Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514

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Contents

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1.0 Purpose

This document provides instructions to Federal agencies on implementation of the water use efficiency and management goals of section 2(d) of Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (74 Fed. Reg. 52117).

This document supersedes documents prepared to address water related goals of Executive Order 13423: *Strengthening Federal Environmental, Energy, and Transportation Management*, including instruction provided in relevant parts of Section VI in *Instructions for Implementing Executive Order 13423*, issued by the Council on Environmental Quality (CEQ) on August 3, 2007. It does not affect the requirement for Federal agencies to implement and achieve the objectives of the *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*. This document applies only to Federal agencies and provides details on implementing the requirements of Executive Orders 13514 and 13423. It does not create any right or obligation enforceable at law or in equity by any party against the Federal government.

2.0 Introduction

On October 5, 2009, President Obama signed Executive Order (EO) 13514 *Federal Leadership in Environmental, Energy, and Economic Performance*. EO 13514 included provisions to require Federal agencies to improve water use efficiency and management. In June 2010, CEQ requested that the Department of Energy (DOE) and the Environmental Protection Agency (EPA) co-chair an interagency working group to develop recommendations for implementation of the water efficiency and management provisions of EO 13514. These agencies had been working previously to implement water efficiency provisions associated with various Federal requirements and were able to recommend specific guidance for implementing EO 13514. This document reflects recommendations from that interagency group.

2.1 EO 13514 Goals

The water use efficiency and management goals for Federal agencies in Section 2(d) of EO 13514 are:

1. Reduce potable water consumption intensity by 2% annually through fiscal year (FY) 2020, or 26% by the end of FY 2020, relative to the agency's FY 2007 baseline water consumption by implementing water management strategies including water-efficient and low-flow fixtures and efficient cooling towers;
2. Reduce agency industrial, landscaping, and agricultural water (ILA) consumption by 2% annually, or 20% by the end of FY 2020, relative to a baseline of the agency’s industrial, landscaping, and agricultural water consumption in FY 2010;
3. Consistent with State law, identify, promote, and implement water reuse strategies that reduce potable water consumption; and

4. Implement and achieve the objectives identified in the stormwater management guidance issued by the Environmental Protection Agency (EPA) under the Energy Independence and Security Act of 2007.[1]

EO 13423 established quantifiable water reduction requirements for Federal agencies and required that, beginning in FY 2008, Federal agencies must reduce water consumption intensity through life-cycle cost-effective measures relative to the baseline of the agency's water consumption in FY 2007 by 2% annually through the end of FY 2015 or 16% by the end of FY 2015. EO 13514 extends the annual 2% reduction in water consumption intensity to 2020, thereby requiring a total reduction of 26%.

EO 13514 also establishes specific water reduction requirements for ILA water consumption and encourages the implementation of water reuse strategies and implementation of stormwater management strategies. This document provides guidance on implementing and monitoring the water use efficiency and management requirements of EO 13514 and EO 13423 including appropriate reporting requirements. Agencies should refer to the *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* for guidance on stormwater issues.

The EO 13514 water efficiency and management goals support requirements contained in the Energy Independence and Security Act of 2007 (EISA). EISA requires Federal agencies to conduct comprehensive energy and water evaluations for all "covered facilities," which include energy and water audits and a commissioning assessment for the purpose of identifying conservation opportunities (see 42 U.S.C. 8253(f)(3)(A)). For more information on EISA and covered facilities agencies should refer to the 2012 publication by the U.S. Department of Energy, *Guidance for the Implementation and Follow-up of Identified Energy and Water Efficiency Measures in Covered Facilities*.[2]

2.2 General Principles

When implementing the water efficiency and management goals of EO 13514, Federal agencies should pursue an "Efficiency First" approach, whereby they seek to reduce or eliminate water use wherever feasible by making the most efficient use of existing water sources and reducing use. Metering should be implemented wherever feasible to identify opportunities to reduce water use and enable tracking of reductions and associated benefits including cost savings.

The water use efficiency and management requirements of EO 13514 apply at the Agency level and agencies should focus on long-term reductions with the 20% target as

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[1] The EPA *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* , can be found at http://www.epa.gov/owow/NPS/lid/section438/

[2] The DOE *Guidance for the Implementation and Follow-up of Identified Energy and Water Efficiency Measures in Covered Facilities, can be found at http://www1.eere.energy.gov/femp/pdfs/eisa_project_guidance.pdf?CFID=2049309&CFTOKEN=15865459*

their goal. Agencies should not direct uniform reduction targets to the sub-agency bureau or command level unless appropriate, but should instead identify reduction targets based on mission needs and opportunities for efficiency and reduction success. Where agencies elect to maintain current levels of water use for certain mission critical activities such as research experiments that require the same amount of water to be used consistently over time, agencies should focus efforts on improving efficiency in the water delivery and containment systems that provide this water.

- Agencies may find it more beneficial and cost-effective to target reductions in areas where water scarcity is greater than in areas where water is more abundant.
- Agencies should consider current water use across various sub-elements and focus efforts where the largest and most feasible opportunities exist.
- Agencies should consider energy-water tradeoffs associated with the use of new water and energy efficiency technologies.
- Actions for reducing landscaping and agricultural water consumption should take into account variability in climate as well as complimentary EO 13514 goals such as energy efficiency.

As agencies work to meet the requirements of EO 13514, they must ensure that their actions comply with all applicable statutes, regulations, and codes.

3.0 Definitions

The following definitions are provided to assist Federal agencies in understanding the requirements of EO 13423 and EO 13514 and reflect how these terms are used for purposes of implementing EO 13423 and EO 13514:

Agricultural water– Water used for irrigation and other uses related to Federal agency testing and development of agricultural products including food and goods ultimately used in farming and forestry, and water use related to research associated with animal and livestock operations. This use also includes Federal agency operations where water is used for greenhouse operations, aquaculture and animal support operations. Water reused for agricultural processes or obtained from an alternative water source is not classified as agricultural water consumption. In the event where agricultural water is also classified as potable, see section 4.3.

