Ew, Gross! Cleaning Up Gross Baselines

Michael W. Rufo

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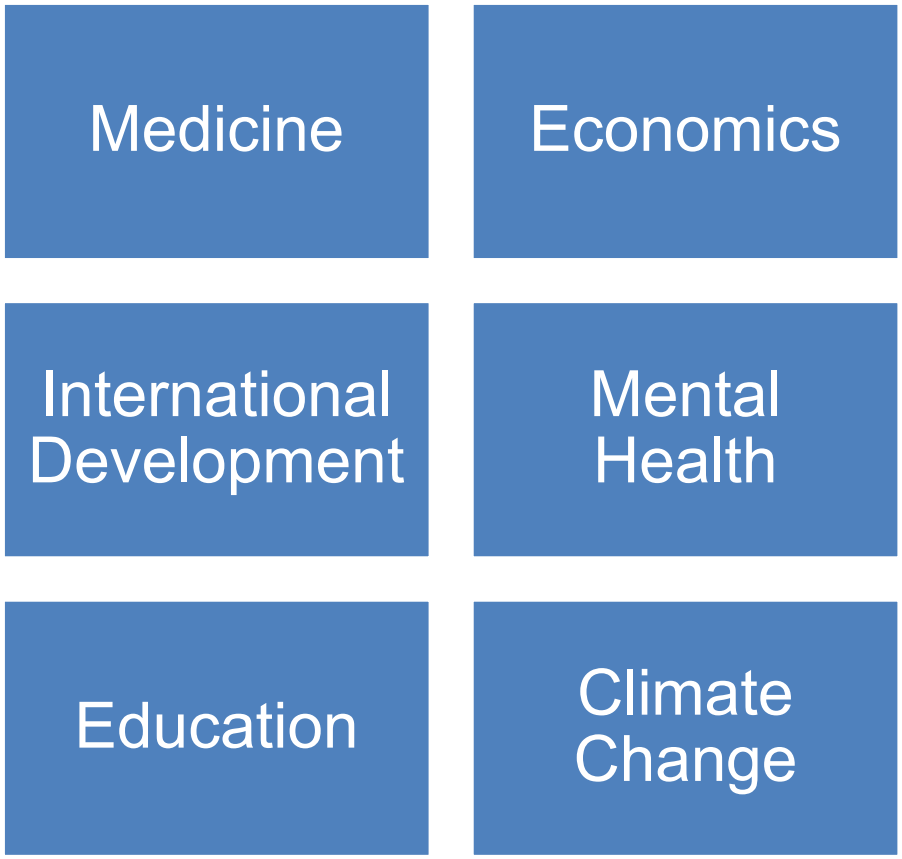
The Paper & The Prez

- Simple gross baseline approaches
- “Common Practice” gross baselines
- Gross baselines in combination w. NTGR
- Conclusions and recommendations

Baselines: Here, There, Everywhere…



Baseline Framework

Natural Turnover	• *Common or Standard* practice baseline
Early Replacement:	• Best addressed via "Dual Baseline" • Must be "*Program-induced*" • Remaining Useful Life (RUL)
Add-on - *new equipment added to existing*	• Dual baseline or *in situ* baseline, depending
New Construction/Major Renovation	• *Code or standard practice*

Common Practice Baseline (CPB)

Many names (e.g., ISP)

- Address baseline in absence of program
- Address overuse of in-situ & minimums
- Replace/obviate net

