RENEWABLE TECHNOLOGIES ON THE HORIZON

Moderator:

Commissioner Maria Bocanegra, Illinois

Panelists:

Jason Feldman, Co-founder, Green Era Sustainability

Cristina Negri, Director Of The Environmental Science (EVS) Division At Argonne National Labs

Dr. Ufuk Erdal, Senior Vice President, Water Reuse National Technology Director at ARCADIS, Director at the Water Research Foundation

WHAT IS NARUC

- The National Association of Regulatory Utility Commissioners (NARUC) is a non-profit organization founded in 1889.
- Our Members are the state regulatory Commissioners in all 50 states & the territories. FERC & FCC Commissioners are also members. NARUC has Associate Members in over 20 other countries.
- NARUC member agencies regulate electricity, natural gas, telecommunications, and water utilities.

WHAT IS NARUC'S CENTER FOR PARTNERSHIPS AND INNOVATION?

- Grant-funded team dedicated to providing technical assistance to members.
- CPI identifies emerging challenges and connects state commissions with expertise and strategies.
- CPI builds relationships, develops resources, and delivers trainings.

NARUC CPI Topical Areas

Energy Infrastructure & Technology Modernization

Electricity System Transition

Critical Infrastructure, Cybersecurity, Resilience

Emerging Issues

www.NARUC.org/CPI-1

WEBINAR LOGISTICS

- We're recording the webinar. It will be posted on the CPI webpage
- Because of the large number of participants, everyone is in *listen* mode only.
- **Please use the questions box to send us your questions** and comments any time during the webinar. You may want to direct your question to a specific panelist.
- The panelists will respond to questions typed in the chat box during moderated Q&A, following each presentation and at the end.

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PANEL 1

Jason Feldman
Co-Founder
Green Era Sustainability

Jumpstarting a GreenEra

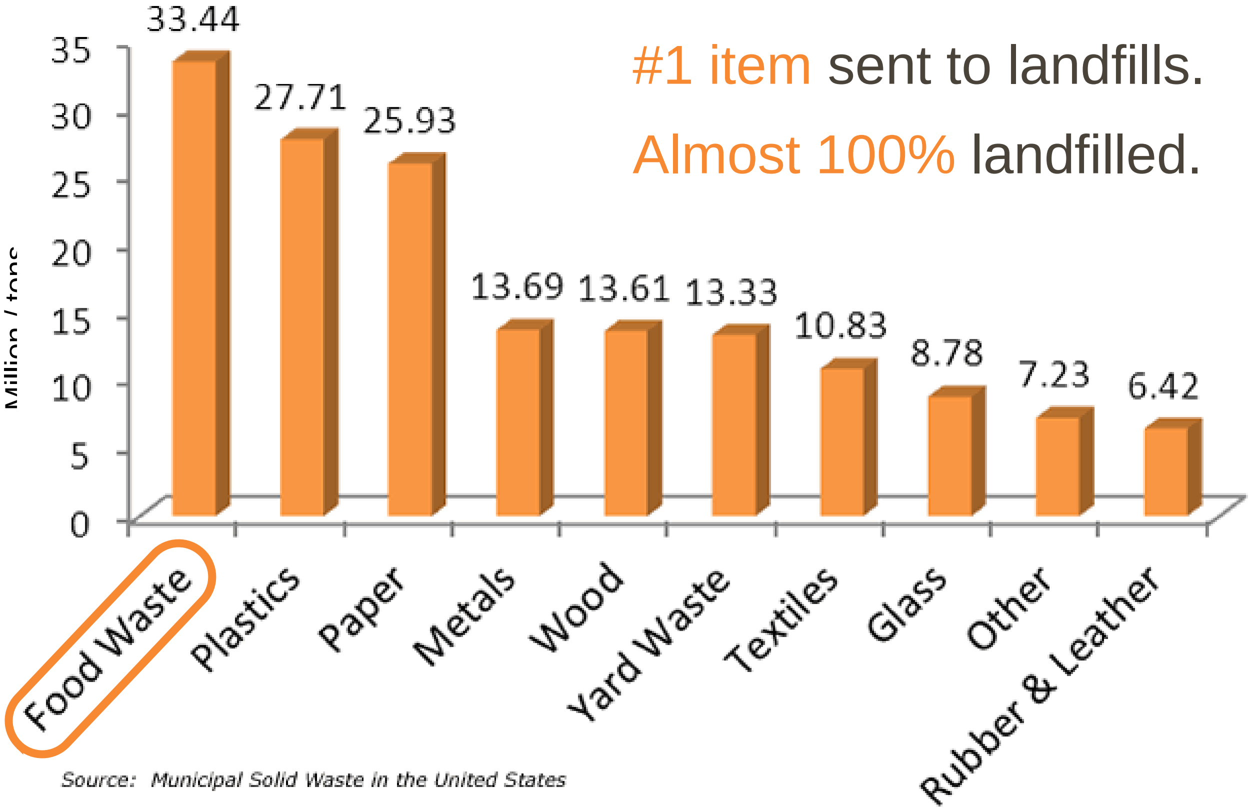
How we will transform
waste into energy, jobs, food,
& healthy neighborhoods.

NARUC - Renewable Energy Technologies on the Horizon Webinar

August 20, 2020


We created
Green Era
SUSTAINABILITY PARTNERS
to change:
How we think of waste
How we grow food
How we create energy

Problem: Food Waste

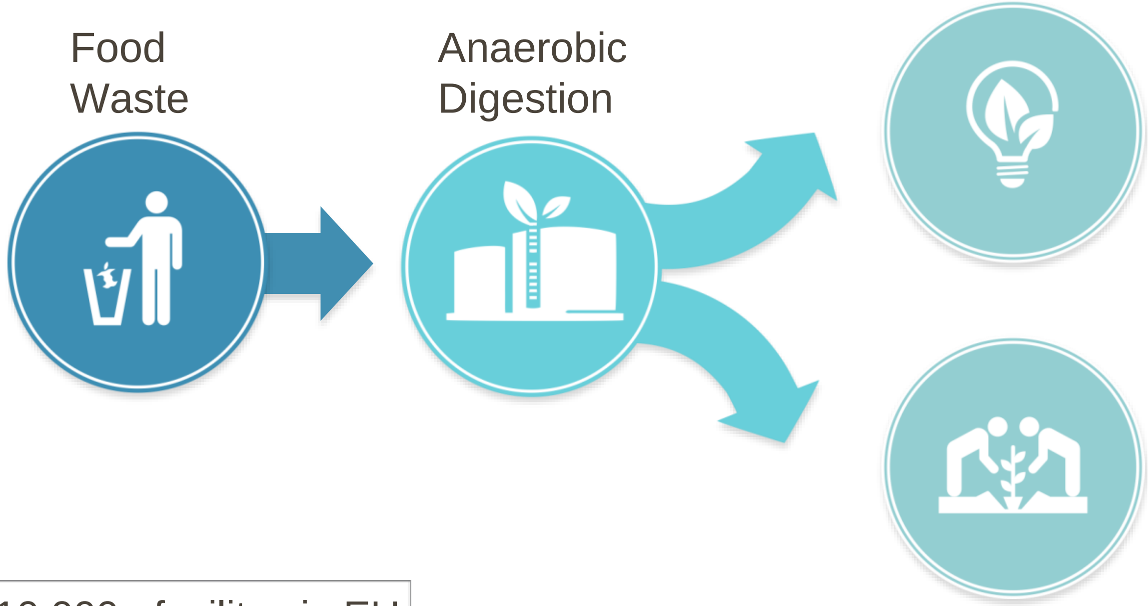


#1 item sent to landfills.

Almost 100% landfilled.

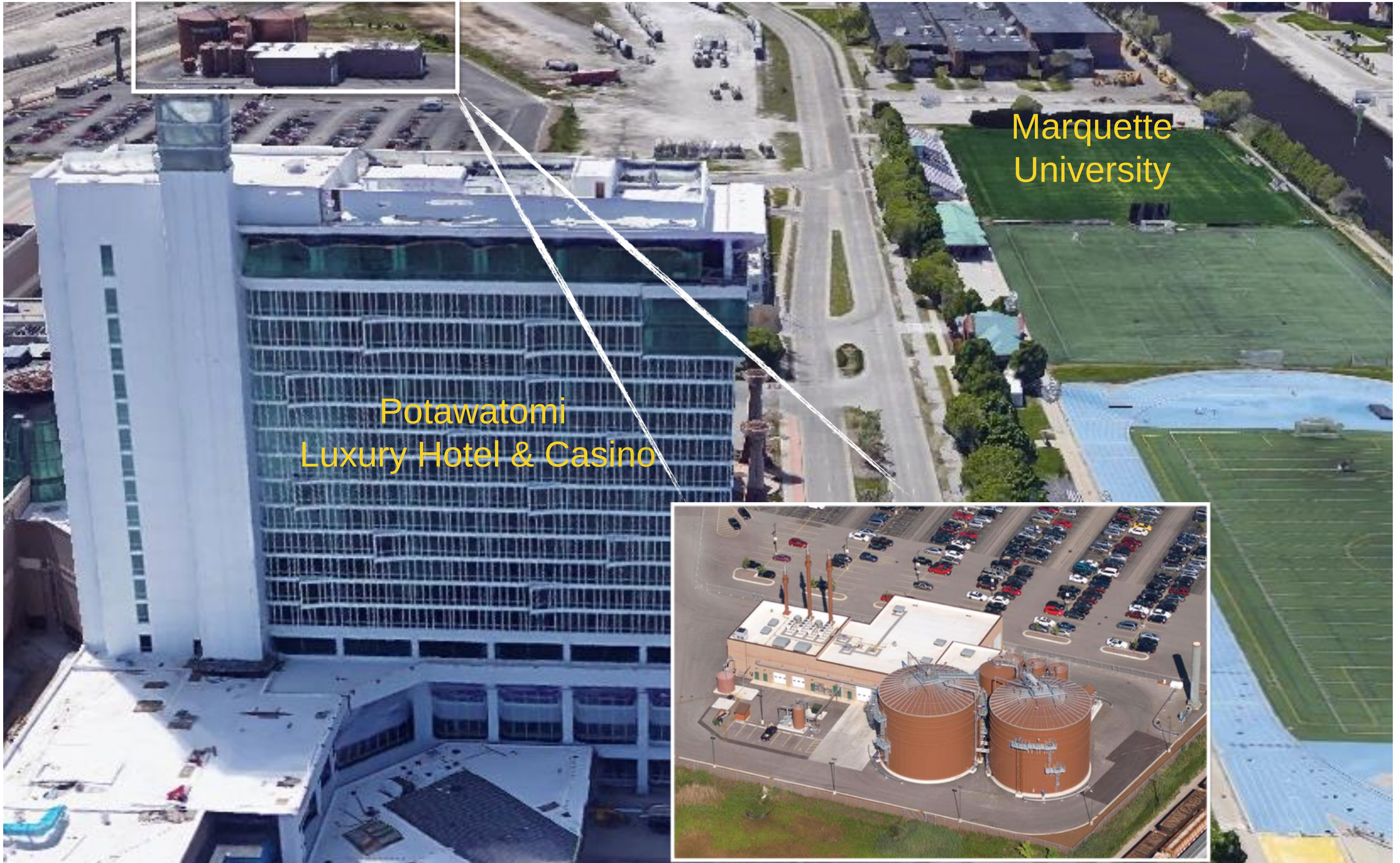
Our Solution: Anaerobic Digestion

A safe and proven technology with the power to transform local food systems.

