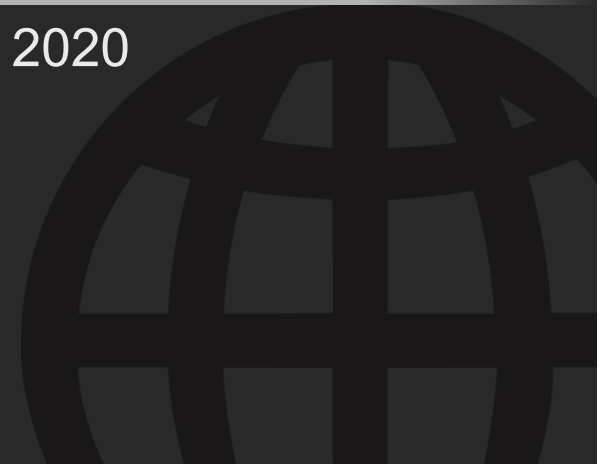




Migrating Resources to Reserves

September 29, 2020



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Outline

- Reserve Requirements
- Differences in Resource Categories
- Requirements for moving Resource Categories to Reserves:
 - Prospective Resources
 - Contingent Resources:
 - Technical Contingencies
 - Contractual/Economic
- Data Acquisition to Optimize Resources Migration

Reserves Requirements

Are These Reserves?



Why do We Care about Reserves?

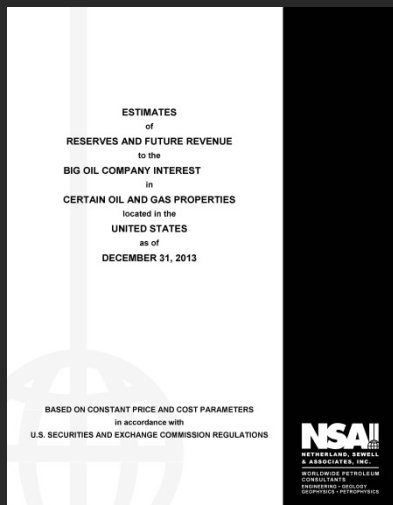
Reserves are the core business for E&P companies

- Finding them
- Developing them
- Producing them
- Generating cash flow with them



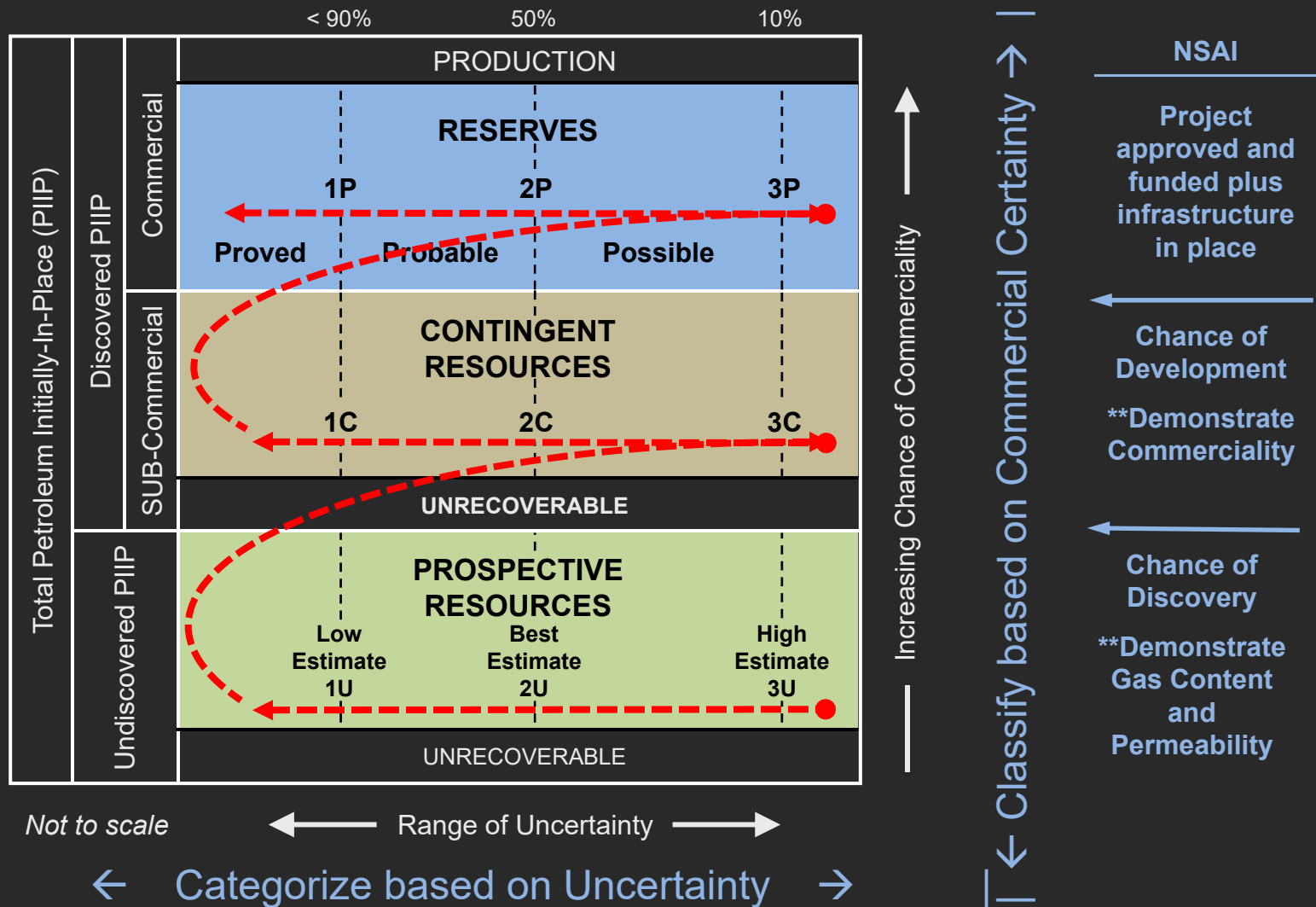
Standardization of reserves reporting is important

- Communicating with the market – market efficiency
- Allowing investors to make accurate relative comparisons
- Provide even footing and basis for good investments



Differences in Resource Categories

Petroleum Resources Classification System



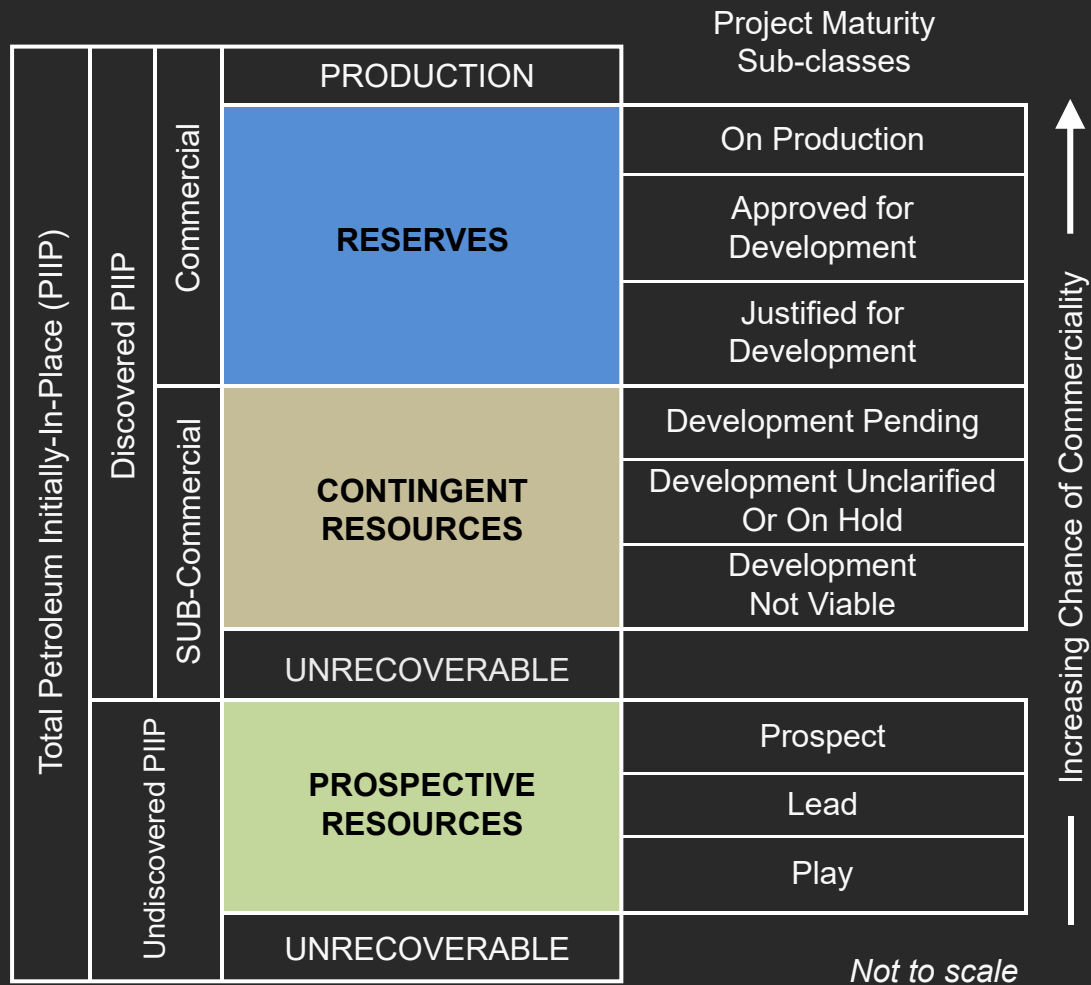
Prospective Resources

- "Those quantities of petroleum which are estimated, as of a given date, to be **potentially recoverable** from **undiscovered accumulations**."
- "Potential accumulations are evaluated according to their chance of discovery and, assuming a discovery, the estimated quantities that would be recoverable under defined development projects. It is recognized that the development programs will be of significantly less detail and depend more heavily on analog developments in the earlier phases of exploration."

