

Date: May 25, 2012

To: Interbasin Compact Committee Members

From: Mark Koleber, Chairman of the Metro Basin Roundtable

Subject: Water Supply Paper

Below is a paper describing the Metro Roundtable's vision for meeting our basin's projected future supply gap.

As you may know, metro area water providers have the responsibility for over half of the state's future municipal water supply, which is the subject of the planning exercises that the roundtables conducted. The Metro Roundtable has put a lot of effort into understanding and explaining the practicalities of meeting our portion of the gap and developing what we feel are reasonable solutions for meeting the gap. Our hope is that this paper will help serve as a resource for your discussion about how to meet the gap.

The paper is in draft form because we would like to confer with roundtables before we prepare a final version. However, we are providing it to you now as you begin your own planning exercise on May 31st.

Water Supply Paper for the Metro Basin Roundtable

1. Introduction and Purpose of Paper

This paper describes how the Metro Roundtable conducted the Portfolio Tool planning exercise. The outcome of the exercise was the development of the Metro Roundtable's vision for meeting the projected future gap in municipal supply needs which is also described in this paper. This paper contains five sections:

- 1) Introduction and Purpose of the Paper
- 2) Background Information on Portfolios
- 3) Supply Component of the Portfolios
- 4) Our Vision for Meeting the Municipal Supply Gap
- 5) Recommended Improvements to the Portfolio Planning Process
- 6) Concluding Comments

The Metro Roundtable prepared companion papers titled "Metro Roundtable Conservation Strategy" and "Selection of a Reuse Factor for the Portfolio Tool Planning Exercise." Together, these papers on filling the supply gap, conservation and reuse explain how the Roundtable performed its Portfolio Tool planning exercise.

The Portfolio Tool was developed by the Colorado Water Conservation Board for an exercise by the basin roundtables to consider various strategies or portfolios for meeting future municipal and industrial (M&I) water supply needs. Each basin roundtable has been directed to produce a set of portfolios using the Tool. To develop a portfolio, the user of the Tool needs to specify an amount of a hypothetical additional supply necessary for meeting future M&I water needs. The Tool requests user preferences for whether the additional supply would come from developing Colorado River Basin water ("New Supply" in the Portfolio Tool) or from water currently being used for agriculture ("Agricultural Transfer" in the Portfolio Tool) or from a combination of the two.

In earlier portfolio runs, the Metro Roundtable chose to not specify the source of additional water pending discussion with other roundtables. To facilitate comparison of the Metro Roundtable's portfolios with other roundtables, CWCB staff assumed 50 percent of the additional supply would come from New Supply and 50 percent from Agricultural Transfers. For

this final portion of the portfolio exercise, the CWCB staff has asked the Metro Roundtable to do an allocation of additional supply between New Supply and Agricultural Transfer

The Portfolio Tool was designed for statewide water planning. The Metro Roundtable only did the portfolio exercise for its own “basin,” choosing to leave planning considerations of other basins to the local basin roundtables and future IBCC discussions. CWCB staff extrapolated the results of the Metro basin to the other basins.

As requested by the CWCB staff, this paper also considers possible implications of supply reductions

Disclaimer. It is important to note that the Portfolio Tool is a simplistic tool developed for a high level state-wide planning process for use by volunteer citizen groups. Information from the Tool is not necessarily applicable at the regional or water utility level or for professional water planning. The information in this paper and the information from the Tool are not suitable for use in regulatory and legal processes. Supply concepts in this paper are for discussion of general, hypothetical supply projects and are not intended to represent actual projects.

2. Background Information on Portfolios

This section provides background information on how the Metro Roundtable selected the supply component of its portfolio in the Portfolio Tool.

The portfolio exercise indicates that water utilities in the Metro basin are responsible for meeting over half of the state’s municipal and industrial supply gap. It is important to understand the role of Metro basin water utilities in meeting this responsibility, in relation to the authority of other entities. Metro basin utilities have an obligation to meet the water service needs of their customers. Decisions about land development, transportation, economic growth incentives and other factors affecting growth of the customer base are generally within the purview of county and municipal governments, not water utilities. That said, water utilities are probably best situated to initiate discussions with decision-makers about the relationship between land use and municipal water demands. Moreover, water utilities promote conservation through education, incentives, watering schedules and water rate structures. Utilities can also prohibit water waste and develop water reuse and other water efficiency projects. However, water utilities generally do not have authority to enact regulations requiring high efficiency plumbing fixtures or low water-using landscapes. Depending on the type of regulation and jurisdiction, this authority rests with local, regional or state government. The Portfolio Tool has inherent limitations in its use, such as many embedded presumptions, a lack of transparency and an inability to adjust key planning variables, including conservation,

reuse factors and safety factors. To help overcome these limitations, the Roundtable performed its analysis on a simple spreadsheet that matched demand projections with supply strategies. The spreadsheet is attached.

