

**Effective Savings & Cost Quantification:
From Front-End Measure Analysis
To Back-End Program Tracking**

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Why Quantify?

1. Front-End Measure Analysis

- What's the savings potential in my service area for Measure X?
- What would the associated cost be?
- How much will I save if I do Measure X for 500 customers?
- How much of Measure X can I do for \$1,000?
- Which measures are most cost-effective?

2. Back-End Program Tracking

- Is my program performing as planned?
- Should I make any modifications?





Part 1

Front-End Measures Analysis



Conservation Categories



Measure		Incentive		
Saves water		<i>Motivation to save water</i>		
Hardware	Behavior	Educational	Financial	Regulatory
More efficient equipment.	More efficient behaviors.	Explain why and how to save water.	Make saving water financially attractive.	Require actions.
<i>Example:</i> Install low flow toilets.	<i>Example:</i> Take shorter showers.	<i>Example:</i> Conservation tips brochure.	<i>Example:</i> Inverted block rate structure.	<i>Example:</i> Retrofit buildings to code upon resale.

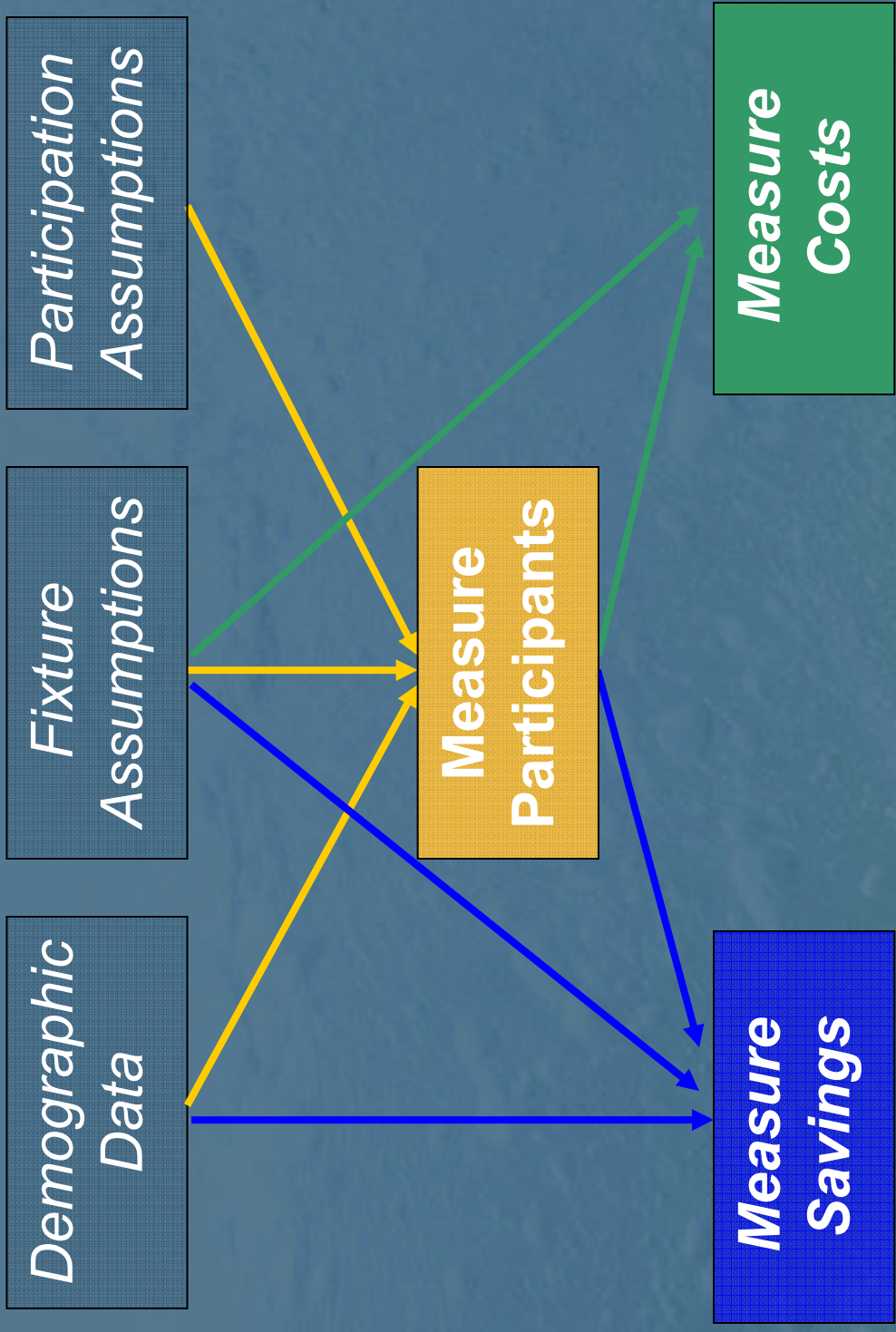
Common Conservation Measures

1. Low flow toilets
2. Shorter showers
3. ET irrigation controllers
4. Toilet leak detection
5. Front loading clotheswashers
6. Waterless urinals
7. Washing full loads of laundry
8. Irrigation system tune-ups
9. And more.....





Measure Analysis Process



Measure Analysis is Flexible

1. Single measure vs multiple measures
 - Only interested in showerheads
 - Want to analyze 20 measures
2. Full savings potential vs savings based on qty/cost
 - Savings & costs if replaced “all” showerheads?
 - Savings if distribute 1,000 showerheads?
 - Savings if have budget of \$5,000 for showerheads?



Planning Process Context



Demographic Data

Example:

- Single family households (SF HH) in service area: 1,000
- People per SF HH: 3

Data Sources:

- Utility billing department (e.g., # of connections)
- City or County planning department
- U.S. Census



Fixture Assumptions

Part 1

Example:

- % of SF HH with showers: 100%
- Avg # of showers per SF HH: 2.5
- Pre-code “rated” flow rate: 3.5 gpm
- Code “rated” flow rate: 2.5 gpm
- “Actual” flow rate as % of “rated” flow rate: 66%
- % Already at code: 90%
