

Austin Integrated Water Resource Planning Community Task Force

September 1, 2015

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Overview



- Consultant Services Procurement: Request for Qualifications (RFQ) Process Update
- Water Conservation Study Briefing Office of Sustainability and Maddaus Water Management, Inc.
 - Task Force Discussion and Input
- Disaggregated Demand Briefing
 - Task Force Discussion and Input



Consultant Services Procurement: Request for Qualifications (RFQ) Process Update

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RFQ Process Update



- RFQ Released July 13th
- CMD issued a clarification document on questions related to scope or evaluation criteria
 - Clarification #1 has been issued August 25, 2015
- Submittals due prior to 3 PM Tuesday, September 8, 2015
- No Contact/Anti-Lobbying Ordinance is currently in effect until contract is executed

RFQ Process Update



- Project Team will plan for two Requests for Council Action (RCAs):
 - to approve selection of a firm and to negotiate a contract with that firm
 - 2) to approve execution of contract with selected firm
- Anticipated recommendation for first RCA is in early 2016
- Anticipated contract execution is ~Summer 2016



Water Conservation Study Briefing

Office of Sustainability and Maddaus Water Management, Inc.

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Water Conservation Study

Task Force Discussion and Input

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City of Austin Water Conservation Study Results Michelle Maddaus Maddaus Water Management, Inc.

Presented to Austin Integrated Water Resources Planning Community Task Force September 1, 2015



MADDAUS WATER MANAGEMENT INC.



City of Austin Office of Sustainability

In association with:





Agenda

- 1. Overview and Goal of the Survey
- 2. Industry Trends
- 3. Key Findings & Highlights
- 4. Ideas for Austin
- 5. Questions



Photo Credit: Austin Water, Wildland Conservation Division



Overview and Goal of the Survey

- Survey of 11 Programs in US and Australia
 - Mature and successful conservation programs
 - Water efficiency leaders
 - Compiled savings goals, conservation measures, budgets
 - Payment mechanisms and staffing needs
- Ways to Support Austin Customers
 - Innovative and new methods and strategies
 - Enhance water use efficiency
- Gained lessons learned from conservation programs



Survey Approach and Participants

- Data gathering via Internet
- Confirmation of and enhancement of data with phone interviews
- Confirmation of data with Administrative Draft Report

Western States	Техаз	Australia
 Seattle, WA Portland, OR East Bay Municipal Utility District (EBMUD), Oakland, CA Irvine, CA Southern Nevada, NV 	 City of Austin, TX San Antonio, TX Dallas, TX 	PerthNewcastleMelbourne

A red drop indicates drought stage.

A yellow drop indicates system been drier than normal

Map of Survey Participants in US



3 out of 6 States in Australia



Type of Data Collected

- Reviewed programs including public info and rebates, system water demand, reclaimed water, and communication with customers
- Summary tables include the following:
 - Service Area Population
 - Service Area Location
 - Water Demand
 - Conservation Budget
 - Conservation Staff

- Conservation Goals
- Conservation Programs
- Reports and Supporting Documentation



Industry Trends

	Number of Survey Participants with the Program	City of Austin	Comments
Automatic Meter Infrastructure	Most looking at AMI	Researching funding	Leaders are ALL considering or working on implementing AMI
CII Efficient Custom Rebate Program	9 offer CII incentives	3C Business Challenge and Bucks for Business	Leaders are targeting high CII water users with more targeted measures.
Rainwater Capture	4 offer incentives + 7 others provide information.	Rebate Offered	For irrigation in US; for irrigation, toilet, and other indoor uses in Australia.
Grey Water	5 offer incentives + 2 more offer information.	Info on website, working on guidance document. No incentive program	Been a slow sell with the public.
Reclaimed Water % of Annual Demand	0%-40% (Average: 9% & Median:4%)	2.8%	8 with both large-scale purple pipe deliveries <i>and</i> on-site recycling schemes.
Social Media / Home Water Use Reports	ALL 11 are doing some form of Social Media	Drop Counter Pilot	Home water use reports and online billing data increasingly popular

