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# New Build Risks

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# Framing the Challenge

- Although much has been done to improve the surrounding processes for new build development and construction ...
- ... limited observed experience exists to-date regarding these benefits ...
- ... and, many stakeholders and observers remain skeptical over the ability of owners and EPCs to execute effectively
- To address this challenge requires that owners thoroughly recognize the future complexities that will underlie aggressive planning and construction ...
- ... based on a healthy respect for the history of mega-projects in achieving planned outcomes, even among sophisticated owners ...
- ... and, a realistic recognition that while project and other risks cannot be fully avoided, proper foresight can provide for effective mitigation in many areas

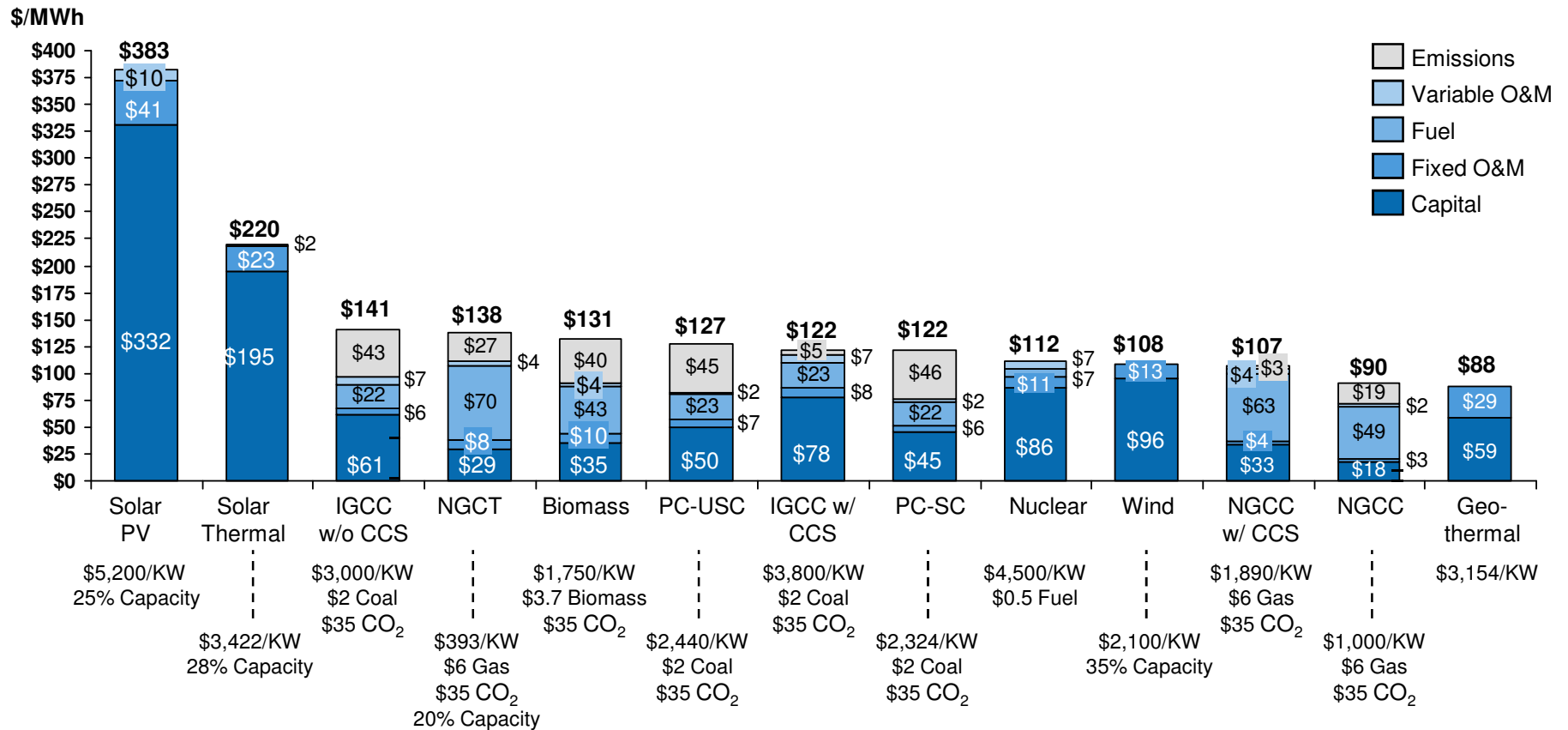
# Next Wave Status

Key Decisions	Status
▪ Certificate of need	Some
▪ "Hard" cost estimate	Not yet
▪ Board approval	Not yet
▪ Executed contracts	Few
▪ Firm equipment orders	Few
▪ Project management structure	Not yet
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•	•
•	•

**The Critical Issue: Risk Apportionment**

# Levelized Cost Comparison

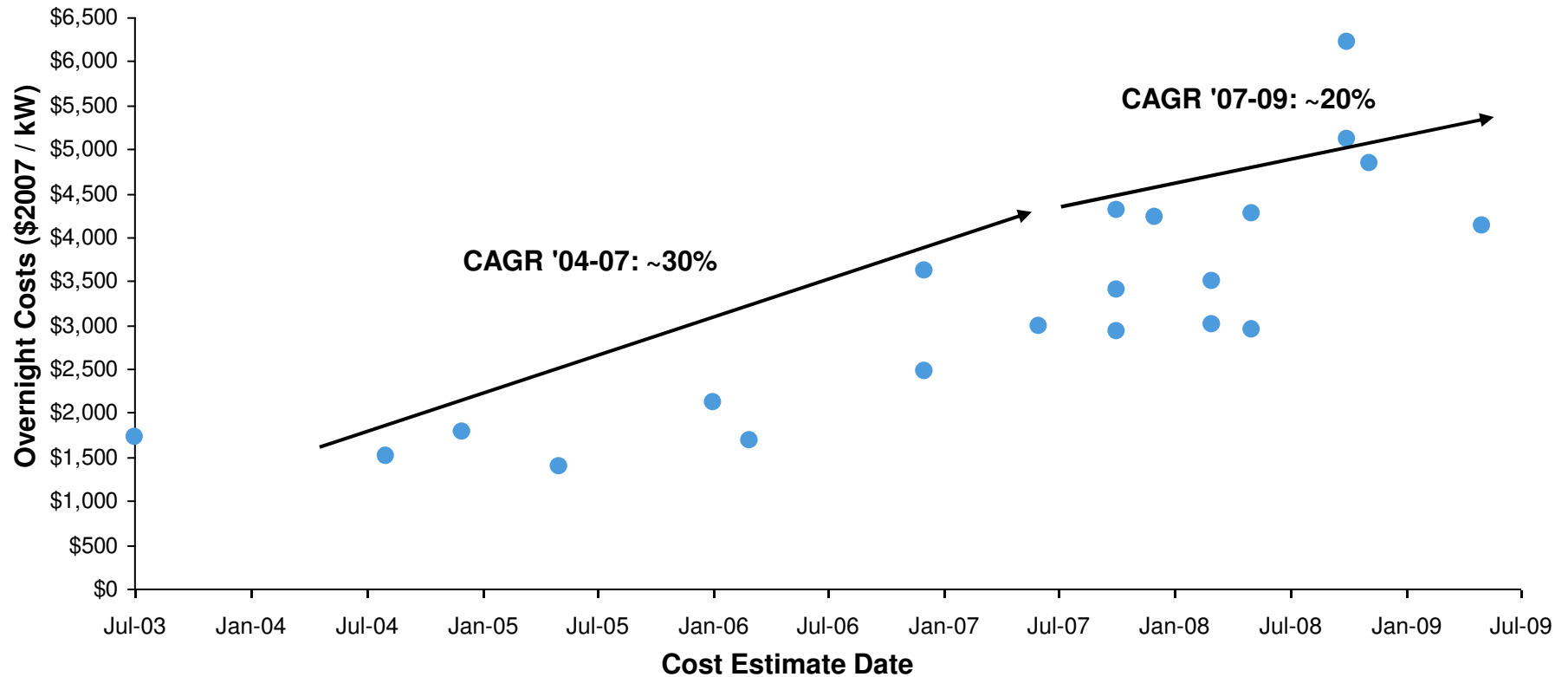
## Levelized Costs by Generation Technology



Note: Assumed cost of equity of 12%, cost of debt 7.5%, 55% debt and escalation of 4.5%; general inflation rate of 2.5%; analysis excludes tax benefits; assumes baseload capacity if not stated

