



THE
**Water
Research**
FOUNDATION

Desal Research Needs Project

(WRF#4834)

Julie Minton
Water Research Foundation

Jeff Mosher
Carollo Engineers



ABOUT



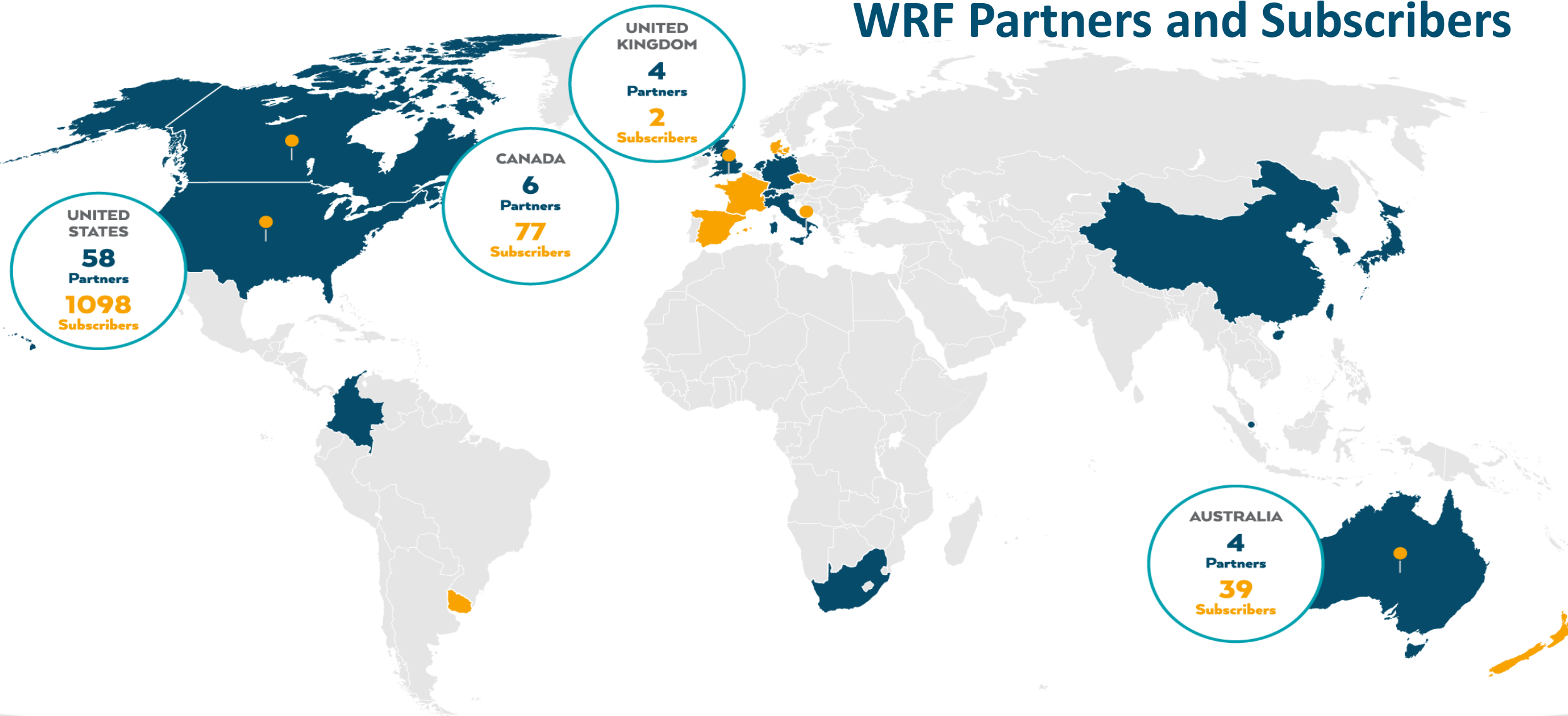
MISSION

Advancing the science of water to improve the quality of life.

VISION

To create the definitive research organization to advance the science of all things water to better meet the evolving needs of subscribers and the water sector.