Key Finding 1: Population and Reclaimed Water

	Range of Survey Participants	City of Austin
Approximate Population	370,000 - 2.6 million	977,491
Service Area Size (sq. mi.)	181 - over 1 million	555
System Demand (MGD)	61 - 418 (Average: 181 MGD & Median: 119 MGD)	118.5
Recycled Water	0% - 40% (Average 8.7% & Median 4.4%)	2.8%







Key Finding 1: Staff and Spending

		Range of Survey Participants	City of Austin
Annual Conserv Budget (\$USD)	ation	\$325,000 - \$8,500,000 (Average: \$3.6 million & Median: \$3.2 million)	\$4,375,000
Conservation Sp (\$/capita)	ending	\$0.6 - \$5.35 (Average: \$2.93 and Median: \$3.00)	\$4.48
Conservation St	aff in FTE	3 – 20 (Average: 12.3 and Median: 13)	20
_		A <mark>us</mark> tin	
\$325,000		Annual Conservation Budget (\$USD)	\$8,500,000

\$0.6	Conservation Spending (\$USD/capita)	\$5.35	





Key Finding 2: Water Savings Goals

- Savings goals range: 0.5 1.5 % demand reduction per year
- 6 of 11 agencies are currently exceeding their goal
- Austin 140 GPCD Goal equates to 1% reduction per year



Austin exceeded their 140 GPCD by 2020 goal. Should review savings goal as part of the Integrated Plan.

Key Finding 3: Top 5 Common Measures

The 11 surveyed programs varied. The most common measures are:

- Public and School Education Programs
- Residential Indoor Programs clothes washer and toilet incentives
- Commercial Indoor Programs water efficient commercial technologies for process water use and efficient water fixtures (toilets, urinals, etc.)
- Residential Landscape Programs promotional campaigns with local nurseries, education and incentives
- Commercial Landscape Programs irrigation equipment and system improvement incentives





Key Finding 4: Program Funding Source

- Water charges (rates and/or system connection fees) and grants are the most common source of funding
- Conservation at a regional level is funded through rates and dues (as applicable).
- Supplemental funding comes from state and federal grants.
- Some work with private parties who offer funding from businesses who want to be sustainable.

Austin can review long term funding needs based on a review of Integrated Plan savings goals.

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Austin funds through rates and grants - similar to most surveyed. Consider partnerships with businesses beyond rebates and case studies.

Key Finding 5: Cost and Staffing Example



Year

Key Finding 6: Commercial Programs

Commercial Customers: Challenges can be rewarded with big savings

• Offering significant funds with a simpler process and targeted by industry is helpful.

Semiconductors: Often efficient but there are lots of ways to save

• Large water user. Lots of rebate ideas are possible.

Universities, Schools, Government Buildings: Possible Untapped Savings

Typically older buildings and good water savings potential.



NAGEMENT

Business Industry and Government (BIG) Water Conservation

Photo: Portland Water Bureau – Business, Industry and Government (BIG) Water Conservation Program

Key Finding 7: Outdoor Water Savings

- Car wash coupons
- Proper plant selection and new landscape design
- Landscape rebates for existing irrigation upgrades:
 - Weather-based irrigation controller rebates
 - High-efficiency rotating Sprinkler nozzle rebates
 - Drip irrigation to replace sprinkler rebates
 - Soil amendment program
 - Turf replacement program
 - Rebates for low-water use landscaping

Austin has landscape rebates but funds less than others surveyed. Austin does not have any coupon programs which are well liked by customers and businesses.







Key Finding 8: Alternative Water Sources

Reclaimed water and non-potable reuse are increasing in popularity, i.e, EBMUD (example below) and Water Corporation (Western Australia)



Key Finding 8: Rainwater Catchment

- 36% of Australian households use rainfall for irrigation.
- Rainwater capture challenging to make cost effective.
- Ongoing and regular maintenance difficult for residential home owners.
- Large scale successful programs like fields at schools, and roofs of businesses such as ice rinks.
- Some agencies find many who install rainwater tanks already tend to be very low water-users (not much overall savings opportunity), while high water users might install a tank AND a potable water back up, in fact increasing their potable use because they feel good about watering from the tank.

