Capital Cost Overrun and Operational Performance in Mining Industry

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Canada

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OVERVIEW

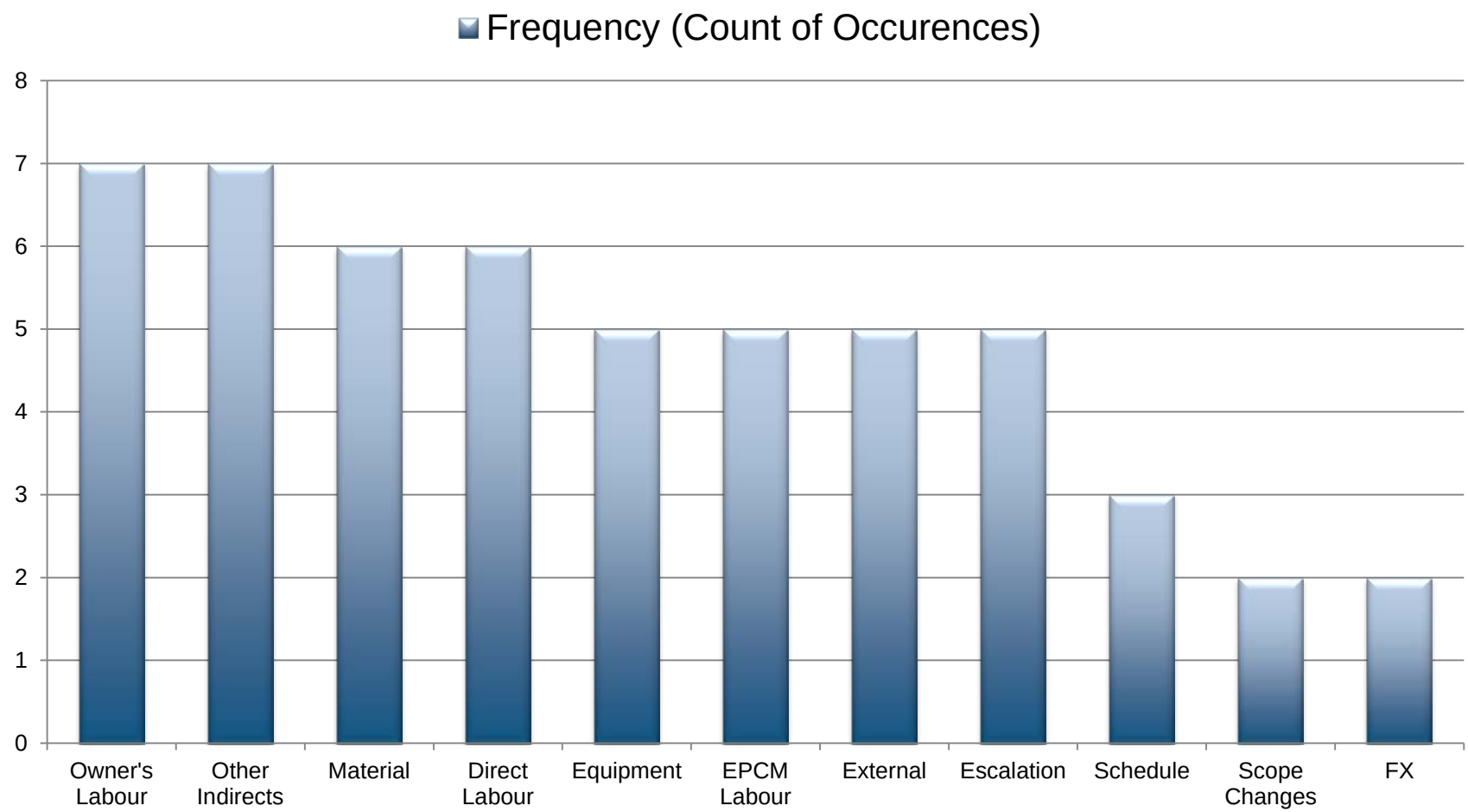
- Project Cost Overruns
- Operational Performance
  - Production performance
  - Operating cost performance
  - Performance index

CAPITAL COST OVERRUNS

BACKGROUND

- Capital cost overruns (CO) have been endemic and significant.
- EDC has a significant lending portfolio in mining and metals.
- As a lender, EDC faced the issue which drove the desire to identify and mitigate potential CO's.
- 2012 study identified sources of CO using internal data from 12 projects.
- 2015 study characterized attributes of 78 projects with CO using internal and external data.
- Findings from the studies used to address CO risk.

2012 STUDY – SOURCES OF COST OVERRUNS



Note: 2012 and 2015 studies use different data sets

TAKE AWAYS - 2012 STUDY

- Owner's and indirect costs tend to be significantly underestimated.
- Costs under EPCM scope on average tend to be more or less within expected accuracy level for a feasibility study (i.e. within 15%).
- Evidence of correlation between capex overruns and commodity prices, but not at the rate of increase in commodity prices.
- Significant cost overruns are a more recent phenomena.
- Capex estimates are carried out to feasibility level (AACE[1] Class 3), but stated accuracy levels are higher than AACE's expected accuracy of -20% to +40%.

[1] AACE International, an industry association for advancement of cost engineering

2015 STUDY

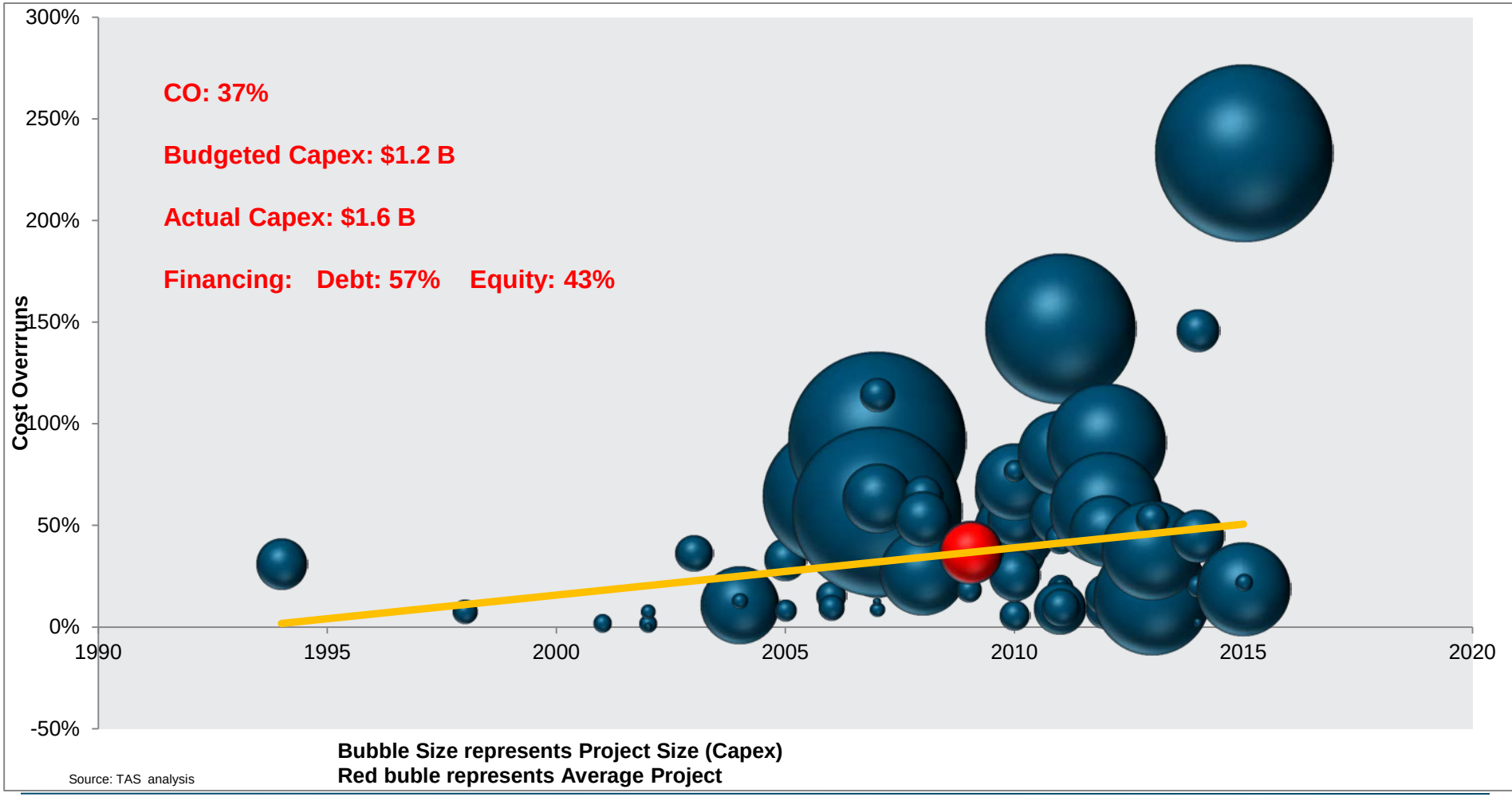
Purpose:

