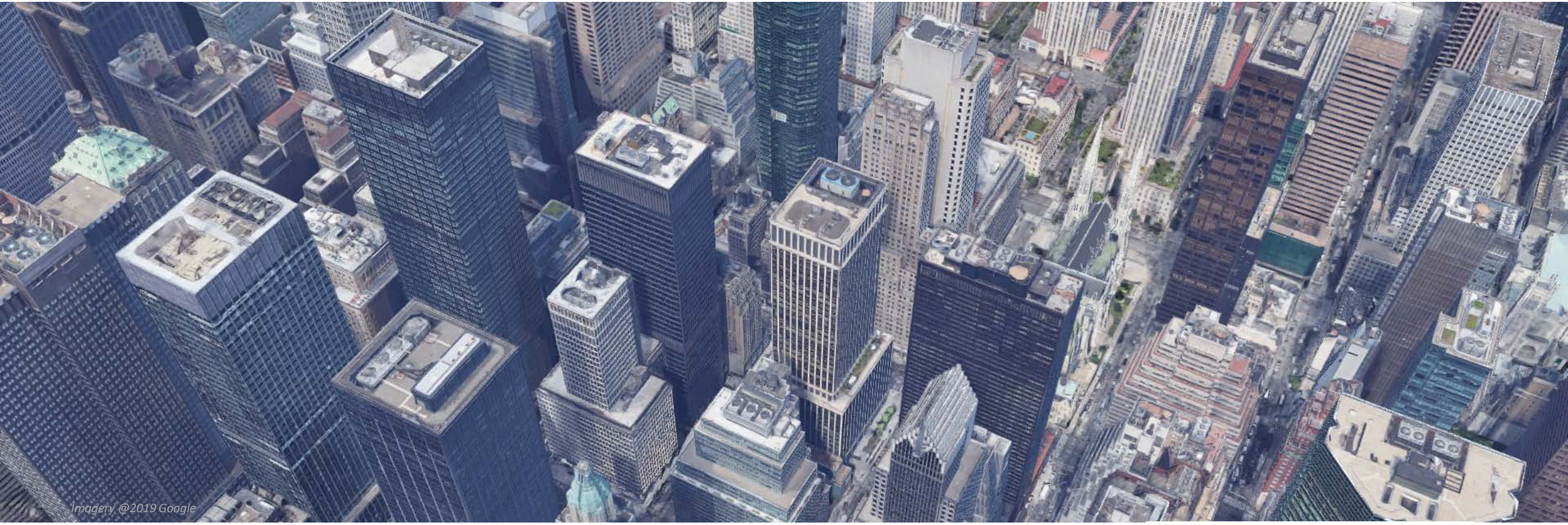


Alliance for Water Efficiency

Hiding on Rooftops:
Cooling Towers and Enormous Water Savings Potential

AWE: A Voice for Water Efficiency

- Our mission is to promote an efficient and sustainable water future

- Nearly 500 member organizations in 200 watersheds delivering water to 50 million water users

Our 2030 Sustainable Water Vision

Efficiency First	Homeowners and businesses are smart water users, empowered by awareness of the value of water, real-time information, and technologies that help them save indoors and outdoors.
Water-Smart Federal, State/Provincial, and Local Policies	Governments adopt and implement policies to use limited water supplies more sustainably.
Sustainable Water Rates and Fiscally Healthy Utilities	Price signals inform customers of the value of water, and financially resilient utilities can provide reliable, safe, and affordable water service today and into the future.
Right-sized, Water-tight, and Intelligent Systems	Utility systems are built to the right capacity, proactively managed to reduce water loss, and equipped with the latest technologies to ensure safe water quality and to leverage data for efficiency.
Integrated, Systems-based Approach	Water efficiency is addressed in the context of a broader, systems-based perspective.


“Advance the adoption of high-quality, cost-effective efficiency programs targeting indoor and outdoor water use in commercial and industrial sectors.”
Imagery @2019 Google

What is a Cooling Tower?

