

Desalination of Brackish Groundwater for Agricultural Use



A collaboration with:



The views, information, or opinions expressed herein are solely those of the individuals involved and don't necessarily represent those of the AWS, WaterRA, One Basin or their employees.

Acknowledgement of Country



We acknowledge and pay respect to the Traditional Owners of the Murray–Darling Basin and their Nations.



We invite you to write in the **chat** now and acknowledge the Traditional Owners of the location you're joining from today.



To join our mailing list, please scan the QR code or visit onebasin.com.au/newsletter



Our research programs



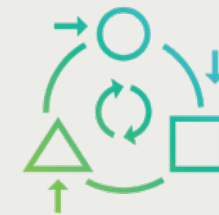
Foresight and decisions



Technology and opportunity



Adaptation and innovation



Our challenges



Building Capacity to Confront Climate Change Together



Creating Value from Digital Technologies to Support the Irrigated Agriculture Sector

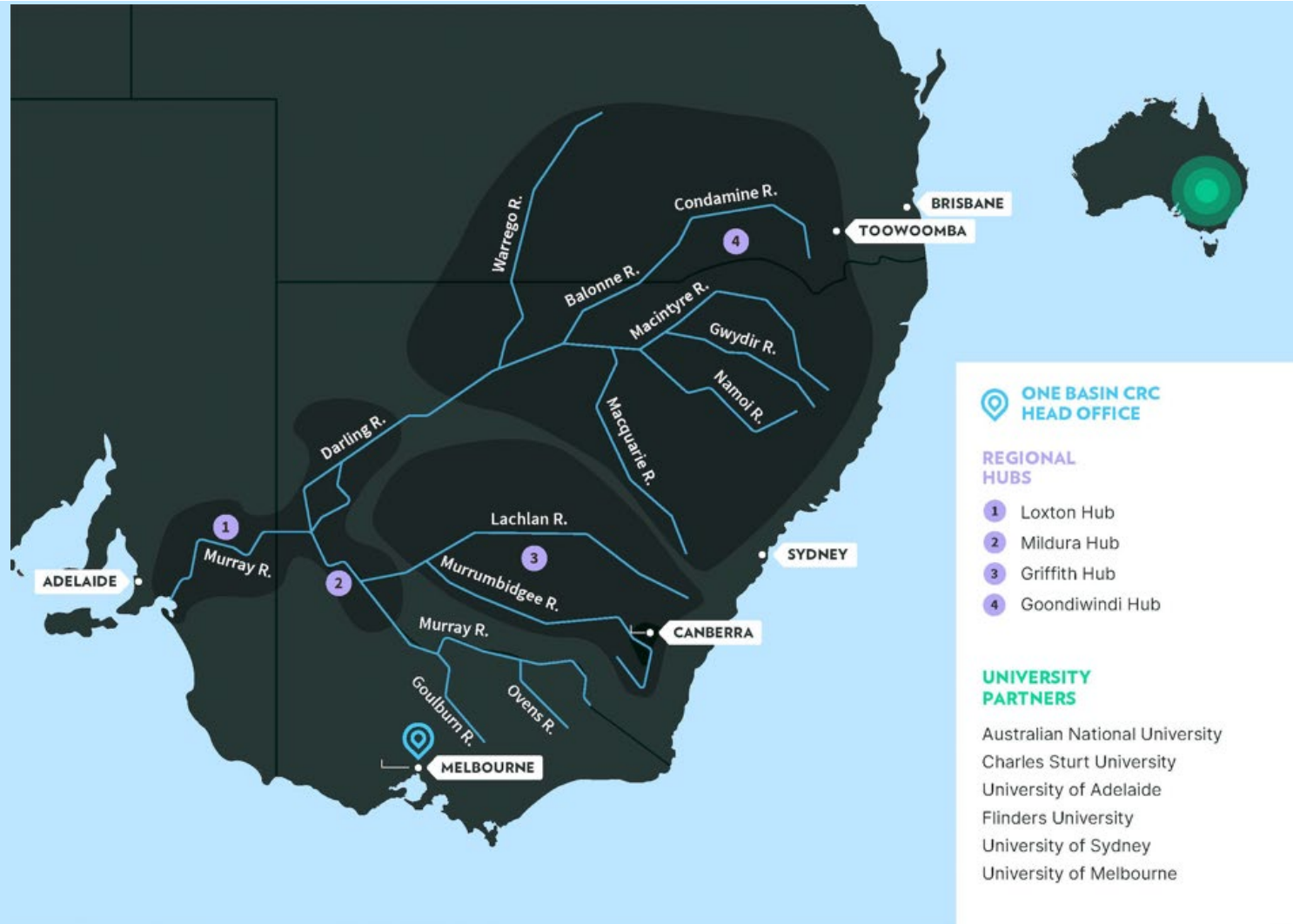


Enhancing the Water Supply System to Deliver for Multiple Uses



Realising Value From and Within Rural Industries and Communities

Regional hubs



ONE BASIN CRC HEAD OFFICE

REGIONAL HUBS

- Loxton Hub
- Mildura Hub
- Griffith Hub
- Goondiwindi Hub

UNIVERSITY PARTNERS

- Australian National University
- Charles Sturt University
- University of Adelaide
- Flinders University
- University of Sydney
- University of Melbourne

Housekeeping



Panel Discussion will run for approximately **60 minutes**



Recording link will be emailed to you, uploaded to our website and YouTube channel



