



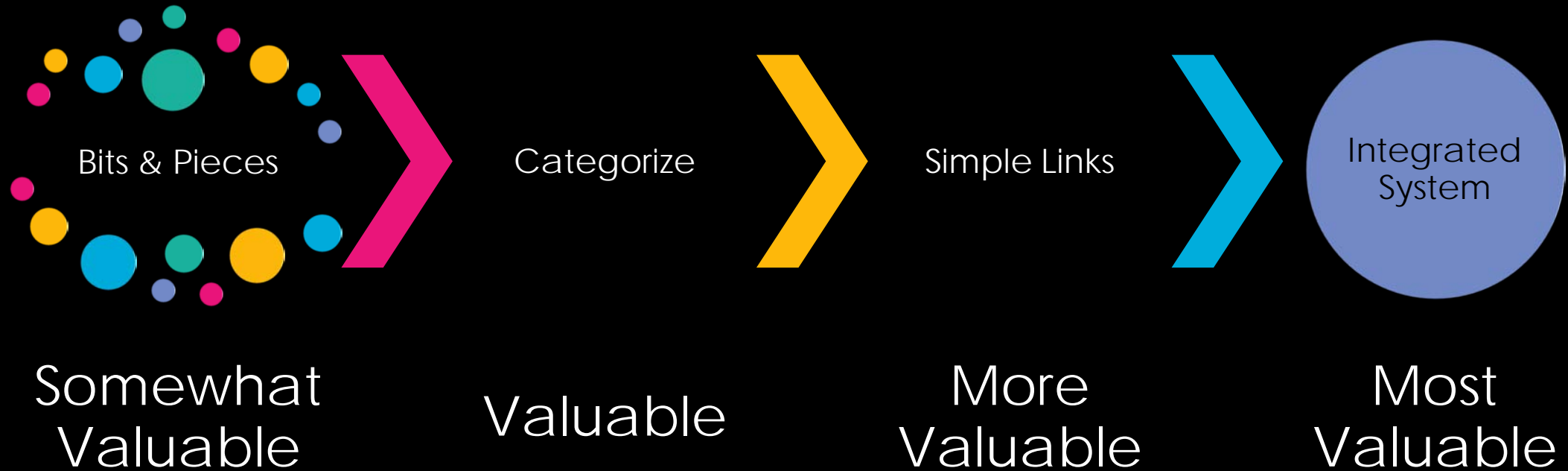
# Innovative Tools to Optimize Fluids Management in the Shale Oil & Gas Industry

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# Why do we need Systems?



