



The Climate Registry

Water-Energy GHG Guidance
GHG Intensity Metrics
for Water Suppliers in Southern California

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Abbreviations and Acronyms

AF	Acre-foot or acre-feet
AWMP	Agricultural Water Management Plan
CA DWR	California Department of Water Resources
CEC	California Energy Commission
CH ₄	Methane
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CPUC	California Public Utilities Commission
CRIS	Climate Registry Information System
EPS	Electric Power Sector
GHG	Greenhouse gas
GRP	TCR's General Reporting Protocol
GVP	TCR's General Verification Protocol
GW	Groundwater
ICLEI	International Council for Local Environment Initiatives
kWh	Kilowatt hour
LGO	Local Government Operations
N ₂ O	Nitrous oxide
POTW	Publicly-owned treatment works
SAWPA	Santa Ana Watershed Project Authority
SCE	Southern California Edison
SEMs	Simplified Estimation Methods
SW	Surface water
SWP	State Water Project
TCR	The Climate Registry
UWMP	Urban Water Management Plan
VB	Verification Body
WEG	Water-energy greenhouse gas

Part I: Introduction

The Climate Registry's (TCR) General Reporting Protocol (GRP) describes TCR's voluntary reporting program and provides the basic framework for Members to report their emissions of greenhouse gases (GHGs). TCR additionally develops sector-specific guidance to support the many sectors reporting to TCR.¹

This Water-Energy GHG (WEG) Guidance was developed by TCR as a supplemental annex to the GRP for the water sector. Using the WEG Guidance, water suppliers in Southern California participating in TCR's voluntary program have the option of reporting one or more WEG intensity metrics alongside their GHG inventory. These metrics measure the GHG footprint of a unit volume of delivered water, and provide water suppliers with a reliable, transparent, and clear communications tool that can be used to communicate WEG intensity information to their customers, policy-makers, funders, and the public. The WEG Guidance is intended to be used in conjunction with the GRP, which remains the primary source document in understanding TCR's basic reporting requirements.

The use of the WEG Guidance and the reporting of one, some, or all of these metrics is optional for applicable TCR Members. However, Members choosing to report these metrics must follow the methodologies outlined in this Guidance.

The WEG Guidance is divided into six sections:

- Part I: Introduction
- Part II: Determining What to Report
- Part III: Overview of WEG Intensity Metrics
- Part IV: Methodology

1. TCR's sector-specific guidance documents as of 2015 include the Electric Power Sector (EPS) Protocol, the Local Government Operations (LGO) Protocol, the Oil & Gas Production Protocol, and the Performance Metrics for Transit Agencies.

- Part V: Reporting
- Part VI: Verification

Background and Context

A significant² portion of California's electricity consumption is associated with water and wastewater operations. As a result, water resource management and water consumption contribute significantly to California's GHG emissions. Optimal management and conservation of water across the complete water use cycle will help reduce GHG emissions. However, transparent methodologies designed to measure, account for, and track these GHG emissions have not been available.

This Guidance establishes a series of WEG intensity metrics to enable water suppliers in Southern California to assess the GHG impact of their urban and agricultural water products. While an important resource on their own for policy evaluation, climate action planning, and to help drive water and energy conservation, they also represent an initial step in the development of a broader standardized sector-specific GHG accounting protocol for the water sector.

The development of this Guidance is based on a comprehensive study of GHG accounting methods and key considerations related to the water-energy nexus in California as well as feedback from TCR and Cool Planet members, California state agencies, technical experts and SCE business and water sector customers. This research and stakeholder feedback are summarized in TCR's *Water-Energy Greenhouse Gas Technical Brief*.³

2. In 2010, studies conducted on behalf of the California Public Utilities Commission (CPUC) found that water and wastewater operations alone account for nearly eight percent of California's electricity requirements (http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm).

3. See TCR's website (<http://www.theclimateregistry.org>).

Benefits of the WEG Guidance

These WEG intensity metrics provide water suppliers, customers, policymakers, funders, and the public a clear means to quantify, compare, and analyze the GHG emissions embedded in water in Southern California.

The following benefits are discussed in more detail below:

1. Comparing data using consistent and transparent methodology;
2. Benchmarking for water suppliers;
3. Claiming credit for reducing energy use and GHGs associated with water; and,
4. Communicating the benefits of water, energy, and GHG reduction efforts to customers.

1. Comparing data using consistent and transparent methodology

TCR's WEG intensity metrics allow Southern California water suppliers to measure the direct and indirect climate impacts of operations pertaining to water. By providing calculation methodologies for direct and indirect emissions, normalizing GHG emissions to units of delivered water, and transparently disclosing which steps in the water use cycle have been accounted for, WEG data can be accurately understood and compared.

2. Benchmarking for water suppliers

Reporting WEG intensity metrics allows water suppliers of all sizes and types to monitor trends in the GHG intensity of water delivered to customers in Southern California. Over time, water sector GHG emissions may increase, for example in times of drought or to meet growing demand. But if water delivery becomes more GHG efficient, TCR's WEG intensity metrics (per unit of delivered water) will reflect these improvements.

While year-to-year comparability is often challenging due to varying water resources, establishing a benchmark using transparent and consistent methodology will help to showcase longer-term trends in water-GHG management.

Water suppliers that do not yet track operations from an energy efficiency or GHG emissions perspective will benefit from establishing a baseline and identifying opportunities for improvement. Tracking WEG metrics over time can help water suppliers and their customers make more informed decisions, set and measure progress towards stated goals or reduction targets, and improve climate action planning.

3. Claiming credit for reducing energy use and GHGs associated with water

Reporting WEG intensity metrics provides an avenue to reward water suppliers for realized reductions through recognition and financial incentives. Some California agencies already incentivize the disclosure of WEG intensity information. Publicly reporting WEG intensity metrics may strengthen applications for these and future incentive and grant programs, possibly resulting in a higher weight for a Member's application. These programs may include energy efficiency incentives, water planning grants, subsidies, and other incentives for reducing energy and/or GHG emissions within the water use cycle, such as:

- California Department of Water Resources (CA DWR) Water-Energy Grant Program;⁴
- California Energy Commission (CEC) Water Energy Technology Program;⁵
- California Greenhouse Gas Reduction Funds;⁶

4. See CA DWR Water-Energy Grant Program website (<http://www.water.ca.gov/waterenergygrant>).

5. See CEC Water Energy Technology Program website (<http://www.energy.ca.gov/wet>).

6. See California Air Resources Board website (<http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/ggrfprogrampage.htm>).

- California State Water Resources Control Board Financial Assistance Funding;⁷
- Utility-funded programs; and,
- Other relevant state, regional, or local programs.

For California state governments and agencies, the WEG intensity metrics will provide a platform for collaboration with state energy agencies on GHG reduction activities, as well as a methodology to better frame state-funded training, action plans, and incentives programs.

4. Communicating the benefits of water, energy, and GHG reduction efforts to customers

TCR’s WEG intensity metrics can be a powerful and tangible communications tool, providing a broad platform for educating stakeholders on the benefits of working to reduce water and GHG emissions and the connection between the two. The development, use, and success of these WEG intensity metrics may encourage other water suppliers to use this Guidance and to invest in better data collection technology.

Water suppliers can use this tool to communicate their water GHG intensity to customers, the public, and policymakers. Doing so can build awareness across the water supplier’s stakeholder base, allowing them to better communicate the impacts of water consumption and encourage conservation.