Alternative water – Water not obtained from a surface water source, ground water source, or purchased reclaimed water from a third party. Alternative water can include rainwater harvested on site, sump pump water harvesting, gray water, air cooling condensate, reject water from water purification systems, water reclaimed on site, or water derived from other water reuse strategies.

***BMP*:** (Best Management Practice) A practice or combination of practices that are determined to be the most effective and practicable (including technological, economic, and institutional considerations) means of controlling point and nonpoint source pollutants at levels compatible with environmental quality goals.

Facility – Any building, installation, structure, land, or other property owned or operated by, or constructed or manufactured and leased to, the Federal Government. This term includes a group of facilities at a single or multiple location(s) managed as an integrated operation, as well as government-owned contractor-operated facilities. Water consumption for facilities that are occupied by multiple agencies will be reported by the agency that reports the energy consumption.

Freshwater source – A water source (surface or ground water) that has a total dissolved solids concentration of less than 1,000 milligrams per liter (1,000 ppm).

Gross square footage or square footage – The area reported for a building or other facility subject to both the energy and water requirements as defined in EO 13423. The value used to calculate the water consumption intensity will generally rely on the value reported for the energy use of that facility. The results can be used to assess the progress being made to reduce water use within each agency. Each agency's total facility square footage for water use will be the same as the value reported for the combined gross square footage of their Energy Goal Subject Buildings and Goal Excluded Facilities under 42 U.S.C. 8253(a). If a significant portion of an agency's square footage does not have water service (unoccupied structures that still use energy, for example), the agency may consult with DOE FEMP and CEQ to determine if it is appropriate to reduce the non-water-using square footage from the water intensity calculation.

ILA water – Industrial, landscaping and agricultural water used by a Federal agency.

Industrial water – Water used by a Federal agency to aid in processes such as cooling, washing, and manufacturing. Industrial water is often supplied on-site, withdrawn from local freshwater sources, or purchased from publicly supplied sources. Some examples of industrial water consumption include, but are not limited to, vehicle wash facilities, make-up water for cooling towers, and process steam production. For the purposes of this guidance, non-potable water use related to space cooling of facilities is classified as industrial water use. Water reused in industrial processes or obtained from an alternative water source is not considered to be industrial water consumption for the purposes of this guidance. In the event where industrial water is also classified as potable, see section 4.3.

Landscaping water– Water used by a Federal agency for the controlled application of water to outdoor spaces to supplement water demand not satisfied by natural precipitation. Examples of Federal agency landscaping water consumption include irrigation of turf or landscaped beds, recreational fields, and ornamental ponds and fountains. Water reused in landscaping or water that is obtained from an alternative water source is not classified as landscaping water consumption. In the event where landscaping water is also classified as potable, see section 4.3.

Non-consumptive water use – As related to the industrial, landscaping, and agricultural water use goal in EO 13514 - water that is diverted from its freshwater source and is returned to the point of diversion in the same quantity and quality as the original diversion. The term "same quantity" means that the volume of water diverted from the

water source is the equivalent volume of water that is returned to the water source. The term "same quality" means that the water discharged is in compliance with effluent limitations contained in applicable discharge permits and that the designated use and the associated water quality criteria for the water source are maintained. Examples are provided in section 4.1.

Non-potable water– Water obtained from freshwater sources that is not of sufficient quality for human consumption and has not been properly treated or has not been permitted and approved for human consumption. Some examples of non-potable water uses include, but are not limited to, industrial process applications such as (but not limited to) cooling towers and boilers, landscape irrigation, and agricultural irrigation.

Potable water– Water that is of sufficient quality for human consumption and is obtained from public water systems or from freshwater sources such as lakes, streams, and aquifers which are classified, permitted, and approved for human consumption. Some examples of potable water use by Federal agencies include drinking, bathing, toilet flushing, laundry, cleaning, food services, landscape irrigation, and process applications such as cooling towers, and boilers.

Purchased reclaimed water – Wastewater-treatment plant effluent purchased from a third party that has been diverted for beneficial uses such as irrigation, industry, or thermoelectric cooling instead of being released to a natural waterway or aquifer.

Water consumption intensity – Water consumption by a Federal agency, per square foot of building space.

Water reuse – Water which is discharged from one process and then utilized as a water source for a different process, which results in a substitution of the use of an existing freshwater source.

4.0 Executive Order Goals

4.1 Water Uses Covered

EO 13514 covers water that is withdrawn and consumed for a specific purpose, such as for public supply, domestic use, irrigation, or industrial processing. It does not affect water transfers or deliveries that agencies are legally obligated to fulfill in response to negotiated agreements such as U.S treaty agreements with tribal governments, or in compliance with contracts to supply water for authorized uses from Federal projects. Nor does it apply to water that is used on lands in conformance with corresponding water rights established through state law that control the use of the water resources on that land.

EO 13514 also does not cover water used in non-Federal facilities, even if co-located on Federal lands, or water used in Federal facilities where the Federal government does not directly pay for the water used.[3]

EO 13514 focuses on reducing water consumption; however there may be water uses in the Federal community that do not ultimately consume water. Therefore, this guidance distinguishes several types of non-consumptive uses that would not fall under the baseline or reduction targets associated with EO 13514. Examples of non-consumptive water use include:

- Fish hatcheries where water is pumped from surface water, such as a river, to supply the fish hatchery with a specific volume of water and that same quantity of water is returned back to the original water source in such a condition as to meet all applicable effluent discharge standards for that receiving body or not otherwise deteriorate water quality conditions below acceptable levels. (Water that could be lost due to leakage of tanks or piping systems associated with the hatchery should be identified and reduced through leak management actions.)
- In-stream use of water that is used, but not withdrawn, from a surface water source for such purposes as hydroelectric power generation, navigation, water quality improvement (e.g., wetland restoration), fish propagation, Endangered Species Act compliance (e.g., minimum flows, both quantity and timing) and recreation.