To investigate a range of future conditions, the Roundtable prepared the portfolios for low, medium and high demands plus a condition with high demand and a warmer climate. A ten percent safety factor was included in the new and existing demands in all but the climate-adjusted demand to account for typical safety factors used in water utility planning to account for the inability to predict demand and supply.

In the climate-adjusted demand, total (new and existing) demand was increased by thirty percent to represent the impact of an assumed future climate with five degrees F of warming and no change in precipitation. This is in the mid-range of temperature projections for the watersheds that provide water supply for the Metro basin water utilities. Based on results of the Joint Front Range Climate Change Vulnerability Study and some simple analysis, the Roundtable estimated that demand would increase roughly ten percent due to increased demand associated with evapotranspiration of landscaping and that supply would decrease by roughly twenty percent due to increased evaporation, plant transpiration, and snow sublimation. Given the potential for a large increase in the supply gap, many Metro basin water utilities think it would be irresponsible to not consider the potential for climate change in the portfolio exercise.

Both, existing demand and new demand were adjusted by the safety factor or climate factors.

The variables in the Tool for “identified projects and processes” (IPPs), conservation, and reuse were set to the maximum levels considered to be achievable based on the experience and expectations of the participating water utilities. IPPs were set at 75 percent success rate of water yield for new projects and 100 percent success rate for growing into existing supplies. The conservation level used was between the low and medium assumptions in the Tool as explained in the companion conservation paper. The amount of conservation applied to the gap varied depending on the demand scenario and was set at 82-90 percent of the amount saved between 2000 and 2050. A conservation saving of 10-18 percent was reserved to buffer against uncertainty and durability of water conservation savings. Utilizing this more modest conservation estimate also allows for a buffer or reserve that can be called upon when and if more severe and/or frequent drought restrictions become necessary.

The reuse factor chosen for New Supply was 50 percent as described in the companion paper on reuse. The Metro Roundtable defines the reuse factor as the percentage of additional

supply available from the reuse of the New Supply and Agricultural Transfers. We assume that the New Supply project and additional Agricultural Transfers are both fully consumable and therefore could be entirely reusable to extinction. Please see the attached spreadsheet for details on the portfolios.

The remainder of the gap was met with additional supplies, either from New Supply or Agricultural Transfers as defined in the Portfolio Tool exercise.

3. Supply Component of the Portfolios

a. Bookends Approach

To help understand the range of options and impacts, the Metro Roundtable used a “bookends” approach to define the limits of meeting future demands exclusively with either New Supply or Agricultural Transfers. The first bookend assumes that all the additional supply would be met exclusively from Agricultural Transfers. The second bookend assumes all the additional supply is met with New Supply. While these bookends identify the expected range of possible future options, the Metro Roundtable is not advocating either. Rather, the Metro Roundtable believes this range of options between the bookends should be preserved for future generation to decide how best to meet their needs. The Metro Roundtable also believes in a balanced and flexible approach to meeting future needs that will fall between the bookends, as described below.

Bookend portfolios were developed for the four demand levels – low, medium, high and high plus a warmer climate. The bookends are described in the attached spreadsheet. The maximum demand to be met is about 220,000 acre-feet per year for the Metro Basin. The bookend approach is a simplification for the Tool exercise and either bookend may be overstated.

b. Key Considerations

There are obviously many important tradeoffs and issues to consider when choosing the amount of additional M&I water supply that would be developed from New Supply or Agricultural Transfers. Opinions vary among Metro Roundtable members about these considerations. While there is not complete consensus among members on all these issues, below is a summary of the discussion and current thinking among Metro Roundtable members.

Water Use Efficiencies. The Metro Roundtable is leading the state in water use efficiency and believes it is in its best interest to continue to lead the state into the future. The Metro Roundtable has the lowest gallons per person per day (gpcd) water use rate. This occurs even though the Metro basin has a higher industrial use per person than most of the communities in the rest of the state. The Metro Roundtable also has the highest municipal water reuse rate. Additional reuse is expected through innovative advanced water retreatment methods and cooperative water and facility sharing arrangements, such as the proposed WISE project. In the WISE project, water reused from west slope and other sources will extend the life and usefulness of the Denver Basin aquifer, making more efficient use of local resources, while negating the immediate need for additional water.

