

Performance and Cost Measurement Program



Global Chloralkali Technical Conference Benchmarking



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Performance and Cost Measurement Program




Global Benchmarking Company to the Petrochemicals Industry

Worldwide reputation for detailed analysis of
plastics, chemicals, and related industries

Offices

Corporate Headquarters	Houston, TX
Europe	Brussels, Belgium
Asia/Pacific	China; Japan; Korea; Malaysia
Middle East	Saudi Arabia



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Background Information on PTAI

A History of Benchmarking Excellence

SPI (Manpower Efficiency) and LNG Value Chain programs licensed from Shell Global

35
Products


55
Programs

44
Countries

Founded In
1972

Partnered with CCPS (technology alliance AIChE) to develop a Process Safety Benchmarking program for the chemical, petrochemical, and refinery industries

Acquired PSI in 2013. Ammonia, Urea and Methanol studies carried out by Plant Surveys Int'l



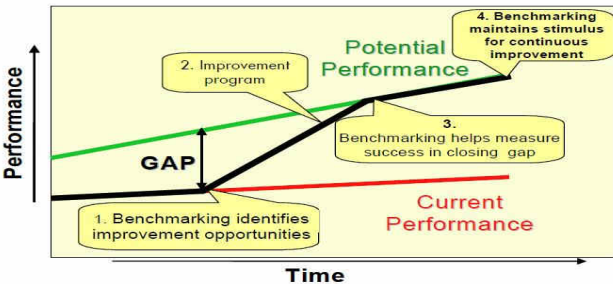
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What Is Benchmarking?