- Avg flow rate for all HHs: 2.6 gpm
- Avg shower length: 10 minutes
- Lifespan of showerhead: 10 years
- Cost per showerhead: \$3



Fixture Assumptions

Part 2

Data Sources:

- *Water Use and Conservation* by Amy Vickers
- Alliance for Water Efficiency (Mary Ann Dickinson)
- American Water Works Association (AWWA)
- *Water Conservation Programs – A Planning Manual* by AWWA
- City or County planning department
- U.S. Census



Participation Assumptions

Example:

- % of HH that accept the showerheads: 25%
- % of “acceptees” that install the showerheads: 90%

Data Sources:

- Past experience
- Professional judgment (e.g., relative attractiveness)





Measure Participants



Basic Calculation:

1,000 SF HH

x 100% have showers

x 25% participation rate

= 250 “participating” SF HH (used for calculating costs)

x 90% installation rate

= 225 “savings generating” SF HH (used for calculating savings)



Additional Considerations:

➤ Free riders

Measure Savings

Part 1

Basic Calculation:

2.6 gallons per minute (gpm) avg flow rate for all SF HH
- 2.0 gpm for program showerhead
x 66% actual flow rate as % of rated flow rate
x 10 minute shower time
x 3 people per SF HH
= 12 gallons per day per “savings generating” SF HH
x 225 “savings generating” SF HHs
= 2,700 gpd savings for all “savings generating” SF HHs (at full implementation)



Measure Savings

Part 2

Additional Considerations:

- Calc: Total gallons saved over measure life
 - Need for cost effectiveness evaluation
- Calc: Savings stream over planning period
 - Need to adjust demand forecast
- Both additional calcs depend on:
 - Initial implementation schedule
 - If will “renew” measures to maintain savings (if measure life < planning period).



Measure Costs

Part 1

Calculation:

\$3 per showerhead

x 2.5 avg # showers per SF HH

= \$7.50 cost per “participating” SF HH

x 250 “participating” SF HH

= \$ 1,875 for all “participating” SF HHs (for initial implementation)



Measure Costs

Part 2

Additional Considerations:

- Will you replace all showerheads in SF HH?
- If avg # of showers is not a whole #, will you round up?
- Sample calc does not reflect any “renewals”
 - # of renewals depends on initial implementation schedule, planning period, and measure lifespan.
- May want to show cost stream over planning period.



