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# OIL AND NATURAL GAS IN COLORADO

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Erik Anglund, Rockies Water Manager

# ERIK ANGLUND – ROCKIES WATER TEAM MANAGER

- **FARMER** – Lifelong Longmont area family operations
- **STUDENT** – Mechanical, agricultural, civil & petroleum engineering
- **ENGINEER** – Water supply, quality, conservation, recycling, regulations
- **FATHER** – Family, school, sports, 4H
- **EXPLORER** – Rockies region camping, hunting, hiking, skiing, climbing

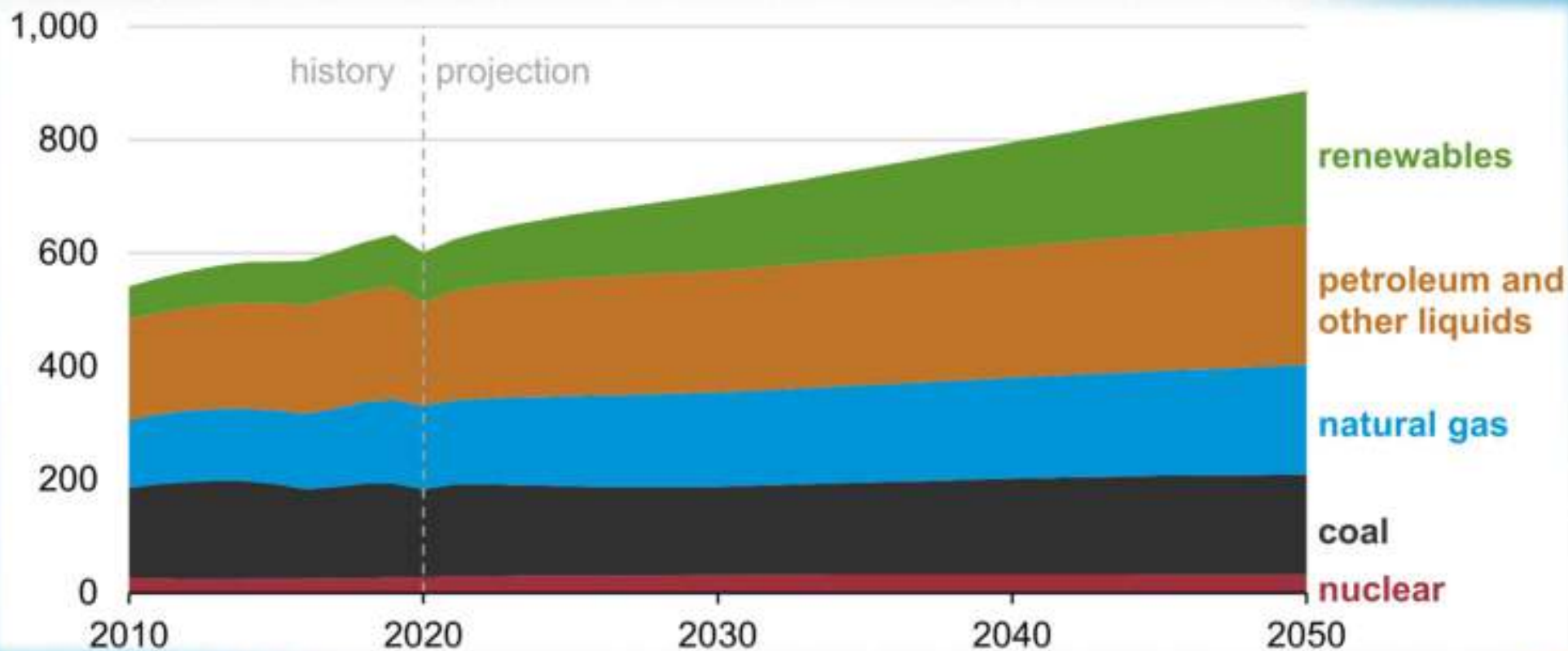


**OIL & NATURAL  
GAS ARE  
FUNDAMENTAL  
FOR MODERN  
LIFE**



# GLOBAL PRIMARY ENERGY CONSUMPTION BY ENERGY SOURCE (2010-2050)

Quadrillion British thermal units



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION, [TODAY IN ENERGY 2021](#)



