APPENDIX VII

Opportunities for Local Carbon Offset Credits in the Water Category

A Preliminary Review of Regulations and Protocols Related to Certain Indoor and Outdoor Water Uses

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EPIC
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Author
Scott Anders, Director, Energy Policy Initiatives Center

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The Energy Policy Initiatives Center is a research center of the University of San Diego School of Law that studies energy policy issues affecting California and the San Diego region. Energy Policy Initiatives Center's mission is to increase awareness and understanding of energy- and climate-related policy issues by conducting research and analysis to inform decision makers and educating law students.

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1 INTRODUCTION

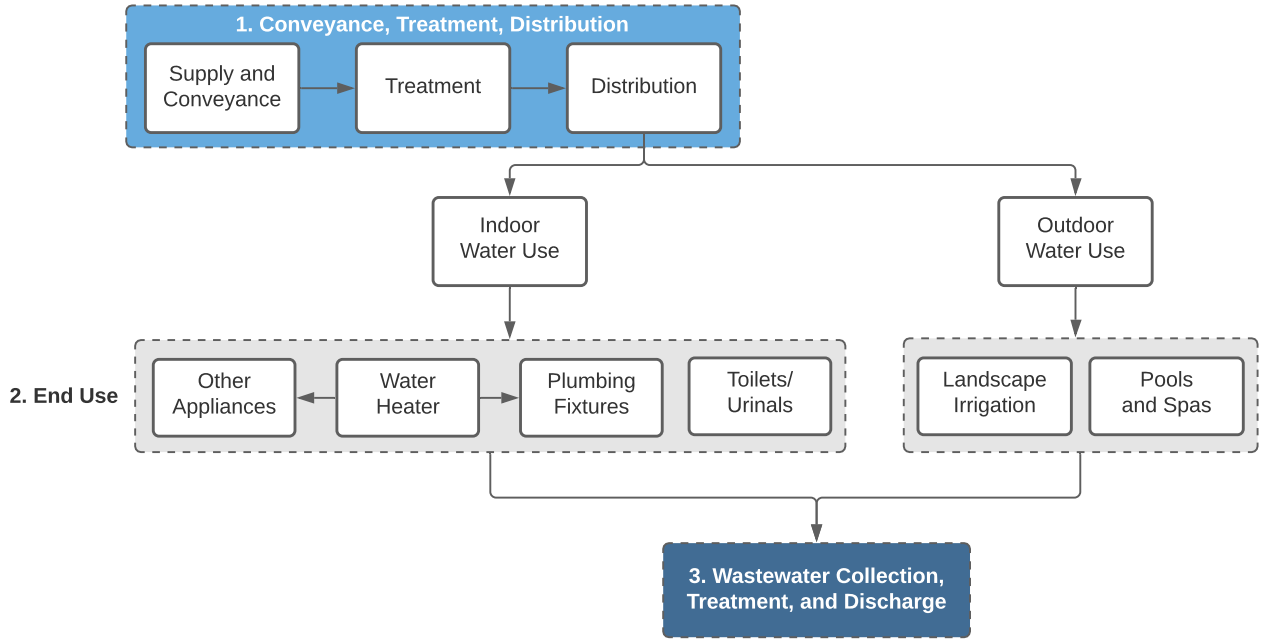
The water emissions category is a subcategory of the electric and natural gas category and is often broken out to highlight the importance of water efficiency and conservation. Emissions associated with water, which represent about 1% of regional emissions,[1] result from energy use at three different stages in the water cycle.[2]

- Conveyance, Treatment, and Distribution – This represents energy use, mostly electricity, to convey, treat, and distribute water. This can include activities both outside and inside of San Diego County. Energy and emissions at this stage represent the amount "embedded" in each gallon consumed at a later point in the cycle.
- End Use – This refers to water used by homes and businesses both indoors and outdoors. Water use at this stage causes greenhouse gas (GHG) emissions in several ways: electricity to operate appliances, energy associated with heating water, and energy used upstream of the end use stage to convey, treat, and distribute water. Because data are not available for energy used by specific appliances, including water heaters, associated emissions are included in the electricity and natural gas category.
- Wastewater Collection, Treatment, and Discharge – This refers to the energy consumption that occurs after the end use in buildings to collect, treat, and discharge wastewater. Similar to end use in buildings, energy use at this stage is accounted for in the electric and natural gas category. Methane emissions associated with wastewater treatment are included in the waste emissions category.

