

CPCI SUSTAINABLE PLANT PERFORMANCE REPORT

Third Quarter 2017



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**NORTH AMERICAN
PRECAST CONCRETE**
SUSTAINABLE PLANT PROGRAM
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INTRODUCTION

The goal of the CPCI Sustainable Plant Program is to benchmark the precast industry's impact on the environment in the areas of global warming, energy, water use, waste, dust and noise generation. Ultimately, the precast industry is striving to reduce the environmental impact at the manufacturing level while creating a culture of sustainability. The CPCI Life Cycle Assessment study for Commercial Buildings (2012) has helped to identify where the industry can improve its impacts, at the manufacturing stage of the life cycle, with a goal to positively influence the impacts at the end of life.

The benefits of sustainable business practices are well documented. As the leading technical resource for the precast concrete industry in Canada, the CPCI has provided the tools for its member plants to measure and implement improvements that will have a measurable impact on their environmental and economic performance, using the customised industry software, *CPCI Plant Sustainability Tracking Program*.

The software program, developed for CPCI by the Athena Sustainable Materials Institute (ASMI), enables individual manufacturers to measure their “cradle to gate” environmental footprint (with cradle being raw material resource extraction and gate being the finished product leaving the precast plant for the construction site).

Once a manufacturing facility enters their raw material usage, electricity, natural gas, gas, diesel, heavy fuel oil and liquefied propane gas usage the software uses the ASMI database to calculate the sustainability indicators – global warming potential (GWP), total primary energy (TPE) and water usage for the plant. The facility also self-evaluates and reports their environmental performance indicators – dust, noise and waste materials.

Participating plants report their tracked results to CPCI on a quarterly basis, the results of which are presented in this report along with the year to date results. Individual plants are also provided a customised report for their own internal benchmarking. Specifiers and owners can request the sustainability impacts on a project-to-project basis and are also encouraged to include this requirement in their contract specifications.

The industry has now been reporting since the first quarter of 2012. The following report reflects the most recent 24 months ending September 2017. The report includes moving averages for the industry during this period.

A. SUSTAINABILITY IMPACT MEASURES

A.1 Global Warming Potential

Global warming potential (GWP) is reported in kg CO₂e and is the reference measure used to report the amount of green house gases created in the extraction, processing and transportation of each material. The following figures and tables express GWP as kg CO₂e per tonne of precast produced.