Contingent Resources

- "Those quantities of petroleum estimated, as of a given date, to be **potentially recoverable** from **known accumulations** by application of development projects, but which are not currently considered to be commercially recoverable **due to one or more contingencies**."
- "Contingent Resources may include, for example, projects for which there are currently no viable markets, or where commercial recovery is dependent on technology under development, or where evaluation of the accumulation is insufficient to clearly assess commerciality. Contingent Resources are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by their economic status."

Sub-classes Based on Project Maturity



Not to scale

Range of Uncertainty

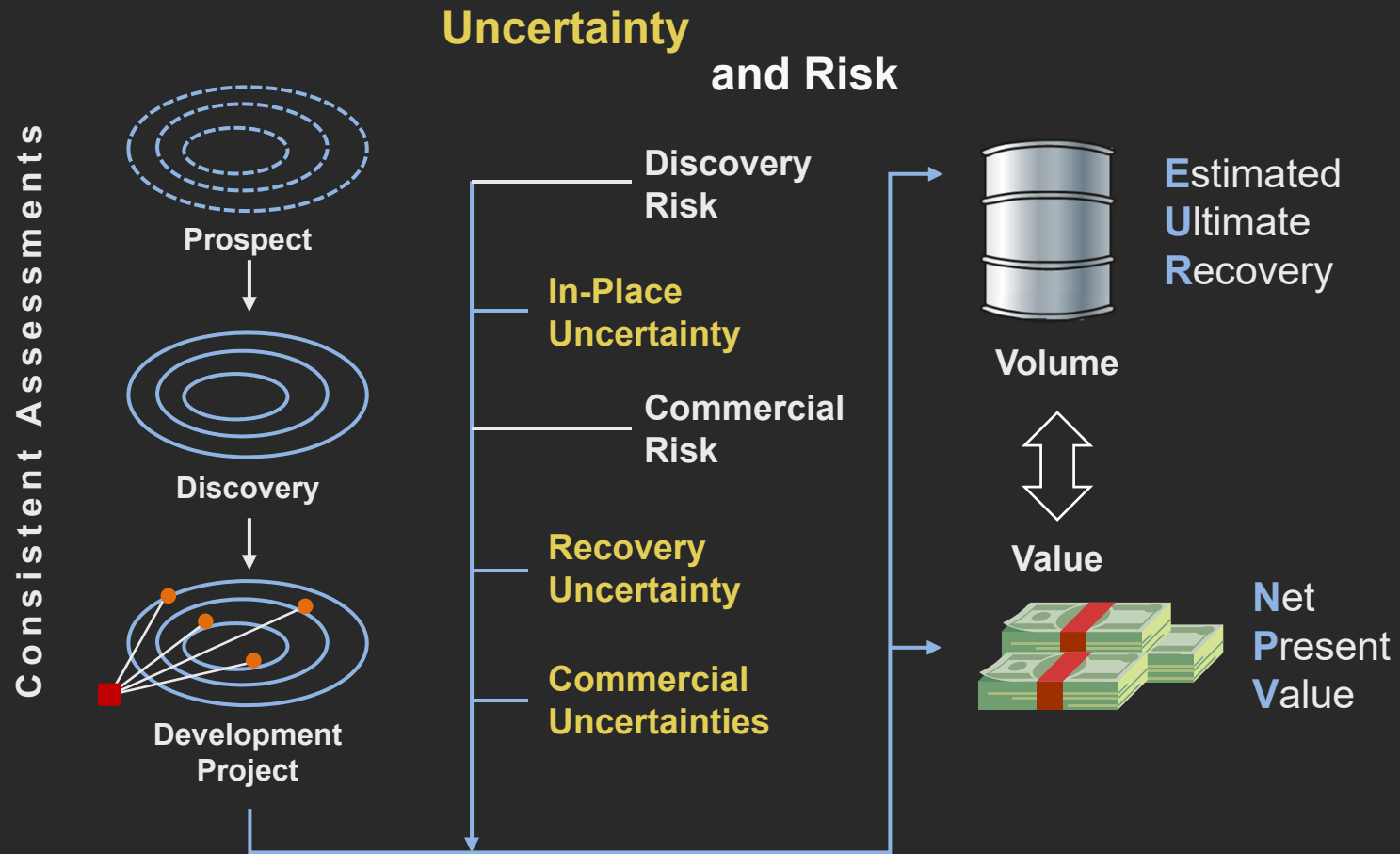


Reserves/Resources Definitions

Why do they exist?

- To quantify risk (uncertainty) associated with the recovery of hydrocarbons
- To standardize classification of reserves/resources within the petroleum industry
- To provide capital markets with consistent standards

Resources Assessment Process



Source: SPE Reserves ATW

Petroleum Reserves and Resources and Classification System

Classification

Categorization

Reserves⁽¹⁾

Proved (1P)

Proved + Probable (2P)

Proved + Probable + Possible (3P)

Contingent Resources

Low (1C)

Best (2C)

High (3C)

Prospective Resources

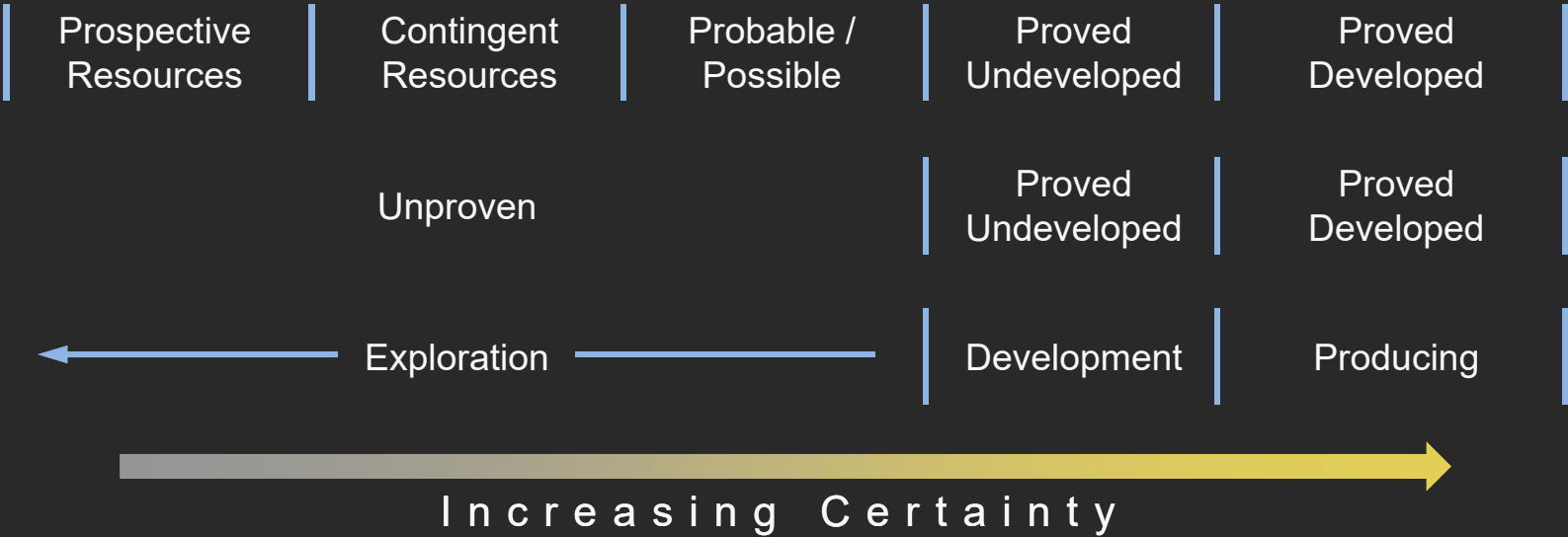
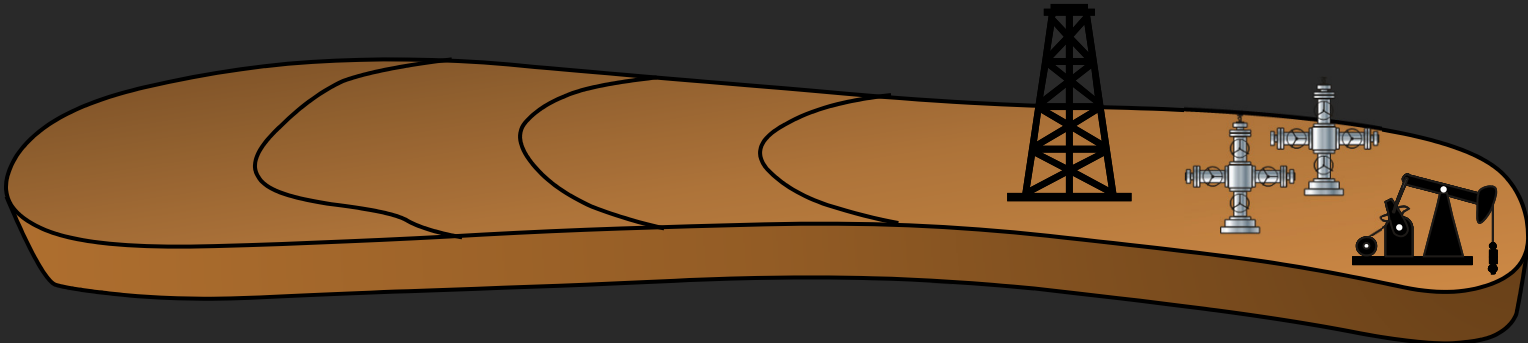
Low (1U)