Figure 1 summarizes these three stages, which illustrate the energy-water nexus.[3] This report focuses on emissions from indoor water use associated with plumbing fixtures (e.g., faucets and showerheads) and toilets and urinals, and outdoor water use in landscape irrigation. Indoor water use associated with appliances is not covered here since it would be accounted for in the electricity and natural gas emissions category. Also, agricultural water use in not considered in this report because no related carbon offset credit protocols were identified.

[1] San Diego Association of Governments, San Diego Forward: The Regional Plan, Appendix D
2012 Regional Greenhouse Gas Emission Inventory for the San Diego Region and Projections, 2015, p. 26: https://www.sdforward.com/pdfs/RP_final/AppendixD-2012GreenhouseGasEmissionsInventoryfortheSanDiegoRegionandProjections.pdf. (Note this is the last publicly available estimate of regional emissions.)
[2] See Energy Policy Initiatives Center, Energy-for-Water Nexus in Cities in San Diego County, 2018: https://www.sandiego.edu/epic/documents/20181017_Final%20TSDF%20Water-Energy%20Report_FINAL.pdf.
[3] Ibid.

Figure 1 Framework for GHG Emissions from Water Use



1.1 Project Purpose and Methods

The goal of this project is to identify project opportunities to reduce or remove GHG emissions in the San Diego region that could be used to generate carbon offset credits (offset credits). To support this overall goal, the Energy Policy Initiatives Center (EPIC) identified categories of GHG emissions in the San Diego region; identified activities to reduce or remove emissions; identified related regulations that require such activities; identified related carbon offset credit protocols; evaluated these protocols based on applicability to conditions in the San Diego region and the number of projects developed in the United States (U.S.), California, and the San Diego region; and, determined whether the carbon offset credit protocols and related activities would be considered additional to what would have happened otherwise. The additionality determination is based on a two part test. The legal requirement test determines whether the activity is required by legislation or regulation or otherwise legally mandated. The common practice test determines whether the project activity is considered a common practice and would have happened otherwise for financial or technological reasons. A more detailed discussion of the project approach is provided in Section 3 of the main project report.

This report summarizes the findings of this analysis for the water category, including certain indoor and outdoor water use.

1.2 Key Findings

The following key findings are based on analysis conducted for this report.

- California Regulates Faucets, Toilets, Urinals, and Showerheads – The State of California has adopted standards stricter than federal standards for faucets, toilets and urinals, and

showerheads. All regulated products sold or offered for sale in California must meet these standards.

- California Requires New and Existing Buildings to Install Water Efficient Equipment – California's Green Building Code requires all new buildings to include water efficient equipment. California law also requires all existing buildings to upgrade noncompliant fixtures.
- Only One Carbon Offset Credit Protocol Relates to Water Use and it is Considered Not Additional – There is only one protocol related to water use reduction. The Verra VMR0005 Low Flow Water Devices protocol covers installation of low-flow hot water savings devices used in existing residential and non-residential buildings, excluding industrial buildings.[4] Given California's current regulation of low-flow water devices, this protocol would be considered not additional. Also, there are no projects in the U.S. using this protocol.
- No Carbon Offset Credit Protocols Relate to Outdoor Water Use, But California Regulates Some Aspects – There are no protocols to reduce outdoor water use. The State of California has adopted standards for spray sprinkler bodies and sets standards for water efficiency in landscape irrigation. GHG reductions would have to exceed these standards to be considered additional.

[4] Verra, Methodology for Installation of Low-Flow Water Devices, Approved VCS Methodology VMR0005, Version 1.0, 2014, p. 5: https://verra.org/wp-content/uploads/2018/03/VMR0005-Methodology-for-Installation-of-Low-Flow-Water-Devices-v1.0.pdf.