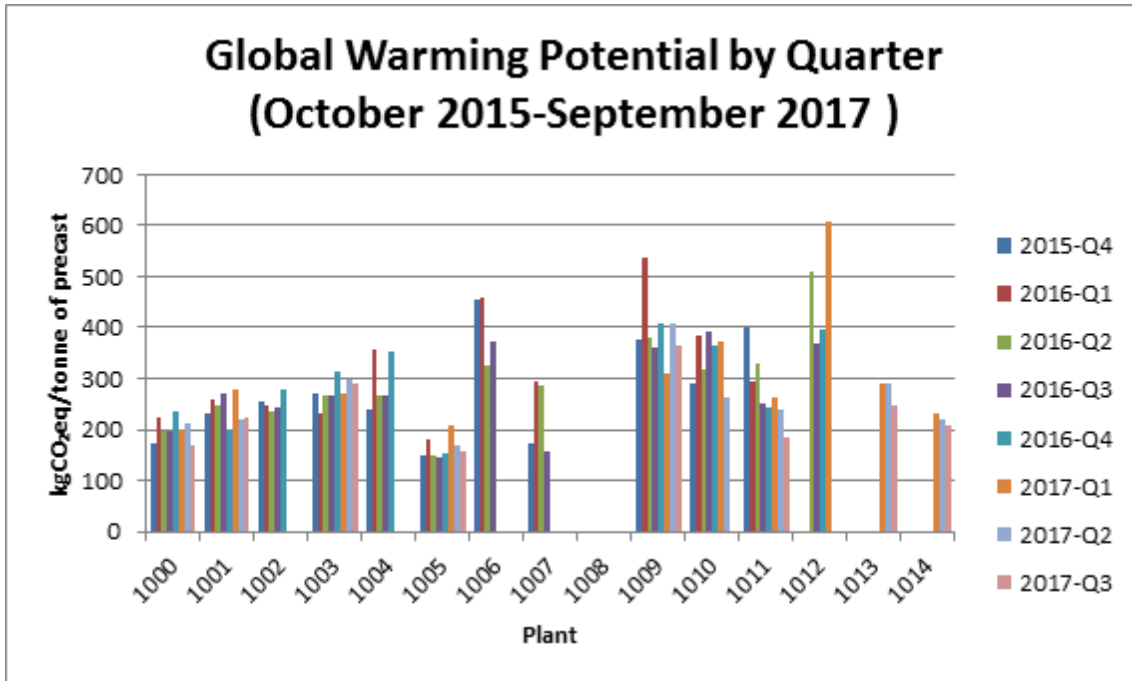


Figure 1: Global Warming Potential by Quarter for Each Plant test

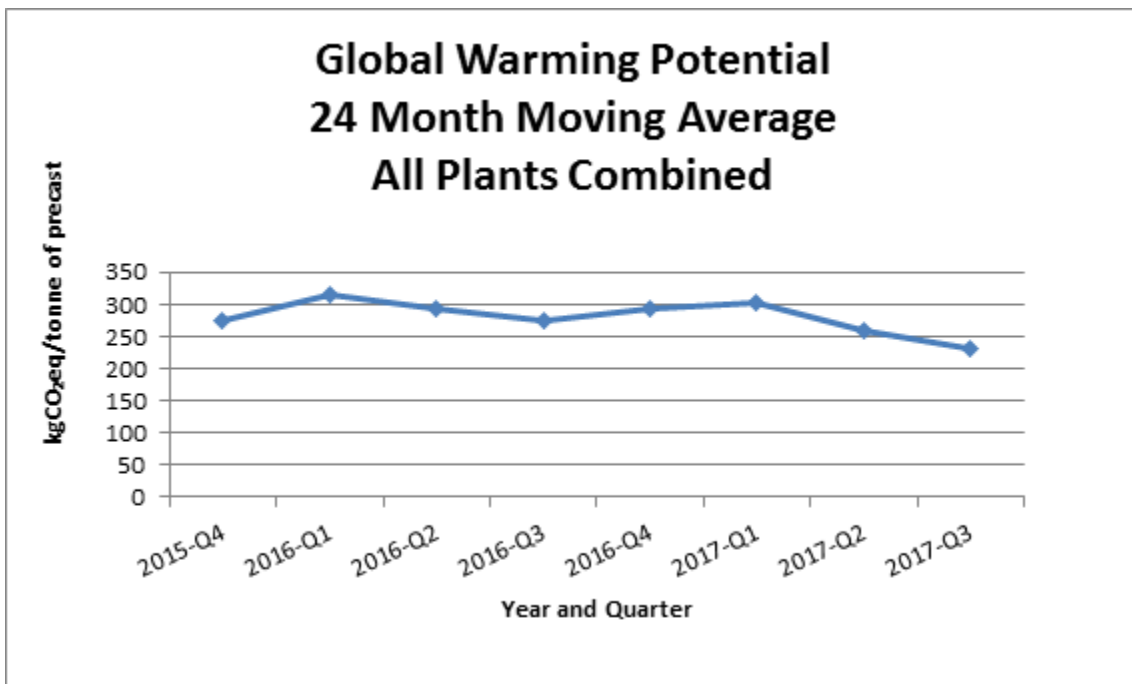


Figure 2: Global Warming Potential - 24 Month Industry Moving Average test

Table 1: GWP - Eight Quarter Average (October 2015-September 2017)

Sample Size: 83

Average GWP (kgCO ₂ /tonne precast)	Standard Deviation (kgCO ₂ /tonne precast)	Coefficient of Variation (%)	High (kgCO ₂ /tonne precast)	Low (kgCO ₂ /tonne precast)
282	93	32.8	608	144