Best (2U)

High (3U)

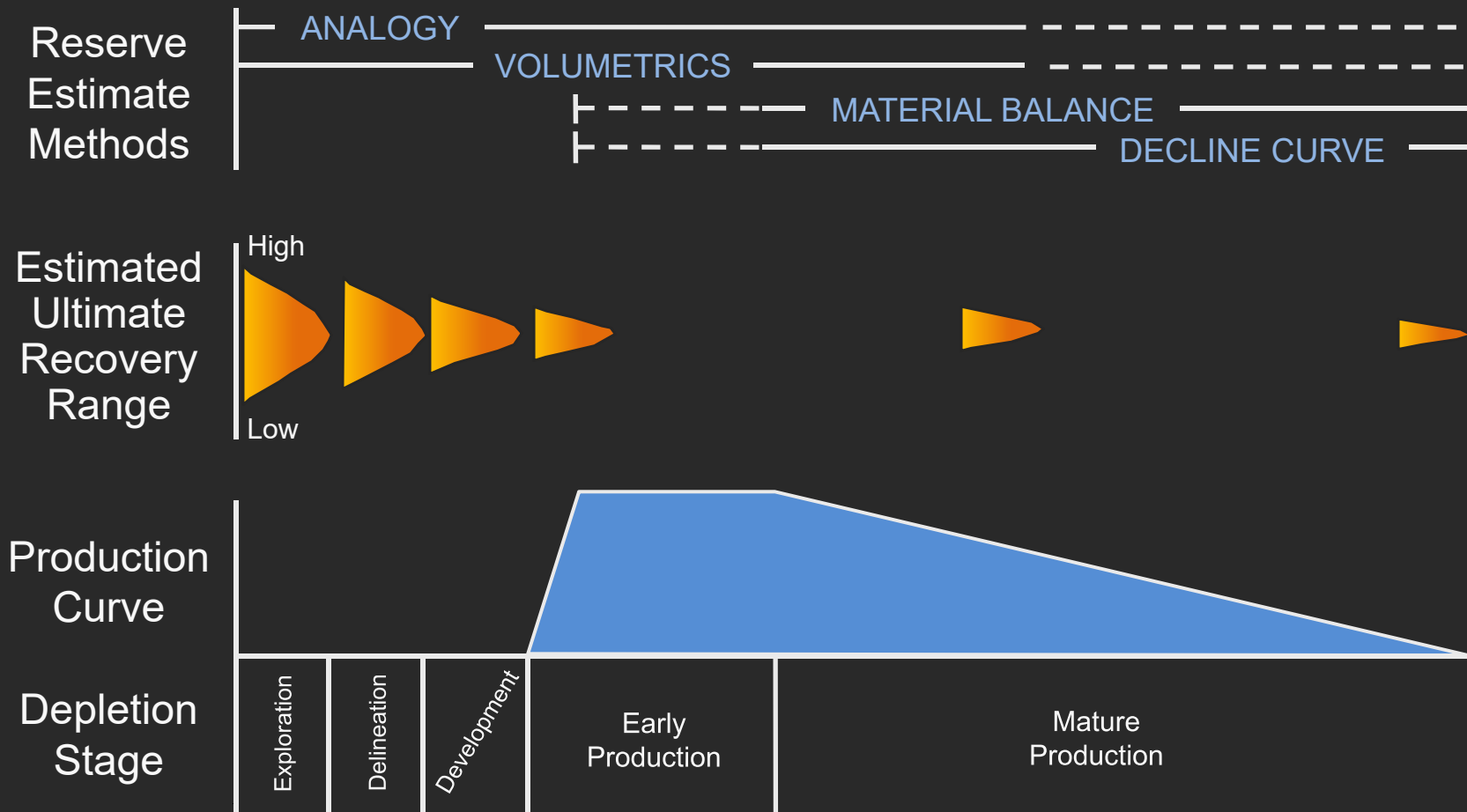
⁽¹⁾ Reserves Status - Producing, Non-Producing, Undeveloped

Resources Definitions During Development



Source: SPE Reserves ATW

Methodology Life Cycle



Requirements for Moving Prospective Resources to Contingent Resources and Reserves

Reserves Requirements

- Discovery of Moveable Hydrocarbons
- Commerciality
- Economic Rates and Volume
- Market and Sales Agreement
- Approved Development Plan
- Financing Ability

Successful Test May Equal Reserves



Requirements for Moving Contingent Resources to Reserves (Technical)

Reserves Requirements

- Document Resolution of Technical Issues including:
- Successful Tests Demonstrating:
 - Sustained Economic Volumes and Rates
 - Successful Application of Technology:
 - Stimulation, Horizontal Wells, Completions
- Sufficient Volume for Economic Development
- Positive Economics

Requirements for Moving Contingent Resources to Reserves (Contractual/Economic)

Reserves Requirements

- Data Proving Contractual/Economic Contingencies have been Resolved
 - Contract Extension
 - Production Sharing vs. Service Contract
- Economic Price
- Market and Sales Agreement
- Approved Field Development Plan, Financing

Data Acquisition to Optimize Resources Migration

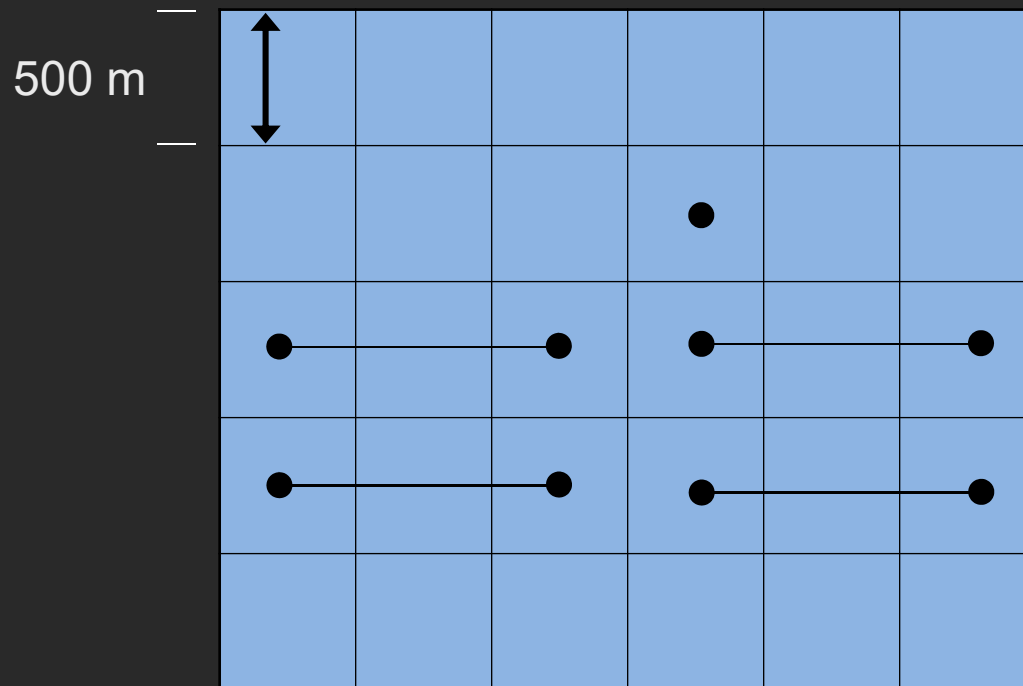
Key Data Acquisition

- Sufficient Data to Understand Reservoir
 - Extent and Variability (well logs, seismic data)
- Reservoir Produceability
 - Well Test(s) Demonstrating Sustained Production