Part 2

Back-End Savings Tracking



What Should You Track?

1. Quantity of “units” (hardware, rebates, audits)
2. Assumptions regarding savings
 - Installation rates
 - Flow rates from previous equipment
 - Fixtures per household / business
 - People per household / business
3. Savings - per unit and total
4. Costs - per unit and total
5. Cost-effectiveness



Approaches to Tracking Savings

1. Link to production or demand (& demographics)
2. Link to measure analysis



Tracking Approach #1

Track:

Total production / population

Ex:

Per capita demand of 100 gpd

Pro:

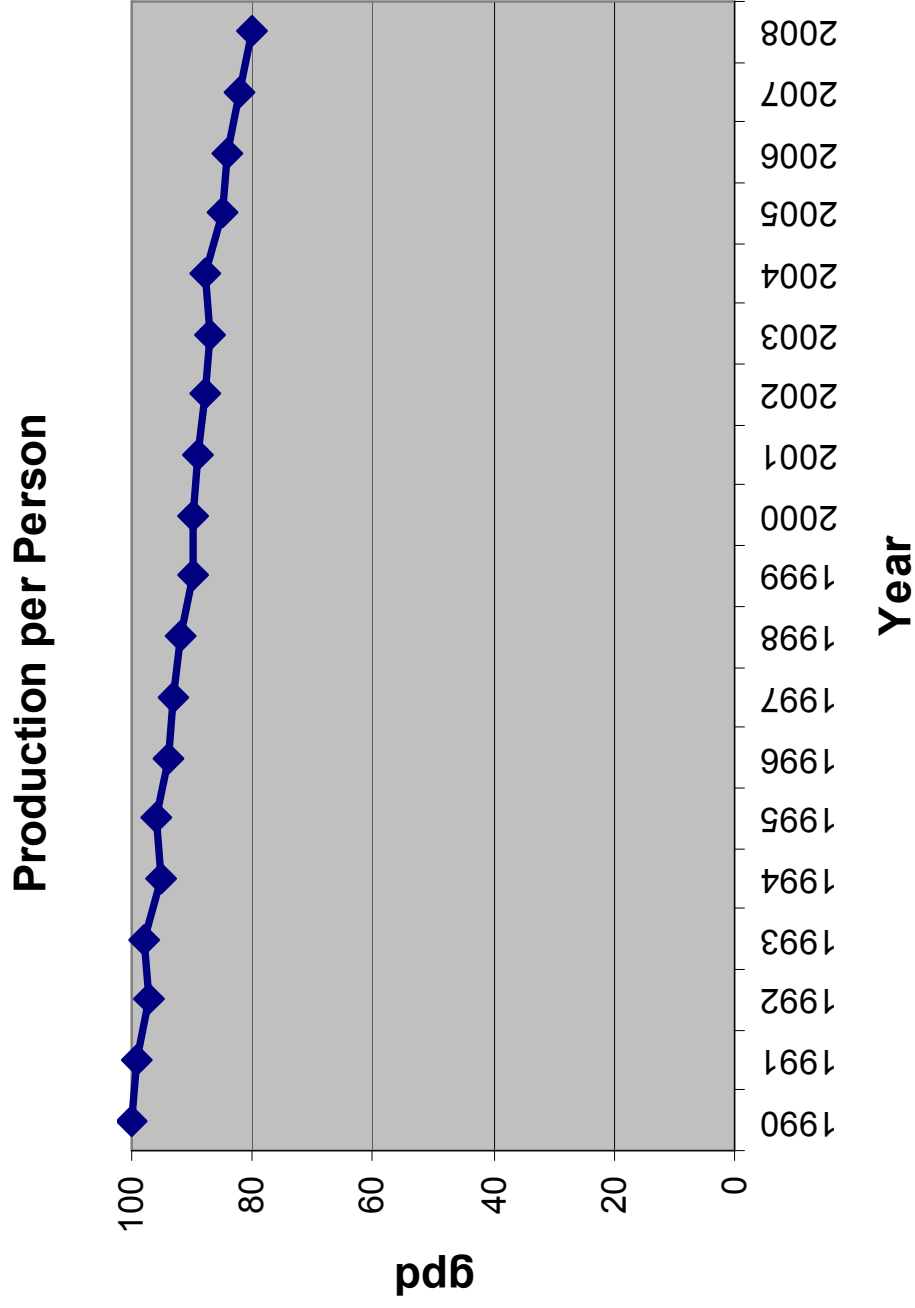
- * Relatively easy.
- * Initially feels robust since tied to actual production (or sales).

