The Water-Energy Nexus:
Measuring Energy and Greenhouse Gas Emissions in the Water Sector

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Welcome & Introductions

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Agenda

• Introduction to TCR
• Introduction to the Water-Energy Nexus
• How to calculate a carbon footprint
• The Water-Energy Nexus Registry
  ▪ Overview
  ▪ How it works
  ▪ Benefits of participation
• Conclusion and wrap-up
The Climate Registry

• Designs, builds, and operates greenhouse gas reporting programs and registries
• Provide resources & services to assist organizations to measure, report, and verify the GHGs in their operations
• Empower our generation to reduce its carbon footprint
Community of Members
What is a Carbon Footprint?
What is a Carbon Footprint?

The total amount of greenhouse gases that are emitted into the atmosphere each year by an organization or company, either directly or indirectly.

Greenhouse gases include:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF6)
- Nitrogen trifluoride (NF3)
GHG Sources
Scopes Examples

Scope 1 - Direct
Scope 2 - Indirect
Scope 3 – Other Indirect
Benefits of GHG Reporting to Companies

- **Be more competitive**
  - Reporting your GHGs will help you save money and become more efficient

- **Be prepared for future climate policy**
  - Gain advantage for future carbon market or regulation

- **Be a leader in the low-carbon economy**
  - Be seen as a leader to vendors, customers, and other key stakeholders

- **Track your success**
  - Set a baseline and track annual progress
Steps to Reporting a Carbon Footprint
Steps of the Reporting Process

1. Define your boundaries
2. Identify facilities and emissions sources
3. Collect emissions data
4. Quantify and report emissions
5. Verification (optional)
Steps of the Reporting Process

1. Define your boundaries
2. Identify facilities and emissions sources
3. Collect emissions data
4. Quantify and report emissions
5. Verification (optional)
Organizational Boundary

Drawing a box around the facilities and emissions sources within an inventory.
Steps of the Reporting Process

1. Define your boundaries
2. Identify facilities and sources of emissions
3. Collect emissions data
4. Quantify and report your emissions
5. Verification (optional)
Example: Facilities and Sources

Entity: Southern California Water Agency

Facility: Headquarters Building – LA County

Source: Electricity for lighting, computers, etc. purchased from SCE

Source: Boilers – natural gas purchased from SoCal Gas

Source: Refrigerators – refrigerant leakage

Source: Forklifts – propane
Steps of the Reporting Process

1. Define your boundaries
2. Identify facilities and emissions sources
3. Collect emissions data
4. Quantify and report your emissions
5. Verification (optional)
Data Sources

• Scope 1
  • Fuel purchase records
  • Mileage logs
  • Continuous Emissions Monitoring System

• Scope 2
  • Utility bills
  • Building management
  • Renewable Energy Contracts

• Scope 3
  • Employee reimbursements
  • Expense reports
  • Annual surveys
Steps of the Reporting Process

1. Define your operations
2. Define facilities based on your boundaries
3. Organize and collect data on emission sources
4. Quantify and report your emissions
5. Verification (optional)
Calculating your GHG Emissions

3 key data types necessary for calculating GHG emissions

- **Activity Data**
  Quantity of fuel or material that, when used, emits GHGs

- **Emission Factor (EF)**
  Converts activity data into amount of GHGs

- **Global Warming Potential (GWP)**
  Converts GHG emissions into CO₂e values
Steps of the Reporting Process

1. Define your operations
2. Define facilities based on your boundaries
3. Organize and collect data on emission sources
4. Quantify and report your emissions
5. Verification (optional)
Verification

Why verify my inventory?

There are many benefits to third-party verification, including:

- Ensures conformance with the General Reporting Protocol
- Improves credibility of data with key stakeholders
- Identify reduction opportunities from an accurate baseline
- Required for recognition opportunities
- Improve internal data management and processes
Water-Energy Nexus
What is the Water-Energy Nexus?
Energy Embedded in Water
Energy Intensity of Water
The Nexus

Water Efficiency + Energy Efficiency = $\text{Cost}$
Water-Energy Nexus Registry
The WEN Registry - A voluntary GHG reporting program

Born out of California’s SB 1425

• Clear and standardized GHG accounting guidance for the water sector

• Providing resources & services to assist organizations in California to measure, report, and verify the GHGs in their operations

• Pathway to publish verified emissions and performance metrics

• Opportunities to demonstrate and achieve recognition for emissions measurement and reductions
WEN Registry Program

Participating organizations have access to:

- **Training, tools, and support** to measure greenhouse gas emissions
- **Recognition opportunities in the Water-Energy Leader™ Program**
- **High-quality data** to demonstrate leadership to your stakeholders
- **Consistent approach** for measuring and accounting for GHGs over time
Founders of the Registry
Stakeholder Outreach and Engagement
Water-Energy Nexus Registry Protocol