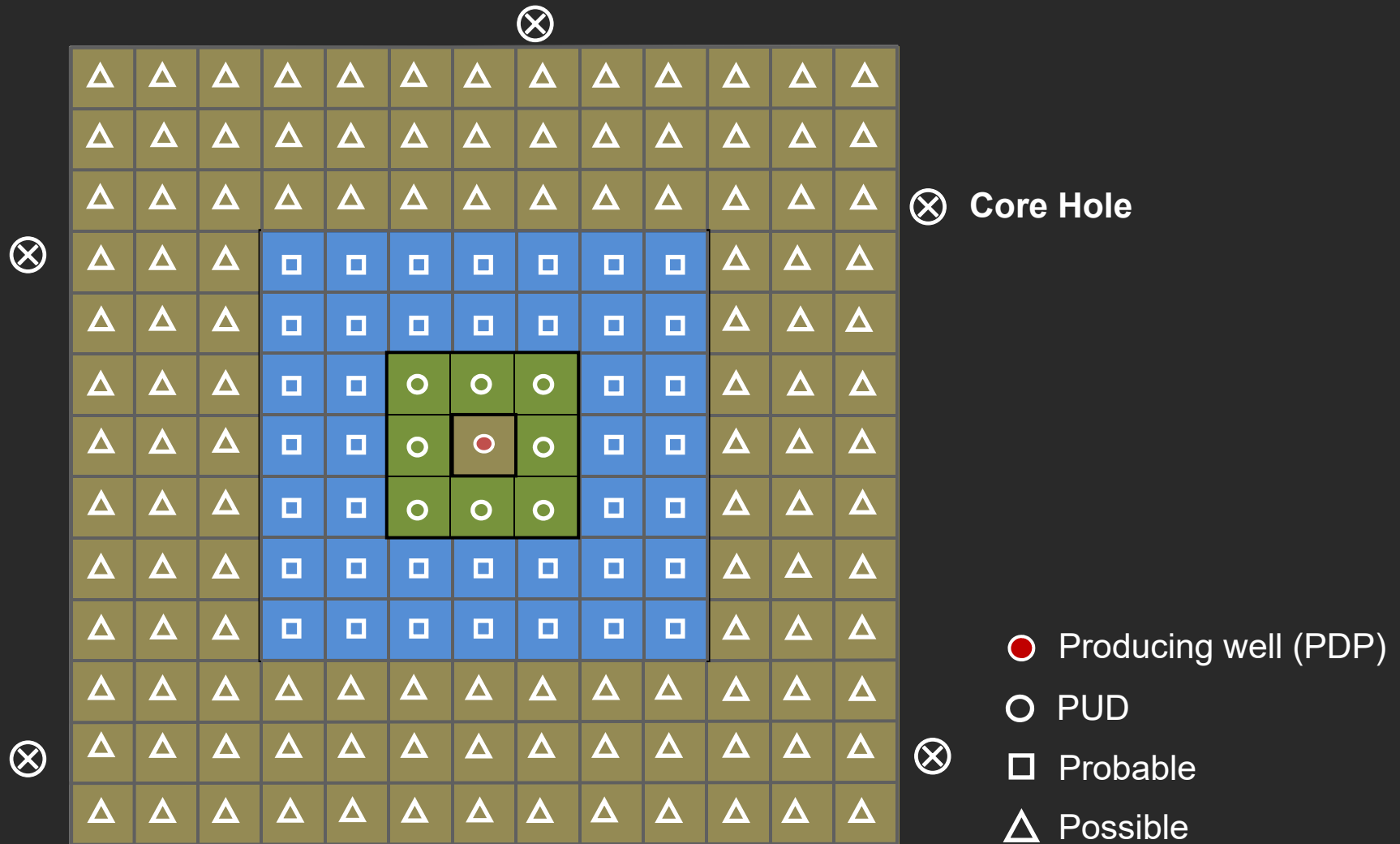
Deterministic Reserves Calculation

Each Grid has NSAI estimate for:

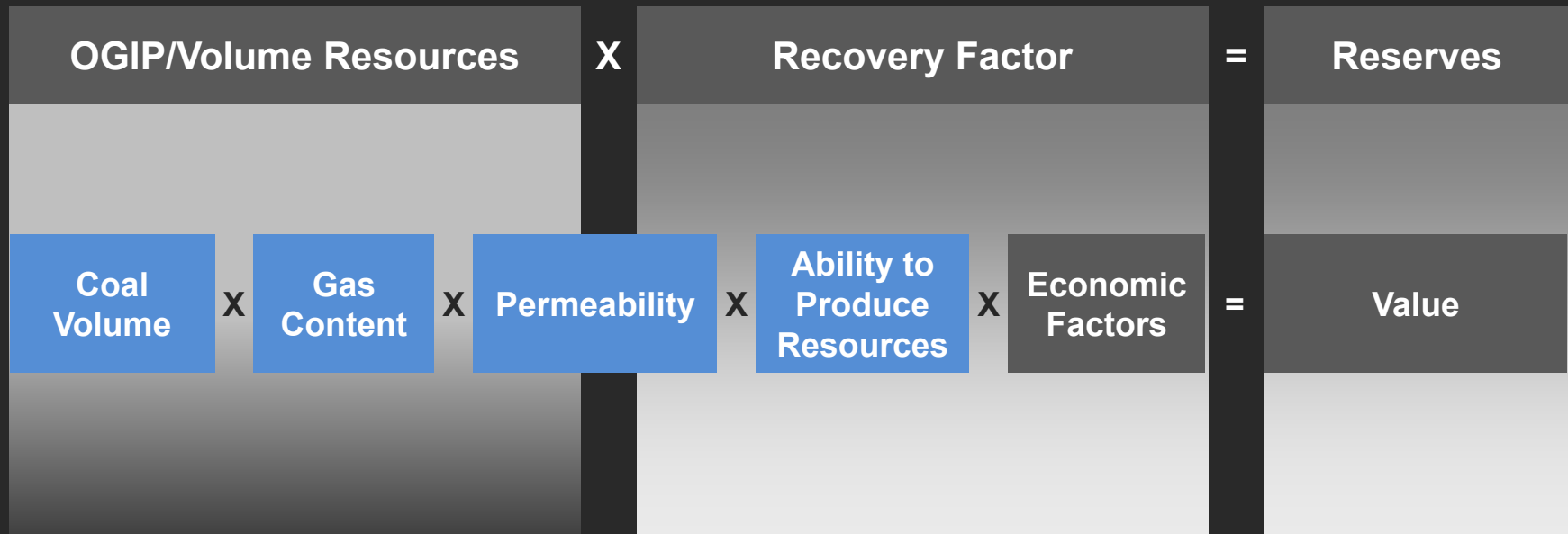
Overburden, thickness, pressure, gas content (VL, PL, ash, moisture),
coal density, abandonment pressure, recovery efficiency