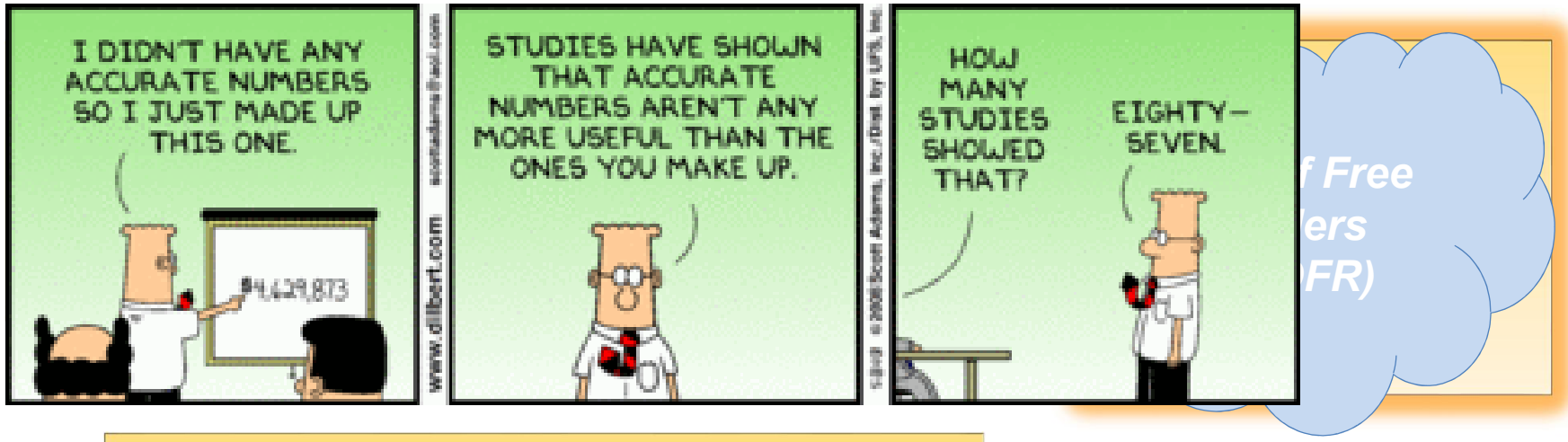
Useful path, but some challenges

- Overlap/underlap when combined with net
- No mathematical frame or benchmarks
- Close, but not identical, to program net
- Does not account for self selection

CP Baseline Concerns

Lower savings	• Depends on claim
Too hypothetical	• All baselines
Too difficult	• Requires market data/studies • Define/place stake on period
Overlap w. NTGR	• Uh, oh, that's a tough one!