Key Components

• Boundary Considerations for Water Sector Reporting
• Water Sector-Specific Emissions Quantification
• Reporting Water-Related Data
• Water Sector Performance Metrics
Water-Energy Nexus Registry Protocol

Water Sector Emissions Quantification

- Wastewater
- Biogas derived biofuels
- Reservoirs and other wetlands
- Upstream water supply chain
Water and Wastewater Operations Footprint

Entity’s Carbon Footprint

Water/Wastewater Operations Footprint
The Water Use Cycle Processes

Water Sector Performance Metrics

• Understanding the GHG intensity of water operations and deliveries.
• Guidance for measuring annual GHG Intensity Metrics (GHG/AF) associated with water deliveries:

Emissions from Water Management (metric tons GHG)
Volume of Water Delivered (AF)
Water Sector Performance Metrics

Efficiency Metrics: Emissions intensity of an agency’s operations. Doesn’t consider upstream emissions.

Delivery Metrics: Total emissions embedded in water delivered to customers or treated. Includes emissions associated with upstream activities.
Applying Performance Metrics in the Water Sector

Combined, emissions intensity metrics can provide information about the overall efficiency of California’s water system, and:

- Provide further context on the emissions impacts of different regions and water year types
- An understanding of how water management technology and techniques can help reduce the emissions intensity the water supply chain
Tracking Emissions Over Time

Monitor emissions associated with water management operations by smoothing out annual variability
## Additional Water-Related Information

Contextualizing organization’s GHG emissions data

<table>
<thead>
<tr>
<th>Water or Wastewater Managers</th>
<th>Consumers/End Users</th>
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<tbody>
<tr>
<td>System Narrative</td>
<td>Water use</td>
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<tr>
<td>Population Served or Number of Employees</td>
<td>Water consumption</td>
</tr>
<tr>
<td>Service Territory and System Boundary Maps</td>
<td>On-site treatment or recycling</td>
</tr>
<tr>
<td>Water Conservation Targets and Savings</td>
<td>Discharges</td>
</tr>
<tr>
<td>Water Loss Data</td>
<td>Quantify Scope 3 emissions from acquired water</td>
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</table>
Communicating with Stakeholders

Allowing customers to understand emissions associated with purchased water products or coproducts.

• Provide emission factors to customers for calculating the indirect Scope 3 emissions associated with the water products they purchase.
Example: Energy Intensity of Water Supplies
A robust and ambitious GHG reduction target requires an accurate emissions baseline solidly underpinned by good data. This will enable organizations to make meaningful and measurable GHG reductions.

Without a basic understanding of GHG inventory, organizations are flying blind. You can’t manage what you don’t measure.
Common GHG reduction opportunities in the water sector

<table>
<thead>
<tr>
<th>Mobile emissions</th>
<th>Energy efficiency and conservation</th>
<th>Other</th>
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<tbody>
<tr>
<td>• Modify fleet (hybrids, alternative fuel trucks, e.g., natural gas)</td>
<td>• Use LED lights and energy-efficient equipment</td>
<td>• Pumped hydro storage</td>
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<tr>
<td>• Invest and promote vehicle fuel economy</td>
<td>• On-peak/off-peak optimization</td>
<td>• Leak detection</td>
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<tr>
<td>• Reduce vehicle miles travelled</td>
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<th>Electricity</th>
<th>Employee commuting</th>
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<tr>
<td>• Purchase renewable energy/green power</td>
<td>• Transit subsidy, carpooling/employee ride share programs and resources, bike to work/walk to work stipend</td>
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<tr>
<td>• Use of biogas and biosolids</td>
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Case Study: CA Department of Water Resources

- In 2016, its total emissions were just over 1 million mtCO2e, marking a **69%** reduction from 3.25 million mtCO2e in 2007.

- DWR has achieved average **savings** of **1.14E6 kWh per year** – equivalent to **$87,000** in annual energy savings.
Case Study: Irvine Ranch Water District

- From 2015-2017, IRWD’s average emissions were ~58.9 mtCO2e – 5% percent below its average of ~62 mtCO2e from 2012-2014.

- Reductions resulting from energy efficiency projects that reduced total electricity usage in kWh by ~6 percent.

- IRWD encourages water conservation and offers incentive programs on use of effective water-saving devices and the adoption of drought-tolerant landscaping.
Water-Energy-Climate
Climate & Water Challenges

• Energy-intensive systems contributes to carbon emissions
• Increased variability in the water cycle
• Mismatches between water availability and needs
• Infrastructure design
Mitigation & Adaptation Strategies
Joining the WEN Registry

www.theclimateregistry.org/wenregistry

- It is open to organizations with operations in California at no cost to participate.

- Program and participation sponsored by CalEPA and administered by The Climate Registry.
THANK YOU