Short 1 minute survey will pop-up at the conclusion— help shape our future training



Click **Q&A** to:

- Ask questions and make comments
- Upvote or comment on other attendees' questions



Click **Chat** to:

- Talk with other attendees
- Ask AWS staff for assistance

Today's panellists



Michael Leonard,
Uni. of Adelaide



Gemma Nunn,
Century Orchards



Julien Anese,
Osmoflo



Peter Reeve
Uni. of Adelaide

Desalination of Brackish Groundwater for Agricultural Use



Osmoflo around the World

Since 1991, designed, built and delivered over 600 WTP projects as EP, EPC, D&C + O&M, BOO.

Currently providing O&M services to approx. 100 desalination plants on behalf of clients around the world.

- Significant Osmoflo Plants
- Osmoflo Offices



Our partners: Century Orchards



Century Orchards: 700 ha of almonds, 100 ha of pistachios, near Loxton.



Opportunities and challenges identifying, sourcing and treating brackish groundwater

Demonstration site

Desalinating brackish groundwater at Century Orchards

Online resource and cost calculator

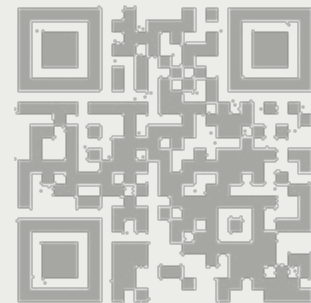
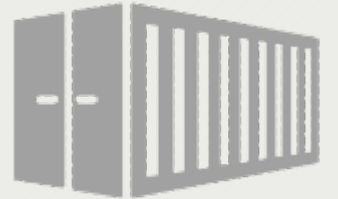
costs-benefit analyses of desalination

Reporting

Diversification of irrigated water sources for high value crops
Opportunity to improve water security

Communication

Bring others along with us on the journey



In 2023 this Quickstart project commenced, investigating relevant sites within SA



Langhorne
Creek, already
implemented

Type	ID	Name
MAR	4	Loddon
MAR	5	Benalla
MAR	6	St George*

MAR	9	Langhorne
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Investigated
with Parilla
Potatoes