- Key component of cooling systems
- For example:
  - Cooling towers recirculate water to remove heat from air conditioning equipment in buildings
  - Heat is rejected from the building via evaporation into the atmosphere
  - Also used for cooling related to various industrial processes
- Contrary to the presentation title...
  Not all cooling towers are mounted on roofs

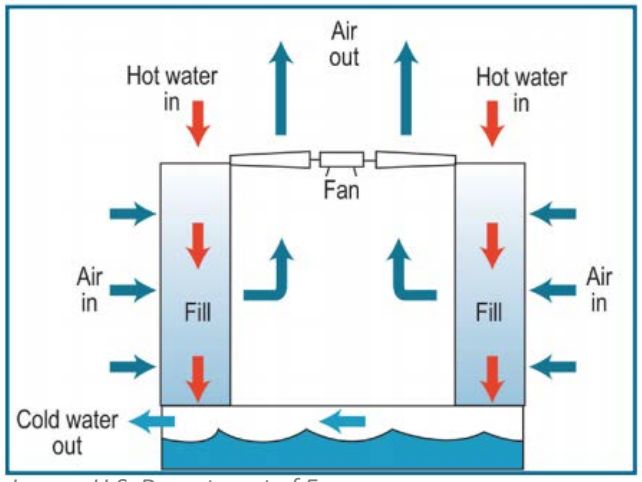
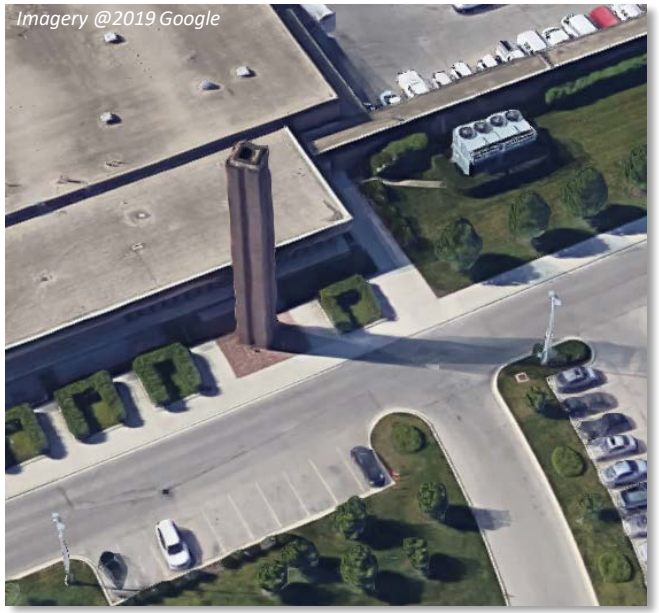


Image: U.S. Department of Energy



Where are Cooling Towers Used?

Examples:

- Office Buildings
- Large Multifamily Buildings
- Schools
- Hospitals
- Supermarkets
- Data Centers
- Airports
- Industrial and Manufacturing Facilities

Cooling Tower Water Use and Key Terms

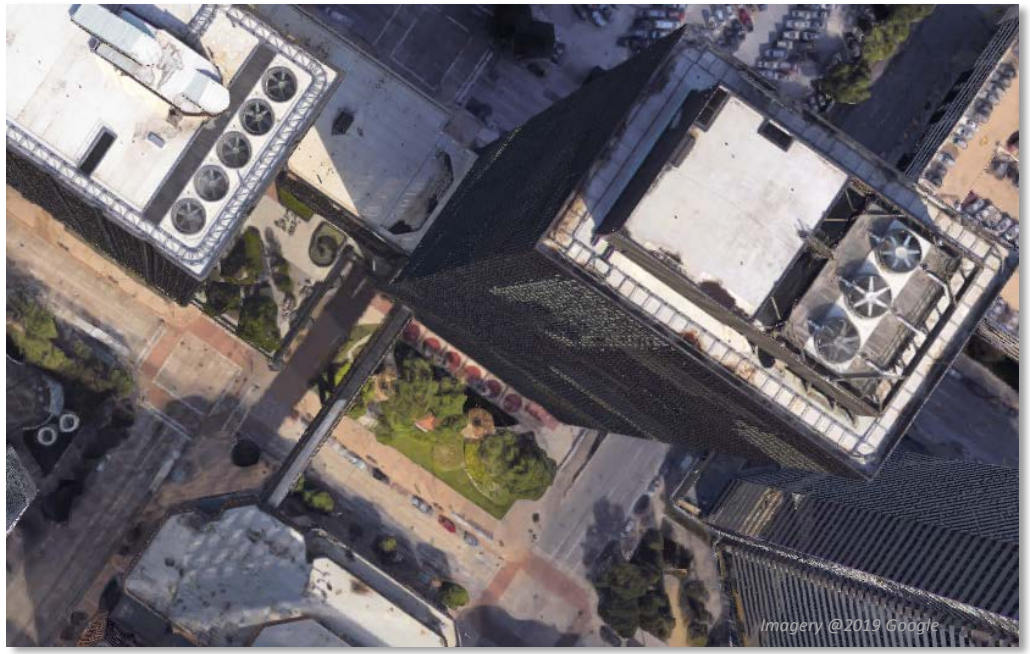
Cooling towers often represent the largest use of water in commercial and industrial applications

