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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

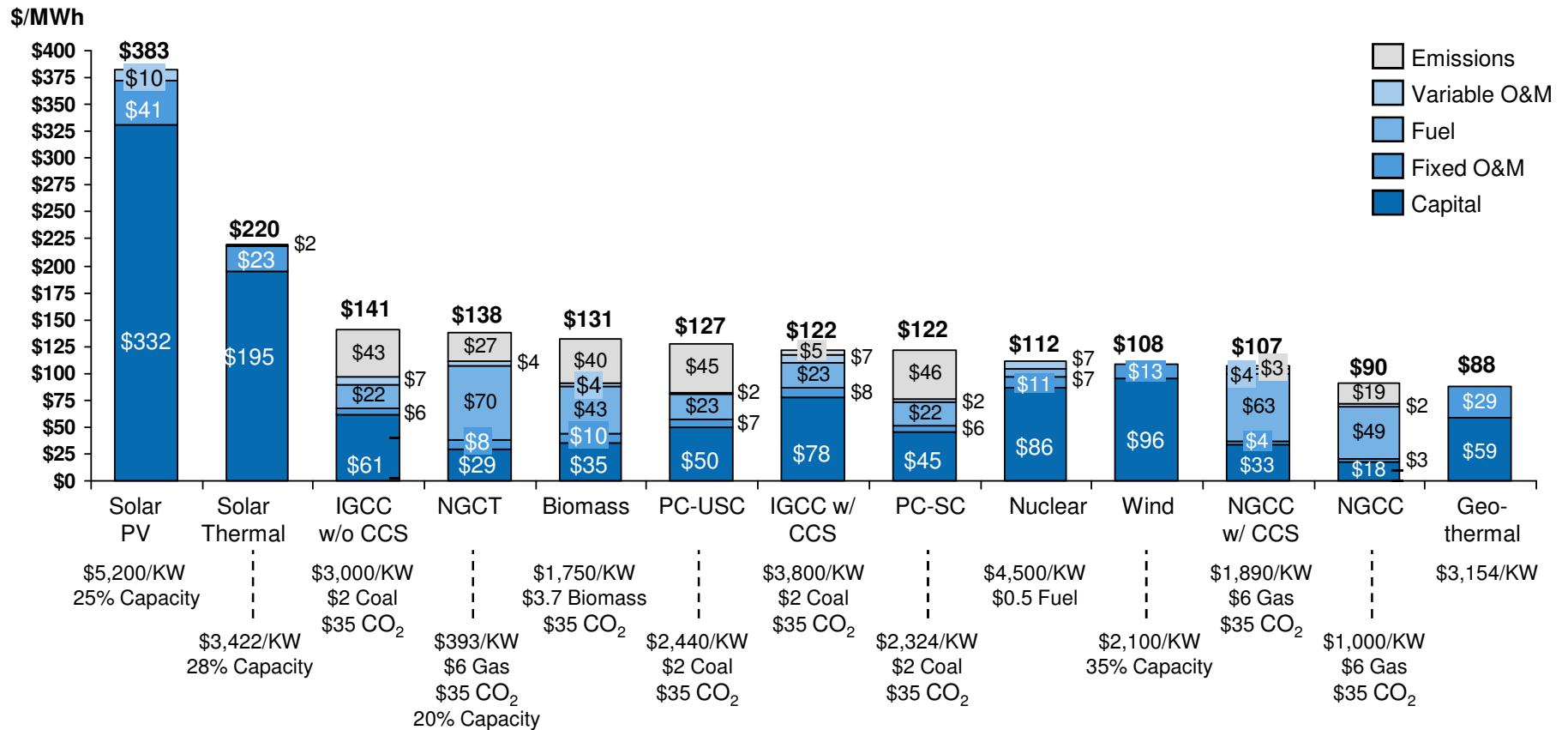
Next Wave Status

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

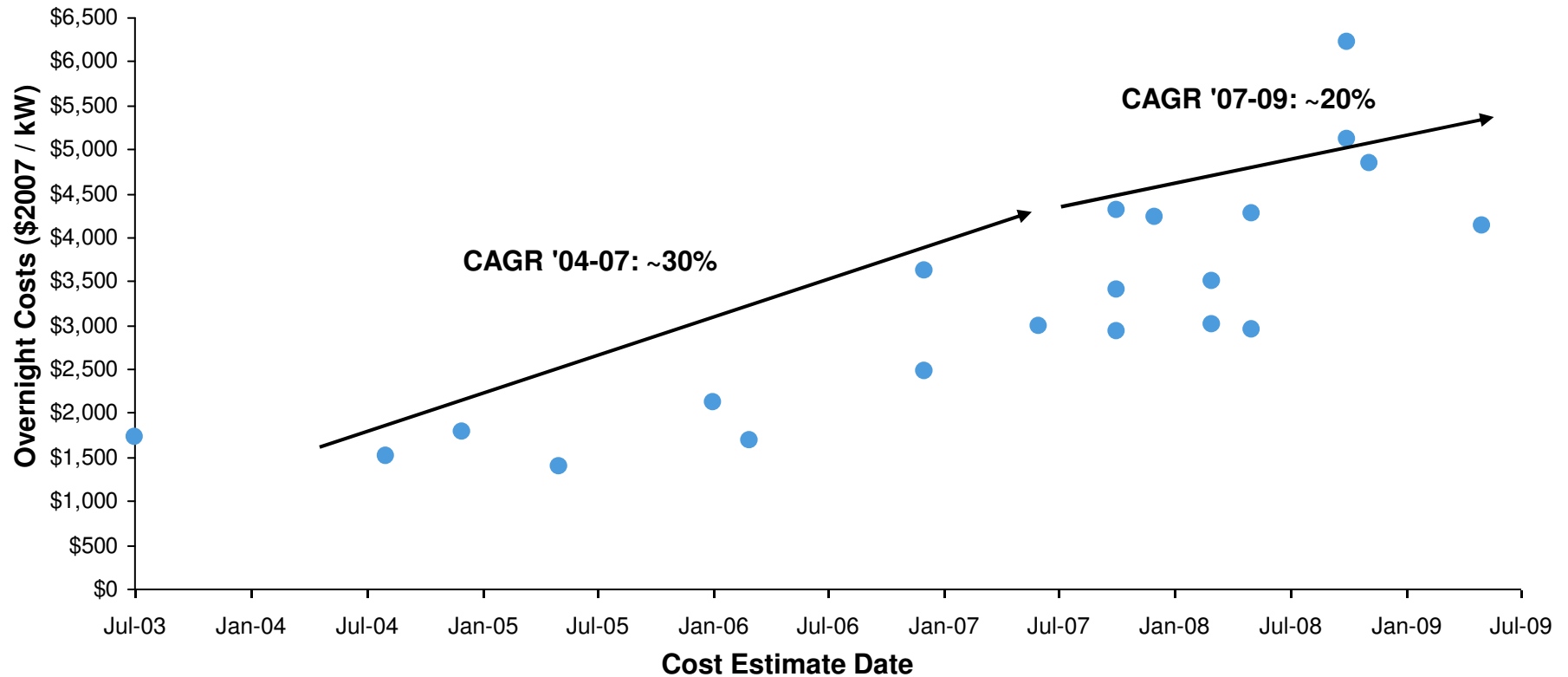
Levelized Costs by Generation Technology



