



REQUEST FOR PROPOSALS (RFP)

Per Capita Water Use Calculation (RFP 5335)

Date Posted

March 4, 2025

Due Date

Proposals must be received by 3:00 pm Mountain Time on May 7, 2025.

WRF Project Contact

Sydney Samples, ssamples@waterrf.org

Project Sponsors

This project is co-funded by The Water Research Foundation (WRF), Central Utah Water Conservancy District, and the City of Calgary as part of WRF's Tailored Collaboration Program.

Project Objectives

- Understand how per capita water use is calculated and measured throughout North America and how it is used as a metric for comparison and water resource planning.
- Evaluate the risks and benefits associated with different methodologies for per capita water calculations and the risks and benefits of standardizing the calculation.
- Develop a framework, definitions, and standard methodology for calculating per capita water use that can be used universally, allowing for effective comparisons and planning.
- Apply this framework and methodology to a set of water providers.

Budget

Applicants may request up to \$420,000.00 in WRF funds for this project.

Background and Project Rationale

Many water utilities throughout North America face the same challenge: limited water resources and an increasing demand for water supplies. Utilities employ various metrics to track water usage, highlight trends, and identify conservation potential. One of the most widely used metrics is per capita water use. As a metric, gallons per capita per day (GPCD) has been one of the most useful numbers for planning and comparison while having no industry standard framework, definitions, or methodology for calculation.

GPCD is calculated by taking the annual water volume, divided by the population, divided by 365 days. The concept seems simple, but variations in calculation methodologies often do not produce comparable results. For example, per capita use can be calculated using water use

measured at the point of diversion, customer-level or by using end use metering.

Similarly, the population values used to calculate GPCD must be scrutinized if an “apples to apples” comparison is to be made. Customer level data, census data, local population estimates, and forecasted population are all used to calculate GPCD, depending upon the goals and objectives and availability. Population calculations, and whether measurements or projections are used, can result in differences in results.

When per capita water use is not compared with other utilities and regions, any consistent method for calculation has merit. Many utilities use GPCD to set conservation goals and metrics for water resource planning. The ability to measure change over time is very important, and when per capita water use is used to compare year over year to itself, it can show important trends in water use and provide needed detail. However, with many pressures that utilities face in managing their water supplies, the wide range of reported per capita water use has resulted in some utilities struggling to understand their own water use in reference to others.

Per capita water use comparisons can be valuable and are an important tool in evaluating the state of use and overuse. However, with the wide range of water use and population measurements used for the calculation, it is extremely difficult to know if any two utilities are using the same method of calculation.

Research is needed to better understand the current practices for calculating per capita water use so that a framework, definitions, and standard methodology for calculating per capita water use can be created. This framework can then be applied and used, allowing for effective comparisons and planning where appropriate.

Research Approach

The purpose of this research is to understand how per capita water use is calculated and measured throughout North America and how it is used as a metric for comparison and water resources planning. Part of this analysis will be to evaluate the risks and benefits associated with different methodologies for per capita water calculations and the risks and benefits of standardizing the calculation. The team should consider equity impacts when evaluating risks and benefits.

Understanding GPCD: Review of Literature, Current Methods and Data

Identify the variety of methods used to calculate per capita water use, as well as the rationale for utilizing different methodologies. Through identifying the range of methodologies for per capita water use throughout North America, the “common” or “most common” methods may be identified. Methods for calculating total or gross per capita use should be researched along with methods for calculating residential per capita use.

Additionally, some areas, such as California, may have statutory requirements for specific reporting and use of per capita water metrics, which should also be identified and evaluated.

As part of this project, an evaluation of the risks and benefits of adopting or not adopting uniform methods of calculating per capita water use should also be conducted. The researchers

should identify how such a standard might be established and maintained. This study should also discuss how normalized data on per capita water use should be collected and tracked in the future.

Based on the evaluation of the methods, it is our goal that the most promising methods will be identified that will provide a path for standardization. While there are many variables that result in differences across North America (such as climate, population density, size of household, etc.), the goal of this study is to develop aligned methods of per capita calculation.

GPCD Framework, Definitions, and Standard Methodology

Using the information gathered, the research team will develop a framework, definitions, and standard methodology for calculating per capita water use that can be used universally, allowing for effective comparisons and planning.

Apply and Demonstrate Standard GPCD Framework

Once the framework is reviewed and approved by The Water Research Foundation, the research team will apply and demonstrate this framework and methodology for a set of water providers. The team should seek to achieve a significant sample of North American water providers to account for various sizes of providers/regulators and climatic regions. The size and scope of this demonstration are up to the individual applicants but should adequately reflect the size of funds requested.