# HOW DO WE PRODUCE OIL & NATURAL GAS?

**DRILLING**

5-8 days



**HYDRAULIC FRACTURING**

5-8 days

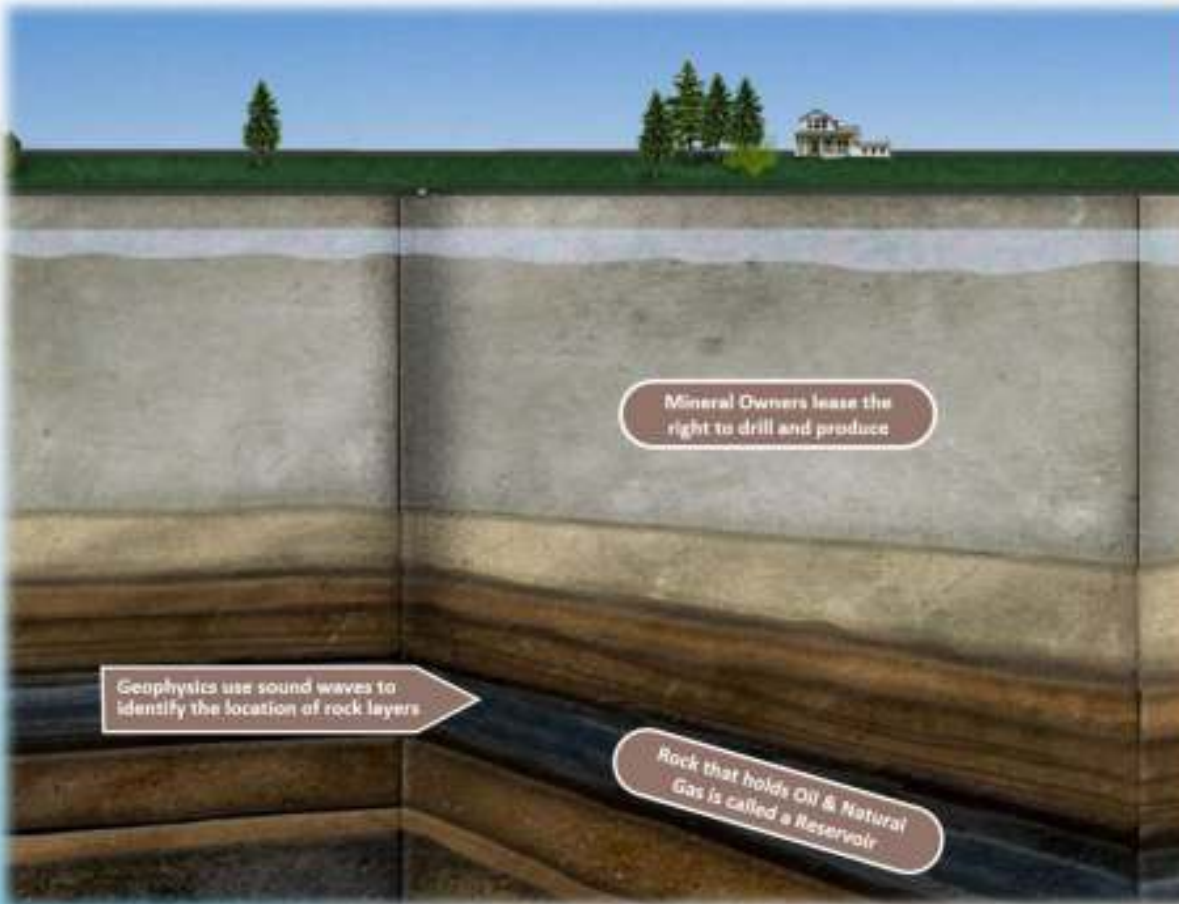


**PRODUCING WELL**

20+ years

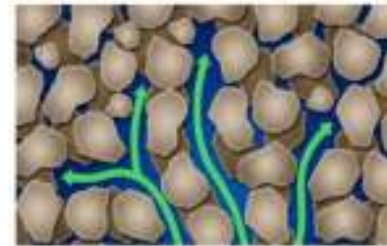


