

# On-site Measurement and Verification versus Project File Desk Review

IEPEC Rome 2012

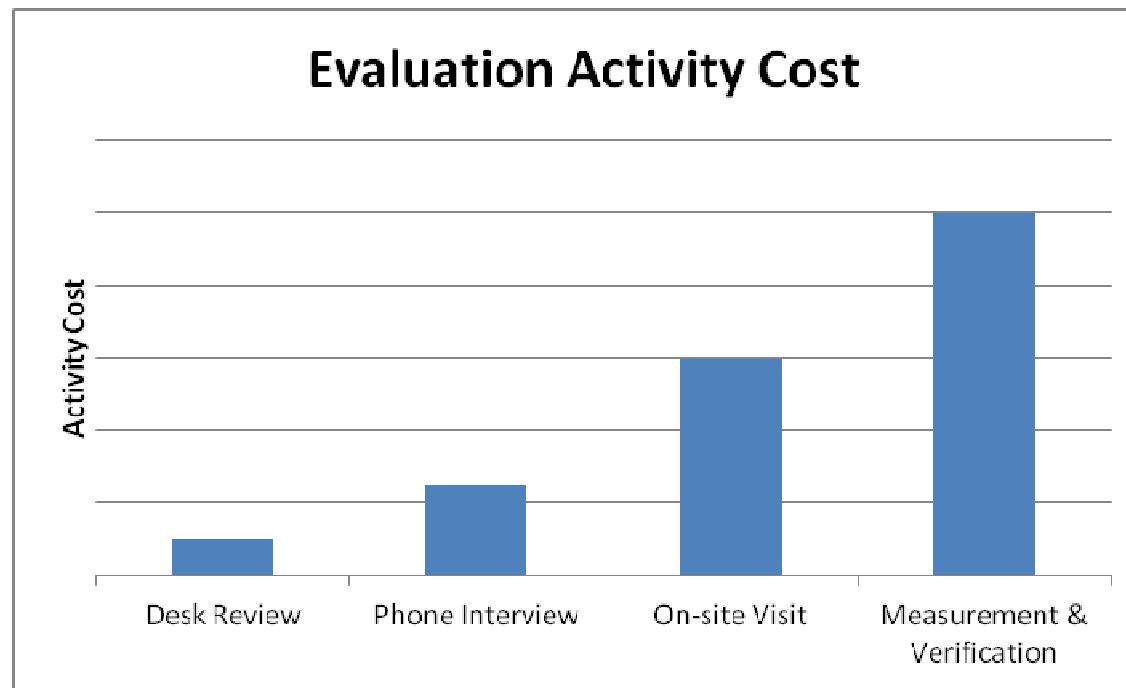
Mike Frischmann, Ryan Kroll  
Michaels Energy  
La Crosse, WI