Some Key Terms:

- Evaporation and Drift
- Blowdown Water
- Leaks and Overflows
- Make-Up Water
- Conductivity
- Cycles of Concentration

Cooling Tower Water Use Efficiency Examples

- Energy Efficiency (reduce the need for cooling)
- Metering
- Optimize Cycles of Concentration to Reduce Blowdown
  - Conductivity Controller
  - Water Treatment
- Alternative Cooling Technologies
- Alternative Water Sources



AWE Cooling Technology Study: Origin

- AWE Water Efficiency Research Committee
- Members identified need
  - Cooling towers poorly understood
  - Difficult to design effective water utility efficiency programs
  - Hard to connect with the right people
  - Number of cooling towers, locations, and water use often unknown
- Huge water savings potential

Project Goals

1. Develop best practices for **identifying water-cooled facilities** in urban areas.
2. Develop best practices for **estimating consumptive and non-consumptive water demands** for cooling.
3. Determine the **conservation potential for various improvements** to traditional cooling technologies such as cooling towers.
4. Determine the conservation potential of **alternative cooling technologies**.
5. Develop practical guides, incorporating study results, to increase the effectiveness of cooling WUE incentive and outreach programs.

Project Team

Research Team

- Pacific Northwest National Laboratory

Project Managers and Advisors

- Maureen Erbeznik & Associates
- Alliance for Water Efficiency
- Project Advisory Committee
  - Funders
  - H.W. Hoffman & Associates

Project Partners

1. Metropolitan Water District of Southern California, United States
2. Southern Nevada Water Authority, United States
3. San Antonio Water System, United States
4. California Water Service, United States
5. City of Guelph, Canada
6. Denver Water, United States
7. City of Tucson, United States
8. City of Santa Fe, United States
9. Santa Clara Valley Water District, United States
10. City of Calgary, Canada
11. East Bay Municipal Utility District