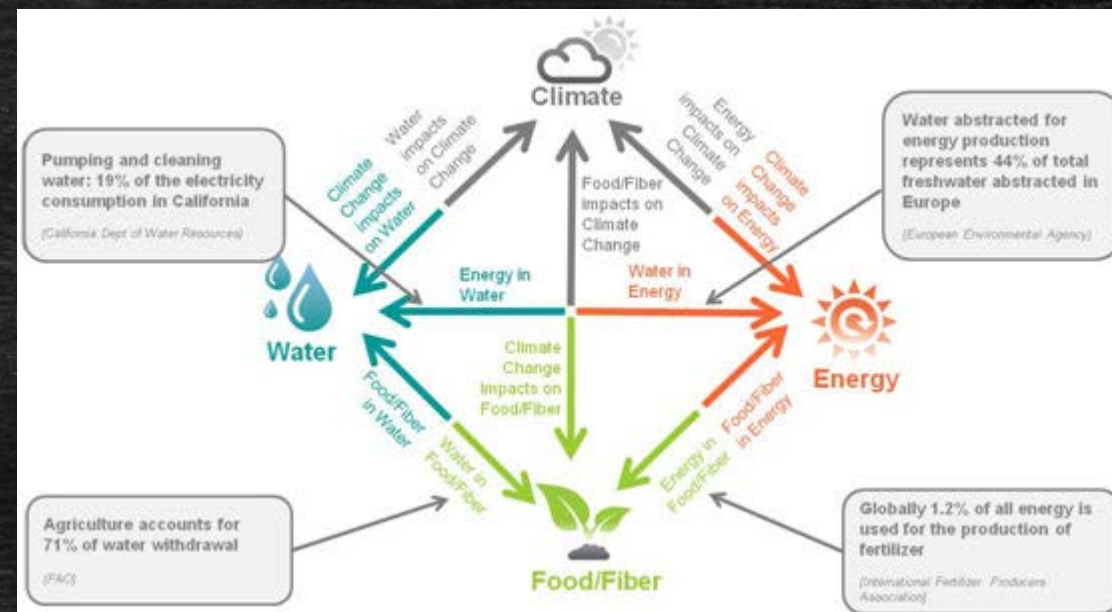
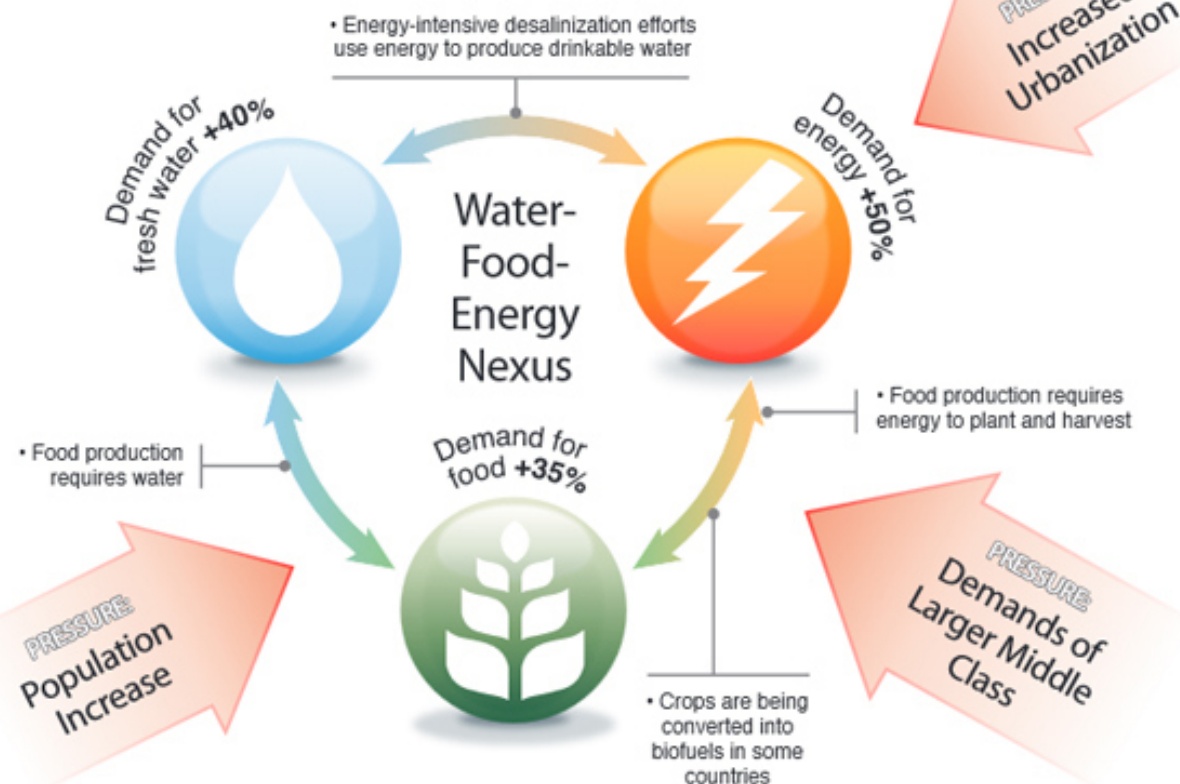