Con:

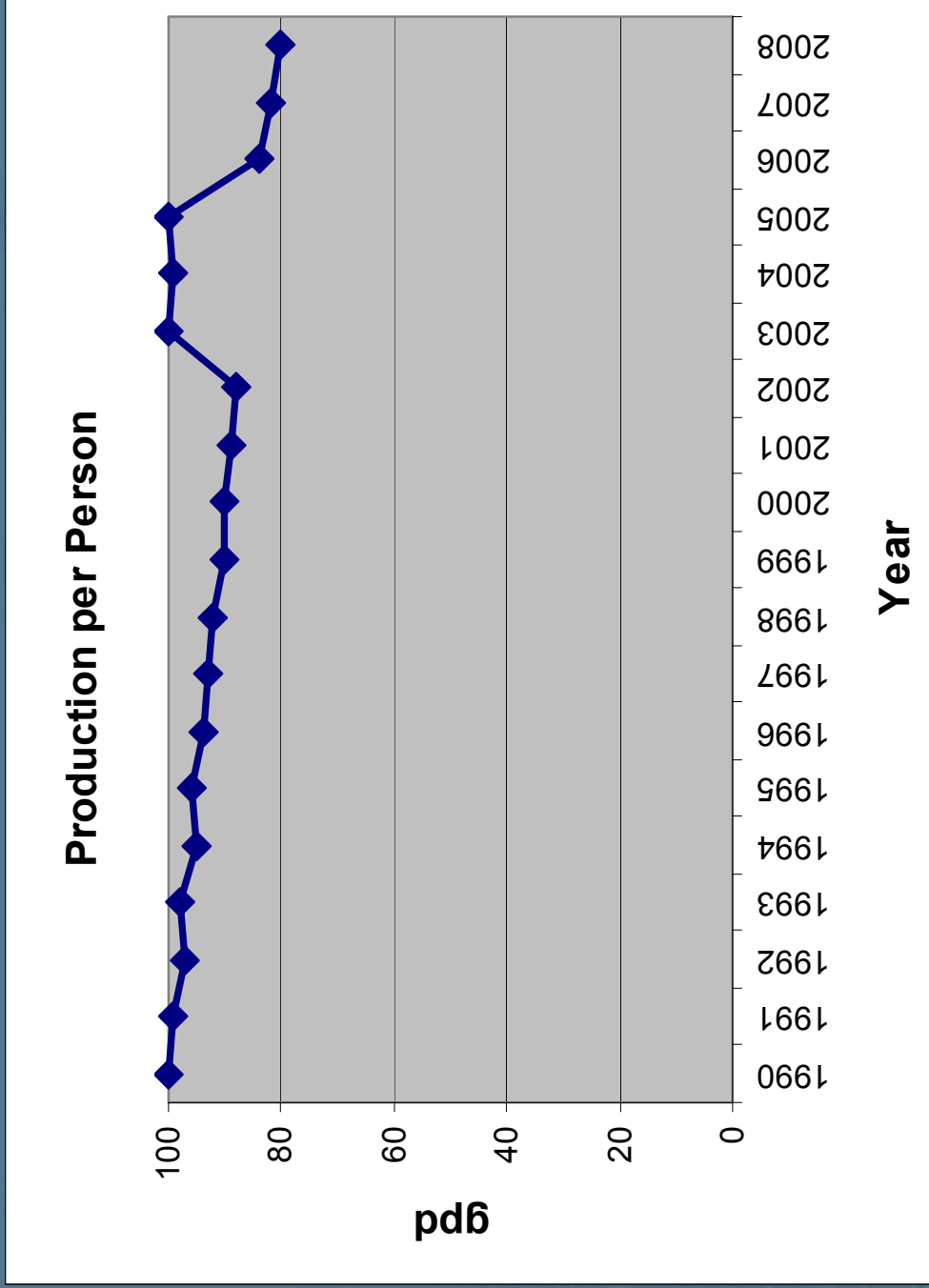
- * Does not correlate 100% to conservation program.
- * Accurately describes production / person trend.
- * However, non-conservation elements can impact that trend (code, weather, lot sizes, large industrial customer shift, rates).



