Order-Independent Waterfall Graphics to Display Comprehensive Impact Evaluation Results

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Impact Evaluation Audiences

- Program Managers/Planners
- Regulators
- Ratepayers
- Policymakers
- Procurement Planners
- Public Stakeholders

Each group has unique evaluation goals and needs.

Typical Impact Evaluation Reporting:



First Limitation:

• Does not expose the *reasons* behind ex ante (reported) and ex post (evaluated) discrepancies

Impact Parameter Reporting for a More Complete Picture

| | Ex Ante | Ex Ante | Ex Post | | Ex Post | Ex Pos | st | |
|--------------------------|------------------------|-------------------------|-----------------------|--------|--------------------------|----------|----------------|------------------------|
| _ | Gross Savings | Net Savings | Gross Savings | GRR | NTG | Net Savi | ngs | |
| | 100 | 80 | 50 | 0.5 | 0.6 | 30 | | |
| | | | | | | | | |
| | | | Impact Parameters | | | | | |
| Ex Ante Gross Savings | Ex Ante Net Savings | Ex Post Gross Saving | Hours of Use (HOI) | AWatts | In Service Rate (ISR) | GRR | Ex Post NTG | Ex Post Net Savings |
| 100 | 80 | 50 | 0.70 x | 1.14 | x 0.63 | = 0.5 | 0.6 | 30 |

Benefits:

- Provides insight to drivers of evaluation findings
- Provides actionable information for program and policy decisions
- Impact parameters are not new. Some evaluations do this already.
- But... it Enables construction of a 'Waterfall' graphic

PG<mark>&</mark>E

The Gross Waterfall Graphic



Order-Independent Waterfall Graphics via Permutation

Second Limitation.

• What aboute statistic for the service of the service base decisions on met sapings results?





Funhouse Mirror effect Solution: Average all permutations of impact parameter adjustments.

This waterfall now shows order-independent gross impact parameter steps.

Conversion to a Net Savings Waterfall

Gross Waterfall





Gross waterfall lacks a net savings comparison

30 Savings and Adjustments Gross and Net waterfalls together provide comprehensive impact reporting

- Links differences between ex ante and ex post savings ۲
- Quantifies adjustments without distortion, including NTG
- **Provides insights to program improvements**
- Can be done at portfolio level: steps represent different programs ٠ 7



Net Waterfall

• New Example: Both Gross and Net Waterfalls are Essential for Comprehensive Impact Evaluation Results

| | Impact Parameters | | | | | | | |
|----------------------|-------------------|----------------------|-----------|---------------|------------|------|---------|-------------|
| Ex Ante | Ex Ante | Ex Post | Hours of | | In Service | | Ex Post | Ex Post |
| Gross Savings | Net Savings | Gross Savings | Use (HOU) | ΔWatts | Rate (ISR) | GRR | NTG | Net Savings |
| 100 | 05 | 24.2 | 0.70 | 0.70 | 0.70 | 0.34 | 0.5 | 17.2 |

Gross Waterfall

Net Waterfall



Appendix: The Pathways to Ex Post Net Saving

Traditional Evaluation:

 $Gross_{XA} \cdot GRR = Gross_{XP}$

 $Gross_{XP} \cdot NTG_{XP} = Net_{XP}$

Policy Framework:

 $Gross_{XA} \cdot NTG_{XA} = Net_{XA}$

 $Net_{XA} \cdot NRR = Net_{XP}$

$$Net_{XP} = Gras_{XA} \cdot GRR \cdot NTG_{XP} = Gras_{XA} \cdot NTG_{XA} \cdot NRR$$

 $NTG_{XP} \cdot GRR = NTG_{XA} \cdot NRR$ $NRR = GRR \cdot \frac{NTG_{XP}}{NTG_{XA}}$

• Example: Both Gross and Net Waterfalls are Essential for Comprehensive Impact Evaluation Results

| | Impact Parameters | | | | | | | |
|----------------------|-------------------|----------------------|-----------|--------|------------|-------|---------|-------------|
| Ex Ante | Ex Ante | Ex Post | Hours of | | In Service | | Ex Post | Ex Post |
| Gross Savings | Net Savings | Gross Savings | Use (HOU) | ΔWatts | Rate (ISR) | GRR | NTG | Net Savings |
| 100 | 60.0 | 75.6 | 0.90 | 0.70 | 1.2 | 0.756 | 0.8 | 60.5 |

Gross Waterfall

Net Waterfall