# FEW Nexus

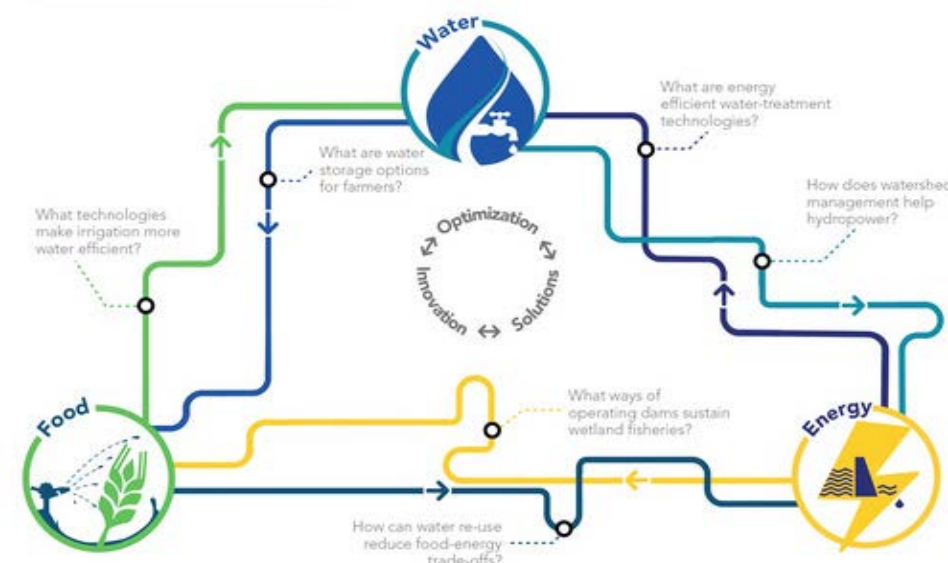
As population grows, pressures mount

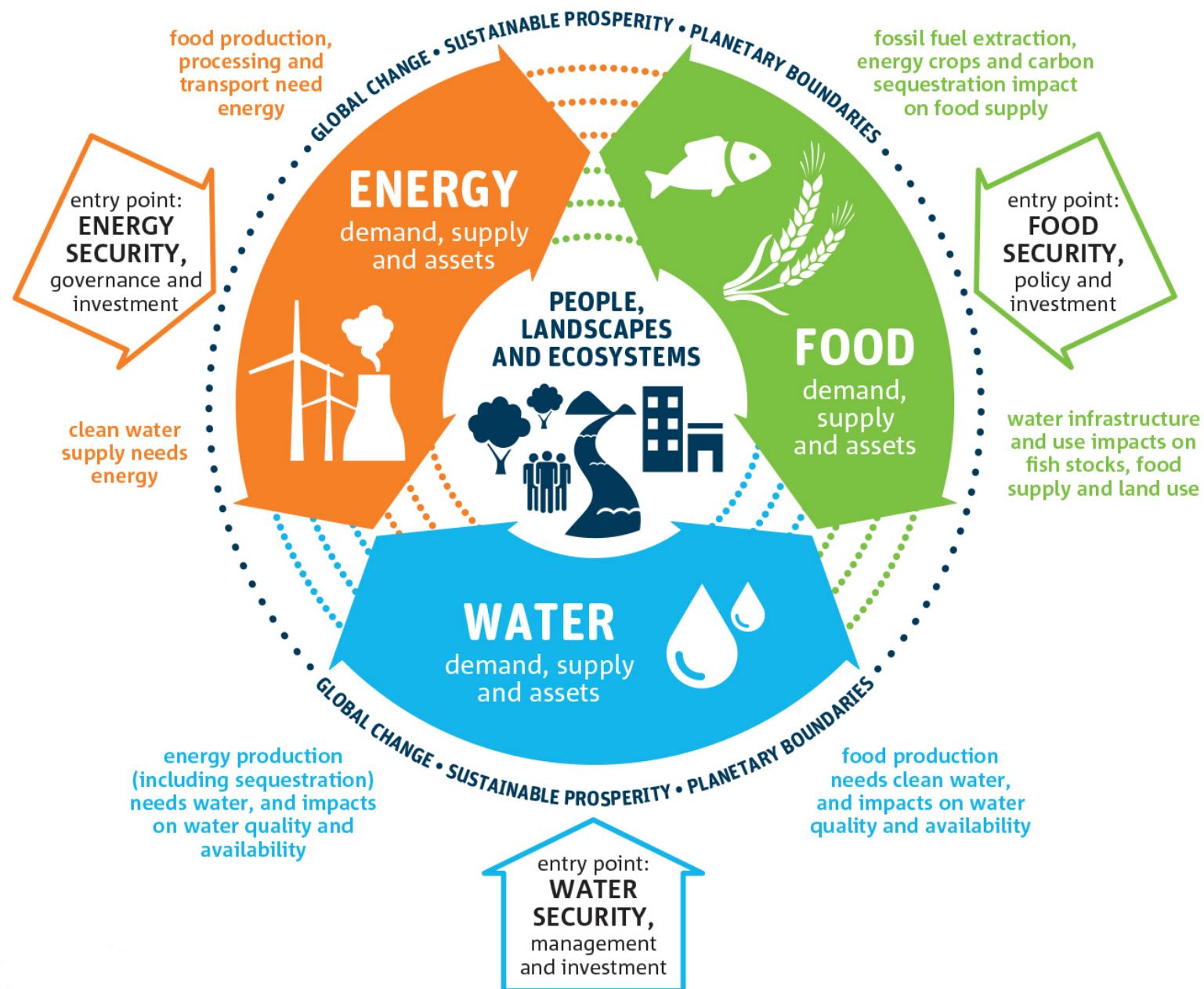
And the relationships between food, water, and energy supplies become critical