Nearly all unused municipal return flow is put to agricultural use in the Lower South Platte basin. The Metro basin has among the highest economic return per acre-foot of water used. Likewise the economic return on agricultural water use in the South Platte basin is among the highest in the state. However, it is also important to recognize that water uses in other parts of the state, and the environmental, recreational or aesthetic value of water, are just as important to the future of Colorado.

Water customers of Metro area water utilities have reduced per capita water use by approximately 20 percent in the last decade. Much of the metro area's lawn watering levels are at or near the minimum levels needed to maintain viability. Water providers are committed to increasing efficiencies in the future; however, they are also seeing limits to the amount of additional conservation savings that can be attained unless there is a broader societal decision to legislate high efficiency fixtures and change the urban environment to a more xeric landscape. Utilities encourage conservation through water rate designs, education, watering schedules and rebate programs, as well as water waste rules. Enacting ordinances and legislation to require more efficient plumbing fixtures and landscaping - the next step in water conservation requires unity in political will beyond the authority of metro water providers. The recently unsuccessful attempts to propose legislation to require the sale of more efficient toilets and to allow grey water use typifies the need for political will to gain higher levels of efficiencies. In its conservation paper, the Metro Roundtable described what it believes to be reasonably achievable maximum level of conservation that water utilities can achieve through 2050, absent more fundamental changes in lifestyle and development patterns.

The Metro basin has opportunities to redevelop lands for greater job and population densities. Increasing residential density, while not considered in the Portfolio Tool, has the potential to significantly increase water use efficiency. In addition to requiring less water, increasing density within existing urban service areas carries the added benefits of maintaining open space

and agricultural lands, reducing energy demands and increasing the efficiency of transportation systems. Again, this will take broad political support to achieve. Living and working in a more densely populated environment has and will continue to result in a lower impact on natural resources.

As mentioned above, decisions about land development are generally within the purview of county and municipal governments, but not water utilities. Similar to enacting water efficiency ordinances and legislation, enacting land development decisions that may result in more efficient water use will require political will beyond the authority of water utilities. Historically, water utilities have generally not attempted to influence land use decisions. However, it would be worthwhile for water utilities to discuss water efficiency measures with land use planners and decision-makers in their service areas. Water utilities that are governed by elected municipal officials may have more influence on land use decisions than utilities that are independent governmental entities.

Growth. Half of all population growth in Colorado will consist of people moving into Colorado to fill jobs, mostly into the urban areas along the Front Range. The other half of population growth will come from the existing population within the state, because the reproduction rate is greater than 1.0, i.e., the birthrate is higher than the death rate. Being able to supply the water needed for these new jobs and new people is in the best interest of the entire state. Likewise, providing that supply in a responsible way that best accommodates the needs of our environment and agricultural sector is also in the best interest of the entire state.

In order to accomplish this goal, metro basin water providers need the assistance of political and business leaders that promote job growth. We need support for state policies and legislation on conservation, for permitting of IPPs, for legislation enabling alternative agricultural transfer methods and for development of New Supplies. The IBCC and the basin roundtables have the responsibility for initiating and building this political will if they want to avoid the default to traditional Agricultural Transfers.

High Costs. The cost of developing additional M&I supply is rapidly increasing. Most of the gravity-fed, high water quality options have been developed. Most additional supplies will require long pipelines, pumps for large elevation lifts and advanced water treatment. The CWCB's SWSI 2010 technical team developed estimates of the total life-cycle unit costs (the net present value or capitalized cost of water, conveyance, facilities and operating and maintenance costs) of several 100,000 and 250,000 acre-foot projects. These include projects on the lower Yampa River, Green River at Flaming Gorge, the Gunnison at Blue Mesa, the lower Arkansas River and the South Platte River. Total life cycle cost (net present value of capital and

operation and maintenance costs) range from about \$80,000 to \$100,000 per acre-foot of additional supply. Smaller projects like the Green Mountain and Ruedi reservoir pumpback projects cost about \$40,000 per acre-foot.

All these projects require long pipes and large elevation lifts. All of the New Supply projects would require expensive conveyance costs from long pipelines and pumping requirements for large elevation lifts. The Agricultural Transfer projects from the Arkansas or South Platte would also require expensive advanced water treatment in addition to conveyance costs.