Benchmarking process

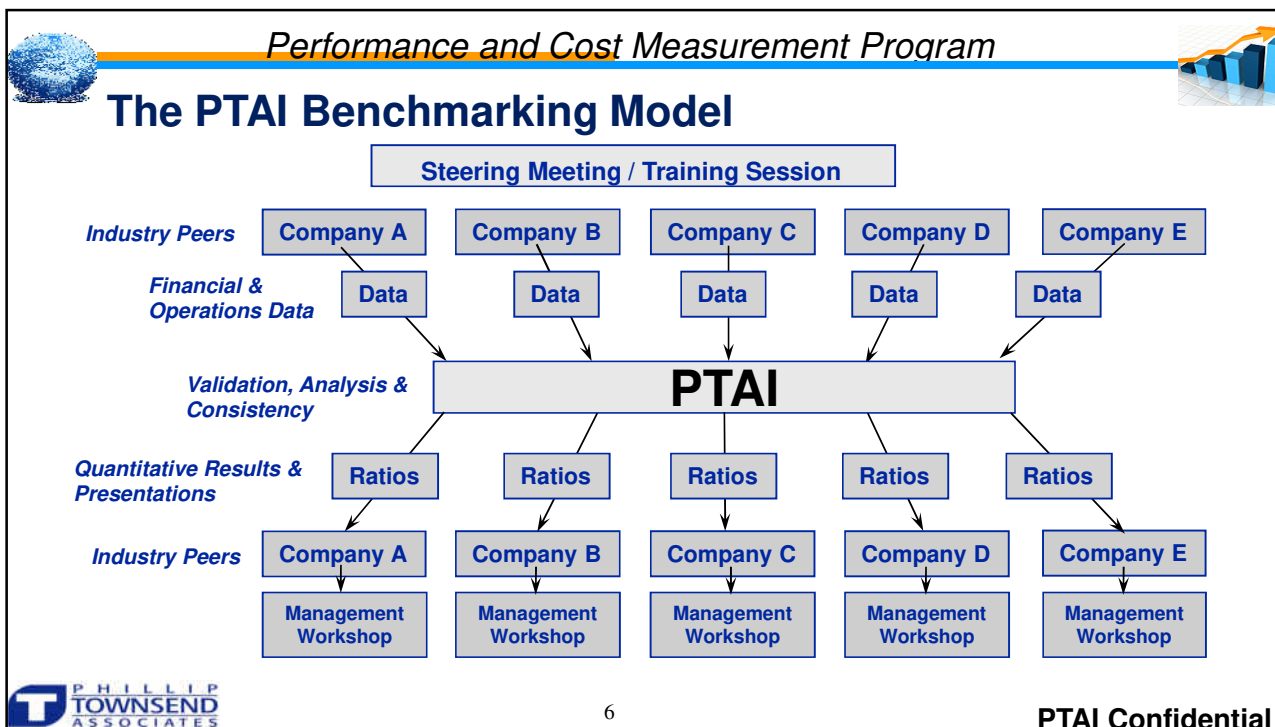
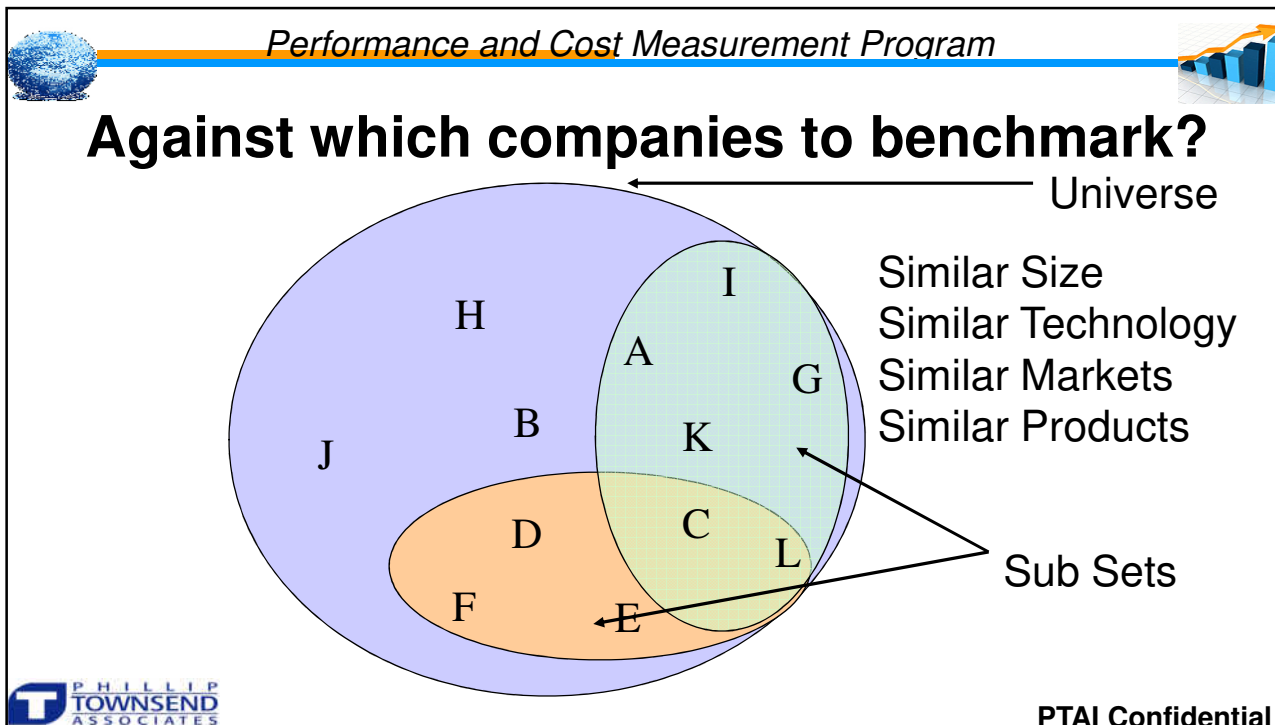
- Allows companies to understand their position relative to their peers across different business areas
- Highlights strengths and opportunities in performance and costs for different KPIs
- Based on actual data submitted by participating companies using a standard set of agreed upon definitions
- Confidentiality of each and every participating company is maintained
- The results are made available only to companies that submit their data