Because of growth in global population and the consumption patterns of an expanding middle class, in less than two decades three key demands will sharply increase ...



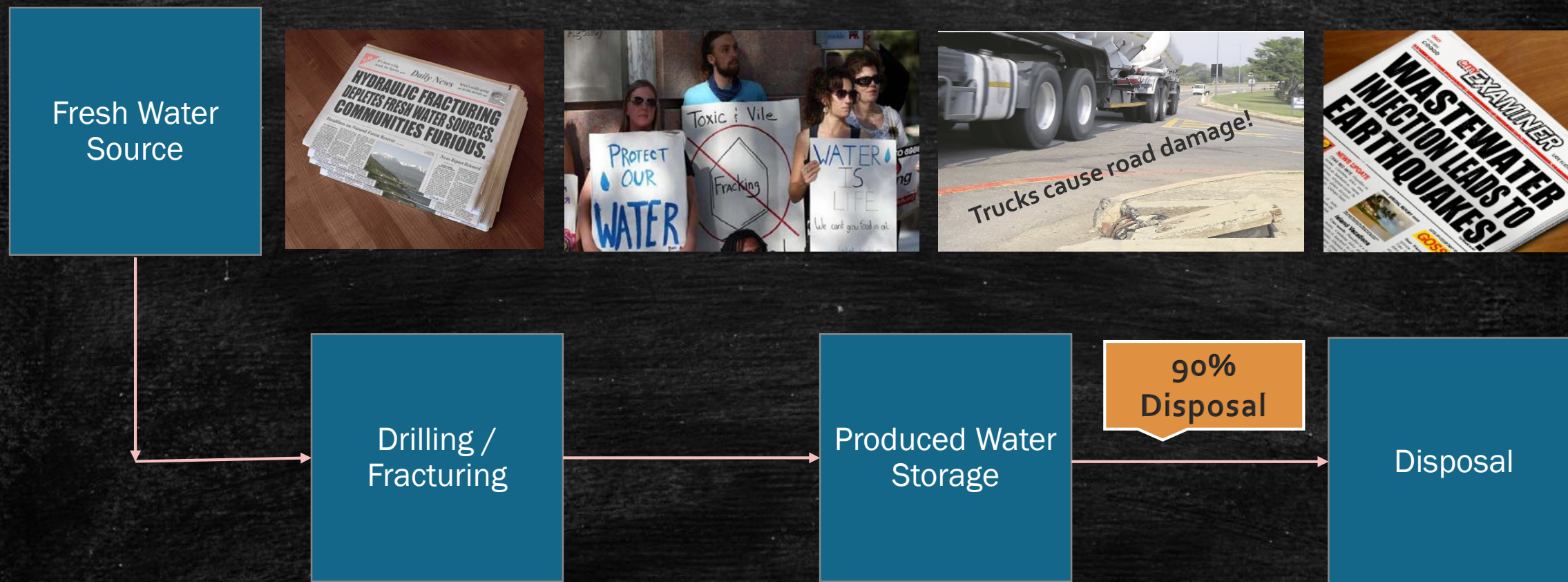
## Interactions between water, energy and food