Source: EIA; multiple industry reports and company filings; Booz & Company analysis

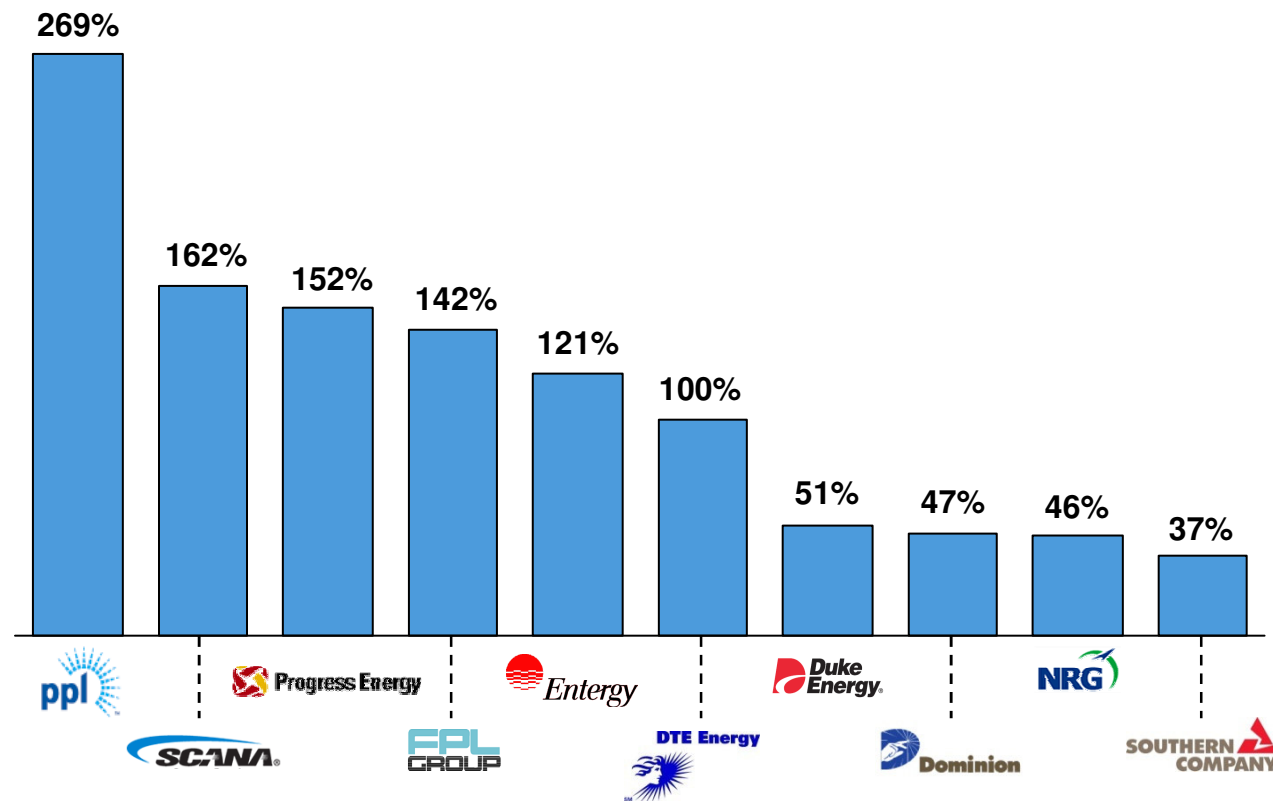
# Nuclear Overnight Costs



Note: CAGR is calculated as an average of the estimates in the first half of 2006, an average of the estimates in the second half of 2008 over a period of 3 years; assumes annual inflation rate of 3.4% based on nuclear construction Handy-Whitman Index CAGR 1996-2008  
 Source: Booz & Company analysis

# Impacts to Current Position

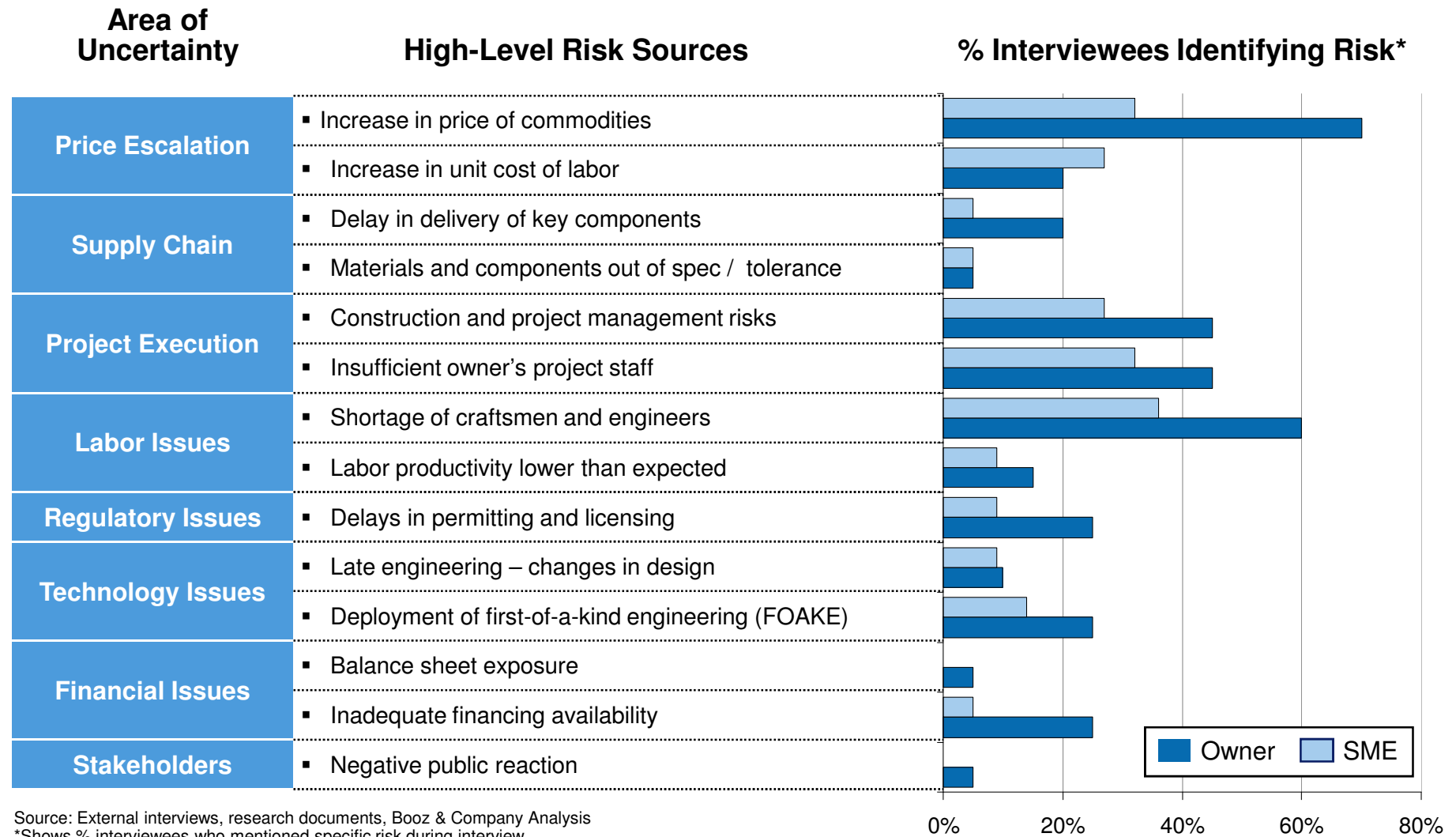
## Nuclear Investment Cost as a % of Book Equity