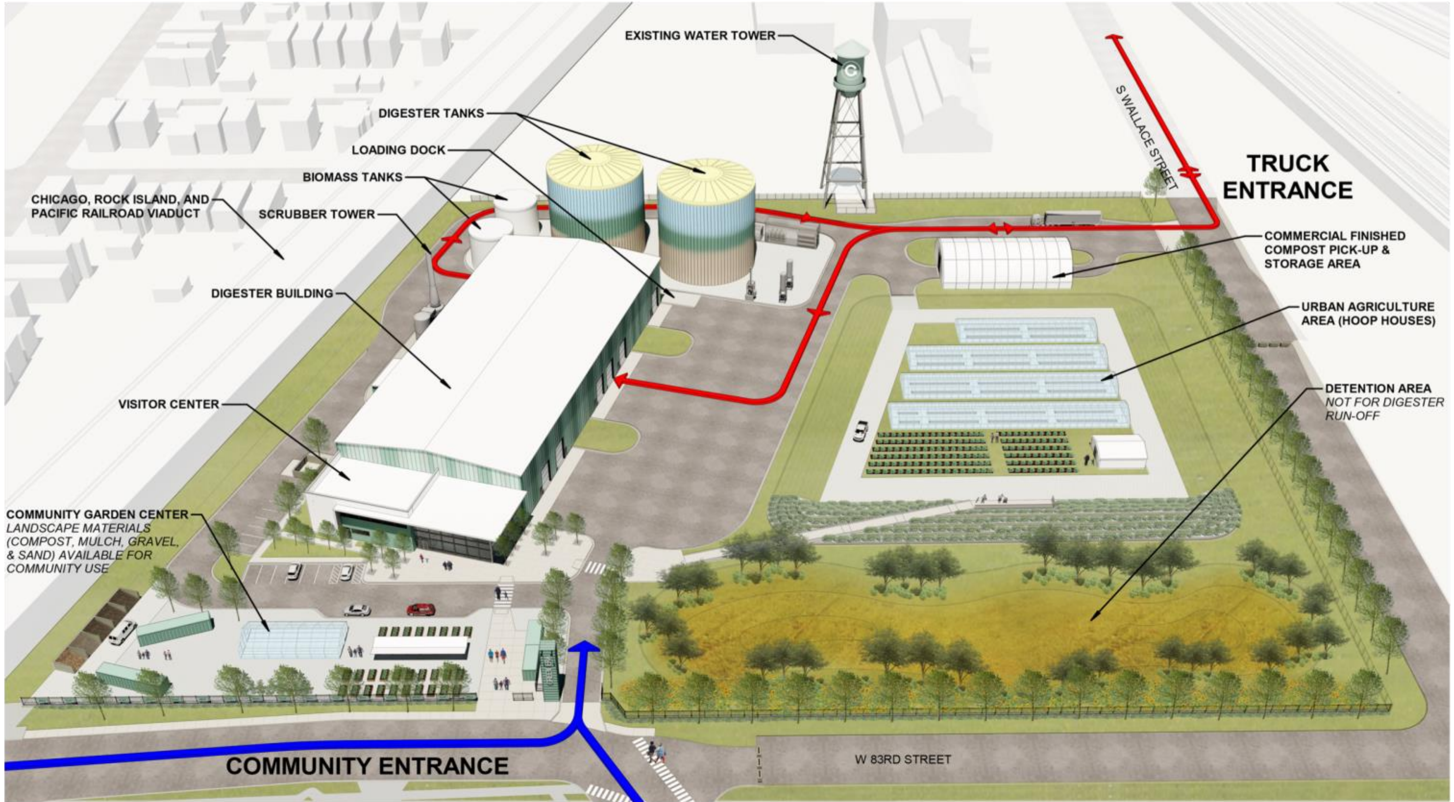


10,000+ facilites in EU
300+ facilities in US

Community Digester in Europe


Marquette
University
Potawatomi
Luxury Hotel & Casino

Green ERA Renewable Energy & Urban Farming Campus



Green Era Project


GREEN ERA

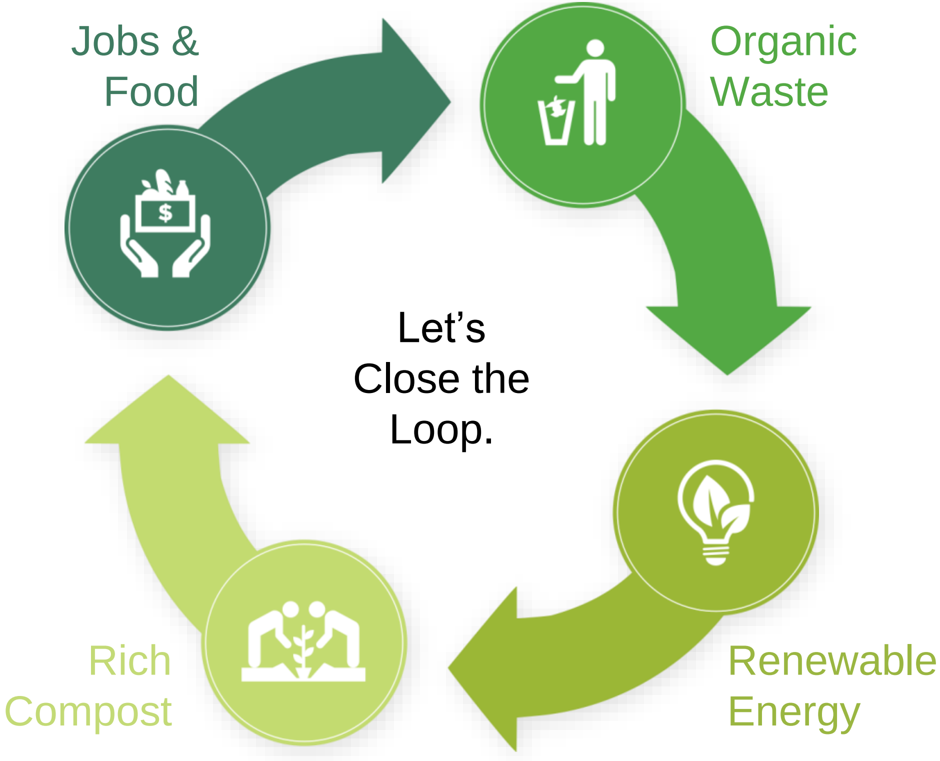
Linear Economy

UNSUSTAINABLE

Take → Make → Waste

Decoupling economic activity
from the consumption of finite resources.

Green Era Model



Creating an Urban Circular Economy!

Urban Growers Collective Farms

8 urban farms on 11 acres located predominately in Chicago's South Side.
urbangrowerscollective.org

Green Era's compost provides catalytic input to expand local food production & economic development.

grounds for PEACE

ayor Rahm Emanuel tours a mobile market operated by the Urban Growers Collective during an event on Aug. 22, 2018. (Courtesy ity of Chicago)

Renewable Natural Gas

WHAT IS RNG?

- Renewable Natural Gas (RNG) is natural gas that is produced from the decomposition of organic waste material.
- After treatment to remove CO2 and trace constituents to meet pipeline quality specifications, RNG is mostly methane (~95%).
- RNG is a low-carbon to carbon-negative alternative to fossil-derived conventional natural gas.

Renewable Natural Gas

RNG vs. NATURAL GAS

- RNG is produced from inevitable, organic waste streams that emit methane during decomposition.
- Natural Gas is collected from limited fossil resources that would otherwise remain sequestered within the earth.
- Utilizing waste methane as RNG reduces GHG emissions from both waste generation and fossil fuel consumption.

Renewable Natural Gas

WHERE IS RNG USED?

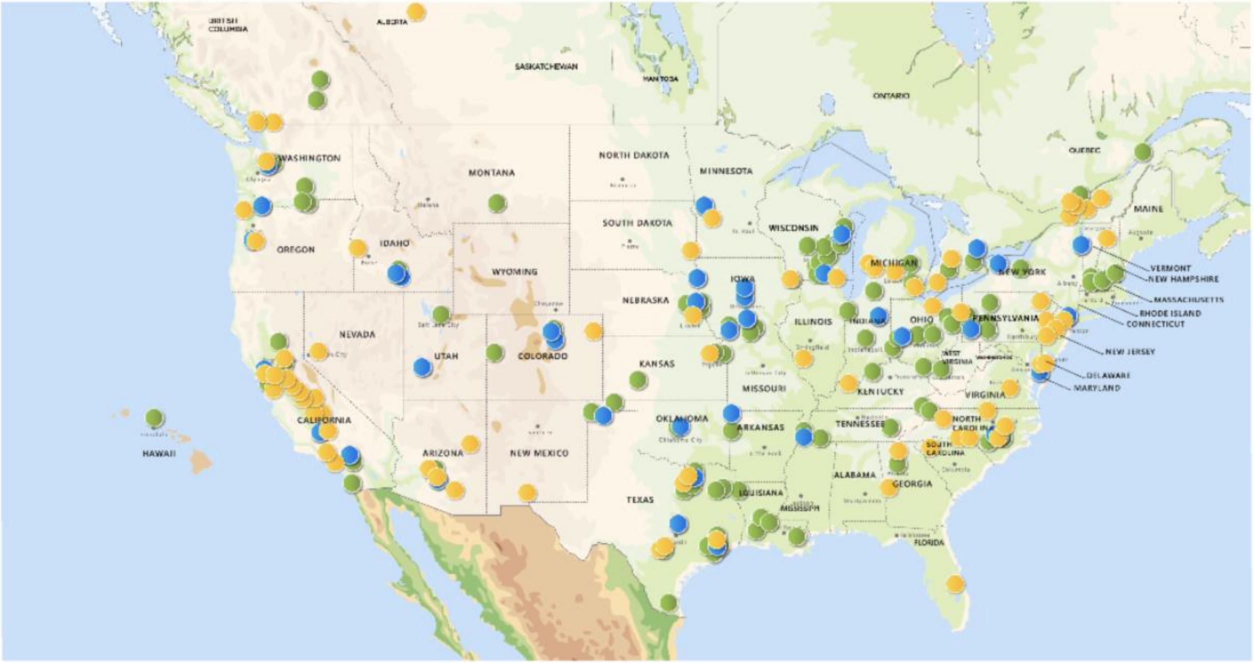
- RNG uses existing gas infrastructure for transportation, dispensing and consumption.
- Most commonly used in heating applications, to generate electricity, and as a transportation fuel.
- Interchangeable with conventional natural gas, providing pathway to decarbonization wherever energy demand exists.

Renewable Natural Gas

RNG ECONOMIC BENEFITS

- The RNG industry has experienced unprecedented growth in recent years.
- 129+ operational RNG facilities in N. America
- Additional 110 RNG facilities under construction or in substantial development.
- RNG has the potential to create millions in capital investment per project and thousands of jobs.

RNG PRODUCTION FACILITIES
IN NORTH AMERICA



129 OPERATIONAL/ONLINE (U.S. - 118, CANADA - 11)

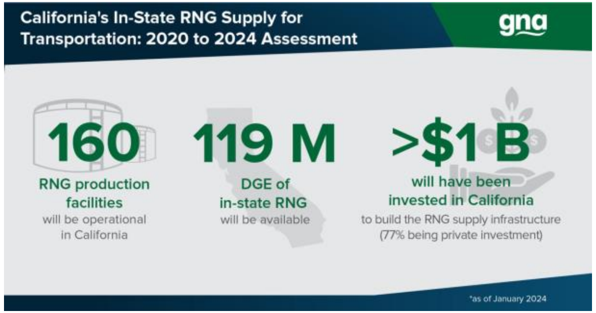
35 UNDER CONSTRUCTION (U.S. - 34, CANADA - 1)

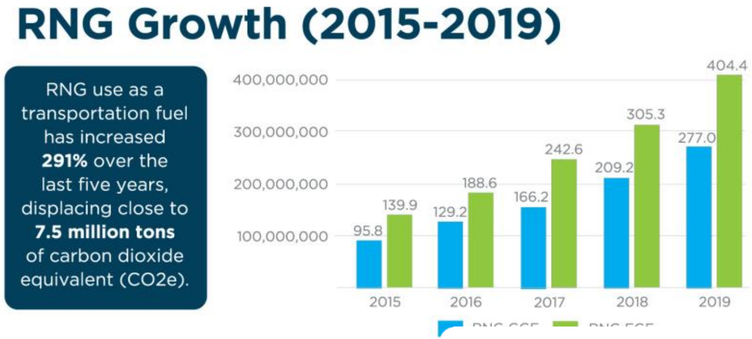
75 IN SUBSTANTIAL DEVELOPMENT (U.S. - 64, CANADA - 11)

THE COALITION FOR RENEWABLE NATURAL GAS

RNG Demand

GROWING DEMAND





UPS commits to largest purchase of 'renewable natural gas' ever in U.S.

May 22, 2019, 10:13am EDT

L'Oréal USA to Achieve Carbon Neutrality by Purchasing RNG

VGS Renewable Natural Gas

Dominion Energy **Dominion, Smithfield invest $500 million in RNG projects**

SoCalGas A Sempra Energy utility

SoCalGas seeks to offer RNG to customers

RNG Plant Will Bring Middlebury Close to Carbon Neutrality

Middlebury College

Could Renewable Natural Gas Be the Next Big Thing in Green Energy?