2 INDOOR WATER USE

Indoor water use can lead to GHG emissions in three different ways: electricity to operate appliances, energy associated with heating water, and energy used upstream of the end use stage. Table 1 summarizes the GHG emissions impact of typical indoor water uses. It also summarizes how activities related to water use can reduce GHG emissions.

- Water Heaters – Water heaters cause emissions by using energy to heat water and energy use in the conveyance, treatment, and distribution stage. A more-efficient water heater uses less energy to heat water but does not necessarily affect the amount of water consumed and thus does not affect upstream energy use.
- Appliances – Water-related appliances lead to GHG emissions from electricity used to operate, upstream energy used to transport and treat water, and energy used to heat water. More energy efficient dishwashers and clothes washers use less electricity to operate. Appliances that are also water-efficient use less water, thus reducing end-use water heating needs and upstream energy use.
- Fixtures – Water use associated with plumbing fixtures like faucets and showerheads create emissions from energy used to heat water and for upstream needs. Low-flow devices reduce water use and thus energy and emissions in both cases.
- Toilets and Urinals – Water used in toilets and urinals is typically unheated water, so emissions from these uses result from upstream energy needs. Low-flow versions use less water, which reduces upstream water use, and lowers upstream energy use.

Table 1 GHG Emissions Impact Related to Indoor Water Use

	Cause of GHG Emissions		
Water Usage Category	**Energy Use**	**Water Use**	**Impact of GHG Reduction Activity**
Water Heating	Electricity, natural gas, and propane to heat water	N/A	More efficient water heaters use less energy to heat each gallon of water consumed. There is no impact on upstream energy.
Appliances (e.g., dishwashers and clothes washers)	Electricity used to operate appliance	Energy used in upstream and local conveyance, treatment, and distribution Electricity, natural gas, and propane to heat water	Energy efficient appliances use less electricity to operate. Water-efficient appliances use less water, thus reducing upstream energy and end-use water heating needs.
Plumbing Fixtures (e.g., faucets and showerheads)	N/A	Energy used in upstream and local conveyance, treatment, and distribution Electricity, natural gas, and propane to heat water	Water-efficient plumbing fixtures use less water, thus reducing upstream energy and end-use water heating needs.
Toilets, Urinals	N/A	Energy used in upstream and local conveyance, treatment, and distribution	Water-efficient toilets and urinals use less water, thus reducing upstream energy needed.

Emission reductions due to energy efficiency improvements in water heaters and other appliances would be addressed in Appendix II: Electric and Natural Gas. Also, while water efficient appliances would reduce upstream energy use, they are also not included here. This section focuses on the GHG emissions reductions that result from reducing water use in indoor fixtures, toilets, and urinals.

2.1 Legislation and Regulation

Water conservation and efficiency is regulated at the federal and state levels. Local jurisdictions also can adopt ordinances related to water use.

2.1.1 Federal

The Energy Policy Act of 1992 established national standards for plumbing fixtures that took effect in 1994. The U.S. Department of Energy (DOE) officially waived federal preemption for these standards, which allows states to set standards provided they are stricter than the national standard.[5] Table 2 summarizes federal standards for plumbing fixtures.

Table 2 Federal Standards for Plumbing Fixtures

Plumbing Fixture	Standard (gpm)*
Faucets	2.2
Showerheads	2.5
Toilets	1.6
Urinals	1

*Gallons per minute

2.1.2 State

California has a long history of water conservation. Current water efficiency standards for plumbing fixtures are among the strictest of any state in the nation. The State also requires water-efficient fixtures in new construction and existing buildings.

2.1.2.1 California Code of Regulations Title 20, Sections 1601 through 1609

Because the DOE waived federal preemption for plumbing fixture standards, California is able to set its own standards as long as they are stricter than federal standards. California Code of Regulations (CCR), Title 20, Sections 1601 through 1609 codifies the State's plumbing fixture standards. The California Energy Commission (CEC) promulgated amendments to the State's appliance efficiency regulations for plumbing fixtures in September 2015.[6] Included were water efficiency standards for toilets, urinals, faucets, and showerheads. Table 3 summarizes the adopted standards.