- Analyze capital cost overruns in mining projects and relationship to various variables.
- To compliment the 2012 study on sources of cost overruns.
- Discover other factors to consider in sizing cost overrun facility.

Scope:

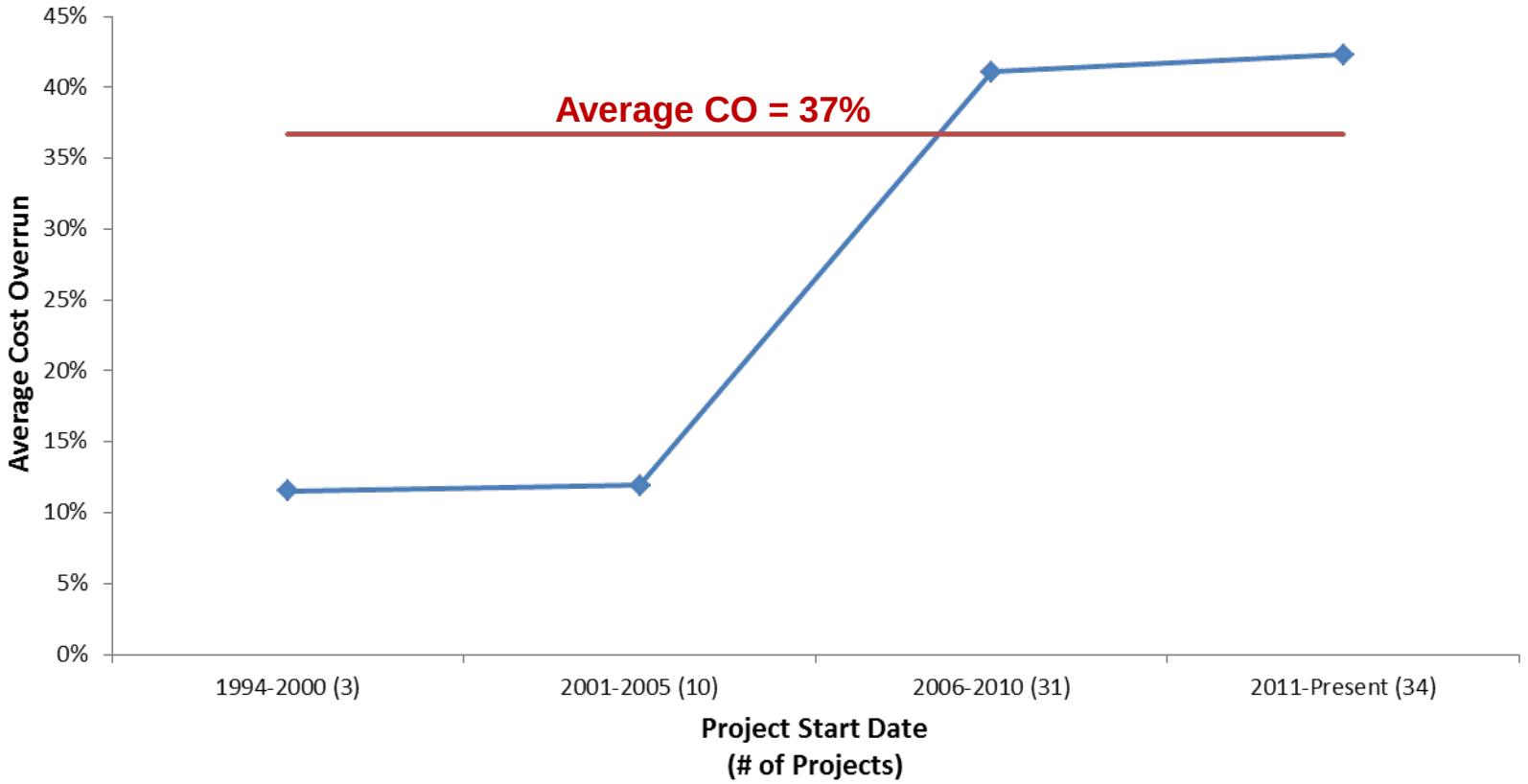
- Study limited to 78 projects:
  - Capex > $ 50 M
  - Started within last 20 years

CAPEX COST OVERRUNS (CO)