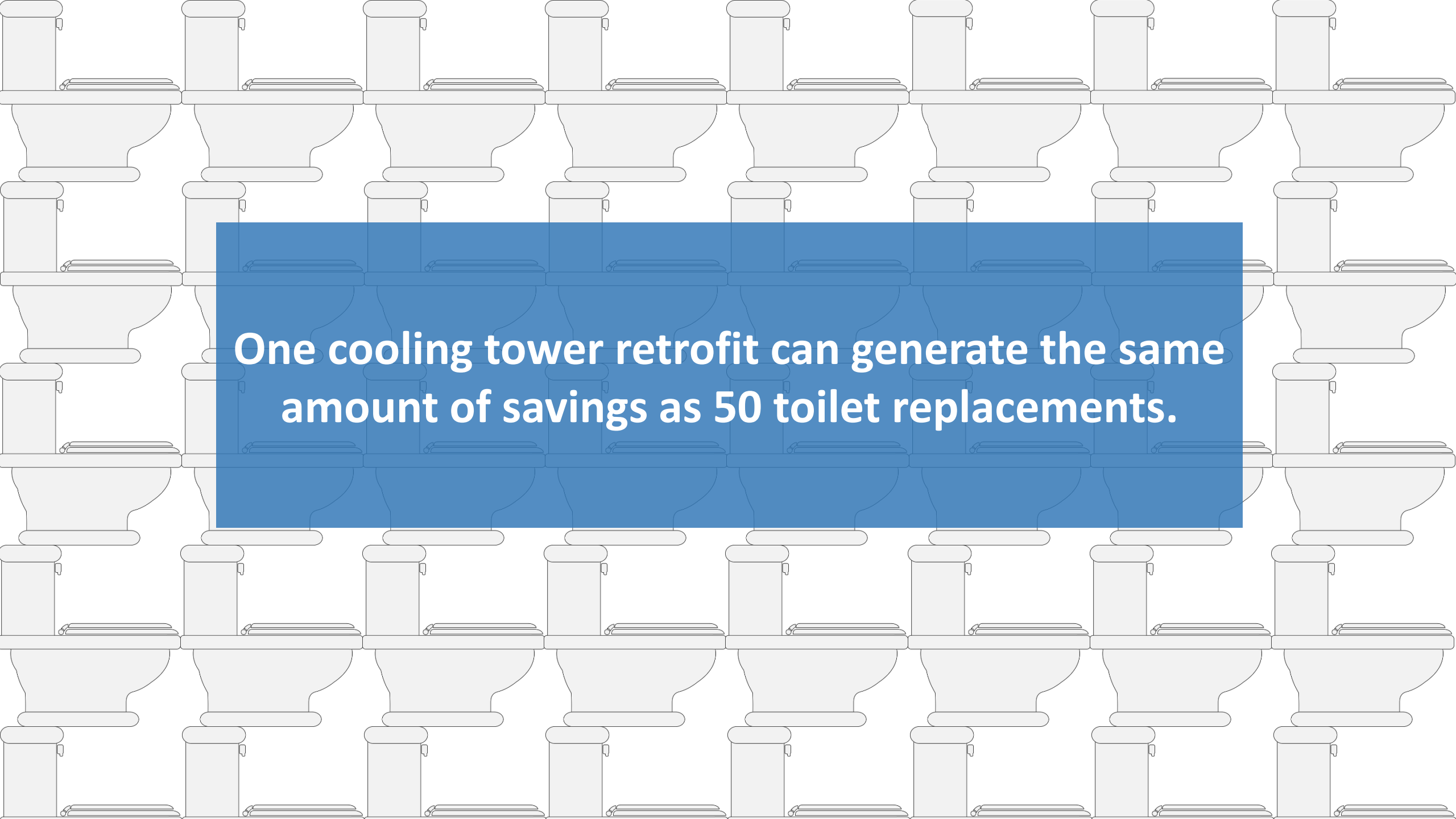
Seven Project Tasks

1. Initial Data Collection
2. Develop Best Practices for Identifying Water-cooled Facilities in Urban Areas
3. Develop Best Practices for Estimating Consumptive and Non-consumptive Water Demands for Cooling
4. Determine the Conservation Potential for Improvements to Existing Cooling Tower Systems

Seven Project Tasks

5. Determine Water Savings Potential of Implementing Alternative Cooling Technologies
6. Assemble Final Report
7. Develop Practical Guides, Outreach Materials, and Utility Incentive Programs