Scope of this Guidance

The use of the WEG Guidance and the reporting of one or more of these WEG intensity metrics is optional. The WEG Guidance is meant to be used as a supplement to TCR’s GRP, and is not intended to be a stand-alone reporting protocol that can be used independently. This approach is consistent with TCR’s other sector-specific protocols and metrics, and is informed by the best

available data and feedback received during the WEG Guidance-development process. Table 1 describes the scope of the WEG Guidance.

Applicability: Who Should Use this Guidance

The primary users of the WEG Guidance are intended to be Members of TCR that are also water suppliers in Southern California. Water consumers in Southern California can use reported WEG intensity metrics in their own TCR inventories, if their water suppliers report an appropriate metric using the WEG Guidance. Other water suppliers, their customers, and interested stakeholders can also use this Guidance to benchmark their own WEG intensity.⁸

Water Suppliers

Water suppliers that complete at least one of the water management processes required to provide water to a user (see Table 2 and Part IV) in Southern California are the primary users of the WEG Guidance. This includes both public and private suppliers, urban and agricultural suppliers, as well as both large agencies required to submit Urban Water Management Plans (UWMPs) and smaller suppliers that are not. Applicable water suppliers that have operations in, or distribute water to, Southern California, may include:

- Wholesalers;
- California Department of Water Resources—State Water Project (SWP) Contractors;
- Municipal retailers;⁹
- Investor-owned retailers;¹⁰

8. The WEG Guidance is intended to be used by water suppliers in Southern California as research, stakeholder outreach, and technical feedback was solicited in this area. Water suppliers outside Southern California may use this Guidance as a best practice if they feel it is appropriate.

9. Retailers include city and country municipal water agencies.

10. Ibid.

7. See State Water Resources Control Board website (http://www.waterboards.ca.gov/water_issues/programs/grants_loans).

TABLE 1: Scope of the WEG Guidance

WEG Topic	Addressed	Not Addressed
Type of Water	Urban and agricultural water.*	Environmental water.
Applicability	Water suppliers: wholesalers, retailers, irrigation districts, publicly-owned treatment works (see Applicability for complete list).	Water customers, the end-user of the water provided by the entities addressed (i.e., residential, commercial, governmental, industrial or agricultural customers).
Reporting Period	Calendar year.	Fiscal year reporting; temporal variability within a calendar year; resource changes year-to-year.
Geographic Boundary	Southern California (see Part II: Geographic Boundary for more detail).	State-wide, national, or international GHG emissions embedded in water.
Operational Boundary	Complete reporting required for WEG Metric A;** upstream reporting required for WEG Metrics B and C.	Transitional reporting; consequential or non-consequential hydropower generation.†
Water Use Cycle	The following steps in the water use cycle are covered, based on data availability: <ol style="list-style-type: none"> 1. Extract and Divert 2. Place into Storage; 3. Conveyance; 4. Treatment; and, 5. Distribution. 	End-use of water by customers; recycled water treatment and distribution; wastewater collection, treatment, and disposal.
Level of Reporting	Facility- or source-level reporting.	Entity-level reporting.
Scope 3 Emissions	Upstream (required) and downstream (optional) processing of delivered water for WEG Metrics B and C.	Scope 3 emissions not pertaining to the delivery of water.
<p>Please note: this Guidance does not provide sector-specific guidance for establishing base years or Simplified Estimation Methods (SEMs). The GRP should be referred to for these topics.</p>		

* Much of the water used for agricultural purposes in Southern California is distributed as urban water rather than true agricultural water. See the Water-Energy Greenhouse Gas Technical Brief for more discussion on urban, agricultural, and environmental water in California (<http://www.theclimateregistry.org>).

** Definitions of complete and transitional reporting can be found in Section 1.4 of TCR's GRP.

† Many water suppliers in Southern California generate and consume hydropower as part of their water operations. Members should refer to the

GRP for guidance on how to account for emissions from renewable energy and self-generated hydropower. Since the calculation of the WEG intensity metrics begins with emissions data, emissions from hydropower will already have been taken into account. Consequential and non-consequential hydropower refer to terms defined in 2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity, November 2015.

- Special district retailers;¹¹
- Private water retailers;¹²
- Irrigation districts; and,
- Publicly-owned treatments works (POTWs).

Please note: While recycled water treatment and distribution and wastewater collection, treatment, and disposal are outside the scope of the WEG Guidance, water suppliers with recycled water or wastewater services within their boundaries are eligible to use this Guidance and report the emissions associated with the steps in the water use cycle noted in Table 1.

The WEG intensity metrics are intended to be water source- and entity-agnostic. They are designed to be calculated and reported by any applicable entity, regardless of whether the supplier is a wholesale or retail supplier, for example.

Water Consumers

While not using the WEG Guidance to report metrics, water consumers in Southern California and other interested parties are encouraged to refer to the WEG Guidance to understand the WEG intensity metrics reported by their suppliers. Water consumers are purchasers of water from a water supplier who use the water for residential, commercial, governmental, industrial, or agricultural uses. Consumers include both large-scale consumers of urban and agricultural water and smaller-scale consumers.

TCR anticipates that the WEG intensity metrics reported by Members using this Guidance will become a valuable source of data for other Members to use when calculating their own indirect emissions. TCR Members that obtain water from suppliers that provide an applicable WEG intensity metric should use the appropriate metric in their own GHG inventories to

report the indirect Scope 3 emissions associated with the upstream and downstream processing of the water they consume. Water suppliers choosing to report WEG intensity metrics will be providing a valuable service to their wholesale and retail customers.

Part II: Determining What to Report

Reporting Period

In line with reporting using TCR's GRP, Members using the WEG Guidance will report emissions on a calendar year basis.

The calendar year in which the emissions occurred is known as the emissions year. For example, an inventory reported in 2015 for an organization's 2014 emissions is known as emissions year 2014.

Geographic Boundary

TCR's GRP fully describes the process and options for setting a transparent and consistent geographic boundary for a GHG inventory.

Geographic boundary considerations for the water sector can be complex as water moves throughout the state and across state lines. For the purpose of calculating one or more of the optional WEG intensity metrics, Southern California is defined as the following hydrologic regions:¹³

- Central Coast;
- Colorado River;
- South Coast;
- South Lahontan; and,
- Tulare Lake.

11. Ibid.

12. Ibid.

13. California's hydrologic regions are defined by the California Department of Water Resources.

Members should include data from facilities that are used to process water that is delivered to customers located in any of the above hydrologic regions. Please note this may include emissions from sources and facilities outside Southern California if the water is transported into or out of Southern California for upstream and/or downstream processing. Depending on the boundaries of the WEG intensity metric being reported, this may include emissions from any and all steps in the water use cycle within or outside the Member's organizational boundaries.¹⁴

Organizational Boundary

As part of reporting a GHG inventory using TCR's GRP, Members will select an organizational boundary control approach of either operational or financial control. In addition, Members have the option to report using equity share alongside the chosen control approach.

Members will use the same organizational boundary to calculate and report the WEG intensity metrics as used to report their entity-wide inventory according to the GRP. If a particular control approach is required by another mandatory or voluntary reporting program, the Member should use the same approach in their TCR inventory for consistency. The chosen approach(es) will be transparent in the Member's public report.

It is not required that a Member use the same control approach as an upstream or downstream supplier from which it is using data to report Scope 3 emissions. However, it is recommended that the Member disclose the control approach used by these other entities for which data was used to calculate any of the WEG intensity metrics.

