

Middle Rio Grande Water Assembly  
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Dane Smith Hall, UNM Campus, Albuquerque

Summary of Scenario Work

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**GROUP 1: “A MIRACLE OCCURS” OR “WHAT? ME WORRY?”**

**Plentiful Water/Plentiful Energy**

**Victoria Garcia, facilitator**

Indicators for plentiful /cheap water:

Flooding/Lots of water  
Able to retain flood water by effective capture  
Increased ski season (due to good snow pack) bringing in more tourists/increasing economic benefit  
Cheap desalinization results from more effective treatment  
Cuts in government spending  
Lots of industry using water  
Water is wasted and not valued  
Change/decrease in the quality of water  
Return to dry farming  
Change in Infrastructure: water is piped to NM from other places—more water  
Valley and all other places are GREEN

Indicators for plentiful/cheap energy:

More pollution  
Solar panels on every house and effective power purchase agreements  
Dramatic increase of renewable energy  
More energy efficiency  
Less energy efficiency  
Better energy storage systems  
Technology shifts:  
    nuclear, solar and subsets of the same, e.g. efficient solar panel collectors;  
    enriching waste from the nuclear power plants  
20% decrease in population because economy tanks  
Decentralization

Social indicators:

Educating children and their families causing use/behavior changes  
Miles per gallon may be modified in relation to the energy changes  
Resources are adjusted to reality  
Better planning

City Councils distribute rain barrels to all homes with dollars saved from effective resource use  
Every elementary school teacher learns and then teaches their students about thermodynamics  
Maybe folks won't be driving all over/people begin to see "it's up to me"  
Doing less with more resources  
Equal treatment of stakeholders; no more fighting over scarce resources

What the 2025 world looks like:

***2025 hasn't really accounted for all the invisible costs to get here***

***Economic principles drive use rather than sustainability***

Lots of flooding/water is captured

Water is wasted

Lots of Water brings lots of industry

Energy: Plentiful/Cheap

Solar energy on every house

Hydropower overtakes oil and gas as energy source

Waste

Pollution

Carbon burn creates carbon dioxide in the atmosphere furthering global warming

Cost of efficiency results in more use

Crowded

Less population

Could look like the Netherlands with tons of water; then inefficient use and increased populations

Population living here are living on higher elevations

"Business as Usual" measured by Today

Disruption of natural cycles

Efficiencies created by Technology breaks-through

Environmental regulations capture costs more efficiently /changing view of "cost to customer" includes all costs

Headline: "Breakthrough on cheaply capturing clean energy from coal!"

Lifestyle changes: alternative energy methodologies more available (individuals have more control)

View of reality by the populace changes

Headlines along the way from present to 2025

2012 -- Educate children to better use resources/ Obama loses/Regulations relaxed/Collapse of World Economies/Ban on births for 25 years/ Solar power used and lots of unregulated coal use results in pollution

2015—Intel closes-Feds cut budgets 20%/ new sources of water discovered/Emigration from the state leaves more water for those behind/ EPA goes away

2020 -- work with children in early part of timeline pays off in better use/change mindset through education

2025 -- on the brink of disaster—Can't sustain!

## **GROUP 2: "HOBBIT LAND"**

**Plentiful water/ scarce energy**

**Yolynda Begay, Facilitator**

### Indicators for plentiful/cheap water:

- Economics collapse = Increase water availability
- Food basket of the world; processed/canned/preserved
- Use river for transportation but understand it could be difficult
- Rebuild levee system to prevent a catastrophic event
- Building turnouts into fields
- Play with water i.e. Egypt water wheel
- Climate change that brings plenty of water; changes in run off precipitation
- Transition to farming/ranching; local agrarian lifestyle.
- Increase in rainfall
- Changes in river flow
- No trouble meeting our water compact agreement with TX
- Could potentially sell water
- Tribes would be happy