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

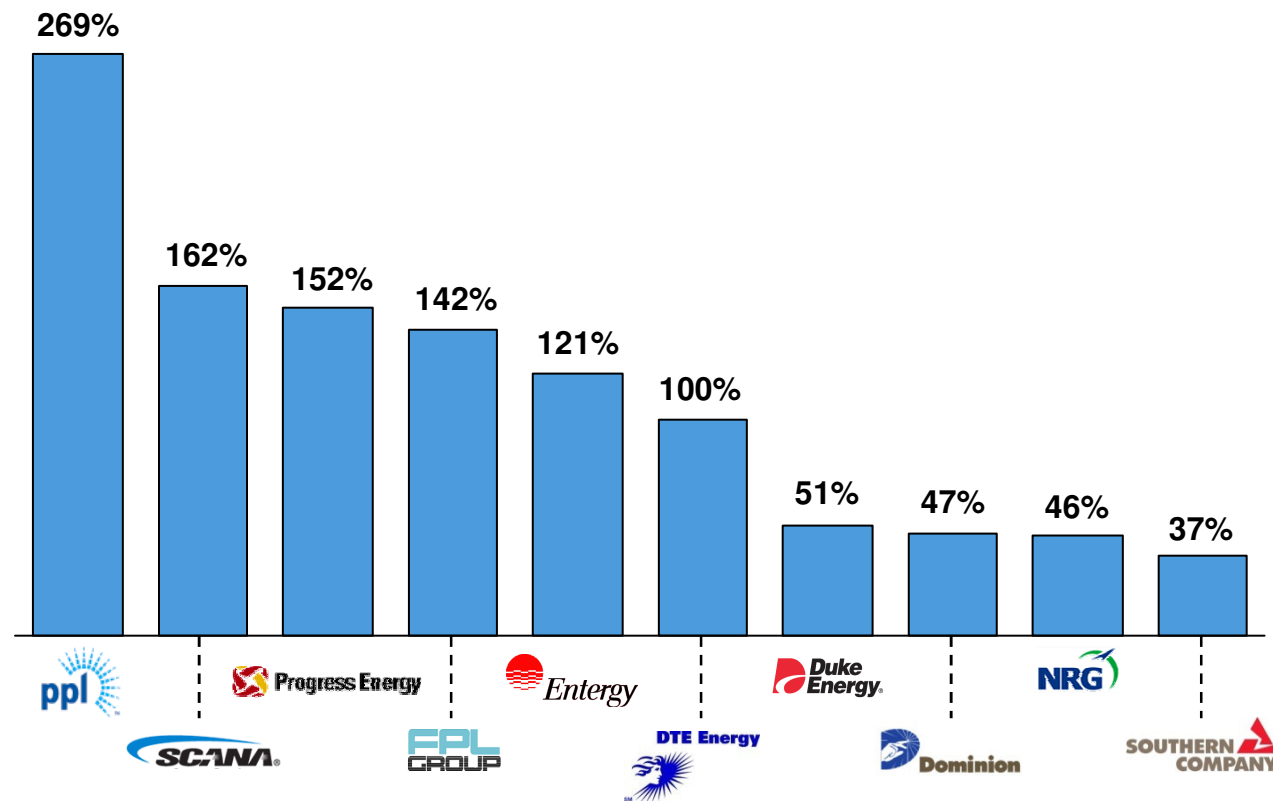
Nuclear Overnight Costs



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

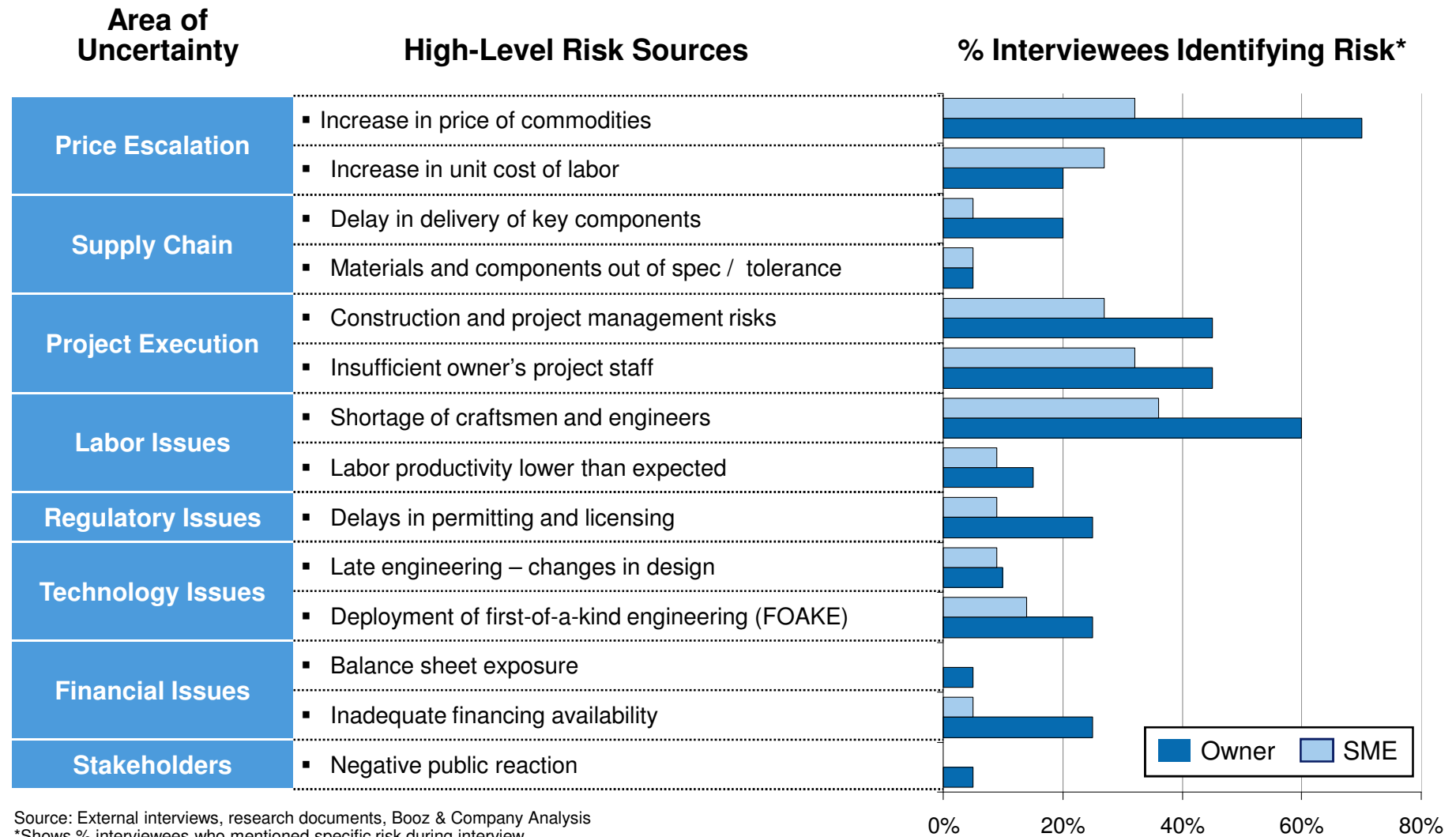
Nuclear Investment Cost as a % of Book Equity



