Water Research Foundation®

Celebrating 50 Years
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Utilities' Work With Brackish Water

Sustainable Water Resources Roundtable
July 19, 2016

advancing the science of water

WRF Background

- Research Cooperative
  - Governed by utilities
- Over $500M of research
- ~1,000 subscribers
- 50 year anniversary!

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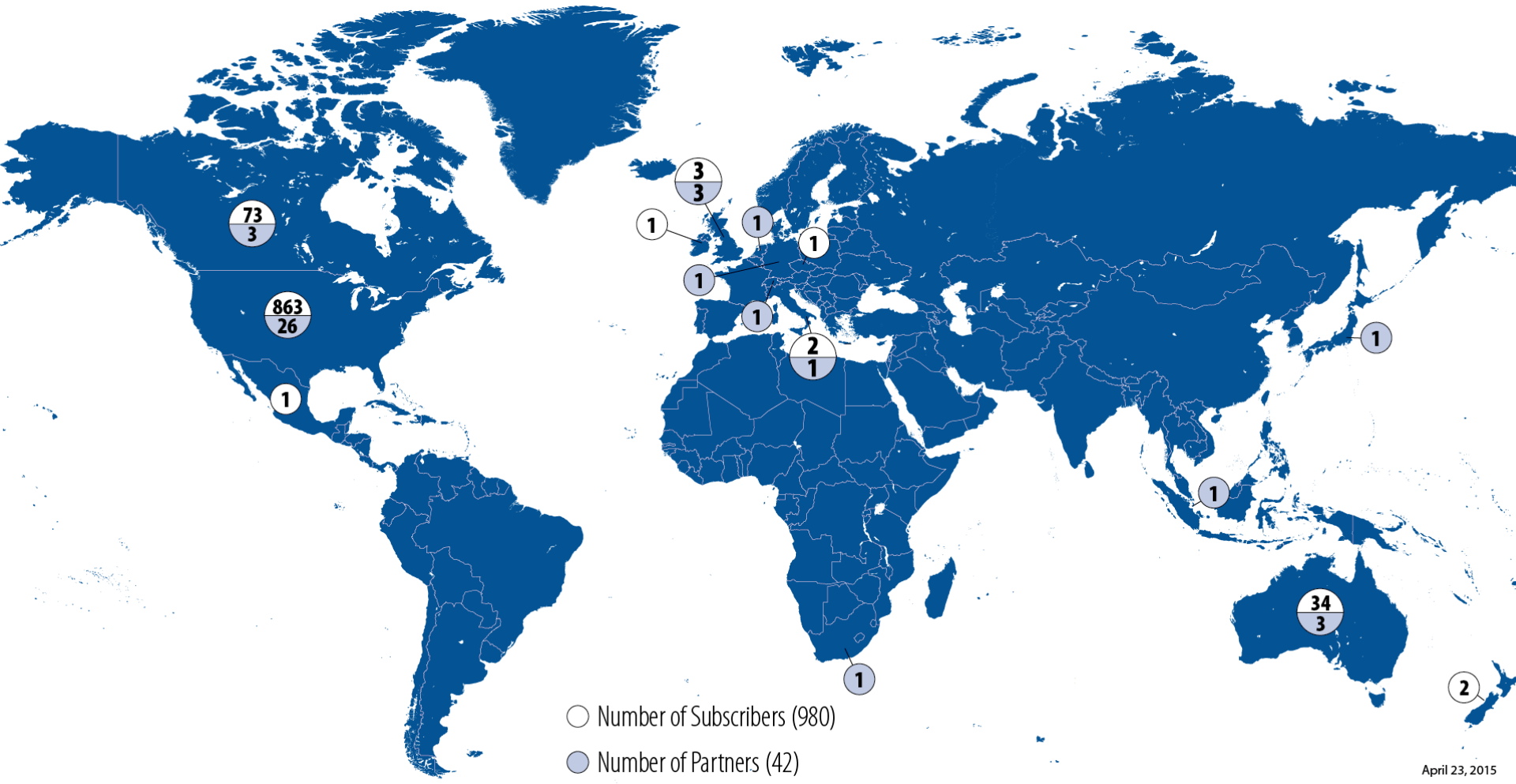
WRF Subscribers and Partners