WRF Partners and Subscribers



● PARTNERS

United States: **58**
Australia: **4**
Canada: **6**
United Kingdom: **4**

China: **1**
Colombia: **1**
Germany: **1**
Italy: **1**

Japan: **1**
Korea: **1**
Netherlands: **1**

Singapore: **1**
South Africa: **1**
Switzerland: **1**

● SUBSCRIBERS

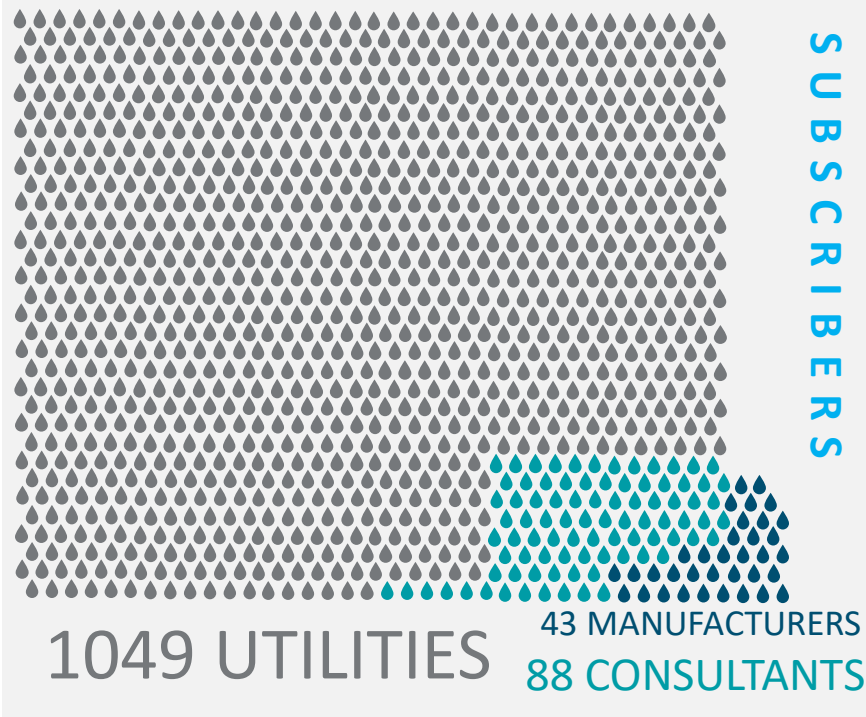
United States: **1098**
Australia: **39**
Canada: **77**

United Kingdom: **2**
Denmark: **2**
Italy: **2**

France: **1**
New Zealand: **1**
Spain: **1**

Uruguay: **1**
Czech Republic: **1**

WRF AT A GLANCE – 12/2019



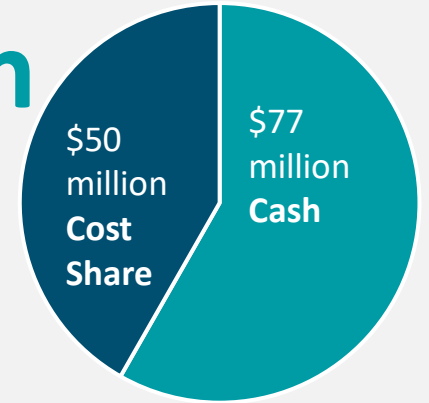
PROGRAMS

- Research Priority
- Tailored Collaboration
- Emerging Opportunities
- Unsolicited Research
- Grants/Awards
- Facilitated Research