Key Questions

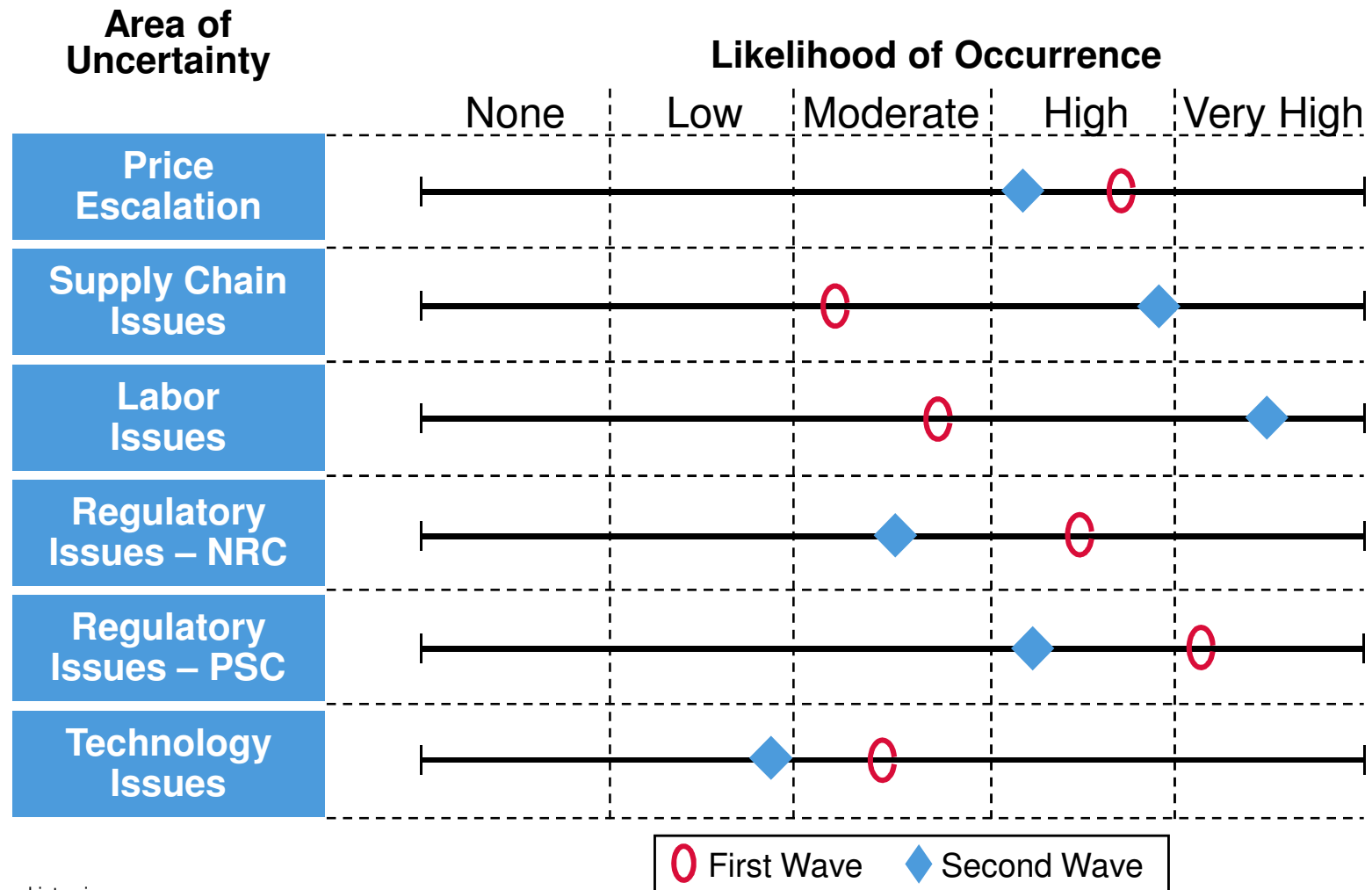
- Are expectations realistic?
- Are regulators supportive?
- Are customers aware?
- Are plans financeable?

Recognition of Risks



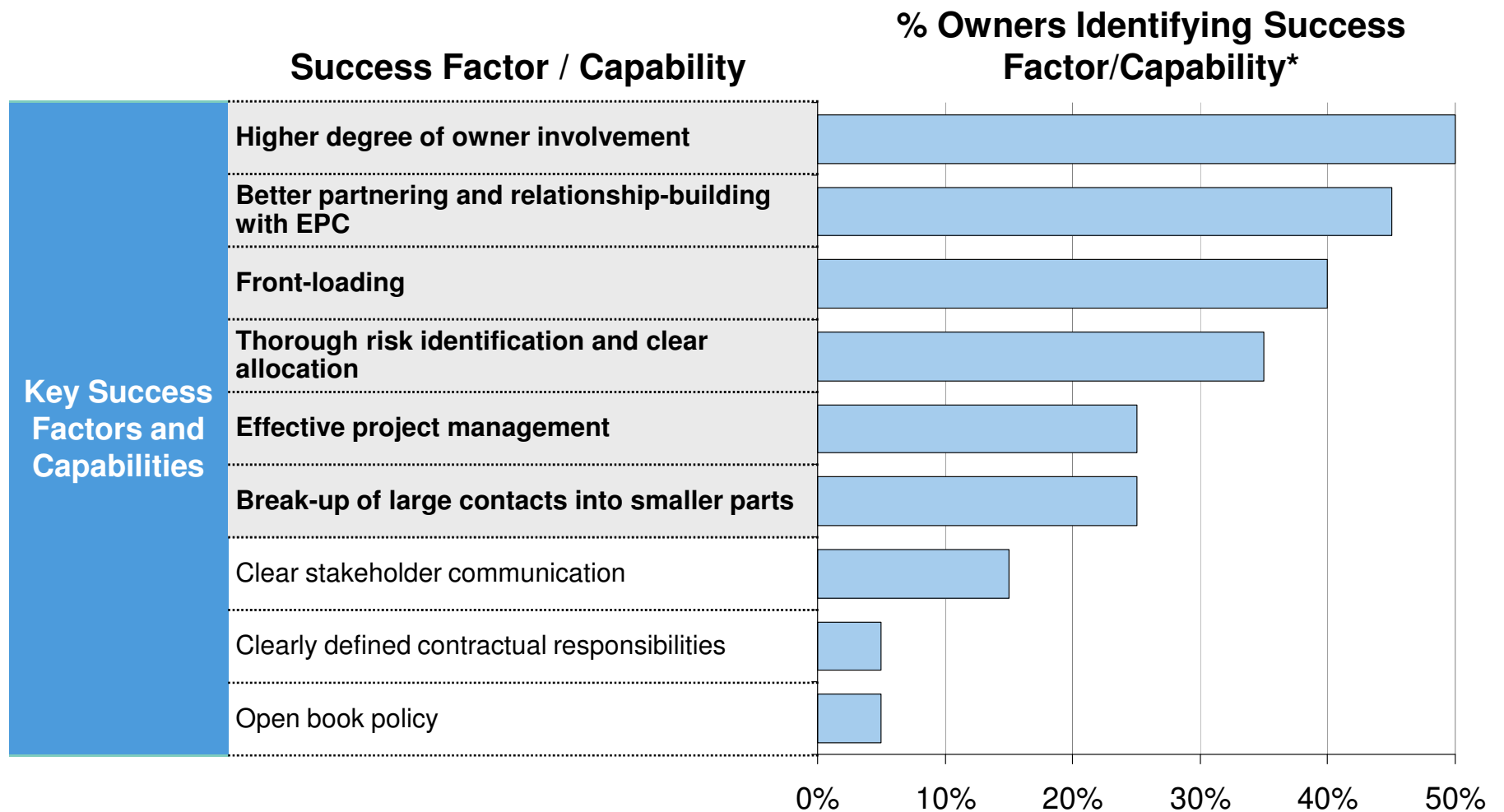
Source: External interviews, research documents, Booz & Company Analysis
 *Shows % interviewees who mentioned specific risk during interview