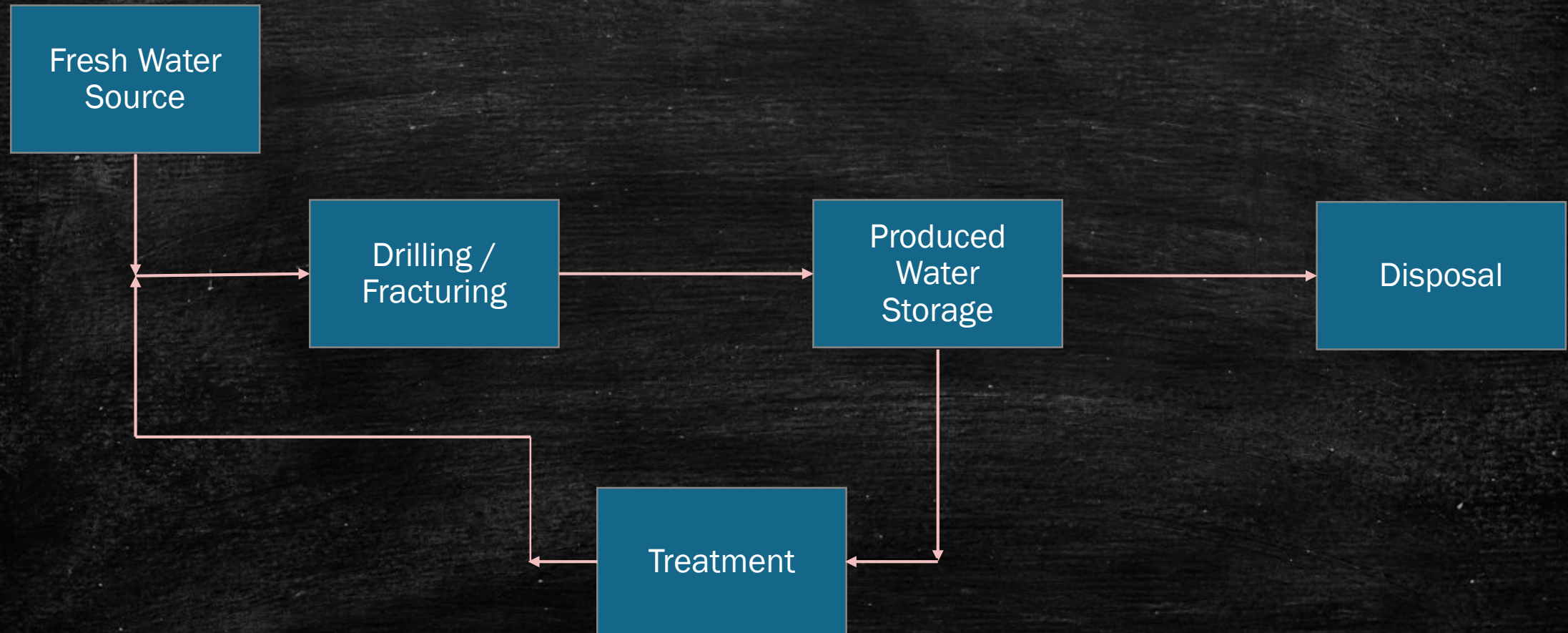
# Current Trend





# Current Picture with Treatment

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## Workshop on Food-Energy-Water Nexus – December 2015

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- Participants include Environmental Organizations (**EDF**), Oil & Gas Operators (**Noble Energy, Anadarko**), Service Companies (**Halliburton, Baker Hughes**), Government Organizations (**NSF, DOE, NCSE**) and Educational Institutions (**CSU, CSM, Texas A&M**)
- Discussions – Identifying barriers in successful beneficial Treatment/Reuse
- Key Research Need – **Need for Systems** (integrated approach to solve a complex problem(s))