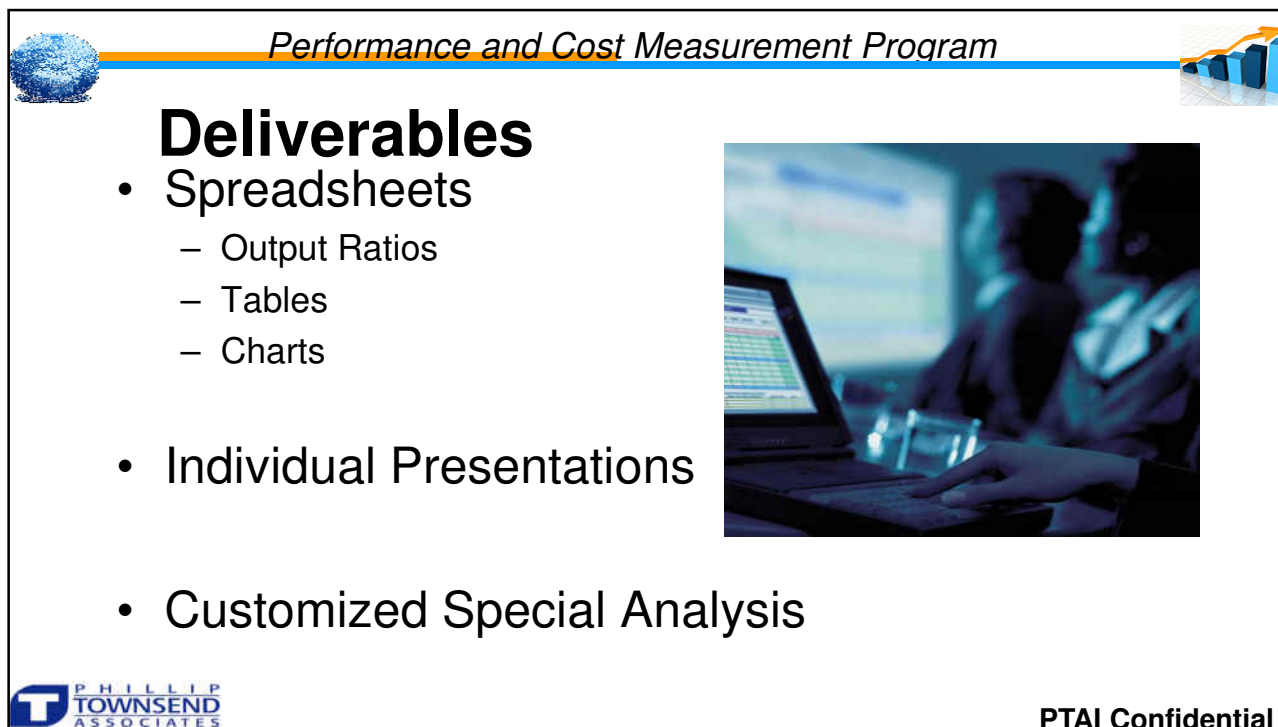
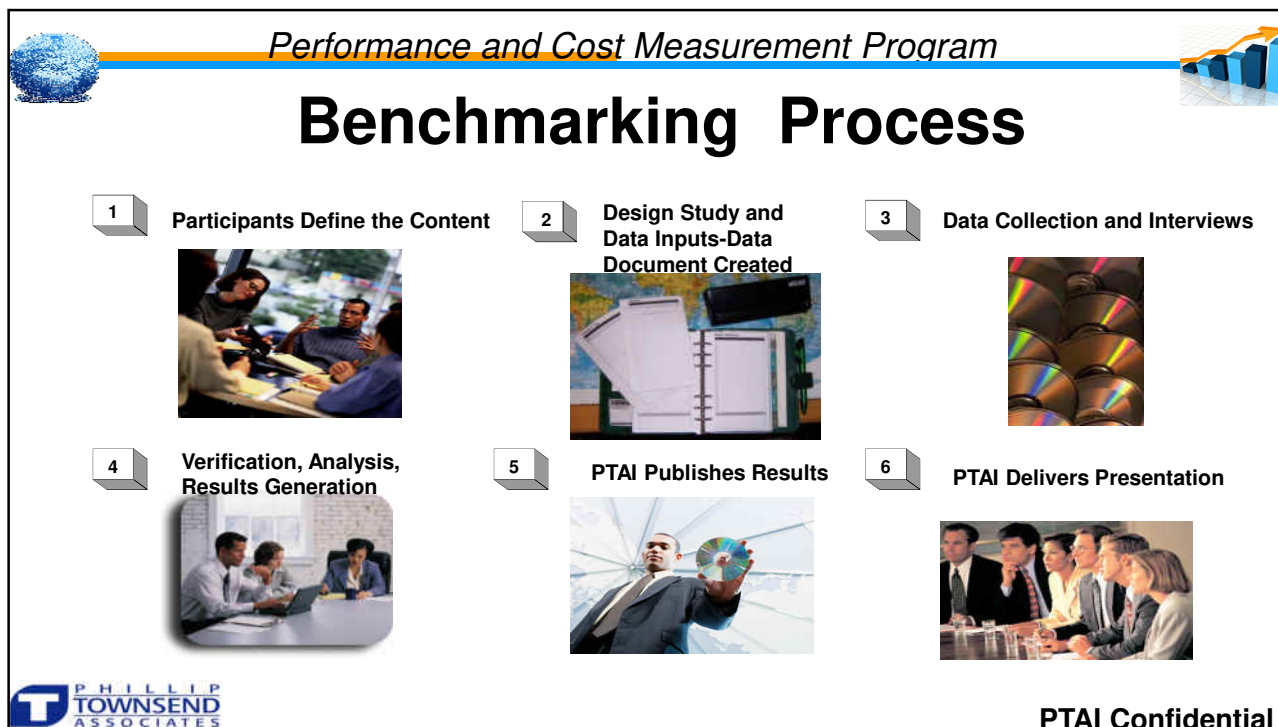