Unless there is a large New Supply project available to smaller water utilities to share in the economies of scale, these smaller water providers might be unable to develop New Supply and hence would use Agricultural Transfers instead.

Similar to supply projects, much of the low hanging fruit of conservation and reuse projects has been picked. As a result, new water efficiency projects are becoming more expensive than previous projects and those being pursued at present.

Water Quality. As explained above, projects that take water from the lower reaches of rivers will require costly advanced water treatment. Likewise, growth in the Metro basin area results in increased wastewater discharges, lower dilution flows, and an increase in the costs to treat water from the South Platte River in the Metro basin area. Reuse projects and diversions from the South Platte in the Metro basin will require expensive water treatment. Blending with higher quality existing supplies may be possible at lower volumes of new supply. Advanced treatment includes reverse osmosis which has associated brine disposal challenges.

Managing the Risk of Reduced Supplies. Simple hydrology modeling performed for the Colorado River water banking study shows that there is a low probability of the Upper Basin failing to meet Colorado River Compact obligations at existing demand levels and using observed streamflow (recorded from the last 100 years). In fact, under these same assumptions the probability of failure to meet compact obligations remains less than a few percentage points in any given year even if 700,000 of acre-feet of additional depletions occur in the upper basin.

However, preliminary modeling indicates that the probability of curtailment would increase to a little over 10 percent if there were to be a streamflow decrease of 10% combined with the 700,000 acre-feet of additional depletions. A cooperative water bank study is exploring the concept of municipal water users paying agricultural water users to reduce water uses in order

to avoid curtailment or lessen the impact of curtailment on those municipal water users. The roundtable supports these efforts.

Other roundtables have discussed the concept of establishing triggers and other tools to manage use of Colorado River water in an effort to meet Compact obligations. The Metro Roundtable supports further discussions of these concepts as a way to adaptively manage and develop New Supply and recommends that voluntary demand reductions also be explored. An adaptive management approach that allows for full development of Colorado's Compact entitlement to supply future demands on both the east slope and the west slope should be explored instead of attempts to limit development of Colorado's allocation of water. The Metro Roundtable, however, opposes efforts to establish an arbitrary cap on water use.

Hydrology modeling of climate change projections that was performed for water utilities along the Front Range shows that a considerable range of possible streamflow changes, from wetter to drier conditions, are projected in the east and west slope watersheds that supply the urban communities along the Front Range. The ability to use or receive credits from *senior* agricultural water rights, from one or both slopes, could provide important coping strategies (hedges) against the risk of a hotter and/or drier climate.

While helping to preserve agriculture on the east slope, developing New Supplies on the west slope could affect west slope agriculture if it results in agricultural demand reduction strategies necessary to meet Compact obligations. Also, apparently some west slope roundtable members are concerned that if a transbasin pipeline is built, instead of filling it with New Supply (new water appropriations), Front Range water providers would instead use Agricultural Transfers on the west slope (buy senior agricultural rights) to create a more "firm" supply to better guarantee the success of their water supply project.

Storage. Nearly all future supply strategies require additional water storage. Storage makes more efficient use of water and provides benefits beyond M&I water supplies. Storage is also a method to hedge against drier conditions. If the state's climate becomes drier, it will be even more important to store water in wetter times for later use. The Metro Roundtable believes carefully designed and operated storage in reservoirs and aquifers such as the Denver Basin is a viable management tool for meeting future water needs. Conjunctive use of Denver Basin aquifers with New Supply available in average or wet years is an opportunity to stretch the Basin's significant groundwater resources to meet future demands.

The Roundtable has used Water Supply Reserve Account funding to study the viability of deep aquifer storage and recovery with the South Metro Water Authority. Past studies show that

surface storage is needed to temporarily capture streamflow when it is available during high runoff periods until there is capacity to pump it into the deep aquifers for long-term storage.

Identified Projects and Processes. The Portfolio Tool exercise helps highlight how critical the success of IPPs are to meeting the municipal supply gap. IPPs proposed by metro area providers, if successful, will provide much of the water supply needed for the project proponents through 2025. But they won't meet all needs of the Metro basin. IPPs are in fact the foundation of the entire portfolio exercise and the basis for the state to move forward to meet the water supply gap. The planning exercise has demonstrated that if these IPPs fail, the whole effort to meet the supply gap founders. Success is so important to meeting the gap that the Metro Roundtable believes that all roundtables and the IBCC must support the implementation of the water supply IPPs.