# Focus on One Beneficial Reuse

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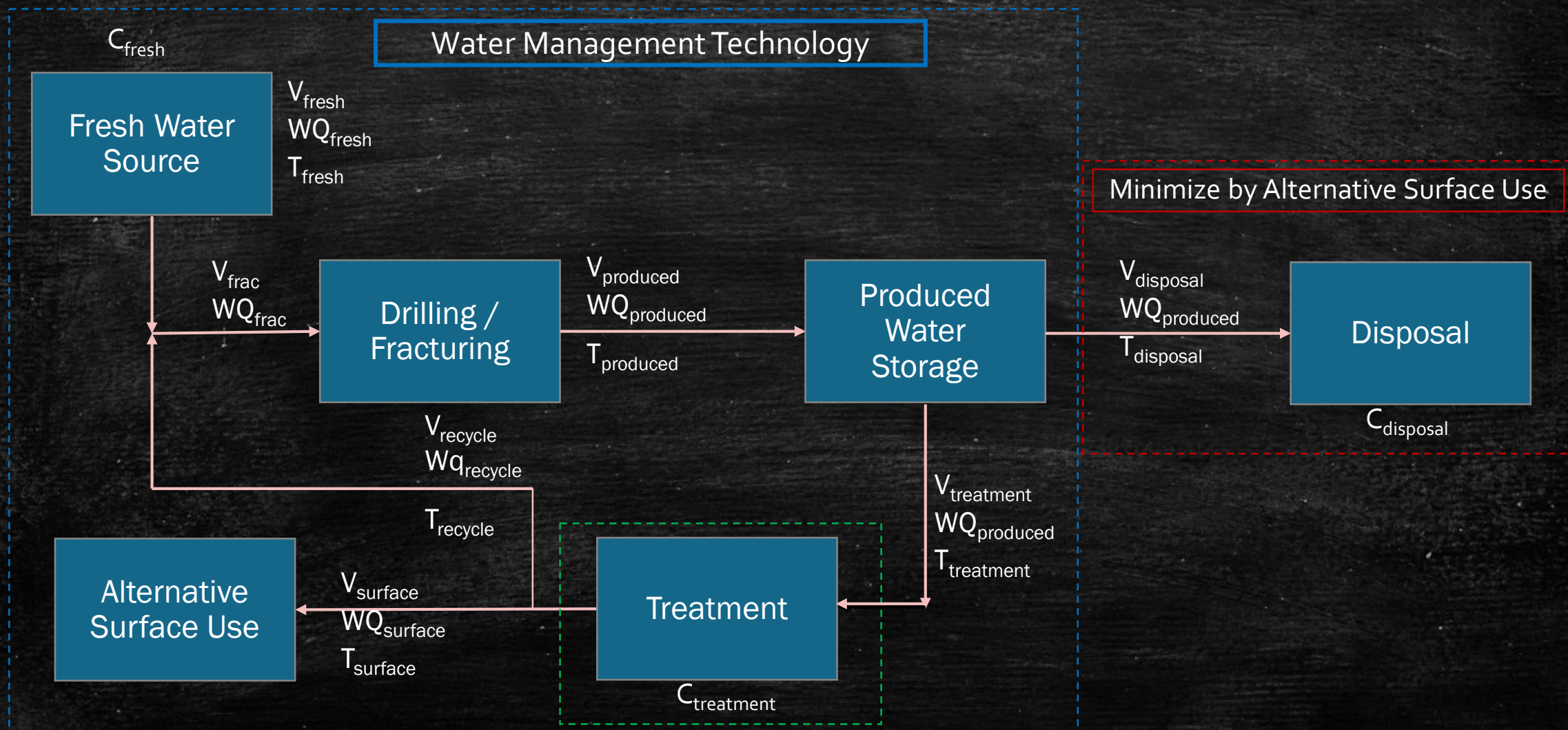