Because of the heterogeneous nature of the California water use cycle, consistency of water supplier orga-

nizational boundaries may be impacted by complex water supply scenarios. These include, but are not limited to, suppliers with shared assets, unique agency structures, long-term purchase agreements, water transmission rights, groundwater banking, and water exchanges.¹⁵

Operational Boundary

The operational boundary defines what emissions are included in a GHG inventory.

TCR's program includes all seven GHGs recognized under the Kyoto Protocol, so that each WEG intensity metric should be calculated using any of the seven GHGs that have emissions embedded in water. For GHG emissions embedded in water, most of the emissions are usually from carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).

In line with complete reporting in the GRP, the WEG Guidance requires Members to report all Scope 1, Scope 2, and direct biogenic CO₂ emissions from biomass combustion within their defined boundaries.¹⁶ Transitional reporting is not permitted for the WEG Guidance, to ensure that the boundaries underlying reported WEG intensity metrics are consistent between entities.¹⁷

15. Guidance on how to handle these more complex organizational boundary situations can be found in TCR's EPS Protocol, *Electric Power Sector Protocol for the Voluntary Reporting Program: Version 1.0*. The Climate Registry, 2009.

16. TCR follows international best practice in categorizing direct and indirect emissions into scopes according to the World Resources Institute and the World Business Council for Sustainable Development *GHG Protocol Corporate Standard*. Scope 1 refers to direct anthropogenic emissions from stationary and mobile combustion. Scope 2 refers to indirect anthropogenic emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling. Scope 3 refers to all other indirect anthropogenic emissions that occur in the value chain. Biogenic emissions refer to the carbon dioxide generated during the combustion or decomposition of biologically-based material. See Chapter 5 of the GRP for more complete definitions of each scope category.

17. See Part IV of this Guidance to determine which emissions in an entity-wide inventory pertain to water to calculate the WEG intensity metrics.

14. Water suppliers outside Southern California using this Guidance should define and report a transparent geographic boundary.

TABLE 2: Potential Emission Categories for Various Water Supplier Organizations

Step in the Water Use Cycle	Wholesale Supplier	Retail Supplier
1. Extract & Divert	Scopes 1, 2	Scope 3
2. Place into Storage	Scopes 1, 2	Scope 3
3. Conveyance	Scopes 1, 2	Scope 3
4. Treatment	Scopes 1, 2, or 3	Scopes 1, 2
5. Distribution	Scopes 1, 2, or 3	Scopes 1, 2

As explained in more detail in the GRP, indirect emissions reported by one entity may also be reported as direct emissions by another entity. The scopes prevent double counting as entities report the emissions associated with electricity production and its use in the appropriate scope, so that Scope 2 and Scope 3 emissions will always be a part of another entity's Scope 1 emissions, and the same Scope 3 emissions may be reported as Scope 3 emissions by more than one Member. This does not constitute double counting as emissions are only aggregated meaningfully within a scope total in TCR public reports.

In TCR's voluntary program, Members may report any Scope 3 emissions as optional data. For the purpose of the WEG Guidance, the only relevant Scope 3 emissions are those that occur upstream and/or downstream related to the processing of water delivered to customers in Southern California.¹⁸ While data availability and reliability may influence which Scope 3 emissions are included in an inventory, it is accepted that data accuracy may be lower than Scope 1 and Scope 2 data.

As described in Table 1, end-use of water by the customer, recycled water treatment and distribution, and

wastewater collection, treatment, and distribution are not part of the water supplier's operational boundary. Instead, the operational boundary ends at point-of-delivery, or end-of-pipe.

Table 2 provides a matrix of typical scope categories for two common water supplier entity types. Table 2 also introduces the discrete water management processes, referred to in the WEG Guidance as steps in the water use cycle, that will be used to organize data, calculate, and report the WEG intensity metrics. The definitions of these steps for the purpose of the WEG Guidance are as follows:¹⁹

1. Extract & Divert: emissions generated from removing water from a channel, pipeline, stream, or aquifer;
2. Place into Storage: emissions generated to place water into a storage reservoir or groundwater bank;
3. Conveyance: emissions generated from transporting untreated water through aqueducts, canals, and pipelines from its source to a water treatment facility or directly to an end-user;²⁰
4. Treatment: emissions generated from treating water prior to distribution to customers;²¹ and,

18. GHG Protocol's *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* defines and explains the 15 categories of Scope 3 emissions that may be optionally reported under TCR's program. Categories such as employee commuting and business travel are encouraged to be reported in TCR's voluntary program, but are not relevant to the WEG Guidance.

19. Steps in the water use cycle are consistent with those outlined in the *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity*, November 2015.

20. For wholesale suppliers, this does not include emissions generated from conveying SWP supplies.

21. Treatment of recycled water and wastewater is not included in this step.

5. Distribution: emissions generated to transport treated water from the treatment plant or wellhead disinfection point to the point of delivery.

The table provides illustrative examples only. Suppliers in the example categories shown may have emissions in different or additional scope categories for some steps due to the wide diversity in water entities, systems and resources in Southern California. A given water entity may have more than one type of supplier activity under their operational boundary, so that their inventory will include emissions from all categories and scopes applicable to those operations. For example, a retail supplier with Extract & Divert and Conveyance within their organizational boundary will have Scope 1 and 2 emissions for these steps, instead of Scope 3.

Level of Reporting

To support the calculation of the WEG intensity metrics, TCR requires Members using the WEG Guidance to report at the facility-level and strongly encourages source-level reporting.

Members must report in conformance with TCR's facility-level and source-level reporting requirements as described in the GRP. This includes the option to aggregate the emissions for certain facilities as allowed in the GRP. Facility-level reporting enables tracking of GHG emissions at a disaggregated level and will allow Members to determine the emissions in their inventory pertaining to water (see Part IV).

If data is available, source-level reporting is strongly encouraged. This more granular level of reporting is valuable for internal data management, can help streamline verification, and for the WEG Guidance, can allow Members to more easily determine the emissions in their inventory pertaining to water. If this data becomes available in future emissions years, TCR encourages Members to progress from facility-level reporting to source-level reporting. No matter what

level of reporting a Member chooses, TCR will not make source-level information publicly available.

Part III: Overview of WEG Intensity Metrics

Summary of WEG Intensity Metrics

Where possible, Members should report all the emissions inputs throughout the entire water use cycle, irrespective of which entity put the emissions into the water or where. Such a comprehensive approach would include all of a Member's Scope 1, Scope 2, and Scope 3 emissions and any biogenic emissions that pertain to water for each step in the water use cycle. However, TCR recognizes the lack of data available to some Members both within and outside a Member's organizational boundary. Some Members may not have the data collection technology to report Scope 1 and 2 emissions at the source-level, for example, while others may not be able to access relevant upstream and/or downstream data from other entities across the supply chain. As a result, the WEG Guidance provides methodology for reporting three classes of WEG intensity metrics. The WEG intensity metrics progress from basic to more detailed, offering options for reporting the GHG emissions embedded in water included in a Member's GHG emissions inventory, depending on the data available.

The use of this Guidance to report of one, some, or all of these metrics is optional. If a Member chooses to use this Guidance, the reporting of WEG Metric A is required at minimum. Reporting WEG Metrics B and/or C is optional if WEG Metric A has been reported. TCR recognizes the benefit of these metrics and strongly recommends reporting as completely as possible.