Risk Across the Cycles



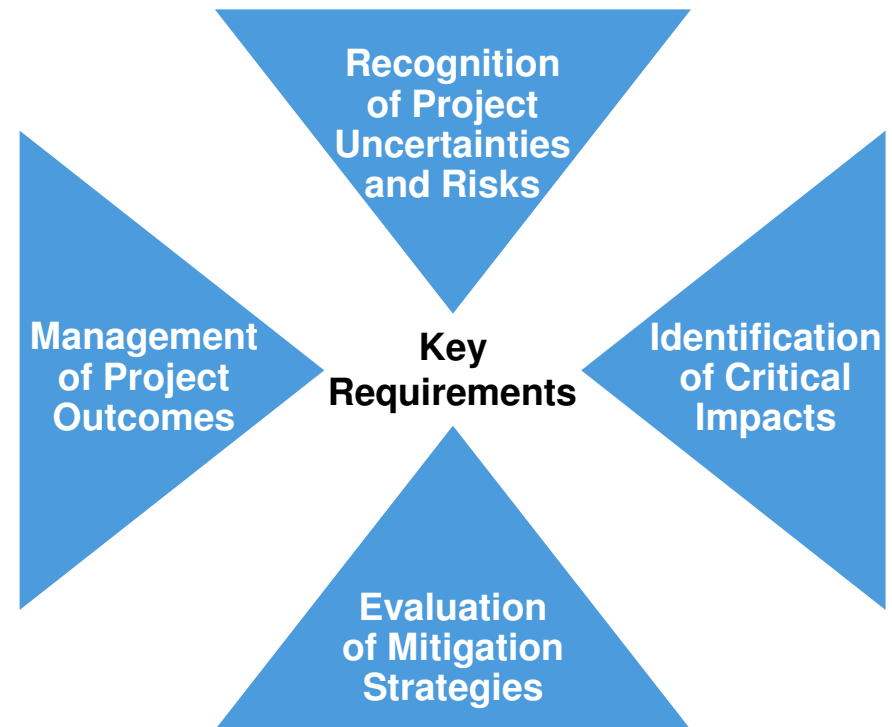
Source: External interviews

Owner Requirements for Success



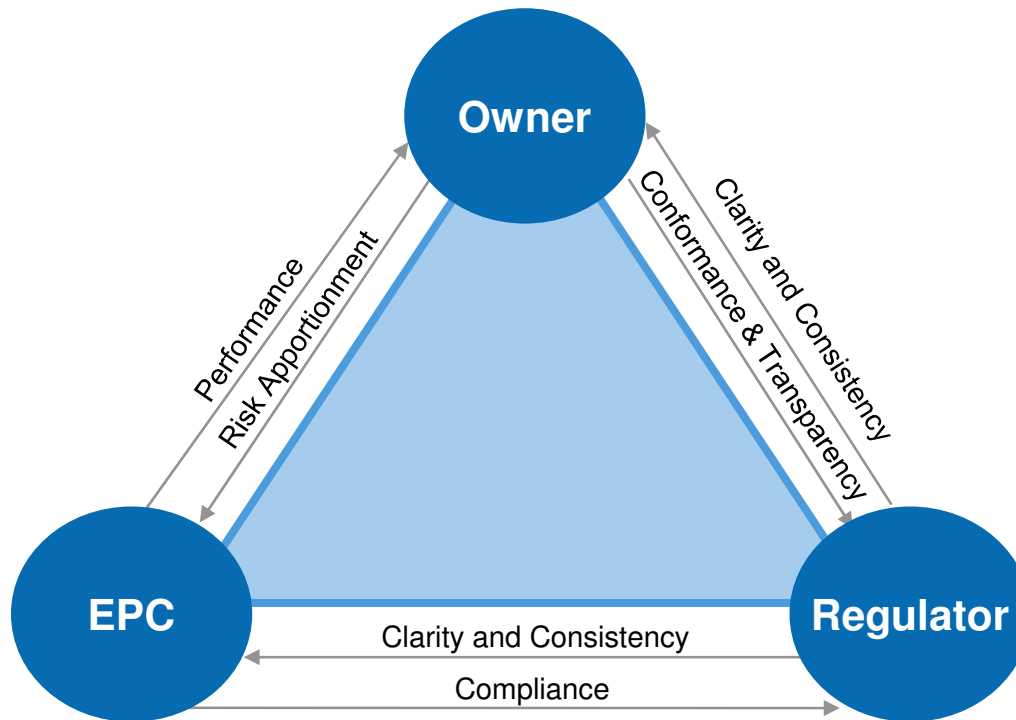
Risk Assessment Introduction

- 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

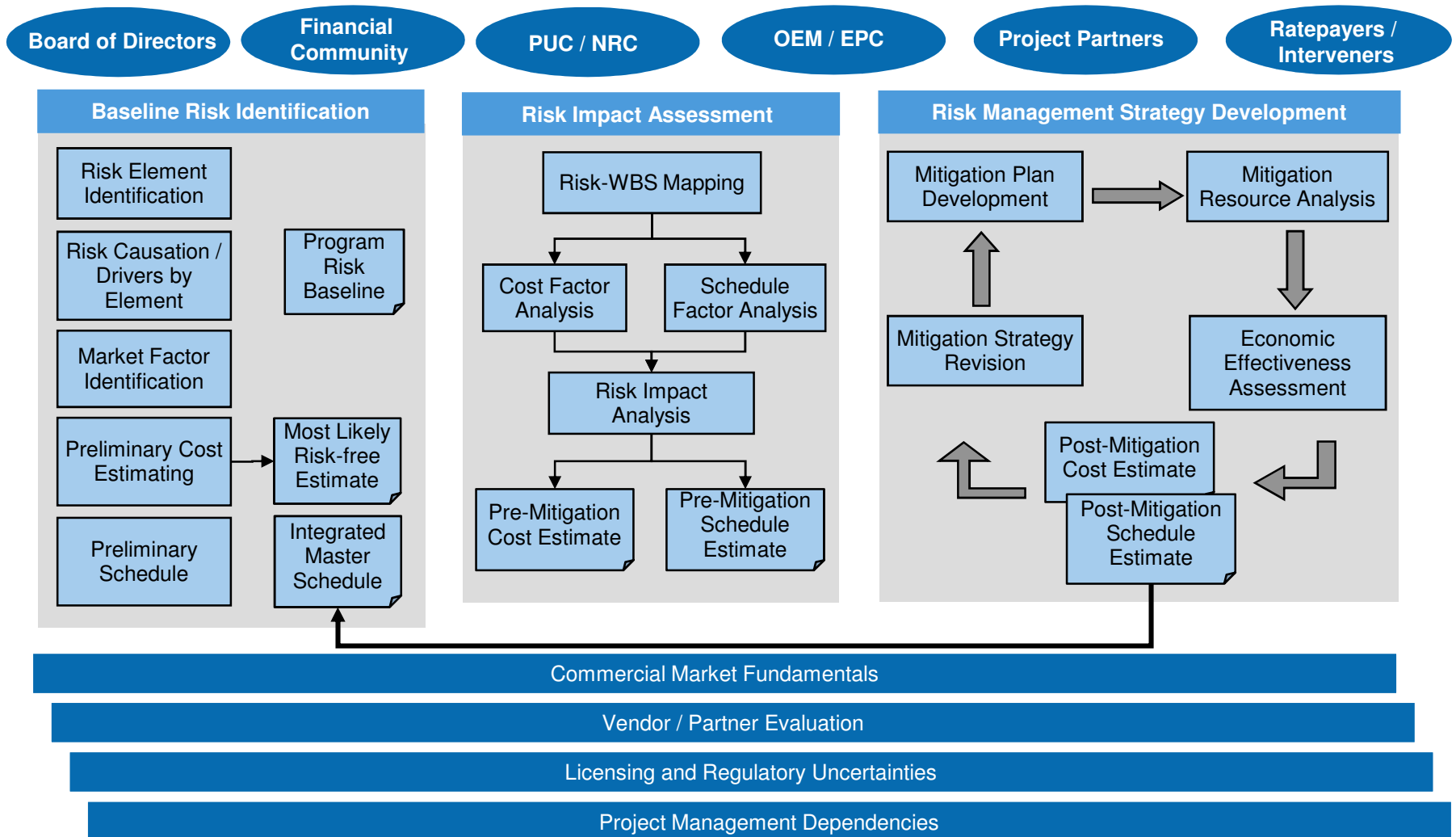
Key Dependencies



Key Questions

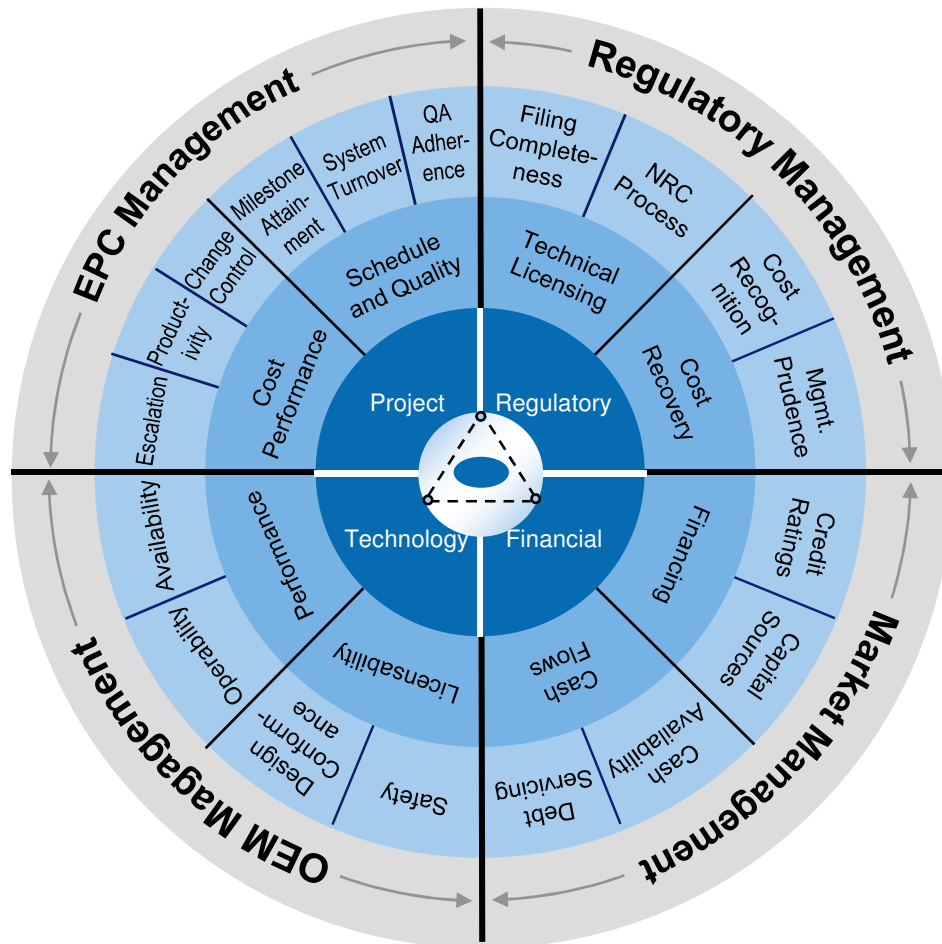
- **Owners** request “reasonable protection”
- **Regulators** request “stringent conformance”