## Key Questions

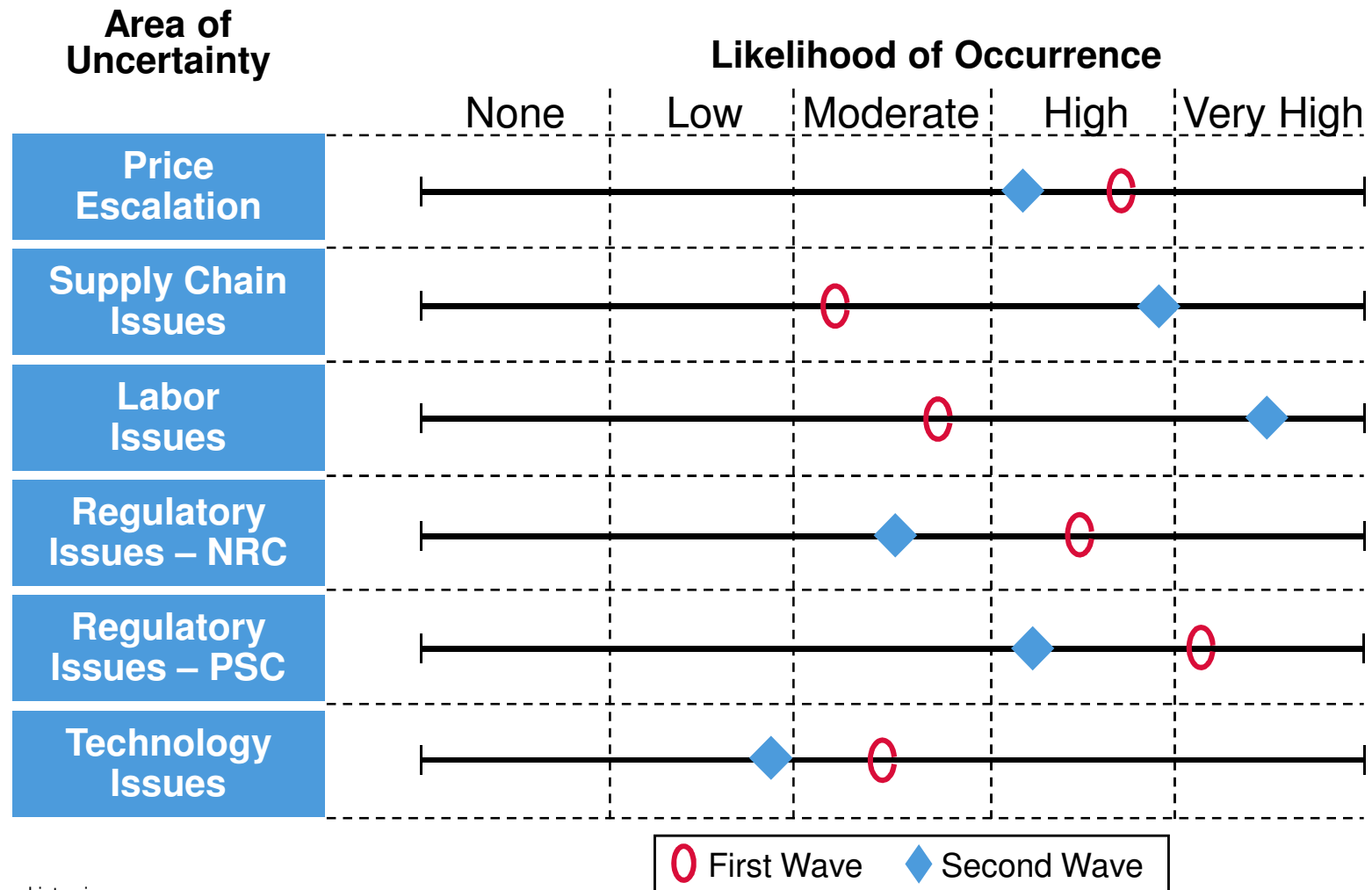
- Are expectations realistic?
- Are regulators supportive?
- Are customers aware?
- Are plans financeable?

# Recognition of Risks



Source: External interviews, research documents, Booz & Company Analysis  
 \*Shows % interviewees who mentioned specific risk during interview