Success of IPPs is far from a safe assumption at this time. Many supply projects currently being pursued by Metro water providers are enlargements of or reoperations of existing water facilities and are designed to have less environmental impacts by using existing facilities. Unfortunately, these projects are stalled in long environmental review processes, some over 10 years, with no definite end in sight. For example, the effort to reallocate the storage capacity in Chatfield Reservoir from flood control to municipal water supply use has been in approval processes for 13 years, even though no new storage capacity is being constructed.

Alternative Agricultural Transfer Methods. The Metro Roundtable supports and is encouraged by the studies investigating methods for reducing the impacts of Agricultural Transfers. Additional study of practices that allow for continued agricultural production, while at the same time permitting municipal uses, is encouraged. Examples of such practices include, switching to cool weather crops, reducing soil moisture evaporation (e.g., mulching or drip irrigation), leasing/fallowing, deficit irrigation and dry year leasing.

When a local government issues a water tap, the water provider has the obligation to supply that tap continuously and permanently. To meet that obligation, most water utilities would need a permanent and dependable right to the use of agricultural water. However, some Denver Basin municipal water providers may be able to extend the life of their groundwater supplies significantly through the conjunctive use of agricultural water when it's available. In addition, some municipal water providers may have adequate base supplies, but lack adequate supplies to meet dry year demands and/or refill storage following a drought, a need that agricultural water may be well suited to meet to increase the reliability of the municipality's supplies. In short, there are many innovative ways to meet municipal water supply needs and to help maintain the viability of agricultural communities and economies. Holders of agricultural water rights should not, however, be prevented from selling their property right.

Environmental and Social Impacts. The Metro Roundtable understands the potential for negative impacts to local communities and environments from the development of New Supply and from Agricultural Transfers. The Roundtable seeks to better understand the concerns of the other roundtables on these issues.

Environmental and social impacts can occur on the east slope from Agricultural Transfers as well as on the west slope from New Supply development. The metro area residents benefit greatly from the food production and from the recreational amenities on both the east and west slopes. Likewise, we believe the recreational and agricultural communities benefit from the purchases of their goods and services by the metro area market. Preserving the mutual trade of values between areas of the state is important our future.

The Metro Roundtable believes there are opportunities to minimize the negative impacts of projects and in many cases produce positive impacts through close consultation with affected interests. Projects that are carefully designed, that embody multiple purposes and that feature adaptive management can lead to win-win solutions. The Colorado River Cooperative Agreement is the leading example of this approach.

Preserving Options. The portfolio exercises demonstrate the enormous challenges the state of Colorado faces in providing water for its economic and population growth. The roundtable is of the opinion that it is vital that the full range of M&I supply options be preserved for future generations to decide how best to meet their supply needs based on the circumstances they will face. Limiting options at this time would be irresponsible to future generations.

The Metro Roundtable believes that supply options should be preserved for all basin roundtables. This includes preserving New Supply options for future generations on both the west and east slopes. As noted above, some west slope roundtable members are concerned that new transbasin projects supplying the Front Range might use Agricultural Transfers on the west slope as the source of water instead of using New Supply (unappropriated water) on the west slope. Preserving the option to develop New Supply on the west slope could help avoid this concern. Otherwise, the state may be left with just the option of choosing between east slope and west slope Agricultural Transfers to meet future M&I needs.

There are many challenges to development of New Supply. These include water rights for recreational in-channel diversions and wild and scenic river designations, or their alternative protection plans. These actions can impede development opportunities and/or push them toward or past state lines, further away from the urbanized areas. On the Colorado River, this

could prevent use of the state's compact entitlement. Water efficiency enhancements (conservation and reuse) alone are not enough to meet the M&I supply gap.

Despite that fact, Metro basin water providers are up against great challenges to secure permits, even in developing small, incremental extensions of existing water systems. Without a fairly quick and strong reversal in lack of political will to protect the ability to develop New Supply, it appears that Agricultural Transfers will inevitably be the default for supplying the water for the economic and population growth of the state.

While the Metro Roundtable supports Agricultural Transfers as “one leg of the stool” to help meet the water supply gap, the Metro Roundtable does not support relying exclusively on Agricultural Transfers for the additional supplies needed to meet the water supply gap and instead urges a balanced approach which includes development of needed New Supply projects in the short-term and preservation of options to develop New Supplies in the long-term.