For decades, small-scale biogas systems have collected methane from landfills, sewage plants, and farms. Now, in Europe and the U.S., the growth of this renewable form of natural gas is taking off as businesses capture large amounts of methane from manure, food waste, and other sources.

BY JONATHAN MINGLE · JULY 25, 2019

Renewable Natural Gas

RNG - PART OF THE SOLUTION

We need a diverse portfolio of solutions to address environmental challenges like decarbonization

RNG is one important part of the solution

- Provide local and renewable supply of gas
- Enhance system flexibility
- Embrace environmental sustainability
- Allows customers to make an impact
- All without new pipeline

Coronavirus Impact

NOW MORE THAN EVER

- Pandemic impacting global food system

- Spotlighting need to expand local food system and upgrade infrastructure.

- The project will directly help by:
  - Expanding local food production
  - Improving food security and nutrition
  - Reducing climate change impacts
  - Creating jobs in underserved communities

Exciting News

$10M CHICAGO PRIZE RECIPIENT!!

Exciting News

GOV PRITZKER ANNOUNCEMENT

SCIENCE & NATURE

State Kicks in $2M to Transform South Side Brownfield Into Hub for Green Innovation

Patty Wetli | August 7, 2020 3:49 pm

A $2 million investment from the state pushed funding for an urban farming campus over the top, paving the way for Friday's groundbreaking. (Illinois Department of Commerce and Economic Opportunity / Twitter)

Thank You!

QUESTIONS?

PANEL 2

Cristina Negri
Director
Environmental Science (EVS) Division
Argonne National Labs

THE MULTIPLE VALUES OF BIOENERGY CROPS IN THE MIDWEST

Renewable Energy Technologies on the Horizon

National Association of Regulatory Utility Commissioners Webinar

August 20, 2020

Cristina Negri,*
John Quinn, Jules Cacho, Colleen Zumpf, Shruti Khadka Mishra
Argonne National Laboratory

*negri@anl.gov

ARGONNE IS A VITAL PART OF THE DEPARTMENT OF ENERGY NATIONAL LABORATORY SYSTEM

ARGONNE'S ENVIRONMENTAL SCIENCE DIVISION

COMPUTING, ENVIRONMENT AND LIFE SCIENCES DIRECTORATE

EARTH SYSTEMS

We advocate Earth systems science and climate science, and we improve our understanding of climate risk and resiliency and better understand the effects of climate risks on natural and managed systems, energy availability, human livelihood, and biodiversity.

ENERGY AND ENVIRONMENTAL IMPACTS

We understand and predict the interactions between energy systems and other human activities and ecosystems. We also provide science-based solutions to mitigate unwanted impacts.

RESPONSIBLE INNOVATION

We drive new discoveries and use of natural resources toward responsible outcomes. We embed our scientific knowledge of environmental systems into the design of new materials and processes to preempt unwanted impacts on the environment and to improve our natural capital.

ASKING DIFFERENT KINDS OF QUESTIONS

Responsible innovation: **“taking care of the future through collective stewardship of science and innovation in the present”***

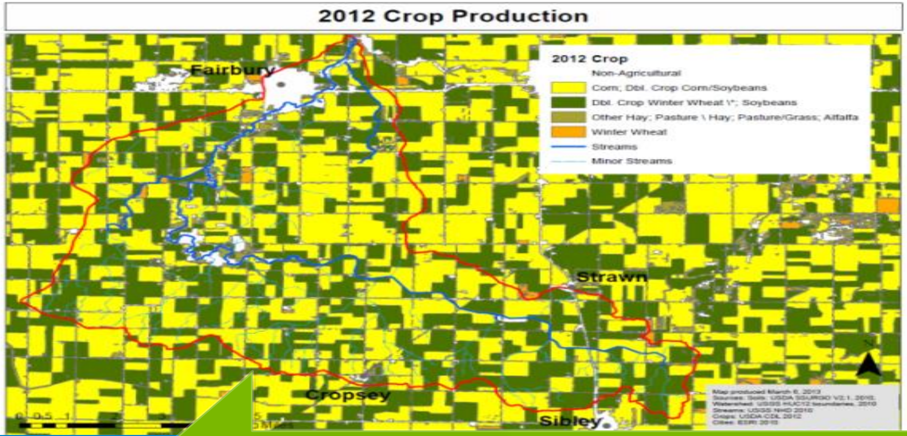
Don’t ask what the impacts will be, but design from the start for the enhancement of our natural capital and human wellbeing.

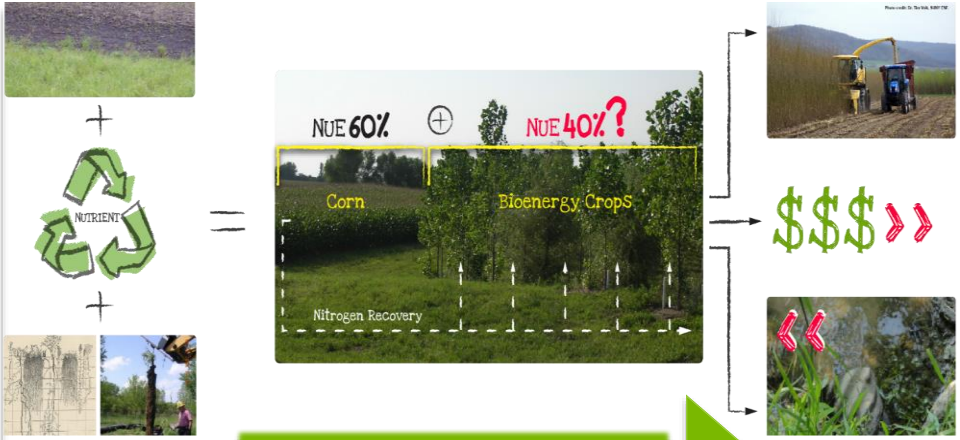
*Stilgoe, Owen, and MacNaghten. https://spectrum.ieee.org/tech-talk/at-work/innovation/what-does-responsible-innovation-mean

CHALLENGES TO THE EXISTING AGRICULTURAL LANDSCAPE

- Corn prices are fluctuating – so is rural livelihood
- What will happen when cars will be all electric??
  - New markets for corn and ethanol from corn?
- Environmental problems
  - Exporting trouble to the Gulf of Mexico, and impairing our water
- The dichotomy between economics and environment need not be

RETHINKING THE AGRICULTURAL LANDSCAPE
TO ENHANCE ECOSYSTEM SERVICES





Evaluating damage

Preventing damage

Enhancing natural capital and human wellbeing

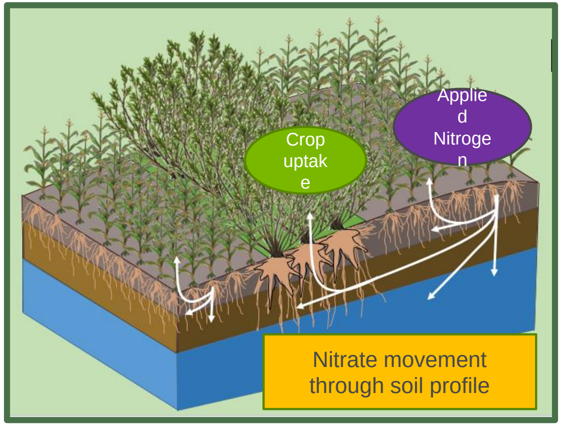
Current landscape focused on providing:

- One *provisioning* service: yields, profit.
- *Regulating* services not factored in the economics, called externalities
- Conceptual focus is how to mitigate the impacts retroactively
- Non diversified business models concentrates risk

Landscape Design focused on providing:

- *Provisioning services* – optimize yields of food, feed, fiber, bioenergy, bioproducts
- *Regulating services*: water quality, habitat, C sequestration, GHG reduction, flood control, etc. are part of the design
- Economic models accounts for both
- Conceptual model focuses beyond mitigating impacts, on “how to design”
- Diversified business model distributes risk

LANDSCAPE DESIGN APPROACH



- Designing landscapes from the start to enhance natural capital and human wellbeing
- Taking a wholistic approach to landscape management
  - ✓ Production + Conservation
- How can we sustainably intensify productivity of current working agricultural lands?
- **One approach:**
  - ✓ Targeting marginal lands
  - ✓ Using perennial bioenergy crops
  - ✓ Strategic placement to increase benefits

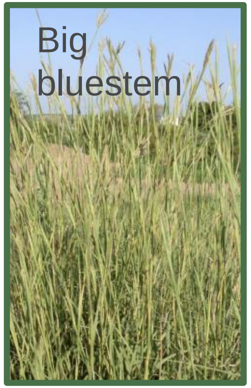
PERENNIAL BIOENERGY CROPS

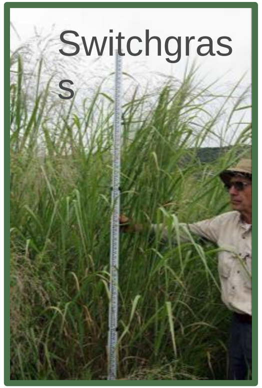
1. Greater tolerance to environmental stressors than annual grain (row) crops
   - ✓ Wet, dry, high salinity, low fertility, etc.

2. Lower nutrient and management requirements
   - ✓ Less fertilizer, chemicals, tillage
   - ✓ Rely on internal/local nutrient cycling

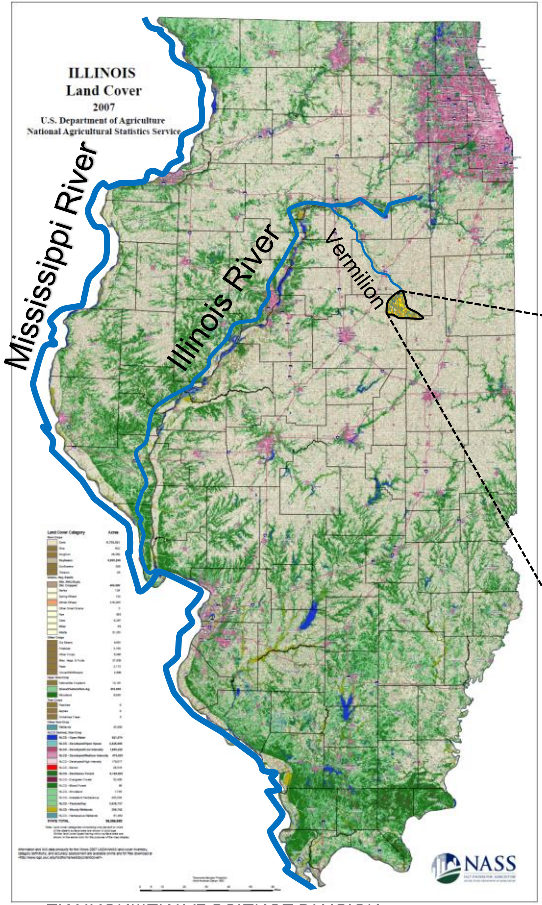
3. Provide ecosystem services
   - ✓ Water quality; GHGs; Biodiversity; Soil health; Carbon sequestration
     - ✓ Perennial (deep root systems, soil coverage, nutrient cycling)
     - ✓ Provide habitat heterogeneity

4. Provide benefits disproportionally greater than land area they occupy
   - ✓ Reduce impact on commodity crop production