Inland	11	Lameroo*
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Inland	13	Hillston
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Inland	16	Griffith
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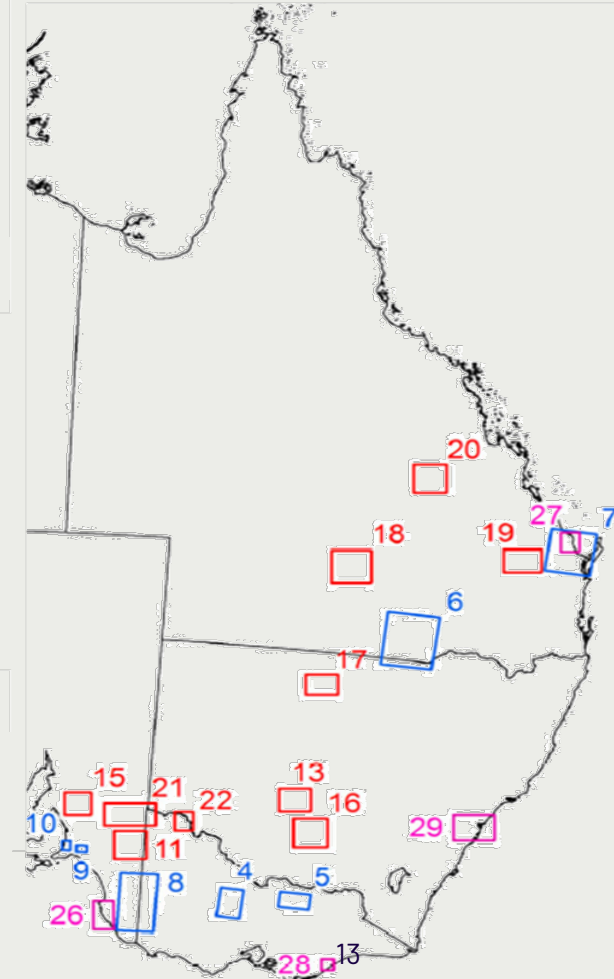
Inland	17	Bourke*
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Inland	18	Charleville*
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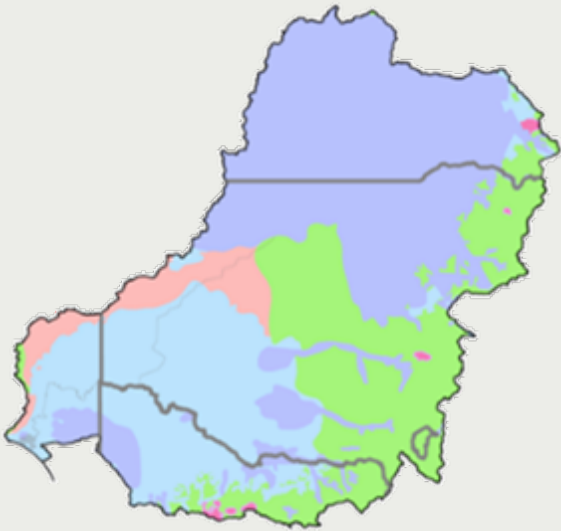
Inland	21	Berri*
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Inland	22	Mildura
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We partnered
with Century
Orchards.

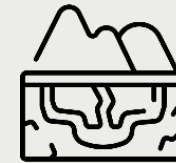


Brackish groundwater is abundant in the Murray-Darling Basin



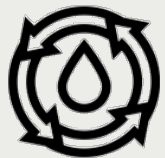
Aquifer Type

- Fractured or fissured, extensive aquifers of low to moderate productivity
- Fractured or fissured, extensive highly productive aquifers
- Local aquifers, of generally low productivity
- Porous, extensive aquifers of low to moderate productivity
- Porous, extensive highly productive aquifers

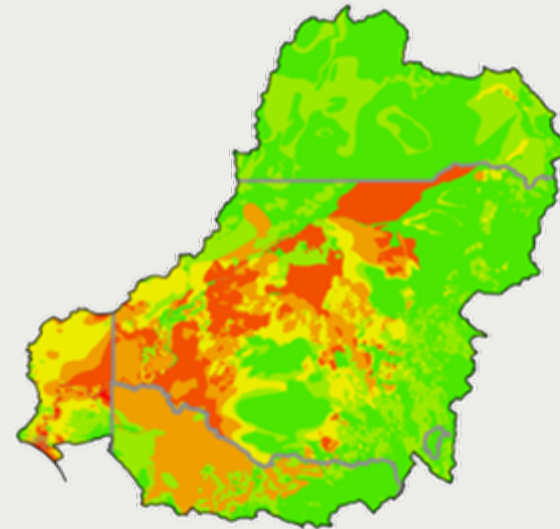


Over 80,000 GL of brackish aquifers in the MDB

(Bureau Rural Sciences 2008)



Over 2000 GL can be sustainably extracted per year (Barron et al. 2015)



Groundwater Salinity as TDS (mg/L)