- **EPC firms** request “absolute predictability”

Risk Assessment Model



“The Risk Wheel”

Management of Risk and Uncertainty



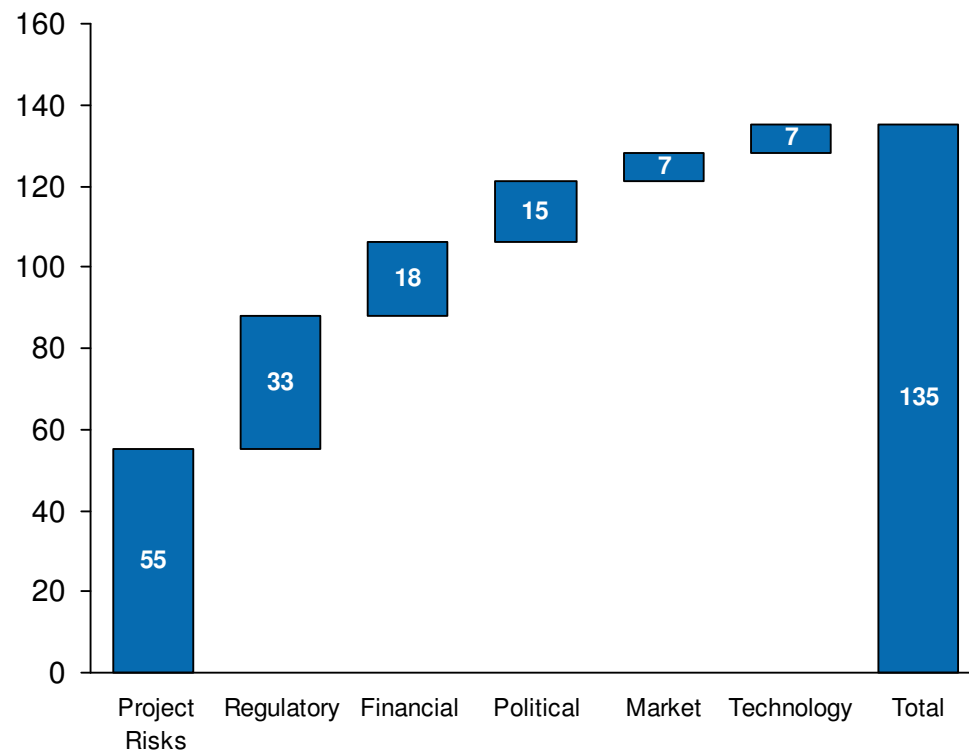
Assessing Related Risks

- 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



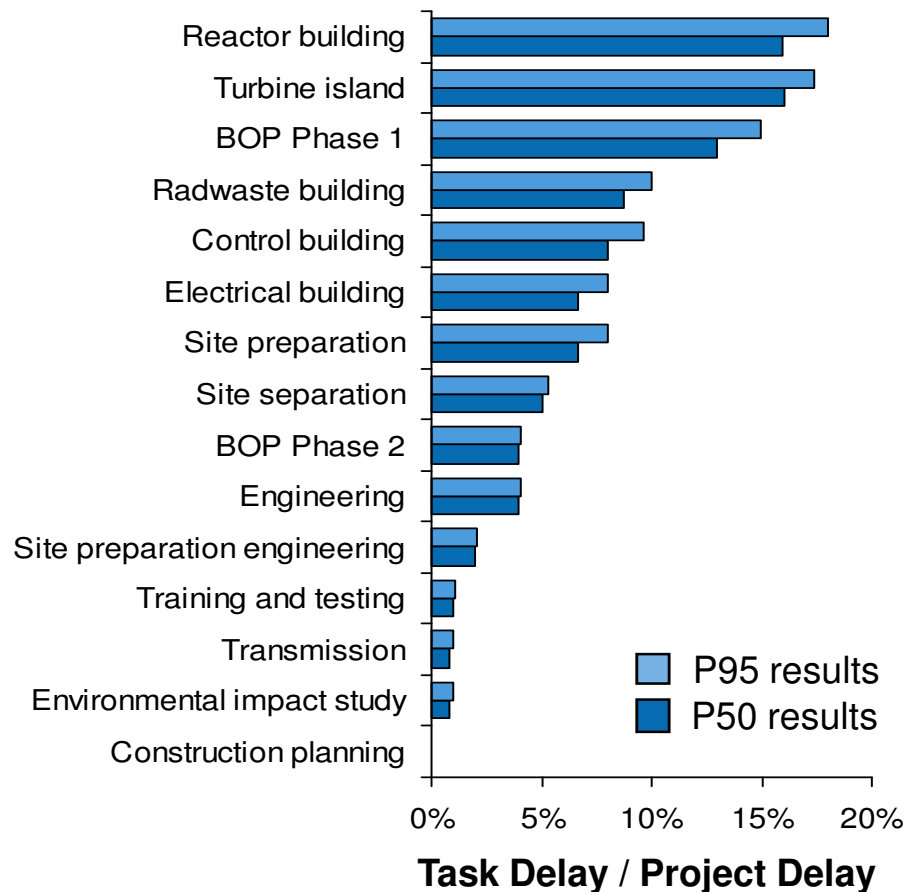
Illustrative Risks

- **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**
 - CO₂ emission costs
 - Natural gas price
- **Technology**
 - Reliability
 - OEM support level