Summary of Considerations

- Metro basin water utilities are leaders in water efficiency and plan to push the practical limits of conservation and reuse. Achieving higher levels depends on lifestyle changes that will require broad statewide support and political will beyond the purview of metro area water utilities.
- Even at high levels, water efficiency (conservation and reuse) is not a panacea for meeting the water supply needs of the expected economic and population growth in the state.
- Small, incremental additions to existing supply projects, which have lower impact levels than building new supply projects, are detained in approval process with no definite end in sight.
- Substantial amounts of New Supply can be developed within the state's Colorado River Compact entitlement. Management techniques such as water banks and methods for temporarily reducing water use during dry conditions are available to manage a warmer and/or drier climate. However, artificially capping development due to a fear of a “compact call” merely shifts future risks to agriculture.
- Options to develop New Supply are systematically being closed, and a concerted effort is needed to preserve future options to develop New Supply. A balance needs to be struck between providing protections for in stream uses and retaining options to develop supplies in the future if and when they are needed.
- Additional storage is key part of the solution to the supply gap.

- The Portfolio Tool exercise highlights the realities that even by pushing water efficiency to practical limits, the difficulties in developing and preserving New Supply options makes some Agricultural Transfers the default option if decision makers do not exercise the political will to preserve and promote opportunities to develop New Supply for use along the urban Front Range. The Metro Roundtable opposes this default approach and seeks a more balanced approach.
- Alternative transfer methods may reduce impacts of Agricultural Transfers and such techniques should continue to be developed. To be successful, the transfer method must provide a permanent, reliable supply of water for water utilities. However, in some cases interruptible, drought leases may work and it might also work to have the ownership of the water and lands remain in agriculture. Innovative approaches like this may require supportive water rights legislation to address the difficulties that have been encountered in the water court process.
- Unfortunately, climate change is not directly considered in the Tool. The Metro Roundtable included in its portfolio exercise the consideration of a temperature increase of 5 degree F, which is in the mid-range of projections for 2050. Analysis indicates this would decrease supplies by about 20 percent and increase municipal demands by about 10 percent. This dramatically increases the supply gap. Because the consequences could be high and water utilities are taking this threat very seriously, the Metro Roundtable believes it is critical that the IBCC also consider climate change in its Portfolio Tool exercise.

4. Our Vision for Meeting the Municipal Supply Gap

As explained above, the Metro Roundtable believes in preserving the ability to use Colorado's entitlement under the Colorado River Compact and to pursue Agricultural Transfers. The bookends approach is an effort to preserve both of these options for water needs through 2050 and well beyond. Closing either of these options would be irresponsible to future generations who should be left with the ability to choose how to best use Colorado's water resources, depending on the conditions they face at the time. Those uses could be for municipal, industrial, agricultural, recreational, environmental or other yet-to-be identified uses.

The Metro Roundtable does not anticipate that either extreme will be pursued. A balance should be sought while maintaining options for future generations, as well as preserving and enhancing environmental and recreational values and protecting private property rights.

In this section, the roundtable describes a possible integrated, managed approach that is somewhere between the bookends. Much of the value of scenario planning (upon which the

Portfolio Tool is based) is lost when only a middle of the road option is available. Middle options tend to be paths of least resistance that don't prepare for the range of possible challenges. This middle option is being suggested only to the extent that it is considered in the context of the bookend approach, and the need to preserve a range of options for the future.

In essence, our vision is for the state to plan for an integrated, managed approach to meeting the M&I supply gap. This approach would develop, and preserve the potential to develop, New Supply, and more storage, and would utilize Agricultural Transfers while simultaneously enhancing efficiencies (conservation and reuse) and building our IPP's. Our goal is to prepare for future water needs in a way that maximizes the state-wide benefits of our water resources and while minimizing the impacts.

Ideally, projects would be multi-purpose, with associated recreational and environmental benefits. New Supply would be developed in a manner that does not exacerbate compact risks. East slope storage would come from enlarging existing reservoirs, building off-river storage, and using underground storage to minimize riparian impacts. New Supply and east slope storage would form the base of the M&I supply. East slope Agricultural Transfers and conjunctive use of the Denver Basin Aquifer would be used primarily for droughts and drought recovery. Alternative agricultural transfer methods including land and water conservation easements could be used to help maintain agricultural production and the local economic benefits of agriculture.