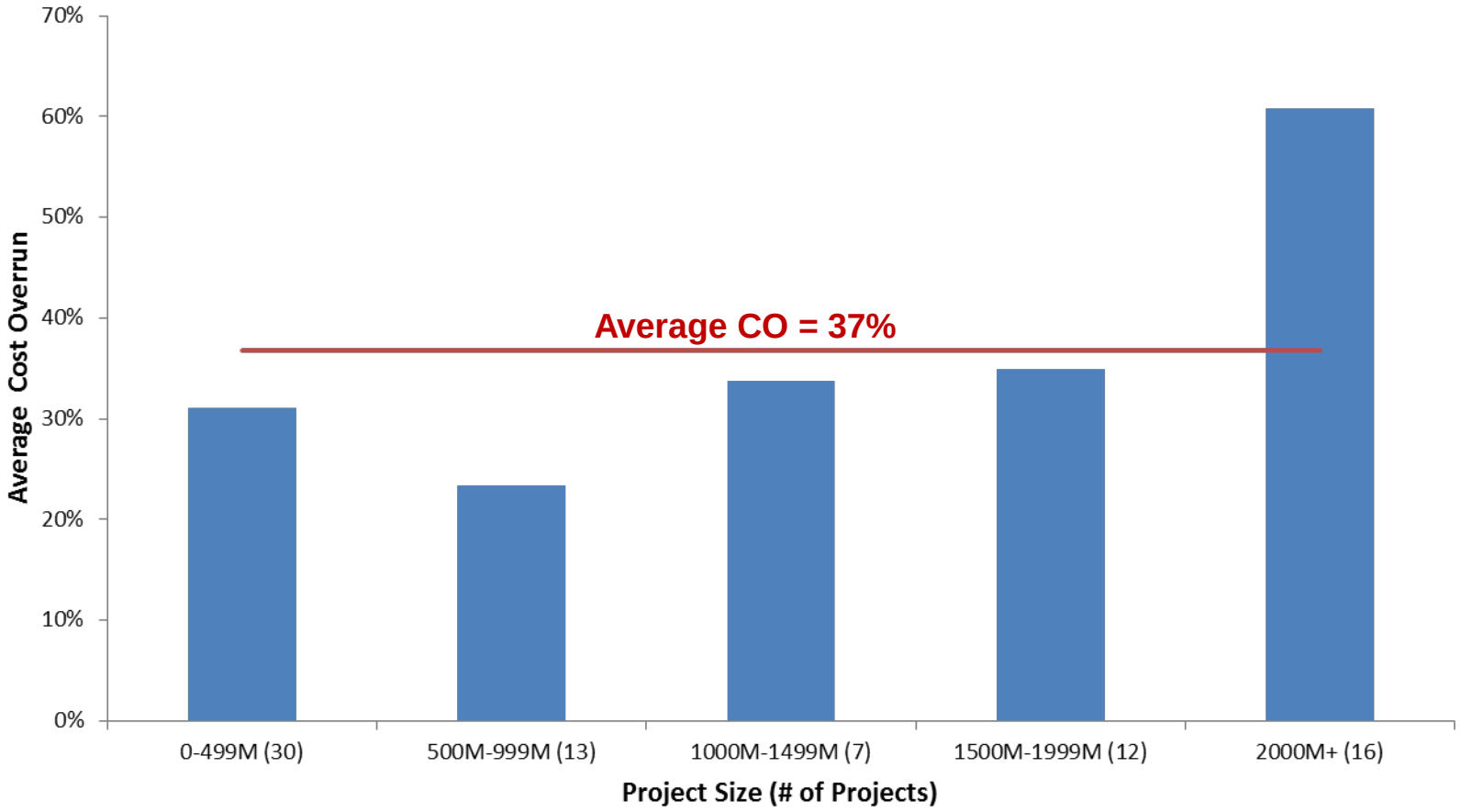
Source: TAS analysis

COST OVERRUN OVER THE YEARS

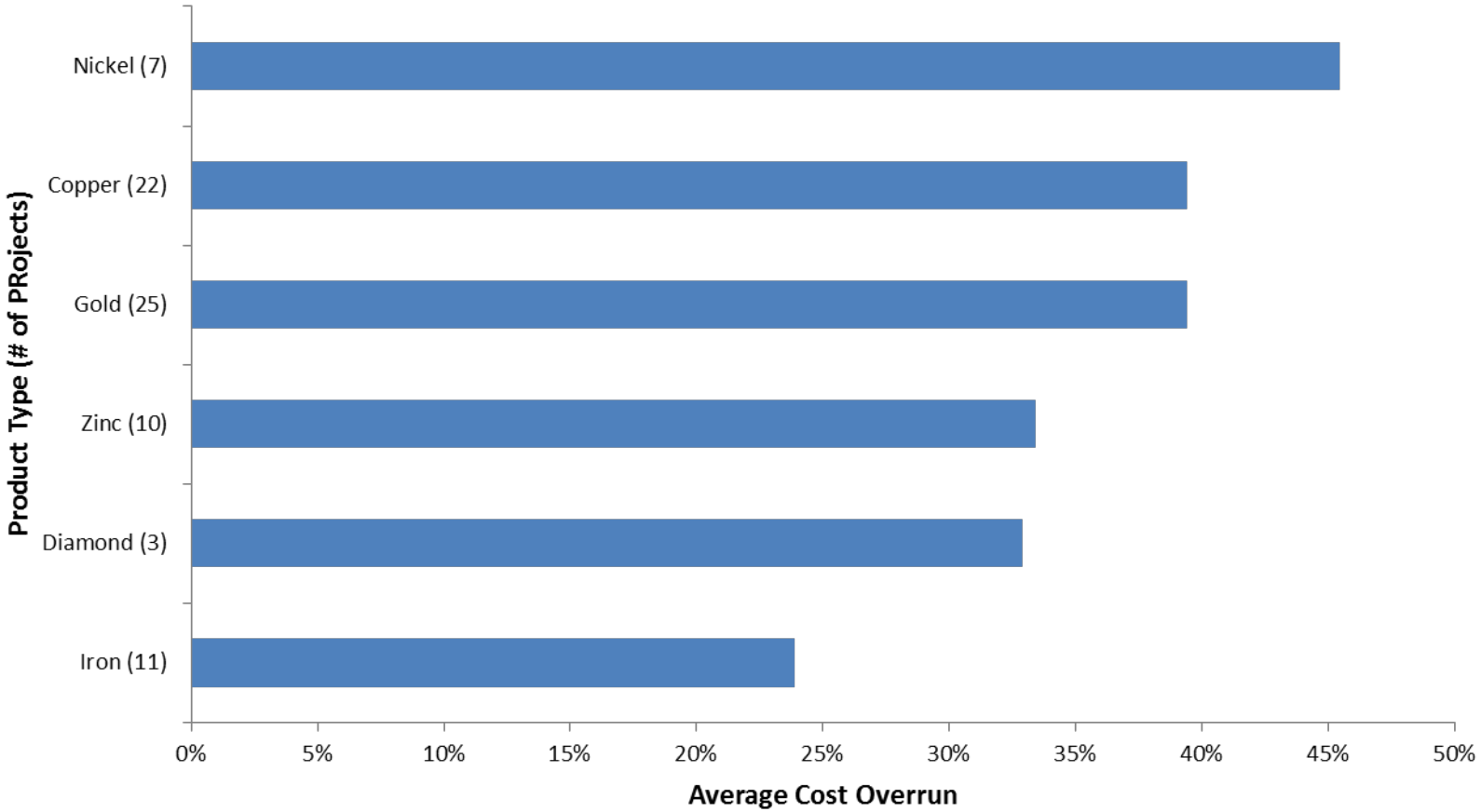


Post 2010 average CO growth rate is showing signs of slowing down after reaching above 40%.