# The Ultimate Solution



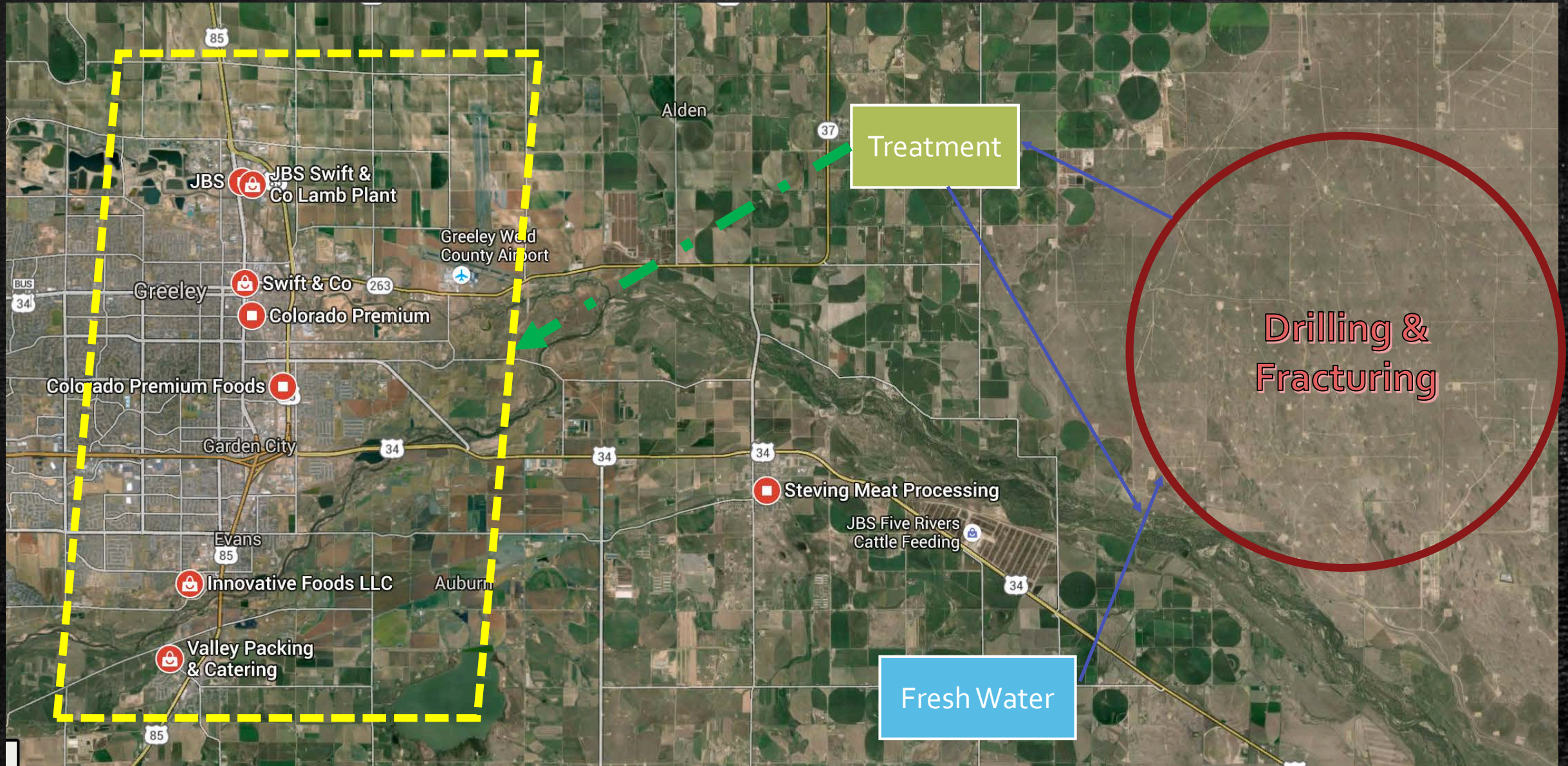


# The Big Picture



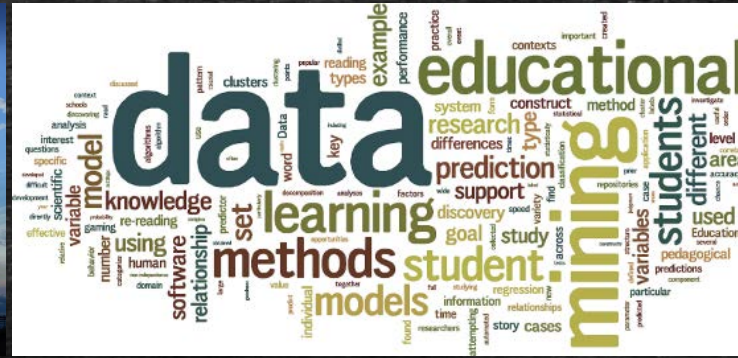


# Improved Beneficial Reuse – Geospatial Optimization





# An Effective Optimized System





# What does this mean for the community?

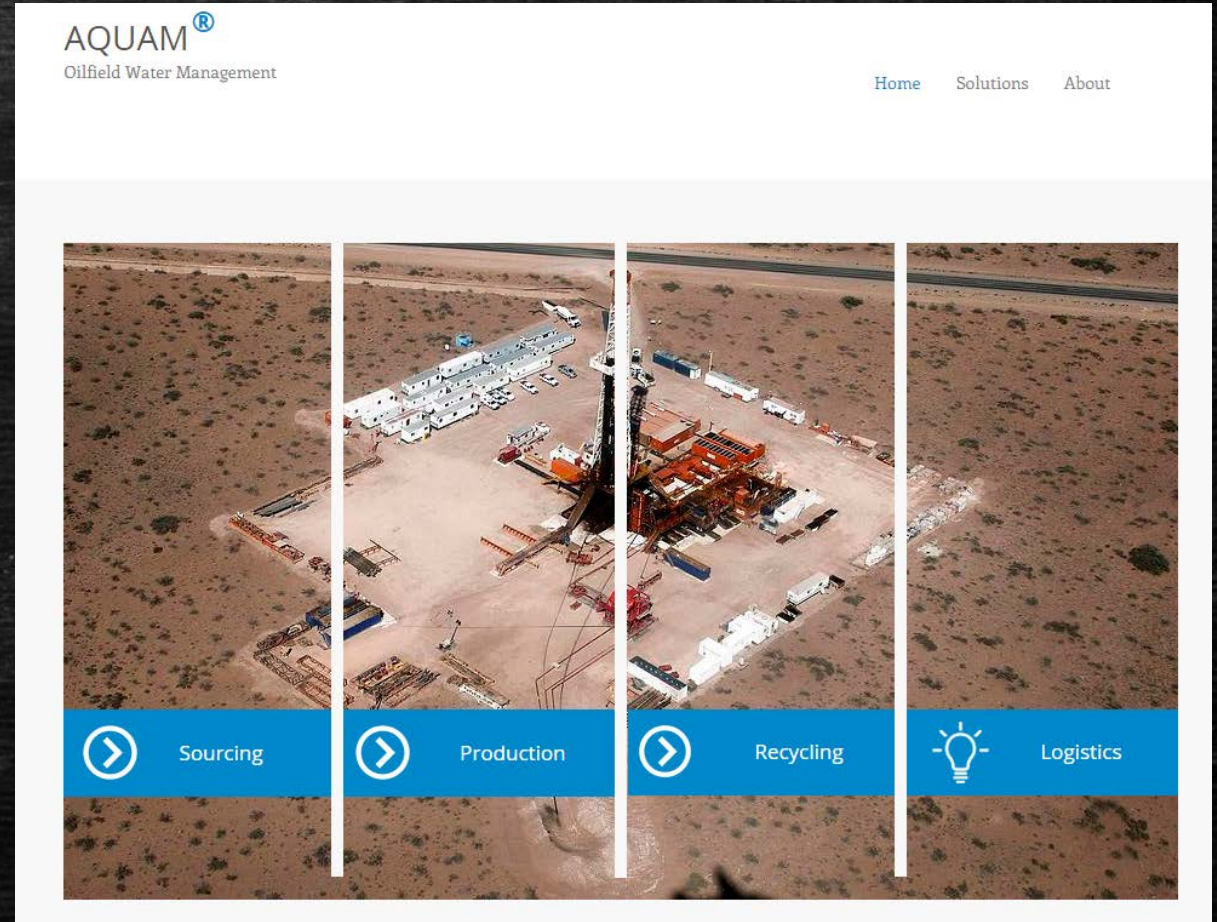
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1. Reduced dependency on freshwater
2. Reduced environmental impacts
3. Reduced social impacts
4. Reduced truck traffic
5. Reduced costs



# AQUAM

- Comprehensive Oilfield Water Management
- User friendly website
- Dedicated support for customization
- Completely web based tools which can be run on any portable device
- Desktop to Drill Site (D2D) Technology







# Tools in development

- Pipeline Routing Optimization
- Fixed & Mobile Facility Location Optimization
- Real-Time Fresh Water Sourcing Evaluation
- Disposal Optimizer



# Advantages

- Optimization for Every Scenario
- Feed more Data, reap more benefits!

The systems integration provides a more complete approach to increase the beneficial outcomes from the process.





## Current Scenario



Workable Solution for Surface Reuse



# Discussion



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