[5] Appliance Standards Awareness Project, Faucets, Last Visited March 1, 2021: https://appliance-standards.org/product/faucets.

[6] California Energy Commission, CEC-400-2015-030, Appliance Efficiency Regulations; 20 California Code of Regulations (CCR) §§ 1601–1609.

Table 3 California Standards for Plumbing Fixtures[7]

Plumbing Fixture	Standard (gpm)*	Trigger	Authority
Lavatory Faucets and Aerators	1.2	Manufactured on or after July 1, 2016	Section 1605.3 (h)(2)
Kitchen Faucets and Aerators	1.8	Sold or offered for sale on or after January 1, 2016	Section 1605.3 (h)(3)
Public Lavatory Faucets and Aerators	0.5	Sold or offered for sale on or after January 1, 2016	Section 1605.3 (h)(3)
Showerheads	1.8	Manufactured on or after July 1, 2018	Section 1605.3 (h)(5)
Toilets	1.28	Sold or offered for sale on or after January 1, 2016	Section 1605.3 (h)(6)
Wall Mounted Urinals	0.125	Sold or offered for sale on or after January 1, 2016	Section 1605.3 (h)(6)
Other urinals	0.5	Sold or offered for sale on or after January 1, 2016	Section 1605.3 (h)(6)

*Gallons per minute

2.1.2.2 California Code of Regulations Title 24, Part 11 (CALGreen)

California Code of Regulations, Title 24, Part 11 sets forth California's green building standards for new construction, including water efficiency and conservation requirements. The following two sections of the regulation require plumbing fixtures in new buildings to meet the standards included in Table 3 above.

- Chapter 4 Residential Mandatory Measures, Division 4.3 – Water Efficiency and Conservation
- Chapter 5 Nonresidential Mandatory Measures, Division 5.3 – Water Efficiency and Conservation

The regulation also provides for voluntary measures to go beyond regulated levels of water efficiency. Residential voluntary measures include:

- Kitchen faucets with a maximum flow rate of 1.5 gallons per minute (Section 4.303.1)
- Alternate water sources for non-potable applications (Section 4.303.2)
- Non-water urinals and waterless toilets (Section 4.303.4)

For non-residential buildings, there are several tiers of performance targets to reduce overall use of potable water within the building.

- Tier 1 – 12 percent reduction (Section A5.303.1)
- Tier 2 – 20 percent reduction (Section A5.303.2)
- An additional option of a 25 percent reduction is available (Section A5.303.3)

[7] Ibid.

- Section A5.303.4 of the regulation provides for use of non-potable water systems, including captured rainwater and treated greywater, in determining the above water use reductions.

2.1.2.3 California Civil Code Sections 1101.1–1101.9

California Civil Code Section 1101.4 requires that single-family building owners replace all noncompliant plumbing fixtures with water-conserving fixtures in cases of alterations or improvements as a condition of final permit approval by the local building department. On or before January 1, 2017, single-family property owners must replace any non-compliant plumbing fixtures.

A similar requirement in the same section of the California Civil Code exists for multifamily residential and commercial buildings. On or before January 1, 2019 all non-compliant plumbing fixtures must replace any non-compliant fixtures.

The statute defines "non-compliant plumbing fixture" as

- Any toilet manufactured to use more than 1.6 gallons of water per flush;
- Any urinal manufactured to use more than one gallon of water per flush;
- Any showerhead manufactured to have a flow capacity of more than 2.5 gallons of water per minute;
- Any interior faucet that emits more than 2.2 gallons of water per minute.

2.1.3 Local

Local jurisdictions also can adopt policies and regulations related to water efficient plumbing fixtures. Water efficiency measures are common in Climate Action Plans (CAPs) in the San Diego region. A sample of these measures is provided here.

2.1.3.1 County of San Diego

The County of San Diego adopted a Climate Action Plan in February 2018. While the 2018 plan is no longer valid,[8] it provides representative examples of the type of water efficiency measures typically included in CAPs.

- Measure W-1.1 – Increase Water Efficiency in New Residential Development – This measure would have required installation of water-efficient appliances and plumbing fixtures in all new residential construction pursuant to Tier 1 of CALGreen by 2020. This measure would include water efficient kitchen faucets, dishwashers, and clothes washers.

