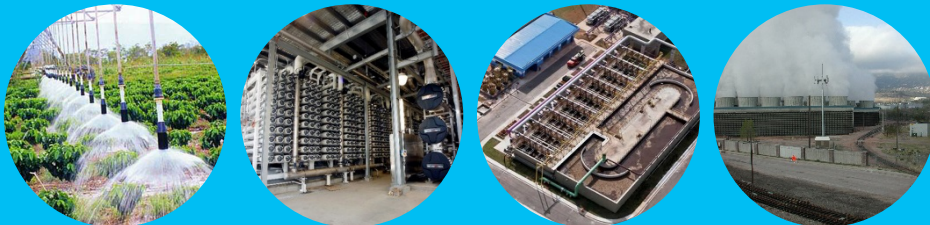

Emergence of Potable Reuse in Brazil

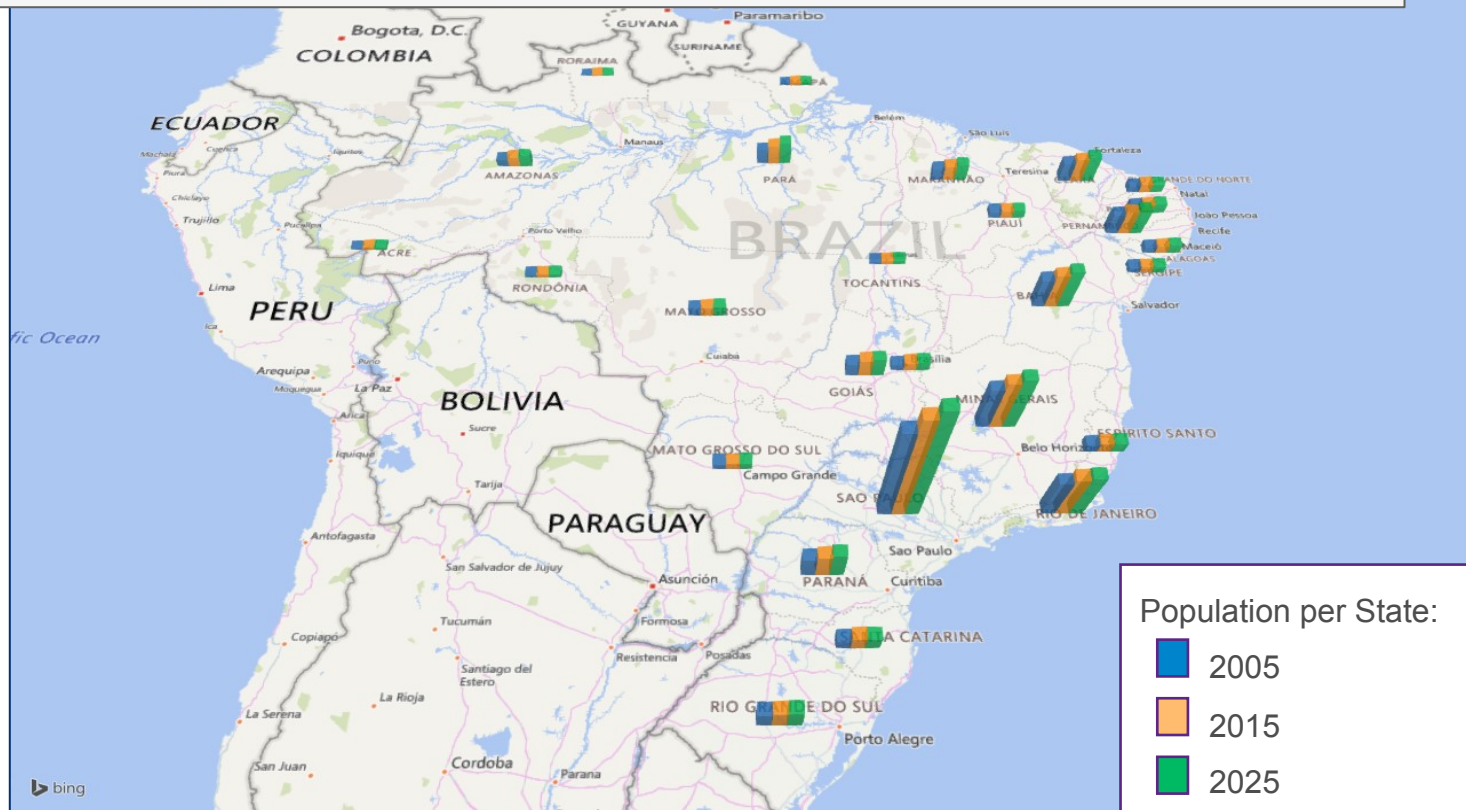
Multi-State Salinity Coalition
March 2, 2017
Las Vegas, NV

Brock McEwen
Global Water Technology Director



Why potable reuse in Brazil?