Table 2: GWP - Most Recent Quarter Average (3rd Quarter 2017)

Sample Size: 8

Average GWP (kgCO ₂ /tonne precast)	Standard Deviation (kgCO ₂ /tonne precast)	Coefficient of Variation (%)	High (kgCO ₂ /tonne precast)	Low (kgCO ₂ /tonne precast)
231	69	30.0	363	156

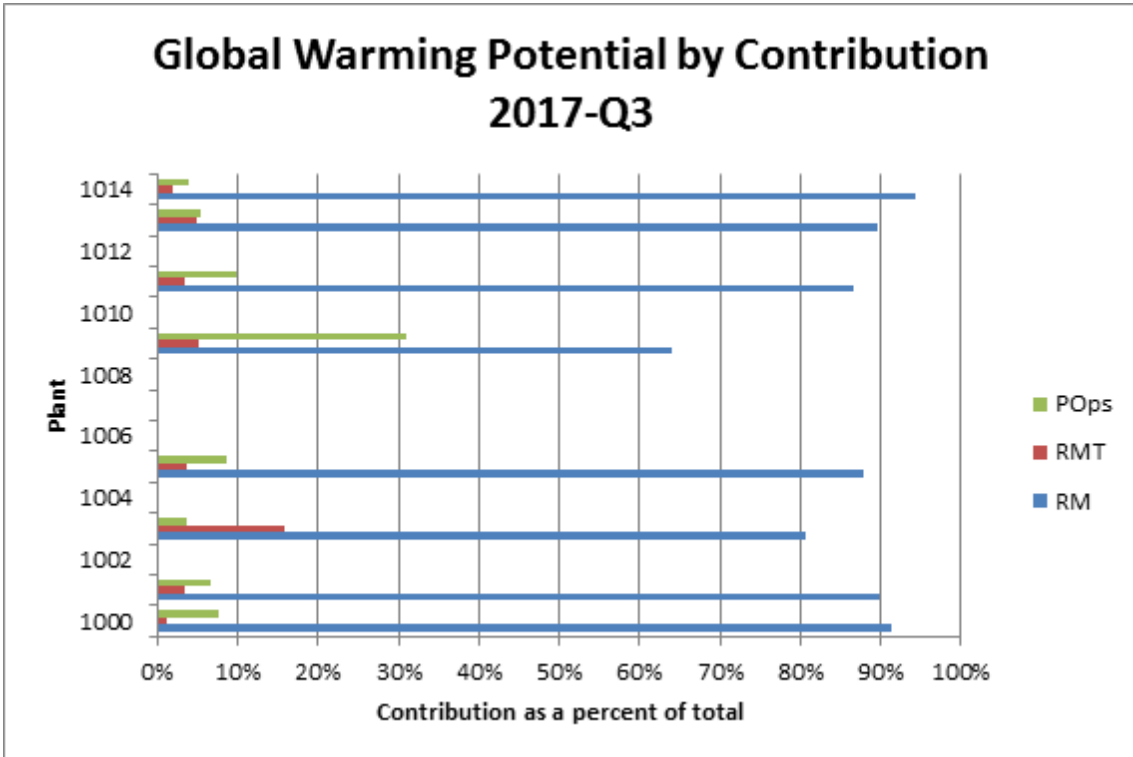


Figure 3: Global Warming Potential by Contribution - 2017 Q3

POps = Plant Operations; RMT = Raw Material Transportation; RM = Raw Materials

Table 3: GWP by Contribution (as a Percent of Total) - 3rd Quarter 2017

Sample Size: 8

Average GWP (kgCO ₂ /tonne precast)	Contribution from Raw Materials	Contribution from Raw Material Transportation	Contribution from Precast Plant Operations
Industry Average	85.5%	4.9%	9.6%
High	94.3%	15.8%	30.9%
Low	64.0%	1.2%	3.6%

A.2 Total Primary Energy

Total Primary Energy (TPE) is reported in mega-joules (MJ) and is a measure of all primary energy consumed (direct and indirect) to transform or transport raw materials into products. This includes inherent energy in raw or feedstock materials that are also used as common energy sources. In addition, the measure also captures the pre-combustion (indirect) energy associated with processing, transporting, converting and delivering fuel and energy. The following tables show the TPE expressed as MJ per tonne of precast produced.