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Industry Analysis

- **Determine how industry is performing**
 - Utilization up? Down? Fixed costs up?

- **How your company is performing vs. industry?**
 - What has changed? Start with major categories (totals)
 - Is this historically significant ?
 - What is your company’s strategy?
 - What kind of special situations

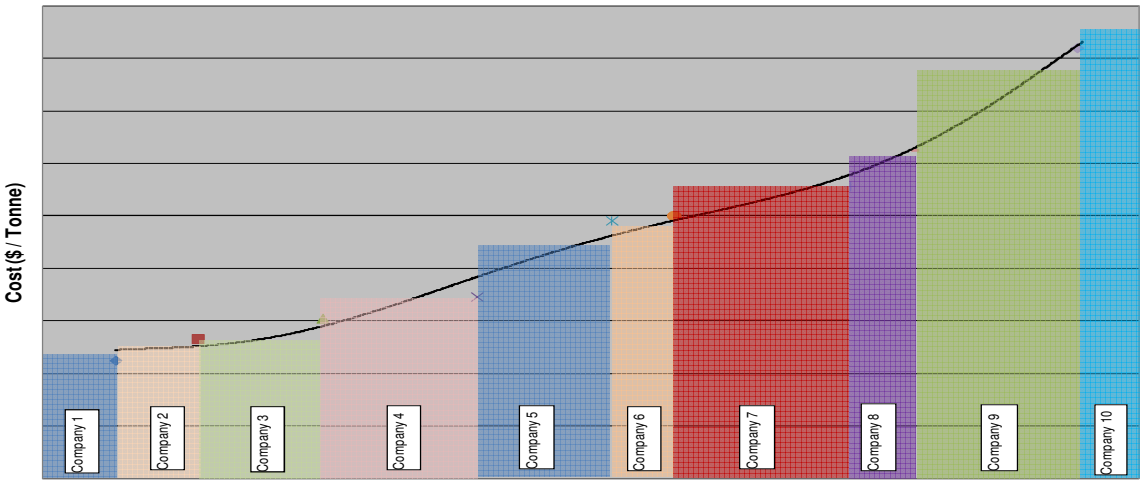


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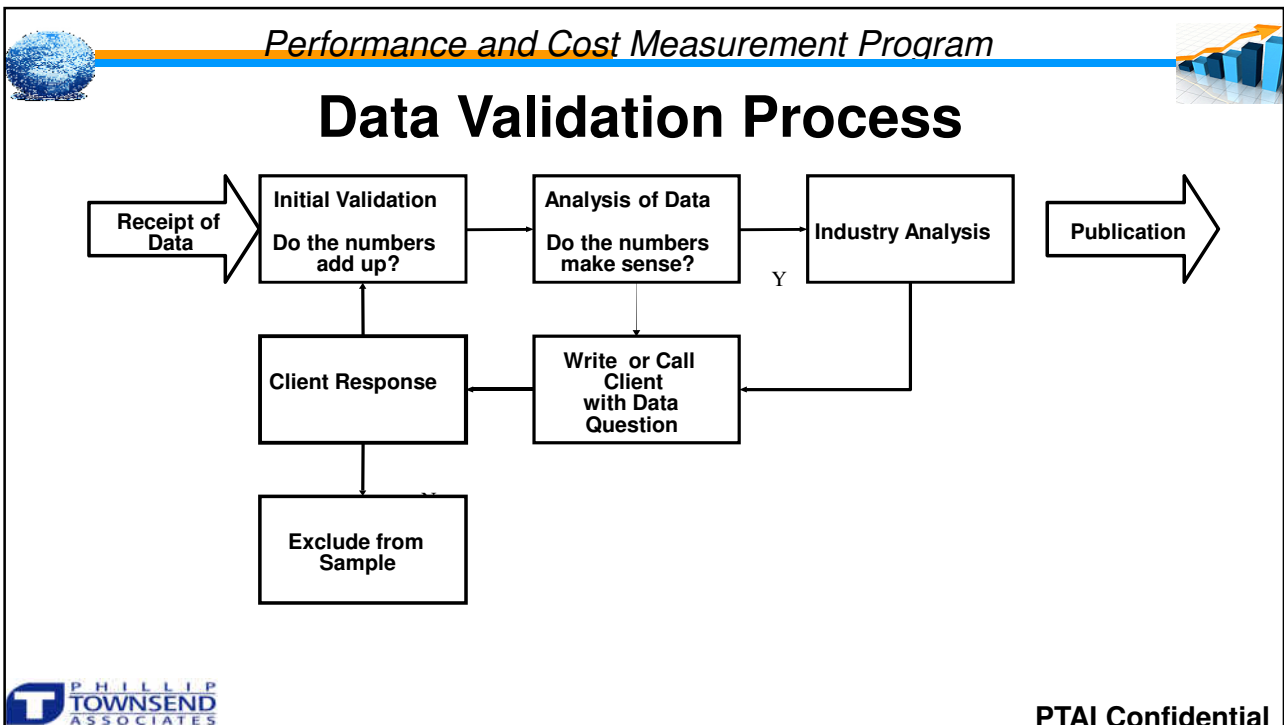
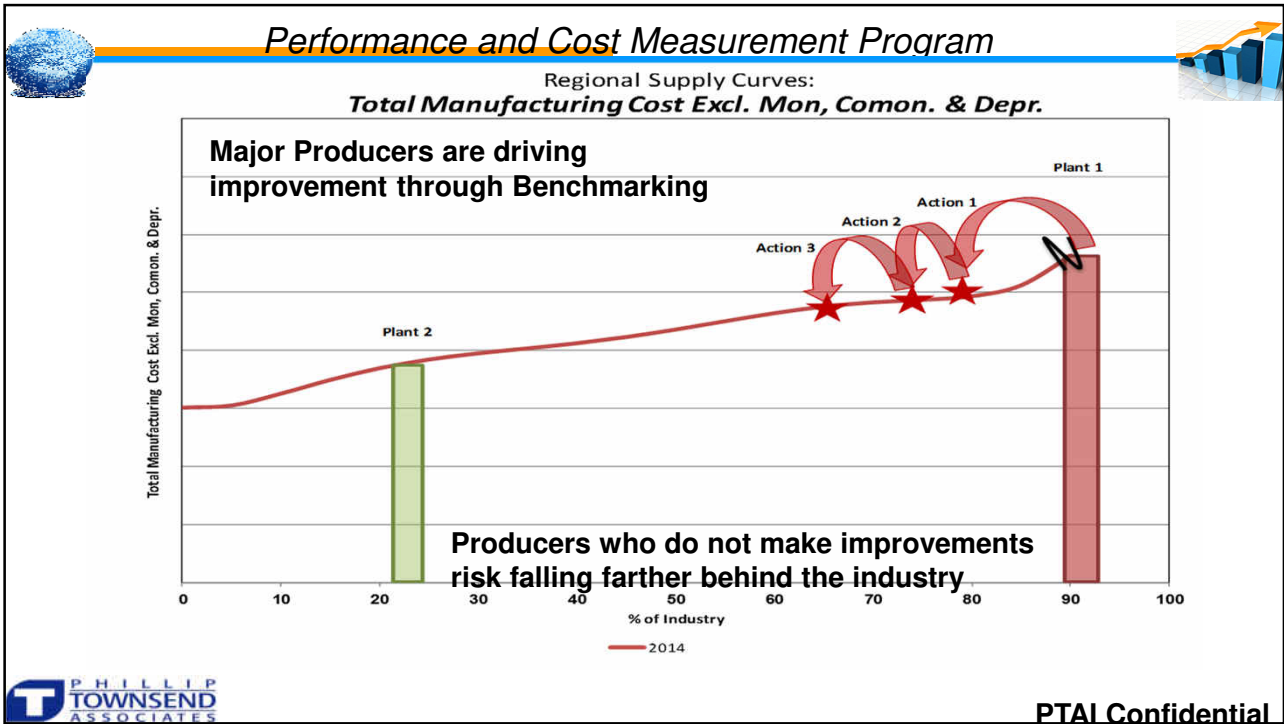
Benchmarking – Methodology