Doin' The Net Two-Step*

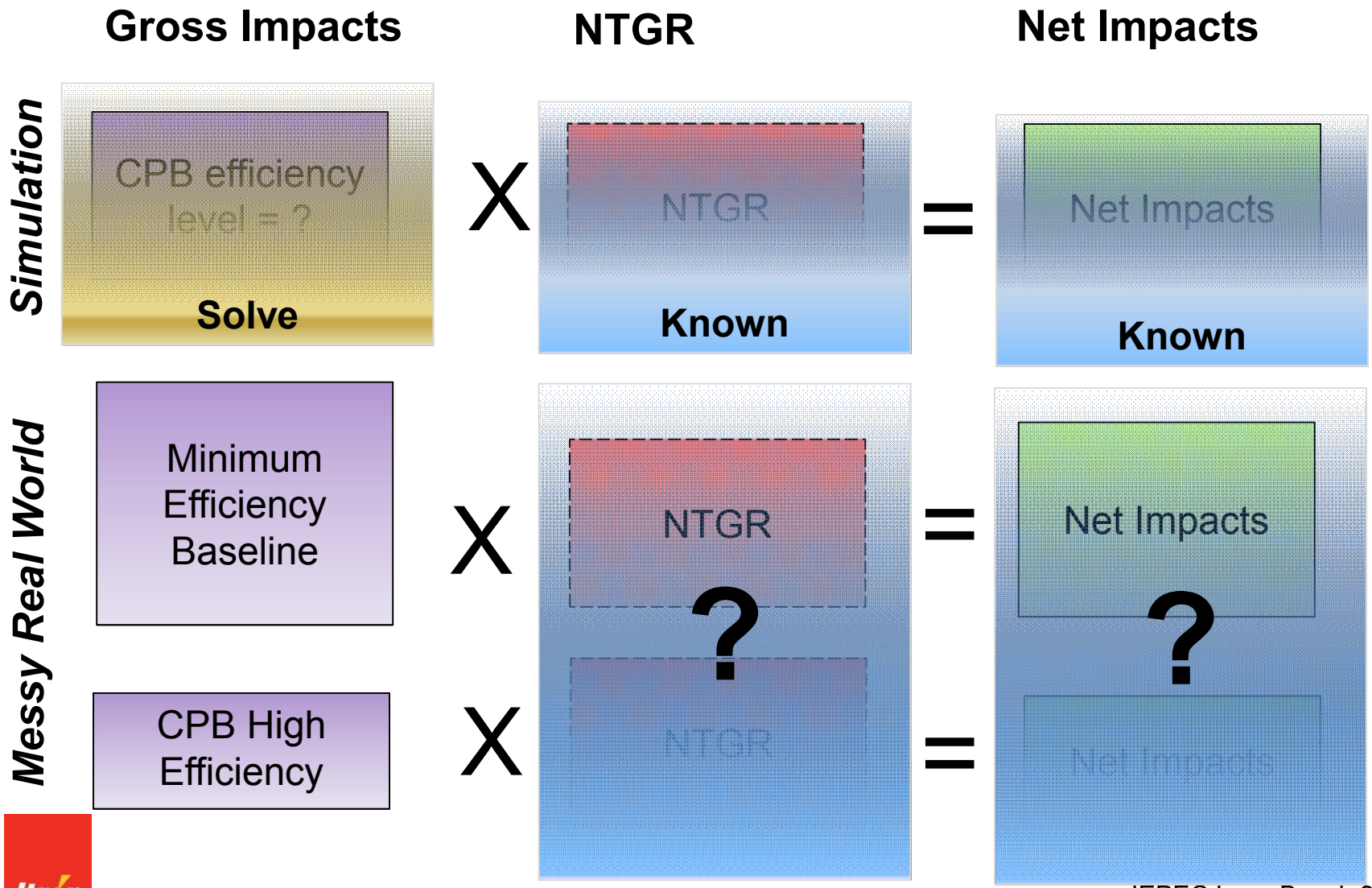


Net-to-gross Ratio (NTGR)

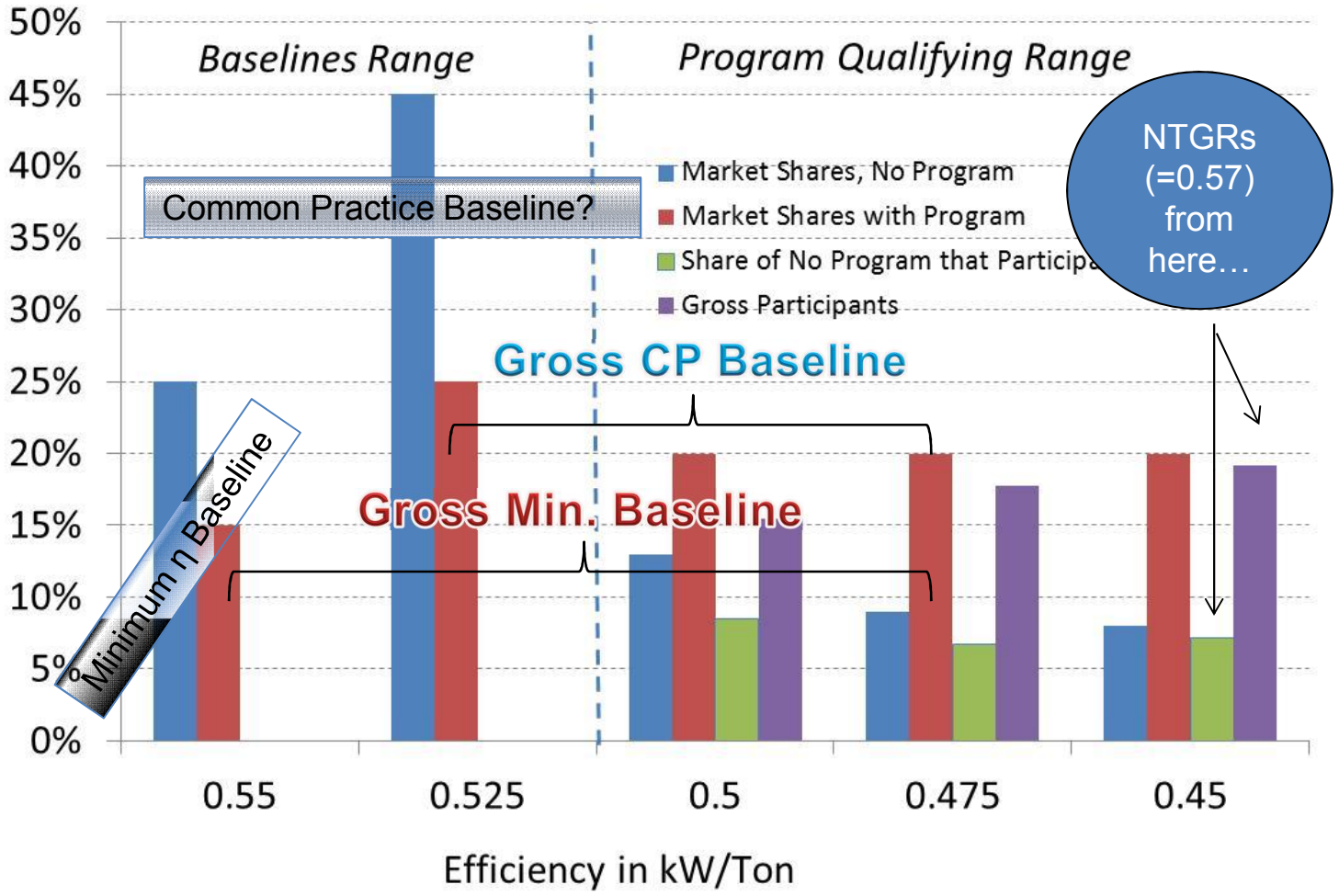
- Fraction of estimated net to gross impacts
- Applied to gross program savings claims
- ***NTGR X Gross = Net impacts***
- Sometimes include partial adjustment for intermediate efficiency baseline