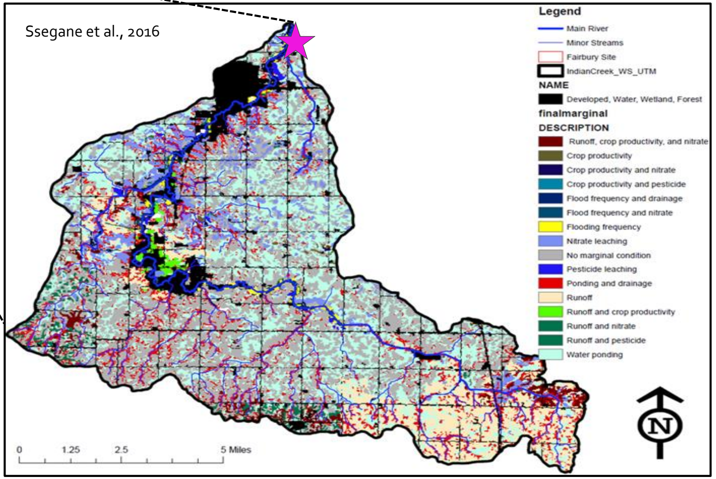


TARGETING MARGINAL LANDS



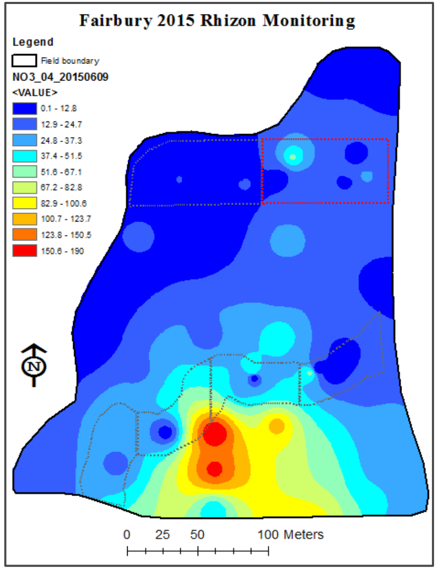
Indian Creek Watershed: Headwaters of Vermilion River (Central Illinois)

Soil drainage **Crop productivity index** **Surface water ponding**



Flooding frequency **Pesticide leaching** **Nitrate leaching**

Field Site: Fairbury, IL



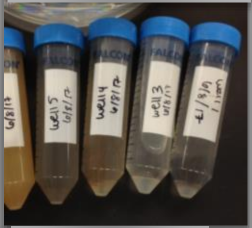
Argonne NATIONAL LABORATORY

WILLOWS REDUCED THE NITRATE-N

Nitrate Leaching

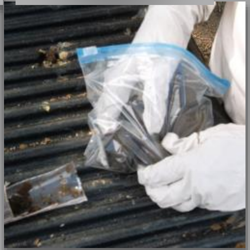
Surface Soil-Water

Groundwater

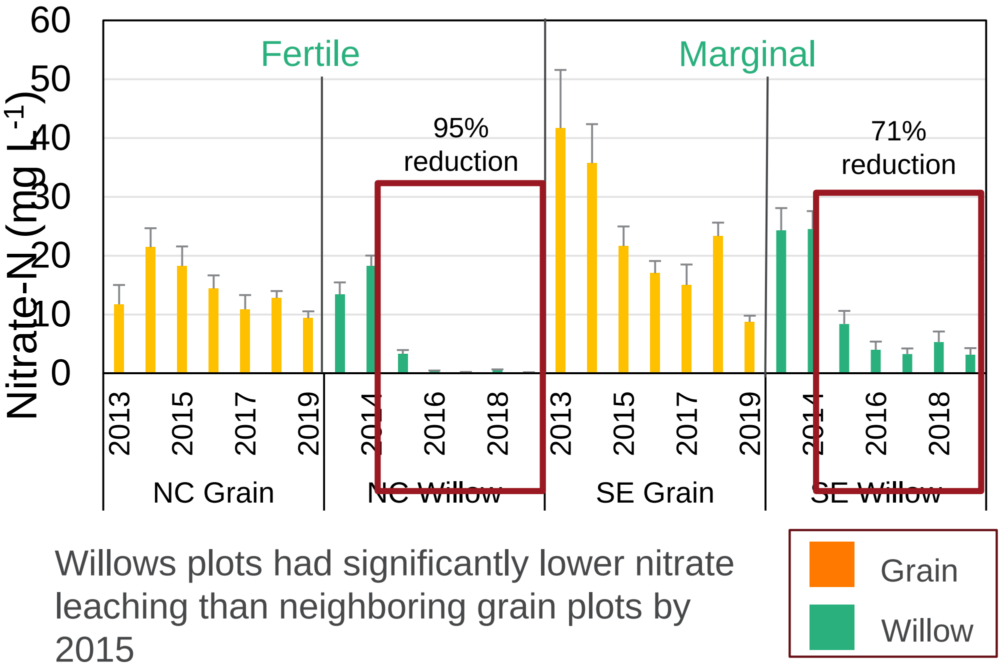


Subsurface Soil-Water

Soil



Seasonal Nitrate-N Concentration in Subsurface Water (150cm)

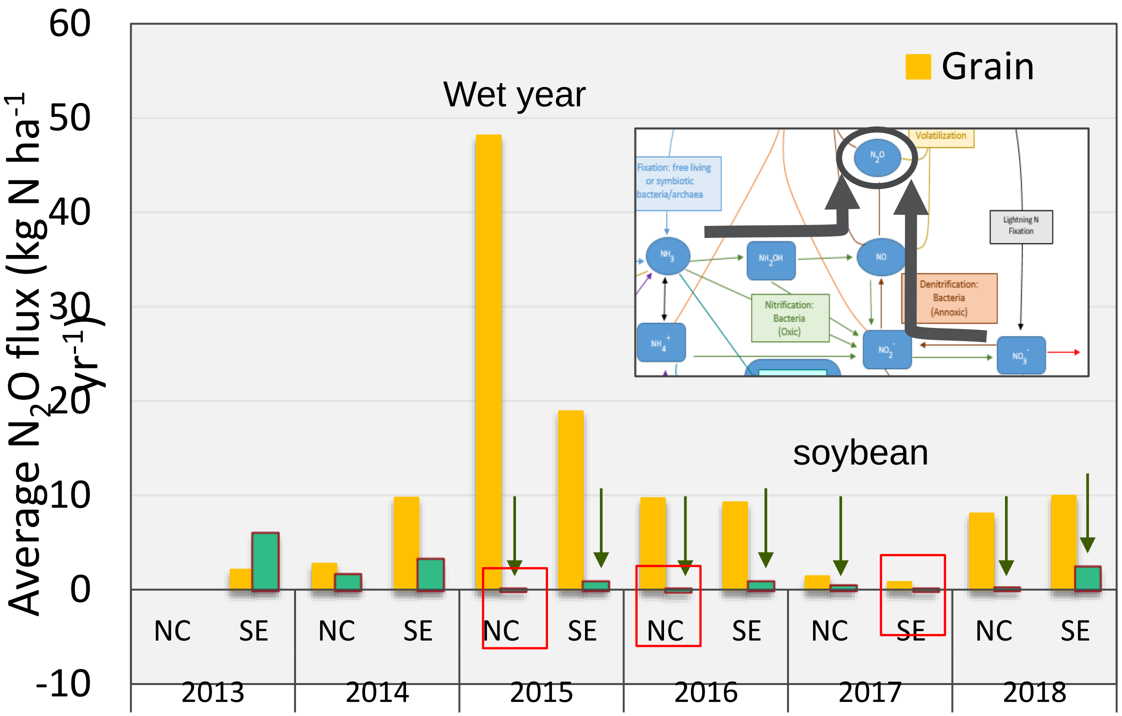


Willows plots had significantly lower nitrate leaching than neighboring grain plots by 2015

WILLOWS REDUCED NITROUS OXIDE EMISSIONS

Soil Respiration

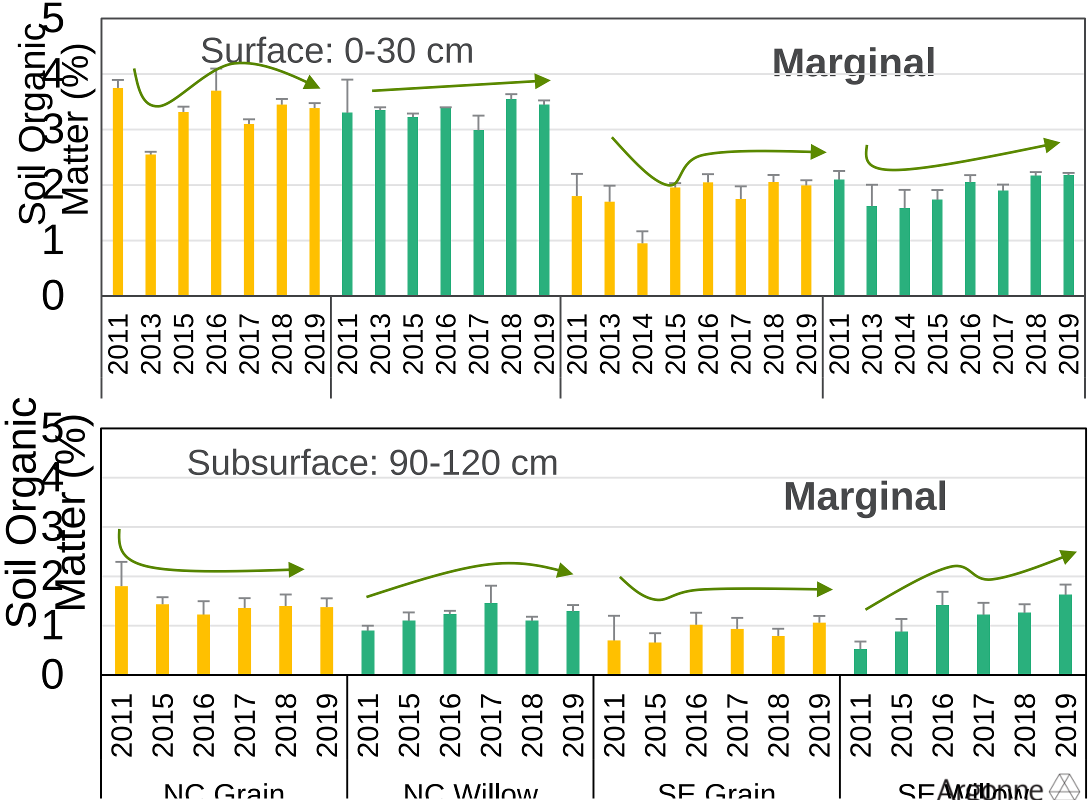
- Lower nitrate-N in the soil and soil water under willow also resulted in reductions in nitrous oxide emissions
- Negative flux means N_2O consumption (reduced to N_2)



WILLOWS INCREASED SOIL ORGANIC MATTER

Soil Nutrients

- SE willow plots show increasing trend in soil organic matter
- Leaf litter is estimated to return about 35 kg N ha^{-1} per season
- Fine root biomass is estimated to return around 2.7-3.6 Mg C ha^{-1} and 0.07 Mg N ha^{-1}
  - ✓ The lower C/N ratio of willow roots in the SE plots may explain the greater SOM build up

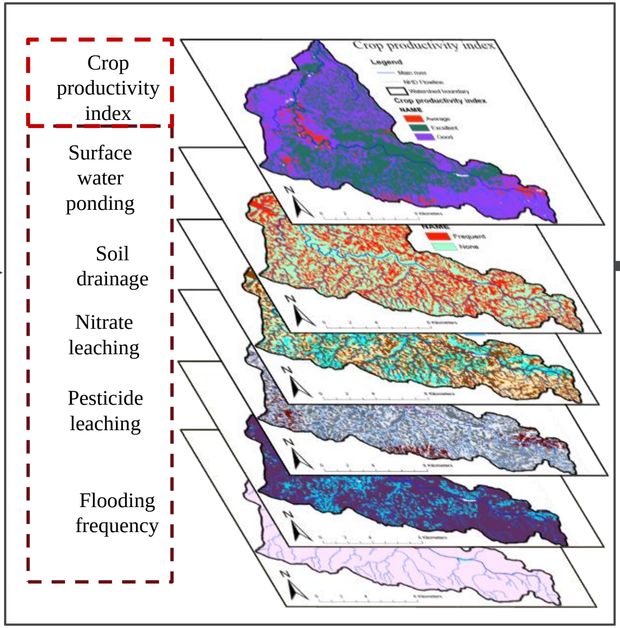


MARGINAL LAND DEFINITION AND CLASSIFICATION

Marginality = *f*(*economic*, *environmental*)