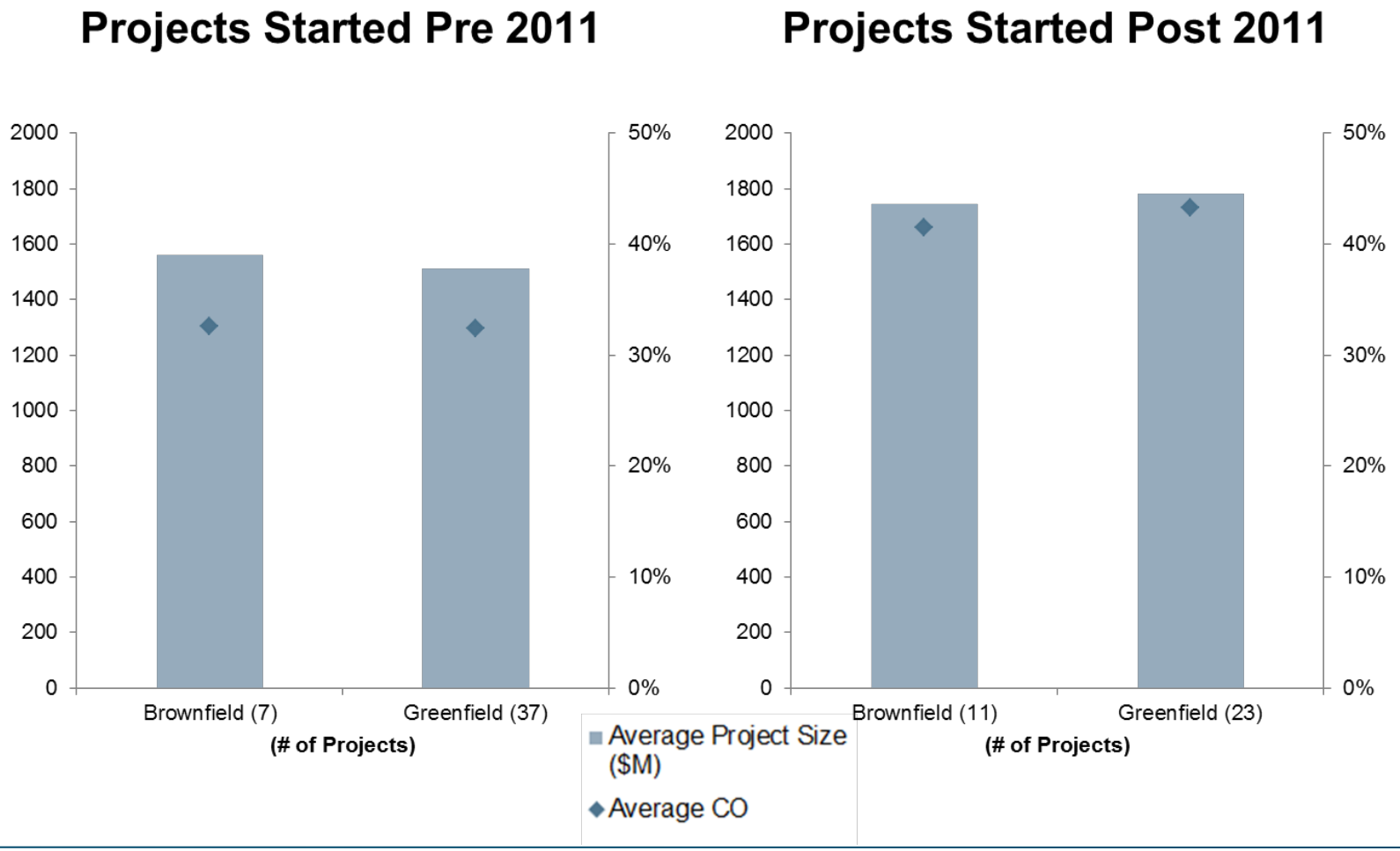
COST OVERRUN & PROJECT SIZE



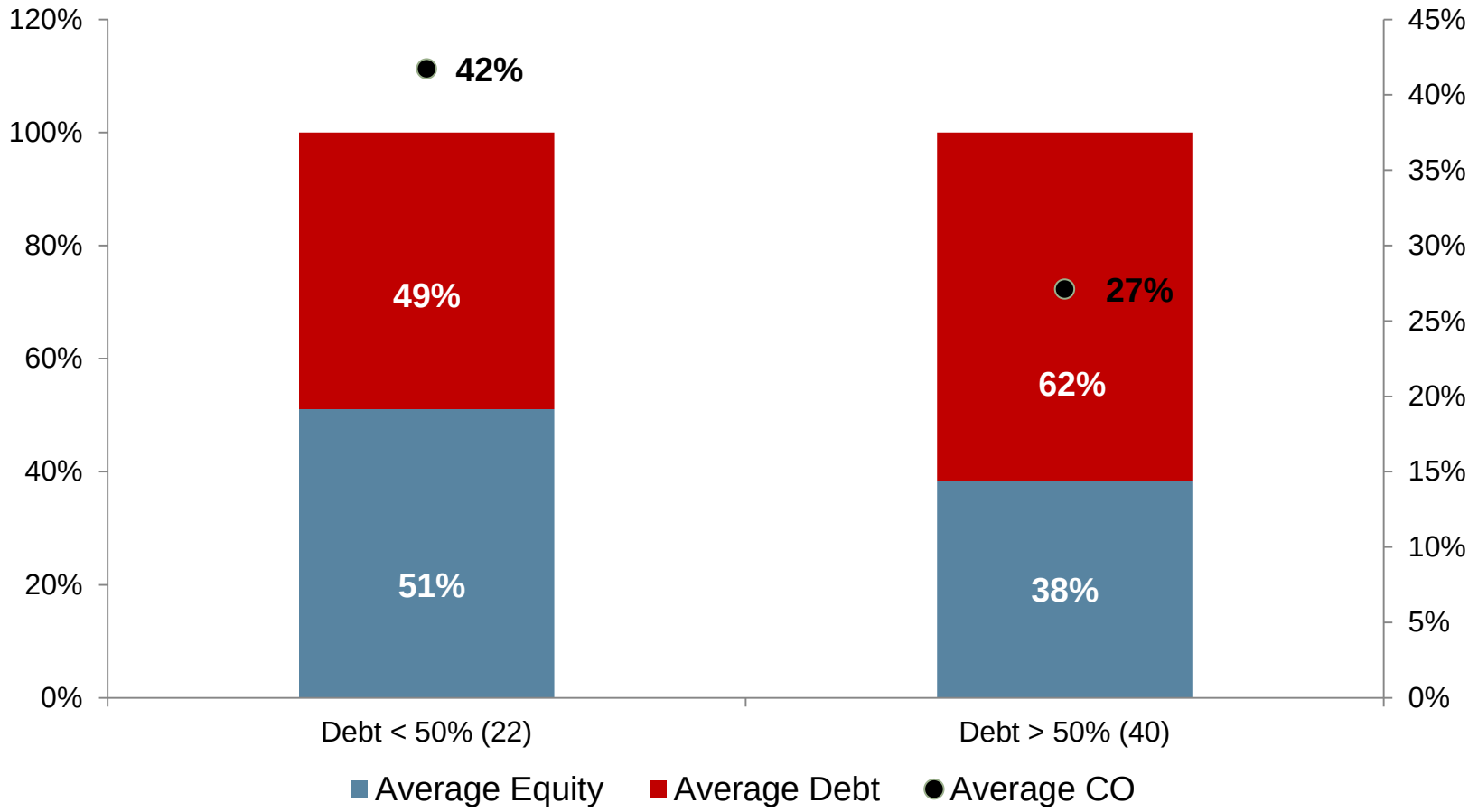
COST OVERRUN & COMMODITY TYPE



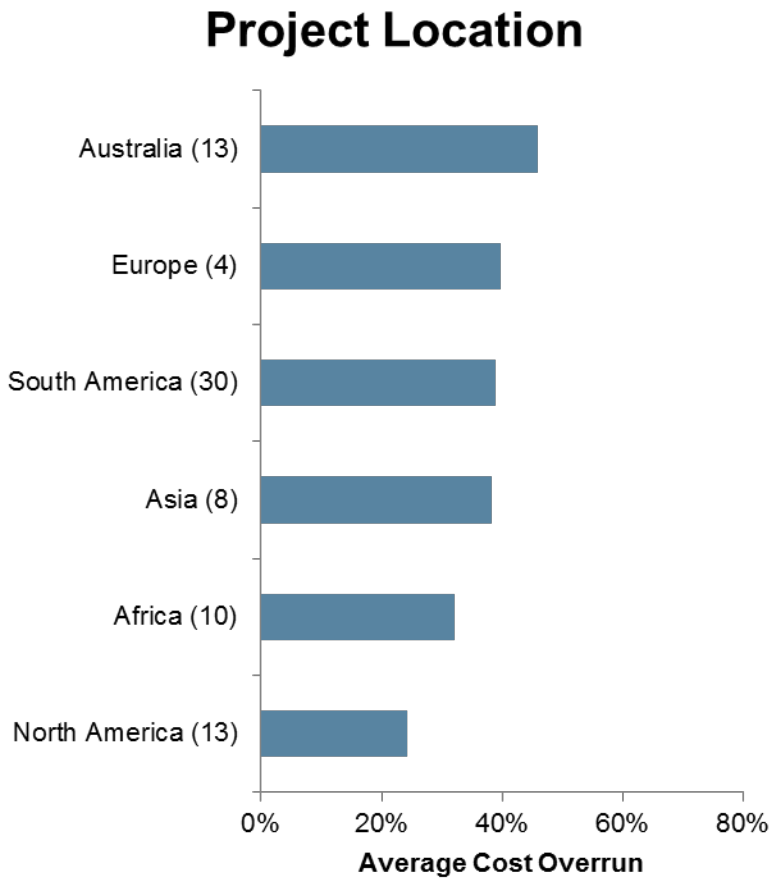
BROWNFIELD vs. GREENFIELD PROJECTS

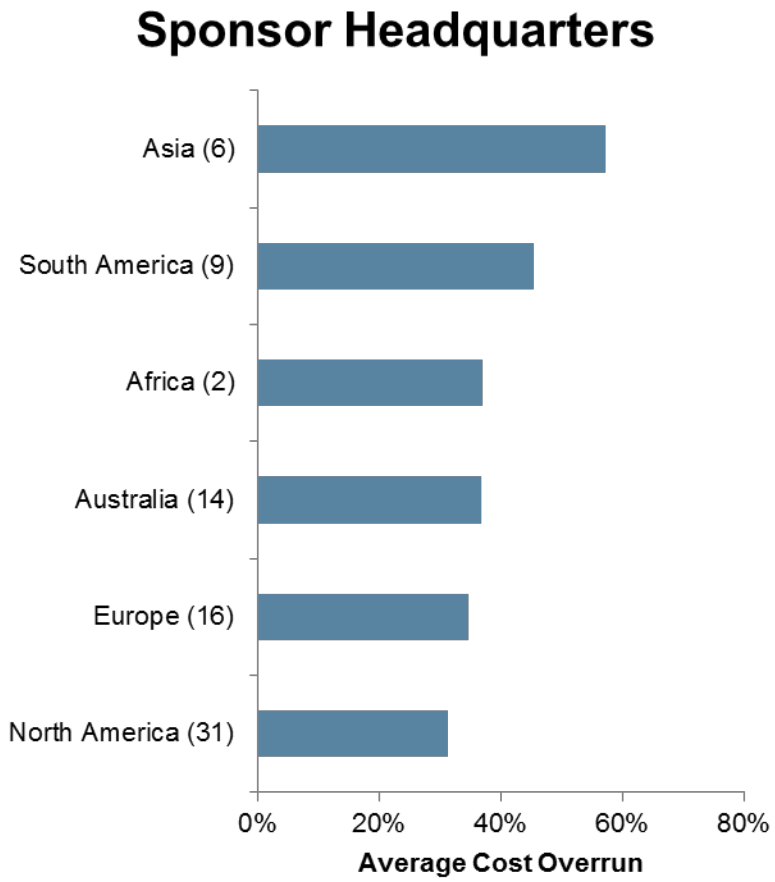


DEBT VS. EQUITY FUNDING

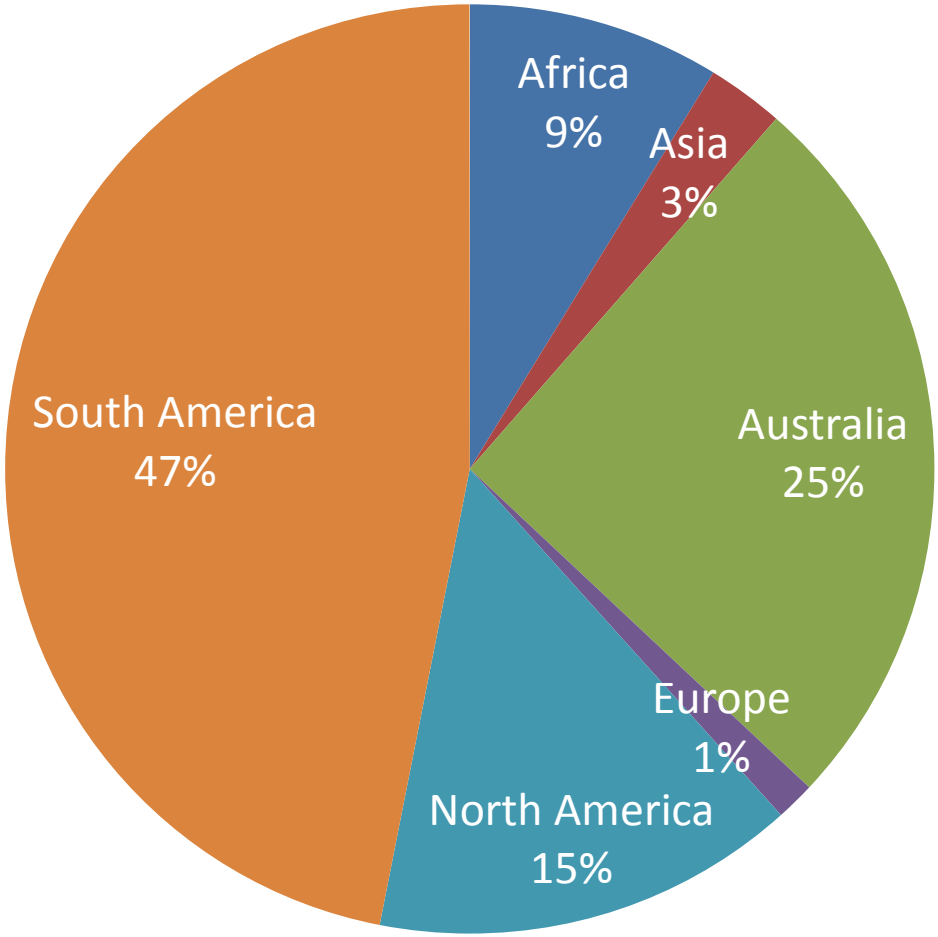


COST OVERRUNS AROUND THE WORLD





DISTRIBUTION OF PROJECT COST BY REGION



TAKE AWAYS – 2015 STUDY

- Average cost overrun 37%
- Significant increases in cost overruns are recent trend
- Variables with significant impact:
  - Project Size
  - Project Location
  - Project Sponsor Headquarters
  - Type of commodity
  - Leverage (Debt to Equity Structure)
- Variables with negligible impact
  - Sponsor Size (Major, Mid Size, Junior)
  - Product Type (Concentrate, Cathode, Doré)
  - Mining Method (Open Pit, Underground)

CONCLUSION – ADOPTED APPROACH

1. Verify that capex estimates are carried out to AACE Class 3 or better.
2. Confirm whether budgeted contingencies are commensurate with level of engineering completed.