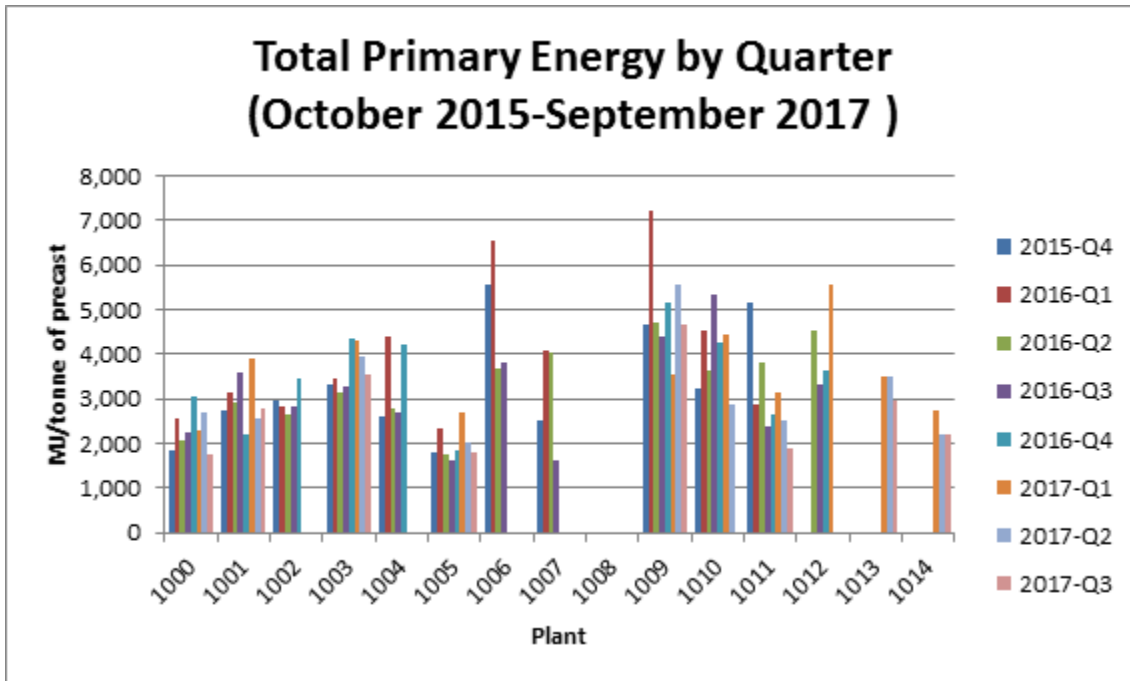


Figure 4: Total Primary Energy by Quarter for Each Plant test

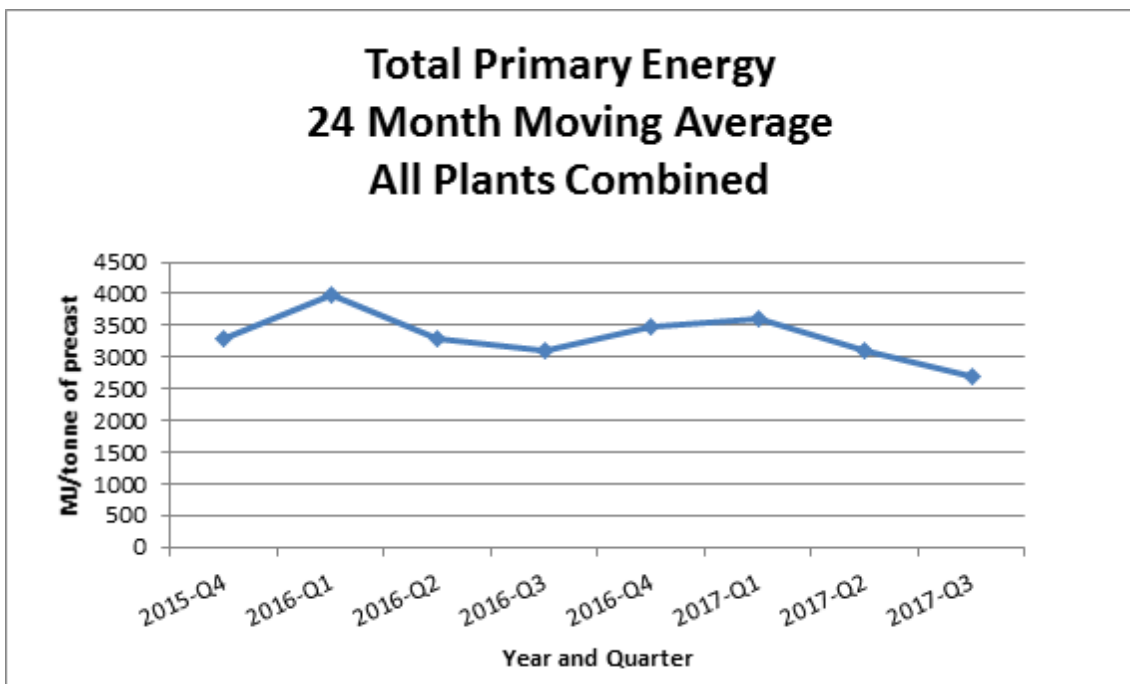


Figure 5: Total Primary Energy - 24 Month Industry Moving Average test

Table 4: TPE Eight Quarter Average (October 2015-September 2017)

Sample Size: 83

Average TPE (MJ/tonne precast)	Standard Deviation (MJ/tonne precast)	Coefficient of Variation (%)	High (MJ/tonne precast)	Low (MJ/tonne precast)
3339	1162	34.8	7230	1597

Table 5: TPE Most Recent Quarter Average (3rd Quarter 2017)

Sample Size: 8

Average TPE (MJ/tonne precast)	Standard Deviation (MJ/tonne precast)	Coefficient of Variation (%)	High (MJ/tonne precast)	Low (MJ/tonne precast)
2685	1013	37.7	4645	1731