*Program Management • Facility Studies • Engineering Support*

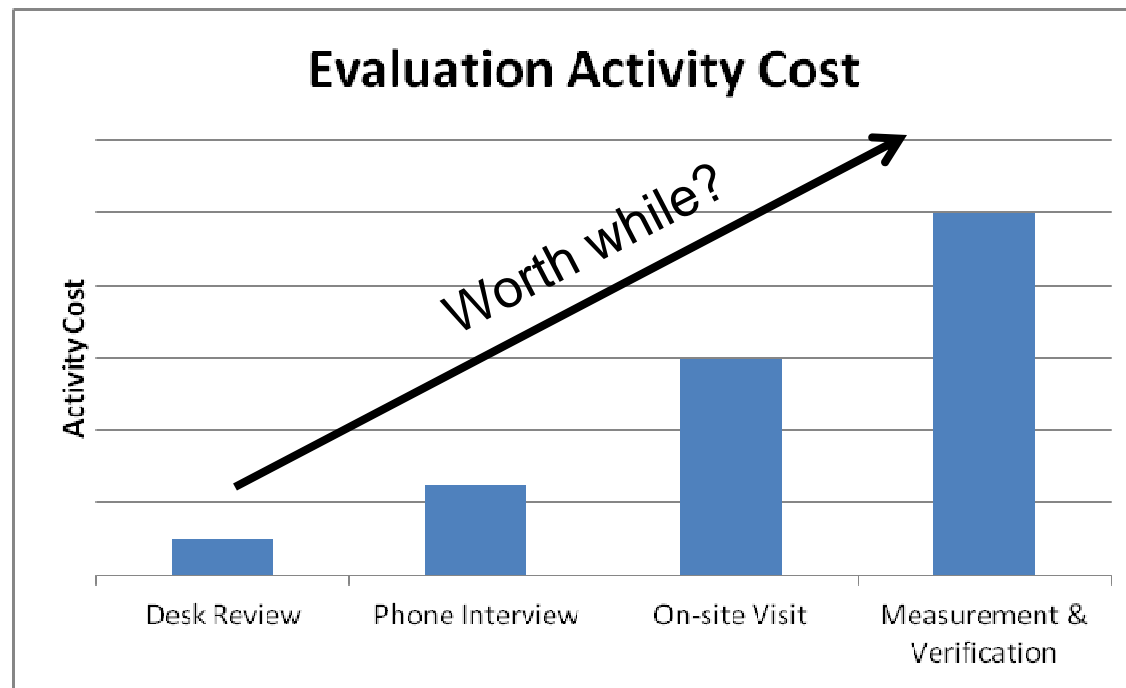
# Impact Evaluation

- Program evaluation involves several tasks
- One of those is impact evaluation
  - Determination of gross energy savings



# Impact Evaluation

- Is there a difference in the different evaluation methods?
- Is the difference large enough to justify spending the extra money?



# Evaluation Methodology

- Two evaluation approaches were used
- Desk Review
  - Ensure quantities, parameters are consistent with project documentation
  - Verify algorithms are accurate, consistent with engineering fundamentals
  - May include a brief customer interview
- On-Site Review -
  - Perform a site visit to verify quantities, equipment installation, efficiency, and size
  - Install data loggers and interview customer to determine operation

