This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
PEAK DAY WATER DEMAND REDUCTION STUDY

Peter Mayer, P.E.
Principal
WaterDM
Peak Demand Patterns

Peak Reduction ~ 2 mgd

Production (mgd)

Non-Seasonal  Modified Seasonal (mgd)  Shaved Peak (mgd)
Energy Sector Demand Management

- Sophisticated demand-side peak shaving programs.
- Typically focused on reducing air conditioning demand.
- Agreement with customers.
- Incentives (including reduced rates and free equipment).
- Highly successful.
- Implemented widely based on need.
Rachio, Inc. – internet enabled irrigation controller
A turn-key, cloud-connected infrastructure

Next watering: Tuesday

50% Shrubs
50% Flowers

Watering now

Watering duration: 15 min

Waters on Mon, Wed, Fri

Rain shut-off
that dictates half of residential water use.
Pilot Peak Day Water Reduction Research

Peter Mayer, P.E. – concept development, research lead
Rebecca Smith – co-author

Margaret Hunter, John Kij, Kevin Keane, and Jonathan Fink – financial support, customer recruitment and installation, customer data, analysis

Ric Miles, Clay Kraus, Emil Motycka – free controllers, support, peak reduction implementation

Mary Ann Dickinson – project management
NJ American Water Service Area
REDUCE YOUR WATER BILL
Fill out our survey and see if you qualify to participate in our outdoor water efficiency pilot program!

New Jersey American Water is performing a smart irrigation technology pilot study in its Coastal North Service Area. You were selected as a potential candidate for this study based on your location and water use in 2014.

The goal of this program is to promote outdoor water efficiency by upgrading conventional, water-efficient irrigation systems with smart irrigation controllers.

Smart controllers use technologies such as advanced weather data, on-site weather sensors, and soil moisture sensors to more effectively irrigate landscapes. On average, the participants of this study have been found to reduce water use by 25 percent and as much as 40 percent.

New Jersey American Water is funding the pilot study to assess smart irrigation technology to validate the water savings potential and ability to reduce outdoor water use in this threatened area.

What’s in it for you?
This program will be offered on a first-come, first-served basis to a limited number of customers who qualify.

If you’re selected for the pilot study:
• You will receive one of our smart controllers and installation of the equipment on your system at no cost to you.
• You could reduce your outdoor water use by as much as 25 percent (based on industry studies of similar installations).
• You’ll have wireless access to your irrigation system via computer/mobile phone.
• You’ll be helping New Jersey to become a more water efficient!

Why conduct this pilot?
A majority of the Coastal North Service Area where you are located is considered to be a “Critical Water Supply Area” by the New Jersey Department of Environmental Protection. The EPA estimates that the U.S. uses nearly 9 billion gallons of water daily for residential irrigation. Now is the opportunity to test new technologies that can better manage our water resources.

What are the benefits?
In order to meet the challenges of our “changing climate,” we need to conserve water for all our needs. That means for daily household use, irrigation, and industry. By testing and participating in this pilot study, you can help create a sustainable future for all.

Requirements:
• You must be located in the Coastal North Service Area.
• You must complete the survey and return it by May 15th.

How to apply?
To determine if you qualify, please fill out the enclosed survey and return it by May 15th:

Questions?
Contact Margarita Munoz, New Jersey American Water, 1025 Laurel Oak Road, Voorhees, NJ 08043. For more information, call 856-277-7045 or email mgmunoz@amerwater.com.

Visit us online at www.newjerseyamericanwater.com

Smart Irrigation Pilot Program APPLICATION

5. Does your facility property have an existing irrigation system?
   • Yes, please provide with survey
   • No, ticket taken at your time. This pilot is focusing on properties that have irrigation systems installed.

6. Approximately how many acres of land you currently irrigate?
   • Approximately 1-5 acres
   • 6-10 acres
   • 11-20 acres
   • 21-50 acres
   • 51 acres or more

7. How many irrigation controllers do you currently have installed?

8. Does your facility have a control system?
   • Yes, please provide with survey
   • No, ticket taken at your time. This pilot is focusing on properties that have irrigation systems installed.

9. Approximately how many acres of land you currently irrigate?
   • Approximately 1-5 acres
   • 6-10 acres
   • 11-20 acres
   • 21-50 acres
   • 51 acres or more

10. Contact information and next steps for recruitment (last name and first name):

Please complete and return by May 15th. Margarita Munoz, New Jersey American Water, 1025 Laurel Oak Road, Voorhees, NJ 08043 using the self-addressed envelope provided.

Participant Recruitment

We CARE ABOUT WATER. IT’S WHAT WE DO.

50 percent

Water saved from inefficient water-use methods and systems.

Curb your water waste!
# Experiment 1 – August 19, 2016

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X = irrigation system operated  
0 = irrigation system idle
# Experiment 2 – August 26, 2016

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**Max. Temp**
- 87.1°F
- 82.8°F
- 86.4°F
- 90.5°F
- 86.7°F
- 94.8°F
- 89.2°F

**Min. Temp**
- 73.0°F
- 67.1°F
- 58.8°F
- 61.2°F
- 65.3°F
- 72.1°F
- 69.6°F

**Precip. (in.)**
- 0

*X* = irrigation system operated

0 = irrigation system idle
Annual Seasonal Use

Annual Household Water Use

Thousands of Gallons

Household ID

Non-seasonal Seasonal

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Peak 2016 Monthly Outdoor Use

Thousands of Gallons

Household ID
Irrigation Frequency Before 2016 Pilot Study

- 0 - 14 days/month: 40%
- 15 - 22 days/month: 40%
- 23 - 31 days/month: 20%

Legend:
- Red: 0 - 14 days/month
- Blue: 15 - 22 days/month
- Purple: 23 - 31 days/month
Total Zones by Household
Estimated Irrigation Day Use (kgal)

Thousands of Gallons

Household ID
Participation for 1 MGD Peak Reduction

- **# 6-zone sites**
  - Conservative Estimate: 2,000
  - Average Estimate: 600

- **# 8-zone sites**
  - Conservative Estimate: 1,500
  - Average Estimate: 400

- **# 12-zone sites**
  - Conservative Estimate: 1,000
  - Average Estimate: 300

<table>
<thead>
<tr>
<th>Participants</th>
<th># 6-zone sites</th>
<th># 8-zone sites</th>
<th># 12-zone sites</th>
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<td>600</td>
<td>400</td>
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- Participants are grouped by the number of zones per site.
- The conservative estimate is shown in gray, while the average estimate is shown in blue.
Participation for 5 MGD Potential Peak Reduction

- # 6-zone sites: 9,900 (Conservative Estimate), 2,900 (Average Estimate)
- # 8-zone sites: 7,400 (Conservative Estimate), 2,200 (Average Estimate)
- # 12-zone sites: 4,900 (Conservative Estimate), 1,400 (Average Estimate)
Conclusions

- Great potential
- **Additional research and evaluation is needed**
- It is not enough to simply shut systems off one day and shift the load to the next, thus creating a different, but similarly large peak day.
- With thousands of enabled irrigation controllers in a system, much more sophisticated load shifting approaches become possible.
- In a fully developed water demand management system, urban irrigation could be orchestrated to match water production profiles during key parts of the summer.
- Remote emergency shutdown of irrigation systems during an emergency such as a water main break, a major fire, or an earthquake.
- This pilot study is a small step in the direction of a more advanced approach to water demand management of urban water systems.
Interested? Rachio and WaterDM are seeking new research locations.
Thank you!

Questions?

Peter Mayer, P.E.

peter.mayer@waterdm.com