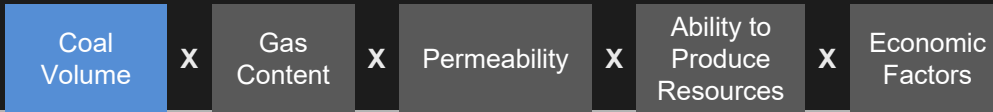
Leverage for 1P, 2P Reserves



Requirements for Successful CSG Project



The Case for Prospective Resources

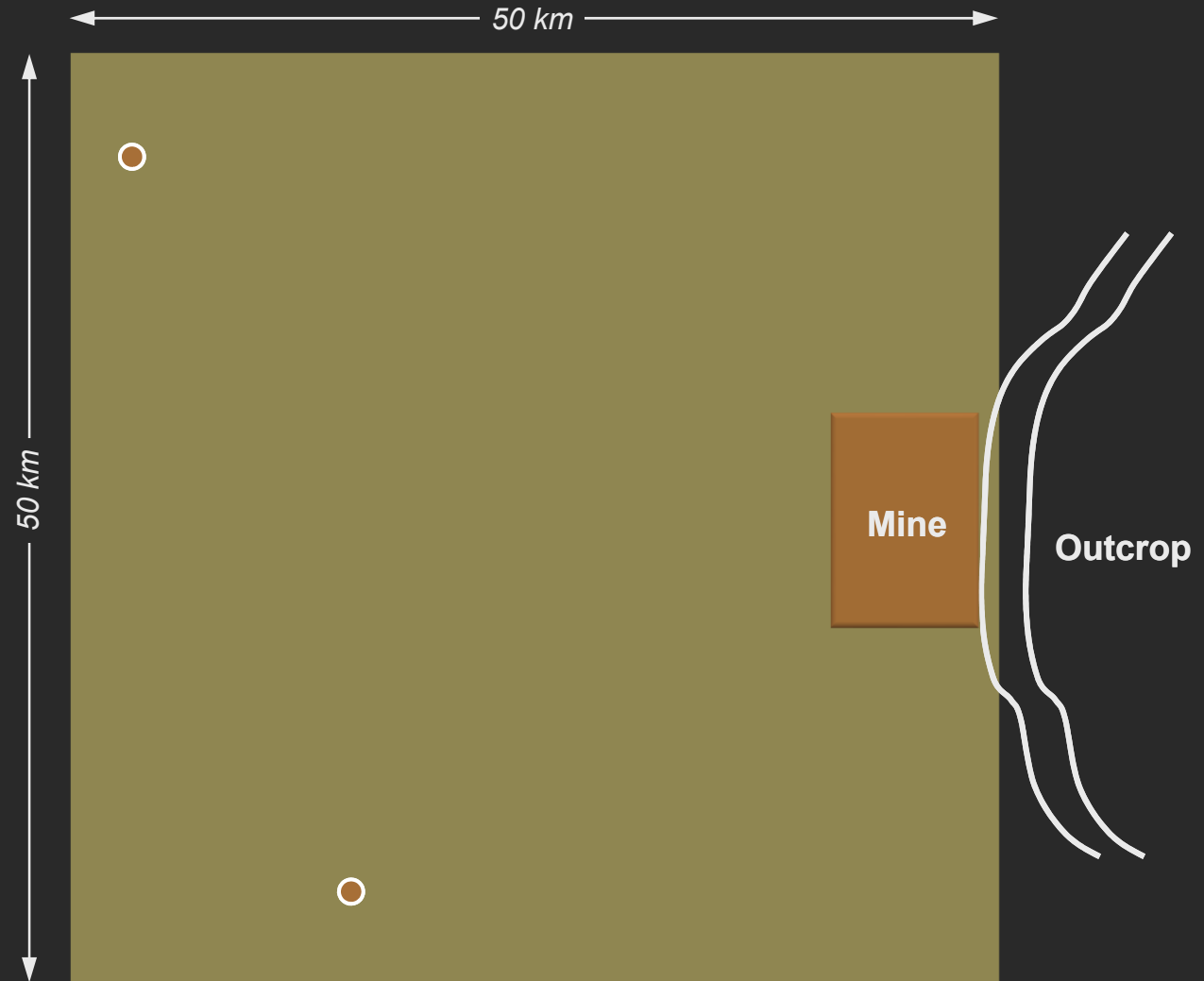


Prospective Resources

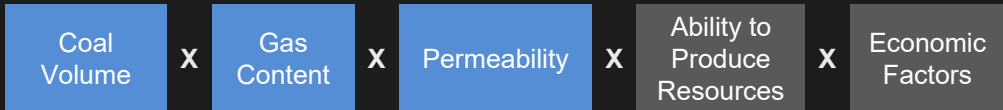
- Little Data
- Outcrop Data
- Mine Data
- Conventional Exploration well

Resources

- Prospective
- Contingent



The Case for Contingent Resources

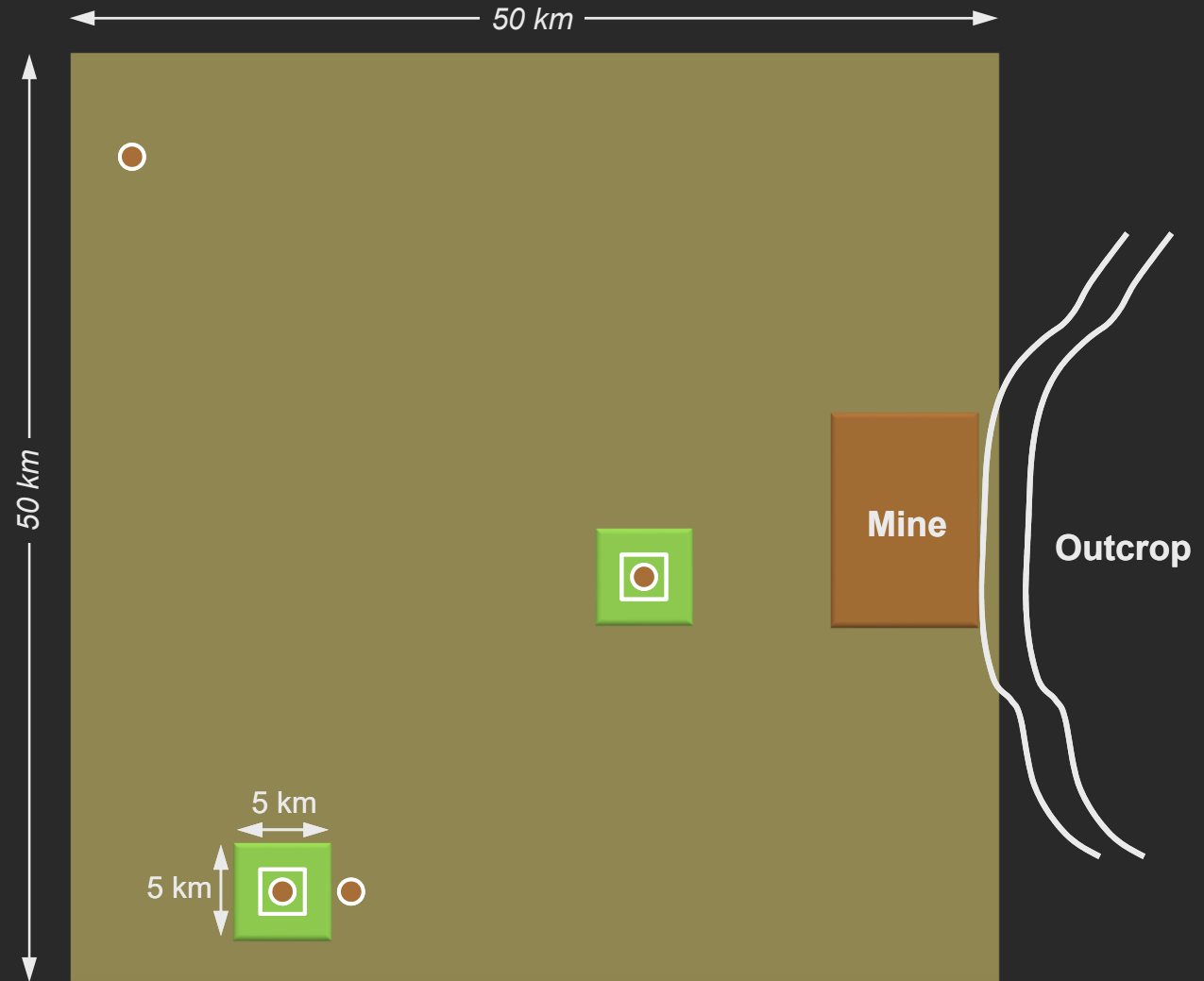


Contingent Resources

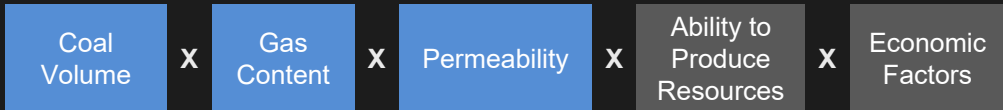
- Outcrop Data
- Mine Data
- Conventional well
- ◻○ CSG Exploration well
 - Perm + Gas Content
 - "Good" Flow Test

Resources

- Prospective
- Contingent



The Case for Contingent Resources



Contingent Resources

- Outcrop Data
- Mine Data
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- ◻○ CSG Exploration well

If:

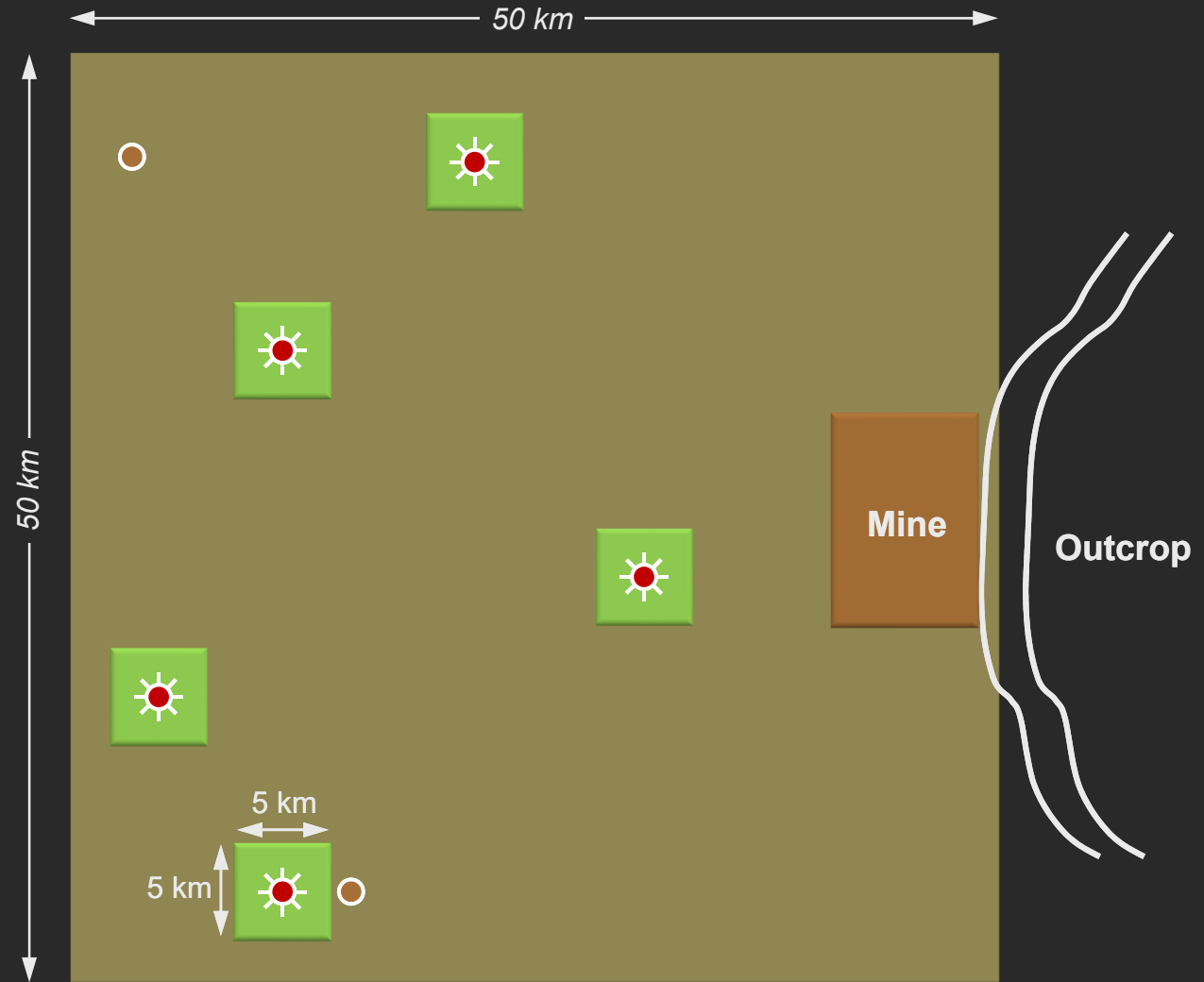
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Then:

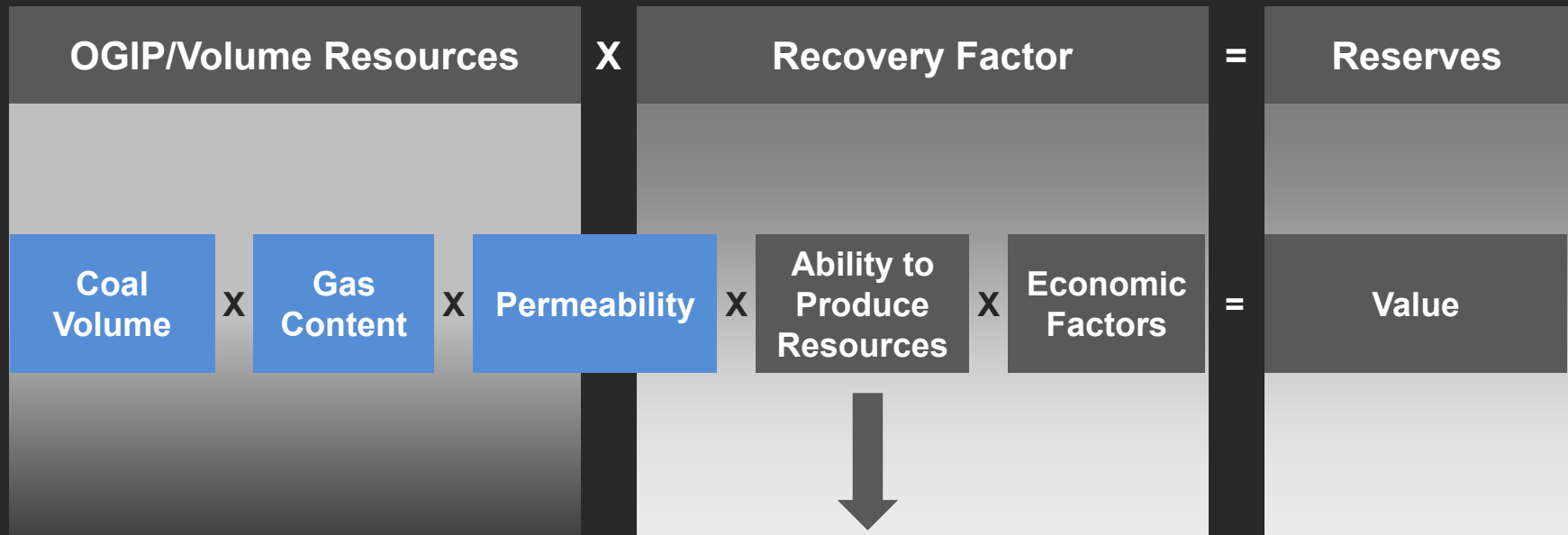
- ☀ Successful CSM well
 - Gas Content
 - Permeability
 - Successful flow test

Resources

- Prospective
- Contingent



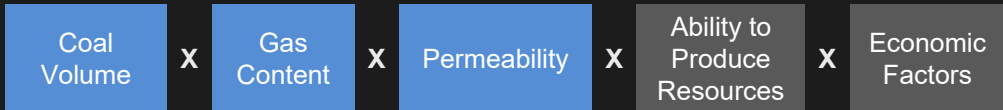
Requirements for Successful CSG Project



Ability to Produce Resource

- Ability to Dewater
- Permeability
- Aquifer Recharge
- Well performance data
 - Reservoir pressure
 - Pressure build-up
 - Interference testing