# Evaluation Methodology

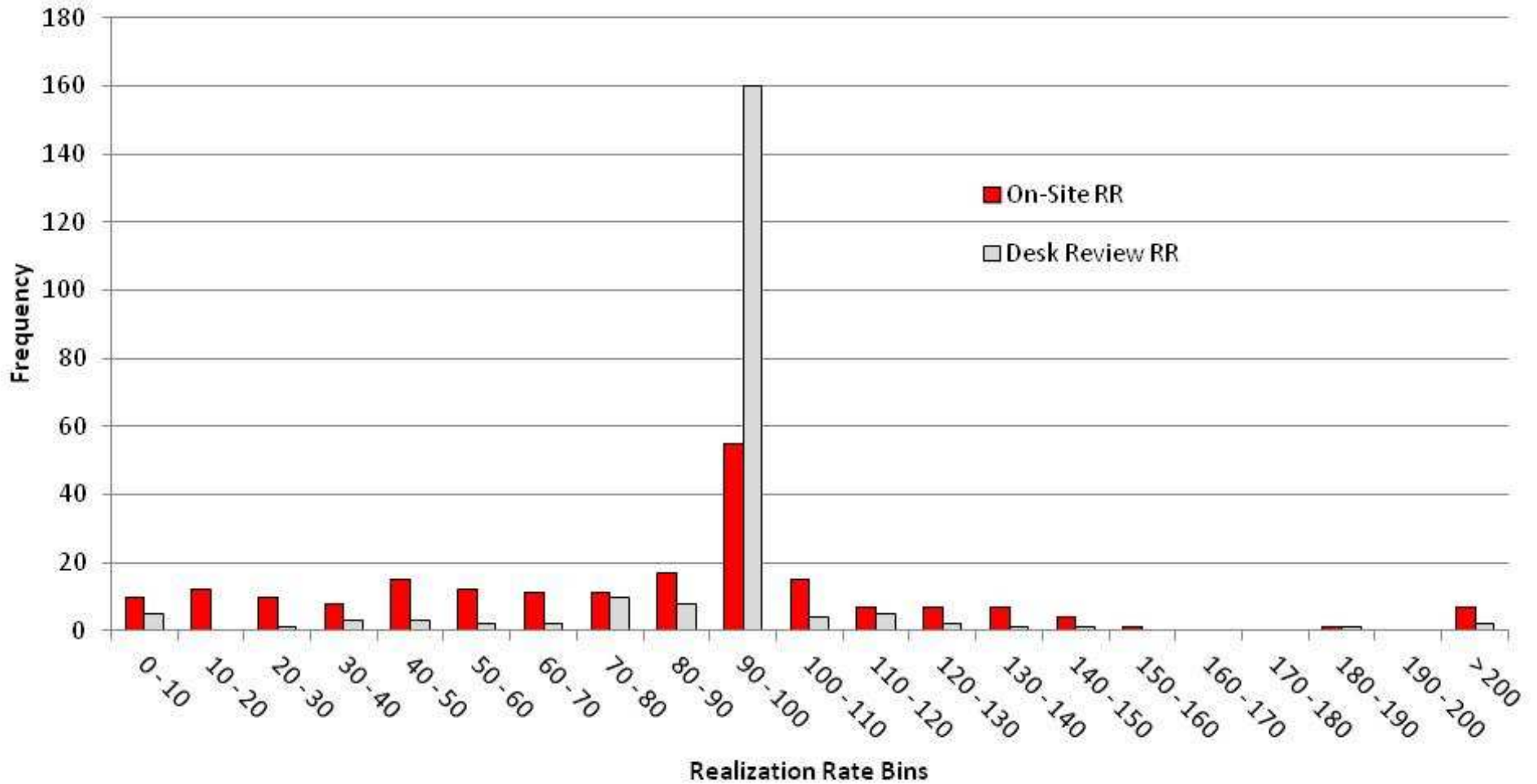
- Realization Rate
  - The ratio of ex-post savings to ex-ante savings

$$\text{Realization Rate} = \textit{Ex-Post} / \textit{Ex-Ante}$$

## Data Sets

	<b>Prescriptive</b>	<b>Custom</b>
Number of Programs	3	3
Different Program Years	5	8
Number of Measures	643	210
Electricity Savings	94.16 GWh	145.4 GWh
Measures	lighting replacements and occupancy sensors, variable frequency drives, high efficiency motors, HVAC equipment	lighting replacements, motors, variable frequency drives, cooling, agricultural, and process improvements