3. Undertake comprehensive review of estimates by independent engineer.
4. Recognize that capex estimates are carried out to feasibility level (AACE Class 3), but stated accuracy levels are higher than AACE's expected accuracy of -20% to +40%.
5. Consider factors from 2015 study.
6. Assess points 1 to 5 to gauge potential cost overrun risk in a specific project.
7. Deploy structural features to address potential cost overrun risk - completion guarantee, committed cost overrun funding, conditions to funding, cost-to-complete test.

OPERATIONAL PERFORMANCE

BACKGROUND

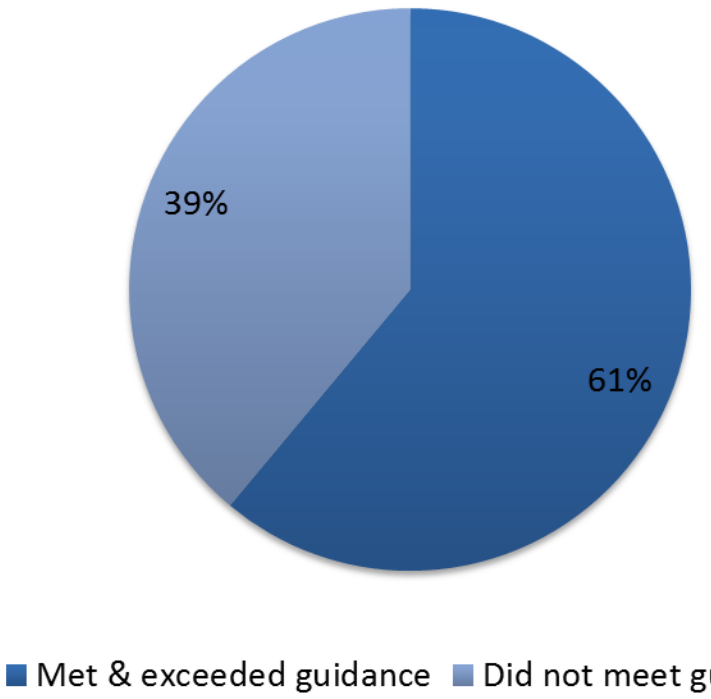
- Projected production and opex performance is a key due diligence area.
- Earlier study on the subject showed that companies' forecasts generally tend to over-estimate production and under-estimate operating costs.
- Since the dataset was small, expanded the study.
- Consider whether findings from the expanded study could/should be applied in due diligence.

