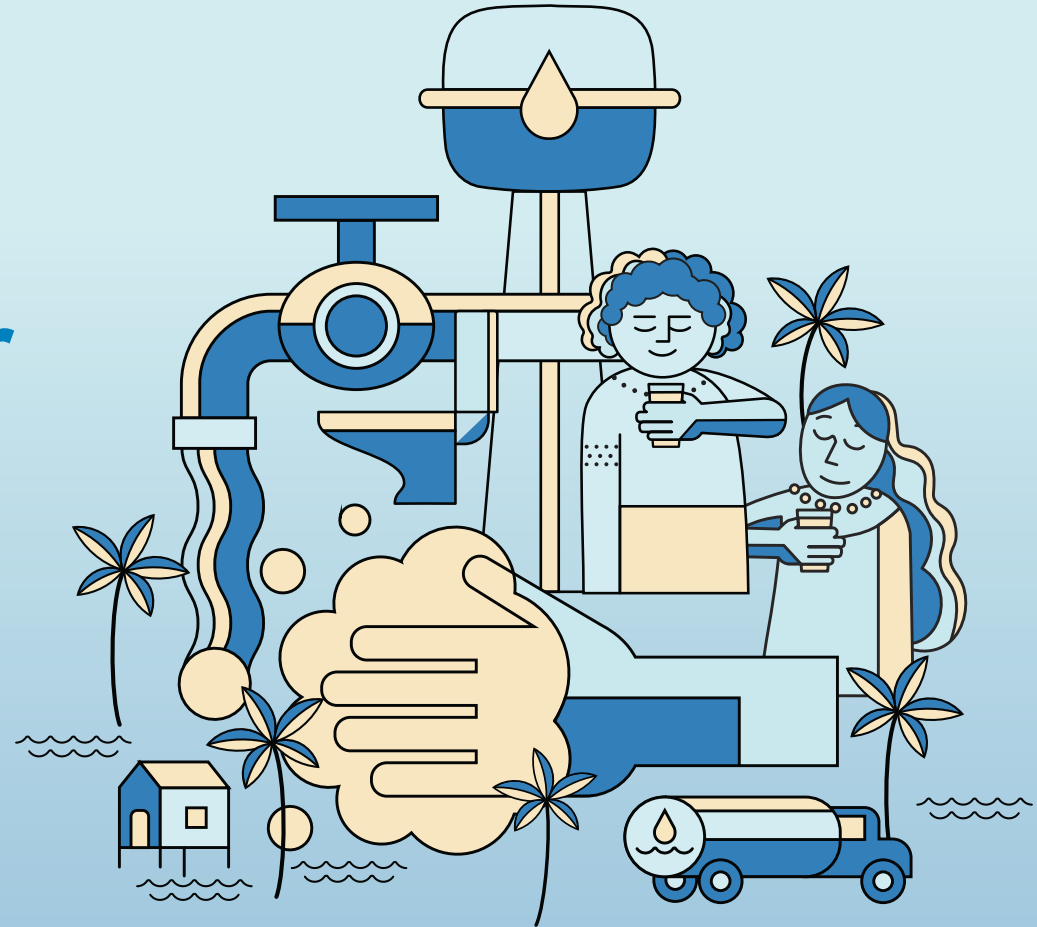


## Exploring Desalination Options in the Pacific for Emergency and Remote Applications

16 October 2024



We will begin shortly.  
Participants, kindly note the following for this seminar

Please rename your Zoom name to:

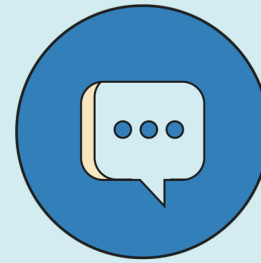
**Name, Org or Project**  
(e.g. Las Fernando, ADB)