# Custom Results



## Custom Results

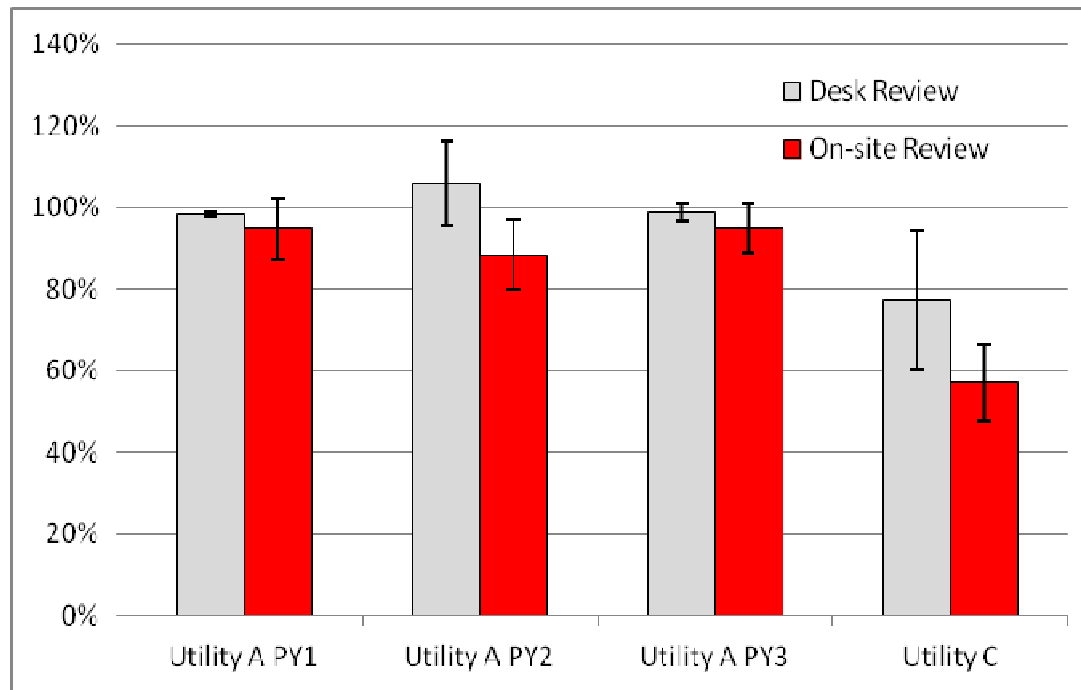
	Desk Review RR	On-site RR	Difference
Utility A PY1	98.9%	94.7%	-4.1%
Utility A PY2	88.4%	105.8%	17.3%
Utility A PY3	97.7%	85.7%	-12.0%
Utility B	99.9%	94.5%	-5.4%
Utility C	73.7%	58.2%	-15.5%
Utility D	99.1%	55.8%	-43.3%
Utility E	89.4%	74.1%	-15.3%
Utility F	99.4%	52.7%	-46.7%

- Average difference -15.6%
- Average of difference magnitude 20.0%
- Correlation coefficient of 0.5