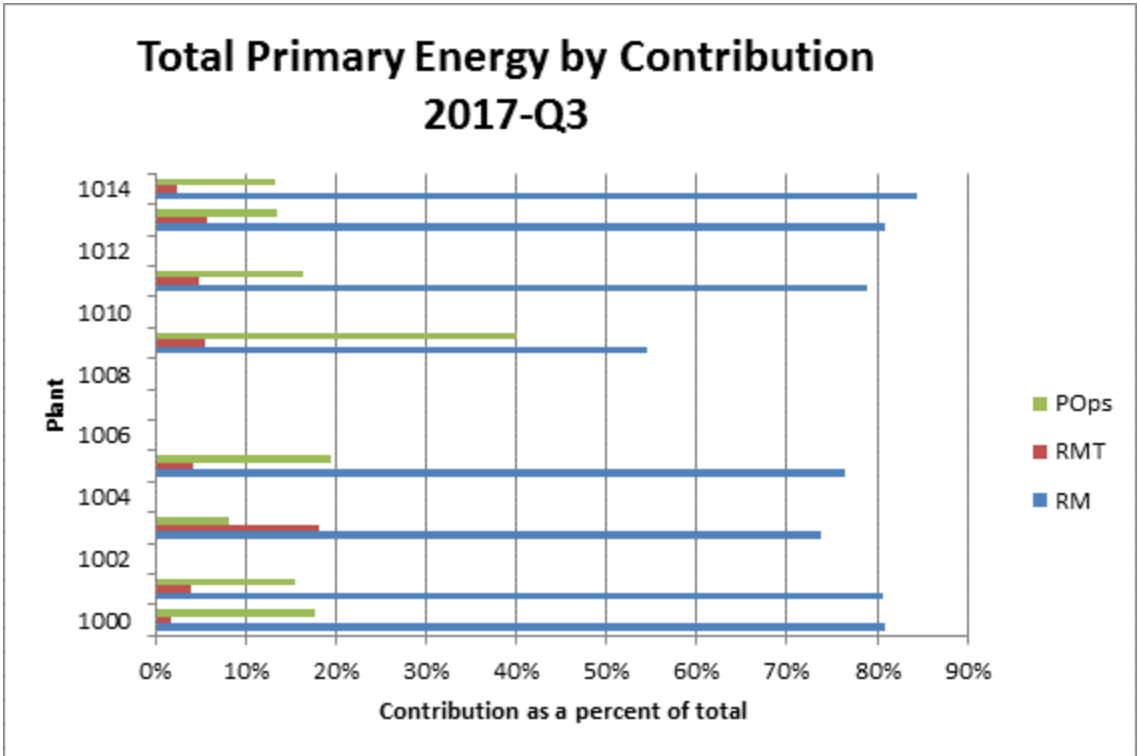


Figure 6: Total Primary Energy by Contribution - 2017 Q3

POps = Plant Operations; RMT = Raw Material Transportation; RM = Raw Materials

Table 6: TPE by Contribution (as a Percent of Total) – 3rd Quarter 2017

Sample Size: 8

Average TPE (MJ/tonne precast)	Contribution from Raw Materials	Contribution from Raw Material Transportation	Contribution from Precast Plant Operations
Industry Average	76.3%	5.7%	18.0%
High	84.5%	18.0%	40.0%
Low	54.5%	1.6%	8.2%

B. RESOURCE MEASURES

B.1 Water

The water consumption is tracked in the plant as water for batching concrete (also known as mix water) and water used to wash-out mixers and general clean-up in the plant. Included in the total water consumption is the water in upstream processing of all raw materials, for example washing of coarse and fine aggregates. Water is expressed as litres per tonne of precast produced.