FUNDED RESEARCH

\$127 Million

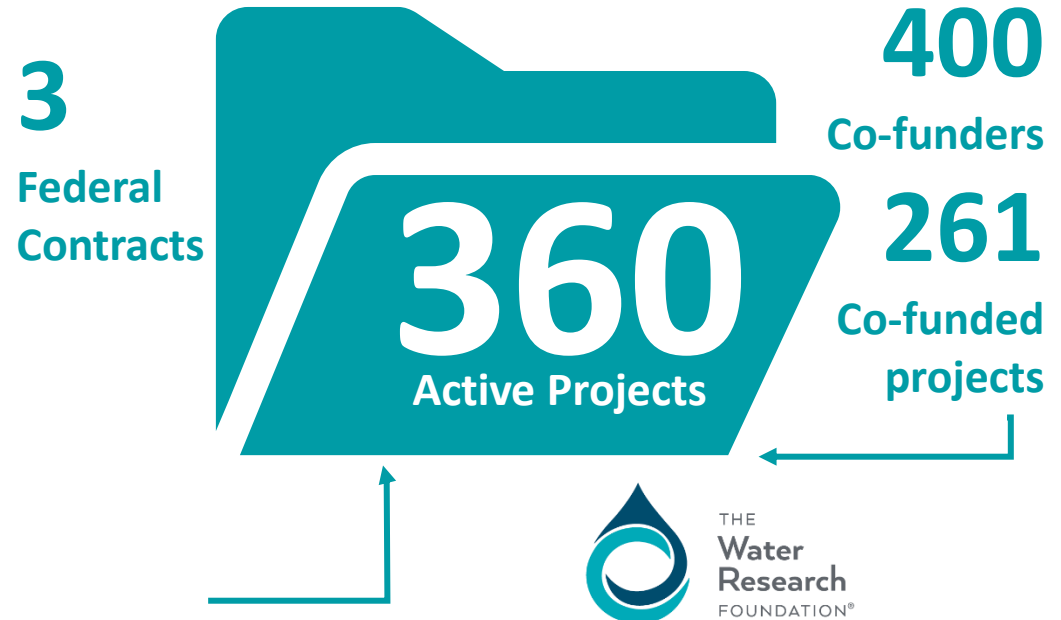
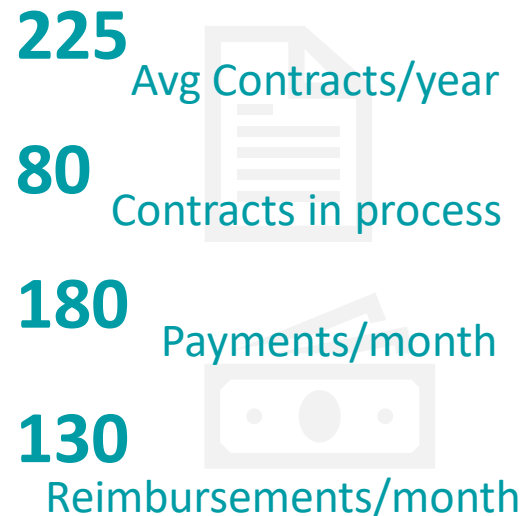
Contractually Funded Research