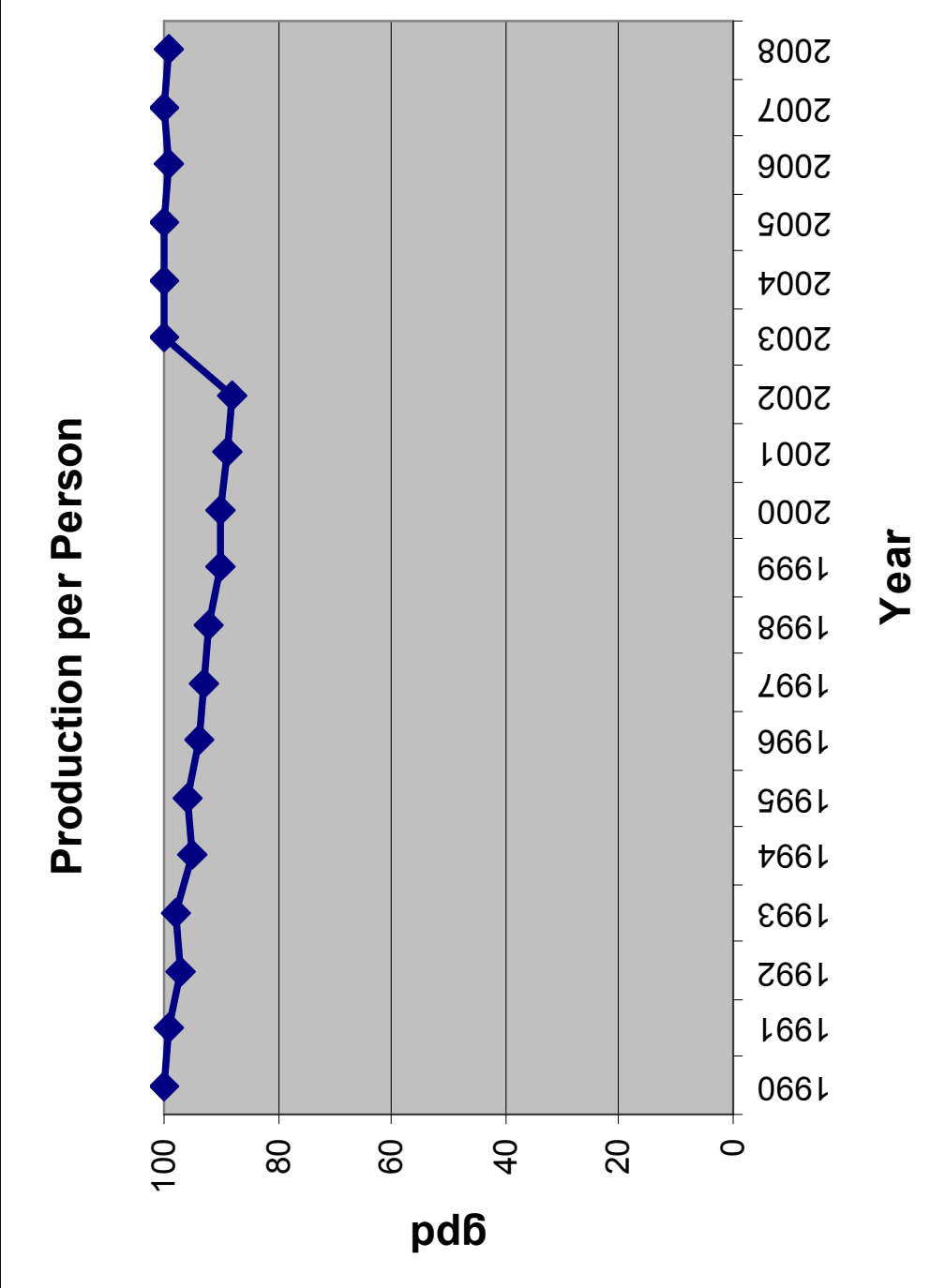
The Supposed "Proof"