Traditional Water Supply Planning

- Predict Demand
- Obtain surface or groundwater supply with sufficient estimated yield
- Develop infrastructure and policies to maintain quality of service

New challenges → New approach

Challenges to Approach

- Maturation of land use development and subsequent water use development
- Shifts in social value
  - From exploitation to stewardship of resource
- Emerging understanding of uncertainty factors and impact on:
  - Water supply availability
  - Water demands
  - Water quality

New Planning Approaches Now Utilized

- Incorporate risks and uncertainties
- Evaluate reliability, resilience, vulnerability, sustainability
- Look at **Alternative Supplies** like reuse and desalination

Project 4615, *Evaluating Alternative Water Supplies to Balance Cost with Reliability, Resilience, and Sustainability*

Utility Decision Making

- Cost
- Environmental benefits
  - IPR/DPR/brackish desal
- Regulatory considerations
  - Brine disposal
- Local hydrology/geology/climate
- Resilience, reliability, sustainability
  - WRF project 4615: *Framework for Evaluating Alternative Water Supplies: Balancing Cost with Reliability, Resilience, and Sustainability*

Brackish Desalination or Reuse?

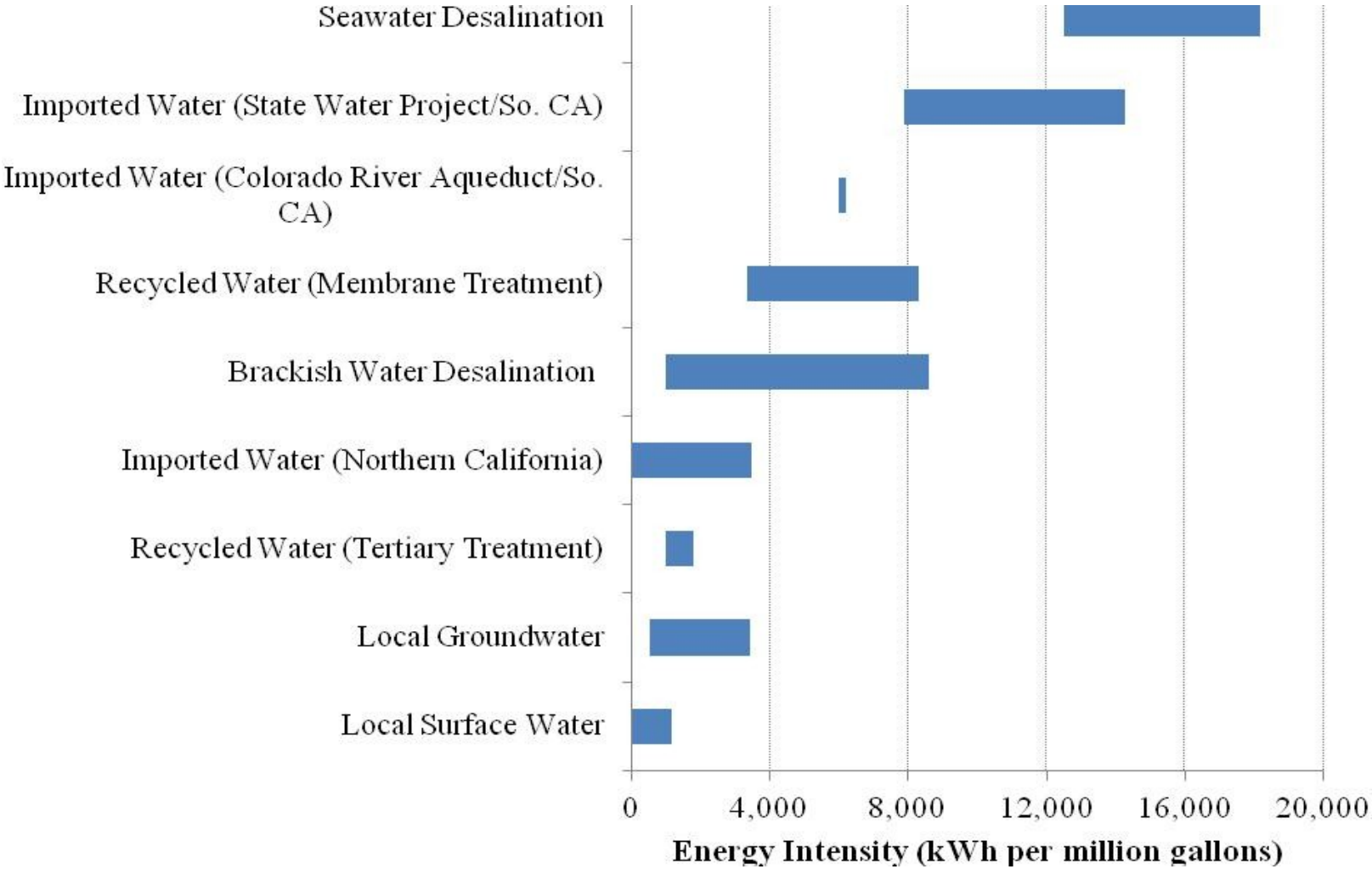
- **Energy Use**
  - Brackish desal and reuse can have similar energy requirements
  - Improved energy efficiency in both reuse and desalination technologies in recent years
- **Environmental Impact**
  - Both have environmental benefits and costs