# PLANNING HORIZONTAL WELLS



## Geologists Study Rock Properties

**Porosity:** pores are microscopic holes in rock



**Permeability:** passageways between the pores

**Source:** Plants and animals, like Plankton

With heat, pressure, and time organic matter becomes oil and natural gas

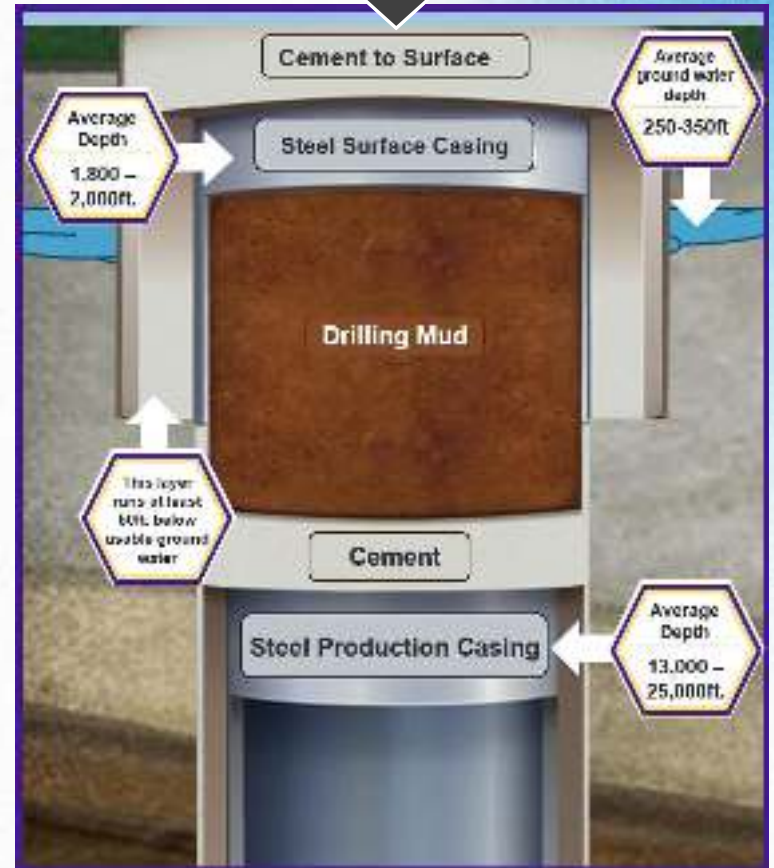


# DRILLING HORIZONTAL WELLS

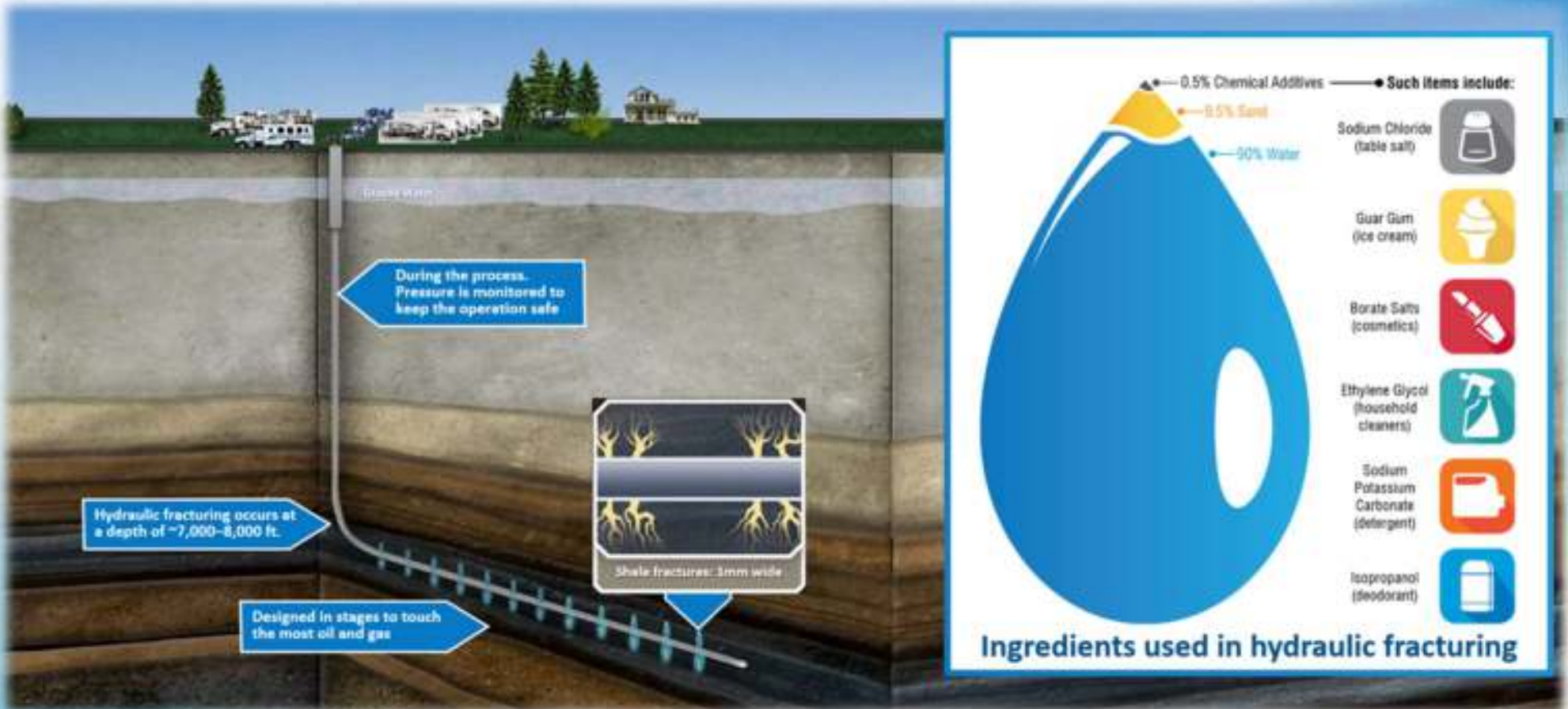