All WEG intensity metrics express GHG emissions per unit of water delivered. The metrics will be calculated individually for each step in the water use cycle and aggregated for a composite metric for each GHG that

TABLE 3: Summary of Optional WEG Intensity Metrics

Reference	Level of Detail	Metric	Reporting Requirement	Units
WEG Metric A	Composite	A–Basic System Average	Minimum requirement	Metric tons GHG/Acre-foot of total delivered water
	By Step in Water Use Cycle	A1–Extract & Divert A2–Place into Storage A3–Conveyance A4–Treatment A5–Distribution	Optional, if composite Metric A reported	
WEG Metric B	Composite	B–Overall System Average	Optional	Metric tons GHG/Acre-foot of total delivered water
	By Step in Water Use Cycle	B1–Extract & Divert B2–Place into Storage B3–Conveyance B4–Treatment B5–Distribution	Optional, if composite Metric B reported	
WEG Metric C	Composite	C–Product-Specific Average	Optional	Metric tons GHG/Acre-foot of product-specific delivered water
	By Step in Water Use Cycle	C1–Extract & Divert C2–Place into Storage C3–Conveyance C4–Treatment C5–Distribution	Optional, if composite Metric C reported	

Please note: each metric will be reported by individual GHG, so that there may be multiple values reported for each metric by gas. For WEG Metric C, there will be a composite value and values for each step in the water use cycle (optional) for each discrete product being reported.

has emissions associated with the water operations. For each WEG intensity metric, the composite value is reported and the values for each step in the water use cycle are optional to report. The WEG intensity metrics will not be aggregated to carbon dioxide equivalent (CO₂e).

This section provides an overview of the metrics as well as the definition of delivered water, and the following section outlines the calculation methodologies. Table 3 presents a summary of the three classes of optional WEG intensity metrics.

Delivered Water

As described above, the denominator for each WEG intensity metric will be the volume of delivered water. For the purpose of the WEG Guidance, delivered water is defined as the total volume of water entering the distribution system for the entire emissions year.²²

22. At this time, water loss cannot be addressed comprehensively due to lack of available data across the water use cycle. By defining delivered water in this way, water loss upstream of the distribution system is inherently reflected in the WEG intensity metrics without being actively accounted for. If water loss is reduced upstream of distribution, this improvement will

Recycled water and wastewater should not be included in the volumes of delivered water.²³ The definition of delivered water as it pertains to each WEG intensity metric is detailed in Part IV, Step 3.

WEG Metric A: Basic System Average

This is the minimum requirement for Members using the WEG Guidance. If a Member has reported a complete emissions inventory using TCR's GRP, Metric A is the simplest WEG metric to calculate and report as all the needed emissions data has already been compiled.

WEG Metric A is reported in metric tons of GHG per acre-foot (AF) and measures the GHG intensity of delivered water of Scope 1 and Scope 2 emissions, and any biogenic CO₂ emissions (reported outside the scopes) aggregated across all supply sources within the Member's chosen organizational boundary. The numerator is the sum of the GHG emissions the Member has reported using complete reporting²⁴ under the GRP for each relevant GHG and has designated as pertaining to water (see Part IV). WEG Metric A is calculated for each step in the water use cycle for each relevant GHG, and is then aggregated for a composite WEG Metric A. The composite value for WEG Metric A will be reported, while it is optional to report the values for each step in the water use cycle.

WEG Metric A is independent of WEG Metrics B and C, and is the first step in quantifying the GHG emissions embedded in delivered water. This metric is not comprehensive since it does not include emissions

be reflected in the WEG intensity metrics as the excess energy required to process water that is lost will decrease.

23. Recycled water is not included in the volume of delivered water since it is currently not utilized as a direct potable water supply. This approach is consistent with *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity*, November 2015.

24. Note that transitional reporting is not permitted in the WEG Guidance.

from any Scope 3 categories pertaining to water from upstream or downstream processing outside the Member's organizational boundary, but it provides a basic and transparent metric to report and track WEG intensity over time.

At minimum, a composite WEG Metric A must be reported for Members using this Guidance. Reporting WEG Metric A should be feasible for most water suppliers.

WEG Metric B: Overall System Average

For many Members, a substantial portion of the GHG emissions embedded in the water they deliver may be outside Scope 1 and Scope 2 emissions, occurring in Scope 3 from upstream and/or downstream processing. Members electing to report emissions for some Scope 3 categories pertaining to water can choose to report an entity-wide metric, WEG Metric B.

WEG Metric B displays reported metric tons of GHG per AF and will measure the entity-wide GHG intensity of delivered water of a Member's Scope 1, Scope 2, biogenic CO₂ emissions (reported outside the scopes), and specified Scope 3 emissions outside the Member's chosen organizational boundary. The numerator is the sum of GHG the emissions for each step in the water use cycle the Member has reported.

For Members choosing to report WEG Metric B, accounting for upstream processes is required while downstream processes are optional. Note that what classifies as upstream and downstream will be different for each Member. Some Members choosing to report WEG Metric B may not have access to upstream data if it is not reported by other entities in the Member's water supply chain, or may only have access to partial data. In these cases, Members with incomplete upstream data may exclude these emissions and publicly disclose the lack of available

data.²⁵ Members choosing to report downstream emissions may do so for any step in the water use cycle.

WEG Metric B is calculated for each step in the water use cycle for each relevant GHG, and aggregated for a composite WEG Metric B. The composite value for WEG Metric B will be reported, while it is optional to report the values for each step in the water use cycle.

WEG Metric C: Product-specific Average

WEG Metric C provides another option for Members electing to report emissions for some Scope 3 categories pertaining to water from upstream and/or downstream processing, for a product-specific metric.

WEG Metric C is reported in metric tons of CO₂ per AF and measures the GHG intensity of discrete water products delivered to customers including Scope 1, Scope 2, direct biogenic CO₂ emissions (reported outside the scopes), and specified Scope 3 emissions outside the Member's chosen organizational boundary. The numerator is the sum of GHG the emissions for each step in the water use cycle the Member has reported. WEG Metric C is calculated for each step in the water use cycle for each relevant GHG, and then aggregated for a composite Metric C for each product that is reported. In this way, Members may have several values to report using Metric C. The composite value for each WEG Metric C will be reported, while it is optional to report the values for each step in the water use cycle.

Examples of discrete water products include retail potable water, retail non-potable, wholesale potable, wholesale non-potable, agricultural, environmental,

and other deliveries.²⁶ Members may report one or more values for WEG Metric C for each discrete product for which data is available. This may include more than one value for a single product type if the supplier has discrete products of the same type with unique GHG intensities, if delivered to varying locations, for example.

Similar to WEG Metric B, accounting for upstream processes is required for WEG Metric C while downstream processes are optional. The same disclosure requirements apply to WEG Metric C, as well.

Part IV: Methodology

This section outlines the core process used to calculate each of the WEG intensity metrics.

Calculating each of the WEG intensity metrics is a five step process:

1. Follow TCR's GRP to develop a complete GHG inventory;
2. Determine the emissions in your inventory pertaining to water;
3. Collect additional data;
4. Calculate Scope 3 emissions; and,
5. Calculate WEG intensity metrics.

Each of the steps is described below, including sample calculation methodology for each WEG intensity metric in Step 5.

Step 1: Follow TCR's GRP to develop a GHG inventory

The first step in reporting any of the WEG intensity metrics is to report a complete GHG emissions inventory according to TCR's program requirements.

25. If applicable defaults are available (see Part IV), upstream processes should be reported.

26. For definitions of these example water products, refer to *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers*, November 2015.