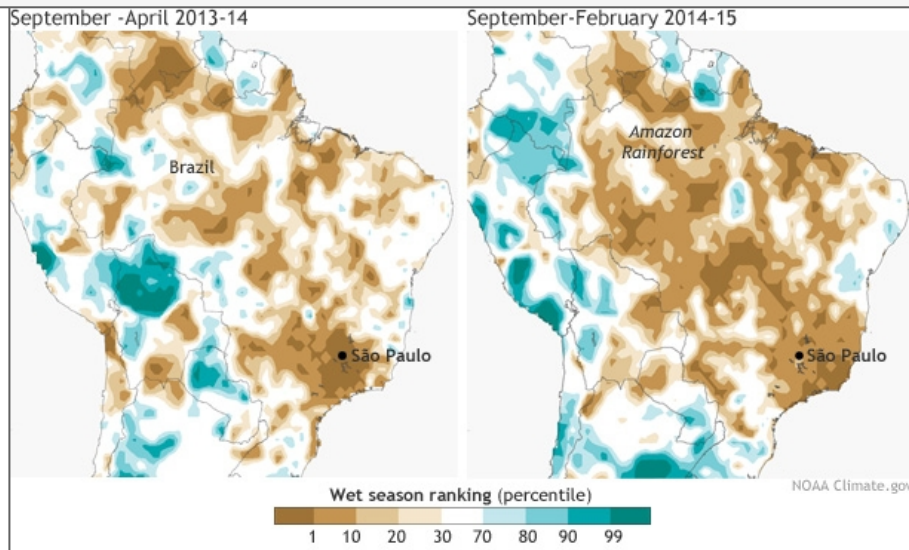
Main driver: population growth and lack of fresh water where growth is occurring (under both normal and drought conditions)



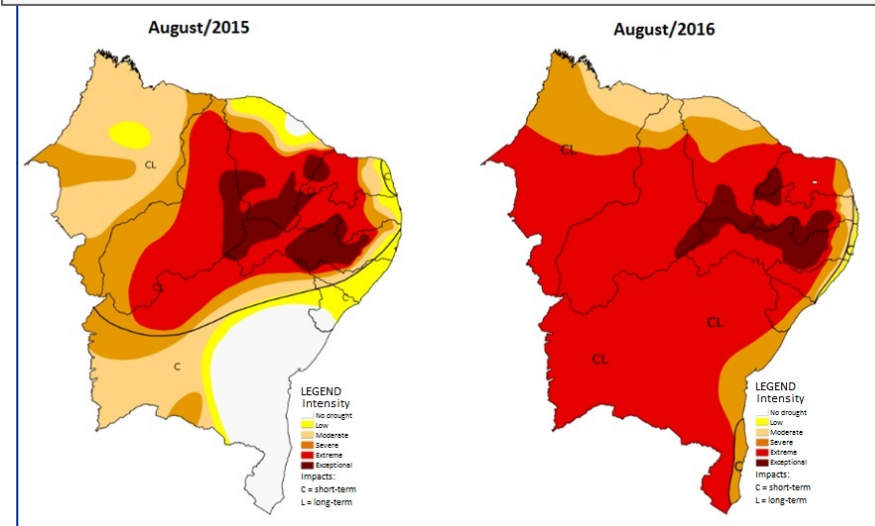
Data source: IBGE, 2016

Brazil is facing significant water supply investment needs and more frequent and severe droughts in populated areas