**Please turn your mic off  
during the presentation**



**Raise hand  
when you want to talk**



**Use the chat box  
for questions/concerns**



**We have a Q&A portion  
after the presentation**

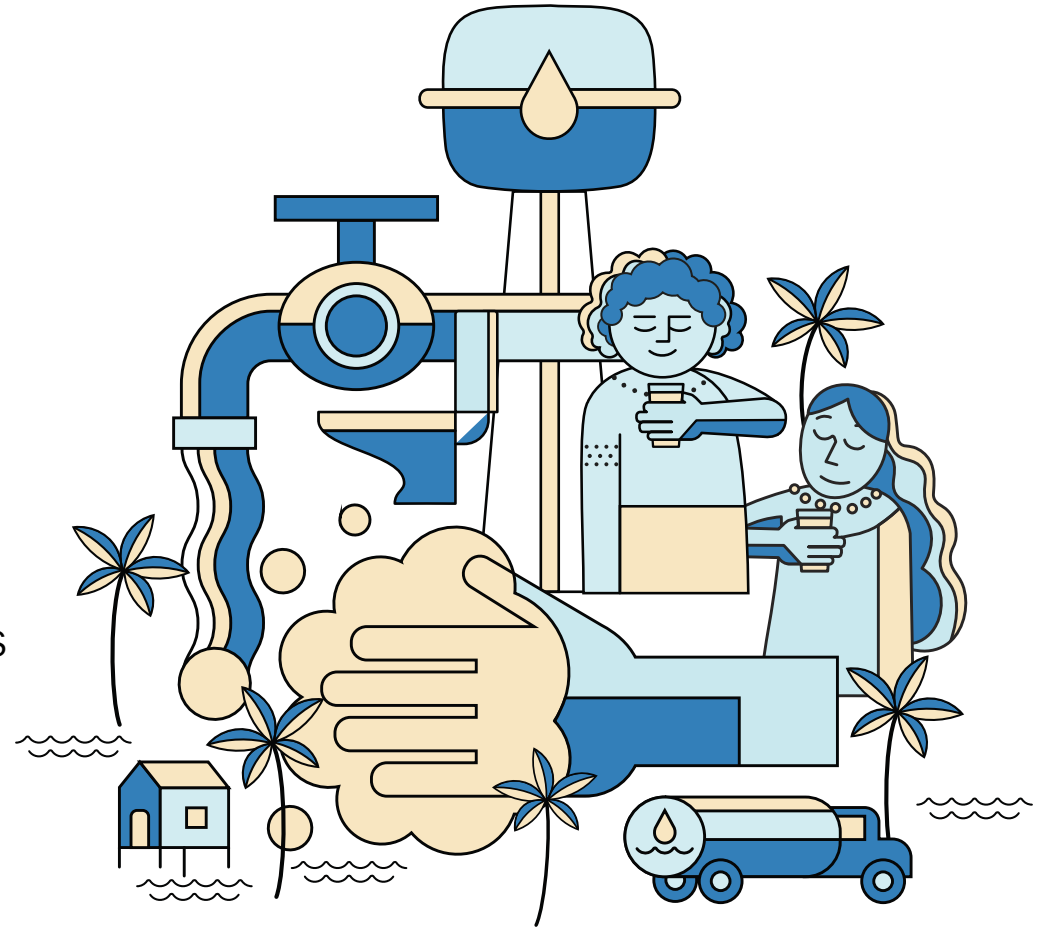
# Webinar schedule

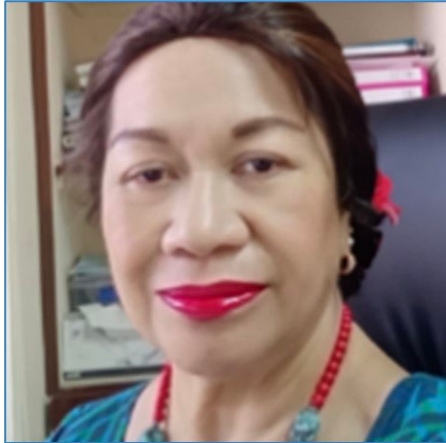
<b>Time (AEST)</b>	
10:00am	<b>Welcome</b>
10:05am	<b>Opening Remarks</b> <b>Introduction of presenters</b>
10:10am	<b>Presentations</b>
10:40am	<b>Q&amp;A session</b>
10:55am	<b>Closing, poll and group photo</b>

## Welcome from Asian Development Bank

### Satoshi Ishii

Director, Strategy and Partnerships  
Team  
Water and Urban Development  
Sector Office

