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## Introduction

For Californians, news of the current state of emergency around quickly depleting water reserves is never far from thought. From our digital highway marquee to daily coverage in our newspapers, we see daily signs that California's government is urging residents to do their part in water conservation. On April 1, 2015, the Governor's office issued an executive order directing the State Water Resources Control Board to drive mandatory urban potable water usage down by 25% statewide.

According to the [Water Board's website](#), the Board is currently working towards decisions on implementing active enforcement - possibly including rate restructuring, fines, and forcing lifestyle changes to many residents in the areas of elective water consumption. As of May 5, 2015, the Board adopted an emergency conservation regulation in accordance with the governor's directive, with provisions of this regulation going into effect on May 15, 2015 ([source](#)).

While most of the attention is given to commercial, retail, and residential water users, the affect on industrial users are slowly coming to light. In response, Wright Process Systems has been working with several of our industrial food process customers to help devise plans and move toward reducing water consumption within their plants.

This white paper is the first in a series of three, and is intended to give an overview of the current water reduction conditions as they relate to industrial food process manufacturers. In the upcoming parts two and three of the series, we will cover specific water reduction and reuse opportunities common in food process plants. Altogether, we hope that this series of white papers helps to educate and inform, and spell out areas in which we can work together to improve water use conditions for the betterment of our communities.

## Current Legislation

For the first time in California's history, the Governor's office has directed mandatory water conservation for all residents, and has directed several state agencies, such as the State Water Board, to take immediate action to safeguard the state's remaining potable urban water supplies.



“This is the drought of the century, with greater impact than anything our parents and grandparents experienced, and we have to act accordingly,” said Felicia Marcus, Chair of the State Water Resources Control Board.

“[On May 5, 2015], we set a high but achievable bar, with the goal of stretching urban California’s water supply. We have to face the reality that this drought may continue and prepare as if that’s the case. If it rains and snows next winter, we celebrate. If the drought continues, we’ll be glad we took difficult but prudent action today. It’s the responsible thing to do.” ([source for the above three paragraphs](#))

The Governor’s Executive Order B-29-15 makes the following statements (excerpt):

- ◆ Whereas on January 17, 2014, I proclaimed a State of Emergency to exist throughout the State of California due to severe drought conditions, and
- ◆ Whereas on April 25, 2014, I proclaimed a Continued State of Emergency to exist throughout the State of California due to the ongoing drought, and
- ◆ Whereas under the provisions of section 8558(b) of the Government Code, I find that conditions of extreme peril to the safety of persons and property continue to exist in California due to water shortage and drought conditions with which local authority is unable to cope
- ◆ It is hereby ordered that:
  - ✧ The State Water Resources Control Board (Water Board) shall impose restrictions to achieve a statewide 25% reduction in potable urban water usage through February 28, 2016...
  - ✧ The Water Board shall impose restrictions to require that commercial, industrial, and institutional properties...immediately implement water efficiency measures to reduce potable water usage in an amount consistent with the reduction targets...
  - ✧ The Water Board shall direct urban water suppliers to develop rate structures and other pricing mechanisms, including but not limited to surcharges, fees, and penalties, to maximize water conservation consistent with statewide water restrictions...

Full text of the Order can be found here ([source](#)).

An additional key item in the Order is as follows:

- ◆ The California Energy Commission, jointly with the Department and the Water Board, shall implement a Water Energy Technology (WET) program to deploy innovative water management technologies for businesses, residents, industries, and agriculture. This program will achieve water and energy savings and greenhouse gas reductions by accelerating use of cutting-edge technologies such as renewable energy-powered desalination, integrated on-site reuse systems, water-use monitoring software, irrigation system timing and precision technology, and on-farm precision technology.

More on this item below.





## Looking to the Future

To begin looking at the future of this issue, let's first look at the past.

In 2010, the US Geological Survey conducted a water use study that rendered the below breakdown of water consumption in California:



(above water usage info from the USGS website)

Based on some of our research, we see the following future elements being added to the water conservation discussion over the coming 2015 summer:

- ◆ Creation and definition of rebate and grant programs for industrial users' conservation efforts. The WET program described below focuses on new technologies. We would like to see creation or expansion of programs focused on operational improvements using existing infrastructure, which should be the focus for food processors.
- ◆ Regulators defining specific reduction targets for large industrial users, and asking for timeframes around making these reductions
- ◆ Breakdown of the 25% reduction requirement by market segment, which may result in the 400 million gallon per day industrial segment being asked to reduce this use to between 285 million and 350 million gallons per day.
- ◆ Enforcement of water conservation being assigned and actively pursued by regulators
- ◆ New construction or expansions construction permits requiring increased water use documentation



Visit the USGS interactive map for county details  
(Source USGS website)

- ◆ New conversation about the relationship between reducing water and reducing overall energy, which are trade-offs that are not mutually exclusive. For example, putting in low-water equipment that requires three times the energy input would not be effective or desirable long-term.