### Indicators for scarce/expensive energy:

- Gravity fed surface water (water is plentiful)
- Decrease in world oil production & increase in price of oil
- Economic decline
- Carbon sequestration on power plants
- Technology cost – looking for least expensive & most productive
- Fossil fuels expensive
- Seeking non-traditional energy
- All energy sources would have to be scarce
- People would have to move closer to sources like water
- Increase in population density around sources
- Broad social and economic consequences
- Unemployment high and lots of instability
- Energy efficient homes – designed to be more sustainable i.e. incorporating cistern in design
- Energy brought into Rio Grande Valley – stimulate peripheral activities; could potential increase economic activity
- Energy generated through water source

- Local food production
- Stimulate more innovation
- “Culture of Conservation”
- War
- Demographic changes; could not afford a whole lot, expensive costs for households – given the economic downturn/recession people are already doing without, this would further deepen those impacts

#### What the 2025 world looks like:

- Food production altered
  - Changes in farming practices
  - Better return per acre
  - More animals to graze crops
  - Local food production
- Increase in biodiversity
  - Resilience to ecosystem
- Changes in water rights
- Resurgence of micro-hydro
  - Reservoir/plants
  - Millstones
- Excess food production; potential to sell organic produce
- Healthier people-eating locally/more physically active
- Shift in water management/institution
- NM State budget could have two outcomes
  - Decrease in population & increase in economic activity
  - Increase in state budget could be as a result of viable shale production
- Manufacture green energy
- Refugee from the coastal communities; increase in NM’s population

#### Headlines along the way from present to 2025:

- U.S. turns its back on fossil fuels
- NM turns its back on water transportation
- Coastal refugees from the coast swell to NM
- Where are all the people going
- Construction industry building code revisions to achieve higher efficiency standard
- LANL announce 100 mpg vehicle
- Irrigated acreage increase to all time high
- Green Fire Times circulation hits 1 million
- 10 years since most recent wildfire
- Biofuels source increase
- Worlds largest tree found in NM
- Isleta Pueblo flooding concerns
- NM reaches food self-sustainability
- NM sends food to Mexico and exports to China
- Innovations in farm equipment

- Technology shifts its focus

Other suggested names discussed during group discussion:

- Turning back the clock
- Flying Flamingos/Whooping Cranes
- Agriculture Innovators
- Agricultural Utopia
- Utopia with no energy
- Low energy utopia
- Managing chaos of change

**GROUP 3: “COMING TO OUR SENSES”**

**Scarce water /scarce energy**

**Jason Hurd, facilitator**

Indicators for scarce/expensive water:

- The cost of everything has gone up: consumer goods, services, etc
- Development and population growth is restricted
- Population/development is more compact (through zoning, etc) (the group was not in agreement on this)
  - Urban, less rural
  - High density, vertical cities
  - Modular planning
  - Abandoned infrastructure
- Population exodus from area
- Less food production
- Use of alternative energies has increased
- Total paradigm shift, we have completely reexamined our relationship to water, how we produce and use it
- There is much more social and political instability
- Agriculture is throttled
- Pumping water is less feasible
- Food shortages
- The gap between the rich and the poor has widened
- There is technological innovation
- Mixed environmental impacts
  - Environment is breaking down; or
  - Environment is in recovery
- Economic downturn/depression
- Genetic improvements to crops
- More small, local farmers
- Increased awareness of population’s impact
- We are more self-reliant; smaller communities, more local
- More community connectivity; in-person and electronic
- Water rights are consolidated