Our vision is to develop solutions to use New Supply and Agricultural Transfer in a coordinated manner to reduce recreational, environmental and social impacts and to equitably spread project impacts between the east and west slopes. We are proposing the building of projects that develop both sources of supply – from New Supply and Agricultural Transfers – instead of building a project that has a single source, from either New Supply or Agricultural Transfer. Because the facilities needed essentially doubles with dual source projects, the cost would roughly double compared to single source projects. These higher costs may be well beyond the ability of water utilities to finance. To afford the benefits of dual source systems, additional funding sources would probably be needed. This should be a research area for the IBCC to consider.

Far-sighted management would maintain the capability to scale and adjust project sizes and purposes as needed in the future, assuming the options to build the projects are preserved. For instance, a warmer climate could be managed through water banking or other demand management programs on the east and/or west slopes, while allowing additional supplies to be developed for future job and population growth.

For the near term, the next 20 to 40 years, all IPPs should be successfully implemented. Small supply projects on the west slope could be developed such as those identified in SWSI studies, Colorado River Water Conservation District studies and other studies. If properly designed and operated, these small supply projects should have multiple benefits for the east and west slopes while minimizing environmental impacts. The Metro Roundtable favors a risk management program for the Colorado River compact that addresses existing water uses and new water development and provides benefit for both the west and east slopes. On the east slope, new storage could be built through enlarging existing reservoirs and building off-river reservoirs and underground storage using the Denver Basin aquifer. This storage would be paired with east slope agricultural water for use in droughts and drought recovery.

Based on our bookend approach for the scenario planning, we envision preserving New Supply and Agricultural Transfer options for meeting long term needs. Our vision is to preserve the following options for future generations to determine whether they should be developed:

- West slope multi-use New Supply projects capable of producing roughly 250,000 acre-feet of M&I supply for the urban Front Range from the Green, Yampa and/or Gunnison Rivers.
- East slope Agricultural Transfer projects (including the use of alternative transfer methods) capable of producing roughly 250,000 acre-feet of M&I supply for the urban Front Range from the South Platte and/or Arkansas rivers.
- Additional East slope storage opportunities to maximize the use of the new supplies.

To preserve these long-term options for future supplies, the following actions would be taken:

- Where needed, obtain water rights that protect the New Supply options described above. Use the IBCC process as a starting point to determine where water rights might be needed to protect the options describe above, when the water rights should to be filed, how they should be filed, who should file and hold the rights, and how the water rights would be maintained for the long-term.
- Consider legislation to establish a mechanism for the obtaining and maintaining of water rights that protect the New Supply options.
- Investigate the viability of obtaining Bureau of Reclamation water contracts in lieu of water rights.
- Require an allowance for these new projects in relevant Recreational In-channel Diversion projects and Wild and Scenic processes and alternative protection plans. (Note, until there would be a decision made on the merits of whether to build a supply project, the instream flows would remain unaffected. As described above, the project

would be designed to minimize impacts to and, where possible, enhance instream values).

- Ensure early state involvement in these new projects, supporting project proponents in all local, state and federal processes once initial concerns are identified and addressed.
- Obtain land or right-of-ways for project facilities.
- Continue efforts to recover federally listed endangered species and to keep new species from becoming listed.

While near term supply projects are being developed and the long term projects are being preserved, the water efficiency (conservation and reuse) challenges explained above should be overcome to continue to increase urban water use efficiency and minimize the need for additional supply development.

Recommended Improvements to the Portfolio Planning Process

Having developed its own spreadsheet to help overcome limitations in the Portfolio Tool and having considered the integrated, managed approach which is beyond the capability of the Tool, the Metro Roundtable recommends use of other evaluation tools or improvements to the Portfolio Tool or subsequent analyses before the IBCC selects its representative portfolio scenario planning exercises. These include the ability to:

- Display conservation since the year 2000, and base the amount applied to the gap on total conservation between 2000 and 2050.
- Add ability to custom select the values for the following variables: conservation, reuse factor, safety factor, climate factor and environmental flow metrics.
- Add the option to make additional use the Colorado River only in wet and average years and to pair that supply with storage and/or dry year leasing of agricultural water and/or water banking.
- Display flow impacts to actual flow not pre-development conditions. (For instance, the South Platte accretion/depletion calculations could be used statewide. These calculations display changes to actual flows, not pre-development conditions).
- Display the actual amount of additional supply diversions.
- Add a factor to reduce demand with increasing population density.
- Add a feature that adjusts returns flows available for reuse based on conservation measures employed. (This feature could be similar to how the calculation of South Platte accretion/depletion adjusts returns with municipal conservation.)
- Account for losses from source to treatment. (These losses can be as high as 30 percent).