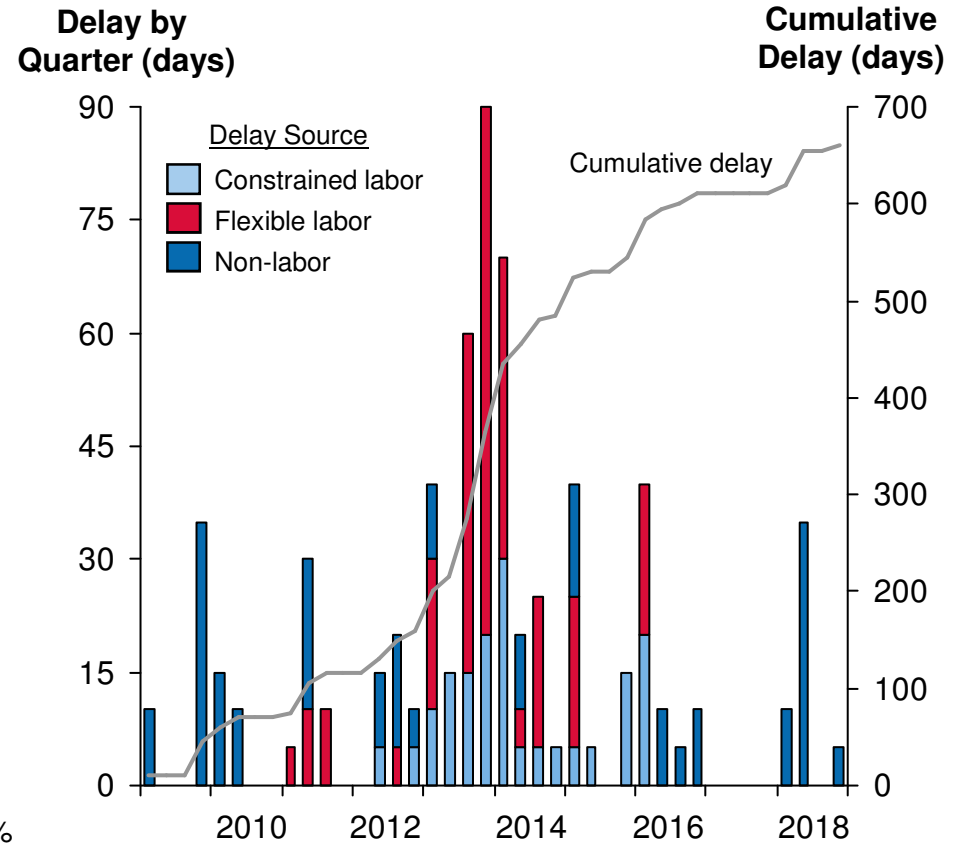
Schedule Risk Attribution

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Contribution to Schedule Delay By Schedule Task

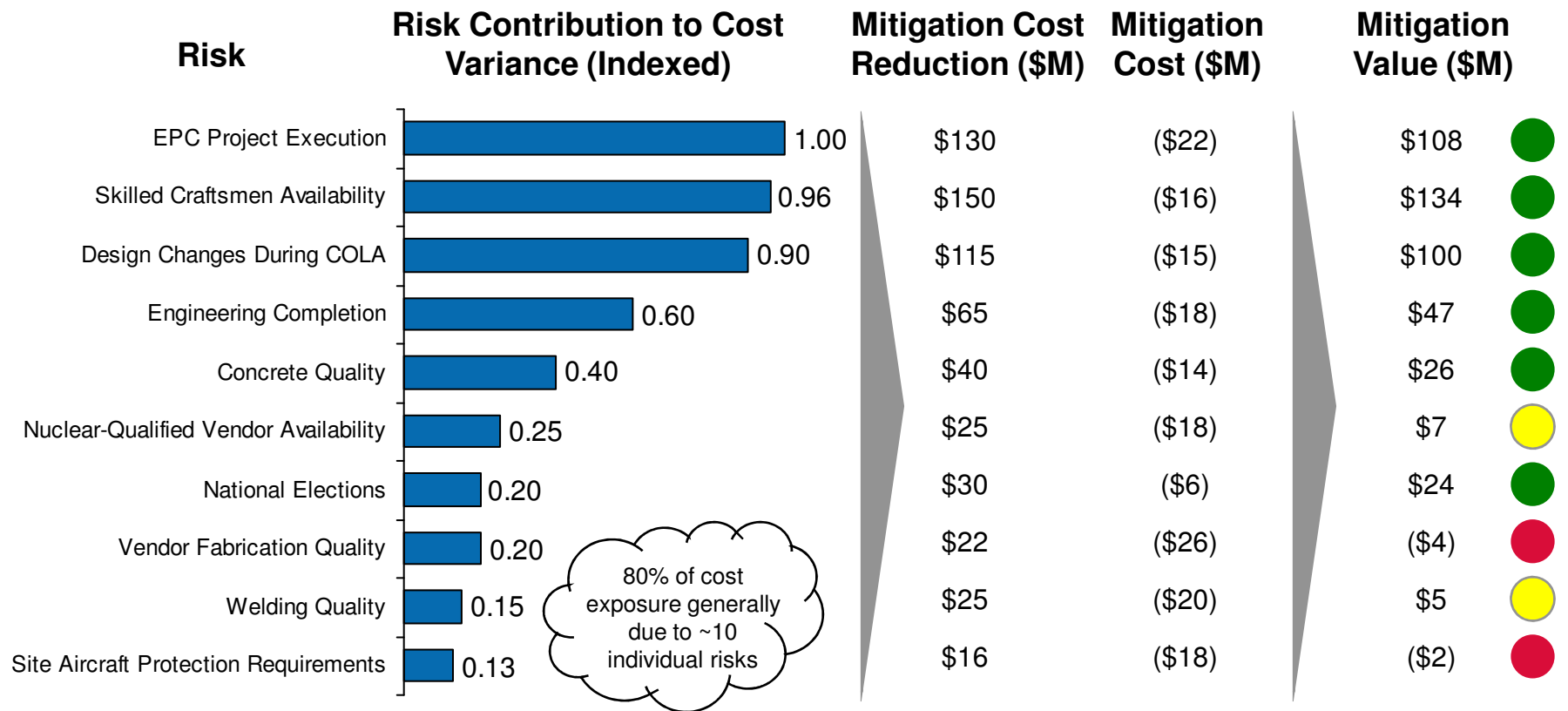


P50 Project Delay by Quarter and Source



Risk Ranking

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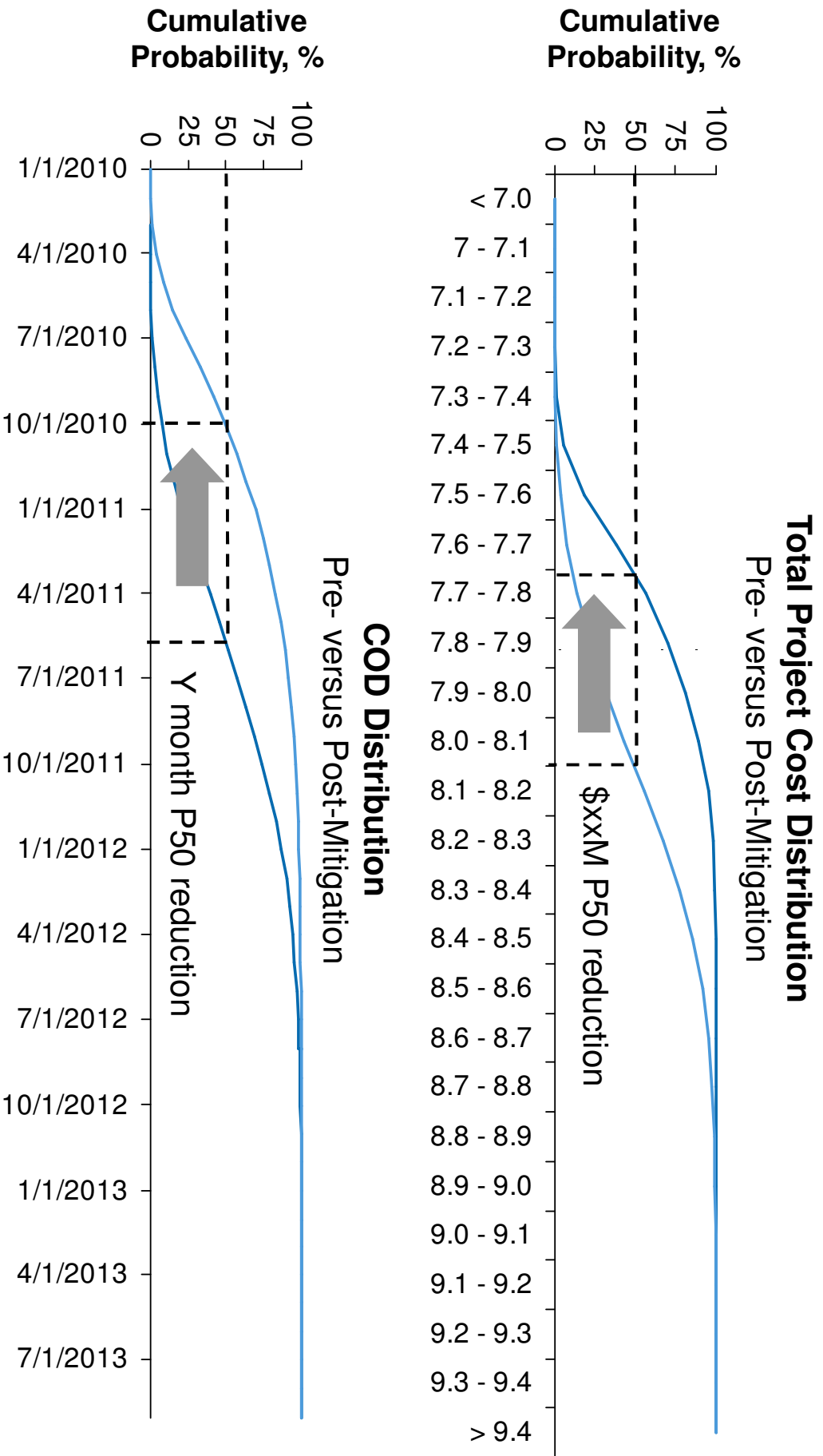
Individual risks are ranked based on a covariance analysis – measuring the linkage between the magnitude of a risk’s discrete impact and the variance in total project costs (relative to pre-risk estimate) across all simulation cases