4.2 Reduce Potable Water Consumption Intensity by 2% Annually

Under Section 2(d)(i) of EO 13514, each agency is directed to reduce potable water consumption intensity by 2% annually through FY 2020, or 26% by the end of FY 2020, relative to the FY 2007 baseline. This goal maintains the FY 2007 baseline established under EO 13423 and extends the date of the water intensity reduction goal of EO 13423

[3] Facilities not covered also includes facilities with fully-serviced leases where the landlord, a non-federal entity, is responsible for paying all water bills and facilities that are co-located on Federal lands, but are privately owned (e.g., takeout restaurants, privatized family housing) and thus not considered part of the Federal building inventory.

from FY 2015 to FY 2020, thereby increasing the overall reduction from 16% to 26%. Agencies should develop a strategy that identifies and prioritizes sites with high potential for savings from both a water consumption and economic perspective. Agencies should also ensure that cost-effective best management practices are instituted at agency-controlled potable water production facilities (to include plants and distribution lines) to make certain that systems continue to meet applicable drinking water regulations while addressing water conservation goals.

Section 2(d)(i) specifically states that water use associated with this goal is for potable water consumption. While EO 13423 did not specify potable water consumption, the guidance on EO 13423, *Establishing Baseline and Meeting Water Conservation Goals of Executive Order 13423*, [4] issued by the Department of Energy did define water consumption for this goal as potable water consumption.

Agencies that have included potable water consumption related to ILA water consumption in the EO 13423 FY 2007 baseline for potable water consumption and subsequent annual reports should continue to track these water uses as potable water consumption.

Meeting the EO 13514 goal requires Federal agencies to take the following steps, including some that may have already been taken:

1. ***Baseline development*** – calculate a baseline of FY 2007 water use intensity, defined as gallons per gross square foot per year. All future potable water reduction goals will be measured relative to this baseline.

2. ***Reduction of water use intensity*** – identify and implement life-cycle cost-effective water savings measures to achieve a minimum of 2% annual reduction or 26% overall reduction of water use intensity by the end of FY 2020.

3. ***Reporting*** – report baseline and annual consumption data per the requirements of Section 7(b)(iv) of EO 13514 and Section 8 of this guidance.

4.3 Reduce Industrial, Landscaping, and Agricultural Water Consumption by 2% Annually

Under 2(d)(ii) of EO 13514, Federal agencies are required to reduce ILA water consumption by 2% annually, or 20% by the end of FY 2020, relative to a FY 2010 baseline.

The goal for ILA water consumption reduction applies when each of the following criteria is met:

- The water use is industrial, landscaping, or agricultural water consumption (as defined in the Definitions section of this document), **and**

[4] *Establishing Baseline and Meeting Water Conservation Goals of Executive Order 13423* can be obtained on the FEMP website at: http://www1.eere.energy.gov/femp/pdfs/water_guidance.pdf

- The water use is **not** currently tracked in the baseline and subsequent annual water reports for the water intensity reduction goal of EO 13423 (per the interpretation in item 4.2 above), **and**
- The water used for industrial, landscaping, and agricultural activities occurs at a Federal facility (as defined in the Definitions section of this document), **and**
- The water use is not considered "non-consumptive."

To eliminate an overlap and preclude the need for agencies to change their FY 2007 potable water use baseline, agencies should include in their FY 2010 baseline only potable and non-potable ILA water consumption that is **not** currently tracked in their FY 2007 baseline.

There is an important distinction for this goal—Federal agencies are required to reduce the total combined volume of water consumption (gallons) for ILA water rather than water consumption intensity (gallons per gross square foot) as measured under Section 2(d)(i). Under 2(d)(ii) of EO 13514, reduction in ILA water consumption is not associated with facility square footage.

The key steps for Federal agency to following in meeting this goal for ILA water consumption reduction are described below.

1. ***Baseline development*** – calculate a baseline of FY 2010 water consumption for each ILA usage type (as defined in the Definitions section of this document) and combine the three uses into a total volume for the entire agency. All future reduction goals will be measured against to this total baseline value.

2. ***Reduction of water consumption*** – identify and implement water saving measures in ILA water applications to achieve a target 2% annual reduction and 20% overall reduction of water consumption by the end of FY 2020 based on the FY 2010 baseline.

3. ***Reporting*** – report baseline and annual consumption data per the requirements of Section 7(b)(iv) of EO 13514 and Section 8 of this guidance and any other OMB or CEQ direction.

4.4 Unique ILA Water Uses

Agencies may have types of ILA water use that are limited in volume and may not be practical to measure in order to meet targeted reductions. Examples include remote water facilities that are unmetered and have only sporadic human oversight (e.g., watering stations for wildlife). The episodic use by Federal agencies of water for control of wildfires should not be included in the accounting for water use under this instruction.

In circumstances where ongoing measurement and monitoring of water use is not possible or practical and likely water use is limited, agencies should identify and

inventory those circumstances including estimates of water used. Based on potential benefits, agencies should implement feasible efforts to reduce water use by employing efficiency and/or productivity improvements. To ensure best practices are shared, agencies will be asked to describe any inventory of these unique uses and the approaches they will undertake to use water more efficiently through the application of best management practices in the agencies' annual Strategic Sustainability Performance Plans.

4.5 Identify, Promote, and Implement Water Reuse Strategies

Section 2(d)(iii) of EO 13514 directs Federal agencies, consistent with State law, to identify, promote, and implement water reuse strategies to reduce potable water consumption from freshwater sources. Note that the provision specifies a reduction of potable water consumption, not non-potable water consumption.