[8] On September 30, 2020, the County of San Diego Board of Supervisors voted to set aside its approval of the County's 2018 Climate Action Plan (2018 CAP) and related actions because the Final Supplemental Environmental Impact Report (2018 CAP SEIR) was found to be out of compliance with the California Environmental Quality Act (CEQA). In response to this Board action, staff are preparing a Climate Action Plan Update (CAP Update) to revise the 2018 CAP and correct the items identified by the Court within the Final 2018 CAP SEIR that were not compliant. See https://www.sandiegocounty.gov/content/sdc/sustainability/climateactionplan/2018cap.html.

- Measure W-1.3 – Reduce Potable Water Consumption at County Facilities – This measure would have reduced potable water consumption at County facilities by 15% below 2014 levels by 2020 and 20% below 2014 levels by 2030.

2.1.3.2 City of San Diego

In its 2015 CAP, the City of San Diego proposed to present to City Council for consideration a Water Conservation and Disclosure Ordinance. The city aims to reduce daily per capita water consumption by 4 gallons by 2020 and 9 gallons by 2035.

In addition, the City of San Diego previously adopted a Plumbing Retrofit Upon Re-sale Ordinance.[9] The seller of a property is responsible for complying with the following plumbing fixture requirements.

- Toilets which are manufactured to use more than 3.5 gallons per flush (gpf) must be replaced with Ultra-Low Flush Toilets that use 1.6 gpf or less.
- Showerheads that emit more than 2.5 gallons per minute (gpm) must be replaced with a low-flow showerhead that uses no more than 2.5 gpm.
- Sink faucets (bathroom, bar, and kitchen sink faucets) that use more than 2.2 gpm must be retrofitted. Faucet aerators may be installed to reduce the water flow.
- Urinals that use more than 1.0 gpf must be replaced with low-flush models.

2.2 Protocols

EPIC identified one protocol related to water-efficiency plumbing fixtures. The Verra VMR0005 Low Flow Water Devices protocol, which is based on Clean Development Mechanism protocol AMS-II.M, covers installation of low-flow hot water savings devices that are used in existing residential and non-residential buildings, excluding industrial buildings.[10] New construction projects are not included. Eligible devices may include low-flow devices used for personal bathing (e.g., low-flow showerheads), kitchen faucets, and/or bathroom faucets. There are no projects in the U.S. associated with this protocol.

2.3 Additionality

This section evaluates whether the protocols listed above or similar activities would lead to GHG reductions that would not have occurred otherwise. In the context of offset credits, it is important to determine whether a project and associated GHG reductions and removals would have happened in the absence of any benefit derived from creating a carbon offset credit; that is, whether the reduction or removal is in addition to what would have otherwise happened. Additionality is a defining characteristic of offset credits and there are several different ways to determine, or test, whether a project is additional.

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[9] The City of San Diego, Plumbing Retrofit Upon Re-sale Ordinance, Last Visited March 1, 2021: https://www.sandiego.gov/public-utilities/sustainability/water-conservation/plumbing-retrofit.

[10] Verra, Methodology for Installation of Low-Flow Water Devices, Approved VCS Methodology VMR0005, Version 1.0, 2014, p. 5: https://verra.org/wp-content/uploads/2018/03/VMR0005-Methodology-for-Installation-of-Low-Flow-Water-Devices-v1.0.pdf.

California regulation defines "additional" to mean "greenhouse gas emission reductions or removals that exceed any greenhouse gas reduction or removals otherwise required by law, regulation or legally binding mandate, and that exceed any greenhouse gas reductions or removals that would otherwise occur in a conservative business-as-usual scenario."[11] This definition creates a two-part test of additionality: a legal requirement test and a common practice test (sometimes called performance test). Even though this test is developed in the context of CARB's compliance offsets, it is similar to that used by offset credit programs, and thus can serve as a reasonable framework to evaluate whether carbon offset protocols and resulting GHG emission reductions or removals would be considered additional.