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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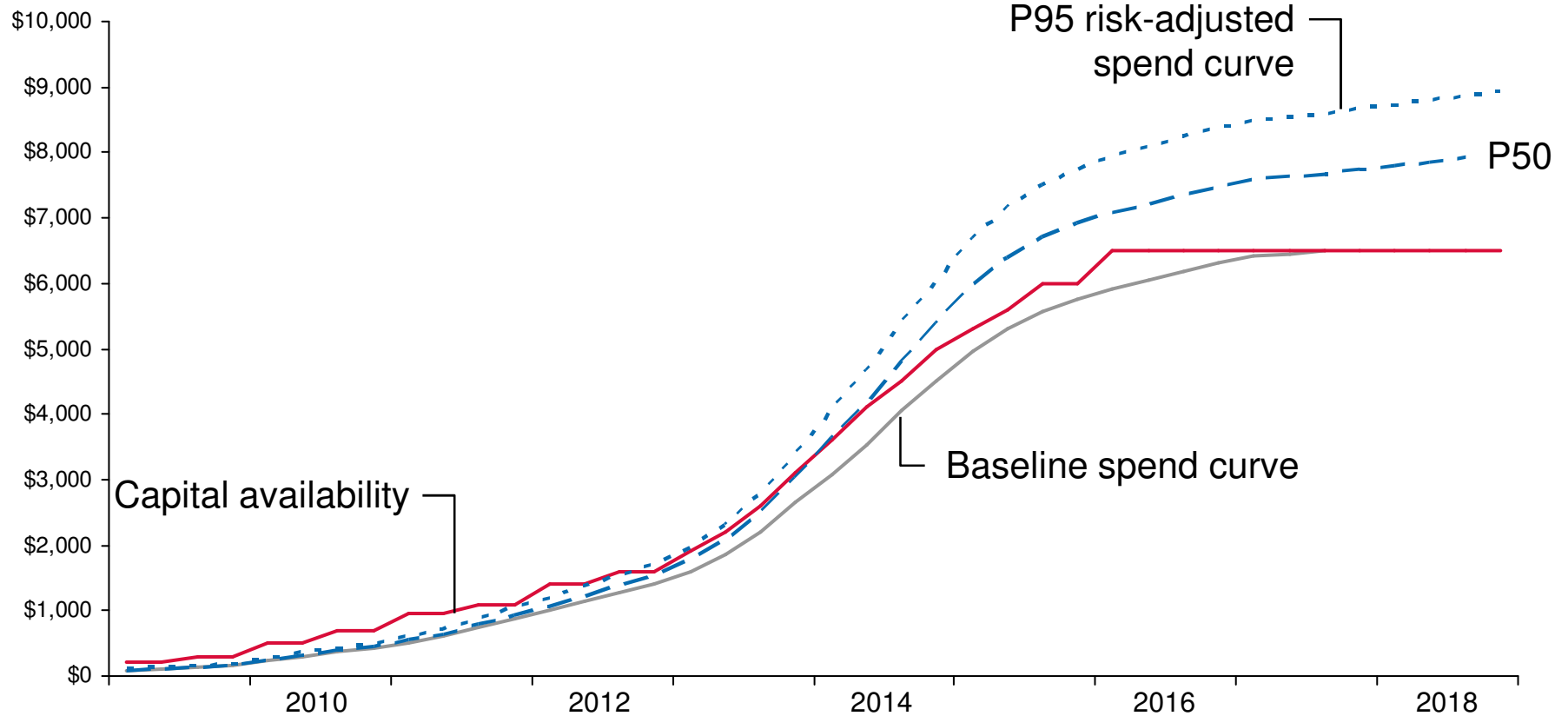


Risks and Financing Alignment

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Projected Spend Curves and Capital Availability

Capital Inflows /
Outflows (\$M)