There are no quantifiable goals related to this provision. Section 6 of this document provides an overview of water reuse and describes how water reuse strategies can be used to satisfy certain water uses.

4.6 Implement and Achieve Stormwater Management Objectives

Section 2(d)(iv) of EO 13514 directs Federal agencies to implement and achieve stormwater management objectives identified in guidance issued by EPA in 2009 entitled *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*.

The Technical Guidance provides background information, key definitions, case studies, and guidance on meeting the new requirements. Federal agencies can comply with Section 438 by using a variety of stormwater management practices often referred to as "green infrastructure" or "low impact development" practices, including, for example, reducing impervious surfaces, using vegetative practices, porous pavements, cisterns and green roofs. The Technical Guidance can be found at EPA's Low Impact development website at http://www.epa.gov/owow/NPS/lid/section438/.

5.0 Baseline Development

5.1 Potable Water Consumption

EO 13514 extends the schedule for the EO 13423 requirement for all Federal agencies to reduce potable water use. The baseline under EO 13514 is the same as the baseline established under EO 13423. All potable water consumption in Federal facilities should be reported (with the exception of water used in Federal facilities where the Federal government does not directly pay for the water used), whether used for human consumption, building process, power plant or building cooling, landscape watering, irrigation, or industrial uses. Each agency will develop a water use intensity number, which is defined as annual potable water use divided by total gross square footage of

facility space.[5] Potable water used for agricultural or landscape irrigation is to be reported in the agency total potable water use, but the amount of turf, landscape or other affected area is not included in the gross square footage reporting.

Metered Facilities:
All metered potable water use at agency facilities is to be included in the total water use for the baseline period.

Unmetered Facilities:
Some Federal facilities are not metered for water use. Agencies that have sites without metered potable water use should estimate potable water consumption. Agencies are encouraged to support the incorporation of metering to the extent that it enables both baseline development and information to provide current and accurate indicators of the agency's progress toward water consumption reduction goals.

It is important to document the assumptions and estimating techniques used so that they can be repeated in the future to measure progress towards reduction goals. Of equal importance is documenting any adjustment to baseline data, once efforts are implemented to account for unmetered facilities either through metering or estimating techniques. All baseline adjustments must be documented and submitted with annual data reports.

Federal facilities and sites that produce their own potable water from water drawn from on-site wells should install meters to measure the amount of water produced. Prior to installation of such meters, well production can be estimated using pump flow rates at the given well depth multiplied by known runtime. Pump flow rate data is typically specified at design; runtime can be monitored easily and inexpensively for representative intervals and then applied to annual calculations. Agencies producing their own water are requested to report water consumption data consistent with their own respective measuring methods (i.e., the use of daily logs, metered data, or flow estimates). The intent is to account for and record what the agency is currently using relative to its established baseline consumption.

5.2 Industrial, Landscaping, and Agricultural Water Use

Conformance with EO 13514 requires that Federal agencies to develop a water consumption baseline for industrial, landscaping, and agricultural uses based on FY 2010 ILA water consumption. Federal agencies should work closely with individual sites to collect accurate data. For ease of data management and reduction strategies and to facilitate decision-making for agency goals, agencies should collect and track each water category so that they have separate accounting of industrial, landscaping, and agricultural water use. Agencies should report one total combined volume for these three use types per the requirements of this guidance.

[5] Each agency's total facility square footage for water use will be the same as the value reported for total facility square footage for energy use.

Agencies may have fluctuations in ILA water use from year to year due to precipitation and temperature variations. These variations can influence water use related to processes such as irrigation and cooling tower makeup water for space cooling. For example, drought conditions may cause an increase in irrigation related to landscaping and agricultural water use.

Also, agencies may experience differences in water use from year to year depending on changes in the agency's infrastructure or mission practices. These fluctuations could affect an agency's baseline and subsequent annual water consumption and reduction efforts. Agencies should note specific reasons for atypical water use when reporting either baseline or subsequent fiscal year water use during reporting on progress towards the reduction goals.

The information below provides guidance to Federal agencies on collecting baseline data from metered and unmetered uses of ILA water.

Metered Uses: All metered ILA water use at agency facilities is to be included in the total water use for the baseline period. Where Federal facilities have individual meters on industrial, landscaping, and agricultural applications, it is important to use consistent units in combining metered water use for each application. See Appendix B for additional information regarding measurement of ILA water use.

Estimating Unmetered Uses: There are instances where Federal facilities have not yet installed meters to measure industrial, landscaping, and agricultural water use and metering options may not be applicable or practical in the near term. In these instances, an engineering estimate can be used to approximate annual water use for the FY 2010 ILA baseline. First, Federal facilities are encouraged to inventory all unmetered ILA applications. Based on the inventory, agencies can develop a strategy for determining how various applications should be accurately estimated. This process can also help sites determine which applications are to be considered for future metering efforts and provide information on best opportunities for use reduction.

Temporary flow meters may offer a solution to estimating water usage (conveyed via pipelines). Temporary ultra-sonic flow meters can be installed to the outside of a pipe and do not require a disruption of the flow. Care must be taken to install the meters so that the water flow is representative of conditions that can be used to establish an annual value for consumption. A weir can be used to measure flow in an open channel in appropriate low flow applications.

Agencies should establish procedures to document the assumptions and estimating techniques used so they can be repeated in the future to measure progress towards reduction goals. Documenting any adjustment to baseline consumption data is also important, once efforts are implemented to account for unmetered facilities either through metering or refined estimating techniques. All baseline adjustments must be documented and submitted with annual data reports.

For individual applications where engineering estimating techniques are used to estimate water use, the following table offers suggested guidelines for minimum documentation.