2013-2015 drought in São Paulo area



On going drought in Northeast area



Brazil is also facing significant wastewater investment needs

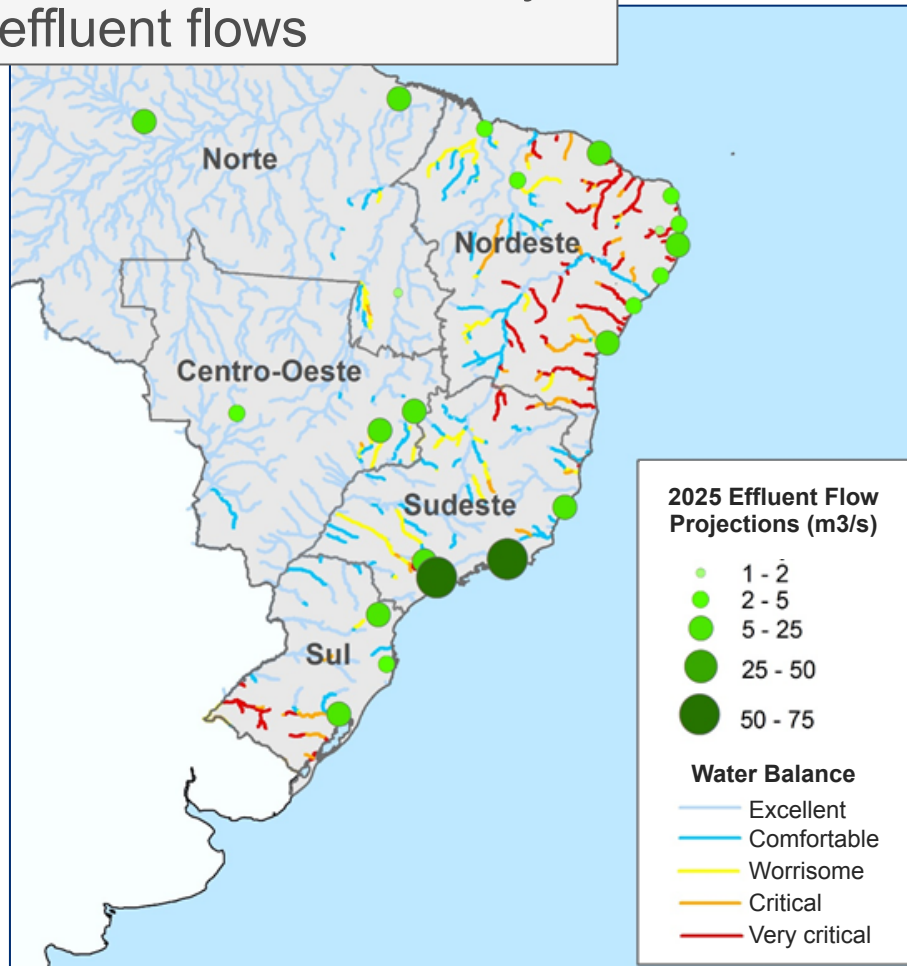
Region	Wastewater collection index			Wastewater treatment index*		
	2018	2023	2033	2018	2023	2033
NORTH	52%	63%	87%	75%	81%	94%
NORTHEAST	59%	68%	85%	77%	82%	93%
MIDWEST	63%	70%	84%	92%	93%	96%
SOUTHEAST	90%	92%	96%	63%	72%	90%
SOUTH	81%	87%	99%	73%	80%	94%
BRASIL	76%	81%	92%	69%	77%	93%

Source: Adapted from National Sanitation Plan (PLANSAB, 2013)

* % of effluent collected

(Potable) reuse has the potential to help on both fronts

Water stressed areas vs. sanitary effluent flows



However, planned reuse of sanitary effluent is an emerging practice in Brazil

Project Size	Quantity	Type
Large (>0,5 m ³ /s) or medium (between 0,1 and 0,5 m ³ /s)	<ul style="list-style-type: none">• 3 projects in operations (Aquapolo, Água Viva, Petrobras)	<ul style="list-style-type: none">• Industrial reuse
Small (<0,1 m ³ /s)	<ul style="list-style-type: none">• A few projects across Brazil, particularly in the Southeast	<ul style="list-style-type: none">• Primarily urban reuse

Source: National Water Reuse Policy Study (CH2M, on going)