**When RCT and other direct net methods are not feasible*

CPB NTGR Overlap



Net Impact = $\sum MS_{NP}$ X Pop X kW/ton X Hrs/YR - $\sum MS_{WP}$ X Pop X kW/ton X Hrs/YR



Example Pop Calcs

(a) Market Share Bins	(h) Gross MWh w. **Min.** Eff. Baseline	(i) Net MWh w. **Min.** Eff Baseline	(j) Gross MWh w. **CPB** Baseline	(k) Net MWh w. **CPB** Baseline	(n [illegible] Net Impacts from Program
1	-	-	-	-	(19,800)
2	-	-	-	-	(9,450)
3	(1,391)	(630)	(1,168)	(529)	6,300
4	(2,396)	(1,485)	(2,141)	(1,327)	9,405
5	(3,456)	(2,160)	(3,180)	(1,987)	9,720
Total	(7,243)	(4,275)	(6,488)		

Example Results

Case 1

(b') CPB Baseline =			
		No Program	With Program
		(c) % of	(d) % of
(t)	Min Eff. Gross/"True" Net		215%
(u)	CPB Gross/"True" Net		168%

Across 12 Scenarios

- Market share for CPB ranged from 25% to 85%
- On average, around 50%

Recommendations

Expand use of dual baseline approach	• Evidence of program effect for early replacement, estimation of RUL
Expand use of CP baseline	• Less use of code and market minimums • …Where compliance is high
Clearer baseline guidance	• Criteria for baseline choices and market share thresholds (e.g., CPUC Policy)
Align NTGR batteries	• To specific baseline η levels • Two-piece NTGR for dual baselines

Considerations

If combined with NTGR

- Set CPBs at ~median *no program* market share

If CPB is used *in lieu of net*

- *No program* market share > median, ~75 percentile

Preliminary results, more research/scenarios needed

Align potential studies & goals with DB & CPB

More market share data and CPB studies

Mike Rufo
Mike.rufo@itron.com

Backup Slides Not Used…

In the Beginning…Simple, Event-Related

Replace-on-Burnout (ROB)	• Standards or market minimum
Retrofit	• In situ (pre-existing)
New Construction	• Code or market minimum

Dual Baseline

Some programs/projects assume:

- In-situ, existing equipment baseline over EUL

Implicit hypothesis difficult to substantiate

- No change expected in equipment over EUL

Evidence is usually stronger that:

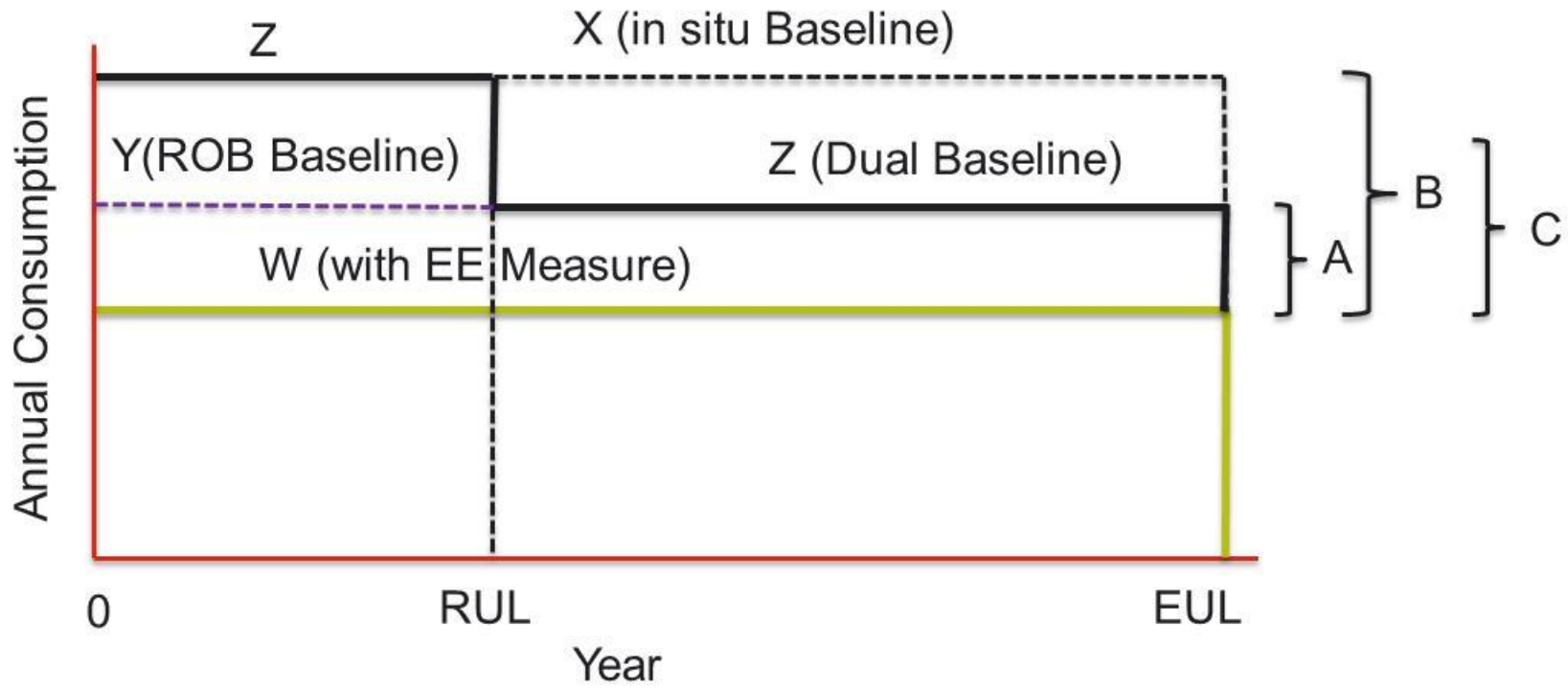
- No program-induced early replacement, or
- Program-induced replacement over RUL

Dual Baseline…Concerns?

Lower savings	• Depends on claim • Lower costs
Too hypothetical	• All baselines • More grounded in market
Too difficult	• Adds context/learning benefits • Training
Incompatible w. systems	• Uh, oh, it's 2015, time to upgrade!

Event	Baseline Approach	Advantages	Disadvantages
Natural Turnover	Code, Market Minimum	Simple to define and apply	Tends to overestimate gross savings, except in cases where the market average η is below code due to significant non-compliance
	Common Practice	More accurate	Challenging to consistently define and estimate market shares
Early Replacement	In situ, pre-existing conditions	Simple to define and apply	Definitively and likely significantly overestimates gross savings on average across a population
	Dual Baseline	More accurate energy impacts, properly aligned cost analysis	Requires estimation of RUL and evidence that early replacement is program-induced. Impacts and costs calculated over two periods.

Dual Baseline



More Scenarios

Case 2

(b') CPB Baseline =	0.525		
		No Program	With Program
(a) Market Share Bins	Efficiency Level (kW/ton)	% of Market at Efficiency Level	% of Market at Efficiency Level
1	0.550	0.16	0.15
2	0.525	0.56	0.25
3	0.500	0.13	0.20
4	0.475	0.09	0.20
5	0.450	0.06	0.20
	Total	1.00	1.00
		0.72	0.40
	0.61		

(Min Eff. Gross X NTGR)/"True" Net	143%
(CPB Gross X NTGR)/"True" Net	100%
Min Eff. Gross/"True" Net	225%
CPB Gross/"True" Net	152%

Case 3

	0.542		
		No Program	With Program
	Efficiency Level (kW/ton)	% of Market at Efficiency Level	% of Market at Efficiency Level
	0.550	0.35	0.15
	0.525	0.35	0.25
	0.500	0.13	0.20
	0.475	0.09	0.20
	0.450	0.08	0.20
	Total	1.00	1.00
		0.49	0.25
	0.57		

	112%
	100%
	189%
	170%

Case 4

	0.526		
		No Program	With Program
	Efficiency Level (kW/ton)	% of Market at Efficiency Level	% of Market at Efficiency Level
	0.550	0.05	0.02
	0.525	0.70	0.05
	0.500	0.05	0.05
	0.475	0.05	0.05
	0.450	0.15	0.83
	Total	1.00	1.00
		0.72	0.10
	0.80		

	131%
	100%
	166%
	125%