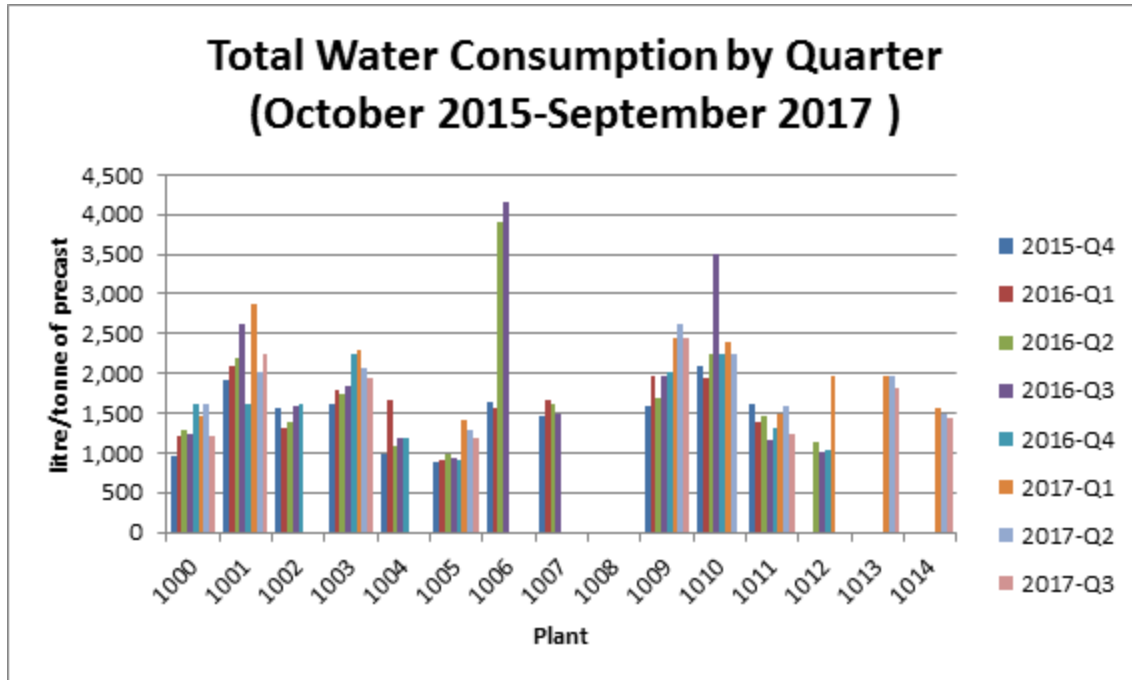


Figure 7: Total Water Consumption by Quarter for Each Plant test

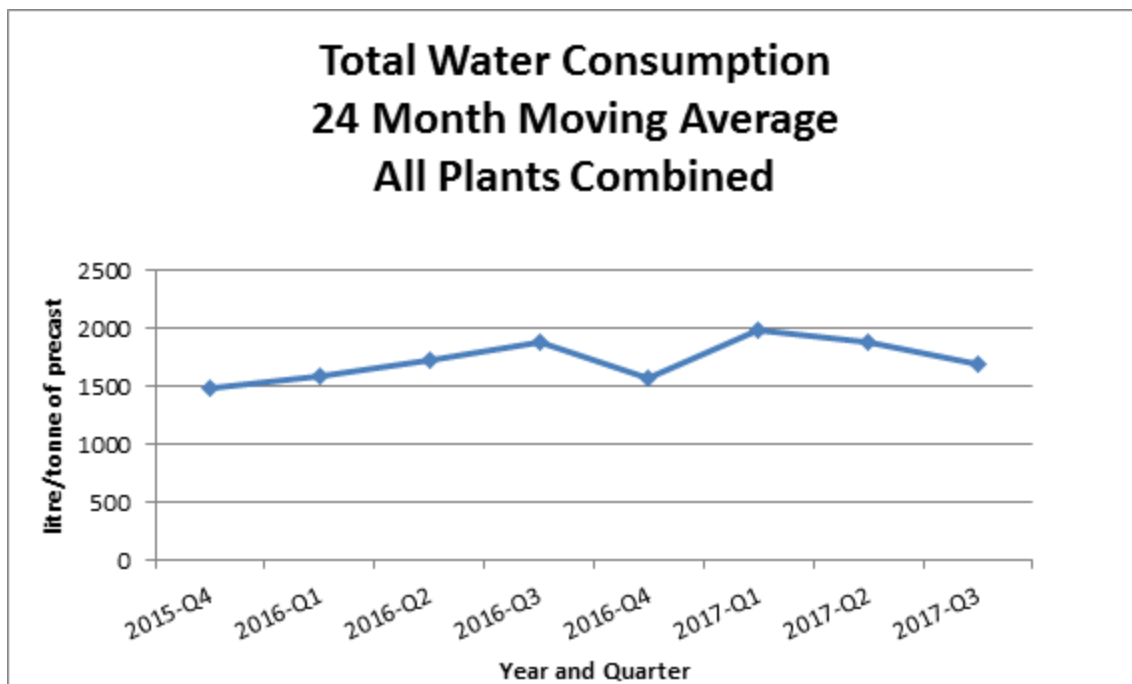


Figure 8: Total Water Consumption - 24 Month Industry Moving Average test

Table 7: Water Consumption - Eight Quarter Average (October 2015-September 2017)

Sample Size: 83

Average Water Consumption (litre/tonne precast)	Standard Deviation (litre/tonne precast)	Coefficient of Variation (%)	High (litre/tonne precast)	Low (litre/tonne precast)
1727	617	35.7	4170	877

Table 8: Water Consumption - Most Recent Quarter Average (3rd Quarter 2017)

Sample Size: 8

Average Water Consumption (litre/tonne precast)	Standard Deviation (litre/tonne precast)	Coefficient of Variation (%)	High (litre/tonne precast)	Low (litre/tonne precast)
1688	490	29.1	2434	1198