Proper Well Construction Protects Groundwater

An Example of a Typical Well Design



# HYDRAULIC FRACTURING WELLS

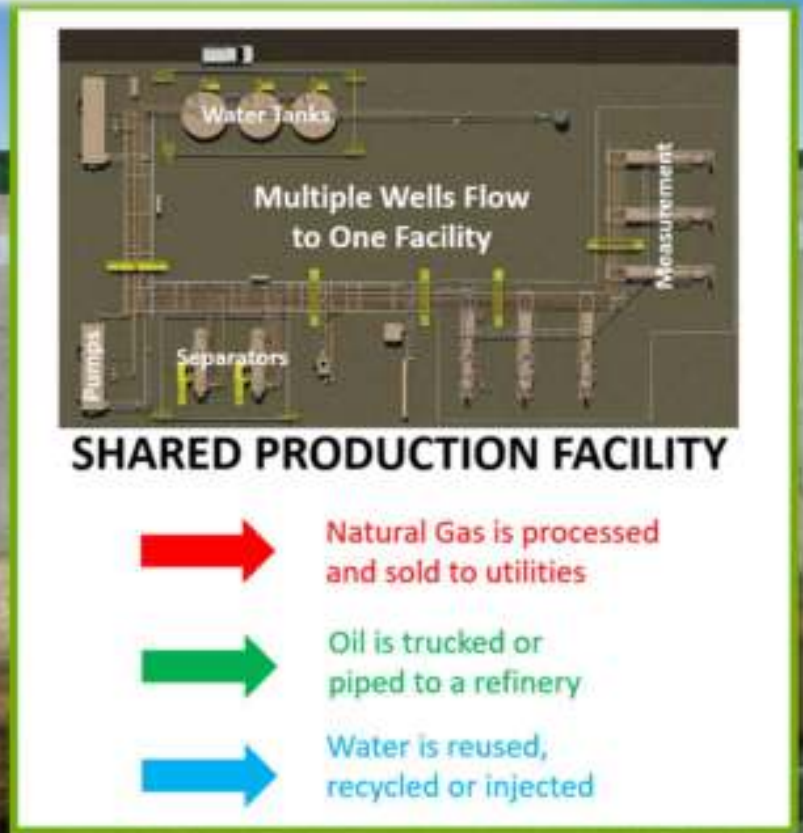
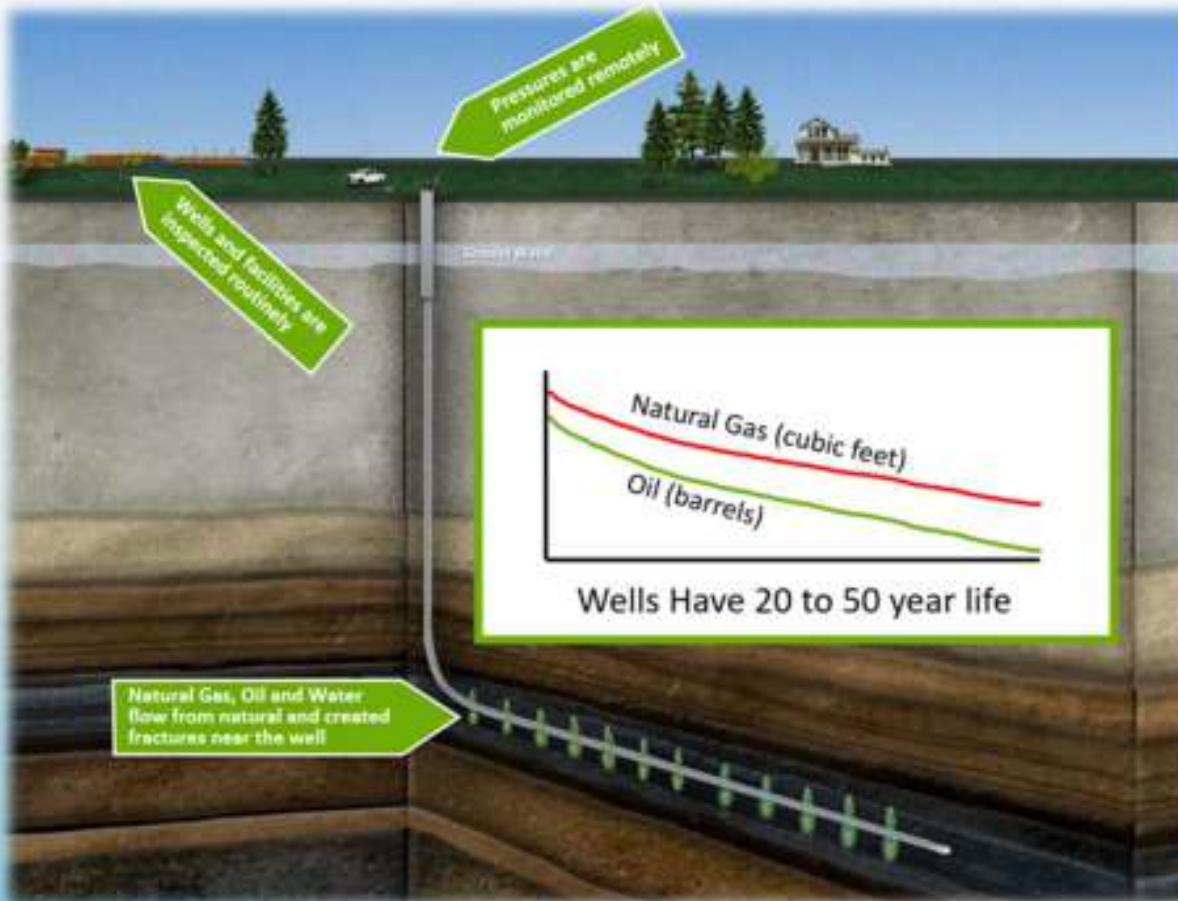