Guidance on developing a GHG inventory can be found in TCR's GRP.²⁷

All of the emissions activity data needed to calculate WEG Metric A should be entered into TCR's Climate Registry Information System (CRIS) as part of the inventory. For complete reporting to TCR, this includes Scope 1 and 2 emissions and biogenic CO₂ emissions from biomass combustion for all facilities/sources under the defined geographic, organizational, and operational boundaries.

Emission Factors

For reporting Scope 1, Scope 2, and any biogenic emissions using the GRP, you should refer to the default emission factors TCR publishes annually. Members are encouraged to use the most specific emission factor available to them, as discussed in more detail in the GRP, and TCR recommends that you customize emission factors when more site-specific data is available.²⁸ For Scope 1 emissions, more specific data includes measured heat content or carbon content data. For Scope 2, this may include utility-developed emission factors if you participate in a green power program.

Please note: for electricity, it is important to use the emission factor most relevant to the power that was actually consumed. This is especially relevant for customers of electric utilities reporting EPS delivery metrics to TCR.²⁹

27. Members can also refer to TCR's EPS Protocol and LGO Protocol, as appropriate, for additional guidance on specific boundary and calculation topics. For example, the EPS Protocol includes information on complex organizational boundaries and how to account for transmission and distribution losses while the LGO Protocol includes guidance on municipal organizational boundaries issues and specific calculation methodologies.

28. Annual default emission factors available on TCR's website (<http://www.theclimateregistry.org>).

Step 2: Determine emissions in your inventory pertaining to water

After reporting a complete inventory using the GRP, you will need to determine which emissions from Scope 1, Scope 2, and any biogenic emissions in your inventory pertain to water.

For the purpose of the WEG Guidance, emissions pertaining to water refer to emissions directly related to a step in the water use cycle. Water suppliers conduct numerous activities related to the delivery of water, such as administration, maintenance, training, planning, and human resources. While related, these emissions are not directly tied to the delivery of water and should not be identified as pertaining to water. Emissions within a Member's boundaries that are due to recycled water and wastewater should not be identified as pertaining to water, as noted previously.

For a wholesale water supplier reporting WEG Metric A, for example, emissions from a pump used to extract and divert water would 'pertain to water' for the Extract & Divert step, while those from purchased electricity for an administration building under the Member's control would not.

Emissions pertaining to water should be identified, assigned to a step in the water use cycle, and used in Step 5 for each WEG intensity metric being reported.

Please note: TCR recognizes that some Members may not have the capability to determine the emissions pertaining to water for all water operations or to assign emissions to a step in the water use cycle due to a lack of data granularity. In these cases, you should use the best data available to you and disclose the operations that are missing or are unable to be separated out (see Part V).

29. TCR's website includes utility-specific emission factors that have been reported and verified using TCR's EPS Protocol. TCR strongly recommends that these factors be used when available (<http://www.theclimateregistry.org>).

Data Extract in CRIS

At any point during the reporting process, you have the option to download a 'Data Extract' in CRIS. This is an excel spreadsheet of all reported emissions data organized by source or facility, depending on how the data was reported. This can be done through the Reports module in CRIS. This spreadsheet can be used as a tool to determine which emissions in your inventory pertain to the delivery of water and to assign them to a step in the water use cycle. If reporting WEG Metric C, this spreadsheet can also be used to determine which sources or facilities pertain to a discrete water product.

Step 3: Collect additional data

To calculate each WEG intensity metric, you will need both water delivery data and GHG emissions data.

Water Delivery Data

For each metric, the volume of water delivered to the customer in AF will be the denominator as first defined in Part III.³⁰

For WEG Metric A only, the volume of delivered water is specific to each step in the water use cycle to account for the differences in the volume of water passing through each step. For the composite WEG Metric A, the volume of delivered water is the total volume entering the distribution system and is specific to the type of supplier.³¹ For wholesale suppliers, this is the volume entering distribution to retail suppliers.

30. Recycled water and wastewater should not be included in these volumes.

31. This is consistent with Water Supply Process Approach A from 2015 *Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity*, November 2015. For many suppliers, the total volume entering the distribution system for

For retail suppliers, this is the volume entering the retail distribution system. Once this water delivery data has been collected for WEG Metric A, it can be combined with the emissions data from Steps 1 and 2 to calculate WEG Metric A. Proceed to Step 5 in this section.

For WEG Metric B, the denominator is total volume of water entering the retail water distribution system for the appropriate emissions year. Since Scope 3 emissions are included and WEG Metric B is intended to reflect the emissions across the entire water use cycle, all entities should use the same volume of delivered water regardless of the type of water supplier. For WEG Metric B, this is the total volume entering the retail water distribution system. The volume of delivered water will be the same for each step in the water use cycle as well as the composite WEG Metric B.

For WEG Metric C, the volume of delivered water will be specific for each discrete water product being reported. The volume of delivered water will be the total volume of water entering the retail distribution system for the specific water product being reported for the appropriate emissions year. Similar to WEG Metric B, this volume will be the same for each step in the water use cycle and for the composite WEG Metric C.

Before proceeding to Step 4, all water delivery data not in AF should be converted to AF. Conversion factors for common water delivery units include are displayed in Table 4.

TABLE 4: Conversion Factors for Water Volume

1 acre-foot (AF) =	325,851 gallons (gal)
1 acre-foot (AF) =	43,560 cubic feet (ft ³)
1 acre-foot (AF) =	1233.49 cubic meters (m ³)
1 acre-foot (AF) =	1,613.3 cubic yards (y ³)

composite WEG Metric A will be the total volume calculated in UWMP Table 4-1: Demands for Potable and Raw Water.

TABLE 5: Potential Sources of Scope 3 Activity Data*

Provider	Data Source
California Department of Water Resources (CA DWR)	Agricultural Water Management Plans (AWMPs) Regional Urban Water Management Plans State Water Project (SWP) Data on Supplies** Urban Water Management Plans (UWMPs), Voluntary Reporting of Energy Intensity (Appendix O)
California Energy Commission (CEC)	California's Water-Energy Relationship† Statewide Assessment of Water-Related Energy Use for the Year 2000‡
California Public Utilities Commission (CPUC)	CPUC Water-Energy Calculator Version 1.04# <i>Embedded Energy in Water Studies, Study 1: Statewide and Regional Water-Energy Relationship</i> <i>Embedded Energy in Water Studies, Study 2: Water Agency and Function Component Study and Embedded Energy-Water Load Profiles, Appendix B—Agency Profiles</i> §
Individual Water Suppliers	Water Master Plan Self-reported WEG Intensity Metrics reported using TCR's <i>Water-Energy GHG (WEG) Guidance for Water Suppliers in Southern California</i> Δ Other entity-specific reporting
Santa Ana Watershed Project Authority (SAWPA)	Greenhouse Gas Emissions Calculator◇
State Water Resources Control Board	20 x 2020 Water Conservation Plan Annual Report to the Drinking Water Program Monthly Urban Water Conservation Reporting
The Climate Registry (TCR)	Public CRIS Reports‡ Verified WEG Intensity Metrics reported using TCR's <i>Water-Energy GHG (WEG) Guidance for Water Suppliers in Southern California</i> ‡
University of Southern California	<i>Water Supply Scarcity of Southern California: Assessing Water District Level Strategies, 2012</i> †

* Table 5 includes example data sources for water suppliers in Southern California, but is not meant to be comprehensive. Members are encouraged to seek additional data sources specific to their water operations.

** See SWP website (http://www.water.ca.gov/climatechange/WaterEnergyNexusSWP_test.cfm).

† Published in 2005 and refined by Navigant Consulting in 2006, *Refining Estimates of Water-Related Energy Use in California*.