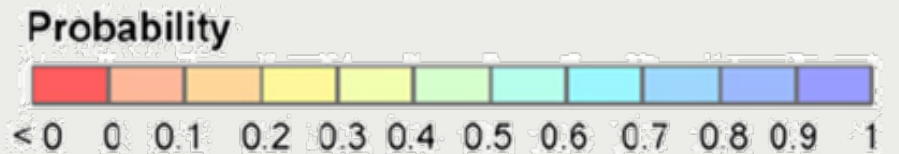
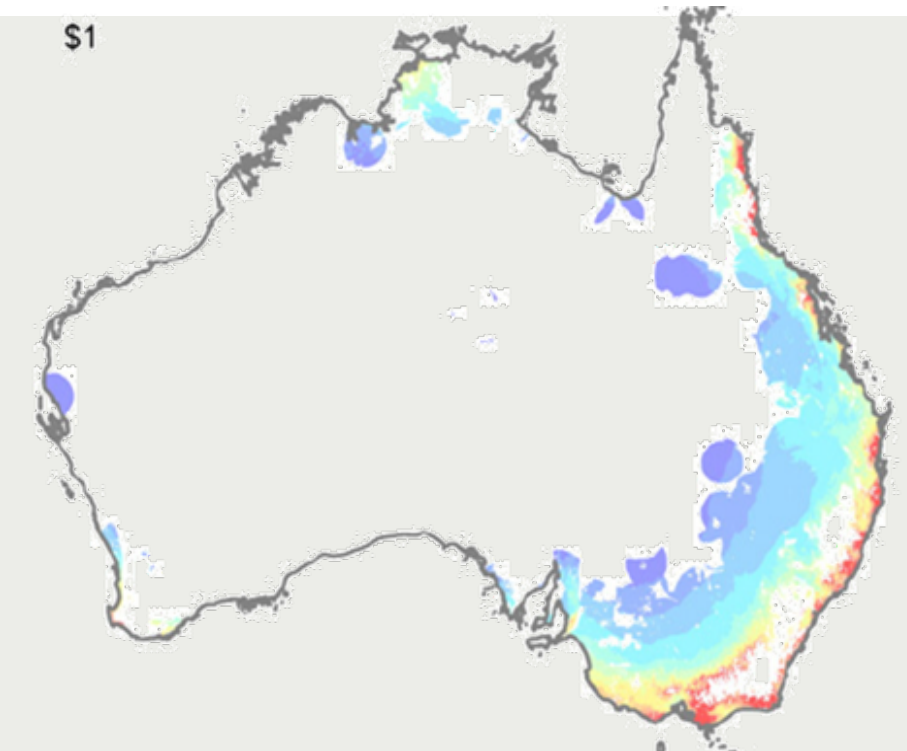
- <1500
- 1500 - 3000
- 3000 - 7000
- 7000 - 14000
- 14000 - 35000
- >35000

Brine disposal is a significant practical challenge

Onsite evaporation basin



Regional evaporation basin
(e.g., salt interception scheme)



Probability of the combined desalination and brine disposal cost being less than \$1 per kL under a 0.9 recovery rate Barron et al. (2015).