Proposed Project Tasks

The following are the expected tasks needed to complete this project:

Understanding GPCD:

- Review the literature on per capita urban water use. How is this metric used by water providers today?
- Identify and understand previous efforts to evaluate per capita water use calculations, including a review of similar and related WRF projects.
- Review different forms of the per capita use calculation, including total/gross per capita use, residential per capita, residential indoor per capita, and consumptive and non-consumptive use. The review should include local and state level policies, calculations and assumptions.
- Identify the variations in population calculation and data sources for population estimates.
- Identify areas where specific per capita reporting is required by state or governing agency.
- Identify and evaluate per capita water use calculation methods across North America (This should be a representative sample of utilities throughout North America and not all utilities).
- Identify and evaluate risks and benefits for each method of calculation.
- Identify the benefits and risks associated with not having a standard methodology of per capita water use calculation.
- Identify the benefits and risks associated with developing a standard per capita water calculation methodology that could be used across North America.
- Evaluate the drivers of per capita water use calculation and what impacts change within specific methodologies.

Prepare GPCD Framework, Definitions, and Methodology:

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- Using the information gathered, the research team will develop a framework, definitions, and standard methodology for calculating per capita water use that can be used universally, allowing for effective comparisons and planning. The framework should include how to calculate for seasonal differences, including population and climate, a water provider may experience.
- Present framework to the Water Research Foundation for review and approval.

Apply GPCD Framework to Selected Water Providers:

- The research team will apply and demonstrate this framework and methodology for a set of water providers. The size and scope of this demonstration are up to the individual applicants.

Final deliverables:

- Develop a report that summarizes the tasks described above.
- Develop a standard framework, definitions, and calculation methodology that utilities can use to calculate per capita water use. The approach should maximize the benefits and reduce the risks associated with other methodologies.

Expected Deliverables

Deliverables for this project must include:

- Research report using WRF's *Research Report Template* that includes the above stated literature review, evaluations, and recommendations for standardization through AWWA
- Guidance manual
- Per capita calculation tool (any technology deliverables must follow the [Technology Deliverables Guidance](#)) Education materials for presentations and/or webcasts

Communication Plan

Please review WRF's [Project Deliverable Guidelines](#) for information on preparing a communication plan. Conference presentations, webcasts, peer-reviewed publication submissions, and other forms of project information dissemination are typically encouraged.

Project Duration

The anticipated period of performance for this project is 15-18 months.

References and Resources

The following list includes examples of research reports, tools, and other resources that may be helpful to proposers. It is not intended to be comprehensive, nor is it a required list for consideration.

- Mayer, P. Forthcoming. *Residential End Uses of Water, Version 3: A Single-Family and Multi-Family Study*. Project 5242. Denver, CO: The Water Research Foundation.
<https://www.waterrf.org/research/projects/residential-end-uses-water-version-3-single-family-and-multi-family-study>.
- DeOreo, W. B., Mayer, P., Dziegielewski, B., & Kiefer, J. 2016. *Technical Report: Residential End Uses of Water, Version 2*. Project 4309. Denver, CO: The Water Research Foundation.

- Kiefer, J.C. & Krentz, L.R. 2018. *Technical Report: Water Use in the Multi-Family Housing Sector*. Project 4554. Denver, CO: The Water Research Foundation.
- DeOreo, W.B. 2011. *Technical Report: Analysis of Water Use in New Single-Family Homes*. Aquacraft, Inc. Water Engineering and Management.
- Beal, C., & Stewart, R.A. 2011. *Technical Report: South East Queensland Residential End Use Study: Final Report*. Urban Water Security Research Alliance
- De Oreo, W.B., Mayer, P.W., Martien, L., Hayden, M., Funk, A., Kramer-Duffield, M., Davis, R., Henderson, J., Raucher, B., Gleick, P., & Heberger, M. 2011. *Technical Report: California Single-Family Water Use Efficiency Study*. Aquacraft Water Engineering & Management.
- Coomes, P., Rockaway, T., Rivard, J., & Kornstein, B. 2010. *Technical Report: North America Residential Water Usage Trends Since 1992*. Project 4031. Denver, CO: The Water Research Foundation.
- DeOreo, W.B., & Hayden, M. 2008. *Technical Report: Analysis of Water Use Patterns in Multi-Family Residences*. Aquacraft, Inc. Water Engineering and Management.
- Mayer, P.W., Towler, E., DeOreo, W.B., Caldwell, E., Miller, T., Osann, E.R., Brown, E., Bickel, P.J., & Fisher, S.B. 2004. *Technical Report: National Multiple Family Submetering and Allocation Billing Program Study*.
- Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W.Y., & Dziegielewski, B. 1999. *Technical Report: Residential End Uses of Water*. Project 241. Denver, CO: The Water Research Foundation.
- NMOSE (New Mexico Office of the State Engineer). 2021. *Instruction Module: New Mexico Office of the State Engineer Gallons Per Capita Per Day Calculation*. NMOSE, Water Use and Conservation Bureau and Water Prospecting and Resource Consulting.
https://www.ose.nm.gov/WUC/wuc_gcpd.php.
- *Technical Report: Utah's Municipal and Industrial Water Use Comparison*. Jacobs. (Available upon request: ssamples@waterrf.org)