The Natural Risk Owners

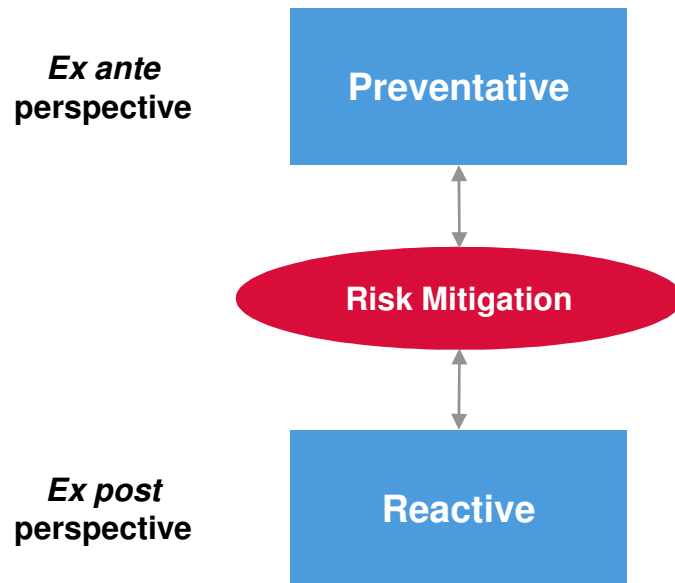
Risk Ownership

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

 Natural owner
  Primary owner
  Shared ownership
  Partial owner

Risk Mitigation Approaches

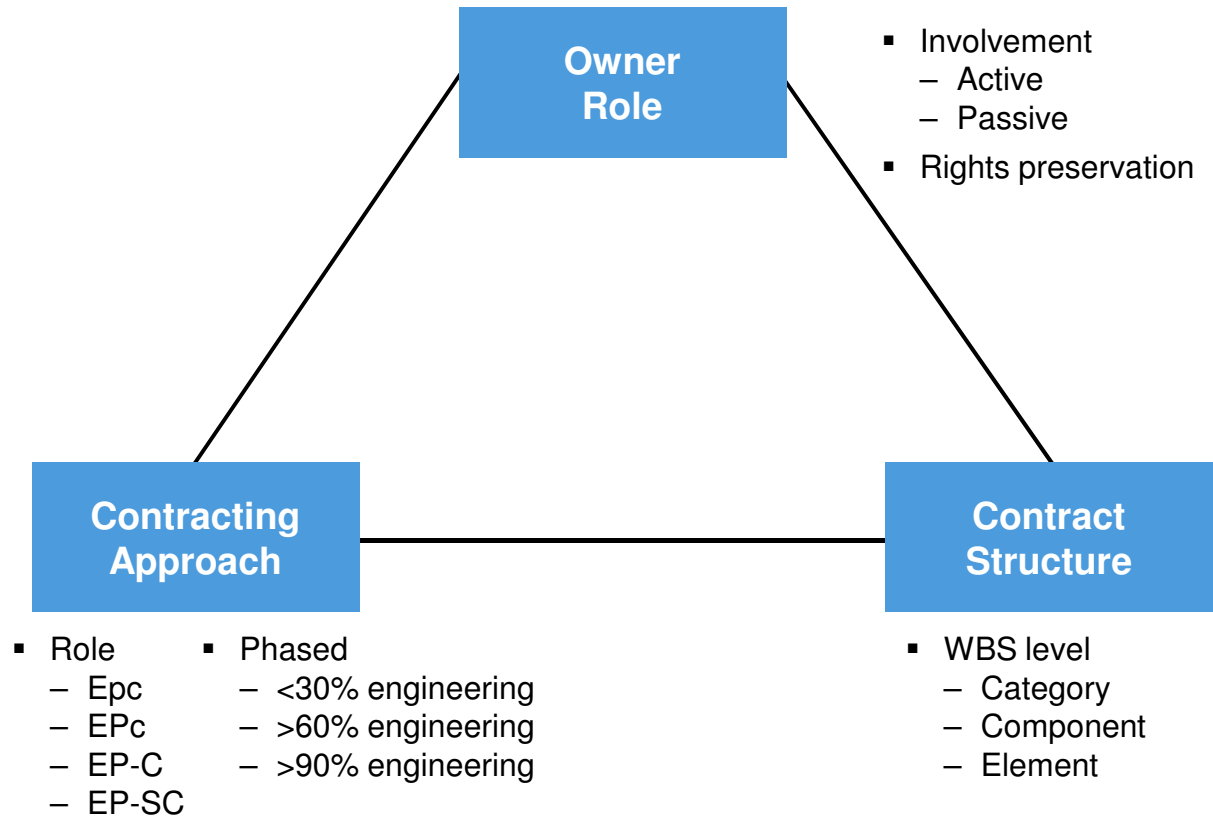
The approaches for risk mitigation address both pre- and post-estimate action . . .



... 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

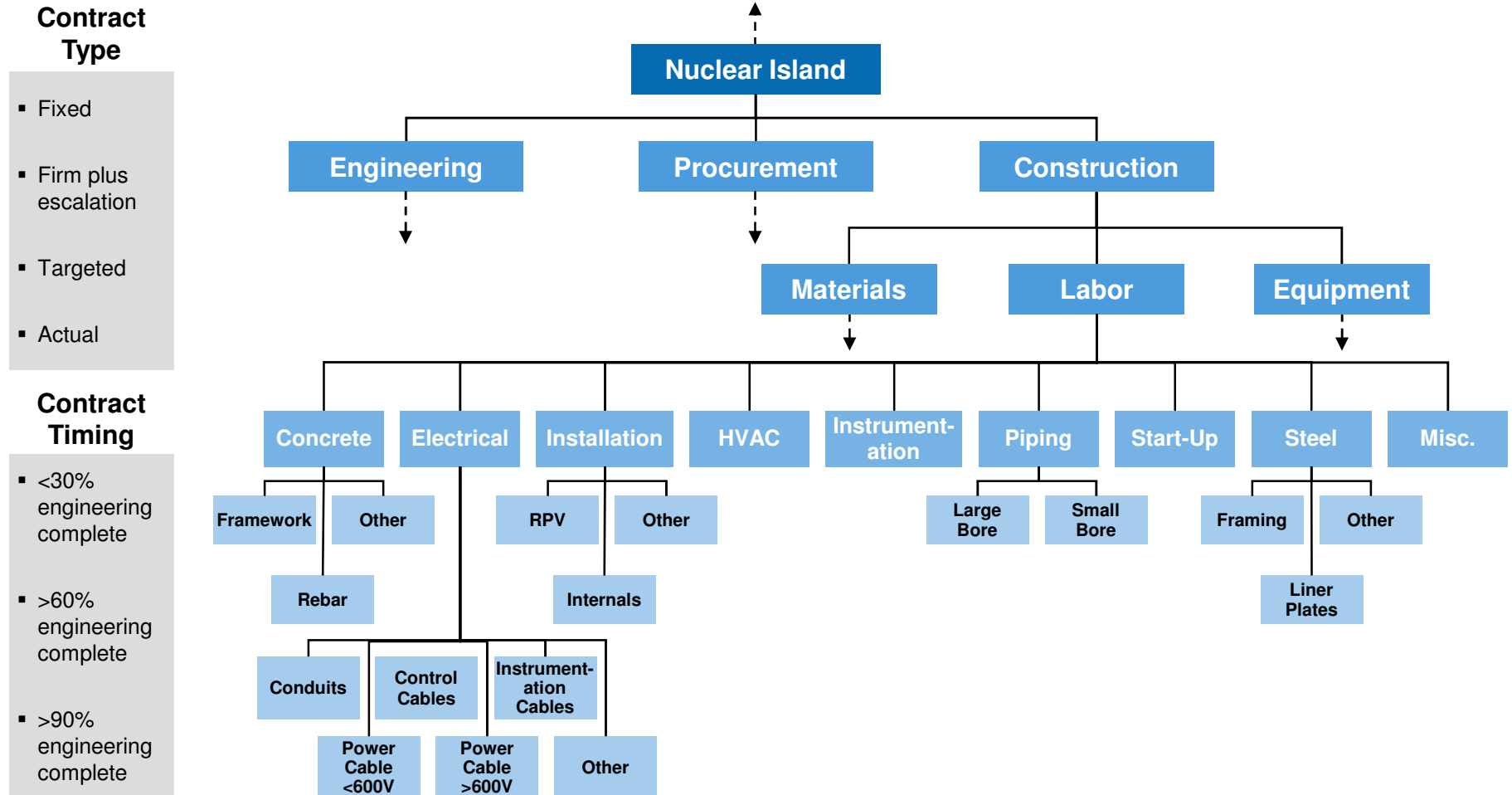
Approaches to Mitigating Risk



Breaking Down the Contract

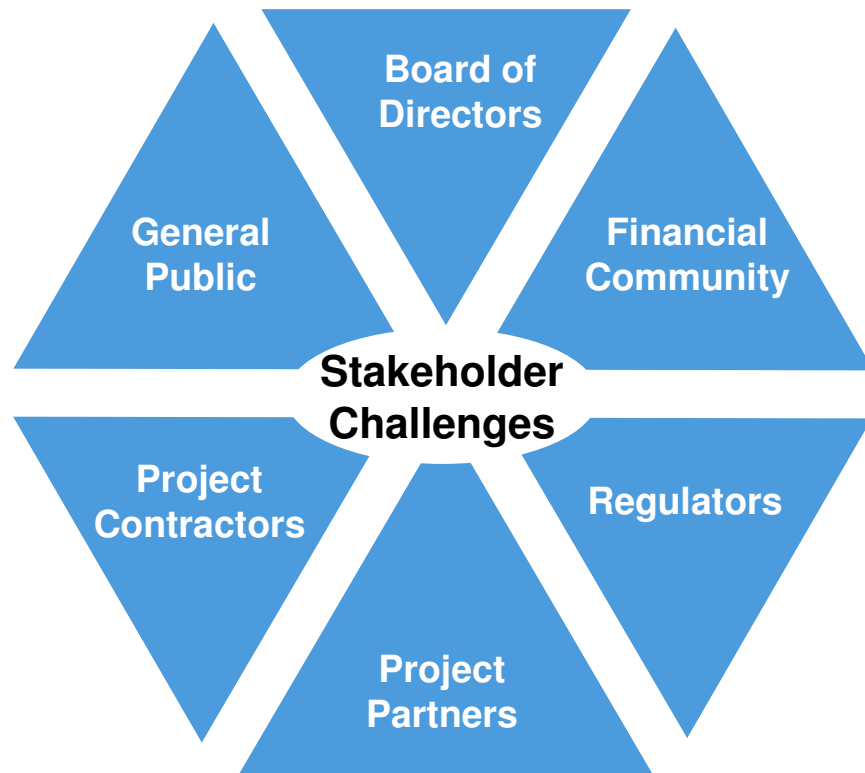
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Total Project Breakdown



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