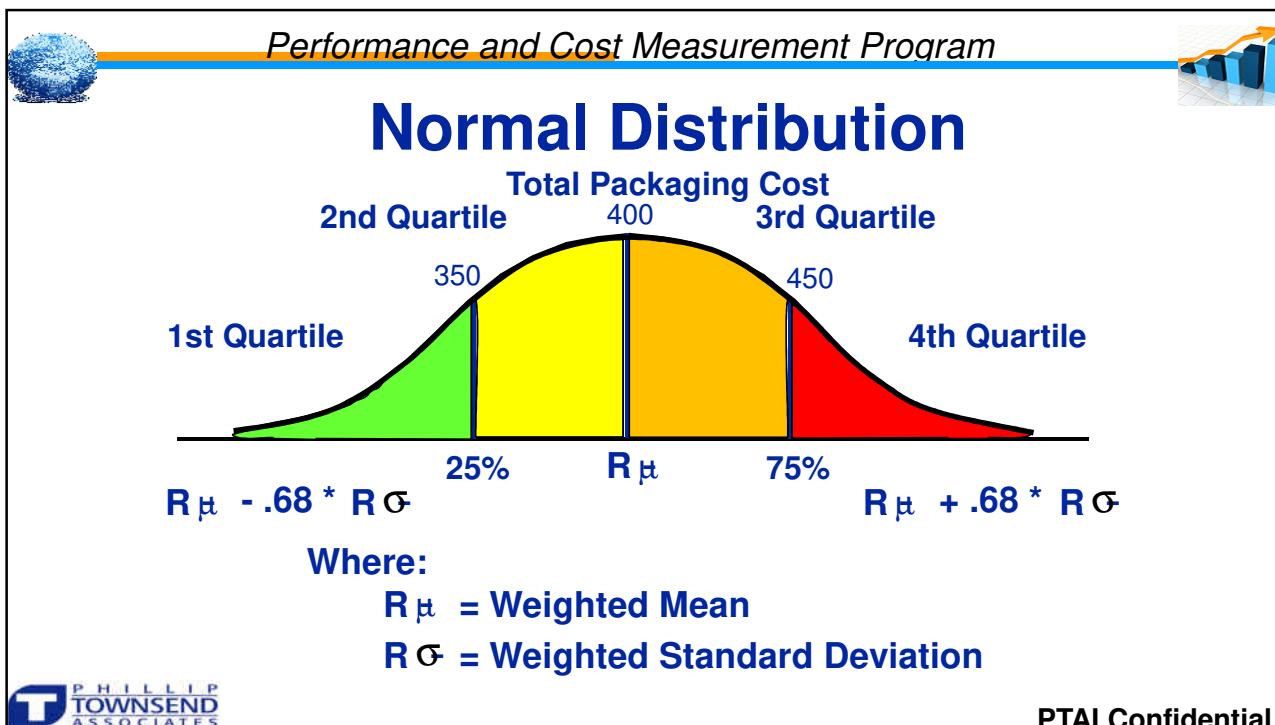
Supply Curve Example



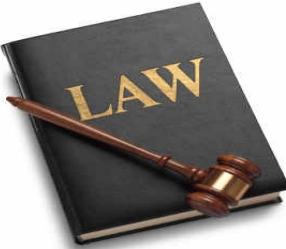

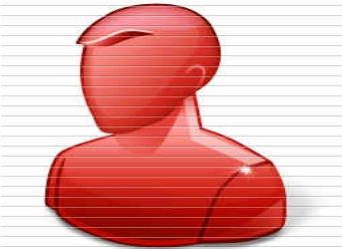
**Production KT
% of Industry (Volume)**

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Legal, Secure, & Confidential