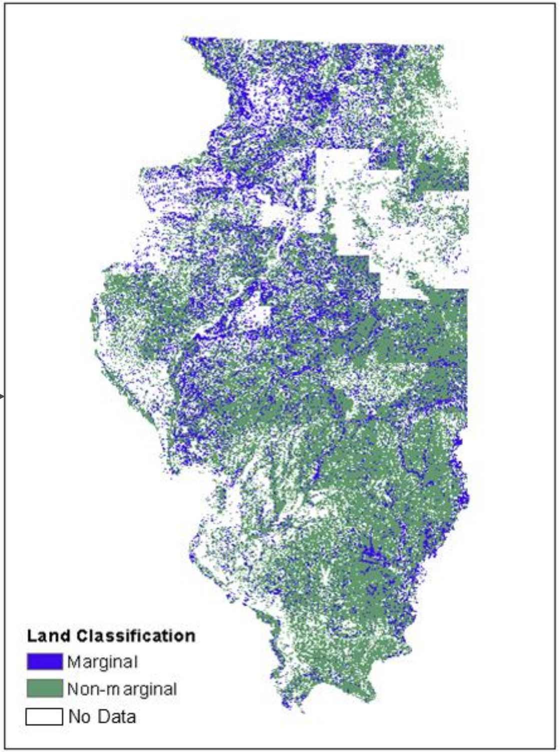
Sustainability metric	Classification	Marginality[a]
Crop productivity index	1. Excellent; CPI ≥ 133	0
	2. Good; CPI = 117 - 132	0
	3. Average; CPI = 100 - 116	1
	4. Fair; CPI < 100	1
Nitrate leaching	1. Very limited	0
	2. Somewhat limited	0
	3. Limited	0
	4. Moderate	1
	5. High	1
Pesticide leaching	1. Very limited	0
	2. Somewhat limited	0
	3. Limited	0
	4. Moderate	1
	5. High	1
Soil drainage	1. Poorly drained	1
	2. Well drained	0
	3. Somewhat poorly drained	1
	4. Moderately well drained	0
	5. No data	NoData [c]
	6. Very poorly drained	1
Frequency of water ponding	1. Rare	0
	2. Frequent	1
Frequency of flooding	1. Rare	0
	2. Frequent	1
Accelerated erosion	1. None	0
	2. Class 1	0
	3. Class 2	0
	4. No data	NoData [c]
	5. Class 3	1
Surface runoff	1. Negligible	0
	2. Low	0
	3. Medium	0
	4. High	1
	5. No data	NoData [c]
	6. Very low	0
	7. Very high	1

- **GIS-based multi-criteria decision analysis**
- **Data sources:**
  - USDA-NRCS: Soil Survey Geographic (SSURGO) database
  - USGS National Elevation Dataset
  - Peer-reviewed publications and technical reports



Ssegane and Negri (2016)

Illinois, USA Marginal Land Map



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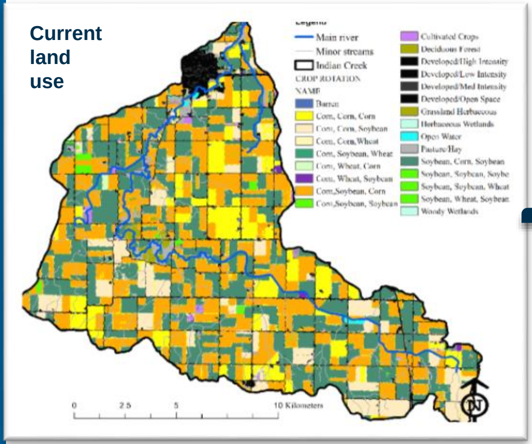
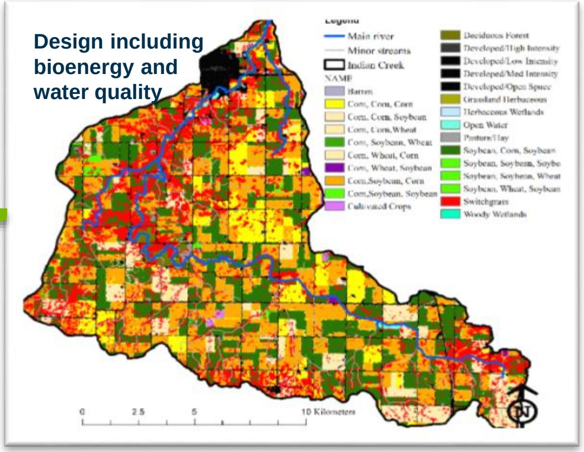
WATERSHED DESIGN INCREASES ES IN MARGINAL LAND

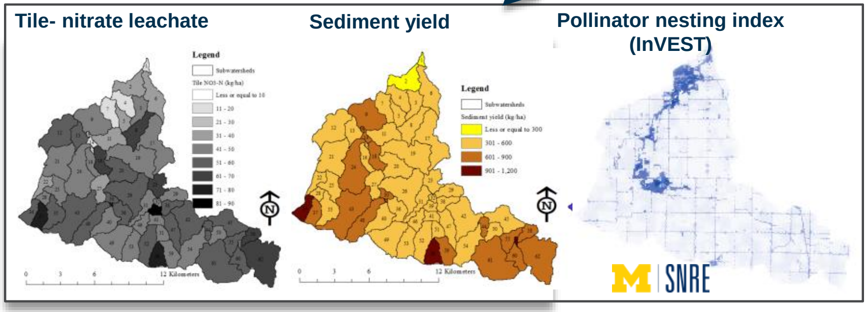


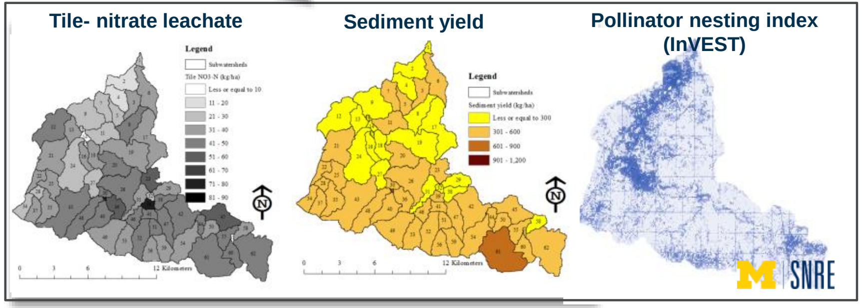
Biophysical models

SWAT[1]

InVest[2]



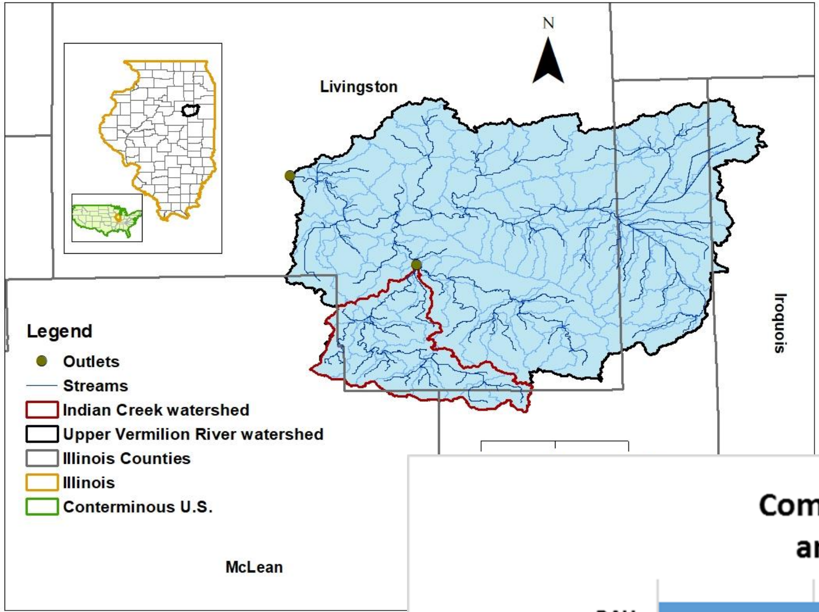




Ssegane et al. (2016)

[1]Soil and Water Assessment Tool (https://swat.tamu.edu/)

[2]Integrated Valuation of Ecosystem Services and Tradeoffs (https://naturalcapitalproject.stanford.edu/software/invest)

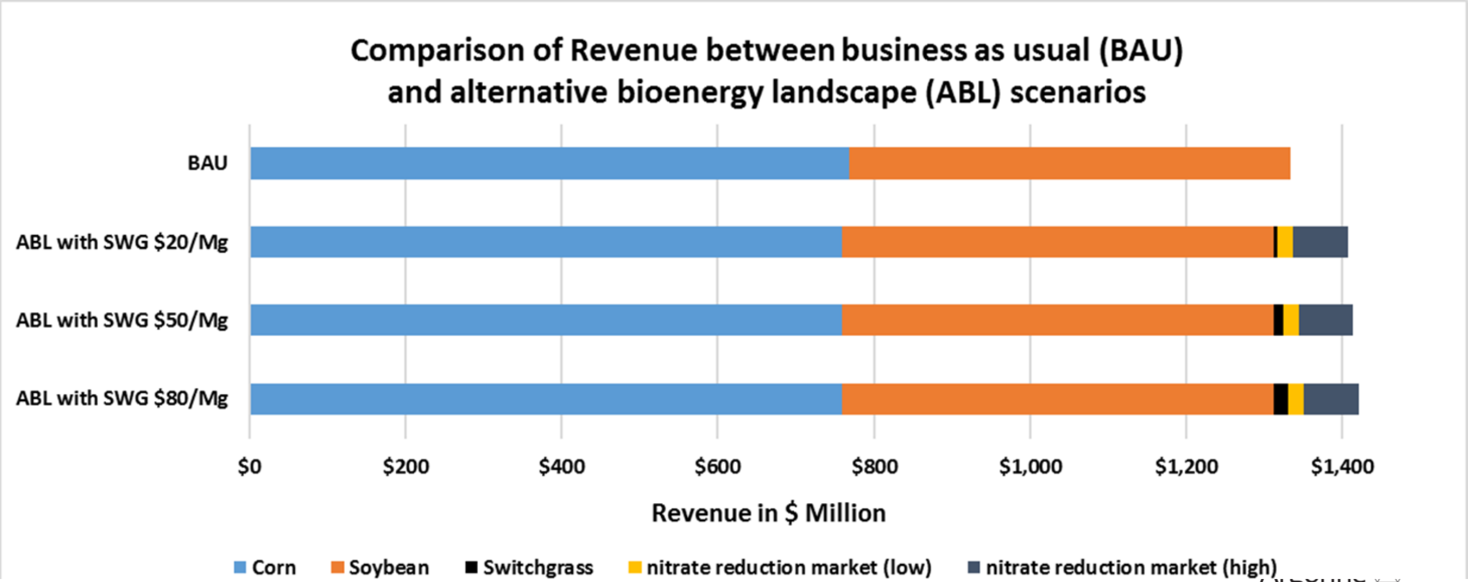


Water quality improvement

Biodiversity (pollinators, pheasants, deer)

Recreational benefits (parks,, bird watching)