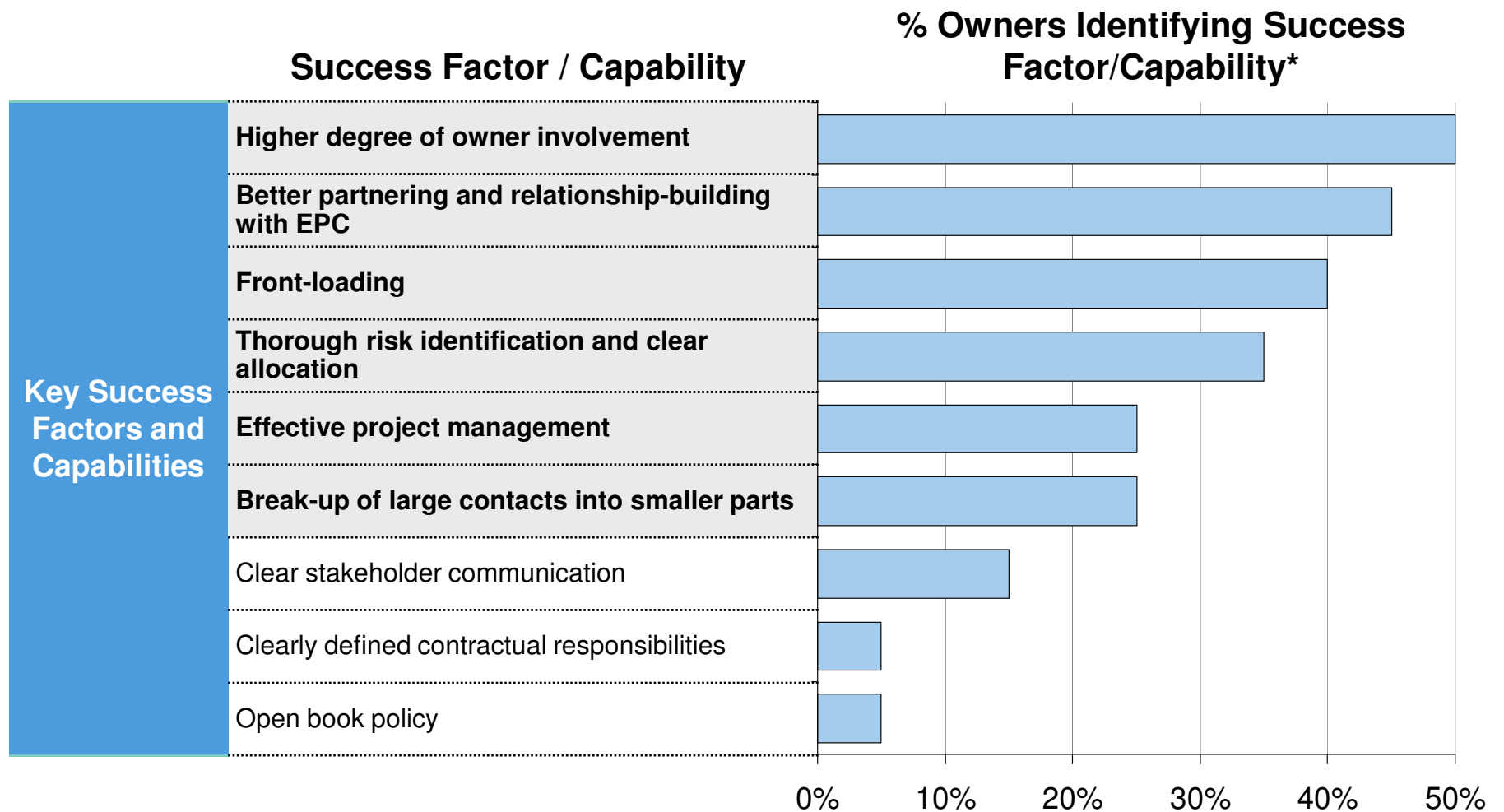
# Risk Across the Cycles



Source: External interviews

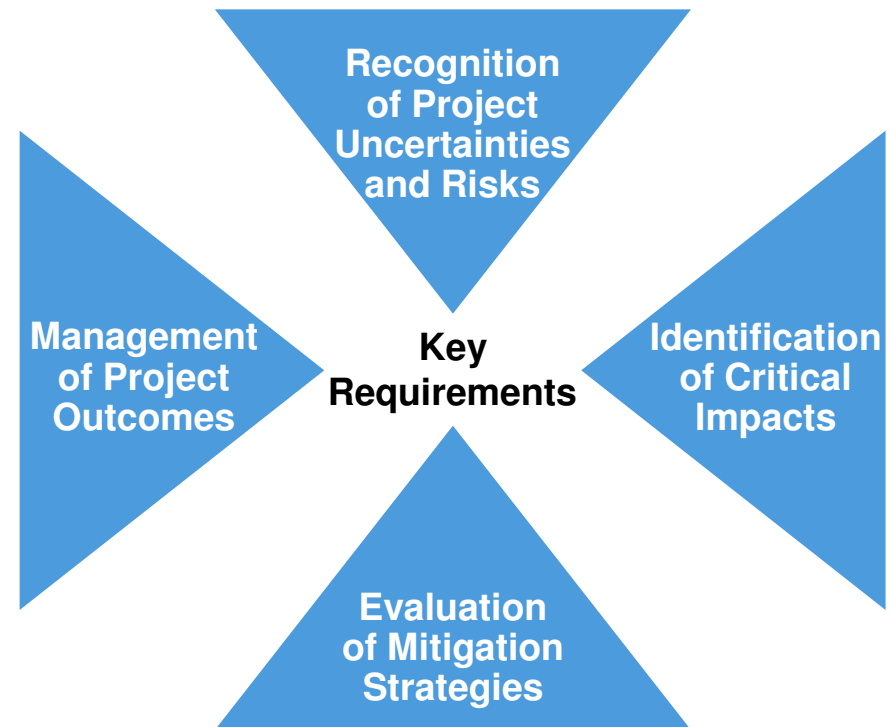


# Owner Requirements for Success



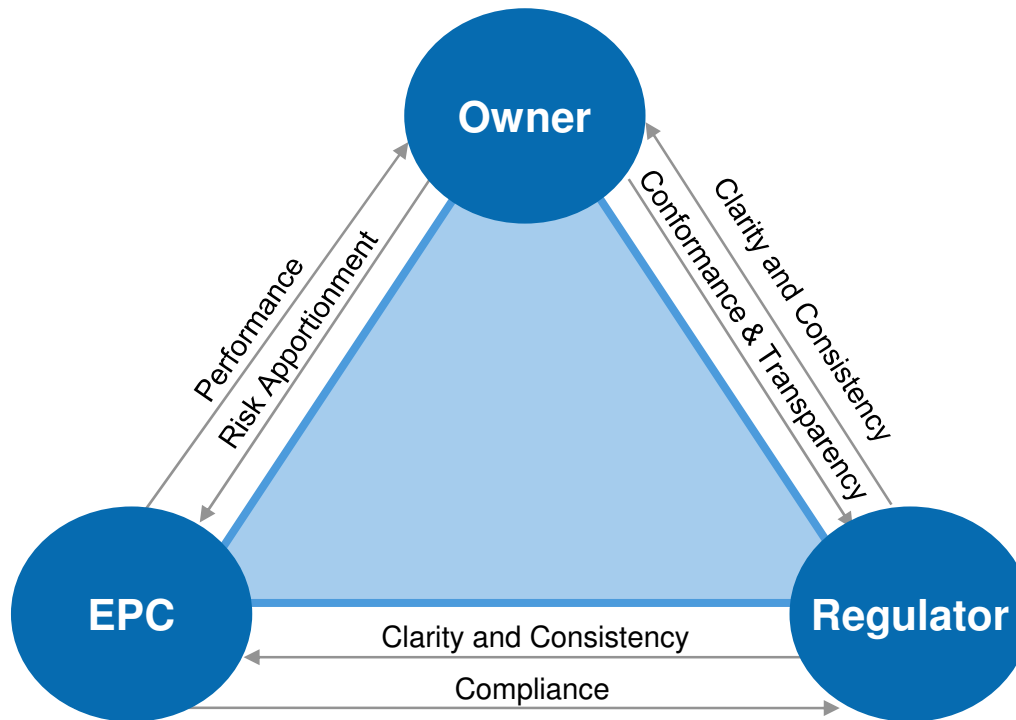
# Risk Assessment Introduction

- What are the risks that can affect planned outcomes for the project?
- How likely is the potential occurrence of these risks?
- What are the potential impacts of these risks on the project?
- How can the affects of these risks be mitigated?
- What impacts do outcomes have on project planning, structuring, and financing?