SOURCE: FRACFOCUS, [WHAT IS FRACTURING FLUID MADE OF?](#)

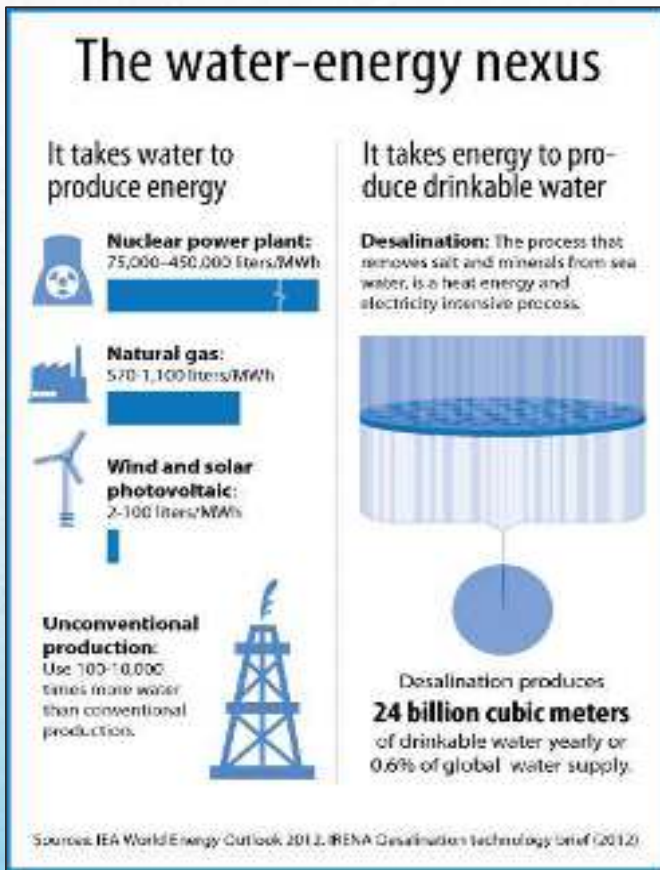




# PRODUCING WELLS



# WATER-ENERGY NEXUS



- Energy and water considerations
- State priority
  - Groundwater Protection Council (GWPC)
  - Interstate Oil and Gas Council (IOGCC)
  - Texas, Colorado, Utah, Wyoming
- Federal priority
  - Funding
  - Regulations that impede the use of water
- Industry priority
  - Energy Water Initiative (22 companies)
  - Water treatment technologies
  - Water infrastructure