<ul style="list-style-type: none"> • Program developed by active participation of steering committee members under strict anti-trust 	<ul style="list-style-type: none"> • Data is completely safe and secure and handled in absolute confidential manner 	<ul style="list-style-type: none"> • Results are completely anonymized to protect participant identity
		

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History of PTAI Chloralkali Benchmarking

- PTAI began a detailed chloralkali benchmark program about 20 years ago with European, N American & global producers
- Execution was mostly annual with occasional breaks
- Scope of data collection varied to optimize for producer needs, to maximize value and minimize effort in data collection
- Chloralkali benchmarking is a proven tool to improve operating performance and monitor competitiveness



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Typical Benchmark Mechanism

- Core manufacturing data collected periodically using optimized parameter grouping previously established with producers.
- PTAI and the producers to make every effort to keep a consistent periodic participation to maintain comparability
- Basic technology comparisons are membrane technology. Specific mercury and diaphragm comparisons can be offered as data are available (minimum 4 companies to protect confidentiality)
- Regional peer groups can be available as sufficient data are available to protect confidentiality



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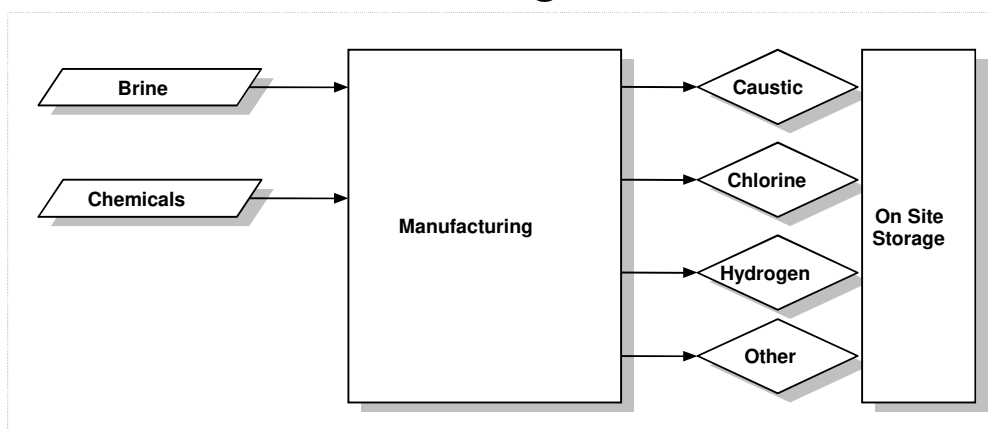
CHLORALKALI BENCHMARK

Example Results – Not Comprehensive

NOTE: These numbers are theoretical and do not reflect actual data from any participating company. Actual benchmark results are much more detailed.




Manufacturing Process



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2016 Manufacturing Cost Summary (Dollars / Tonne)


	Your Company	Avg w/o You	25th %ile	75th %ile
Total Chlorine Production (KT)	167.0	186.4	123.1	245.4
Total Variable Cost	125.7	129.3	114.9	143.1
Total Fixed Mfg Cost Excl Depreciation	57.2	57.3	48.7	65.9
Total Operations Cost	13.6	11.7	9.0	14.9
Total Maintenance Cost	13.5	19.4	14.0	23.6
Total Cell Renewal Cost	11.1	12.1	8.2	15.8
Total Other Manufacturing Cost	13.1	14.7	11.4	17.6
Total Indirect Cost Excl Depreciation	5.9	3.3	1.3	5.9
Total Mfg Cost Excl Depreciation & Licensing & Royalty	182.9	186.7	167.2	205.4

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2016 Variable Costs (Dollars / Tonne)

	Your Company	Avg w/o You	25th %ile	75th %ile
Total Energy Cost including Hydrogen Credit for Chemical use	67.2	81.6	73.8	86.5
Total Brine, Chemicals and Treatment Cost	56.3	45.1	34.4	58.0
Brine Acquisition Cost	48.4	38.9	27.8	52.0
Chemicals Cost	6.5	5.8	4.5	7.3
Brine Treatment Chemicals Cost	6.2	4.5	3.2	6.2
Other Chemicals Cost	0.4	1.6	0.6	2.3
Brine Waste Treatment Cost	1.4	0.3		
Water Cost	2.2	2.7	1.5	3.7
Total Variable Cost	125.7	129.3	114.9	143.1

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