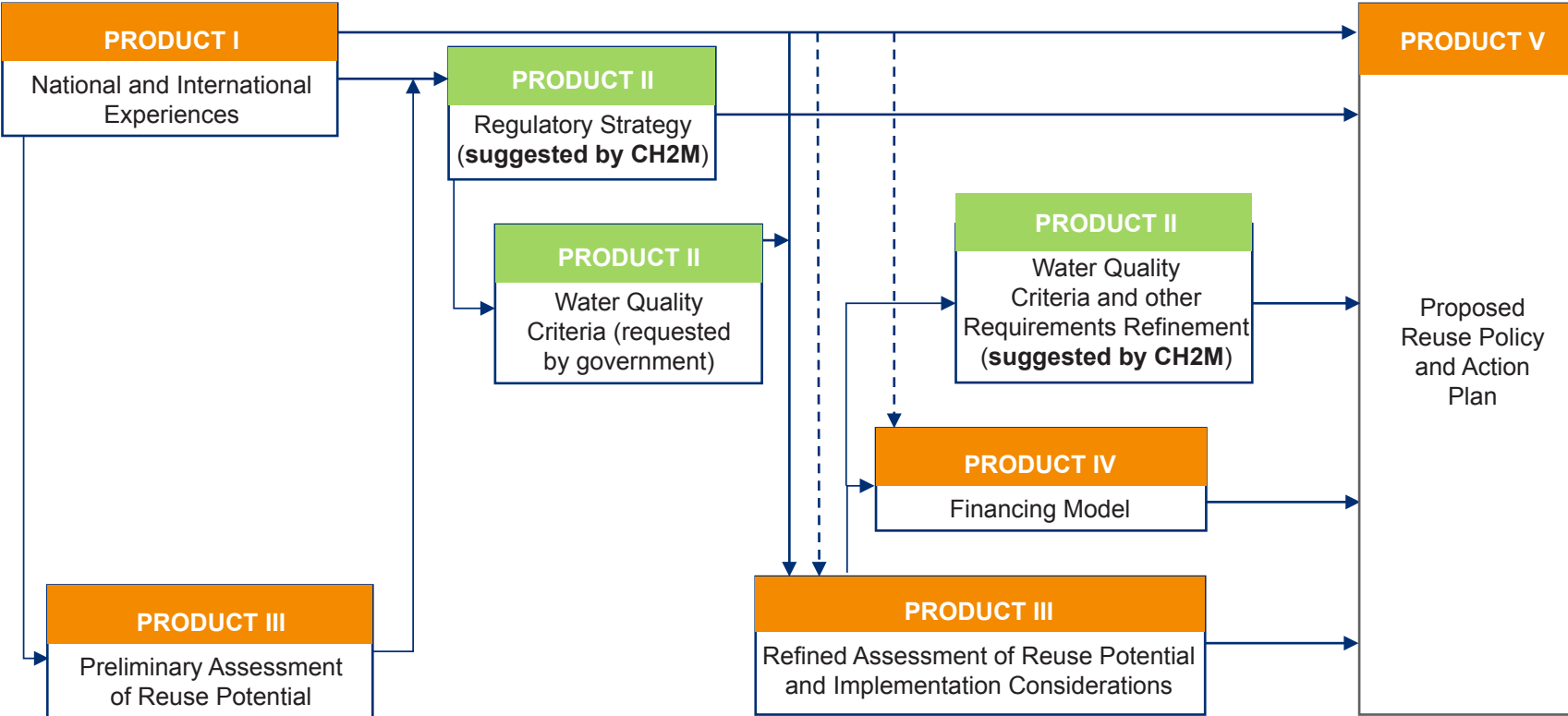
Notes:

- “De facto” potable reuse is occurring in various places (including in the Federal District)
- Agencies such as SABESP and SANASA (State of São Paulo) are considering direct potable reuse