Application	Minimum Engineering Documentation Recommendation
Cooling systems	Annual cooling system make-up rate[6]
Steam heating systems	Annual heating system make-up rate[7]
Washing applications	Number of units washed annually and gallons used per unit[7]
Single-pass cooling systems	Annual system flow rate[8]
Irrigation systems – option 1	Annual irrigation factor[9]
Irrigation systems – option 2	Precipitation rate of equipment and annual runtime of equipment[10]

These documentation recommendations are referenced in guidelines developed by Pacific Northwest National Laboratory on behalf of the Federal Energy Management Program, which offer methodologies to estimate unmetered irrigation and industrial applications. The methodologies presented are intended for individual applications and processes at the site level. They can be found at the following website: http://www1.eere.energy.gov/femp/program/waterefficiency_resources.html#fg. Appendix B contains additional information to improve the accuracy of the estimates when using the guidelines.

6.0 Water Reuse and Alternative Water Sources

This section provides guidance to Federal agencies on strategies for water reuse and alternative water sources. When considering such strategies, agencies must review local and/or state laws, regulations, and codes to ensure that any actions taken will be in compliance with local public health and safety requirements as well as all applicable Federal, state and local statutes, regulations, and codes. Agencies should also obtain any necessary permits and/or determine that they will not interfere with any senior water rights prior to use of water from these sources. EPA's 2004 Guidelines for Water Reuse (http://water.epa.gov/infrastructure/sustain/availability_wp.cfm) may also be a useful resource in developing water reuse strategies and practices.

[6] Make-up rate is the water supply needed to replace all losses due to evaporation, leaks, or discharge in boiler or cooling systems.

[7] If the washing application recycles or reuses water in the system, the percentage of water that is recycled should be taken into account in the documentation of the engineering estimate.

[8] The approximate flow rate of single-pass or once-through cooling systems represents their annual usage because no water is lost due to evaporation.

[9] Annual irrigation factor represents the total annual irrigation requirement per square foot of distinct landscape types. The annual irrigation factor is the sum of the monthly crop coefficients minus the sum of the monthly effective precipitation.

[10] Precipitation rate of irrigation equipment represents the amount of water that is delivered to an area over a given period of time. The annual runtime of the equipment is the total time the irrigation equipment operates over one year.

The goal of Section 2(d) of EO 13514 is reduced consumptive water use—not the substitution of one source of water for another to maintain the same level of water consumption. However, this guidance recognizes that there are circumstances in which it is desirable to change to a different source to support water use. For example, using reclaimed wastewater to support industrial uses may be preferable to withdrawing treated potable water from a public water supply, reducing the impact on a freshwater source that is already under stress. Harvesting stormwater to use for landscape irrigation may be preferable to using treated potable water and has the added benefit of reducing stormwater runoff and saving energy. In cases such as these, water efficiency and substitution of a source should be considered together to achieve improvements in water consumption and reduce the stress on freshwater sources.

6.1 Water Reuse Strategies

EO 13514 promotes water reuse strategies (consistent with State law) as a means to reduce potable water consumption. When considering water reuse or alternative water source strategies, agencies must ensure compliance with applicable local and/or state laws, regulations, and codes. Some methods of water reuse are not resource intensive and are easy to adopt. For example:

- In **water recycling**, discharge water from an application or process is used again in the same application. For example, a vehicle wash facility can capture the final rinse water and use it in the first rinse cycle for the next vehicle.

- In **industrial water reuse,** discharge water from one industrial-oriented application or process can be captured and utilized in another application. For example, in appropriate situations, reject water from a reverse osmosis system or air conditioning condensate could be used for cooling tower make-up.

- In **water reclamation**, effluent generated by a wastewater treatment facility is treated to a level that is appropriate to be used in another application. The water is typically treated to the level that is safe for human contact but not consumption. Reclaimed water can be used in applications such as landscape irrigation, toilet and urinal flushing, vehicle wash facilities, and cooling tower make-up water, if appropriate under local and/or state laws, regulations, and code.

Reclaimed water is a more resource-intensive process because it requires (1) treatment, which can be as great as that needed to provide pathogen free drinking water, and (2) a distribution system to deliver water to users. At this time, some utilities engaged in reclaiming wastewater are already having difficulty meeting demand for reclaimed water resources and some are also concerned that they may not be able to expand capacity or be forced to reduce capacity in order to meet state requirements for in-stream flow. As such, while purchased reclaimed water may be an appropriate strategy to replace the use of potable water in some applications, it may not be appropriate as a strategy to replace the use of non-potable water.

Therefore, rather than disallowing any type of water reuse to be considered as a strategy for reducing ILA water use, this guidance allows all types of water reuse other than purchased reclaimed water to be used as a strategy to claim reductions for the provisions related to ILA water use. Purchased reclaimed water will, however, still be available as a strategy for reducing potable water use. Appendix C provides examples of how to calculate potable and ILA water reductions from different types of water reuse strategies.

6.2 Alternative Water Sources

As previously described, for the purpose of this guidance, alternative water is defined as water that is not obtained from a surface water source, a ground water source, or purchased reclaimed wastewater.

Alternative water sources can be used to reduce water consumption in order to meet the targets associated with the potable and ILA water goals of EO 13514. In addition to rainwater and stormwater harvesting, examples of alternative water sources include:

- ***Gray Water***: This is water that is generated by a facility from end-uses such as restroom sinks, showers, and clothes washing machines. Gray water can contain pathogens and is generally not safe for human contact. Some gray water systems include basic treatment such as filtration or disinfection. A common use for gray water is to reuse the water for toilet and urinal flushing. Depending on the level of treatment, gray water may be reused in irrigation as well. If gray water is not treated, then subsurface or drip irrigation is most appropriate to lessen the likelihood of contact with humans or animals. If the gray water has been treated to the level that is safe for human contact, surface irrigation, ornamental ponds and fountains may be appropriate applications. **To ensure compliance with local and/or state laws, regulations, and codes, agencies must consult local health and safety codes before implementing gray water reuse strategies.**

- ***Air Conditioning Condensate***: Condensate can be captured from air handling units to be delivered to other applications such as cooling tower make-up water, irrigation, or decorative fountains.