‡ Prepared for CEC by The Pacific Institute, 2011.

See CPUC website (<http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Water-Energy+Nexus+Programs.htm>). More recent versions of the CPUC Water-Energy Calculator are acceptable. For more information, refer to *Water/Energy Cost-Effectiveness Analysis Final Report, 2014*,

prepared by Navigant Consulting, Inc. in collaboration with GEI consultants for CPUC.

|| Prepared by GEI Consultants/Navigant Consulting for CPUC, 2010 (<ftp://ftp.cpuc.ca.gov/gopher-data/energy%20efficiency/Water%20Studies%202/Appendix%20B%20-%20Agency%20Profiles%20-%20FINAL.pdf>).

Δ Self-reported WEG intensity metrics will not be verified.

◇ See SAWPA's website (<http://www.sawpa.org/greenhouse-gas-emissions-calculator>).

↓ See TCR's CRIS website (<https://www.cris4.org>).

↑ See TCR's website (<http://www.theclimateregistry.org>).

† Chapter 9 includes data for Los Angeles Department of Water and Power and the Inland Empire Utilities Agency (<http://sustainablecities.usc.edu/research-publications/publications>).

GHG Emissions Data

If reporting WEG Metric B and/or C, Scope 3 activity data and emission factors will need to be collected for upstream or downstream processes pertaining to the delivery of water outside the Member's defined boundaries.

The availability of Scope 3 water activity data varies greatly among water suppliers in Southern California. However, many water suppliers already collect, report, or may have access to data regarding the energy embedded in water and the volumes of water delivered to customers outside their defined boundaries.

Water-energy Intensities

Water-energy intensity is the amount of energy required to take a unit volume of water from one step in the water use cycle to another in a specific location. It is calculated by dividing the quantity of energy consumed by the volume of water entering the distribution system. Water-energy intensity may refer to specific step(s) in the water use cycle or to the entire water use cycle, depending on the methodology used.

To calculate Scope 3 emissions for upstream and/or downstream processing of water, you first need to identify the most specific energy intensity available to you given the following preferred hierarchy. You may refer to the potential sources identified in Table 5, as well as additional appropriate sources:

1. Entity-specific or site-specific energy intensities;
2. Hydrologic region-specific default energy intensities; and,
3. California-specific default energy intensities.

Table 5 provides a list of potential data sources for Scope 3 energy intensities in California.

The preferred energy intensities are those from water suppliers in your organization's water supply chain. For example, a retail supplier should use a supply-specific

energy intensity from their wholesale water provider if it is available. These may be specific to water supplies (e.g., desalinated water, exchanges, groundwater, purchased water, stormwater, surface water, transfers).

If data is not available directly from the other entities in your water supply chain, refer to CPUC's *Energy Embedded in Water Studies, Study 2: Water Agency and Function Component Study and Embedded Energy-Water Load Profiles, Appendix B—Agency Profiles*³² for default energy intensity values. If more recent data is available, it should be used instead.³³

If a supplier-specific energy intensity is not available, you should proceed to a hydrologic region-specific energy intensity or a statewide energy intensity specific to California. Due to the unique circumstances of the water use cycle in California, national average default energy intensities are not acceptable for the WEG Guidance.³⁴

You should identify the appropriate energy intensities for all water supplies being reported for WEG Metrics B and C. You will also need the volume of water for entity-wide delivery (WEG Metric B) and for each water supply for product-specific water delivery (WEG Metric C).

Scope 3 GHG Emission Factors

As mentioned previously, TCR publishes default emission factors annually and provides utility-specific emission factors from EPS Members that report delivery metrics to TCR. To use Equation 1 to calculate

32. Appendix B (2010) can be found here: http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm.

33. This is consistent with the International Council for Local Environment Initiatives (ICLEI) Local Governments for Sustainability USA U.S. *Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Appendix F: Wastewater and Water Emission Activities and Sources*, Version 1.1, 2013.

34. Ibid.

Scope 3 emissions using energy intensities, you should refer to emission factors for Scope 2.³⁵

Please note: the following equations pertain to calculating Scope 3 emissions for upstream and/or downstream processing of water using energy intensities. You must also report non-energy related emissions for WEG Metrics B and C for all relevant GHGs. Please refer to the GRP for guidance on these GHG calculations.

Step 4: Calculate Scope 3 emissions

Once the needed water-energy intensities and emission factors have been identified, you are ready to calculate Scope 3 emissions. This should be done by step in the water use cycle for each relevant GHG for each water supply being reported, if supply-specific energy intensities are available.

Equation 1 describes how this data can be used to determining the Scope 3 emissions data for each step in the water use cycle for WEG Metrics B and C.

EQUATION 1: Calculating Scope 3 Emissions

Scope 3 emissions

$$= \text{Energy intensity} \times \text{Volume of water} \times \text{Emission factor}$$

Where:

Scope 3 emissions = metric tons GHG; note this value should be converted if the emission factor is not already in metric tons³⁶

Energy intensity = amount of energy per unit water, e.g. kilowatt hour (kWh) /AF

Volume of water = AF of water (pertaining to the energy intensity used)

Emission factor = most specific emission factor for this source or facility (e.g. metric tons CO₂/kWh)

Equation 1 applies to all steps in the water use cycle and should be repeated for each water supply and each GHG that has emissions for the particular source or facility.

For WEG Metric C, if a water product is composed of a single water supply, refer to Equation 1. Many water suppliers deliver water that is a mix of more than one water supply. In these cases to calculate Scope 3 emissions for WEG Metric C, you should first use Equation 2 to calculate a product-specific energy intensity based on the composition of the product. You will first need the proportions of each water supply. Equation 2 provides an example for determining Scope 3 emissions data for two water supply sources, groundwater (GW) and surface water (SW).

EQUATION 2: Calculating Scope 3 Emissions from multiple water supplies

Product – specific energy intensity

$$= \text{Percentage of supply(GW)} \times \text{Energy intensity(GW)} \\ + \text{Percentage of supply(SW)} \times \text{Energy intensity(SW)}$$

Where:

Product-specific energy intensity = weighted average of water supplies composing a discrete water product, kWh/AF

Percentage of supply = the proportion of a specific water supply making up the water product; note the percentages must total 1

Energy intensity = amount of energy per unit water in specific supply, e.g. kWh/AF

Equation 2 should be used for each discrete water product being reported for WEG Metric C with multiple input water supplies. If more than two water supply sources make up a product, Equation 2 can be expanded to any number of supplies using the appropriate proportions. Once Equation 2 has been completed, the resulting average product-specific energy intensity can be used in Equation 1.

35. See Chapter 14 of the GRP and TCR's default emission factors and utility-specific emission factors (<http://www.theclimateregistry.org>).

36. Refer to TCR's GRP.

TABLE 6: Calculation Example for WEG Metric A

Step in the Water Use Cycle	Scope 1 Stationary Emissions (metric tons GHG)	Scope 1 Mobile Emissions (metric tons GHG)	Scope 2 Emissions (metric tons GHG)	Biogenic CO ₂ Emissions (metric tons GHG)	Total Emissions (metric tons GHG)	Volume of Delivered Water (AF)
A1. Extract & Divert	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>
A2. Place into Storage	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>
A3. Conveyance	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>
A4. Treatment	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>
A5. Distribution	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>
Total	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>

Step 5: Calculate WEG intensity metrics

Once you have completed your GHG inventory and collected the additional data, the WEG intensity metrics can be calculated. Instructions follow for each of the WEG intensity metrics.