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Medibank IceHouse in Melbourne Australia uses rain capture on roof for their for resurfacing their ice.

> Austin offers homeowners and schools a WaterWise Rainscape Rebate of up to \$500

Key Finding 9: Rebates and Incentives

 Rebates/incentives remain a popular method for encouraging water conservation.

Review market saturation:

- Many agencies assess fixture saturation to determine the continuation of long standing incentive programs (especially residential toilets and clothes washers).
- Many rebates and incentives shifting to:
 - Landscape irrigation
 - CII accounts

Austin regularly evaluates device saturation levels and modifies their programs accordingly.

Southern Nevada Water Authority - Water Smart Landscape conversion rebate

Key Finding 10: Leak Management

Water Loss Reduction: Pressure Regulation,

Meter Testing, Replacement & Leak

- All 11 survey participants conduct leak management.
- Most use International Water Association/American Water Works Association Manual M36 Water Loss Software.
- Meters have accuracy issues.
- Many utilities have increased meter testing and replacement.
- Automatic Metering Infrastructure (AMI) is more popular.

AMI is the future.

Austin is

interested in AMI

and exploring

funding.

Key Finding 11: Building Codes

- Most utilities have some local water use efficiency ordinances
- Ordinances are increasing the number of elements required
- The biggest recent change is enforcement. Many water utilities currently conducting heavy enforcement due to drought
- Some consider keeping drought enforcement caliber after water shortage period.
- New requirement 1-page "checklist format" for business developer's ease of use.
- Many utilities have water use efficiency checklists as part of their "Green Buildings Program".

Austin has codes but not in a checklist format. Austin does more enforcement than most agencies.

Key Finding 12: Communication – Drought

City West Water, Australia:

- 14 years lowest recorded streamflow
- 3 significant El-Nino events 1997/98, 2002/03, 2006/07
- In 2012 City West Water made drought restrictions permanent Austin should

Austin should consider communication strategies in current drought.

Key Finding 12: Communication – Drought

Austin on 8 years of Drought. Melbourne had 14 year long term drought. Consider communication with customers when easing out drought stages.

Streamflow at Melbourne's Major Harvesting Reservoirs tomson, Upper Yarra, O'Shannassy and Maroondah Reservoirs)

The percentages shown are based on a storage capacity of 1810.5G Lincluding Tarago Reservoir

Key Finding 12: Communication – Social Media

- Communication works best during a water shortage take advantage of it!
 - Old: Websites, newsletters, mass e-mails, bill inserts
 - New: Facebook, Twitter, video sites, and targeted letters and emails
- Continued research conducted on effective ways to communicate water conservation to customers
- Austin Water pilot study: mobile app with Dropcountr, Inc., to provide 10,000 residential customers with free home water use reports
- Consider innovative pricing structures

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Survey Participant Suggestions:

Communication with customers:

- Ensure program elements match the climate and economy of the service area.
- Conduct regular surveys of customers to know what is needed.
- Put case studies on the utility website.
- Use online social networking and marketing, which offers 2 way conversations with customers.

Surveys are valuable to communicate customer needs. Austin can do more customer surveys. Especially now with a change in drought conditions.

Survey Participant Suggestions:

Program Implementation

- Cost effectiveness is no longer the primary driver of water programs. Key driver is obtaining water savings.
- Identify and target large water savings opportunities.
- CII programs can be tricky but yield big savings when successful.
- Work together regionally. Leverage programs with neighboring utilities, including energy and wastewater.
- Buy-in is critical at all levels. Engage decision makers and stakeholders:
 - General Managers
 - Conservation Program Managers
 - Water Conservation Coordinators
 - Public
 - Other Interested Parties

Austin should review primary drivers for conservation during Integrated Plan. Austin doing good with buy-in and working with others

Survey Participant Suggestions:

Program Funding:

- Steady and consistent conservation program is wise less reactivity to the economy and drought is more effective.
- Enforcement of landscape regulations/ordinances is vital to long term efficiency.
- Fund and publish research on new innovative technologies.
 - Research new innovative devices to how they work and if they save water (example: Home Water Use Reports)
 - Conduct research or pilot studies on new technologies (example: AMI)
 - Leaders similarly fund and publish innovative study findings for industry benefits

Austin has created a steady program in recent years.