## Food Process Industry Impacts

Wright Process Systems has a direct interest in helping customers understand and implement water conservation improvements throughout their processes. More so, our interest goes beyond just creating business opportunities. California has long-been on the local and global forefront of agricultural and food production development, allowing thousands of businesses to feed and nourish millions of people around the world. Our micro- and macro-community of manufacturers, service providers, contractors, and consumers are all connected through California's food chain. With this food chain so threatened by the current drought, we find that we all have a social responsibility to do our part.

With 400 million gallons per day being consumed by industrial users in California, there is an urgent need to begin understanding that use on a per-plant basis.

New requirements of current legislation that will impact food processors include:

- ◆ Large urban water suppliers (municipalities) will have a tier-based system for water reduction requirements towards meeting the statewide 25% reduction. For example, the City of Hayward will fall under Tier 2 and have an 8% reduction standard, whereas the City of Tulare will fall under Tier 8 and have a 32% reduction standard.
- ◆ Smaller water suppliers must either reduce water use by 25% or restrict outdoor irrigation to no more than two days per week. Each jurisdiction will decide independently.
- ◆ Commercial, industrial, and institutional properties that are not served by a water supplier (or are self-supplied, such as by a groundwater well) also must either reduce water use by 25% or restrict outdoor irrigation to no more than two days per week. No reporting is required but these properties must maintain documentation of their water use and practices.

Responsibility for water consumption in the food industry cannot be pointed in any single market's direction. Agricultural production of raw food stocks through final processing of finished products all share the responsibility to play their part. Farming practices of drilling deeper and deeper for ground water sources impacts the long-term integrity of underground aquifers, and causes ground levels to sink at an alarming rate ([source](#)). Almond farming in particular was recently noted to use the same amount of water in their orchards as would meet the domestic needs of Los Angeles and metro San Diego combined ([source](#)). On the processing end of things, it has been reported that a single large-scale bottled water manufacturing plant can consume 63 million gallons of water per year, taken directly from local water suppliers or groundwater sources ([source](#)). All in all, there can be no feeling of letting larger plants, or those in far-off locales, bear the weight of the required regulations – all areas of the industry must make an effort.





## Categorizing Industrial Water Use

Wright Process Systems has been a leader in developing unique, operations-based energy improvement strategies. Many of today's clean-tech companies are looking to sell the next-best technology – a new instrument, an online monitoring program, a cloud-based use reporting system, or a new water treatment system. Wright Process is a partner to many of these manufacturers, and recommends their implementation where they are best suited. More important to us, however, is the understanding of where simple, existing, proven technologies and streamlined operational practice changes can make just as much, if not more, of a difference to water conservation, as well as the overall energy efficiency of a plant.

Wright Process Systems begins evaluating opportunities for savings by first understanding where water is consumed in a plant, per the below categories.

In food processing, water is generally used in three ways:

- ◆ **Ingredient in the raw or finished product.** Examples include beer, soda, dairy (fluid milk / powder), soups, and, of course, bottled water.
- ◆ **Production process.** Examples include clean-in-place systems, dairy (cheese / butter), sanitation wash down, pump seal cooling and fruit or vegetable blanching.
- ◆ **Industrial utility.** Examples include cooling water, feed water for steam systems, fire sprinkler water, and generator engine cooling.

In general, if we break down a plant by its primary water consumption category, we can begin to see where water reduction challenges and successes may lie:

Water Category:	Example Manufacturer:	Challenges	Opportunities
Water as Main Ingredient	Soda / Beverage Manufacturer (in product)	Water reduction may require production to be reduced directly, as not enough potential for reduction in waste streams alone.	Improve OEE and fill container volumes to reduce rejects, salvaging disposed units worth of water volume.
Water as Main Production Process	Vegetable Packager (washing and conveyance)	Reuse of water to reduce consumption may require chemical treatment and have food safety concerns.	Microwave, steam, or forced air cleaning, as well as maximizing production shift yields to reduce overall per-unit water consumption.
Water as Main Utility	Sugar Manufacturer (heating media)	System may already be at very high efficiency and low waste, requiring replacement with electrical heating systems of higher net energy load.	Heating oil systems, cogen heating systems, and waste sugar digester to supply steam heating systems, as well as outsourcing tanker washes to wash centers.