This project is implementing a novel reinjection approach to brine management

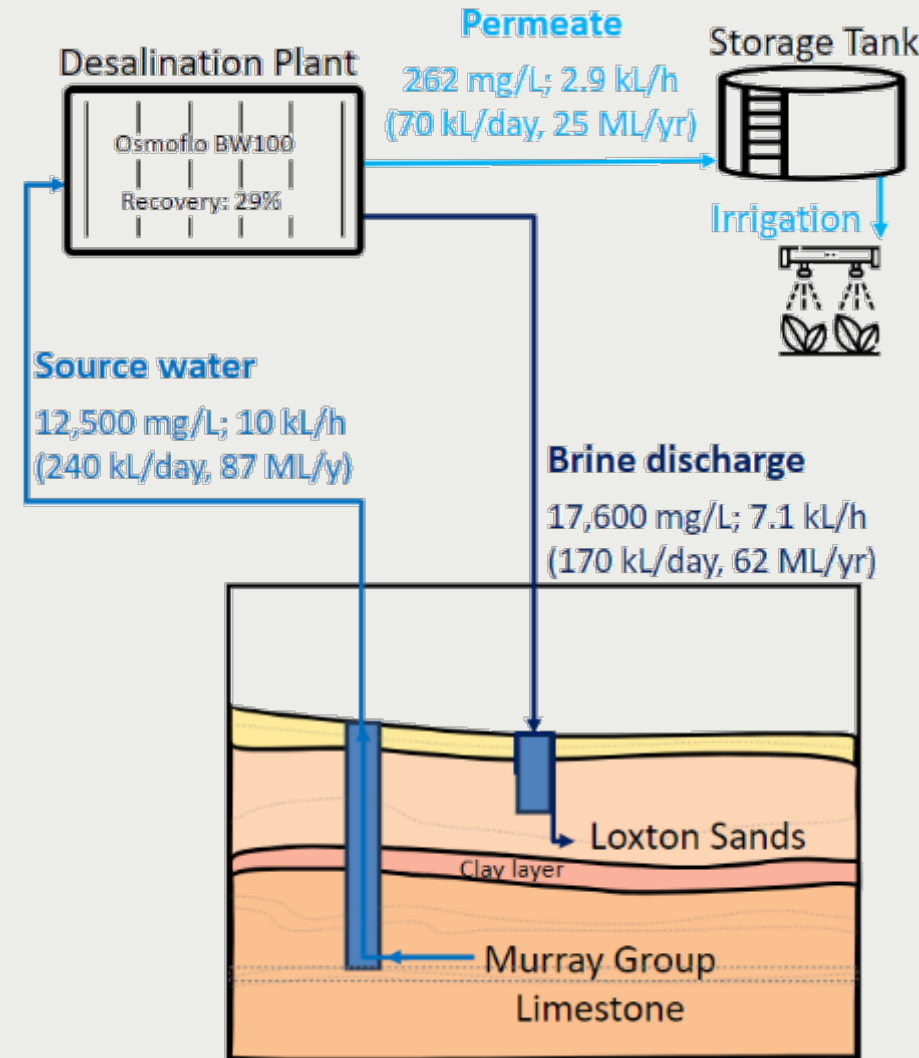
Reinjection is comparatively cheaper than evaporation basins but requires a nearby saline aquifer

Its feasibility depends on a range of factors:

- Aquifer salinity and recovery rates

- Hydrogeological suitability

- Regulatory framework

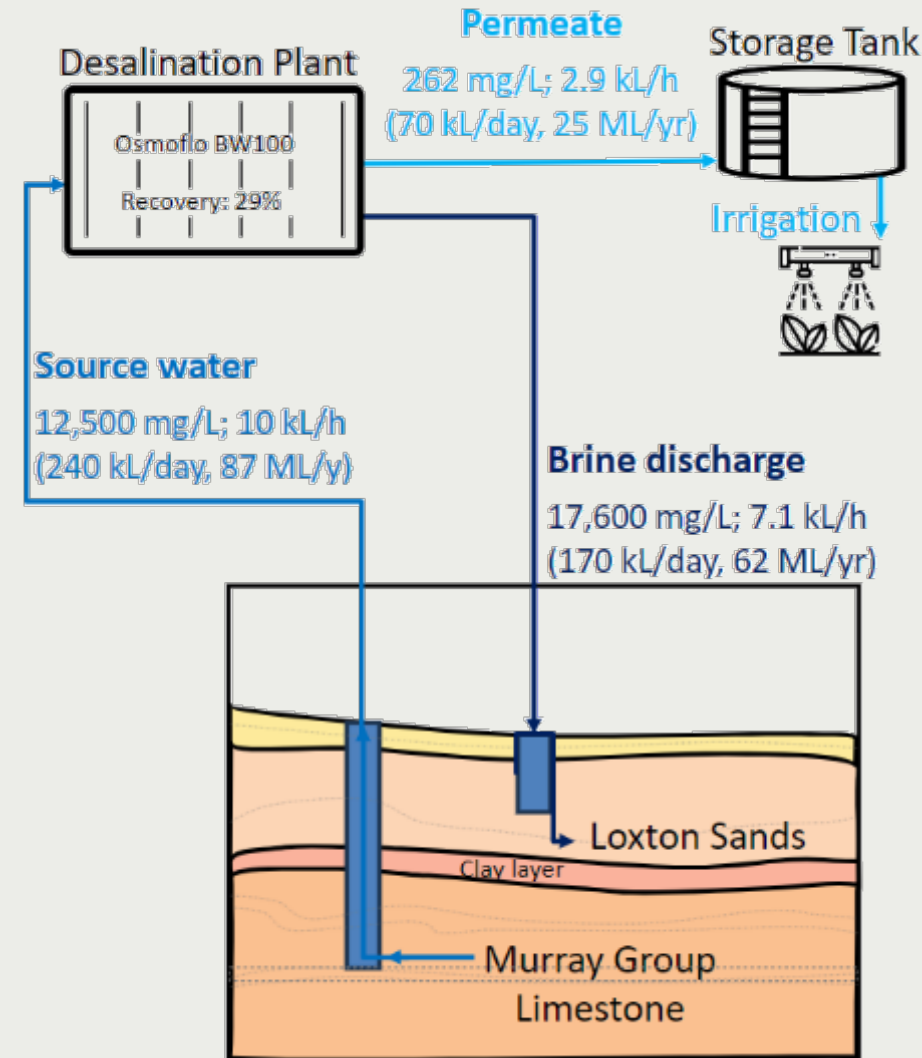


This project is implementing a novel reinjection approach to brine management

Our project is using a low recovery approach (29%)
No chemical inputs, enabling aquifer discharge

Higher recovery can be more favourable when using
evaporation basins for brine disposal

Minimising brine discharge minimises the size
of pond and therefore capital cost



Energy usage is highly seasonal, peaking in summer

Month	h/day	kL/day	kWh/day
Aug	3	8.7	105.6
Sep	7.5	21.8	264.0
Oct	12	34.8	422.4
Nov	13	37.7	457.6
Dec	21.5	62.4	756.8
Jan	22	63.8	774.4
Feb	13.5	39.6	475.2
Mar	7.5	21.8	264.0
Apr	4	11.6	140.8
May	1.4	4.1	49.3
Average	10.5	30.6	371.0

Components	Load (kW/h)	Description
Bore Pump	4.8	Grundfos SP11-20N 316SS (10 kL/h, 70-100 m)
BW100 Desal Unit	28.2	BW100 desalination unit
Irrigation Pump	2.2	Grundfos CMB 10-47 1CAAPC (10 kL/h, 46.6 m)
Total installed load	35.2	



There is a wide range of implementation considerations

Water quality

- Salt levels of feedwater
- Water quality (turbidity, pH, treatment needs)

Water quantity

- Extraction amount
- Recovery rate
- Storage requirement

Logistic

- First Nations dialogue
- Regulatory approval
- Environmental impact
- Access agreements
- Economic analysis

Infrastructure needs

- Access points for semi-trailer and crane for unloading
- Pipework installation
- Water storage
- Site power access
- Area available for equipment
- 3 phase electric power supply

Role	Example
Grower	Century Orchards
Technology provider	Osmoflo
Driller	Clearwater drilling
Hydraulics	Riverland irrigation
Electrical/logic	Leclogix
Approval	DEW SA
Project Management	1BCRC
Feasibility assessment	1BCRC
... and more	step-by-step