Areas of Interest for Austin Water Consideration:

- 1. Pursue Advanced Metering Infrastructure
- Consider keeping permanent outdoor water restrictions 1x day week
- 3. Encourage living buildings and advanced buildings with dual plumbing, onsite water treatment, etc.
- 4. Increase customer engagement, 1-1, surveys, etc.
- 5. Commercial: Improve marketing, expand outreach, use electronic forms to make process work to encourage more participation.
 - Continue fostering relationships w/businesses and publish case studies
 - Continue working w/semiconductors, Univ. Texas, and government buildings
- 6. Create relationships beyond traditional energy, water, sewer.

Expand outreach network to community groups and organizations.

Areas of Interest for Austin Water Consideration:

- 7. Large scale rainwater capture, commercial and residential
- 8. Increase recycled water (purple pipe) connections
- Increase marketing and engagement with largest water users. Conduct large projects with effective incentives and advancements, and save large amounts of water.
- 10. Try coupon programs, such as car wash or purchasing efficient plants

- 11. Advance use of alterative sources and on-site systems
- 12. Add more photos to website and multimedia for customer appeal
- 13. As part of the Integrated Planning process: review saving goals, funding and staffing levels, and consider alternative sources as
 MIDDAUS part of the supply portfolio.
Questions?

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In association with:





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 - www.savingwater.org
- Portland Water Bureau, OR
 - www.portlandoregon.gov/water/2
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- East Bay Municipal Utility District, CA
 - www.ebmud.com
- Irvine Ranch Water District, CA
 - <u>irwd.com</u>
- Southern Nevada Water Authority, NV
 - www.snwa.com
- San Antonio Water System, TX
 - www.saws.org

- <u>dallascityhall.com/departments/w</u> <u>aterutilities</u>
- Austin Water, TX
 - <u>www.austintexas.gov/department</u>
 <u>/water</u>
- City West Water, Melbourne, Australia
 - <u>www.citywestwater.com.au</u>
- Water Corporation, Perth, Australia
 - <u>www.watercorporation.com.au</u>
- Hunter Water, New South Wales, Australia
 - <u>www.hunterwater.com.au</u>



Disaggregated Demand Briefing

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DEMAND DISAGGREGATION

SYSTEMS PLANNING DIVISION

9/1/2015

Water Resources Planning Task Force 2015

Demand Disaggregation: What is it?





Key Drivers

- Recommendation of the 2014 Task Force
- Multiple uses
 - Water Supply Planning
 - Infrastructure Planning Future Water & Wastewater Models
 - Conservation program planning and prioritization
 - Financial planning
 - Geospatially move toward matching treatment level with end uses
- Preparing data for IWRP Consultant

Background Research



Highlights from iSDP

University of Technology – Sydney Australia

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Figure 2 - 2 Factors that influence demand (White 2003 p15)



Austin Water Approach to Date



"Top-Down" and "Bottom-Up"



Historical billing data disaggregation
 Data QA/QC

- Building on past studies and research
- Further disaggregation based on behavioral patterns

Austin Water's Billing Data Disaggregated



Austin Water's Historical Billing Consumption













Disaggregation of the Billing Sectors into Subsectors



Development of a Model to Predict Future Water Demand: Variable Flow Method Approach

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Variable Flow Demand Model Inputs



Demographics: Current and projected singleand multi-family households and employment

The model uses City of Austin DTI-level forecasts of population, households and employment to 2040 apportioned to Austin and individual wholesale service areas.