## Developing a Plan

A thorough analysis of the plant, complete with estimated water figures per category of consumption, is the first step toward identifying the real opportunities for cutting water consumption. From the above examples, we can see that both new process components and optimizing existing equipment are equally available in most types of plants. Wright Process Systems can perform such analyses quickly and with full input from plant staff around the “reality” of water consumption. We then look for opportunities to improve existing system operations before recommending replacement or new equipment.

Developing a solid water reduction plan starts with questions. First, by you, the manufacturer:

- ◆ What are my current water consumption levels? By day / week / season / product / other?
- ◆ What reduction level is my local jurisdiction seeking?
- ◆ How much time do I have to make such reductions?
- ◆ What is my overall energy consumption or efficiency, and how will water reduction impact my energy cost baseline?
- ◆ Poll my department leads. What areas of reduction can be executed in the short term internally?
- ◆ Involve a third party such as Wright Process. What areas of reduction can be planned and executed beyond my internal improvements?
- ◆ Where is funding for such improvements coming from? Capital project, plant level expense, availability of state / local grants or rebates, other?
- ◆ What impacts on my plant will occur if the drought and reduction initiatives continue for another one to five years?

Having helped existing customers with this process at their plants, we see most moving from the above questions stage to one (or all) of three potential next steps:

1. **Establish a budget** – Wright Process can help with round-number budgeting quickly.
2. **Open a dialogue with local jurisdiction or water authority** – Wright Process can help represent technical aspects of your project to regulators, establishing that your plant has an action plan and estimated reduction targets in the works.
3. **Engineer a solution** – Wright Process can complete engineering services to produce a design for water reduction at your plant. Customers are either moving on this design immediately through installation, or holding onto the design until regulators make contact.





## WET Program

We mentioned earlier on in this paper the Water Energy Technology (WET) program being launched by the California Energy Commission. Let's look more into that program now:

The CEC's website states that the WET initiative's purpose is to accelerate the deployment of innovative water- and energy-saving technologies and reduce greenhouse gas emissions by providing funding for innovative technologies that meet the following criteria:

- ◆ Display significant water-savings, energy-savings, and greenhouse gas emission reductions
- ◆ Demonstrate actual operation beyond the research and development stage
- ◆ Document readiness for rapid, large-scale deployment (but not yet widely deployed) in California

Examples of eligible WET program technologies for industrial and commercial markets are described as: advanced industrial/commercial technology solutions that save water, reduce onsite net energy use, and reduce GHG emissions, and can include integrated onsite water reuse and heat recovery systems; packaged/modular wastewater treatment systems; and no-water or low-water use technologies for process operations, laundries, food service, and industries and businesses with high water consumption.

The CEC's website states that the program will be rolled out in summer 2015, and more information will be released about eligibility and application processes for the program. Interested parties are urged to sign-up for the WET program's official newsletter, on the [California Energy Commission website](http://www.energy.ca.gov/wet).

(source for the above info)

Wright Process reviewed the WET project meeting conducted on June 2, 2015 at the Fresno City Hall, where the Energy Commission provided an overview of the program. Here are key notes from that meeting:

Proposed Program Budget	\$30 million
Phase 1 Agricultural Budget	\$7 million in rebates \$3 million in grants
Phase 2 Industrial Budget	\$16 million in rebates and grants
Phase 3 Renewable Desalination	\$3 million in grants
Phase 1 Timeline	Launching in July
Phase 2 Timeline	Launching in September
Phase 3 Timeline	Launching in September



*Screenshot from the WET project meeting presentation on June 2, 2015 at Fresno City Hall.*

## Conclusion

Wright Process Systems is a California company with a history spanning more than 25 years and a staff that lives and works in California. As such, we have a personal interest in helping our community deal with the current drought. Our specialty is designing, optimizing, and building food process systems. Since these are the systems and plants we know intimately, it is our sincerest motivation to now dive into these same systems with water conservation in mind.

In coming months, we'll continue this series of white papers on water reduction, and thereafter lead into other types that all tie back into strengthening the food process industry that supports our business. Please continue to read and comment on our articles, white papers, and newsletters.

You, as a food plant employee, industrial distributor, contractor, engineer, or consultant are invited to contact us to voice your opinion and ask any questions with which we might help. We look forward to hearing from you.



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