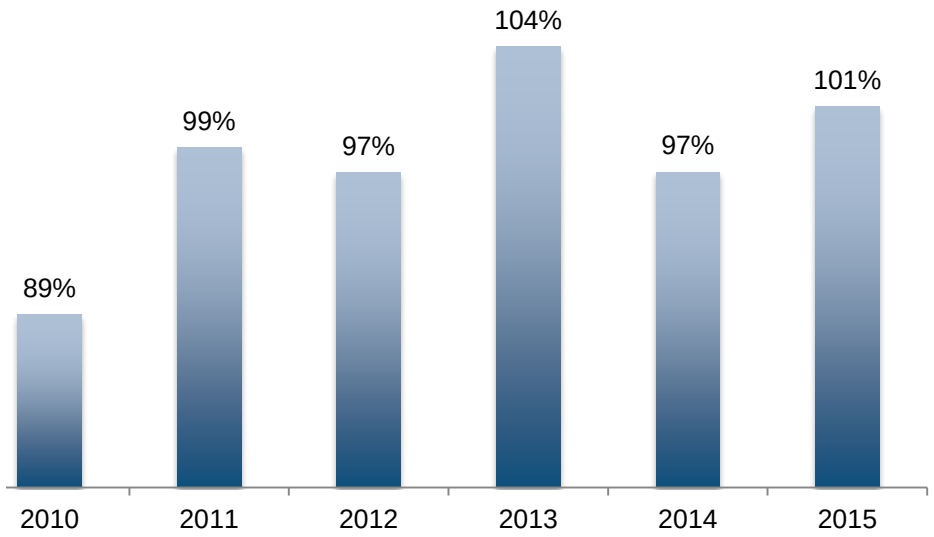
DATASET

- 36 TSX listed gold and copper producers
- Junior, intermediate and senior producers
- Production and operating cost figures
- 6 year period (2010 – 2015)
- 338 data points
- Data source: company's press releases and annual reports