Additionality must be determined on a project-by-project basis. For our purposes here we consider a preliminary screen of protocols and project types (e.g., more water efficient faucets or toilets) to determine whether as a group they could be considered additional. The additionality determination provided here is intended as a preliminary determination and specific additionality screening would have to be applied to a specific project to determine whether the associated GHG reductions or removals are additional.

A more detailed discussion of additionality is provided in Section 2.3 of the main report.

Additionality Tests

There are several different tests to determine additionality. This report uses two common tests.

- Legal Requirement Test – This test determines whether there are any laws, regulations, policies, or legally-binding mandates that would have required the activity. If the activity does not exceed requirements, related emissions reductions would fail the legal requirement test and be considered not additional.
- Common Practice Test – This test determines whether in the absence of a requirement the activity would have happened anyway due to technological, financial, or other considerations. For example, if the activity is cost effective without the proceeds from carbon offset credits or represents a common practice, it could be considered not additional.

2.3.1 Legal Requirement Test

Given California's regulation of indoor fixtures, toilets, and showerheads, and requirements for new and existing buildings, a water conservation or efficiency activity would have to exceed California's standards to be considered additional. For example, CALGreen standards include several options for voluntary actions to go above required levels of water efficiency. Only the incremental portion of energy reductions above that already required would be considered additional. And, if these voluntary actions become mandatory in the future, offset credits would no longer be available.

Eligible activities under the Verra VMR0005 Low Flow Water Devices protocol would not be considered additional. While it does not specify water efficiency standards for each low-flow device,

[11] 17 CCR § 95802(a).

it appears that California standards are stricter than those required by this protocol. For example, the one standard cited in the protocol is that showerheads have to be rated at 2.5 gpm. California law states that showerheads must not use more than 1.8 gpm after July 1, 2018.

Also, in 2018 California enacted Assembly Bill 1668 (Friedman, Chapter 15, Statutes of 2018) and Senate Bill 606 (Hertzberg, Chapter 14, Statutes of 2018), which among other things seeks to "establish water use objectives and long-term standards for efficient water use that apply to urban retail water suppliers; comprised of indoor residential water use, outdoor residential water use, commercial, industrial and institutional (CII) irrigation with dedicated meters, water loss, and other unique local uses."[12] Given California's history of water conservation and the increased threat of droughts, it is likely that California will continue to regulate water use and related devices. It will be necessary to monitor future regulations to determine if they have any impact on the additionality consideration.

2.3.2 Common Practice Test

It would appear that eligible activities related to water-efficient plumbing fixtures under the Verra Low-Flow Water Devices protocol would fail the Common Practice Test because all fixtures sold in California would be more efficient than those likely used for projects under the protocol.

2.4 Other Considerations

Because California has a Cap-and-Trade Regulation that covers the electric power generation sector, it can be difficult to discern ownership of offset credits related to electricity. For example, if an appliance reduces energy consumption, this will, in turn, reduce the emissions of the electric generation sources that are covered by the Cap-and-Trade Regulation. This also would be true of the upstream energy effects of water efficient fixtures and toilets. Offset credit programs generally do not recognize energy reductions in jurisdictions where a Cap-and-Trade Regulation exists due to complications around ownership.

2.5 Summary of GHG Opportunities

There are no carbon offset credit protocols covering indoor, low-flow water that are considered additional. There may be limited opportunities to realize additional GHG emissions reductions in other ways by exceeding State regulations but a project level assessment would be needed to determine if the resulting emissions would be additional.

[12] California Water Boards State Water Resources Control Board, California Statutes Making Conservation a California Way of Life, May 22, 2020: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/california_statutes.html.

3 LANDSCAPE IRRIGATION (OUTDOOR)

Outdoor water use represents a significant portion of overall water use, particularly in the residential sector. The San Diego County Water Authority estimates that single-family home outdoor uses may represent up to 60% of total water consumption.[13] It also notes that most outdoor water use is for landscape irrigation. Only a small portion of water is used for other outdoor uses, including car washing and surface cleaning. As a result, this section focuses on water used in landscape irrigation.