Water Consumption by Contribution 2017-Q3

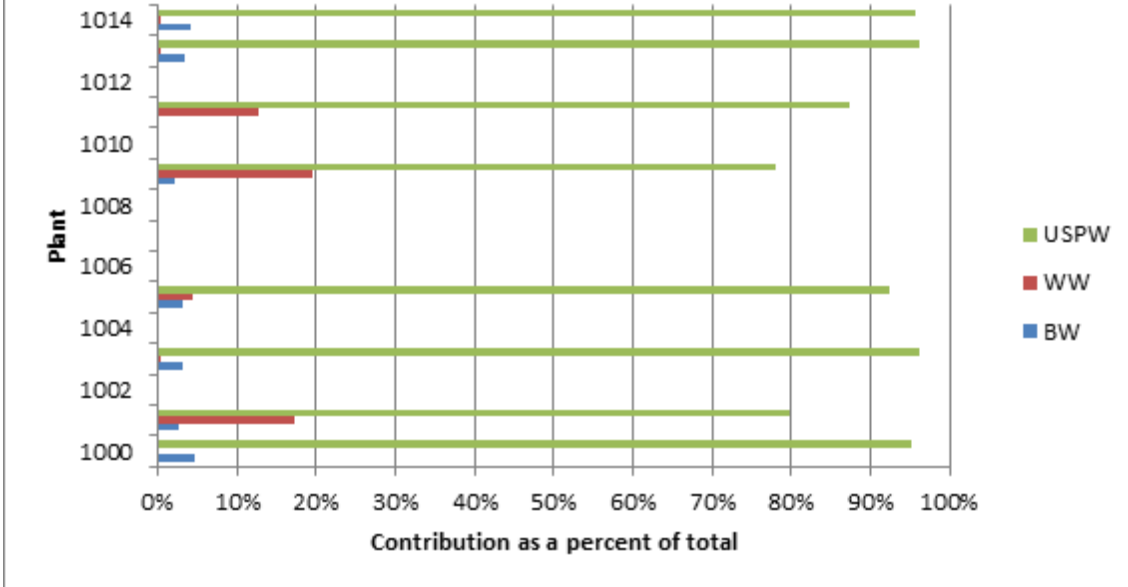


Figure 9: Total Water Consumption by Contribution - 2017 Q3

USPW = Upstream Process Water; WW = Wash Water; BW = Batch Water

Table 9: Water Consumption by Contribution (as a Percent of Total) – 3rd Quarter 2017

Sample Size: 8

Average Water Consumption (litre/tonne precast)	Contribution from In-Plant Fresh Batch Water	Contribution from In-Plant Washing	Contribution from Upstream Raw Material Processing
Industry Average	3.0%	7.0%	90.1%
High	4.6%	19.7%	96.2%
Low	0.0%	0.3%	78.1%

C. ENVIRONMENTAL PERFORMANCE INDICATORS

Environmental performance is measured by the plant as a benchmarking tool. Facilities self-evaluate their plant performance against standard environmental and sustainable indicators. A grading system is used for each measure and an overall grading is achieved. **These grades are internal to each plant but may be available upon request.**

Environmental indicators include:

1. Dust Control – The facility takes measures to control dust including any dust produced by traffic, storage activities or the handling of materials.
2. Process Water, Storm Water and Chemical Management - The facility ensures that it does not discharge untreated process / waste water to the natural environment, and meets the requirements of local ordinances.
3. Noise Control Requirements - The facility makes efforts to control noise to surrounding sensitive receptors (examples; residences, hotel/motels, nursing homes, hospitals, etc.), and meets the requirements of local ordinances.

Sustainability indicators include implementation of best management practices for:

1. Energy consumption
2. Material usage and disposal
3. Transportation

CPCI SUSTAINABLE PLANT PERFORMANCE REPORT

The CPCI Sustainable Plant Program is dedicated to advancing sustainable manufacturing. Our mission is to share best practices and to identify the brightest and most innovative solutions for mitigating the environmental impacts of our manufacturing operations over the long term.

For more information about CPCI's Sustainable Initiatives:

www.sustainableprecast.ca



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