- Water markets
- Fewer water rights holders
- Transfer rural/urban
- More contention
- Innovative water uses; increased efficiency
  - Reprioritize water uses: toilet flushing, survival needs, recycle/conserve
- More competition for water use
  - Junior users cut out
- Going out of business
- Political upheaval
  - End of junior/senior rights concept
  - Constitutional changes
- Centralized control
  - Water rights holders have increased control and influence
- Dramatic changes to public and private landscapes: lawns, parks, golf courses, etc
- Acre foot of water costs \$1,000 or more
- Piped rivers
- Cistern in every backyard
- Pueblos have more water rights than others and are selling water
- More recharge/dams
- Middle Rio Grande adjudicated
- We're importing water
- Ability to pay is not the only criteria for water rights
- Dual/triple/multiple systems: potable/non-potable
- Agricultural uses change, become more efficient; technological advances
- Increased contention between jurisdictions
- Per capita use is down
- Local food production increases; small, backyard farms
- Greenhouse development
- Restrictions on digging wells; metering well water
- Scarce water could result from our decisions to maintain ecosystems; diverting water to restore ecosystems
- Substantial changes to diet
- Water use labels on products (how much water went into the production)
- Increased risk of polluted water
- More decoupling of water and energy
- Increase in water shortage emergencies

Indicators for scarce/expensive energy:

*The group identified a number of energy indicators that would also be water indicators as copied from above.*

- The cost of everything has gone up: consumer goods, services, etc, as a result of higher transportation costs
- Transportation is prohibitive
  - Use of transit and bicycles has increased

- People and goods travel shorter distances
- Food shortages due to logistics of transportation
- Development and population growth is restricted
- Population/development is more compact (through zoning, etc)
  - Urban, less rural
  - High density, vertical cities
  - Modular planning
  - Abandoned infrastructure
- Population exodus from area
- Less food production
- The air is cleaner; population is healthier
- Use of alternative energies has increased
- Families are smaller (the group was not in agreement on this)
- There are fewer jobs
- Our energy footprint is smaller
- Total paradigm shift, we have completely reexamined our relationship to energy, how we produce and use it
- It is cheaper to live in subdivisions
- More energy is locally generated; increased incentive to produce our own energy
- There is pushback from energy providers; they benefit from the higher prices
- There is much more social and political instability
- Agriculture is throttled
- Pumping water is less feasible
- The dollar is less valuable; currency exchange rates
- The gap between the rich and the poor has widened
- There is technological innovation
- Mixed environmental impacts
- Social restructuring
- Economic downturn/depression
  - Global economy shrinks
- More efficient use of energy/conservation
- Genetic improvements to crops
- More small, local farmers
- Increased awareness of population's impact
- We are more self-reliant; smaller communities, more local
- Mix of extremes
- More community connectivity; in-person and electronic
- Shifting use of energy; fewer luxury items and leisure activities
- Diverse energy production
- Continued use of coal
- Higher crime due to density of population
- Losing small farms
- Importing more food
- Energy use labels on products (how much energy went into the production)

*All of the above indicators of scarce/expensive energy and water are dependent on our preparedness as well as outside influences, such as other states using water before it gets here, etc...*

What the 2025 world looks like:

- Everything changes. History reverses itself. Population declines and reverts back to basic survival. Harvests are half of what they were in past years. There are no funds for infrastructure maintenance.
- More government intrusion in private life.
- Energy and water scarcity have generated numerous innovative technologies; conservation-minded development policies and have changed citizen behavior. While lifestyles have had to change, this boring, arid region is still a wonderful place to live.
- The world is more hostile and isolationist with major political upheavals that lead to centralized controls on almost everything. There is more disparity between the rich and poor, especially nations, which reverses the shrinkage of recent decades.
- Energy is scarce, which effects human life. To address the scarcity, we need to change our way of life. Water rights have to be reprioritized.
- Our resources of both energy and water are inadequate for the indefinite use of either or both. Major changes in our use and valuation of both are needed to reduce the demand. Technological innovation will occur, but will be inadequate. Personal, public and business use must be reduced.