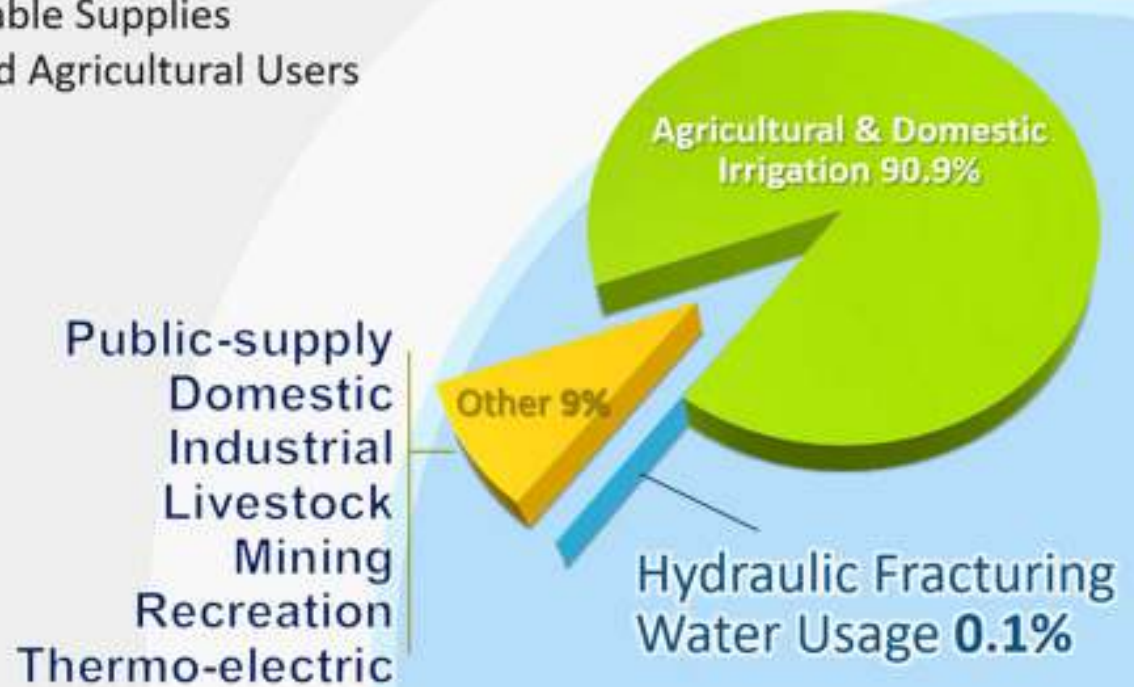




# RESPONSIBLY MANAGING WATER

## Our Approach to Water Sourcing in Colorado

- Non-Potable Supplies (Effluent)
- Commercial and Industrial Water
- Recycling and Re-using Fully Consumable Supplies
- Avoid Competition with Municipal and Agricultural Users