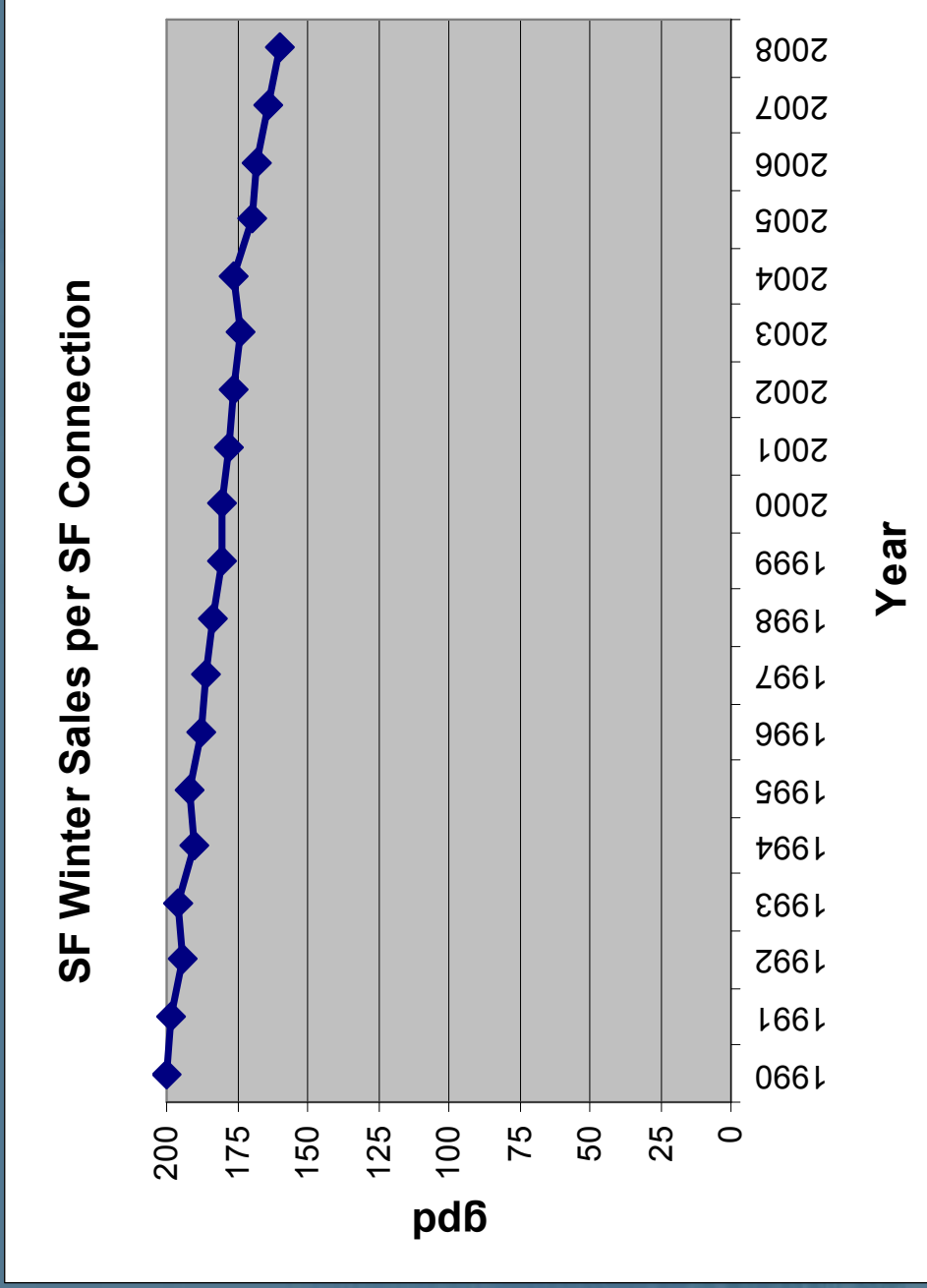
What if Warmer Summers?



What if New Large Industry?



At Least Do This.....



Tracking Approach #2

Track:

Link to measure analysis (& refine assumptions)

Ex:

100 rebates
x 10 gpd per unit savings (*refined down from 12 gpd*)
= 1,000 gpd total savings

Pro:

Better connected to conservation program.

Con:

- * Requires more effort. (Especially if did not do measure analysis)
- * Initially feels less robust since not tied to actual production (or sales).



Questions?

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