- Identify the level of reliability of supply projects and their ability to meet supply needs.

The Metro Roundtable recommends that a disclaimer, similar in nature to the one on this paper, be added to all Portfolio Tool material to make clear the purpose and limitation of the Tool including that it is inappropriate for use in regulatory and judicial processes.

5. Concluding Comments

Our concluding comments are:

1. **The role of water utilities.** The role of water utilities is to serve customer's water needs. In the Metro Basin, this requires serving water for a growing population and growing businesses. The amount and pattern of this growth is determined by others. Metro area utilities will provide water for growth through conservation (see item 2 below), reuse and development of additional water supplies. Metro area water providers have the responsibility for meeting much of the state's future supply gap. Water providers take that responsibility very seriously.
2. **Achieving Higher Levels of Water Savings.** As statewide leaders in conservation, Metro basin utilities plan to push the practical limit of conservation and reuse. However, it should be recognized that the authority and role of utilities in planning for and achieving defined conservation goals is highly limited. The basic tools at our disposal are rates, advertising, rebates and incentives. Utilities cannot "regulate" water use. Utilities cannot control land use. Utilities cannot mandate grass be removed. Utilities cannot mandate high efficiency appliances and fixtures. Obtaining greater savings in outdoor water use would require major changes in landscaping. This goes beyond efficiency measures and involves lifestyle considerations about our urban environments. These decisions needed to be made and implemented at the broader community level, not at the water planner level. Achieving higher levels of indoor conservation will require broad political and public support for plumbing code changes and other measures that are beyond our sole control and involve lawmakers at multiple levels of government.

Changes in land use planning, such as zoning modifications that could increase density levels, can increase water efficiency, but it also requires broad political support. Water utilities can help initiate change by discussing water efficiency measures with land use planners in their service area.

3. **Conservation is not the panacea.** The Tool exercise helps to demonstrate that even high levels of indoor and outdoor water saving won't meet the projected supply gap.
4. **Without the political will to support alternatives, dry-up of agriculture is the default supply.** The Portfolio Tool exercise demonstrates that without broad political support for the changes described in this paper for conservation measures, for alternative agricultural transfer methods, for successful implementation of IPPs, for new storage projects and for the development and preservation of new west slope supply options, large transfers of water from east slope agriculture use becomes the default source for filling the municipal supply gap. The most needed change, if large scale agricultural dry-up is to be avoided, is to develop support for small scale supply projects in the near term and for preserving the option to build large scale supply projects if needed in the longer term. However, the ability to pursue Agricultural Transfers, as well as agricultural water right owner's ability to sell their water, should be preserved as an option for development of additional supply in the future.
5. **Our vision is a balanced, integrated plan.** The Metro Roundtable does not support the agricultural default plan. And, we reject the false choice in the Portfolio Tool of picking between the west slope environment and east slope agriculture. We propose a balanced plan of conservation, reuse, IPPs, storage, New Supply development and Agricultural Transfers developed and operated in an integrated manner that maximizes benefits and minimizes impacts. A key measure in this plan is building integrated projects comprised of New Supply, Agricultural Transfer and new storage, operated in a manner to minimize impacts to agriculture and the environment and where possible to make enhancements. While minimizing impacts, this type of integrated project would be very expensive. Water utilities customers alone can't afford to pay for this approach. Broader political and financial support is essential if the state wants to minimize the water related impacts of growth.
6. **Support from beneficiaries of growth.** There is a close linkage and dependence between the economies of the various regions and business sectors of the state. Job growth is a key component of the state's economy. Job growth in the metro area provides economic growth in the agricultural, recreational, tourism, manufacturing and other sectors of the state's economy. New jobs mean more people and businesses using water. To provide that water, we need the support of those business communities and political leaders that promote and benefit from economic growth to help make the changes described above and to help avoid the default plan of agricultural dry-up.

7. **IBCC leadership is critical.** The Metro Roundtable calls for the IBCC to actively support new conservation legislation, full development of IPPs, water sharing projects between ag and municipal user, development of small scale supply projects and preservation of options to develop future supply projects on the West Slope, as described in this paper. Without leadership from the IBCC to build political support for this balanced plan, metro water providers will be left with the default of pursuing large ag transfers for meeting their water service obligations.