# Perspectives on Success

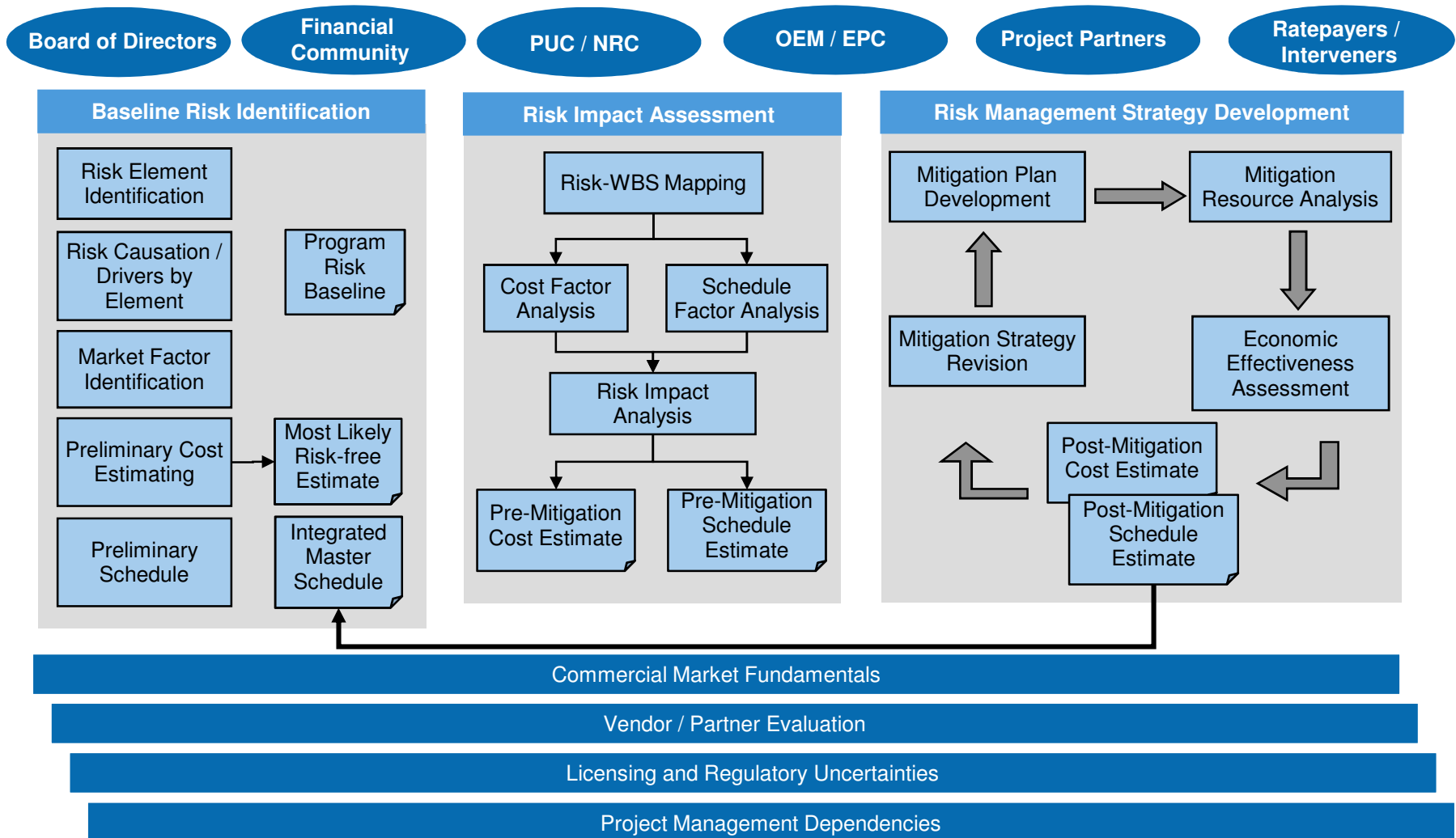
## Key Dependencies



## Key Questions

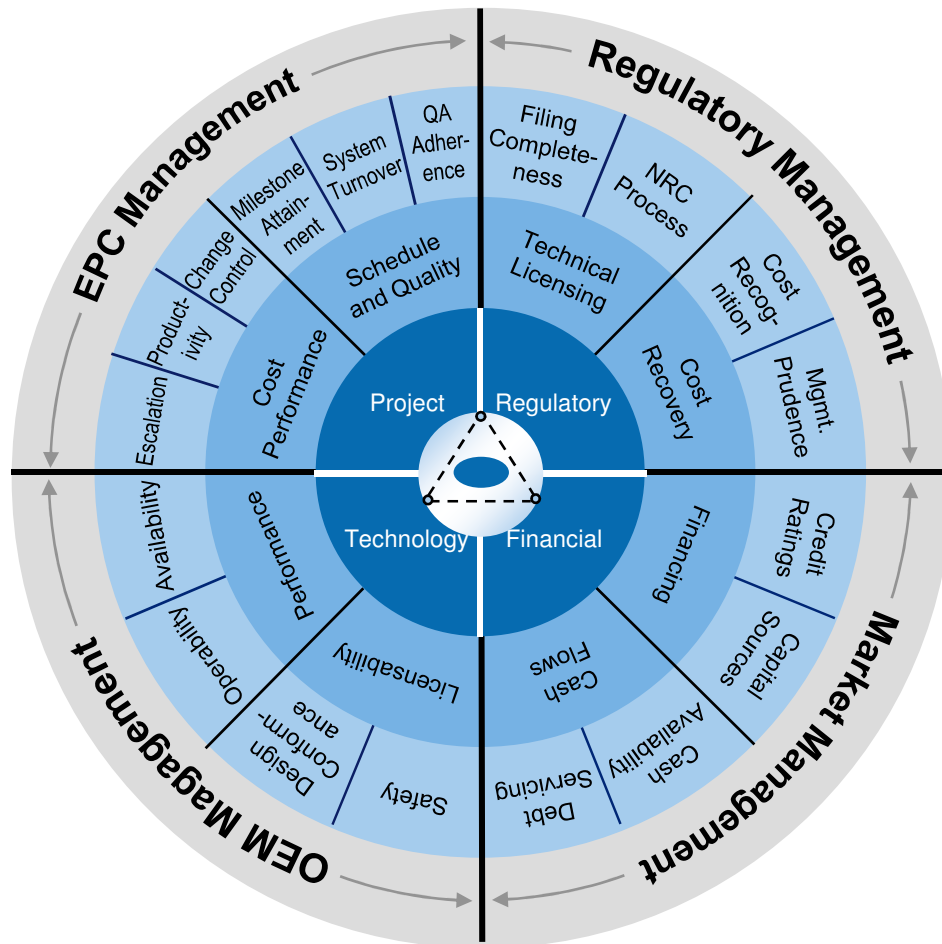
- **Owners** request “reasonable protection”
- **Regulators** request “stringent conformance”
- **EPC firms** request “absolute predictability”

# Risk Assessment Model



# “The Risk Wheel”

## Management of Risk and Uncertainty



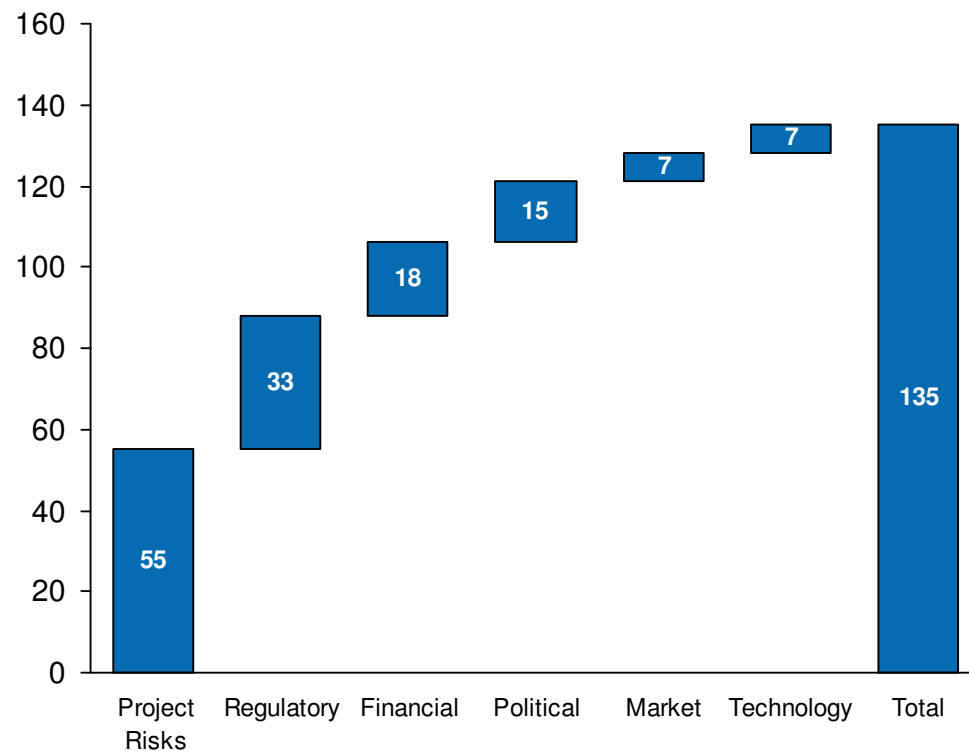
## Assessing Related Risks

- Multiple sources of risks of varying types
- Different scale impacts and timing of occurrence
- Life-of-project impacts regardless of when first emerging
- Mitigation approaches need assessment
- Ongoing risk assessment necessary

# Risk Identification and Categorization

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## Risk Distribution



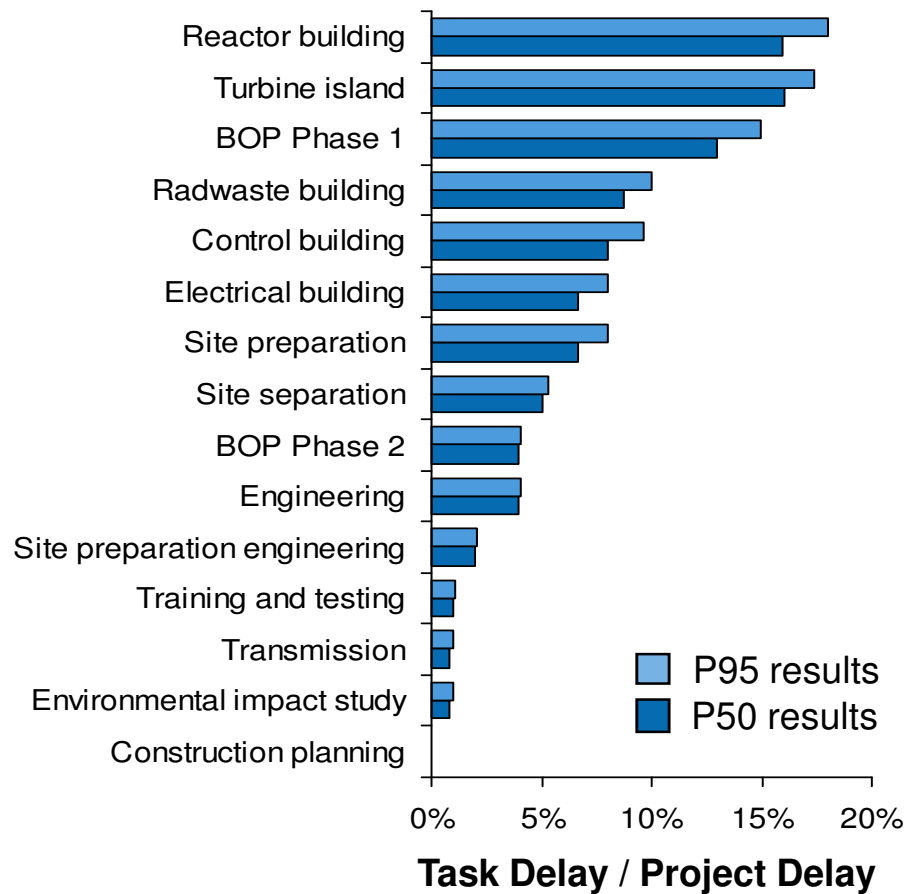
## Illustrative Risks

- **Project**
  - EPC project execution
  - Labor productivity
  - Containment building concrete quality
- **Regulatory**
  - COLA review duration
  - Design certification
  - CPCN approval
- **Financial**
  - Financing availability
  - Foreign exchange
- **Political**
  - National elections
  - NGO intervention
- **Market**
  - CO<sub>2</sub> emission costs
  - Natural gas price
- **Technology**
  - Reliability
  - OEM support level