- ***Water Purification Reject Water***: Water purification systems such as reverse osmosis and nanofiltration systems produce "reject" water as a byproduct of the process. This reject water contains impurities that have been filtered out of the water through the purification process. This reject water often can be used in applications such as cooling tower make up and irrigation.

- ***Sump Pump Drainage Water***: Water that is pumped away from building foundations to preclude damage to the structure can be utilized in other applications such as cooling tower make-up water or landscape irrigation.

7.0 Implementing Water Efficiency Activities

7.1 Identifying and Prioritizing Water Efficiency Opportunities

In accordance with the Energy Independence and Security Act of 2007 (EISA), agencies are required to conduct comprehensive energy and water evaluations of 25% of covered facilities (i.e., facilities that represent 75% of agency energy use) each year. Agencies are encouraged to use this effort to implement water use reduction goals of EO 13514 and identify potential water efficiency opportunities. The Federal Energy Management Program (FEMP) developed guidance for energy and water evaluations. The guidance contains definitions, roles and responsibilities. The guidance can be accessed at http://www1.eere.energy.gov/femp/pdfs/eisa_s432_guidelines.pdf.
FEMP has prepared the *Guidance for the Implementation and Follow-up of Identified Energy and Water Efficiency Measures in Covered Facilities* (September 2012) which can be accessed at
http://www1.eere.energy.gov/femp/pdfs/eisa_project_guidance.pdf?CFID=2049309&CFTOKEN=15865459
Each agency is encouraged to track baseline and annual water consumption using EPA's Portfolio Manager tool in order to benchmark water consumption and prioritize improvement opportunities. Portfolio Manager can track potable and ILA water usage and measure reductions over the baseline year. Data can be easily extracted from Portfolio Manager in a format consistent with agency reporting requirements. To access Portfolio Manager go to: www.energystar.gov/benchmark.

While evaluating water efficiency opportunities, agencies should consider their goals and priorities as well as the life-cycle cost of improvements. Water use efficiency measures should be pursued for both ILA water and potable water. Agencies are encouraged to use life cycle, cost effective evaluation techniques when considering water efficiency improvement options. For more information about life-cycle cost calculations, visit http://www1.eere.energy.gov/femp/program/lifecycle.html.

Each agency should prioritize the installation of water conservation measures based on its own practices and applications. As opportunities are identified, agencies should consider the use of Best Management Practices (BMPs) to make improvements in technologies and behaviors. FEMP and EPA have developed a set of BMPs applicable to water use in federal facilities. These BMPs are available on the FEMP website: http://www1.eere.energy.gov/femp/program/waterefficiency_bmp.html.

When agencies are considering replacing fixtures and other water using products, they should purchase FEMP designated or WaterSense labeled products. All products bearing the EPA WaterSense label have been independently certified to be at least 20% more efficient and perform as well as their traditional counterparts. For more information on these programs, products, and standards, please visit the following sites:

- FEMP Designated Products: http://www1.eere.energy.gov/femp/technologies/procuring_eeproducts.html.
- WaterSense labeled products: www.epa.gov/watersense.
- A matrix of many current standards can be found at http://www.allianceforwaterefficiency.org/codes_and_standards_home_page.aspx.

7.2 Implementing Improvements

Where feasible, agency water efficiency projects should bundle multiple water efficiency and/or energy efficiency measures to make the most effective use of resources. In addition, measurement and verification should be used to quantify the benefits of project implementation. Wherever feasible, projects must include permanently installed water meters for all major water uses, retrofit projects, and tenant organizations. Current measurement and verification guidance for water projects can be found at: http://www1.eere.energy.gov/femp/pdfs/mv_guidelines.pdf.

For additional Water Efficiency Resources, please visit the FEMP Water Efficiency Resources page: http://www1.eere.energy.gov/femp/program/waterefficiency_resources.html.

8.0 Reporting Requirements

8.1 General Requirements

Under section 7(b)(iv) of EO 13514, agencies are required to report the performance and progress towards the goals of the EO to the Council on Environmental Quality (CEQ) and the Office of Management and Budget (OMB).

The following are the specific reporting requirements for the water related goals and water reuse strategies outlined in EO 13514.

8.2 Reduce Potable Water Consumption Intensity by 2% Annually

Federal agencies should continue to report their annual potable water consumption for comparison with the 2007 baseline in the ***Annual GHG and Sustainability Data Report*** managed by DOE's FEMP program and in their Strategic Sustainability Performance Plan as appropriate. Agencies should report their total potable water consumption both metered and estimated, at the agency level in units of millions of gallons along with associated cost (including sewage fees, etc.) incurred directly from potable water consumption in thousands of dollars. The reporting cycle is the fiscal year (October 1 through September 30). The performance metric for potable water consumption in relation to the 2007 baseline is gallons per gross square foot.

For the purposes of determining the water intensity metric for potable water (gallons per gross square foot), agencies should use as the default the combined gross square footage of their Energy Goal Subject Buildings and Goal Excluded Facilities under 42 U.S.C. 8253(a). If a significant portion of an agency's square footage does not have water

service (unoccupied structures that still use energy, for example), the agency may reduce this non-water-using square footage from the water intensity calculation.

Agencies should not include reused, purchased reclaimed, or water from alternative sources in the total for the agency's annual potable water consumption reported. In the event that reused, reclaimed, or water from alternative sources is purchased for potable water consumption, agencies shall include those billed costs within the reported value for potable water consumption in thousands of dollars.