Table 4 summarizes the emissions impacts of outdoor water use and activities to reduce emissions. GHG emissions associated with water used outdoors for landscape irrigation result from energy used upstream to transport and treat water. Since water used in irrigation is typically not heated, there are no emissions from energy used in water heating. There are numerous ways to reduce the amount of outdoor water used for landscape irrigation, including irrigation controllers, including weather-based controllers; in-stem flow regulators; soil moisture sensor systems; turf replacement; and capturing rainwater.

Table 4 GHG Emissions Impacts of Outdoor Water Use

	Cause of GHG Emissions		
Water Usage Category	**Energy Use**	**Water Use**	**Impact of GHG Reduction Activity**
Outdoor - Lanscape Irrigation	N/A	Energy used in upstream and local conveyance, treatment, and distribution	Water-efficient landscape irrigation equipment uses less water, thus reducing upstream energy needed.
Outdoor - Other Uses (e.g., car washing)	N/A	Energy used in upstream and local conveyance, treatment, and distribution Electricity, natural gas, and propane to heat water	Using less water for other outdoor uses reduces upstream energy and can reduce end-use water heating needs, to the extent hot water is used.

There are no carbon offset credit protocols related to landscape irrigation; nonetheless, the following provides a brief summary of this category to help evaluate potential additional GHG reduction activities.

There are no national standards for lawn spray sprinklers. However, the U.S. Environmental Protection Agency (EPA) developed a labeling program called WaterSense to help consumers identify water-efficient products. Products and services with the WaterSense label are certified to use at least 20% less water.[14] The State of California has adopted standards for spray sprinkler

[13] San Diego County Water Authority, San Diego County Water Authority Final 2015 Urban Water Management Plan, 2016, p. 2-1: https://www.sandiegocounty.gov/content/dam/sdc/pds/ProjectPlanning/NS/Newland%20DEIR/V-2%20SDCWA%202015%20UWMP.pdf

[14] See United States Environmental Protection Agency, About WaterSense, Last Visited March 1, 2021: https://www.epa.gov/watersense/about-watersense.

bodies based on the WaterSense requirements.[15] The State of California also sets standards for water efficiency in landscape irrigation.[16] The Department of Water Resources adopts and periodically amends the Model Water Efficient Landscape Ordinance (MWELO).[17] Local governments are required to adopt an ordinance as effective as the MWELO at reducing water use.

CAPs in the San Diego region often include measures that address outdoor water use. The Cities of Chula Vista, El Cajon, Del Mar, Encinitas, San Diego, Solana Beach, and Oceanside, and the County of San Diego have CAP measures related to landscape irrigation water use.

As with indoor water use, the GHG emissions impact for each gallon of water reduced is relatively small. Further, to be considered additional, GHG emission reductions would have to go beyond existing state regulations and/or CAP measures for outdoor landscaping and spray sprinkler bodies.

[15] 20 CCR §§ 1601 et seq.; see also Appliance Standards Awareness Project, Lawn Spray Sprinklers, Last Visited March 19, 2021: https://appliance-standards.org/product/lawn-spray-sprinklers.
[16] California Government Code §§ 65591 et seq.
[17] 23 CCR §§ 490 et seq.

4 CONCLUSION

Emissions from the water category account for about 1% of regional emissions.[18] Significant regulation of indoor plumbing fixtures, toilets, and urinals significantly limits the opportunities for additional GHG reductions from the water category. Also, because GHG reductions in the water category result from energy reductions, the California Cap-and-Trade Regulation poses further challenges as it can be difficult to determine ownership of GHG reductions.

There is only one protocol related to water use and it applies to indoor water use. Given related regulations in California, this protocol would not be considered additional. There are no protocols related to outdoor water use, but regulation of spray sprinkler bodies and a requirement for local jurisdictions to adopt a statewide MWELO likely would limit opportunities for additional GHG reduction activities.

[18] San Diego Association of Governments, San Diego Forward: The Regional Plan, Appendix D 2012 Regional Greenhouse Gas Emission Inventory for the San Diego Region and Projections, 2015, p. 26: https://www.sdforward.com/pdfs/RP_final/AppendixD-2012GreenhouseGasEmissionsInventoryfortheSanDiegoRegionandProjections.pdf. (Emissions reported here represent initial estimates for data year 2016.)