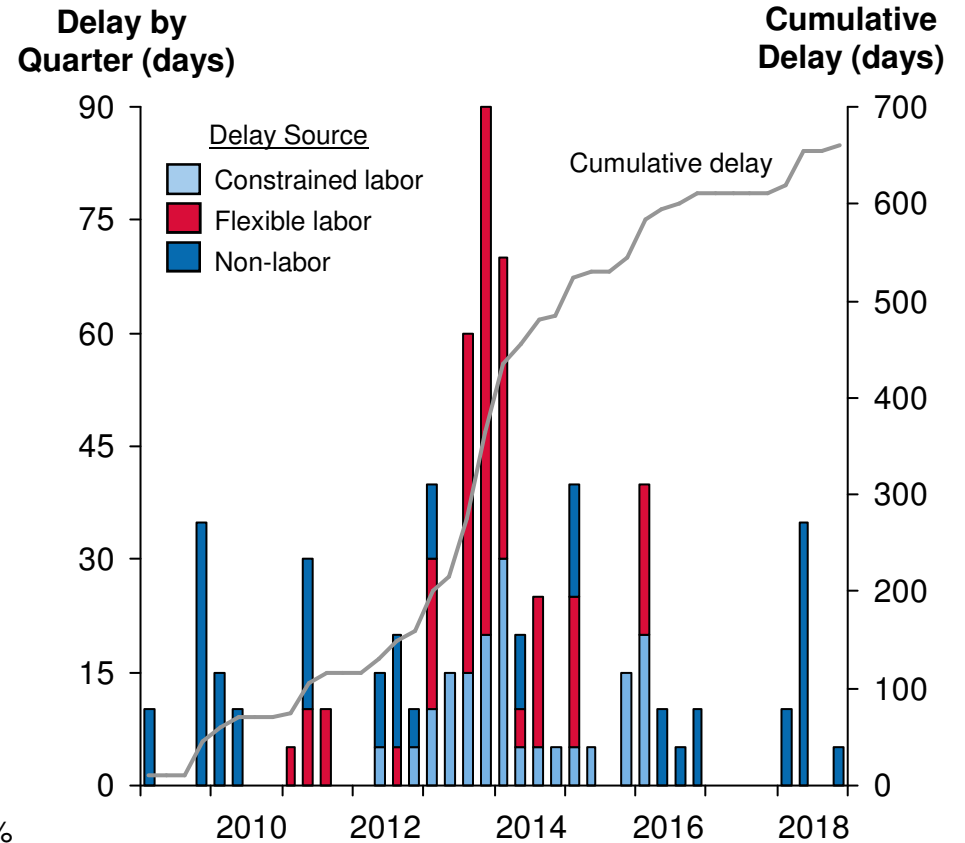
# Schedule Risk Attribution

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### Contribution to Schedule Delay By Schedule Task

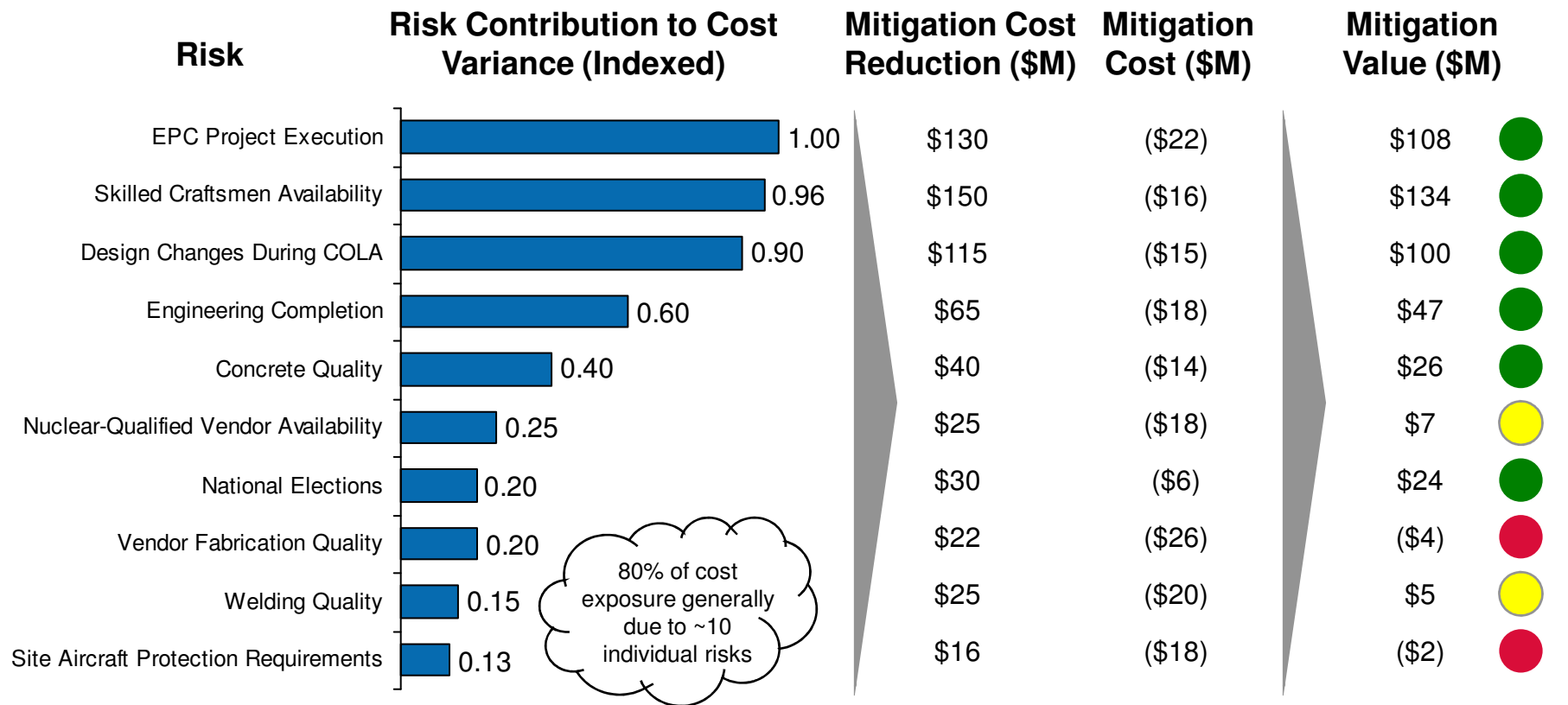


### P50 Project Delay by Quarter and Source



# Risk Ranking

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Individual risks are ranked based on a covariance analysis – measuring the linkage between the magnitude of a risk’s discrete impact and the variance in total project costs (relative to pre-risk estimate) across all simulation cases