Proposal Evaluation Criteria

The following criteria will be used to evaluate proposals:

- Understanding the problem and responsiveness to RFP (maximum 20 points)
- Technical and scientific merit (maximum 30 points)
- Qualifications, capabilities, and management (maximum 15 points)
- Communication plan, deliverables, and applicability (maximum 20 points)
- Budget and schedule (maximum 15 points)

PROPOSAL PREPARATION INSTRUCTIONS

Proposals submitted in response to this RFP must be prepared in accordance with WRF's [Guidelines for Research Priority Program Proposals](#) and [Instructions for Budget Preparation](#). These guidelines contain instructions for the technical aspects, financial statements, indirect costs, and administrative requirements that the applicant must follow when preparing a proposal.

Proposals that include the production of web- or software-based tools, such as websites, Excel spreadsheets, Access databases, etc., must follow the criteria outlined for web tools presented in the [Technology Deliverables Guidance](#).

Eligibility to Submit Proposals

Proposals will be accepted from both U.S.-based and non-U.S.-based entities, including educational institutions, research organizations, governmental agencies, and consultants or other for-profit entities. WRF's Board of Directors has established a [Timeliness Policy](#) that addresses researcher adherence to the project schedule. Researchers who are late on any ongoing WRF-sponsored studies without approved no-cost extensions are not eligible to be named participants in any proposals. Direct any questions about eligibility to the WRF project contact listed at the top of this RFP.

Administrative, Cost, and Audit Standards

WRF's research program standards for administrative, cost, and audit compliance are based upon, and comply with, Office of Management and Budget (OMB) Uniform Grants Guidance (UGG), 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, and 48 CFR 31.2 Contracts with Commercial Organizations. These standards are referenced in WRF's [Guidelines for Research Priority Program Proposals](#) and include specific guidelines outlining the requirements for indirect cost negotiation agreements, financial statements, and the Statement of Direct Labor, Fringe Benefits, and General Overhead. Inclusion of indirect costs must be substantiated by a negotiated agreement or appropriate Statement of Direct Labor, Fringe Benefits, and General Overhead. Well in advance of preparing the proposal, your research and financial staff should review the detailed instructions included in WRF's [Guidelines for Research Priority Program Proposals](#) and consult the [Instructions for Budget Preparation](#).

Budget and Funding Information

The maximum funding available from WRF for this project is \$420,000.00. The applicant must contribute additional resources equivalent to at least 33% of the project award. For example, if an applicant requests \$100,000 from WRF, an additional \$33,000 or more must be contributed by the applicant. Acceptable forms of applicant contribution include cost share, applicant in-kind, or third-party in-kind that comply with 2 CFR Part 200.306 cost sharing or matching. The applicant may elect to contribute more than 33% to the project, but the maximum WRF funding available remains fixed at \$420,000.00. Proposals that do not meet the minimum 33% of the project award will not be accepted. Consult the [Instructions for Budget Preparation](#) for more information and definitions of terms.

Period of Performance

It is WRF's policy to negotiate a reasonable schedule for each research project. Once this schedule is established, WRF and its sub-recipients have a contractual obligation to adhere to the agreed-upon schedule. Under WRF's [No-Cost Extension Policy](#), a project schedule cannot be extended more than nine months beyond the original contracted schedule, regardless of the number of extensions granted.

Utility and Organization Participation

WRF encourages participation from water utilities and other organizations in WRF research. Participation can occur in a variety of ways, including direct participation, in-kind contributions, or in-kind services. To facilitate their participation, WRF has provided contact information, on the last page of this RFP, of utilities and other organizations that have indicated an interest in this research. Proposers are responsible for negotiating utility and organization participation in their particular proposals. The listed utilities and organizations are under no obligation to participate, and the proposer is not obligated to include them in their particular proposal.

Application Procedure and Deadline

Proposals are accepted exclusively online in PDF format, and they must be fully submitted before 3:00 pm Mountain Time on Wednesday, May 7, 2025.

The online proposal system allows submission of your documents until the date and time stated in this RFP. To avoid the risk of the system closing before you press the submit button, do not wait until the last minute to complete your submission. Submit your proposal at <https://forms.waterrf.org/cbruck/rfp-5335>.

Questions to clarify the intent of this RFP and WRF's administrative, cost, and financial requirements may be addressed to the WRF project contact, Sydney Samples at 571.384.2108 or ssamples@waterrf.org. Questions related to proposal submittal through the online system may be addressed to Caroline Bruck at 303.347.6118 or cbruck@waterrf.org.

Utility and Organization Participants

The following utilities have indicated interest in possible participation in this research. This information is updated within 24 business hours after a utility or an interested organization submits a volunteer form, and this RFP will be re-posted with the new information. **(Depending on your settings, you may need to click refresh on your browser to load the latest file.)**

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