DPR ENERGY USAGE

Technology/water source	Energy required			Carbon footprint kg $CO_{2e}/10^3$ gal
	Range, kWh/10^3 gal	Typical		
		kWh/10^3 gal	kWh/m^3	
Secondary treatment without nutrient removal	1.35 – 1.05	1.25	0.33	0.63
Tertiary treatment with nutrient removal effluent filtration	1.95 – 1.60	1.85	0.49	0.93
Advanced water treatment	3.25 – 3.50	3.30	0.87	1.65
Ocean desalination	9.50 – 14.75	12.00	3.17	6.00
Brackish water desalination	3.10 – 6.20	5.85	1.55	2.93
Interbasin transfer of water, California State Water Project	7.92 – 9.92	9.20	2.43	4.60
Interbasin transfer of water, Colorado River water	6.15 – 7.40	6.15	1.62	3.07
Conventional water treatment	0.30 – 0.40	0.37	0.10	0.19
Membrane-based water treatment	1.00 -1.50	1.25	0.33	0.63

OCWD actual energy usage

Source: Tchobanoglous, 2015:
http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/recharge/rw_swa_dprexpertpanel/item05-tchobanoglous.pdf



Comparison of the Energy Intensity of California Water Supplies
Sources: Veerapaneni et al. 2011; GWI 2010; Cooley et al. 2012; GEI Consultants/Navigant Consulting, Inc. 2010; pulled from http://pacinst.org/desal-and-energy-use-should-we-pass-the-salt/

Brackish Desalination

- Most brackish plans are in CA, FL, TX
  - Texas 34 with total of 73 MGD
  - Florida >100
- **Site-Specific Considerations**
  - Regulatory Considerations (state, local)
    - FL allows concentrate to land because low salinity
  - Local hydrology, geology, and climate
    - FL and TX use UIC due to unique geology

Advantages of Brackish Desal

- Preservation of fresh water aquifers
- More suitable to small utilities
  - Well and treatment
  - Typically have lagoons
- Cost
  - $1.50 per 1000 gallons

Brackish Desal Considerations

- Concentrate disposal
- Energy costs
  - Largest single variable cost
  - Electricity prices are projected to rise

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Thank you!!

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