8.3 Reduce Industrial, Landscaping, and Agricultural Water Consumption by 2% Annually

Federal agencies should report annual ILA water consumption, including any potable water used for ILA not previously measured for the FY 2010 baseline and their subsequent annual consumption in the ***Annual GHG and Sustainability Data Report*** managed by DOE's FEMP program and in their Strategic Sustainability Performance Plan as appropriate. Agencies should sum metered and estimated ILA water consumption at the agency level in units of millions of gallons along with associated cost incurred directly from ILA water consumption in thousands of dollars. The reporting cycle is the fiscal year (October 1 through September 30). Potable water reported under section 8.2 above shall not be reported as ILA water, no matter its use. Appendix C provides several examples of how to calculate ILA water reductions from different types of water reuse strategies.

Agencies shall include purchased reclaimed water in the ILA FY 2010 baseline and annual values of ILA reported. Agencies are not required to include their consumption of reused, or non-purchased reclaimed water, or water from other alternative sources in each agency's reported annual ILA or potable water consumption. Where appropriate, agencies may include a description of this consumption in their Strategic Sustainability Performance Plan and OMB scorecard narratives. Agencies should include billed costs for purchased reclaimed water within the cost reports for ILA water consumption.

If an agency experiences a wide fluctuation in ILA water use during the baseline or subsequent years, agencies should detail specific reasons for the fluctuations when reporting. Agencies should include performance indicators in their reporting narratives that would indicate the efficient use of ILA water despite any significant fluctuation in overall water use.

Agencies with unique ILA water uses (see section 4.4) should detail the specific reduction efforts they plan to undertake as part of the annual Sustainability Plan process. This should include the inventory of opportunities for water use reductions in the first year and evidence of implementation in subsequent years, including a discussion of the results of actions taken.

8.4 Identify, Promote, and Implement Water Reuse Strategies

Federal agencies, through the annual updates of their Sustainability Plan, should provide a narrative explanation of their plans for and implementation of water reuse strategies, including where possible, the volume of water used.

References

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Appendix A – Flow Meter Types

There are three basic types of flow meters that can be used to measure water use at the building or process level, described in the following table.

Meter type	Size of pipe	Application	Notes
Positive Displacement	up to 3 in.	Residential or small commercial	More accurate at lower flows, easy to install
Differential Pressure (e.g., orifice, venturi)	1/4 in. to 4 in.	Larger commercial or industrial facilities or distribution lines	Medium accuracy
Velocity (e.g., turbine, paddlewheel, vortex shedding, ultra-sonic)	Turbine: 2 in. to 20 in.Vortex: 1 in. to 12 in. Ultra-sonic: up to 20 in.	Larger commercial or industrial facilities or distribution lines	High accuracy

When considering what type of meter to install, it is important to determine the water flow rates, pipe size, line pressure, accuracy requirements, physical installation requirements (length of straight pipe upstream and downstream of meter), and data acquisition/processing needs. Most meters require regular inspections to check for water leakage, corrosion, abnormal sounds, and proper connection. Calibrations should be performed per the manufacturer's recommendation.

Appendix B – Improving the Accuracy of Estimating Water Use for Landscaping and Industrial Uses

Measuring actual water use through flow meters is the best method to measure industrial, landscaping, and agricultural water use. Agencies are encouraged to support the incorporation of metering to the extent that it enables both baseline development (and confirmation) and annual reporting. Metered measurement provides current and accurate indicators of the agencies progress toward the water use reduction goal. Appendix A contains basic information about the types of meters used to measure water flow.

At a minimum, meters should be installed on all supply water sources including non-potable and alternative on-site water sources. Other sub-metering of specific applications should also be considered where cost-effective. The following table provides guidance on applications that should be considered for sub-metering.

Application	Metering Guidance[11]
Irrigation systems	Meter all irrigated landscape area exceeding 25,000 square feet
Cooling towers	Meter cooling tower make-up supply water where cooling tower flow through tower exceeds 500 gallons per minute
Evaporative coolers	Meter evaporative cooler make-up supply water where it exceeds 0.6 gallons per minute
Steam and hot water boilers	Meter boiler make-up supply to boilers greater than 500,000 British Thermal Units per hour (Btu/h)
Washing applications	Meter water-intensive wash applications such as vehicle wash station and laundry
Single-pass cooling equipment	Meter all single pass cooling systems
Large water processes	Meter all large water consuming processes where daily consumption exceeds 1,000 gallons per day

When installing flow meters, agencies should consider using meters that have advanced data management capability, similar to the requirements for advanced electric meters per the Energy Policy Act of 2005.[12] Advanced data management capability includes the following:

- remote data access;
- interval data capabilities that collect hourly data (at a minimum);
- electronic data storage and reporting capability.

[11] Recommendations for specific metering applications are adapted from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), *Standard for the Design of High Performance Green Building* 189.1-2009 Table 6.3.3B – Subsystem Water Measurement Thresholds.

[12] Information on advanced metering requirement for electric meters can be found on the FEMP website at: http://www1.eere.energy.gov/femp/regulations/requirements_by_subject.html#am

Advanced meters with these capabilities will allow the user to produce reports that show daily, monthly, and annual water consumption. Information can be generated from the metering system to alert of operational problems such as leaks as well as determine water savings from specific processes or equipment efficiency changes.

Agencies should use discretion when estimating their baselines for unmetered uses. While the guideline documents offer detailed methodologies, agencies should at a minimum incorporate the following information into their calculations to ensure that they are as accurate as possible.

Industrial Water Use

- Agencies should conduct a process audit or develop a water balance for the significant water-using processes in their facilities. This analysis may include a measurement of the water used in each step of a process or a calculation of water inputs and outputs of a system as a whole. In addition to estimating water use, this information can be used to identify areas where water use can be reduced in the future.
- If batching is used within a process, water can be estimated based on the number of units produced and the amount of water used per unit. Additional adjustments should be made if water is recycled or reclaimed during the process.
- In addition to the evaluation of industrial processes, agencies should analyze the water use in mechanical systems such as evaporative cooling systems, steam heating systems, and washing applications as part of their baseline to ensure that all significant water uses are included.