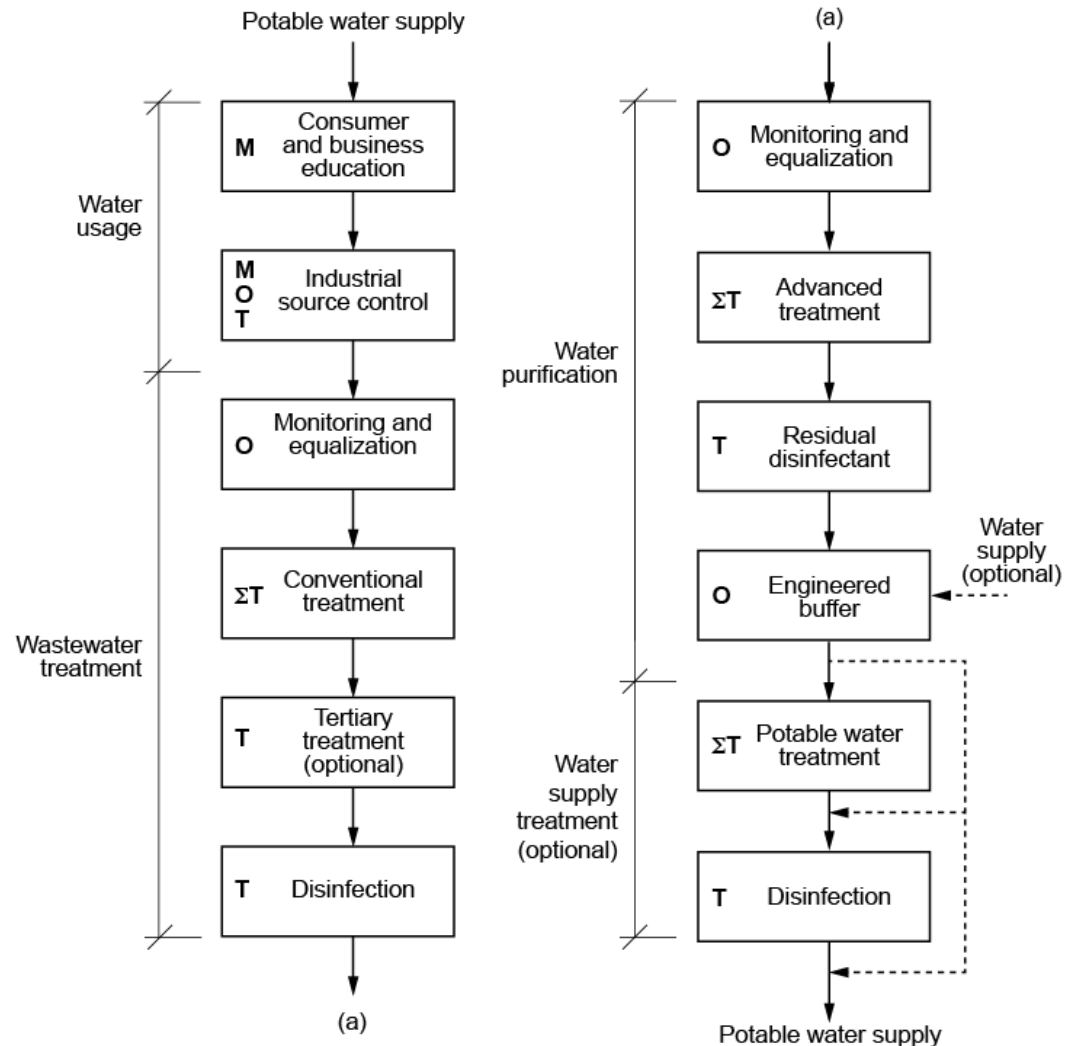
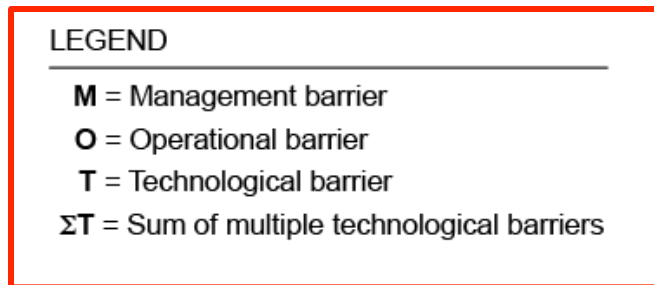
Evaluation of how to encourage safe practices for direct potable reuse has recently been initiated at various government levels

Government Level	Sample Relevant Activities	CH2M Role
Federal	National Water Reuse Policy Study	Lead consultant
State	<i>(currently focusing on non potable reuse)</i>	-
Local/Municipal	Potable Reuse Feasibility Study – SABESP	Lead consultant
	Potable Reuse Pilot Study – SANASA/CIRRA	Tracking progress of Study as part of the National Water Reuse Policy Study

The National Reuse Policy Study is scheduled for completion in October 2017



CH2M is recommending the multiple barrier approach that considers barriers through the entire urban water cycle



Source: *Direct Potable Reuse: The Path Forward*
WaterReuse (2011)

Reverse Osmosis Concentrate Handling Considerations

- If RO is selected for the advanced water treatment train, disposal of the RO concentrate is required
- RO concentrate flow typically 15% to 25% of feed flow; therefore 0.6 m³/s for 2.5 m³/s plant flow
- At coastal locations, RO concentrate is typically discharged to the ocean
- At in-land locations, disposal of RO concentrate can be more challenging because of elevated concentrations of TDS, organics, and nutrients
- Other options if a discharge permit can not be obtained:
 - Mechanical evaporation (very expensive)
 - Deep well injection (very expensive and not always feasible)
 - Sewer disposal (can impact treatment at downstream WWTP)



Conclusions

- Drivers for potable reuse exist in Brazil
- However, planned reuse of sanitary effluent is an emerging practice in Brazil and the pathway to sustainable potable reuse projects has yet to be defined in the local context
- CH2M is playing a lead role in shaping the approach the federal government could take to encourage safe potable reuse practices
- The approach is based on safe practices in the US and abroad with adaptation to Brazil local context, particularly existing drinking water and wastewater discharge standards and practices.

Thank you!