RESEARCH PORTFOLIO

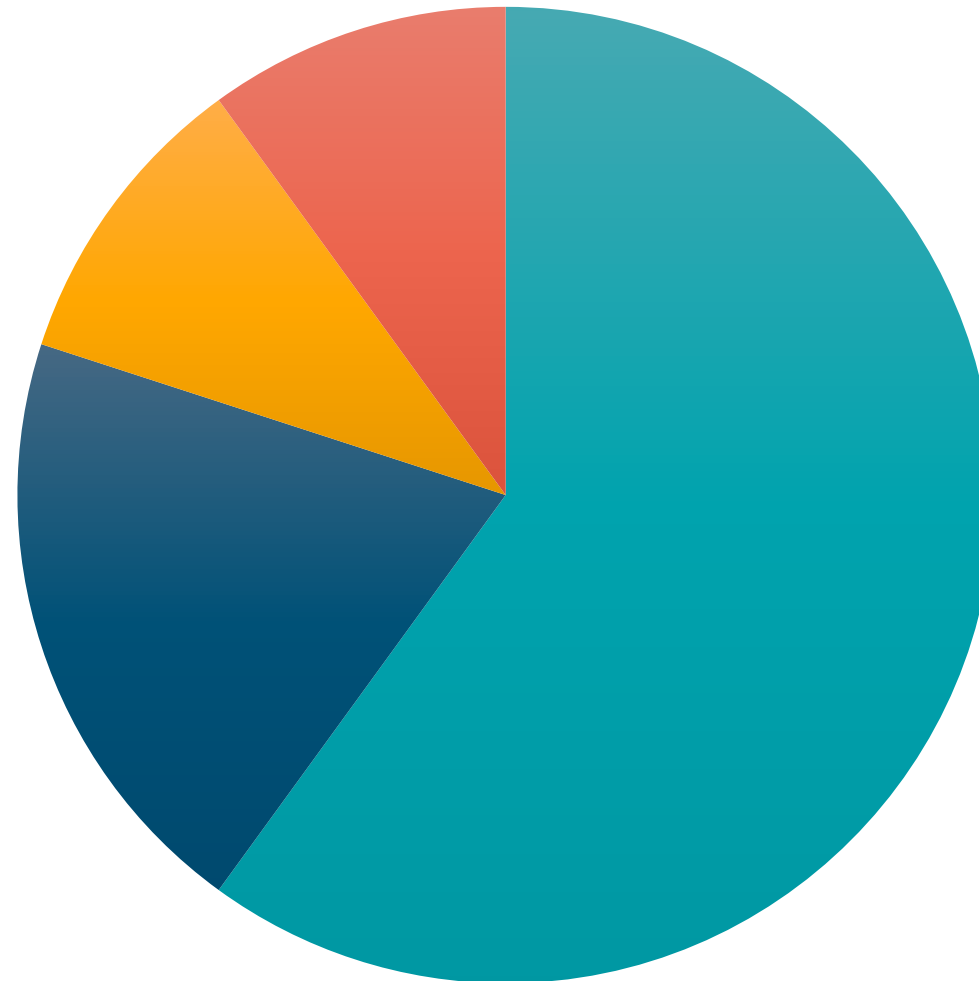
STAFF - 55

RESEARCH SERVICES



Five Research Programs

- Research Priority Program
- Tailored Collaboration Program
- Unsolicited Research Program
- Emerging Opportunities Program
- Facilitated Research Program



2020 Research Areas

CECs/Trace
Organics

Cyanobacteria &
Cyanotoxins

Energy
Production &
Efficiency

Emerging DBPs

Intelligent Water
Systems

Lead & Copper
Management

Linkages in
Receiving Water
Quality

Microplastics

Nutrients
Treatment

PFAS

Optimizing Reuse
w/o Brine

Resilient Water
Infrastructure

Reuse
Monitoring

Stormwater &
Flood
Management

Waterborne
Pathogens in
Premise
Plumbing

Desalination Research Needs (WRF Project #4834)

- Purpose of project:
 - Develop a 2-3 year research plan for WRF
 - Consisting of vetted and prioritized “project descriptions”
 - Ocean desal, brackish desal, and concentrate
 - Technical and policy (planning, permitting, acceptance, etc.)
- Information Workshop at MSSC Summit
 - “Information Workshop” to solicit input
 - 45+ attendees at February 26, 2020 Workshop
 - Opportunity to solicit input on research gaps and needs



Desal Research Needs Project Organization

- **Julie Minton** – WRF Project Manager
- WRF Project Advisory Committee
 - **Amy Childress** (University of Southern California)
 - **Angel Bustamante** (El Paso Water)
 - **Christine Owen** (Hazen and Sawyer)
 - **Yuliana Porras-Mendoza** (Bureau of Reclamation Desalination and Water Purification Research Program)
 - **Nikolay Voutchkov** (Water Globe Consulting)
- Facilitator and PI
 - **Jeff Mosher, Carollo**



Project Partners

- **MSSC**
 - Host of information workshop
- **Southern California Salinity Coalition (SCSC)**
 - Funding Partner
- **American Membrane Technology Association (AMTA)**
 - Promote survey to members



History of Desalination Research at the Foundation(s)



~30 projects (2001-2015)
CA DWR Desal Grant



3 projects (through 2018)



22 projects (through 2013)

Joint Water Reuse and Desalination Task Force
(WRF, WaterReuse, WERF, USBR, Sandia) (2001 to ~2006)

Examples of Previous Research



Development of Habitat Restoration Programs for the Mitigation of Impingement and Entrainment Effects from Intakes for Seawater Desalination Facilities