WEG Metric A: Basic System Average

Table 6 provides an example data table that could be used to calculate WEG Metric A given the data collected in Steps 1, 2, and 3. If not reporting by step in the water use cycle, you may use Table 6 and the following instructions as a general guide depending on the data available to you.

WEG Metric A only reflects GHG emissions within a Member’s boundaries and reporting WEG Metric A is the minimum requirement for Members using the WEG Guidance.

To calculate WEG Metric A, refer to the emissions identified as pertaining to water and assigned to a step in the water use cycle from Step 2. For each emissions category and step in the water use cycle, sum

the emissions from each relevant source or facility for Scope 1 stationary, Scope 1 mobile, Scope 2 (from purchased electricity, steam, heat, and cooling), and any biogenic CO₂. This may involve adding emissions from individual sources/facilities, noting no single source/facility should be counted in more than one category to prevent double counting. Note that not all water suppliers will have data for each cell, depending on the water operations within the Member’s boundaries.

In the ‘Total’ row, the data for each step in the water use cycle should be totaled for each emissions category. Identify the volume of delivered water for each step in the water use cycle and for the overall entity-wide total identified in Step 3 and enter those in the ‘Volume of Delivered Water’ column. Next, the emissions for each step in the water use cycle should then be totaled across each row in the ‘Total Emissions’ column.

Finally, using the values in the ‘Total Emissions’ column and the values in the ‘Volume of Delivered Water’ column, calculate WEG Metric A for each step in the

TABLE 7: Calculation Example for WEG Metric B

Step in the Water Use Cycle	Total Emissions from WEG Metric A (metric tons GHG)	Upstream Scope 3 Emissions (metric tons GHG)	Downstream Scope 3 (metric tons GHG)	Total Emissions (metric tons GHG)	Volume of Delivered Water (AF)	WEG Metric B (metrics tons GHG/AF)
A1. Extract & Divert	<i>Data</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>	<i>WEG Metric B1</i>
A2. Place into Storage	<i>Data</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>	<i>WEG Metric B2</i>
A3. Conveyance	<i>Data</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>	<i>WEG Metric B3</i>
A4. Treatment	<i>Data</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>	<i>WEG Metric B4</i>
A5. Distribution	<i>Data</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>	<i>WEG Metric B5</i>
Total	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Calc.</i>	<i>Data</i>	<i>Composite WEG Metric B</i>

water use cycle and for the composite metric as shown in Equation 3.

EQUATION 3: WEG Metric A

$$WEG\ Metric\ A\ \left(\frac{GHG}{AF}\right) = \frac{Total\ emissions\ (GHG)}{Total\ Volume\ of\ Water\ Delivered\ (AF)}$$

This should be repeated in a separate table for each GHG, as appropriate. The volumes of delivered water will be the same for all GHGs.

WEG Metric B: Overall GHG Intensity of Delivered Water (by step in water use cycle)

Table 7 provides an example data table that could be used to calculate WEG Metric B given the data collected in Steps 1–4. If not reporting by step in the water use cycle, you may use Table 7 and the following instructions as a general guide depending on the data available to you.

Metric B includes Scope 1, Scope 2, and biogenic CO₂ emissions, as well as Scope 3 emissions from upstream

processing of water.³⁷ Reporting Scope 3 emissions from the downstream processing of water is optional.

First, enter the appropriate information from Table 6 from the WEG Metric A calculation in the ‘Total Emissions from WEG Metric A’ column. Next, refer to the emissions calculated in Step 4 for the Scope 3 categories being reported and sum the emissions from each relevant source or facility for the ‘Upstream Scope 3’ and ‘Downstream Scope 3’ columns. This may involve adding emissions from individual sources/facilities, noting no single source/facility should be counted in more than one category to prevent double counting.

In the ‘Total’ row, the data for each step in the water use cycle for each emissions category should be summed. Identify the appropriate volume of delivered water for each step in the water use cycle and for the overall entity-wide total identified in Step 3 and enter those in the ‘Volume of Delivered Water’ column. Next, the emissions for each step in the water use cycle

37. Members with incomplete upstream data or applicable defaults may exclude these emissions and publicly disclose the lack of available data.

TABLE 8: Calculation Example for WEG Metric C

Water Product	Water Use Cycle Steps*					Total Emissions (metric tons GHG)	Volume of Delivered Water (AF)	WEG Metric C (metric tons GHG/AF)
	1.	2.	3.	4.	5.			
Retail Potable	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C
Retail Non-Potable	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C
Wholesale potable	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C
Wholesale non-potable	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C
Agricultural	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C
Environmental	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C
Other	Calc.	Calc.	Calc.	Calc.	Calc.	Calc.	Data	Composite WEG Metric C

* Water use cycle steps are defined as (1) Extract & Divert (metric tons GHG), (2) Place into Storage (metric tons GHG), (3) Conveyance (metric tons GHG), (4) Treatment (metric tons GHG), (5) Distribution (metric tons GHG).

should then be totaled across each row in the ‘Total Emissions’ column.

Finally, using the values in the ‘Total Emissions’ column and the values in the ‘Volume of Delivered Water’ column, calculate WEG Metric B as shown in Equation 4 for each step in the water use cycle and for the composite metric.

EQUATION 4: WEG Metric B

$$WEG\ Metric\ B\ \left(\frac{GHG}{AF}\right) = \frac{Total\ emissions\ (GHG)}{Total\ Volume\ of\ Water\ Delivered\ (AF)}$$

This should be repeated in a separate table for each GHG, as needed. The volumes of delivered water will be the same for all GHGs.

WEG Metric C: Detailed GHG Intensity of Delivered Water (by discrete water product)

Table 8 provides an example data table that could be used to calculate WEG Metric C. If not reporting by step in the water use cycle, you may use Table 8 and the following instructions as a general guide depending on the data available to you.

WEG Metric C quantifies the GHG intensity of discrete water products across the water use cycle. Similar to WEG Metric B, reporting Scope 3 emissions from upstream processing of water is required while reporting downstream processing is optional.³⁸

38. Members with incomplete upstream data may exclude these emissions and publicly disclose the lack of available data.

You should first fill out the first column of Table 8 for each water product being reported.³⁹ You can report any number of discrete water products, depending on the data available, which could include more than one WEG Metric C value for a single type of product if there are unique GHG intensities of similar product types. If a water product does not have emissions in one or more steps in the water use cycle, you should report zero emissions and disclose which steps in the water use cycle do not apply to this product and why.

Next, complete Table 8 with appropriate data from Steps 1–4 for each product being reported for each step in the water use cycle. This may involve adding emissions from individual sources/facilities, noting that no single source/facility should be counted in more than one category to prevent double counting. In the ‘Total Emissions’ column, sum the emissions from each step in the water use cycle. Next, enter the appropriate volume of delivered water from Step 3 specific to the discrete water product being reported. Finally, using the values in the ‘Totals Emissions’ and ‘Volume of Delivered Water’ columns, calculate the composite WEG Metric C for each water product, as shown as an example for potable water in Equation 5.

EQUATION 5: WEG Metric C

$$\text{WEG Metric C – Retail Potable} \left(\frac{\text{GHG}}{\text{AF}} \right) = \frac{\text{Total emissions (GHG)}}{\text{Total Volume of Water Delivered (AF)}}$$

Equation 5 can also be used to calculate WEG Metric C for each step in the water use cycle. Members can use a format similar to Table 7 for each discrete product for more granular calculations. This should be repeated in a separate table for each GHG, as needed, for each discrete water product being reported.