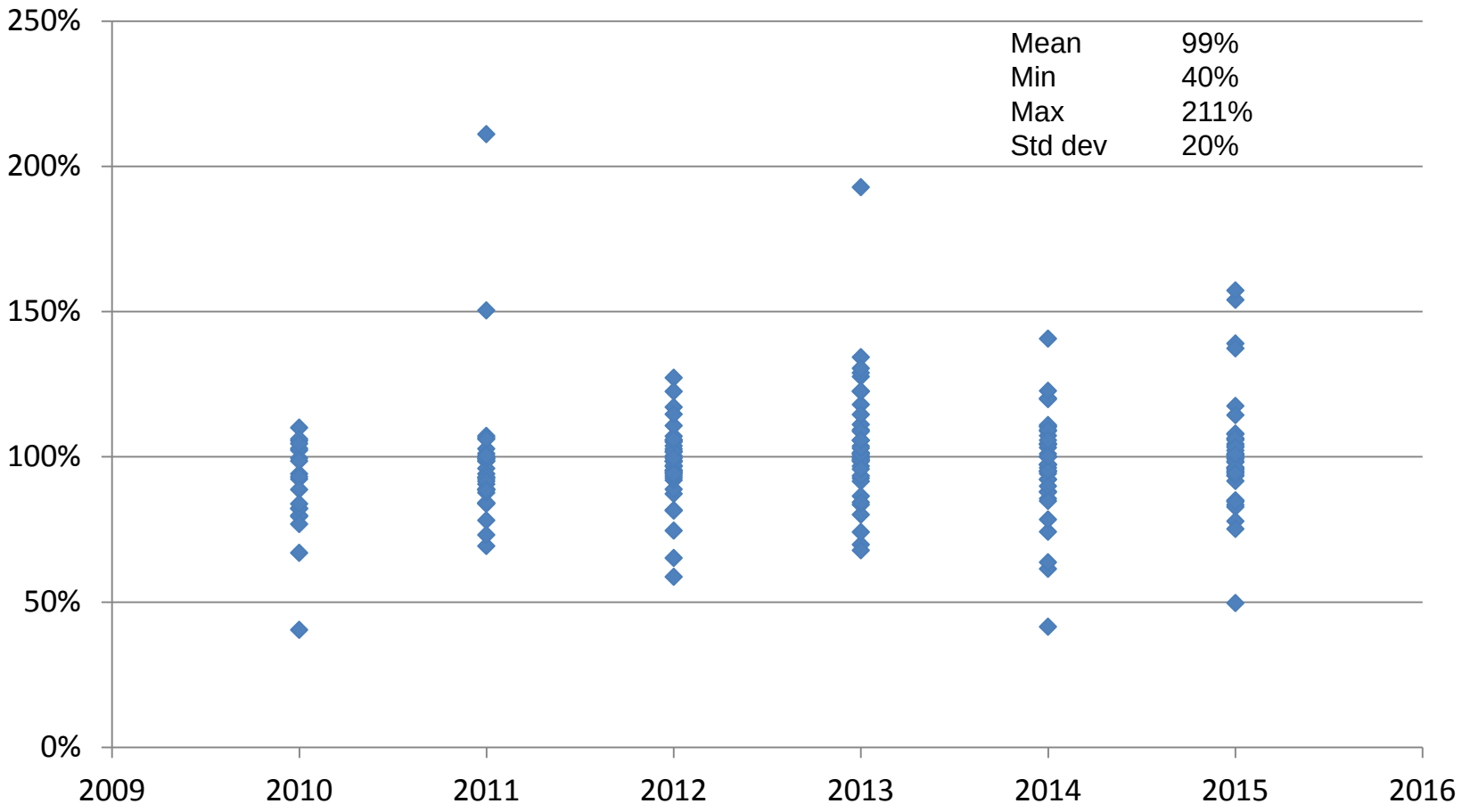
PRODUCTION PERFORMANCE

Production Performance = Actual Production / Company Production Guidance

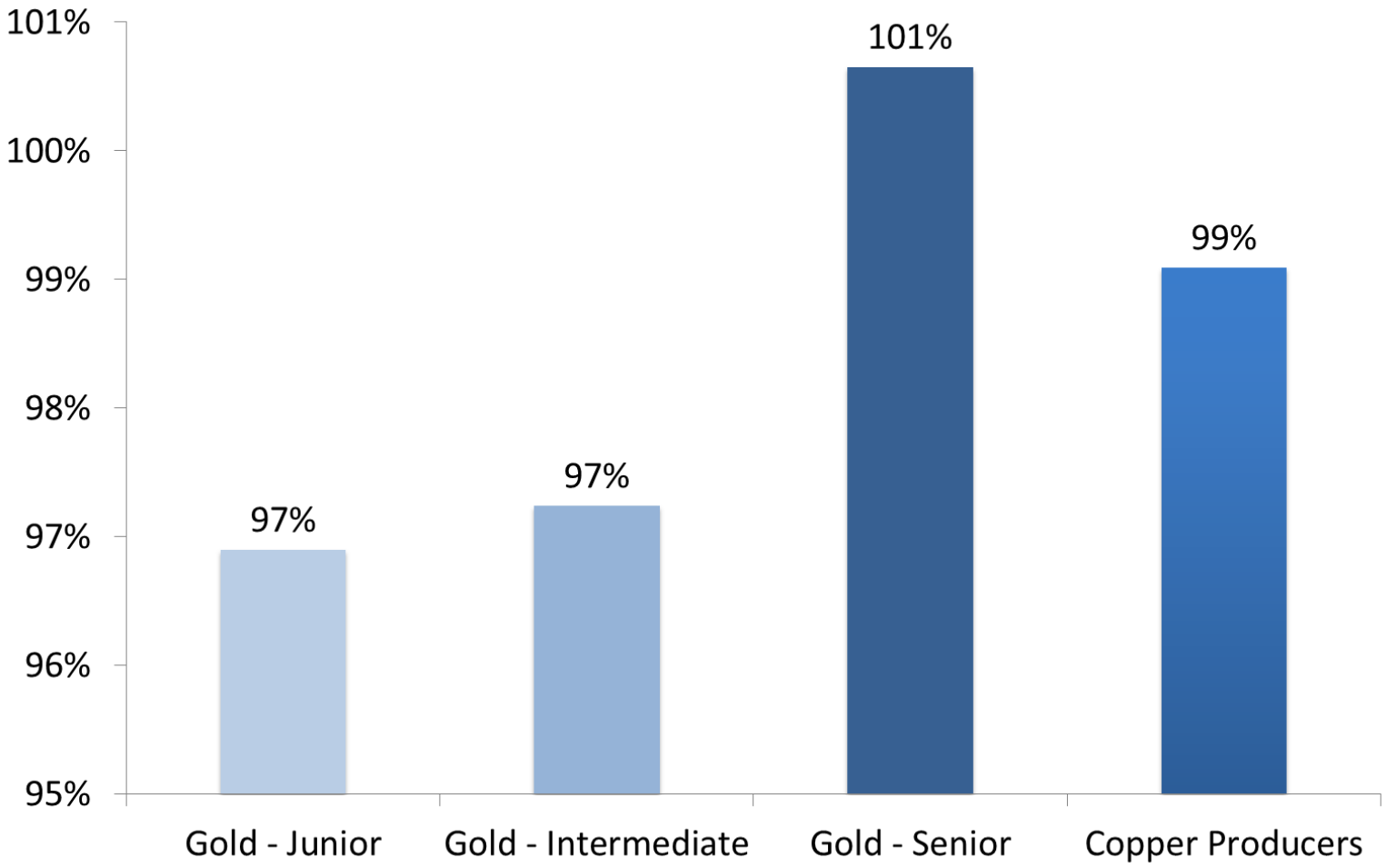




PRODUCTION PERFORMANCE SCATTER PLOT

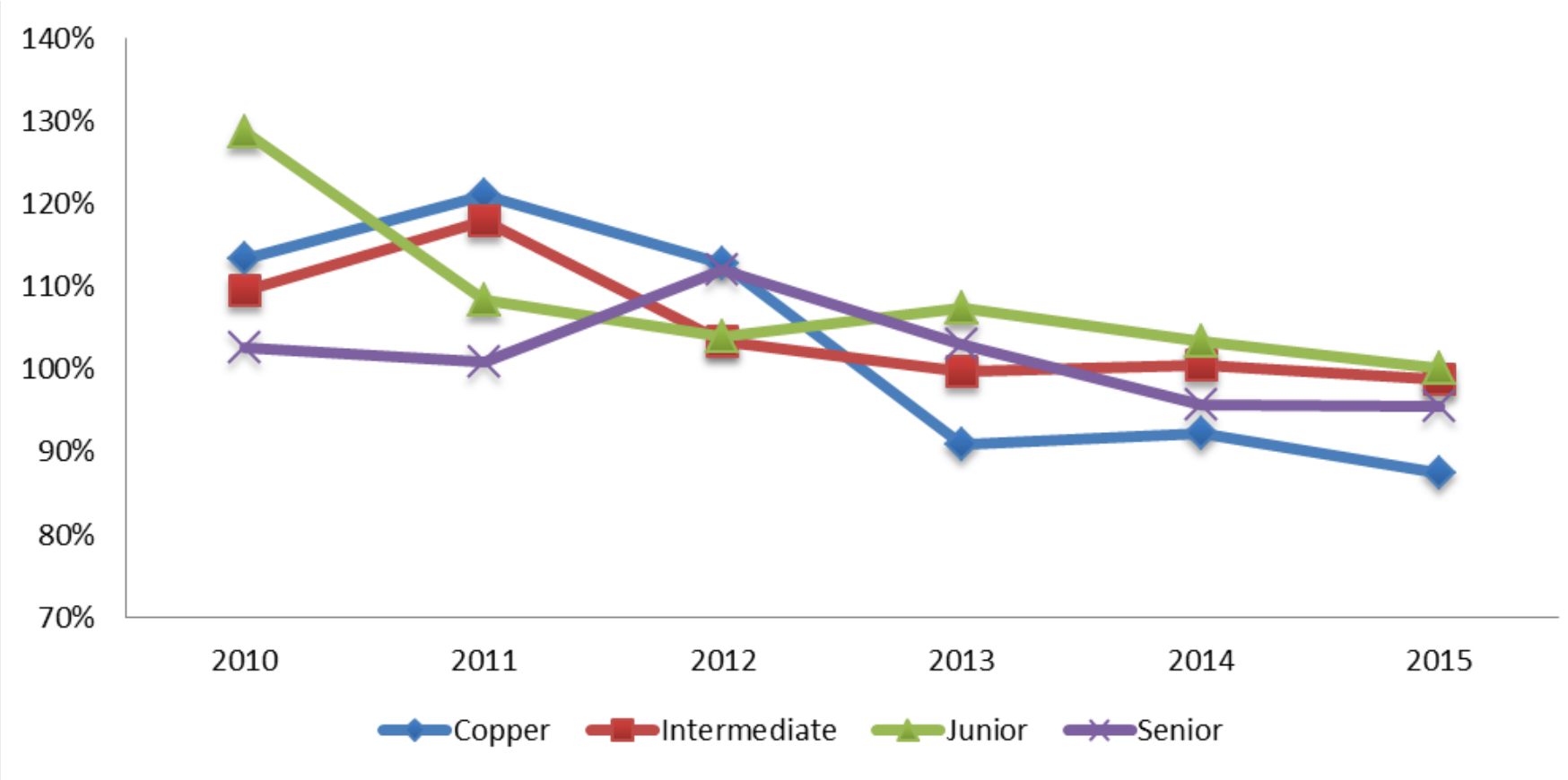


PRODUCTION PERFORMANCE BY PRODUCER TYPE

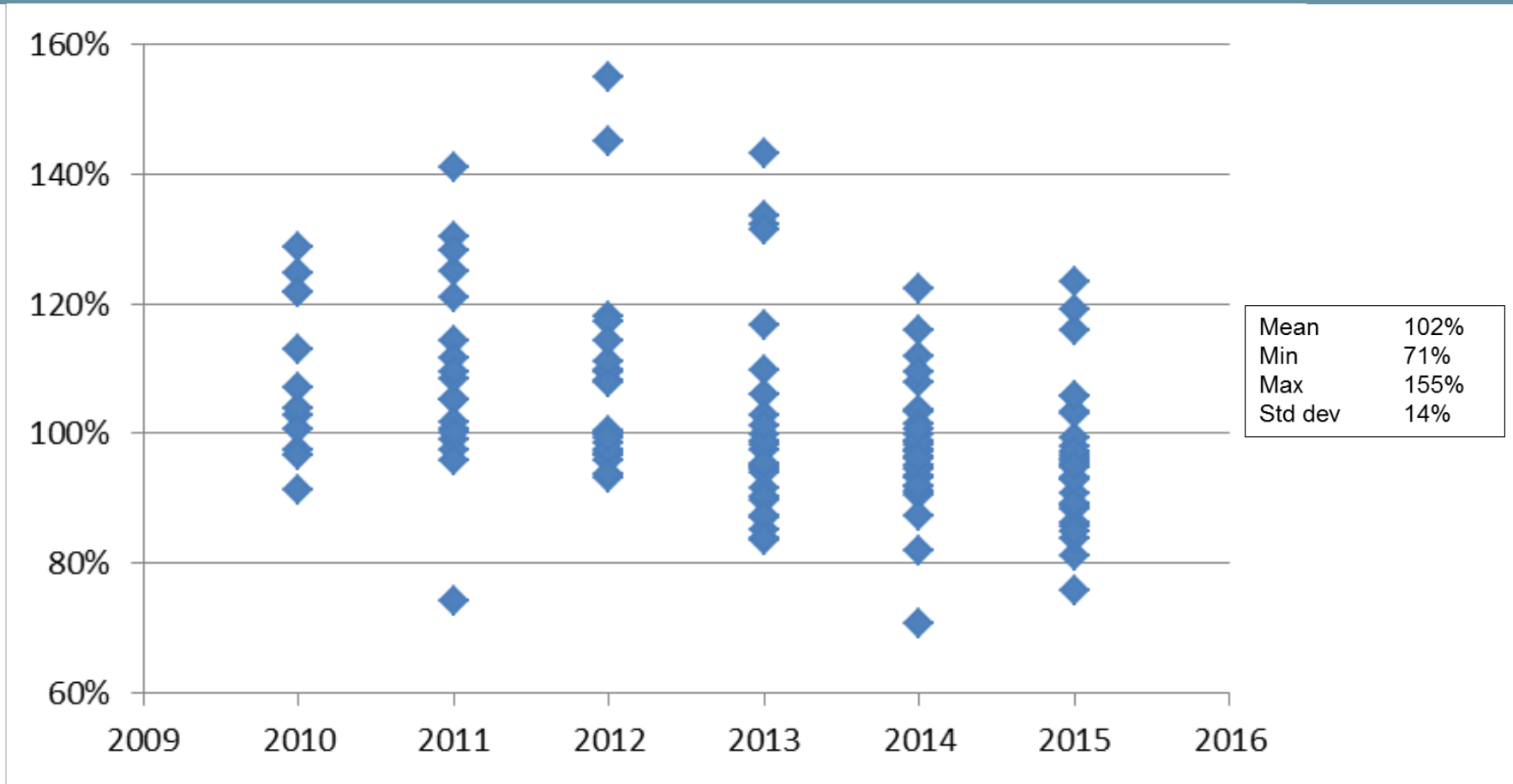


OPERATING COST PERFORMANCE

Opex Performance = Actual Opex / Company Opex Guidance



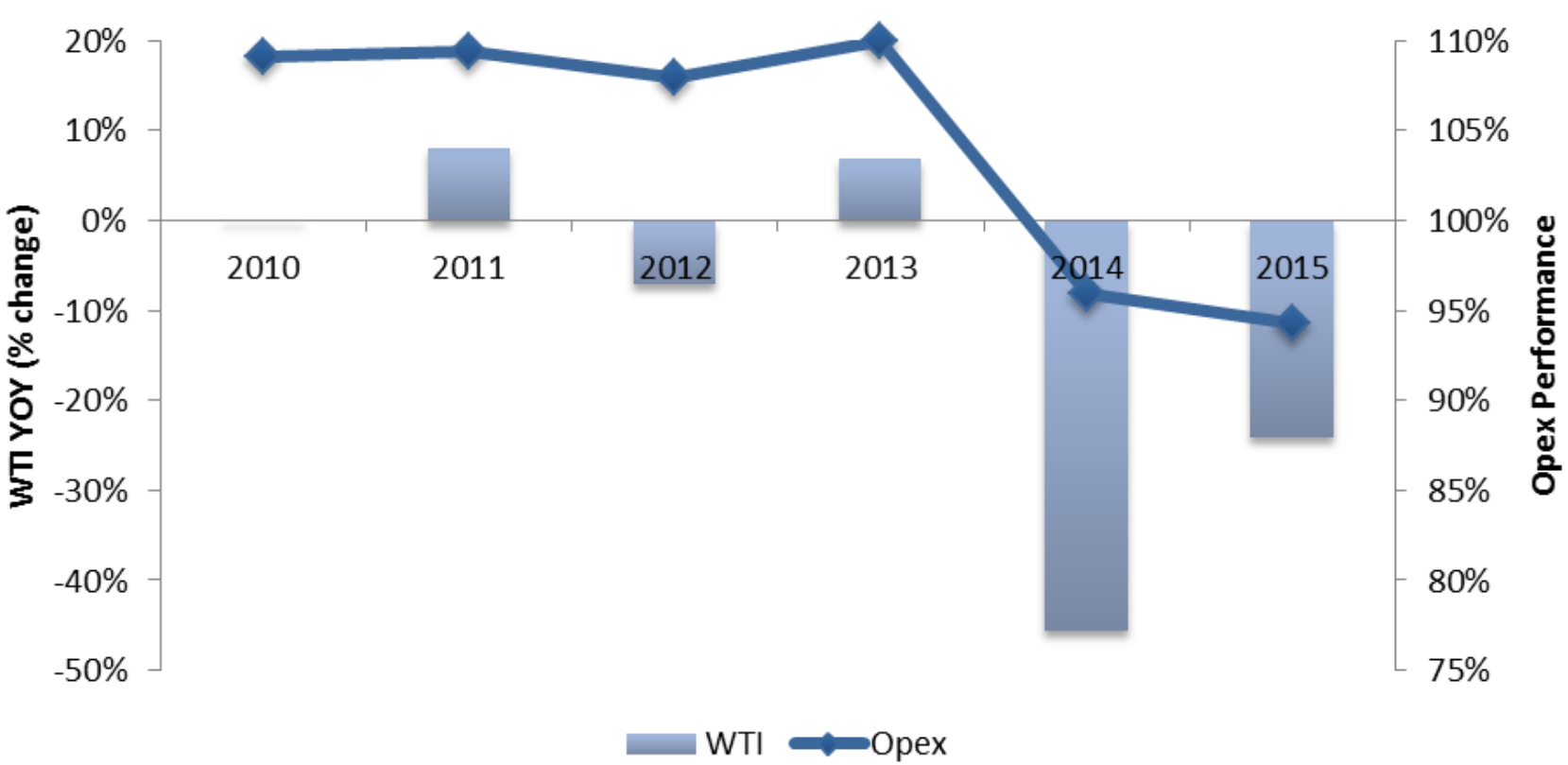
OPERATING COST SCATTER PLOT



KEY SITE OPEX DRIVERS

- **Labour**
  - Cost per employee - relatively stable
  - Workforce count – potential fluctuation
- **Power**
  - Onsite generation – potential fluctuation
