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Sustainability is the ongoing process of securing a quality of life for ourselves and future generations. Over the course of human history, we have been able to sustain ourselves by using abundant and readily accessible resources and the natural world has had the capacity to process the resulting waste. Now however, sustainability is becoming part of our greater understanding because we are realizing we live in a world with limits, and those limitations are causing a decrease in our quality of life, and perhaps a challenge to our existence. The state of our natural ecosystem that yields a continuous flow of valuable goods or services is in a deteriorating state and population pressures are accelerating the problem.

Tucson is a desert community living beyond the carrying capacity of its local resource base. The vast majority of resources are imported, including food, fuel, material goods, and more recently, water delivered through the Central Arizona Canal. We are sustained by a resource transport system that relies almost entirely on fossil fuel. Unfortunately, consumption of fossil fuel supports us on the one hand and strikes with the other. While this transport system supplies us with consumable goods it also produces carbon dioxide, undercutting the stability of our shared climate and destroying the natural capital¹ that needs to remain the basis of our physical support. Carbon dioxide emission reductions should therefore be a major part of the sustainability equation.

Science suggests worldwide levels of CO₂ emissions need to be reduced by between 50% and 85% by 2050². Others argue that zero or negative carbon goals are urgently needed³. Regardless of the actual percentage, science is indicating major reductions will be necessary to mitigate climate change. Fortunately, emission reduction agreements have already become stated policy. The Western Climate Initiative⁴, signed by Arizona Governor Napolitano and the U.S. Mayors Climate Protection Agreement⁵ signed by Mayor Walkup, both call for large-scale CO₂ emission reductions. A draft greenhouse gas inventory for Pima County and the City of Tucson just released, will help determine the baseline for greenhouse gas reductions and what part the City and County water and wastewater systems should play in meeting these goals. An 85% reduction in CO₂ emissions worldwide by 2050 is a daunting task to say the least. It seems likely a rethinking of infrastructure and level of services will be necessary in order to meet those goals.

One way or another, a sustainable water system will require making sure the whole system satisfies carbon emission goals. In rethinking the water system in this time of environmental fragility and considering the problems associated with carbon emissions, one obvious approach suggests creating a system that inherently requires less energy. Developing water supply that falls naturally at or near point of use can use gravity to advantage, eliminating major environmental and energy costs. The case may be made that

¹ Natural Capital definition: Natural capital is the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future.

² IPCC Fourth Assessment Report. Working Group 3. Mitigation of Climate Change

³ Spratt, David and Sutton, Phillip. *Climate 'Code Red' - the case for a sustainability emergency*, 2008

⁴ www.westernclimateinitiative.org

⁵ www.usmayors.org/climateprotection/agreement.htm

the water we have been importing over long distances and raised to great heights, may be better used in other ways. Colorado river allotments currently delivered to Tucson may be more efficiently used supporting agriculture in the Colorado River lowlands and restoring the fisheries beyond its delta.

So what might a sustainable water system look like in Tucson? It could be based on non-imported water, catching all necessary rainwater for residential use at or near where it would be used. Charles Cole (who has presented for this committee) has demonstrated that water harvesting can be done, satisfying typical residential water needs in Tucson. A public wastewater system could collect excess or sewer wastewater, purify it to necessary standards, and recirculate it for toilet flushing and distribution to recreational areas and for fire suppression. Aquifer pumping could be discontinued until natural recharge restored surface flows in riparian areas. Once the aquifer was restored, excess water could be banked appropriately. Commercial and industrial users would be responsible for their own water supplies, either by leased catchment or private pipeline, and be responsible for any cost incurred or waste products produced. Water rates would be based on the cost of treatment and pumping (using carbon neutral renewable energy), as well as the amortized cost for the catchment and necessary piping infrastructure. In this whole-system approach, each citizen would be responsible for their actual water use and assessed a share of cost of public amenities such as green space and fire protection.

Any sustainable water supply system for Tucson will need to meet the carbon emissions requirements necessary for climate change mitigation. If we continue to import long distance water, a thorough analysis is needed to prove its merit. Alternatively, one could design a system based on the only truly renewable water resource we have – rainfall. We have technology that allows us to recycle that water to maximize its use for our community purposes. What environmental and financial costs either of these options incur should be compared and brought before an informed public before requesting funding for major public investment.