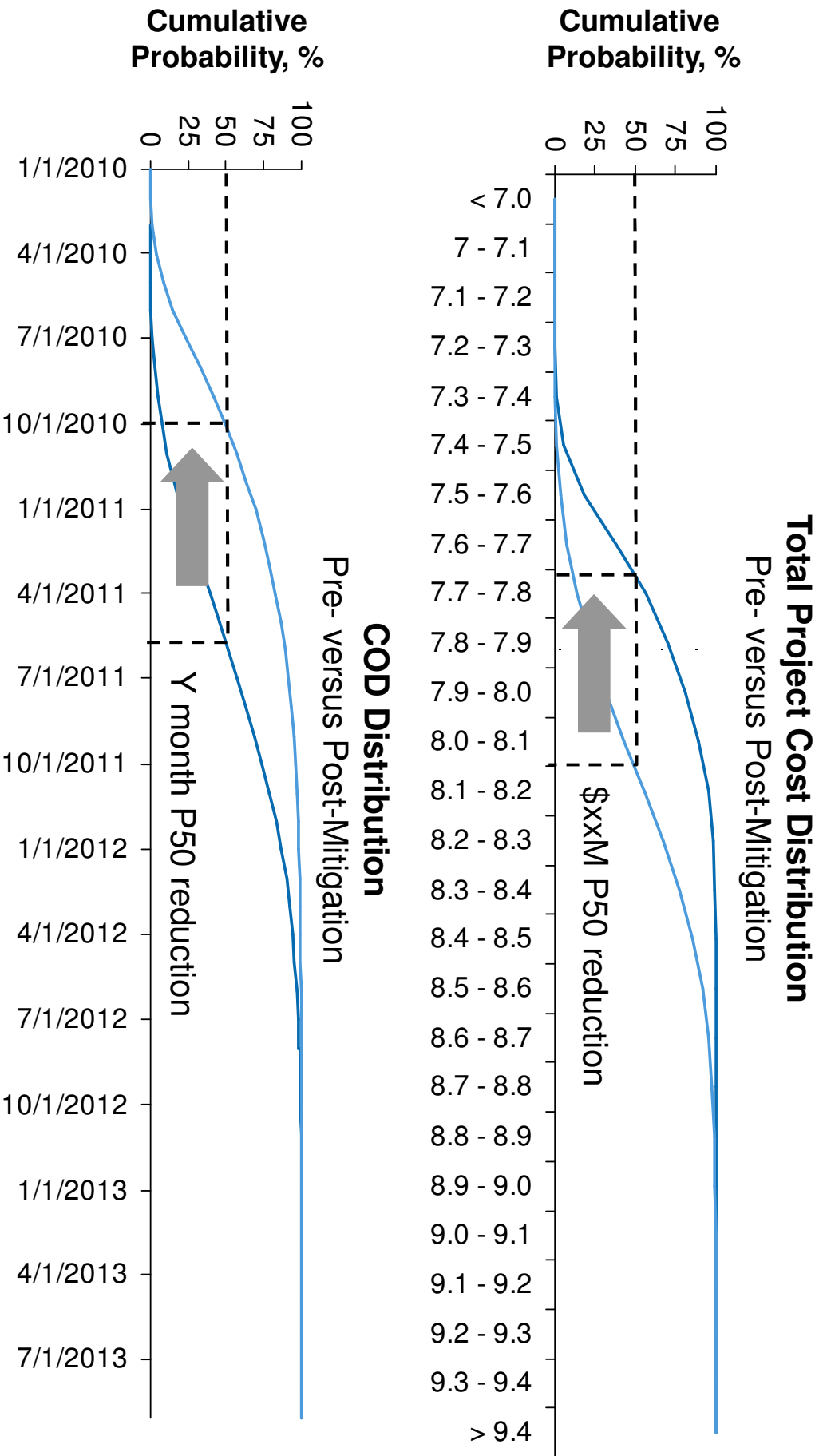
Mitigation value estimated by comparing P50 for a case where risk is mitigated to original P50 results

Mitigation value compared to implementation cost to focus strategies based on cost-effectiveness



# Risk Mitigation Impacts

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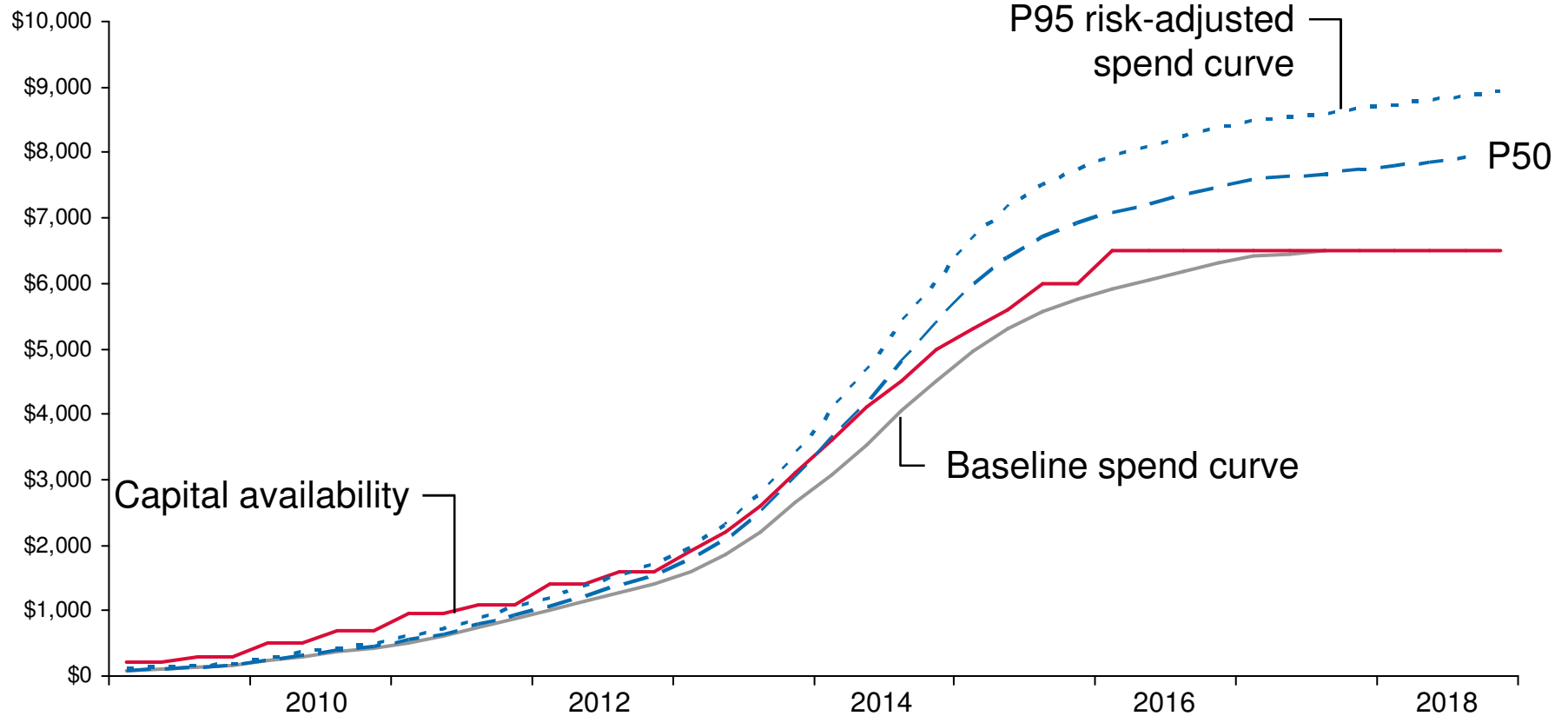


# Risks and Financing Alignment

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## Projected Spend Curves and Capital Availability

Capital Inflows /  
Outflows (\$M)



# The Natural Risk Owners

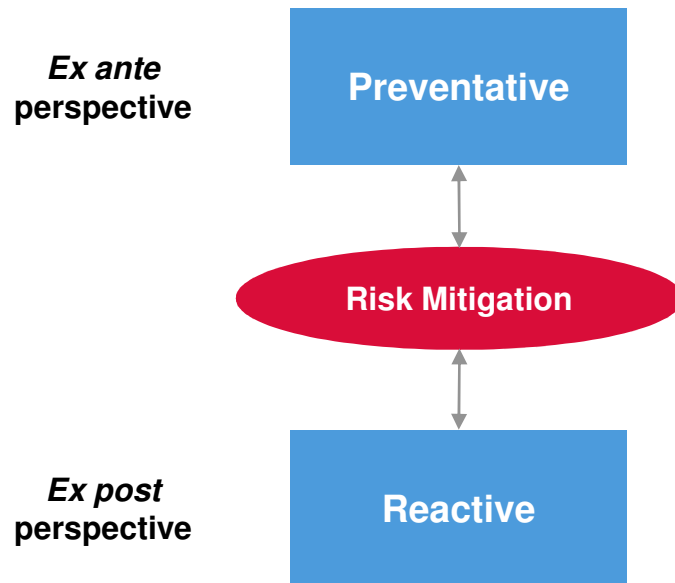
## Risk Ownership

	Owner	EPC	OEM	Risk Description
Regulatory	●			<ul style="list-style-type: none"> <li>Delays in regulatory approvals that could lead to project delays</li> </ul>
Financing	●			<ul style="list-style-type: none"> <li>Risks that could lead to increased equity requirements or borrowing costs</li> </ul>
Technology			●	<ul style="list-style-type: none"> <li>Risk that technology may not perform as expected (reliability, output)</li> </ul>
Project	◐	◐		<ul style="list-style-type: none"> <li>Project risks that lead to costs being greater than projected or duration that is beyond target</li> </ul>
Market	●			<ul style="list-style-type: none"> <li>Risks that nuclear technology will not be competitive vs. other baseload technologies</li> </ul>
Political	●			<ul style="list-style-type: none"> <li>Political risks that could lead to project delays or increased project costs</li> </ul>