  - Long term Power Purchase Agreements – relatively stable
- **Consumables**
  - Potential fluctuation

IS AVERAGE OPEX PERFORMANCE GETTING BETTER?



R^2 (coefficient of determination) between average Opex Performance and WTI: 0.99

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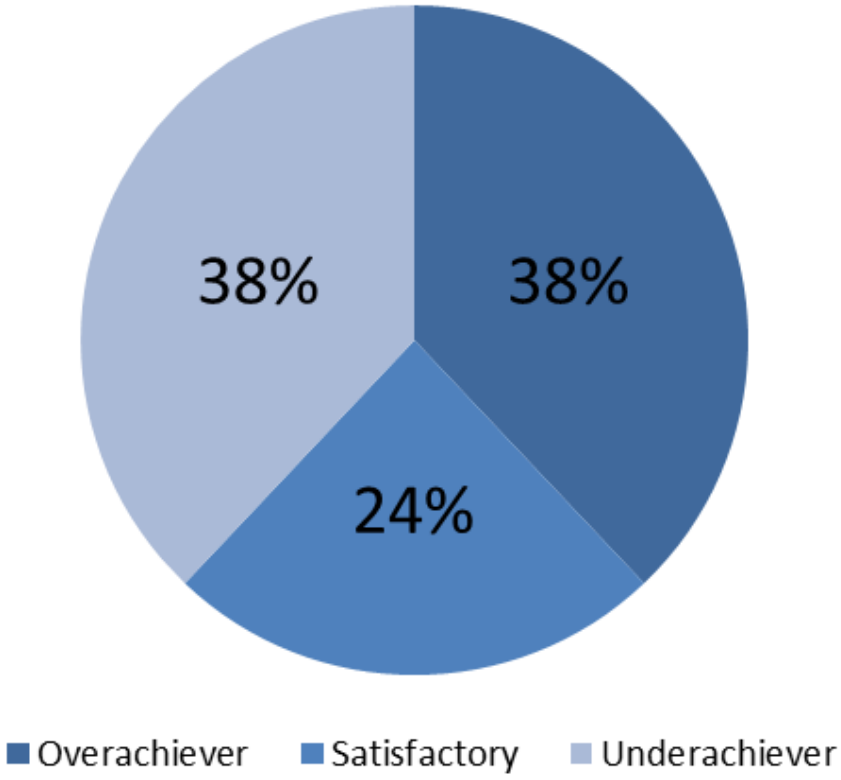
PERFORMANCE INDEX – COMBINING PRODUCTION & OPEX PERFORMANCE

Performance Index = Production Performance / Opex Performance



Criteria	
<= 0.95	Underachiever
0.96-1.0	Satisfactory
>1.0	Overachiever
Average	0.99
Min	0.69
Max	1.36
Std dev	0.15

Questions and Comments ?

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