The Case for Contingent Resources

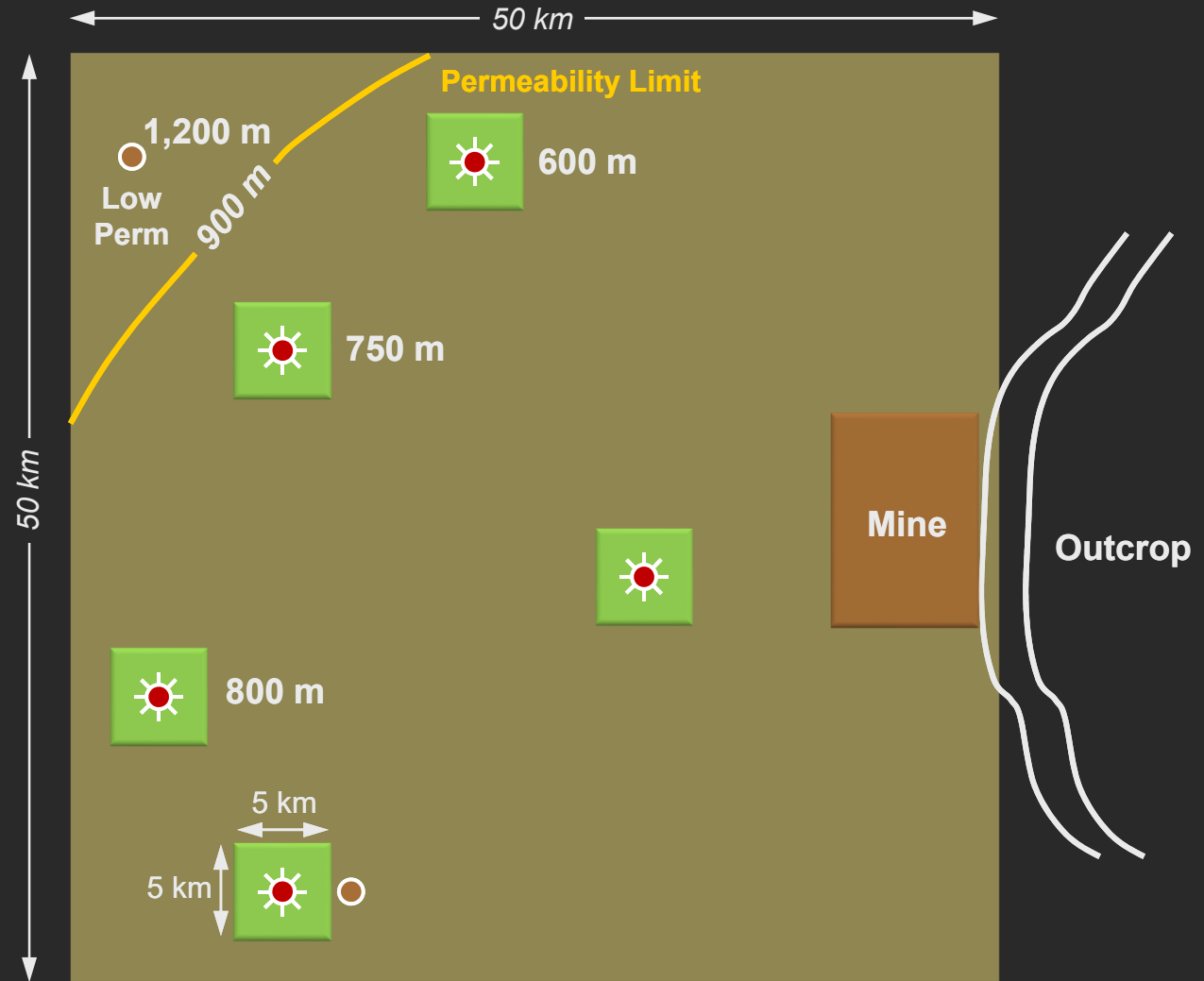


Contingent Resources

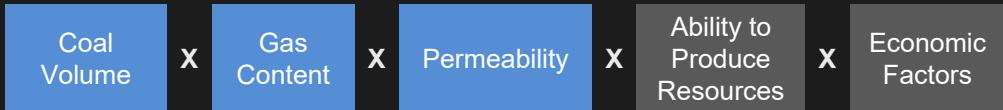
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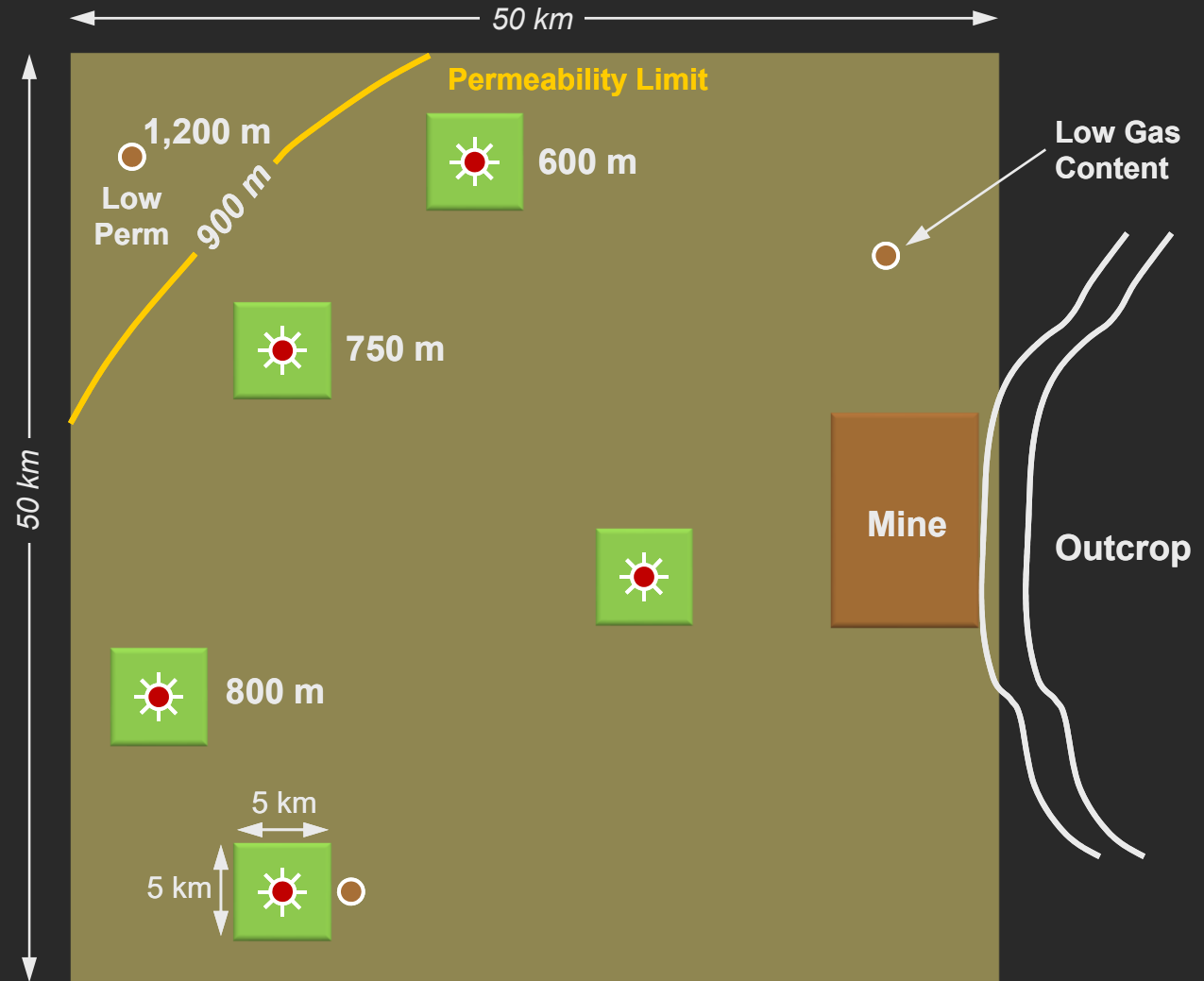


Contingent Resources

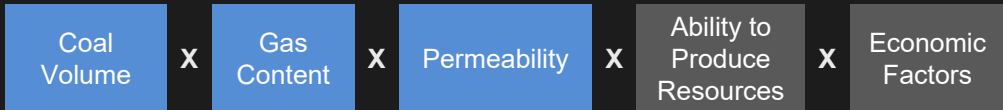
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The Case for Contingent Resources