 Natural owner
  Primary owner
  Shared ownership
  Partial owner

# Risk Mitigation Approaches

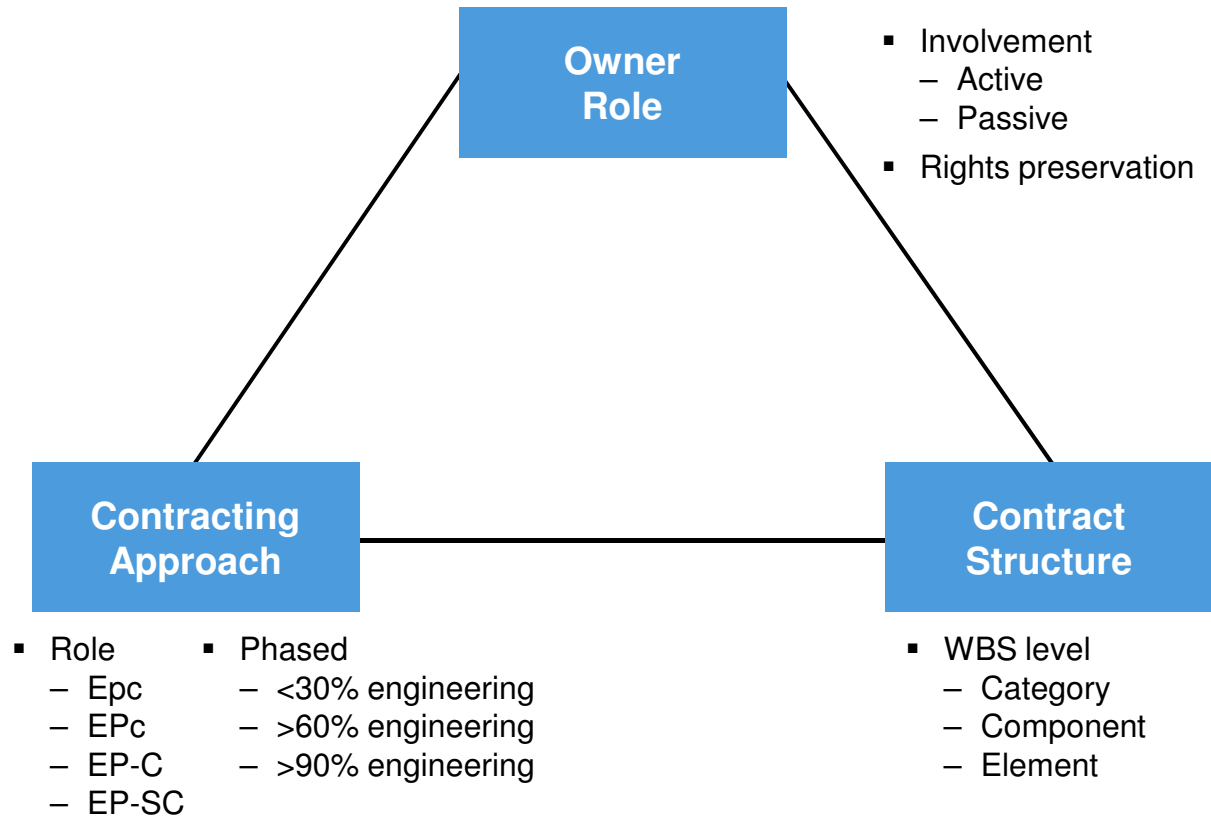
The approaches for risk mitigation address both pre- and post-estimate action . . .



... which tend to capture the available options for assessing response

- Refine current planning assumptions in light of observed risks
- Modify execution model to reflect requirements for additional attention
- Supplement management model to provide additional capabilities
- Negotiate protections into agreements to address potential outcomes
- Define alternatives to current approaches for adoption
- Prepare the organization for remediation or corrective action

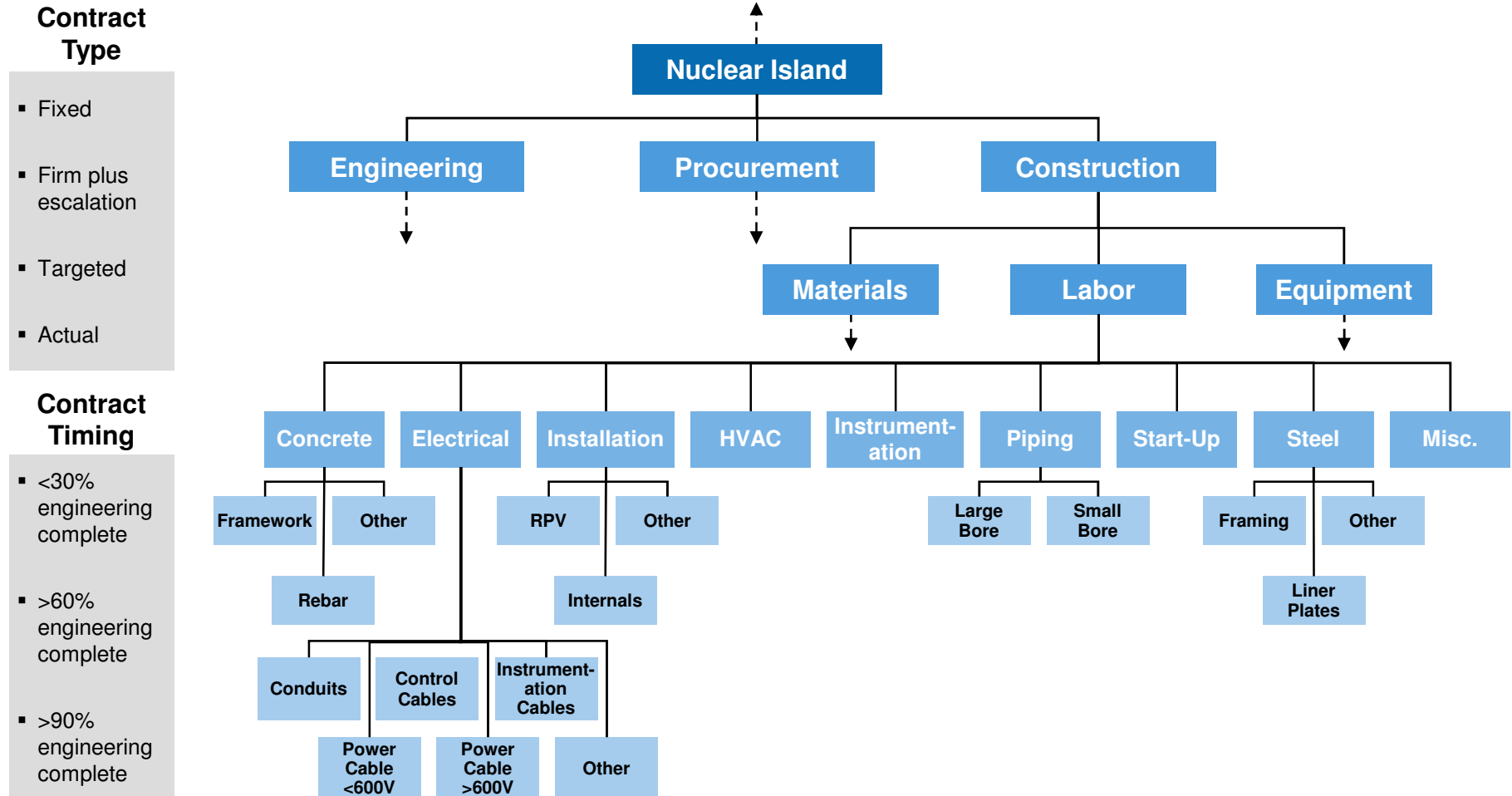
# Approaches to Mitigating Risk



# Breaking Down the Contract

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## Total Project Breakdown



# Anticipating Future Challenges

A variety of parties will maintain an active interest in project development and execution . . .



. . . with each stakeholder focused on a unique set of issues

- Board of Directors:** Focus will be on management capability to execute and enterprise risks to be borne
- Financial Community:** Focus will be on satisfying criteria for demonstrating management's ability to control project performance
- Regulators:** Focus will be on project economics and assessment of incurred costs for recovery and prudence
- Project Partners:** Focus will be on minimizing entity risk and ability of owner to meet standards and targets
- Project Contractors:** Focus will be on project design and execution certainty and avoidance of any entity risk
- General Public:** Focus will be on safety and impacts to bills

# Risk Outcome Applicability

Several tiers of risk model use ...

... to satisfy key concerns or criteria