Carbon Sequestration

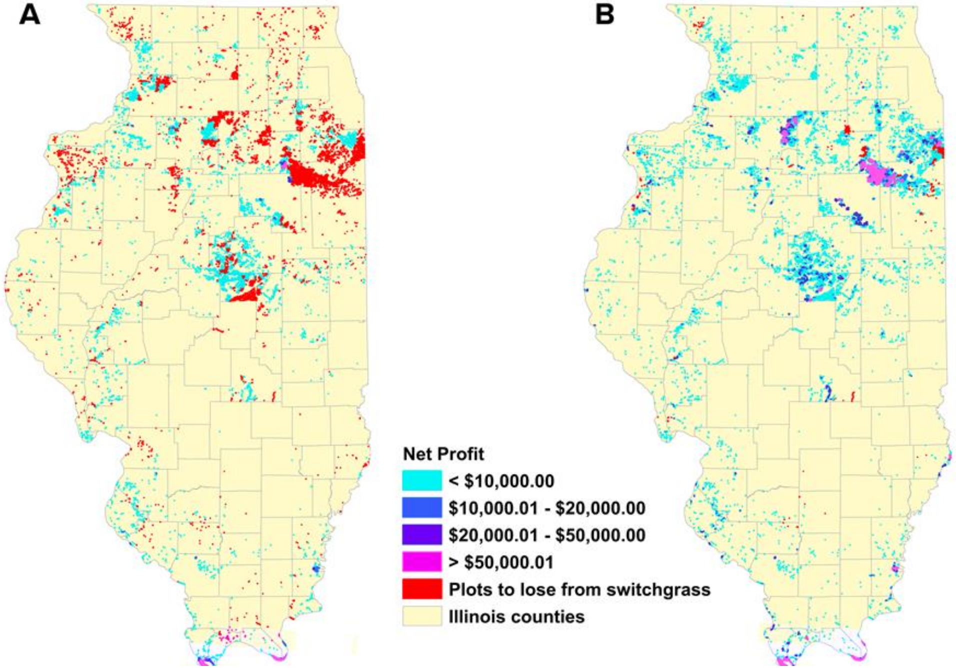


CARBON ECONOMICS OF BIOENERGY CROPS IN ILLINOIS

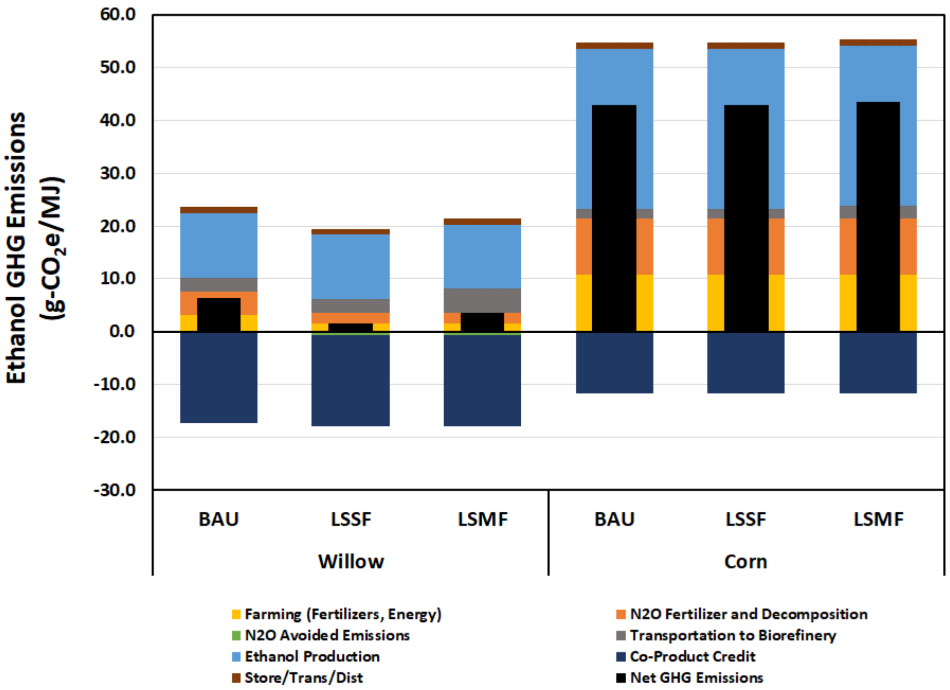
- Total marginal land in the state of Illinois - 2 million ha.
- Out of 1.3 million ha of marginal land >10 ha plots, corn or soy is grown in 0.7 million ha.
- Replacing the corn and soy by switchgrass can produce a total of 9 million metric tons (MT) of biomass.
- The quantity of production and distribution across the state ranges from less than 100 MT per plot of marginal land to 20,000 MT per plots.

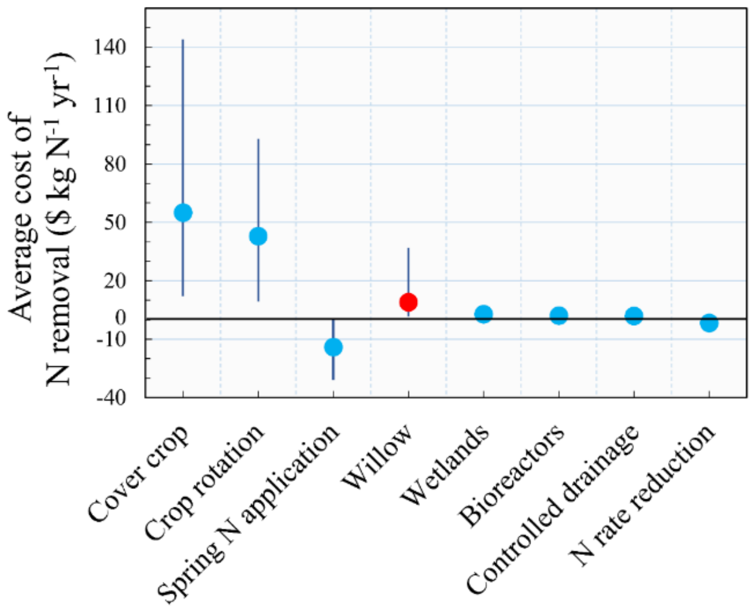
By converting the row crops in marginal land to switchgrass,

1. Carbon can be sequestered at a range of 15 to 30 Mg/ha.
2. Potential for total carbon sequestration is estimated at 18 million Mg in marginal lands of Illinois.



LIFECYCLE ANALYSIS, COST OF N REMOVAL



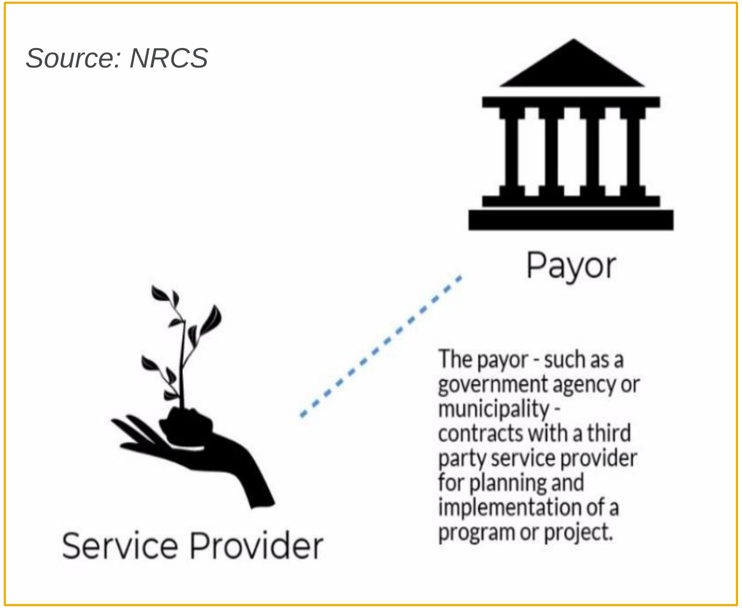


Net GHG emissions from producing willow on marginal land were much less than those from producing corn on that land. Most of the benefit is due to less fertilizer, energy, agrichemicals in willow plots.

Average cost of nitrogen removal by willow (short-rotation woody crop) is comparable to other conservation methods.

ANY CHANCES IT COULD HAPPEN?

PRIVATE- PUBLIC MECHANISMS FOR ECOSYSTEM SERVICES PAYMENT



NRCS - Pay for Success

- i2 Capital's project, with The Nature Conservancy, Quantified Ventures, and other partners in the Brandywine-Christina watershed (Delaware, Maryland, and Pennsylvania).
- American Rivers - in partnership with Environmental Defense Fund and other non-profits, agencies, and utilities - created the Central Valley Habitat Exchange.
- Ohio River Basin Interstate Water Quality Trading Project (funded by EPRI)
- Fox River Valley Phosphorus Trading Program Fox-Wolf Watershed Alliance, Brown County, Outagamie County Land Conservation Department, the Wisconsin Department of Natural Resources, Great Lakes Commission, and the USDA NRCS.

http://nrcs.maps.arcgis.com/apps/Cascade/index.html?appid=769a0ef44b1b4d7b85d6e02c0ba7630d

IMPLICATIONS FOR RURAL ECONOMIES

- How to leverage this work to attract biorefineries?
  - Easing costs for biomass
- Enabling farmers to be energy and environmental entrepreneurs
  - Recognizing a value and a service
- Linking to the need to deliver for Gulf Hypoxia task force
- Setting up trading systems will be important
    - Carbon (power utilities?)
    - Nutrients (water reclamation utilities?)
    - Other ecosystem services

PROJECT WEBSITE

Showcase of past project work products, updated with new material

- https://web.evs.anl.gov/bioenergy/

THANK YOU !

Acknowledgements

- Herbert Ssegane, Jules Cacho, Patty Campbell, Colleen Zumpf, John Quinn, Nora Grasse, Shruti Mishra, Yuki Hamada, Andy Ayers, Jim Kuiper, Lee Walston, Pam Richmond, Argonne National Laboratory
- The many students who help us every summer in the field
- John Graham and Joan Nassauer, University of Michigan
- Silvia Secchi and Justin Kozak, Southern Illinois University
- DK Lee, University of Illinois
- Kristen Johnson and Alicia Lindauer, DOE-BETO
- Paul Kilgus and Ray Popejoy, Fairbury IL
- The Livingston County IL SWCD and NRCS

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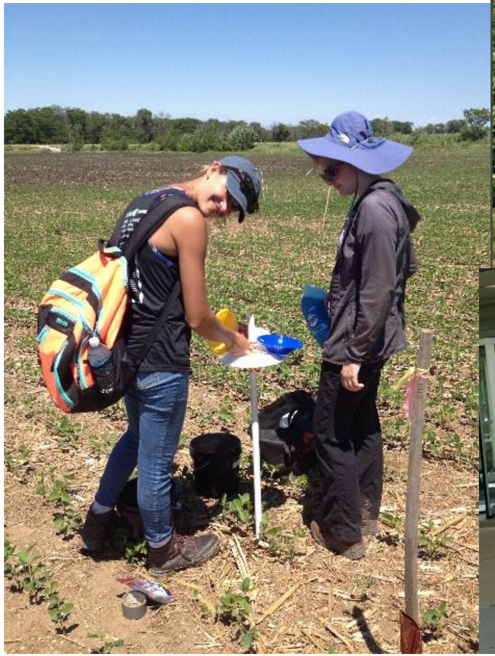


Recent summer interns

QUESTIONS?

PANEL 3

Ufuk Erdal

Senior Vice President
Water Reuse National
Technology Director

ARCADIS Design & Consultancy for natural and built assets

DIRECT POTABLE REUSE

A New Approach to Water Management

August 20 ,2020

Outline

1 Why Water Reuse?

2 Water Reuse Types

3 Potable Reuse Definition and Types

4 Case for Direct Potable Reuse

5 Challenges and Implementation Considerations in Potable Reuse Projects

6 Final Remarks

Why Water Reuse?

- **WATER IS A FINITE PRECIOUS RESOURCE** Although 72% of the Earth's surface is covered with water, less than 2% of this water is suitable for human consumption
- **GROWING POPULATION** in urban areas is resulted in increased water demand by human consumption and industries
  – current supplies cannot meet future demand in most urban areas

Why Water Reuse?

WATER SHORTAGES and PROLONGED DROUGHTS have dramatically increased in recent decades

- Likely to become more frequent and more severe in the future.

- **MORE FREQUENT AND PROLONGED RED TIDE AND ALGAE BLOOMS** due to discharge of treated wastewater containing nutrients and increased water temperatures

Why Water Reuse?

DEPLETED GROUNDWATER DUE TO DROUGHT OR EXCESSIVE WITHDRAWN

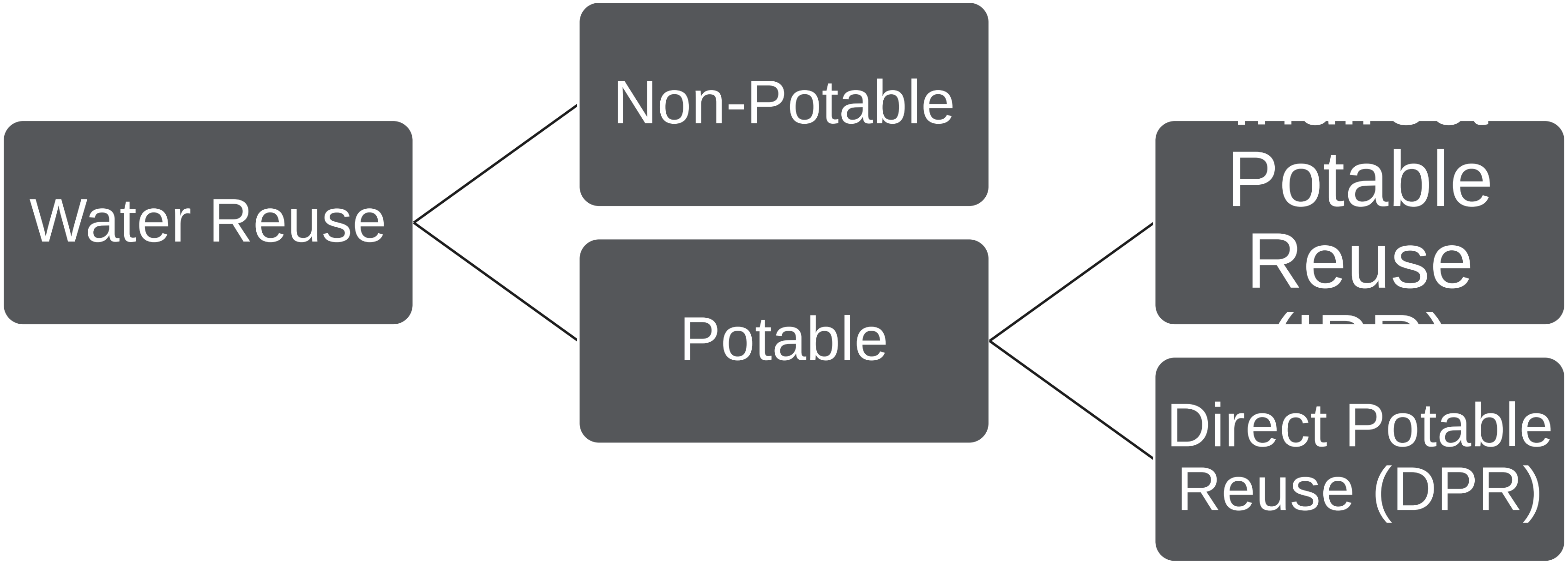
- Seawater intrusion and water quality issues
- Land subsidence
- Reduction of water in streams and lakes

Land Subsidence in Central Valley, CA
Picture Credits: Google.com

Why Water Reuse?