Household and population data from the 2010 Census and City of Austin employment estimates are used to calibrate the City's demographic forecasts to current conditions.

Commercial Sector Data:

Business databases, available from private vendors, provide beneficial information for characterizing commercial water users (business type, # of employees, etc.)

Model Resolution: Can We Get Down to the Parcel Level?



Parcel-Level Data

- Land Use
- Tax appraisal records
- AE census-derived household size
- AE commercial customer data

Data Validity: Spatial Overlays Revealed Inconsistencies in 2010 Data Sets

Land Use and Account Type Matches	SF Accounts	MF Accounts
# of billing meters	232,850	6,288
# of Mismatches to Land Use	11,669	1,543
# Matches to Land Use	221,181	4,752
% Matches to Land Use	95%	76%

Intersecting billing data with land use data revealed incorrectly classified account types, incorrectly located billing and address points, and incorrectly classified land use types



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Austin Water classifies residential accounts by metering arrangement, not by property type



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Single Family Residential

Mutifamily Residential

and Future Work Summary



Disaggregate and map more recent AW billing data up to 2015

Determine appropriate levels of data disaggregation and spatial resolution in model

Validate and correct nonresidential sector data for 2010, calculate water use factors

Calibrate model to historical data

Make projections based on price and income effects, water conservation planning and climate

"Top-Down" and "Bottom-Up"



Historical billing data disaggregation
 Data QA/QC

- Further sub-class disaggregation
- Focuses on individual points of water consumption

What Is End-Use Analysis?

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- Analysis of behavioral patterns related to water use
- Description of water efficiency of different technologies
- Market saturation studies to determine ownership and uptake of water-using features
- "Features" = any place or appliance where water is used

Residential Indoor End Uses



How Does End-Use Analysis Help?



How Does End-Use Analysis Help?



Apply end-use methodology to indoor sub-category
 Account for greater portion of metered consumption

How Does End-Use Analysis Help?



Why Single-Family Residential (SFR)?

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- "Top-Down": Data Driver
- "Bottom-Up": Research Driven













Prepared by:





Figure 2: Average indoor daily household use (gal.) in San Antonio study (n=91)





RESIDENTIAL END USES OF WATER -VERSION 2 FINAL REPORT

End-Use Model Construction – UST Framework

Adopted from Integrated Supply Usage and Demand Planning (iSDP) Model 15 shower minutes per day (Institute for Sustainable Futures) **Feature Water** Stock Consumption • 90% low-flow shower heads Showers = 32.3 GPD

Technology

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- Low flow = 2 GPM
- Normal = 3.5 GPM

End-Use Model Construction

FEATURE DATA INPUT FIELD

Showers and Baths

Comments:

Feature heterogeneity can be entered periodically with known data, and is prioritized. Feature conversion rate must be complete for the time series, but can vary with known data