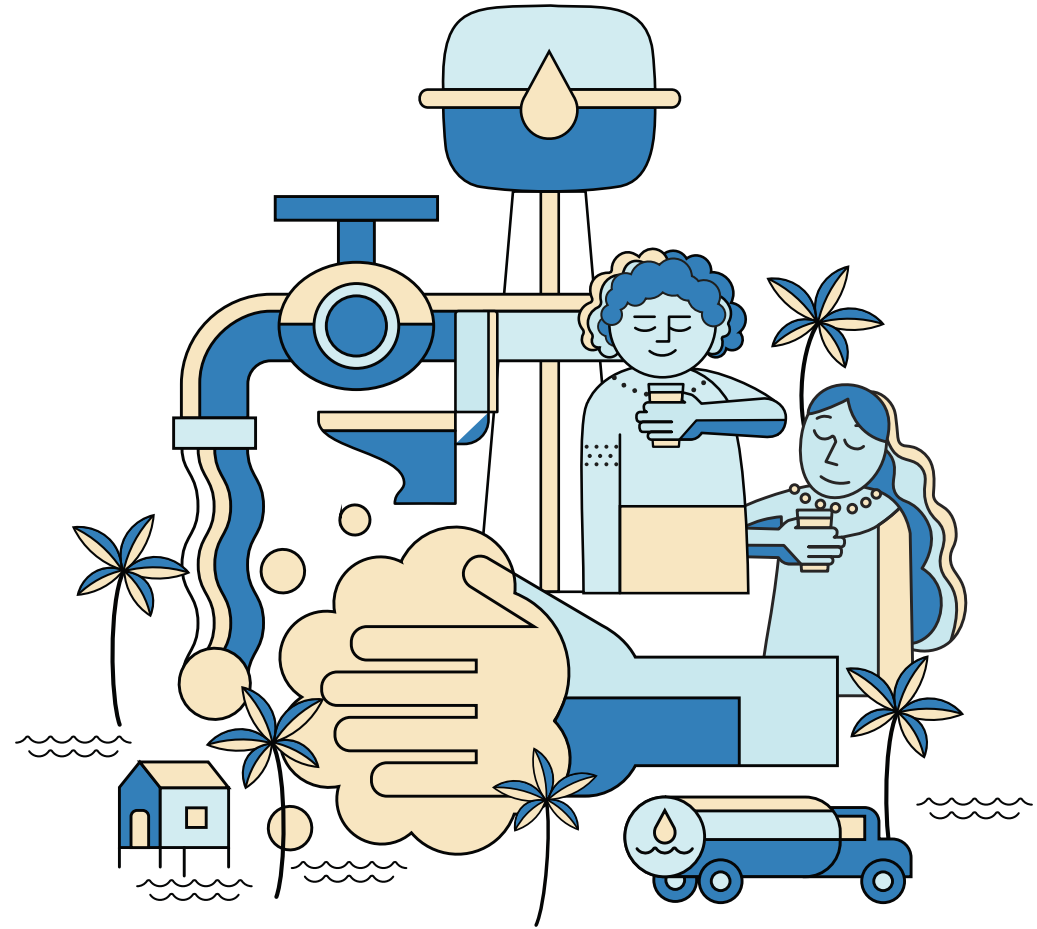




## Welcome from Pacific Water and Wastewater Association

**Lusía Sefo-Leau**

Chief Executive Officer



# Introducing the Speakers



**Mark Hiram**

*General Manager Water Operation*  
Nauru Public Utilities Corporation



**Edkarl Galing - Facilitator**

*Urban Development Specialist*  
Asian Development Bank



**Mat Francis**

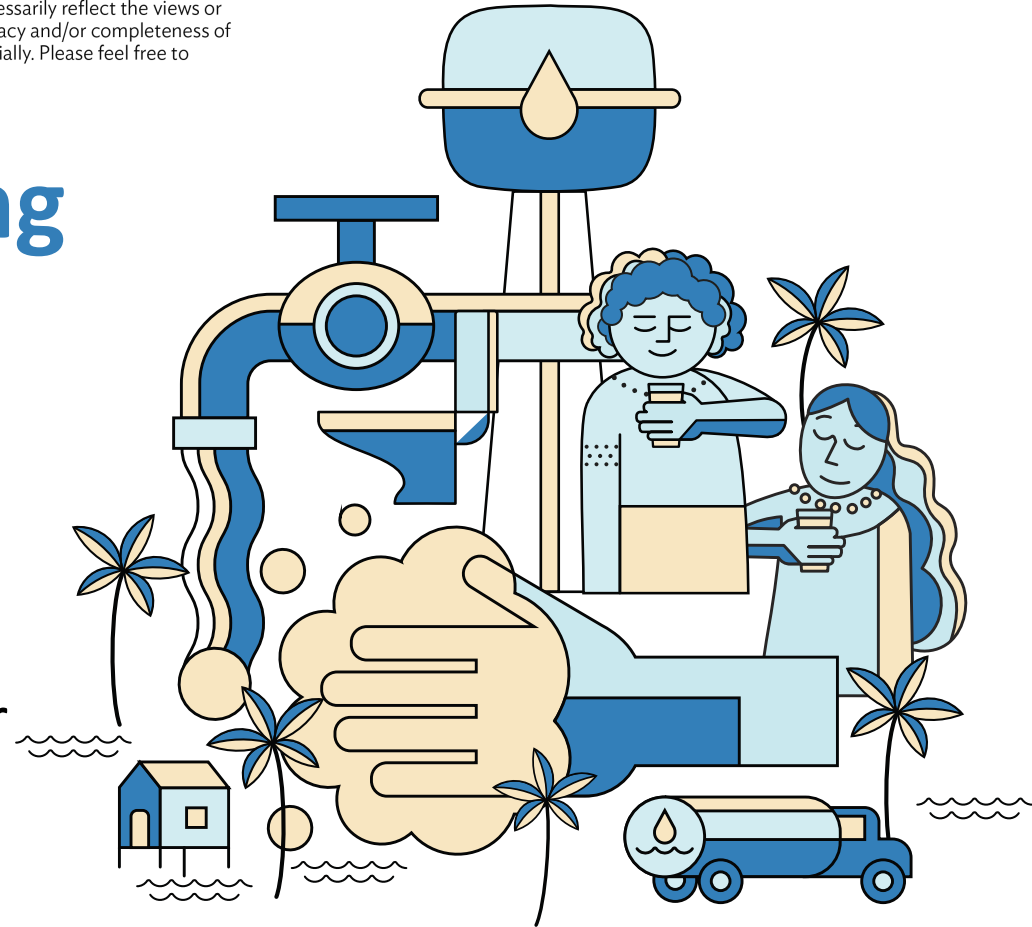
*Director Water Chemistry / Design &  
Capacity Development Lead*  
Moerk Water Solutions

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.

# Presentation 1 – Exploring Desalination Options in the Pacific

Mat Francis

Director Water Chemistry / Design & Capacity Development Lead, Moerk Water Solutions





Clean Water Where You Need It

# Exploring Desalination Options in the Pacific

Implementation of emergency and remote desalination systems

Dr Mat Francis  
Head of Design, Moerk Water Solutions Asia-Pacific







# Increasing Need For Desalination

- **Changing rainfall patterns**
  - Remote Pacific islands
- **Increasing salinity of groundwater**
  - Seawater intrusion into freshwater lens
- **Surface water pollution**
  - Increasing demand
- **Increased severity of natural disasters**
  - Damage to distribution networks
- Abundant clean seawater available
  - **Permanent:** desalination installations
  - **Portable:** emergency desalination units



# Desalination Processes

- Wide range of desalination technologies available using membrane filtration, thermal and/or electrical power
  - 65%:35% split electrical (mainly RO) versus thermal (MSF/MED)
- Emergency/remote contexts there are two main options:



**Solar Still**

Passive solar evaporation



**Reverse Osmosis**

Electrically driven pressure pumps



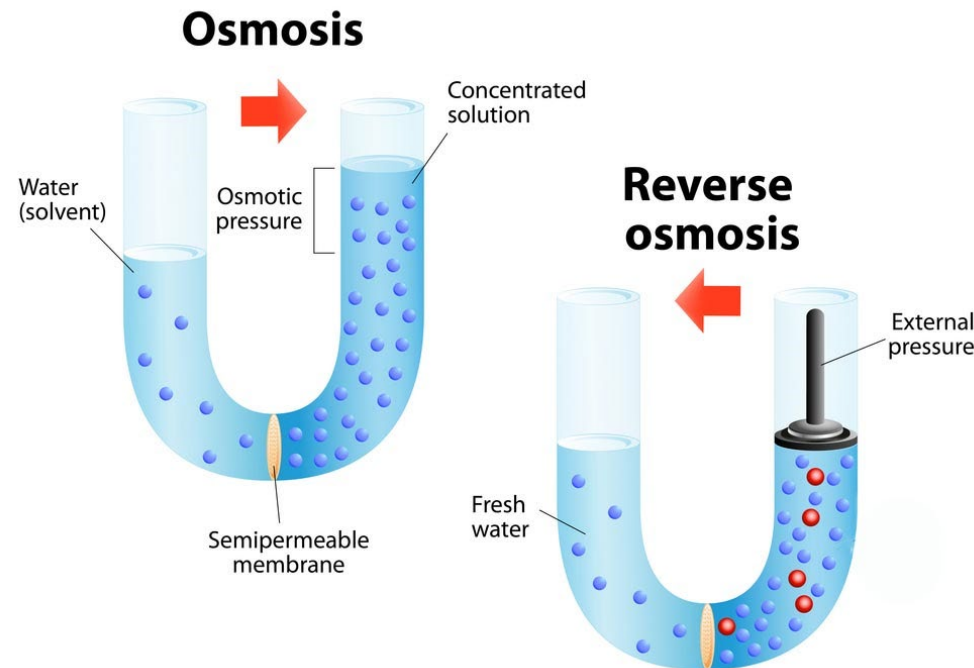
# Different Salinity

- **Solar stills**

- 0.5 to 2 L/day (up to 6 L/m<sup>2</sup>)
- Good for individuals

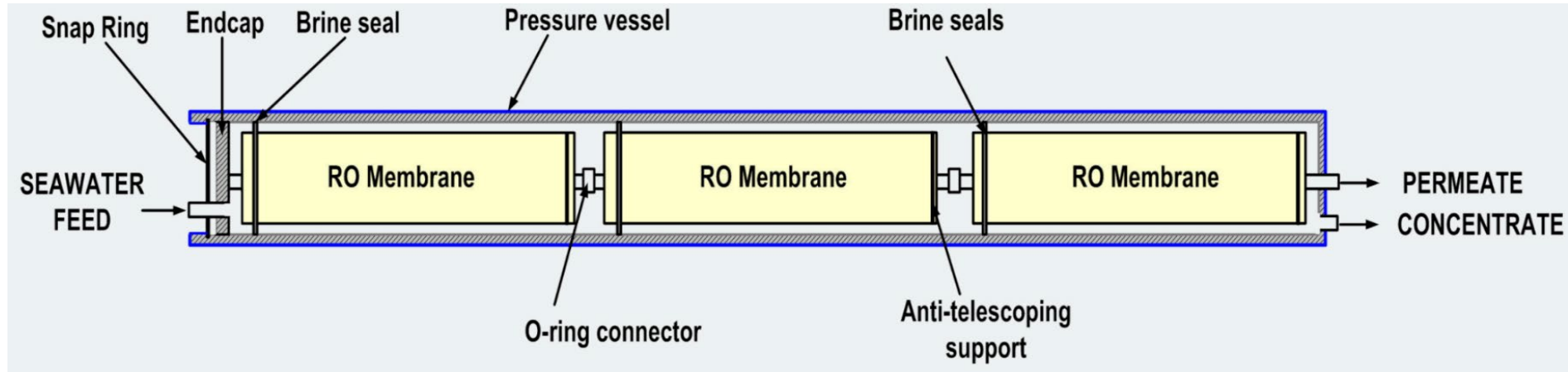
- **Reverse Osmosis**

- ~30 L/day and up
- Better for communities
- Easy to scale, lowest energy desalination option



	Contaminated Fresh Water (<1 g/L)	Brackish Water (1 to 30 g/L)	Seawater (>30 g/L)
Osmotic Pressure	1-2 bar	4-23 bar	25-33 bar
Hydraulic Pressure RO	2-4 bar	6-30 bar	45-65 bar

# Reverse Osmosis Deployment



- **Feed water quality**
  - Pre-treatment, intake system, location of intake
- **Permeate storage**
  - Volume, portability, disinfection
- **Waste disposal**
  - Salinity, chemicals, volume, disposal options



# Reverse Osmosis Deployment (cont.)

- **Power source**

- Grid or Off-grid (generator/renewables)
  - 1.5-3 kWh/m<sup>3</sup> of permeate for BWRO
  - 3-4.5 kWh/m<sup>3</sup> of permeate for SWRO (w/ ERD)
  - Up to 8 kWh/m<sup>3</sup> for small scale SWRO

- **Maintenance requirements**

- Onsite/offsite monitoring
- Service network

- **Training needs**

- Operator/maintenance staff
- Degree of automation

- **Transportation/Housing of unit**





# Emergency Deployment

- **Feedwater**
  - Ocean intake (pre-treatment requirement?)
  - Existing well/bore
  - Surface water sources
- **Storage of produced water**
  - Bladders
  - Existing storage tanks onsite
- **Disposal of reject**
  - Ocean discharge (salinity limits)
  - Evaporation basins/carting/injection
  - Local discharge regulations