Landscape Water Use – At a minimum, agencies should estimate their water use with one of the following methods.

- Evapotranspiration Method – an estimate of supplemental water requirements based on the amount of water transpired and evaporated from plants for different climates across the U.S. This estimate should include an analysis of the water needs of the plants in the landscape at the particular facility in relation to the water available due to rainfall and evapotranspiration. It should also include a factor to incorporate the efficiency of the installed irrigation system.
- Irrigation Audit Method – a physical measurement of water applied to the landscape areas through irrigation equipment. This estimate should calculate the irrigation equipment's precipitation rate and consistency. This analysis can be utilized along with the annual runtime of the system to estimate annual landscape water use.

Appendix C - Examples Showing Where Water Derived from Water Reuse or Alternative Water Sources Can be Used to Help Meet Reduction Targets

(1) A GSA building in San Antonio, Texas currently purchases water from a public water utility to irrigate their landscape. The water system also provides reclaimed water as a service. The facility manager decides to purchase the reclaimed water to substitute use of treated drinking water. What percentage reduction can they claim?

Answer: 100%, because they are changing from potable water to purchased reclaimed water, which has less treatment requirements than treated drinking water. This helps meet Goal 1 of the EO to reduce potable water use.

Before change	
Volume Water Used from Potable Source	500,000 gallons
After change	
Volume Water Used from Reclaimed Water	500,000 gallons
Volume Potable Water Reduced	500,000 gallons
Percent reduction	100%

Result: GSA reports 500,000 gallons less potable water than would otherwise be reported for its potable water consumption.

(2) A GSA building in San Antonio, Texas currently purchases water from a public water utility to irrigate their landscape. The facility manager decides to change the amount of turf grass and install drip irrigation in newly landscaped area. What percentage reduction can they claim?

Answer: 50%, because the new landscape and irrigation system are more water efficient requiring half as much water. This helps meet Goal 1 of the EO to reduce potable water use.

Before change	
Volume Water Used from Potable Source	500,000 gallons
After change	
Volume Water Used from Potable Source	250,000 gallons
Volume Water Used after Landscape Change	250,000 gallons
Volume Potable Water Reduced	250,000 gallons
Percent reduction	50%

Result: GSA reports 250,000 gallons less potable water than would have otherwise been reported for its potable water consumption.

(3) A GSA building in San Antonio, Texas currently uses non-potable water from a ground water well located on the grounds to irrigate their landscape. The local water utility provides reclaimed water as a service. The facility manager decides to purchase reclaimed water to substitute use of self-supplied ground water. What percentage reduction can they claim?

Answer: 0%. Purchased reclaimed water cannot be used as a substitute for self-supplied water. The guidance does not allow use of purchased reclaimed water to count towards reductions in non-potable water.

Before change	
Volume Non-Potable Ground Water Used from Self-Supplied Well	500,000 gallons
After change	
Volume Water Used from Purchased Reclaimed Water	500,000 gallons
Volume Non-Potable Ground Water Reduced	500,000 gallons
Percent reduction	0%

Result: GSA reports the use of the 500,000 gallons of purchased reclaimed water within their total for ILA water consumption.

(4) A GSA building in San Antonio, Texas currently uses non-potable water from a ground water well located on the grounds to irrigate their landscape. The facility manager decides to change the amount of turf grass and install drip irrigation in newly landscaped area. What percentage reduction can they claim?

Answer: 50%, because the new landscape and irrigation system are more water efficient requiring half as much water. This helps meet Goal 2 of the EO to reduce landscaping water use.

Before change	
Volume Water Used from Self-Supplied Ground Water	500,000 gallons
After change	
Volume Water Used after Landscape Change	250,000 gallons
Volume Non-Potable Ground Water Reduced	250,000 gallons
Percent reduction	50%

Result: GSA reports 250,000 gallons less water than would otherwise be reported for its ILA water consumption.

(5) A GSA building in San Antonio, Texas currently uses non-potable water from a ground water well located on the grounds to irrigate their landscape. The facility manager installs underground tanks that capture stormwater runoff and uses it to supplement their ground water well. What percentage reduction can they claim?

Answer: 50%, because they are using a water reuse strategy of stormwater harvesting to supplement water and use half as much water from their well. This helps meet Goal 2 of the EO to reduce landscaping water use.

Before change	
Volume Non-Potable Ground Water Used from Self-Supplied Well	500,000 gallons
After change	
Volume Non-Potable Ground Water Used from Self-Supplied Well	250,000 gallons
Volume Water from Stormwater Capture	250,000 gallons
Volume Non-Potable Ground Water Reduced	250,000 gallons
Percent reduction	50%

Result: GSA reports 250,000 gallons less water that it would otherwise report for its ILA water consumption.

(6) A DOD base in Texas currently uses non-potable water from ground water wells located on the grounds to water their landscape. The base has its own wastewater treatment plant. The facility manager decides to reclaim effluent from the plant to substitute use of self-supplied ground water. What percentage reduction can they claim?

Answer: 100%. On-site reclaimed water can be used as a substitute for self-supplied freshwater. The guidance does not allow use of purchased reclaimed water to count towards reductions in non-potable water, but reclaimed water generated on-site can be considered.

Before change	
Volume Non-Potable Ground Water Used from Self-Supplied Well	500,000 gallons
After change	
Volume Water Used from On-site Reclaimed Water	500,000 gallons
Volume Non-Potable Ground Water Reduced	500,000 gallons
Percent reduction	100%

Result: DOD reports 500,000 gallons less water than it would otherwise report for its ILA water consumption.