VEAD	USAGE			STOCK				TECHNOLOGY		
YEAR	Showers/day/HH	Shower duration (min)	Baths/day/HH	HE feature heterogeneity	HE feature conversion rate	LE feature heterogeneity	LE feature abandonment rate	HE feature flow rate (gpm)	LE feature flow rate (gpm)	Bathtub volume (gal)
1995	1.6	8.3	0.15	21%	1.40%	41%	3.80%	2.668	4.168	21.9
1996	1.6	8.3	0.15		1.40%		3.80%	2.626	4.126	21.9
1997	1.6	8.3	0.15		1.40%		3.80%	2.584	4.084	21.9
1998	1.6	8.3	0.15		1.40%		3.80%	2.542	4.042	21.9
1999	1.6	8.3	0.15		1.40%		3.80%	2.5	4	21.9
2000	1.6	8.3	0.15		1.40%		3.80%	2.458	3.958	21.9
2001	1.6	8.3	0.15		1.40%		3.80%	2.416	3.916	21.9
2002	1.6	8.3	0.15		1.40%		3.80%	2.374	3.874	21.9
2003	1.6	8.3	0.15		1.40%		3.80%	2.332	3.832	21.9
2004	1.6	8.3	0.15		1.40%		3.80%	2.29	3.79	21.9
2005	1.6	8.3	0.15		1.40%		3.80%	2.248	3.748	21.9
2006	1.6	8.3	0.18	37%	12.00%	3%	3.80%	2.206	3.706	20.2
2007	1.6	8.3	0.18		12.00%		3.80%	2.164	3.664	20.2
2008	1.6	8.3	0.18		12.00%		3.80%	2.122	3.622	20.2
2009	1.6	8.3	0.18		12.00%		3.80%	2.08	3.58	20.2
2010	1.6	8.3	0.18	78%	12.00%		3.80%	2.038	3.538	20.2
2011	1.6	8.3	0.18		12.00%		3.80%	2	3.5	20.2
2012	1.6	8.3	0.18		12.00%		3.80%	1.958	3.458	20.2
2013	1.6	8.3	0.18		12.00%		3.80%	1.916	3.416	20.2
2014	1.6	8.3	0.18		12.00%		3.80%	1.874	3.374	20.2
2015	1.6	8.3	0.18		12.00%		3.80%	1.832	3.332	20.2
2016	1.6	8.3	0.18		12.00%		3.80%	1.79	3.29	20.2
2017	1.6	8.3	0.18		12.00%		3.80%	1.748	3.248	20.2
2018	1.6	8.3	0.18		12.00%		3.80%	1.706	3.206	20.2
2019	1.6	8.3	0.18		12.00%		3.80%	1.664	3.164	20.2
2020	1.6	8.3	0.18		12.00%		3.80%	1.622	3.122	20.2
2021	1.6	8.3	0.18		12.00%		3.80%	1.58	3.08	20.2
2022	1.6	8.3	0.18		12.00%		3.80%	1.538	3.038	20.2
2023	1.6	8.3	0.18		12.00%		3.80%	1.5	2.996	20.2
2024	1.6	8.3	0.18		12.00%		3.80%	1.5	2.954	20.2
2025	1.6	8.3	0.18		12.00%		3.80%	1.5	2.912	20.2
2026	1.6	8.3	0.18		12.00%		3.80%	1.5	2.87	20.2
2027	1.6	8.3	0.18		12.00%		3.80%	1.5	2.828	20.2
N TotalUse	e (2) ValidationDat	a 🖉 ValidationGraph 🏑	ValidationGraph (2) 🖌 DifferenceGraph 📈 Reg	ression 🖌 Calculations 🖌 Dem	ographic ShowersBaths	Toilets ClothesWashers Fa	ucetsBasins / DishWashers /	Leaks 🕄 🗍 🖣	

SFR End-Use Model Results



SFR End-Use Model Results



Total SFR Indoor Modeled Use

TOTAL MODELED WATER DEMAND SUMMARY

Estimated SFR Indoor Use (Millions of Gallons)



Validation

Comparison: Billed vs. Modeled

----Residential Indoor Approximation (Min Month Method - MG)



Validation

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Summary and Future Work



Develop predictive model to make feature consumption projections based on household physical, demographic, and socioeconomic information

The Road Ahead

Austin Water

IWRP Consultant

Immediate Next Steps

- Continue QA/QC
- Geospatial Integration of new billing data
- Indoor/Outdoor Use Splits
- Consider other Sectors for end use analysis

Preliminary 2020 & 2040 Demand Forecasting Model Development

Refined Forecasting Model Development

- Climate
- Demographics
- Policy Influence
- Pricing Elasticity




QUESTIONS & DISCUSSION

Top Down – Billing Data Bottom Up – End Use Study Next Steps





Next Meeting

- Consultant Services Procurement: Request for Qualifications (RFQ) Process Update
- Options and Portfolio Evaluation Process Concepts Overview and Discussion
- Water Availability Modeling (WAM) Overview (Hoffpauir Consulting, PLLC)
- Other items to be determined
- Continuation of information and discussion items from Meeting #5 as needed

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