Headlines along the way: from present to 2025:

- Obama rejects Keystone pipeline
- Conservation-minded residents find happiness in boring, arid Southwest
- Regional community conversations underway in Middle Rio Grande Valley
- Adjudication court invalidates traditional water rights
- Middle East cuts back on oil production/export
- Courts uphold EPA authority to register GHGs (6H6s?)
- Lost driver busted for third navigation waste violation
- Massive arctic oil spill shuts down exploration
- Feds order water use reductions due to Colorado River shortfall
- Investors flee nuclear stocks in wake of San Andreas power plant meltdown
- Southern Colorado river basin states (CO, AZ) place call on New Mexico water (Basis would be redistricting on 2020 census)
- Water is the new gold: prices top \$100,000/acre foot
- Albuquerque closes its last golf course
- Popular revolt against high prices for water and energy
- Solving the water and energy crisis locally
- Schools close across the state
- Quality of life has markedly decreased as a result of gluttonous consumption
- The rich get richer, and the poor get poorer
- Water authority GPCD drops to 95, Yuhas retires
- ABCWUA offers rebates for composting toilets

- The Rio Grande River has been downgraded to a large ditch
- People leaving New Mexico for lack of water and higher cost of living
- More former middle class people falling into the poverty class
- Severe drought reaches ninth consecutive year
- Texas sues to prevent Rio Grande ice harvesting
- Agricultural innovations produce economic and produce gains
- Navajo Nation sells/leases Colorado River water to Las Vegas. State of New Mexico OSE protests impacts
- Cities overwhelm farmers in vote to repeal water rights priorities system
- Whiskey for drinking; water for fighting; lots of social unrest
- Cattle industry dies as demand for beef drops
- Population declines over past 10 years
- Global conference fixes prices of gold (2025)
- Increased awareness of resource overuse has resulted in conservation and innovation
- Brownouts, blackouts and water shortage paralyze city
- What good are water rights if there's no water?
- Infant mortality rate on the rise

#### **GROUP 4: “ENERGIZED BUT THIRSTY”**

**Scarce water/plentiful energy**

**Mary Davis Hamlin, Facilitator**

##### Indicators for scarce/expensive water:

- Infrastructure continues to collapse
- Less agriculture and food produced – more imports
- Different foods available (imported)
- Potentially less public participation – decisions made by techno experts
- Water rates go up
- Fewer traditional cultures
- Hotter, drier, more fires
- Fewer trees; less vegetation; less green

[more detail]

- The acequias change from dirt ditches to pipes etc.
- Less local recharge of aquifer
- Regional variation
- Water very expensive
- Extreme conservation measures
- New allocations – agriculture to municipalities
- Huge impact on traditional cultures
- Less vegetation
- More run-off
- Compact/constitutions not changed
- Hotter dryer/more fires

- More water capture
- More pollution
- Large scale diversion projects
- Fewer arid LID
- Less in stream flow in rivers
- Shift to high value crops
- More desalination
- More reclamation of oil and gas water
- Less growth in population
- Individual behavioral changes – compost toilets, etc.
- City are more of a heat island
- Decrease in population
- More xeriscaping
- Capitalism still equates with growth

#### Indicators for plentiful/cheap energy

- Robust energy portfolio for renewable energy
- More solar
- Better at storing energy
- Assert Monroe Document
- Develop more domestic energy
- New batteries
- New technologies solve energy problem
- New transmission technology
- Rare earth element projects
- Increase efficiencies in capturing water
- Decentralize systems
- Wind, biofuels, geothermal;
- Moving water
- More imports of agriculture
- More high value crops
- Water becomes the new gold, controlled by power brokers

#### What does the 2025 world look like:

- Municipalities have priority:
  - water reallocated to cities from other uses
  - water moved from other locations
- Desalination
- More reuse
- Water rates up
- Scarcity equation changes
- Can sell energy for water
- Increased efficiencies
- More Conflict

- More Social Disruption

[more detail]

- Develop an alternative to water
- Water price reflects real cost
- Decrease in cultural values
- More conflicts
- More lawyers
- Hopes for a water authority with real teeth for region
- Admit that adjudication in Rio Grande does not work
- Finally find out how much water is really available

Headlines along the way from present to 2025:

- Infrastructure is continuing to fall apart
- Renewable incentives increase
- Desalination Industry Arrives
- Water rates up
- Climate Change is Real
- Individuals reflect and take personal responsibility
- IPOD Sales up
- People Still not thinking
- Need more education, need an informed democracy
- Youth finally thinking
- EPA loses more teeth
- EPA passes more regulations that don't work
- Rice is our new crop – the reason we are water short now
- Still no money for infrastructure
- Air Force fuel in aquifer
- NM finds new energy source
- Beginning to have active resource management
- The Middle speaks
- Reason starts to rule
- Water mandates with teeth
- Funding for Science and Technology Cut
- NSF disappears
- Governed by experts but citizens are marginalized
- Engage differences
- Institutional players must face reality and become involved in dialogue
- Increase children's education on the importance of conservation
- Tax incentives for water harvesting
- Dual use of water in homes
- Support civil society institutions
- Drink more wine

## PLENARY DISCUSSION ON THE FOUR SCENARIOS:

**Lucy Moore, facilitator**

Where we are today: Many suggested that the fourth scenario – “Energized but Thirsty” is “what is happening now” and “the path we are on.”

Is this a game? Some were uncomfortable with the scenario exercise -- a linear model in a non-linear world, said one. Others felt that the “Miracle Occurs” scenario with abundant water and cheap energy was so unrealistic as to be unimaginable. It is not sustainable. “It is the world we live in and it cannot go on.”

Efficiency: The group discussed some of the dilemmas and unintended consequences of greater efficiencies in the use of water and energy. The more efficiencies, for instance, the less elasticity there is in the system to deal with the unforeseen. The more water is saved and re-used the less is recharged and available for stream flows. There were questions about how to measure efficiency, given the complexity.

Conflict and cooperation: There was a discussion about the likelihood of both increased conflict and increased cooperation. Communities could come together and share resources in times of shortage, as the *acequias* did traditionally; or conflicts, lawsuits, animosity could increase; or both. Cooperation could happen locally, for instance, and litigation on the larger scale.

Hidden costs: Some reminded the group that there are significant hidden costs in all the options. To evaluate “expensive” is a complex process, going beyond simply the cost of a gallon of gasoline, for instance. There are environmental, health, social costs and many more.

Management of water resources: The scenarios could drive management of resources in different directions – centralized basin-wide management or more citizen-based management.

Affecting the course we are on: The group spoke of ways to change course. Many felt it would require a major paradigm shift, probably resulting from a major crisis situation. Political will is fundamental, said a participant if significant change is to be made. Some felt that changing values and cultures is the biggest challenge. The group considered the role of values in decisions we make about the future. “We are a country of immigrants,” said one, “who saw limitless opportunities and boundless resources.” That world view exists today and will be hard to change. Water rights are private property rights; it is hard to imagine being in a situation where those rights would be extinguished, but it is possible. There was discussion about the potential for radical changes in the future that we are unable to predict, like pandemics and mass migrations of the past.

Suggestions: A participant asked the group to look around them. “How many watts of electricity is this building using right now?” he asked. Solar panels have great potential; they are being used extensively even in New Jersey, said another. There was a suggestion to ban bio-fuels.

Moving the axes through space and time: A participant suggested that the center of the two axes represents the status quo, the balance of today, and that the water/energy axes could be “moved through space and time” to focus on different parts of the state and different times, past, present and future. This would give different future scenarios. Looking farther out, beyond 2025, “is a much scarier scenario,” suggested a participant. Looking back and revisiting decisions, it is important to realize that they made sense at the time. A participant suggested that an inventory of historical predictions, trends, etc. and how they played out would be valuable.

Importance of this conversation: Several felt that this discussion about the future paths was important and should happen regularly, perhaps every year, to track our progress toward different futures. Reaching out the full range of users will make the conversation more valuable. The next few years will be critical for understanding the physical and legal systems that we are dealing with and the filters that each of us uses to interpret what we are seeing.

Different axes: A participant suggested that it would be possible to use different axes for scenario planning, for instance, ones that encompassed world views – male to female, and indigenous to western/commercial.