WaterReuse Research Foundation



Final Report

Emerging Energy Reducing Technologies for Desalination Applications

Co-published by



Desalination Concentrate Management Policy Analysis for the Arid West

WaterReuse Research Foundation

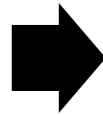
Project Objectives

- Evaluate brackish groundwater, seawater, and concentrate management
- Identify timely, compelling research needs.
- Identify opportunities to improve current technologies.
- Identify emerging and novel technologies.
- Outline the key focus areas and research scope of potential future projects
- Support a WRF desalination research program for the next 2-3 years

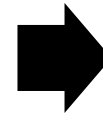
Overview of Approach/Tasks

- Support the development of the **WRF desalination research program** by completing the following:

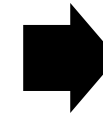
Task 1:
Literature
review



Task 2:
Survey of
Research
Needs



Task 3:
Research
Needs
Workshop



Task 4: Final
Report

- List of project descriptions of potential desalination research projects

Task 2: Survey

- **Format:** Use of an online survey
- **Audience:** Promote to academia, consulting firms, utilities, equipment manufacturers, and others in the desalination field
- **Scope:**
 - Inquire about relevant and critical research needs in various regions and countries
 - Request suggested research concepts
 - Address technical topics and nontechnical topics (regulatory, permitting, policy, and public perception)

Task 3: Expert Workshop

- **Date and venue**
 - TBD
- **Workshop participants**
 - WRF staff, the PAC, project team, and in-kind partners
 - Others could include:
 - Academics
 - Utility representatives
 - State and federal agency representatives
 - Consultants
 - Researchers

Workshop Agenda

- Overview of WRF and desalination
- Overview of National Alliance for Water Innovation (NAWI)
- WRF project background
- Research needs identification
 - “Round Robin Suggestions”
 - Range of topics:



- Regulatory topics
- Intakes and outfalls
- Pretreatment
- Water quality
- Technologies

- Concentrate management
- Permitting challenges
- Energy and carbon footprint
- Implementation topics

Research Needs Identification

- Potential Topics:
 - Regulatory topics
 - Intakes and outfalls
 - Pretreatment
 - Water quality
 - Technologies
 - Concentrate management
 - Permitting challenges
 - Energy and carbon footprint
 - Implementation topics

WRF Desalination Research Needs Workshop (WRF# 4834)

“Proposed Research Need and/or Project”

Name/Affiliation/Email:

Provide a description of 1) a desalination research “need or knowledge gap”; and/or 2) a specific desalination research “project” that addresses a need or knowledge gap. The need or project can address any topic that would assist in advancing desalination, including ocean and brackish desalination, and can address any discipline, including technical or policy areas.

Desalination research need or knowledge gap or specific desalination research project (use back if needed):

What did we hear? Some familiar topics.....

Seawater intakes and outfalls

- Look at facilities across the world
- Define metrics

Concentrate management

- Guidance on technology selection

Improved energy recovery systems

Pilot demonstrations of innovative technologies

Control membrane fouling and scaling

Decentralized treatment systems

Topics that have keep coming up...

Sequester
marketable
constituents from
brine

Reduce energy
consumption and/or
use of renewable
energy

Selective removal of
specific contaminants
- Selective membranes
and absorbents

Fate of constituents
in brine

Communications and
public acceptance

A few new twists...

Characterize economic and environment benefits of desal

Integrate energy recovery systems into smaller systems

Integrate “induction sensors” that support high recovery options

Approaches for inland brackish softening that is salt neutral (all scales)

PFAS
(1,4-dioxane)

Rethink “water grid”. Best practices for demand risk, blending, optimization

More ideas...

Evaluate urban watershed/sewershed salinity impacts



As we approach high recoveries (>85%), missing models to predict behavior of saturated and supersaturated brines

How do we include future impacts in the design of systems today? How to include that in LCAs?

Evaluation of the operations and maintenance costs for brine lines

Next Steps



- Survey will released in Spring
- Develop draft state of the science report by Summer.
- Hold “Expert Workshop” in August/September
- Final Report in late 2020