- Water reuse is an alternative water supply which is drought proof, locally controllable, sustainable and more affordable than conventional water sources
- Reduces or eliminates discharges to receiving bodies
- Reduces groundwater extraction
  - prevents seawater intrusion and land subsidence (groundwater recharge)
- Supports economy

Water Reuse Types – General Classification

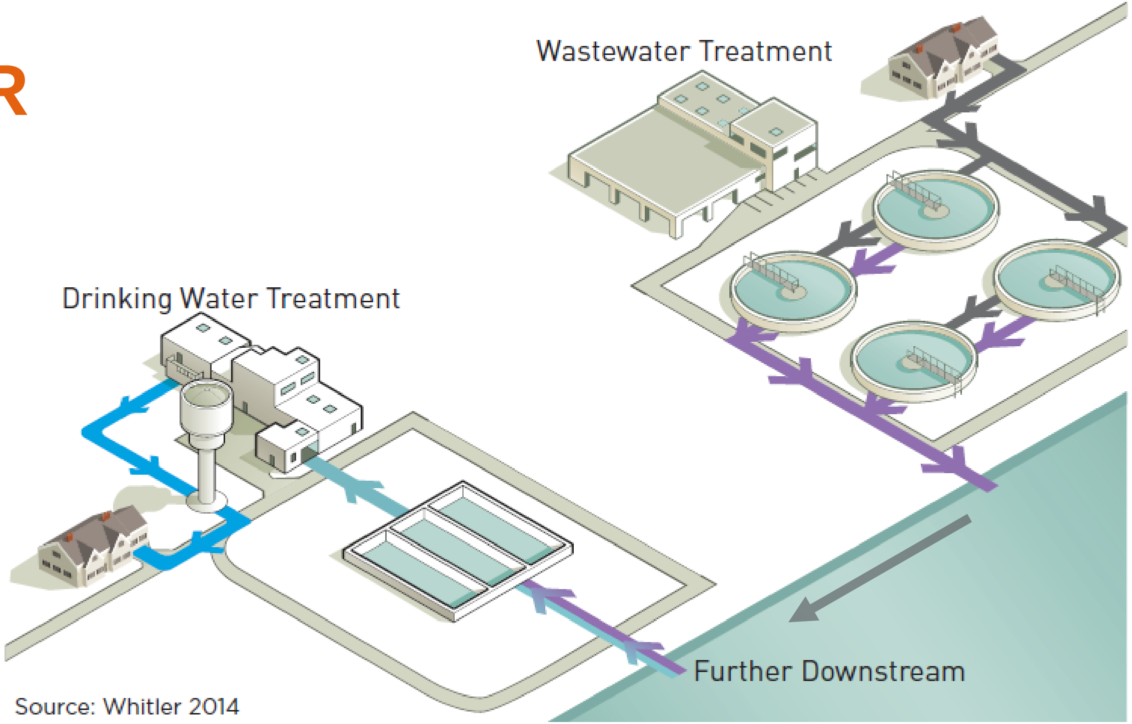


Potable Reuse Definition and Types

Indirect Potable Reuse (IPR)	Direct Potable Reuse (DPR)
Augmentation of a drinking water source (surface water or groundwater) with recycled water followed by an environmental buffer precedes drinking water treatment	Discharge of recycled water to a drinking water source of supply with the intended purpose of augmenting the potable supply without an environmental buffer that precedes drinking water treatment or water distribution system

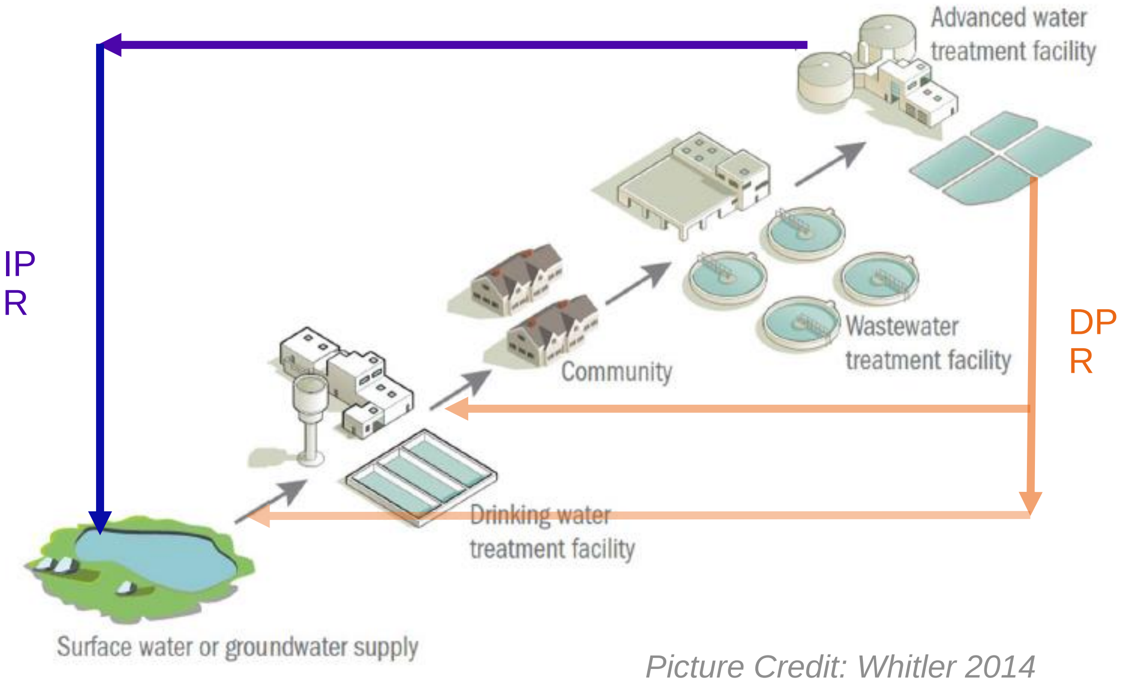
DE FACTO (UNPLANNED) IPR

- Has been a long practice
  - Many people do not recognize that their DW is supplied thru an unplanned IPR
- Large cities that draw their drinking water from rivers with numerous upstream wastewater discharges (e.g., Atlanta, Philadelphia, Houston, Cincinnati, New Orleans, etc.)



Source: Whitler 2014

Planned IPR and DPR



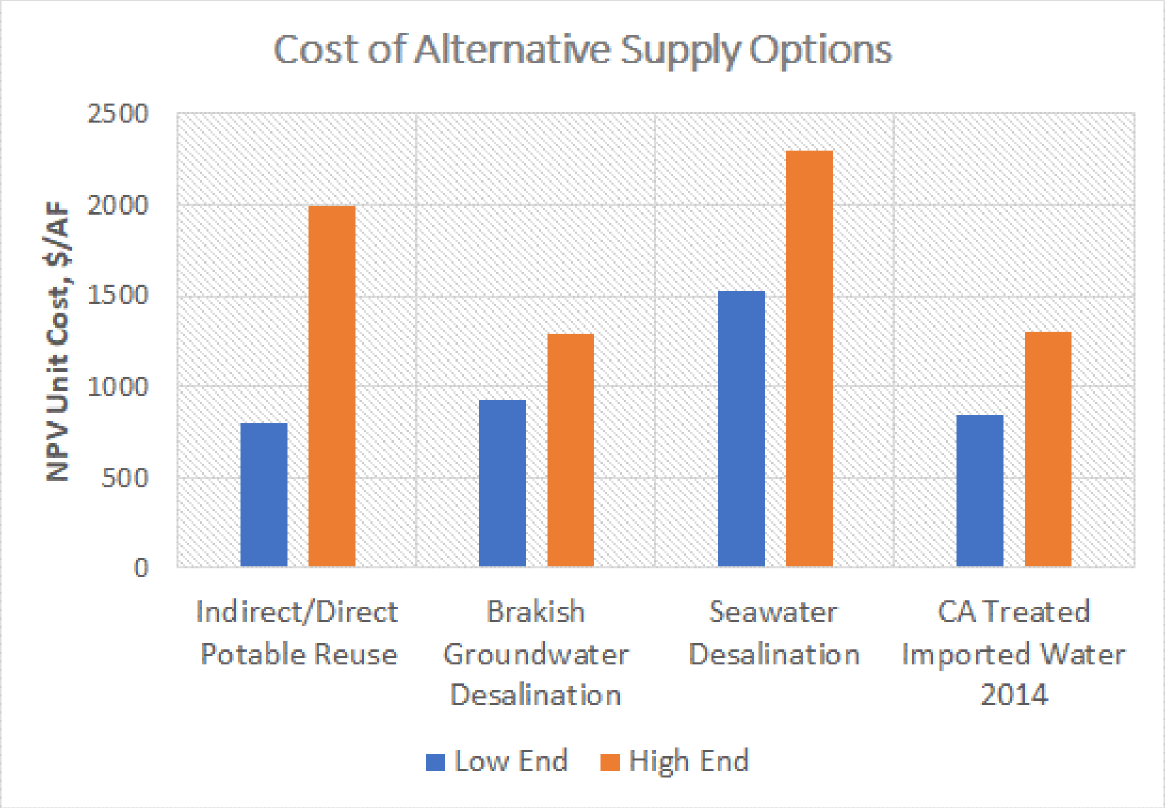
Picture Credit: Whitler 2014

Case for Potable Reuse

Potable Reuse Makes Sense

- Non potable reuse (NPR) demand is generally seasonal whereas potable reuse demand is year round
  - NPR is less sustainable with reduced environmental benefits
- NPR demands often are geographically separated by large distances
  - Significantly increases pumping and conveyance costs
- Public acceptance historically favored NPR over potable reuse. But it is changing with effective public outreach and education