39. For definitions of the example water products shown in Table 8, refer to *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers*, November 2015.

Part V: Reporting

Members will report GHG emissions for all data used to calculate the WEG intensity metrics in CRIS. This includes Scopes 1, 2, and direct biogenic CO₂ emissions for WEG Metric A and any Scope 3 emissions data used for WEG Metrics B and C. This will allow Members the option to use the data extract function in CRIS’ Reports module to download submitted data in an excel spreadsheet. This also allows for the GHG emissions data used to calculate the WEG intensity metrics to appear in the public reports available in CRIS if you complete verification.

Members are encouraged to report any supplemental data, information, or documents that may be relevant to this WEG Guidance and the calculation of reported WEG intensity metrics.

TCR requires Members to publicly disclose the following information alongside any reported WEG intensity metrics:

- Steps in the water use cycle that have not been accounted for, for each reported metric (e.g. steps with only Scope 3 emissions for WEG Metric A or downstream steps in WEG Metrics B and C);
- Lack of available upstream data for WEG Metrics B and C if defaults are not available; and,
- Steps in the water use cycle that do not apply to discrete water products being reported (WEG Metric C).

TCR encourages Members to optionally disclose the following information alongside any reported WEG intensity metrics:

- Map of geographic supply area or system map;
- Most recent UWMP or AWMP submitted to CA DWR, including energy intensity data reported under *Appendix O: Voluntary Reporting of Energy Intensity*, if applicable;
- Description of sources of water supplies and the characteristics of each step in the water use cycle

(name of water basin, treatment technology used, incoming water quality, daily capacity, etc.);

- Information on the lack of data available to a Member due to lack of data granularity (eg., lack of sub-meters at a facility), including any assumptions or explanation of estimates made to determine emissions pertaining to water or to a step in the water use cycle, if applicable;
- Data sources for Scope 3 activity data and emission factors for WEG Metrics B and C, if applicable;
- Organizational control approach used by other entities (upstream and/or downstream) for which data was used; and,
- Most recent date input water meters were calibrated.

a consistency check that the total volume of delivered water presented in the denominator of the metric is clearly disclosed using a standard methodology.⁴²

Part VI: Verification and Third-party Review

Verification is an important and valuable aspect of TCR's program and is optional for all Members.⁴⁰ For the WEG Guidance, the third-party review of WEG Metric A by a TCR-recognized verification body (VB) is optional. Review of WEG Metric A by a third-party VB will allow your metric to be publicly available on TCR's website.⁴¹

To have your WEG Metric A reviewed and published on TCR's website, you will include this in the scope of verification activities when submitting proposals to potential VBs. Third-party review of the composite WEG Metric A will consist of verification of the GHG emissions information in the numerator of the metric (emissions from Scope 1, Scope 2, direct biogenic CO₂) according to TCR's program requirements, and

40. An overview of TCR verification is provided in the Chapter 19 of the GRP. Members should also consult TCR's General Verification Protocol (GVP) for more detail.

41. Since the WEG intensity metrics are intended to be used for policy planning, financial incentives, and by other TCR Members in their own inventories, it is necessary that WEG Metric A be reviewed by a third-party VB in order to be publicly available on TCR's website.

42. The consistency check will ensure that the delivered water data used to build WEG Metric A is consistent with information reported to the official regulatory source (e.g. CA DWR), or is clearly disclosed using a standard methodology (for many water suppliers, the total volume entering the distribution system for composite WEG Metric A will be the total volume calculated in UWMP Table 4-1: Demands for Potable and Raw Water). If the VB cannot confirm that the denominator is consistent with information reported to the official regulatory source or is disclosed using a standard methodology, the numerator may still be verified and posted on TCR's website. The consistency check will be completed by your VB to a 95 percent materiality threshold.

Glossary of Key Terms

Acre-foot ⁴³	(AF) The volume of water that would cover one acre to a depth of one foot.
Biogenic emissions	Carbon dioxide generated during the combustion or decomposition of biologically-based material.
Consequential hydropower generation ⁴⁴	Emissions generated using turbines or other generation devices to generate electricity from falling water where the energy generation is a direct consequence of water delivery. Water passing through the energy generation devices is delivered to users.
Conveyance (step in water use cycle) ⁴⁵	Emissions generated from transporting untreated water through aqueducts, canals, and pipelines from its source to a water treatment facility or directly to an end-user. For wholesale suppliers, this does not include emissions generated from conveying State Water Project supplies.
Delivered water	Total volume of water entering the distribution system for the emissions year being reported in acre-feet.
Distribution (step in water use cycle) ⁴⁶	Emissions generated to transport treated water from the treatment plant or wellhead disinfection point to the point of delivery.
Distribution system ⁴⁷	Large networks of pipes that deliver water for municipal or agricultural purposes.
Extract & Divert (step in water use cycle) ⁴⁸	Emissions generated from removing water from a channel, pipeline, stream, or aquifer.
Hydrologic region ⁴⁹	A geographic region of the state based on the local hydrologic basins. CA DWR divides California into ten regions that correspond to the state's major drainage basins: North Coast, North Lahontan, Sacramento River, San Francisco

43. Definition adapted from CPUC Water-Energy Calculator Version 1.04.

44. Definition adapted from *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity*, November 2015.

45. Ibid.

46. Ibid.

47. Definition adapted from *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix G: Glossary*, November 2015.

48. Definition adapted from *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity*, November 2015.

49. Ibid.

	Bay, Central Coast, San Joaquin River, Tulare Lake, South Coast, South Lahontan, and Colorado River.
Place into Storage ⁵⁰	Emissions generated to place water into a storage reservoir or groundwater bank.
Product ⁵¹	Type of water delivered. Examples of water delivery types include: retail potable, retail non-potable, wholesale potable, wholesale non-potable, agricultural, environmental, and other deliveries.
Recycled water ⁵²	Emissions from municipal wastewater that has been treated to a specified quality, enabling it to be reused for a beneficial purpose. Recycled water treatment and distribution are outside the scope of the WEG Guidance.
Scope 1 emissions	Direct anthropogenic emissions from stationary and mobile combustion.
Scope 2 emissions	Indirect anthropogenic emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling
Scope 3 emissions	All other non-Scope 2 indirect anthropogenic emissions that occur in the value chain.
Step in the water use cycle ⁵³	For the purpose of the WEG Guidance, defined as water management processes Extract & Divert, Place into Storage, Conveyance, Treatment, and Distribution.
Treatment (step in water use cycle)	Emissions generated from treating water prior to distribution to customers. Treatment of recycled water and wastewater is not included in this step.
Wastewater ⁵⁴	Emissions generated from collecting, treating, and discharging wastewater. Wastewater collection, treatment, and distribution are outside the scope of the WEG Guidance.
Water-energy intensity	Amount of energy consumed to take a unit volume of water from one step in the water use cycle to another in a specific location, calculated by dividing the quantity of energy

50. Ibid.

51. Ibid.

52. Definition from *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers*, November 2015.

53. Definition adapted from *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers, Appendix O: Voluntary Reporting of Energy Intensity*, November 2015.

54. Ibid.

consumed by the volume of water entering the distribution system. Energy intensity may refer to part of the water use cycle or the entire water use cycle, depending on the methodology used.

Water loss

Physical water loss from the water distribution system and the supplier’s storage facilities up to the point of customer consumption.⁵⁵

55. Definition from *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers*, November 2015.

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