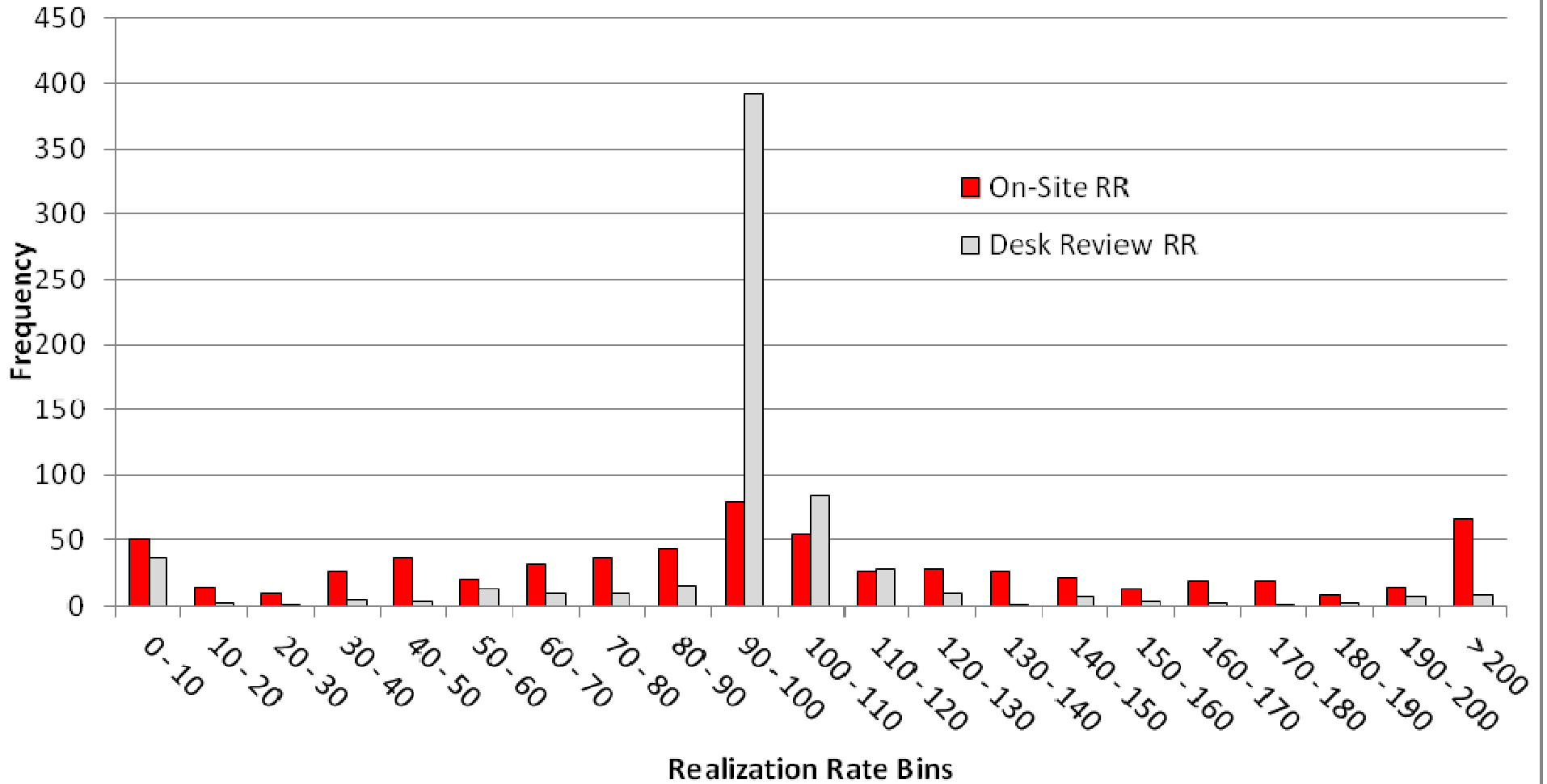


# Custom Results – Program Level

	Desk Review RR	On-site Review RR
Utility A PY1	98.4% ± 0.7%	94.9% ± 7.4%
Utility A PY2	105.8% ± 10.4%	88.4% ± 8.5%
Utility A PY3	98.9% ± 2.1%	94.9% ± 5.9%
Utility C	77.2% ± 17.2%	57.1% ± 9.5 %



# Prescriptive Results



# Prescriptive Results

	Desk Review RR	On-site RR	Difference
Utility A PY2	102.7%	134.2%	31.5%
Utility A PY3	91.0%	69.7%	-21.3%
Utility B PY2	110.3%	127.7%	17.3%
Utility B PY3	82.4%	106.5%	24.1%
Utility C PY2	100.3%	36.5%	-63.8%

- Average difference -2.4%
- Average of difference magnitude 31.6%
- Correlation coefficient of 0.27

# Prescriptive Results – Programs with TRMs

	<b>Installation Rate</b>	<b>Desk Review RR</b>	<b>On-Site Review RR</b>
Utility A PY3	101.0%	91.0%	69.7%
Utility B PY3	110.0%	82.4%	106.5%
Utility C PY3	101.2%	100.3%	36.5%

# Conclusions

- Custom Programs
  - Moderate correlation of 0.5
    - ◆ More information collected up front.
    - ◆ Calculation errors can be caught in desk review
  - Average magnitude of difference 20.0%
  - 6 of 8 program years researched had sample realization rates differ by greater than 10%
  - All extrapolated program realization rates using on-site results were outside the error bands from using desk review results

# Conclusions

- Prescriptive Programs
  - Weak correlation of 0.27
    - ◆ As expected
    - ◆ Information collected is minimal
  - Average magnitude of difference 31.6%
  - Even with an approved and reviewed TRM, on-site results can vary significantly depending on evaluation activity
  - Prescriptive M&V activities can be used for prospective planning, or suggested updates

**THANK YOU  
QUESTIONS/COMMENTS?**