Potable Reuse vs. Alternative Supply Costs



Adapted from WRF, 2014

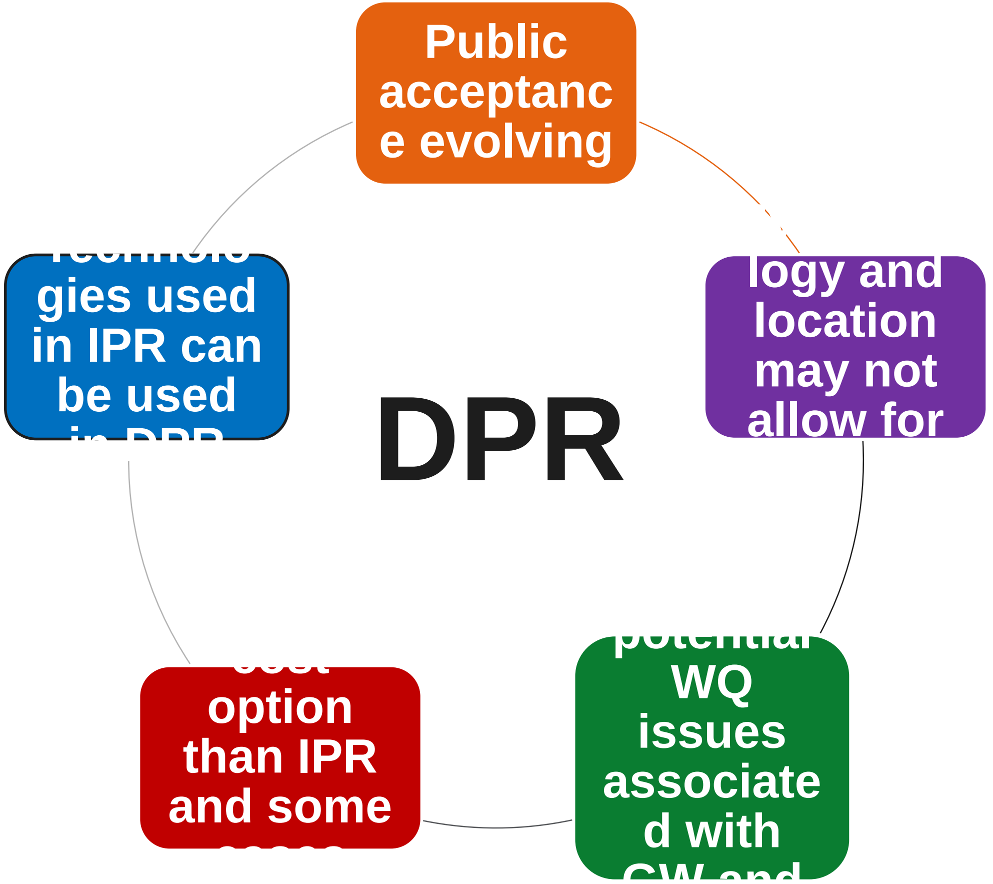
1AF ~0.329 MG

Energy Consumptions for Alternative Supply Sources

Technology/Water Source	Typical Energy Requirement, kWh/10^3 gal
Full Advanced Treatment (MF-RO-UVAOP) used in IPR and DPR (TDS=750-900 mg/L)	**3.30**
Brackish Water Desalination (TDS=5,000 mg/L)	3.8
Seawater Desalination (TDS=34,000-37,000 mg/L)	12.0
Bringing State Project Water (Bay Delta) to So-CAL	9.2
Bringing Colorado River Water to So-CAL	6.2

Adapted from WRF 2012

DPR is Not a New Concept but Getting Traction in TX, FL, CA, AZ and Beyond



DPR Project Examples and Benefits

Name	Year Completed	Cost	Benefits
Goreangab Treatment Plant City of Windhoek, Namibia	1968 1997 (Upgrade)	Unknown $650-900/AF (projected)	Provides safe and reliable water for 200,000 people
Water Recycling System International Space Station	2000 2014 (Upgrade)	Not disclosed	Generates potable water for 7 astronauts, otherwise only 3 can serve at the station
Big Spring Raw Water Production Facility Colorado River Municipal Water District, TX	2013	$750-850/AF	Provides safe and reliable supply to ease impact of the prolong drought
Emergency Direct Potable Reuse Facility Wichita Falls Water Utilities (TX)	2014	$750-850/AF	Provides a safe and reliable backup system

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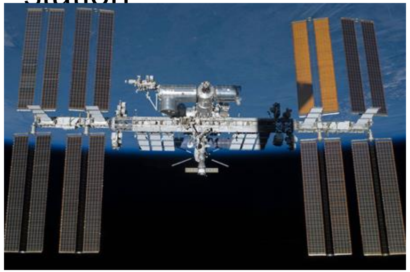
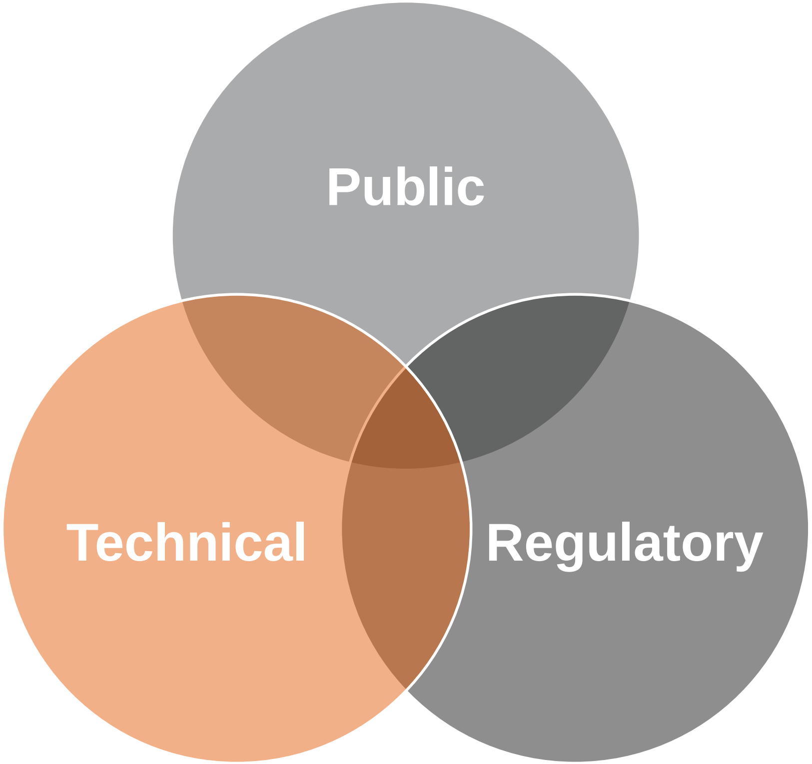
International Space Station

On April 22, 2015 NASA astronaut Scott Kelly tweeted " Recycle Good to the last drop! Making pee potable and turning it into coffee on @space station



Picture Credits: NASA

Challenges and Implementation Considerations in Direct Potable Reuse Projects



1. Public Perceptions and Acceptance

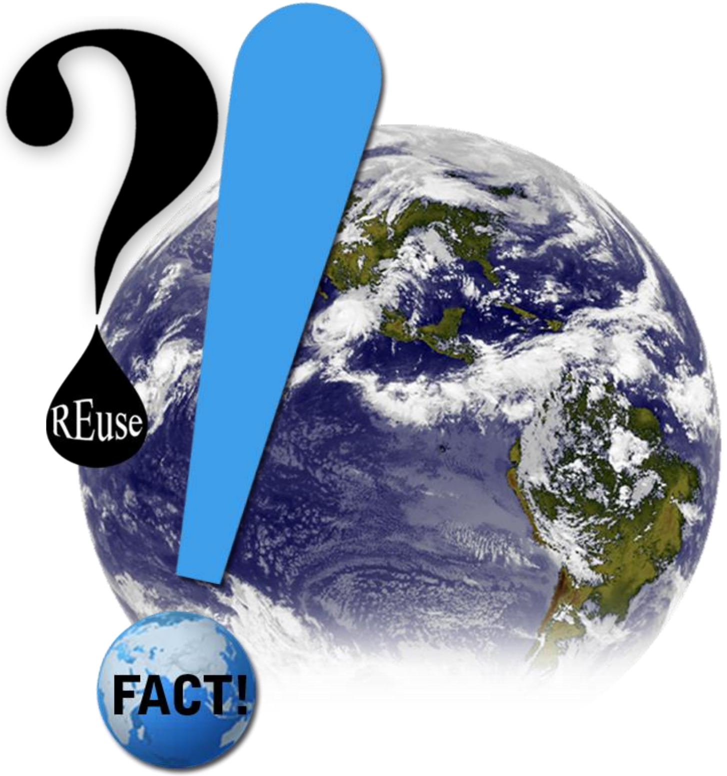
“We want to challenge
the perceptions of USA
women's football and one
day get full stadiums”
– NY Times 2016

Picture Credit: The Guardian, 2018

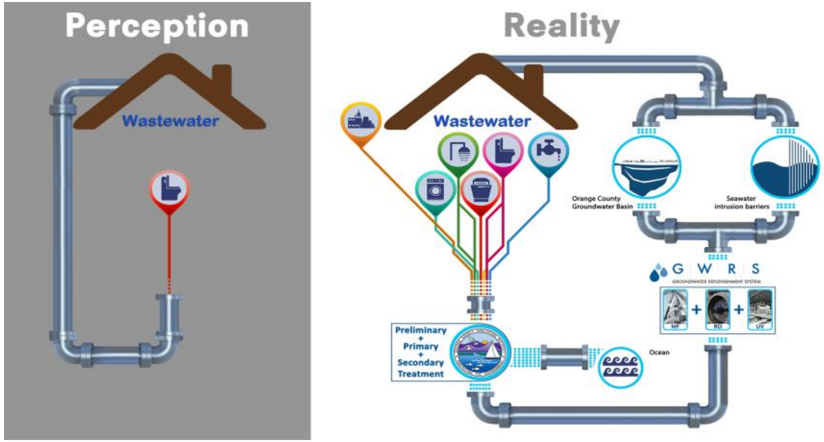
Public Education and Acceptance

If people understand that they are already living downstream, might they be OK with a water solution that includes planned potable reuse?

Linda MacPherson 2012



OCWD and San Diego Did It



www.ocwd.com

www.sandiegopurewater.com

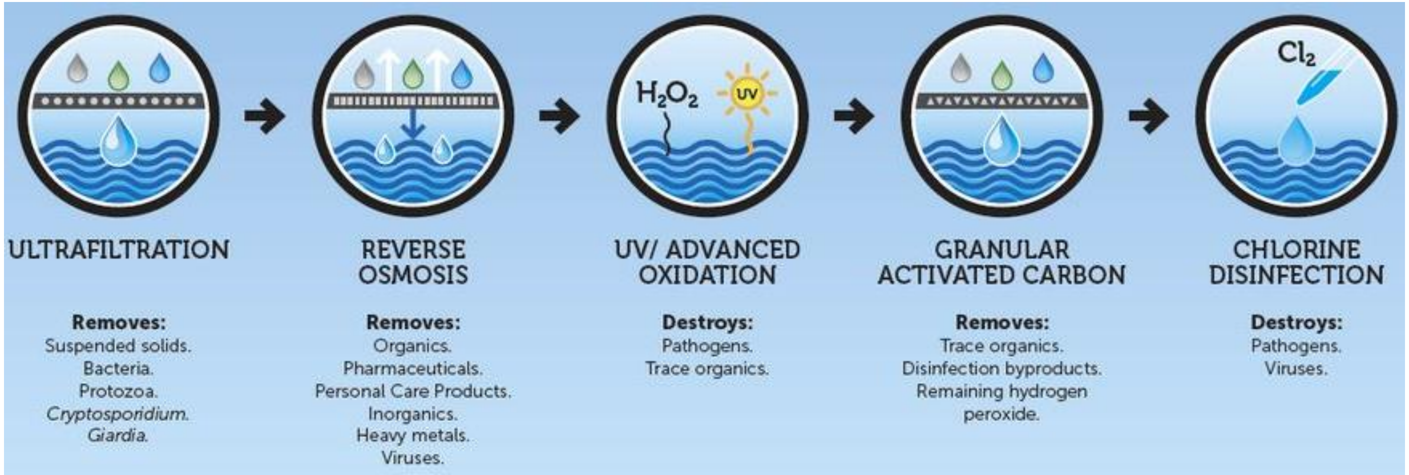
2. Regulatory Concerns

Pathogenic Organisms (Cryptosporidium, Giardia, Virus, Bacteria) — Acute Risk

Trace Organic Compounds or CECs (PFOA, PFOS, NDMA, 1,4 Dioxane, etc.) — Chronic Risk

Multi Barrier Approach Removes Pollutants and Address Regulatory and Public Concerns

Secondary
Or Tertiary
Effluent



Purified
Water

3. Technical Issues

- Cost
- RO Concentrate Treatment and/or Disposal
- Failure Response Time
- Critical Control Points
- Source Control

We can address all those challenges

Final Thoughts

- Recycled water is drought proof, locally available and sustainable alternative supply source
- Potable reuse has advantages over non potable reuse (e.g. non seasonal, superior environmental benefits)
- DPR costs are compatible with conventional sources
- Biggest challenge with DPR is to overcome public perception
  - A sophisticated public outreach can overcome this hurdle
  - Effective source control and enhanced process control and monitoring improve reliability

REMEMBER:

- All water is used and reused again and again
- The water we drink has been around for million years

Linda MacPherson 2012

Thank you!

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QUESTIONS?

1. Use the Question box

2. Direct your question to Panelist by name

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