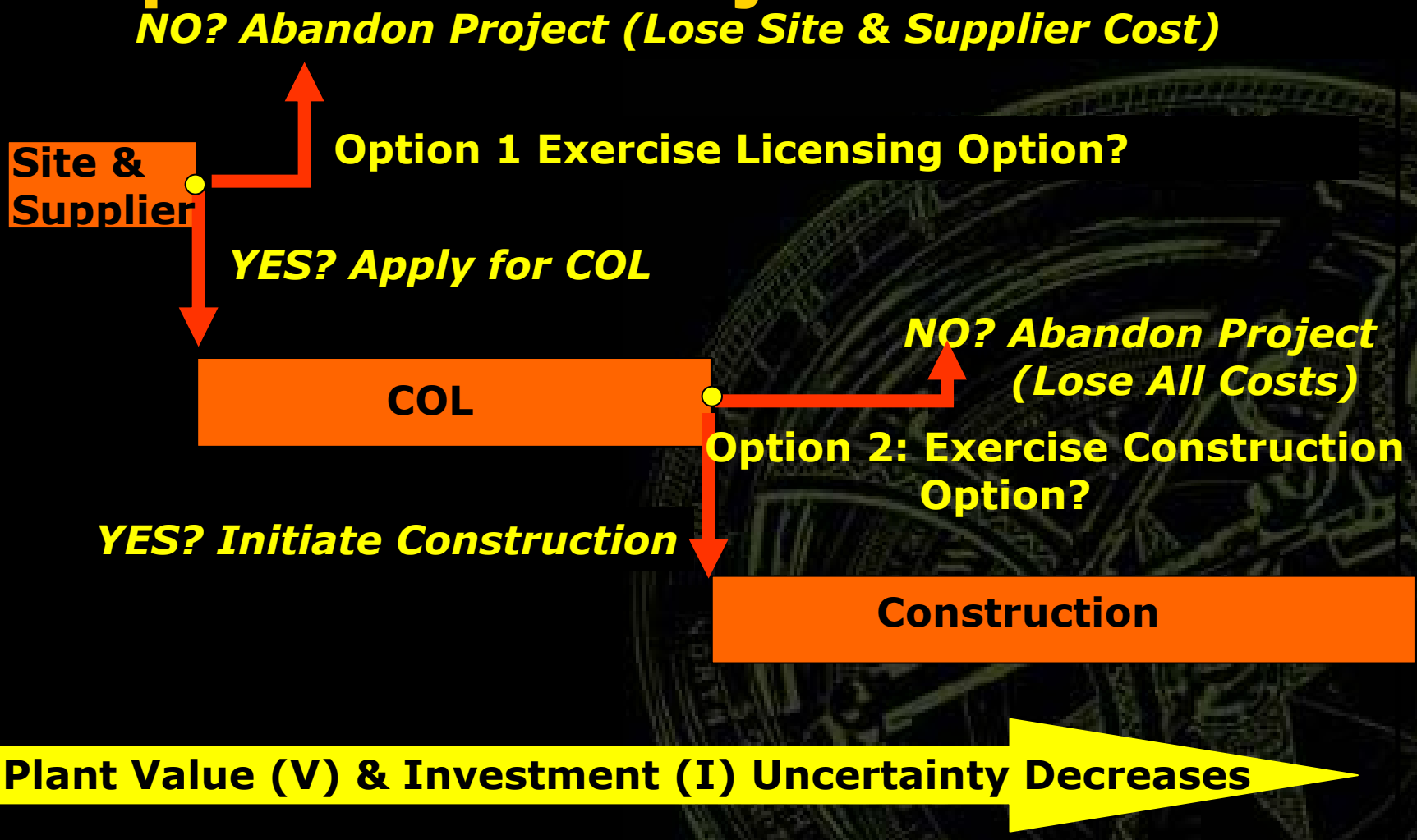
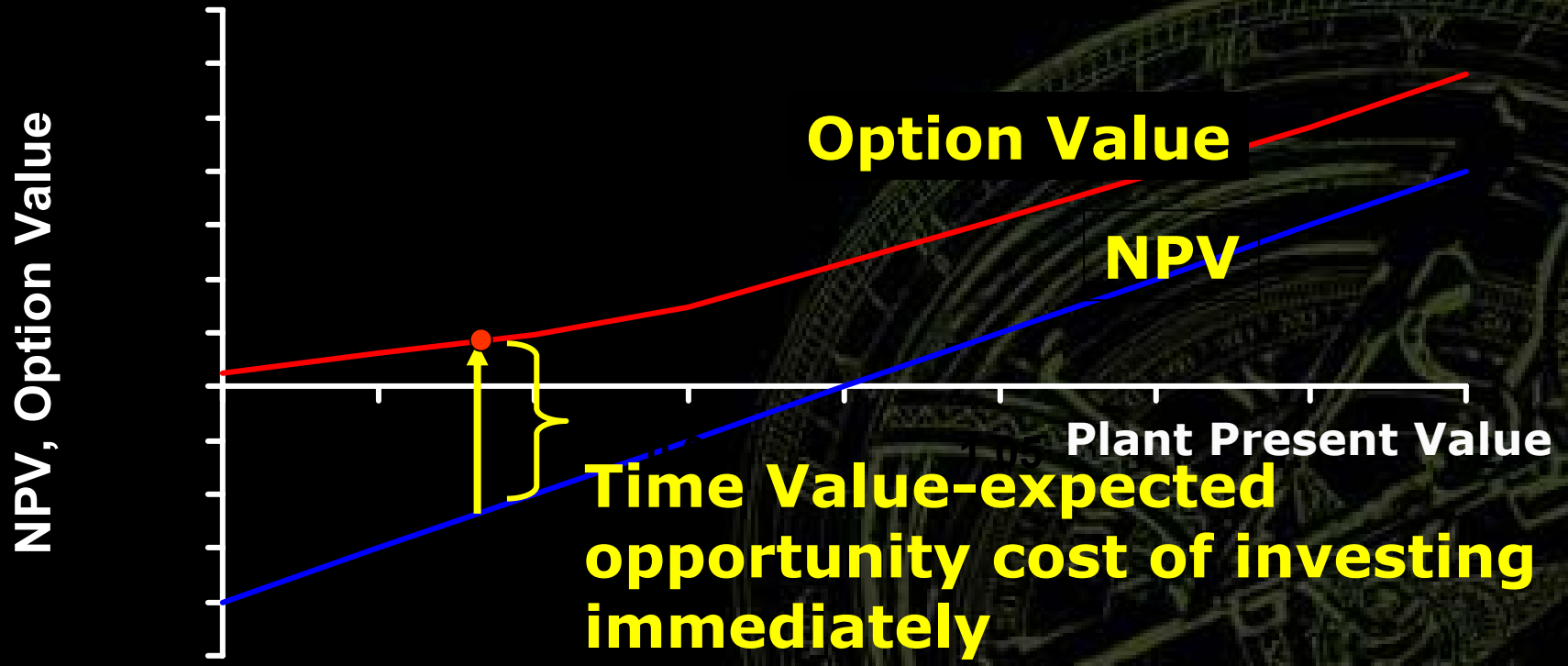
Identify Two Sequential Embedded Options in this Project Schedule



The Presence of Options Renders the NPV Conclusion Wrong Because it Overlooks Opportunity Cost



Time Value Takes Into Account That The Plant & Investment Values are Changing over Time as Uncertainties are Resolved

Solution Procedure

- Binomial Real Options Model Employed
- Plant Value and Investment are Both Random Variables (complicates solution)
- Result is Obtained Using Backwards Recursion

Is Cost of 1st Option < Option Value?

Results

	Present Value	Decision
Expected NPV	($240M)	Plant Uneconomic
Expected Opportunity Cost	+$260M	
Value of Option to Wait	+$20M	Cost<Value Buy Option (Execute 1st Phase)
Option Cost	+$17M	

Conclusions

- NPV analysis understates true project value if significant uncertainty is present;
- Large energy industry capital investments almost always involve a high degree of uncertainty;
- If investment flexibility is possible (and it almost always is), then a real options approach produces a better decision;
- Nuclear plants represent one of the largest and most uncertain investments in the energy industry and have a high degree of investment flexibility; a real options analysis is essential

Lone Star Nuclear Incorporated in Texas in 2004

Thank You For Listening to Our Presentation

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TIACT Study Available On

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