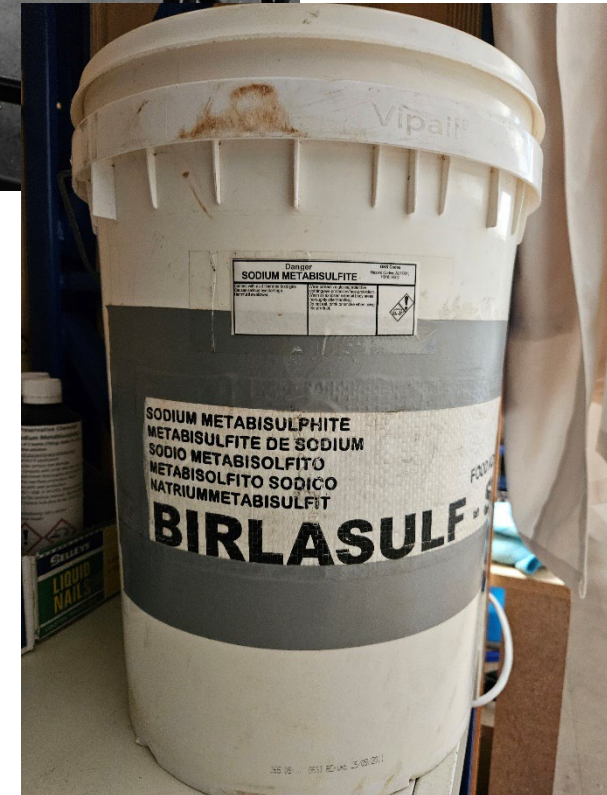
# Emergency Deployment (cont.)



- **Power**
  - Generator
  - Local renewables/grid
  - *Portable renewables not an option for larger desalination systems due to power requirement*
- **Chemical consumables**
  - Does RO require dosing/consumables
- **Transportation**
  - WTS, power generator and all consumables
- **Operation/Maintenance**
  - Training for deployment, operation and system preservation when not in use

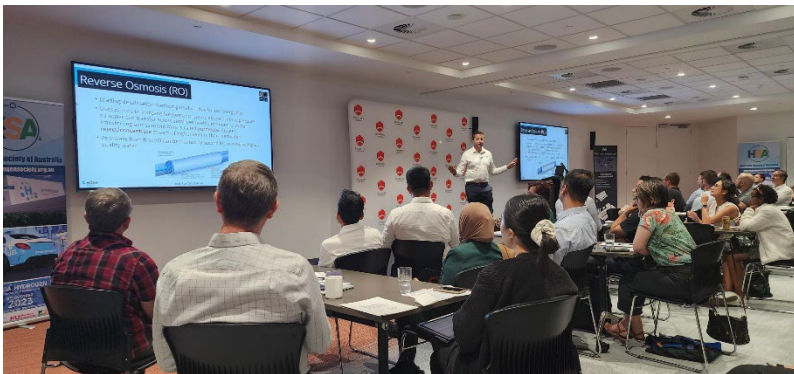
# Storage – Emergency Units

- Preservation of membranes
  - Removal of membranes, soaking in 1% SMBS for 1 hour, sealed in bags
- Flushing, draining and drying of unit
- Monitoring of preservation solution
  - pH measurement of preservation solution every 3 months to determine if still effective
  - Can just rinse membranes and replace preservative
- Storage of unit and peripherals
- Servicing portable power generators
- Maintaining inventory for deployment (critical spares)





# Training – Emergency Units



- Emergency deployment can require higher level of training and staff retention than permanent installations
  - Less automation
- Operation and maintenance training can be combined for emergency deployment
- Comprehensive asset maintenance plans need to be developed
- Refresher training is essential
- *Additional to education of communities as to quality of product water and treatment method*



# Remote Installation

## How Remote Installation differs from Emergency Deployment:

- Renewables become the best form of local power generation
- Training for remote installation is more successful when separated into operation and maintenance specialties
- Transport and long-term storage are not required as systems are designed to operate everyday
- Permanent feed and permeate storage tanks onsite
- Beach well best for ocean feedwater
- Low recovery seawater RO allows for low impact reject disposal for remote coastal locations