Photo: Oregon Department of Forestry

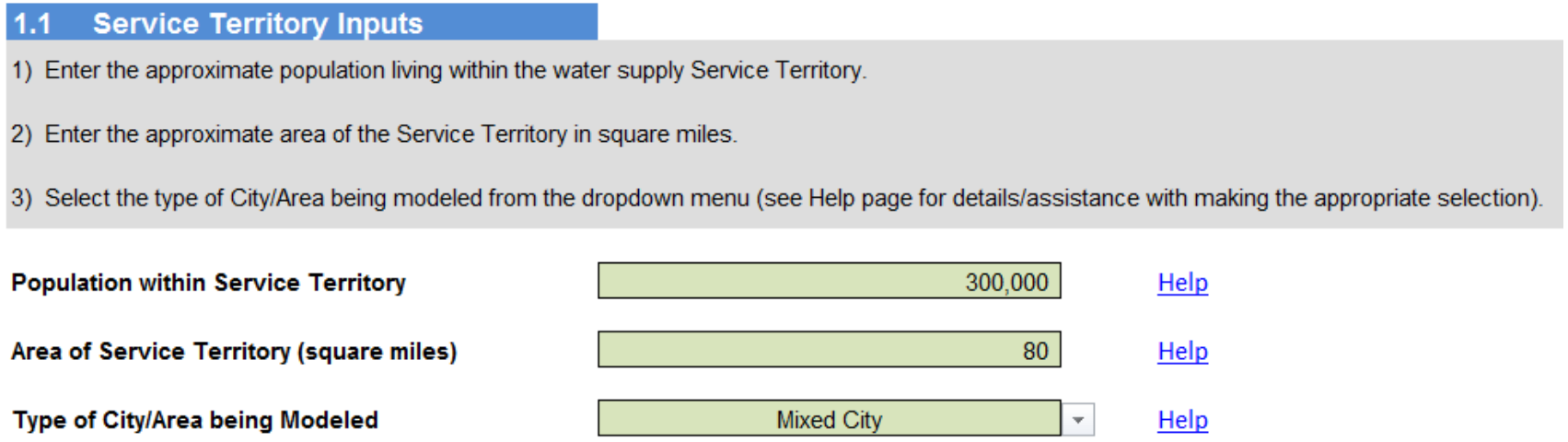


One cooling tower retrofit can generate the same amount of savings as 50 toilet replacements.

Resources and Tools

Best Practices for Identifying Cooling Towers in Urban Areas

- Guidebook
  - Steps and methods for building a cooling tower inventory
- Excel-Based Tool
  - Number of Cooling Towers and Tonnage
  - Pre-Populated with Industrial/Institutional buildings likely to have cooling towers in service area

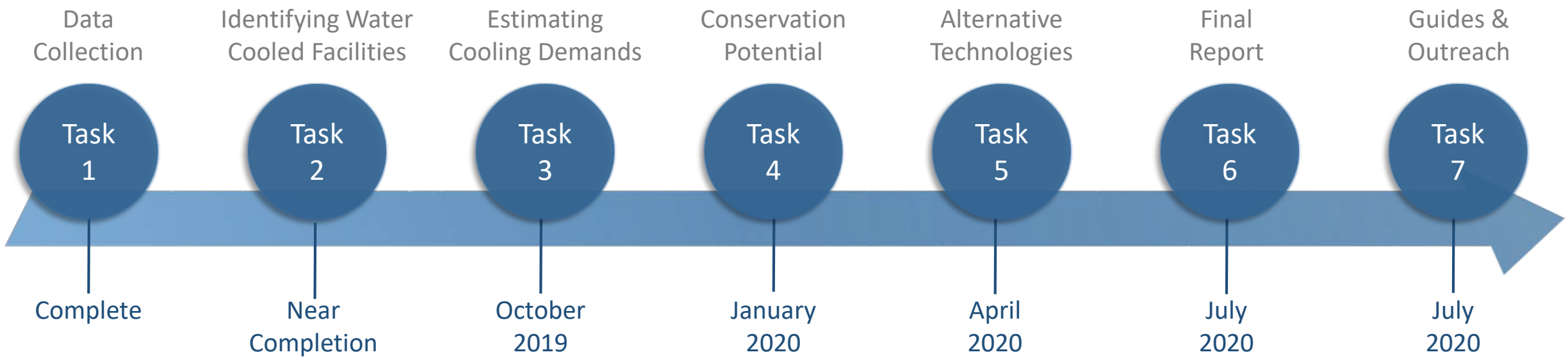


Resources and Tools

- Added module to Excel-based tool for estimating cooling tower systems water use
- Evaluation of conservation potential for cooling systems
- Evaluation of multiple commercially available alternative cooling technologies
- Guides and outreach materials

Progress and Timeline

- Currently finishing Task 2 and working on Task 3
- Project completion second half of 2020
- Funders and PAC members gain early access to tools and resources



Why is this Project Important?

- Cooling towers are unfamiliar to most people
- Difficult to understand the scope of cooling towers in a water provider service area
  - How many?
  - Cooling load?
  - Water use?
  - Where are they located?
- Difficult to design effective water efficiency programs
- Lack of resources and tools
- A lot of opportunity for water savings

Questions?

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