Desalination offers the potential for drought resilience

During millennium drought, Lake Alexandrina unable to provide water

2007 Langhorne Creek championed by Ash Keegan

Reverse osmosis, 1500-7000 mg/L groundwater at 2 ML/day, Capital cost ~\$1M

Uses existing on-site clay-pans as evaporation basins

Investment paid for itself within several years



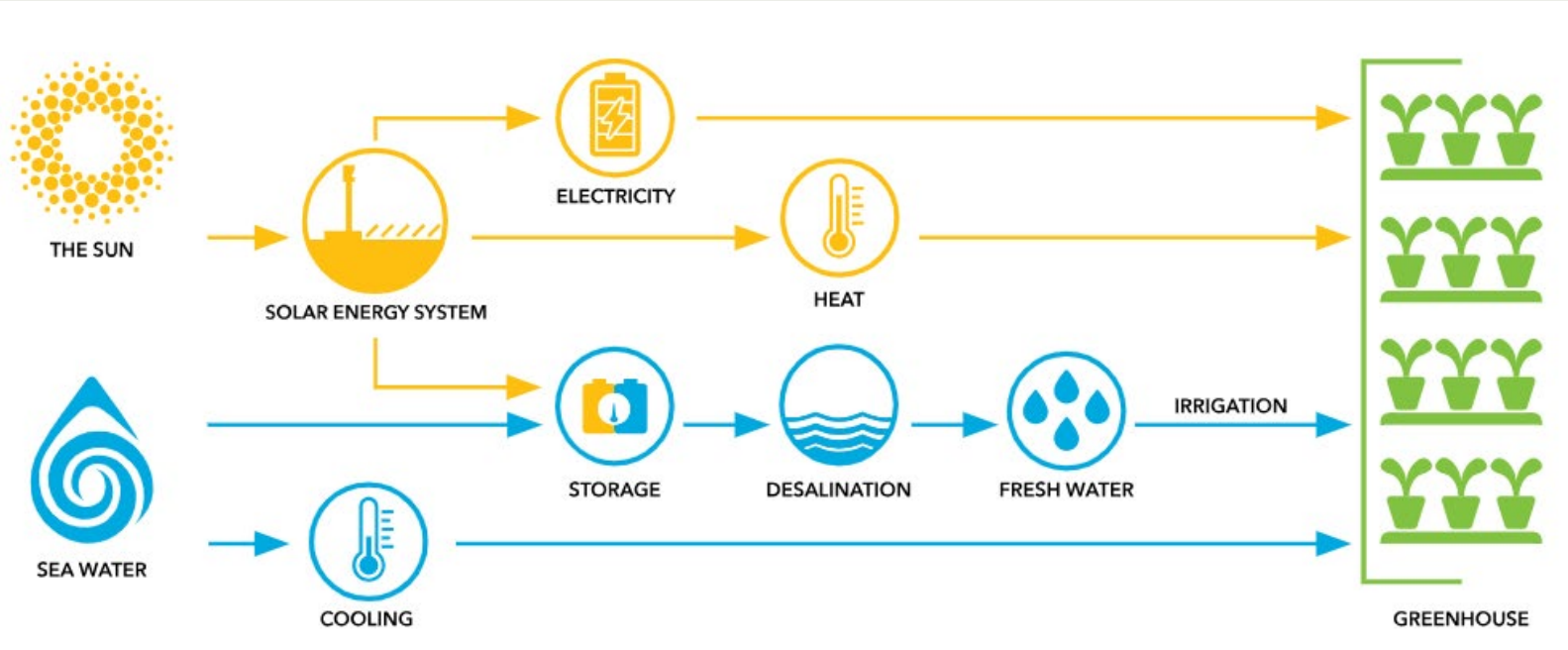
Desalination offers the potential for economic transformation



Current economic analyses investigating transformation potential.

Sundrop Farms provides an archetype: Why couldn't this happen in the Riverland, perhaps for an export market?

Sundrop farms uses solar energy, 40,000 TDS mg/L feedwater



Groundwater desalination offers many opportunities



a more sustainable and climate-resilient basin
economic growth and export potential

more flow in the river, for the environment and for enabling communities to prosper



Please visit our website for more information



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Peter Reeve (postdoc, presenter)

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Project Team:

Julien Anese (Osmoflo), Michael Leonard, Holger Maier, Peter Reeve, Seth Westra (UoA), Okke Batelaan, Howard Fallowfield, Ilka Wallis, Ben Mullins (Flinders), Enys Watt (DEW), Darren Graetz (SARDI).



Government of South Australia
Department for Environment
and Water



We wish to thank Century Orchards for their extensive support of the project, and the project advisory committee, chaired by Kym Walton (1BCRC), for their valuable input.

Panel discussion



Michael Leonard,
Uni. of Adelaide

Gemma Nunn,
Century Orchards

Julien Anese,
Osmoflo

Peter Reeve
Uni. of Adelaide



Thank you

www.onebasin.com.au



Australian Government
Department of Industry,
Science and Resources

Cooperative Research
Centres Program

Thanks for attending



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As a live attendee, you will receive a **Certificate of Attendance** within the next *two business days*. This may count toward your Continuing Professional Development hours.



A **short 1-minute survey** will pop up at the webinar's conclusion or complete it on your phone now by scanning the QR code.



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