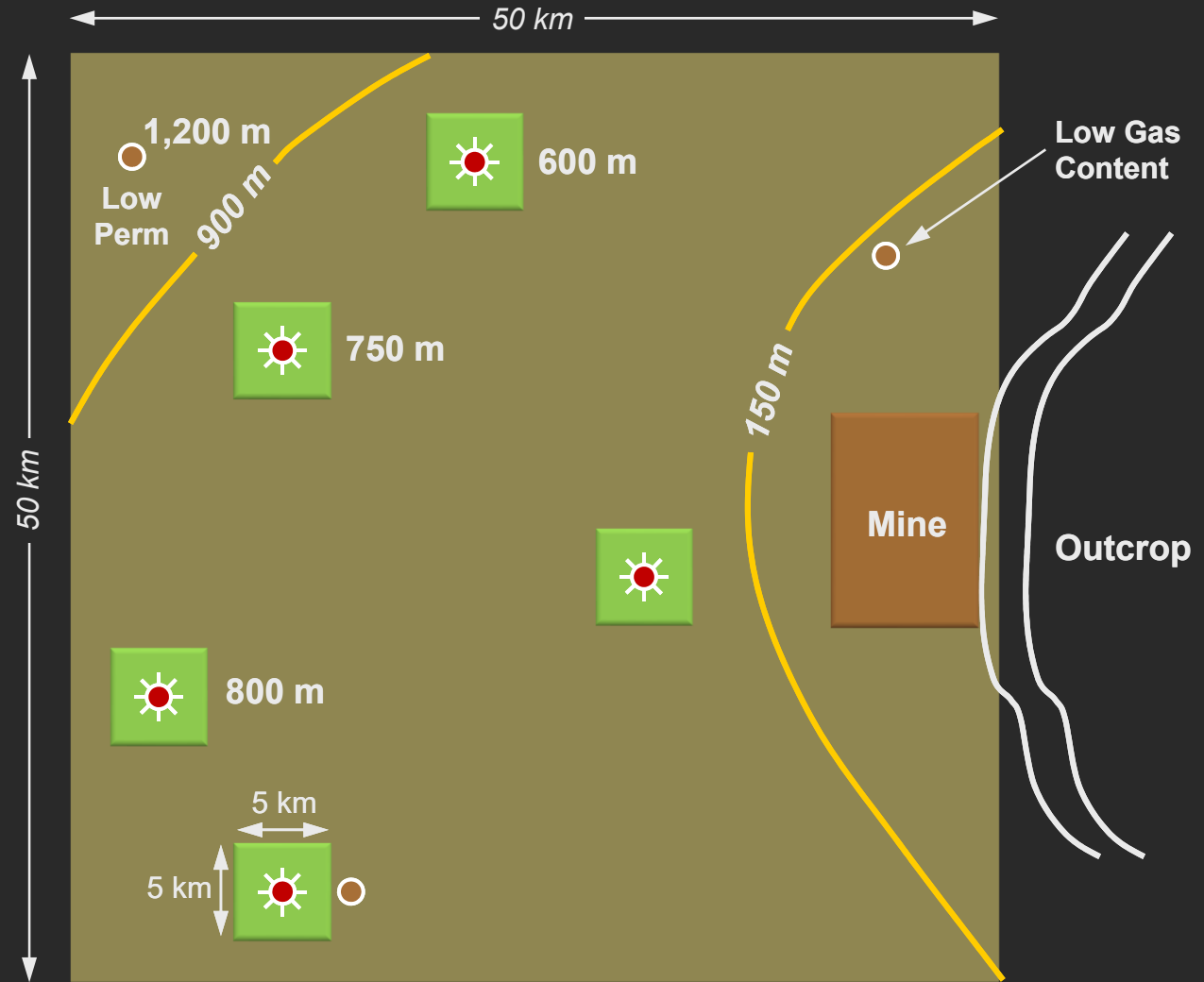


Contingent Resources

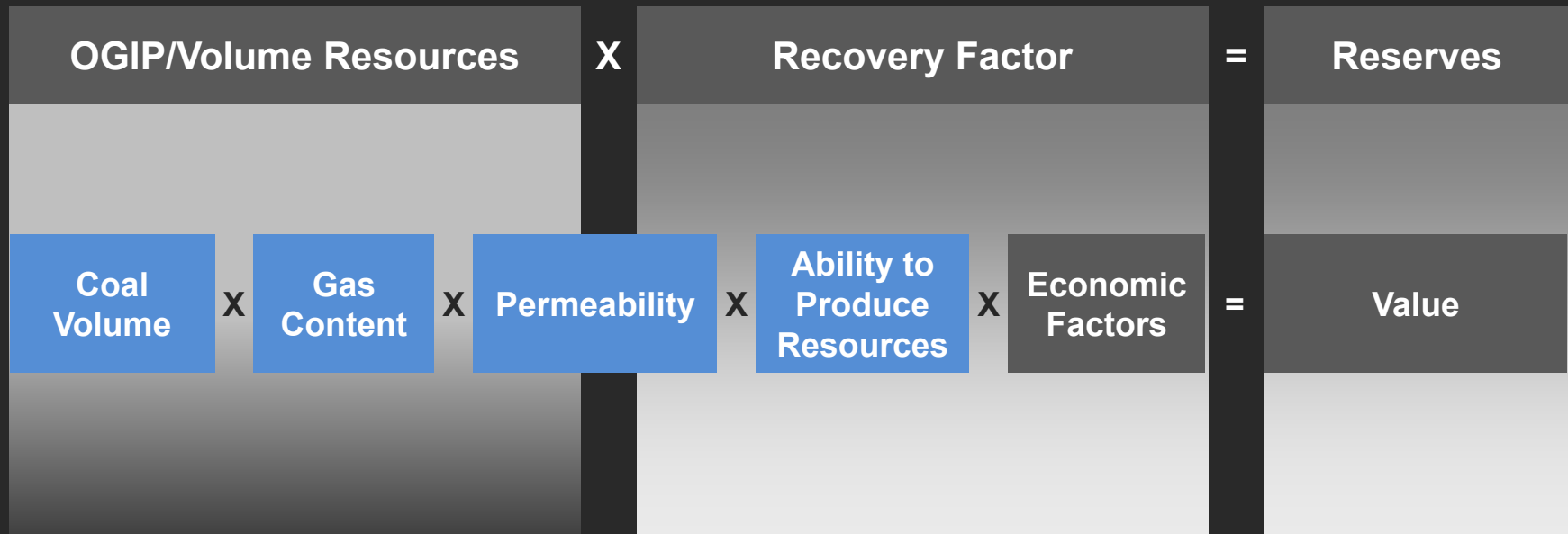
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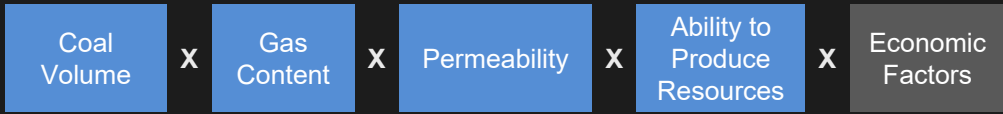
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Requirements for Successful CSG Project



The Case for Contingent Resources

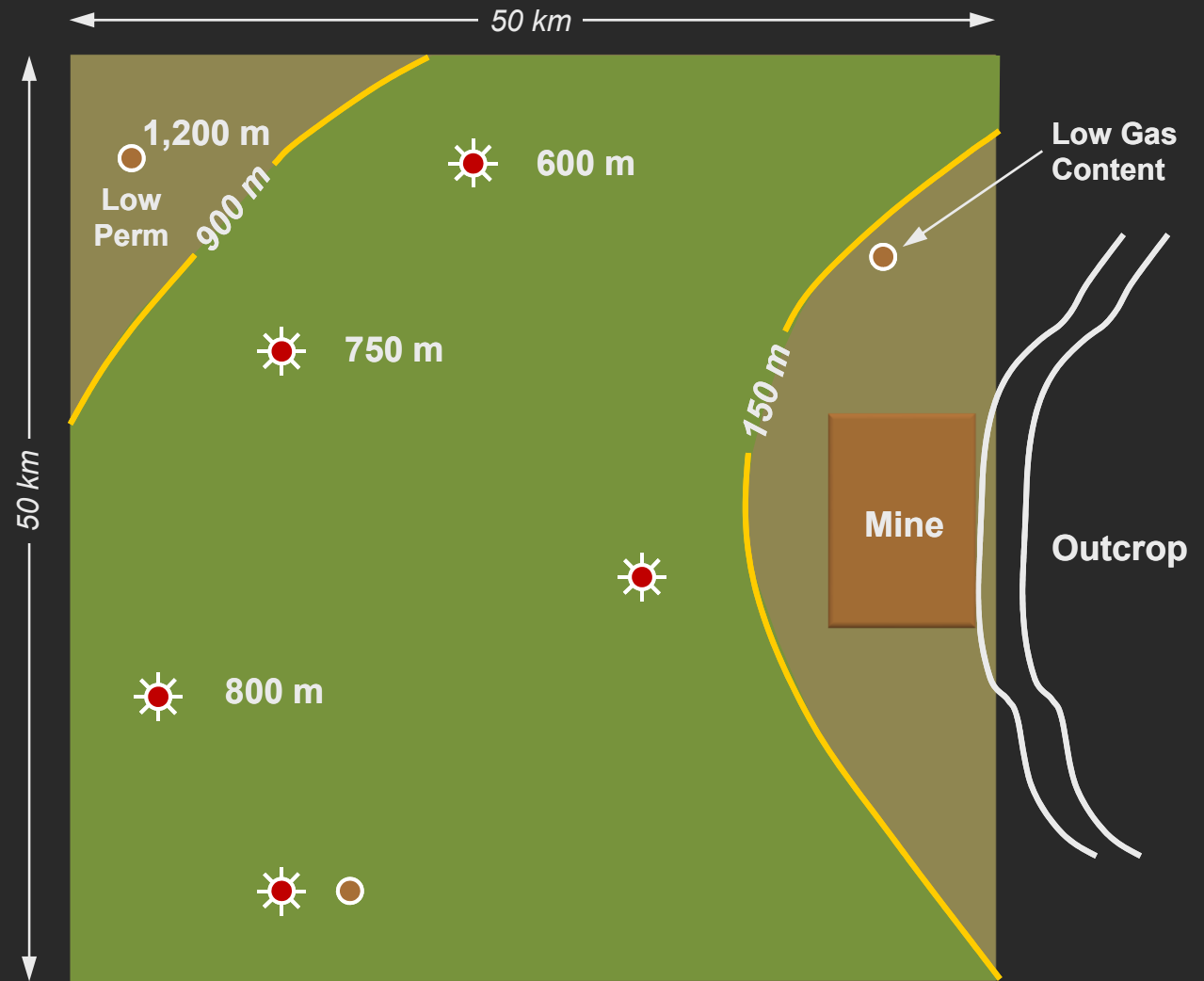


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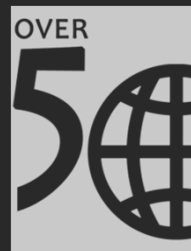
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