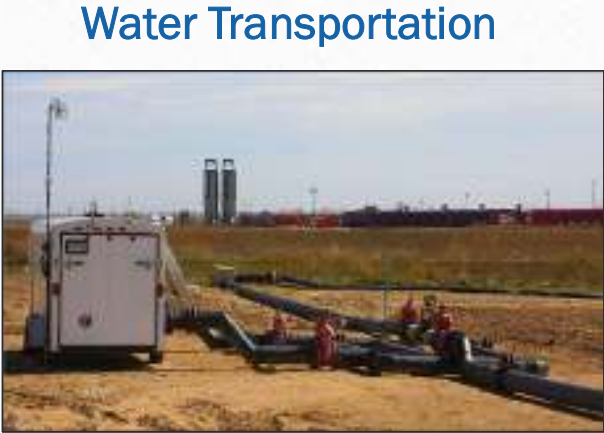
Source: International Gas Union



# WATER OPERATIONS



Water Sourcing



Water Transportation

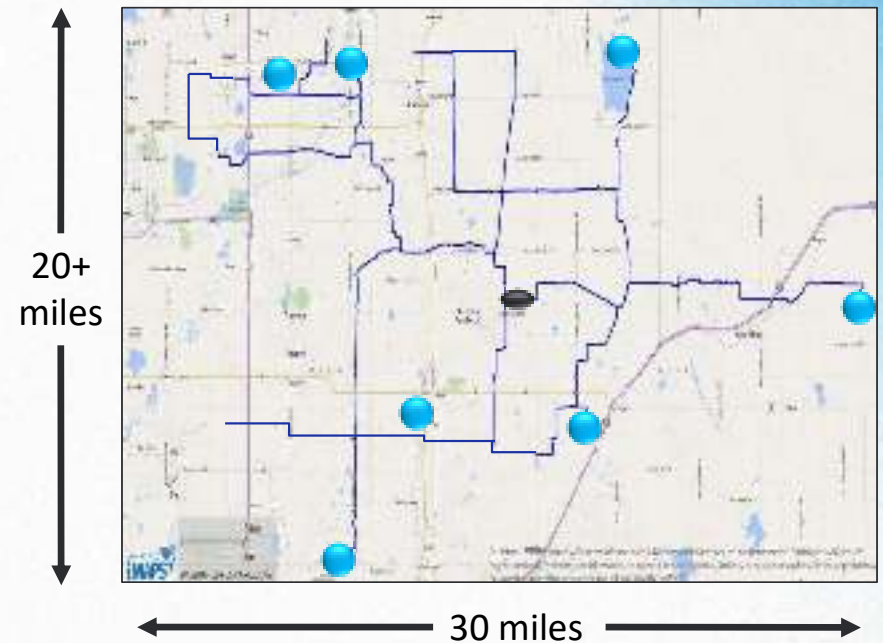


Water Treatment



# WATER ON DEMAND SYSTEM

- Over 180 miles of permanent pipeline
- Serving 4 frac crews simultaneously
- Up to 10 different water sources
- Eliminating 1,500+ truck trips per day
- Delivered 400,000,000 barrels to-date
- Reduced well pad water storage tanks
  - (from 100+ to ~ 20)



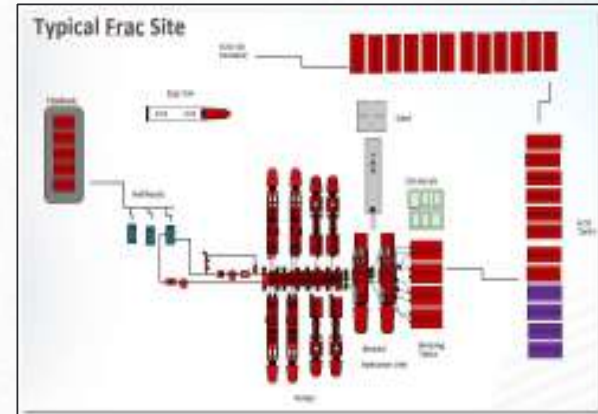
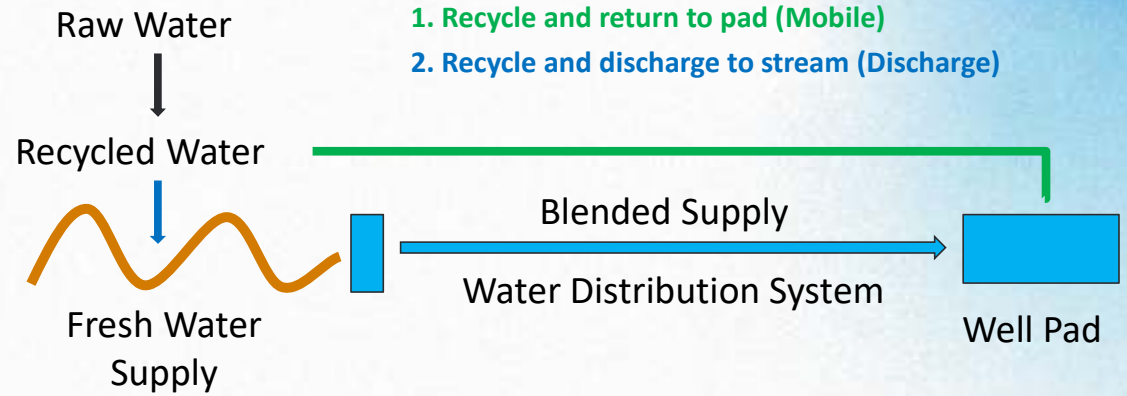
— Water Pipelines

● Water Storage Facilities

● Water Sources



# WATER RECYCLING



# ADDITIONAL WATER SERVICES

Drilling



Cooling



Fire Suppression



3rd Party Operators



Road/Pad Construction



Additional Regional Needs





# REGIONAL BENEFITS THROUGH PARTNERSHIPS



- Short-term Oxy diversion
- Long-term irrigation company diversion
- Designed to irrigation company specifications
- Through Oxy collaboration and funding

- Enhancement of critical river section
- Increase in agricultural irrigator supply
- Beneficial use of commercial water
- Through Oxy collaboration and funding

