

Is the Lake Powell Pipeline Affordable?

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Thanks to:
Gail Blattenberger
Associate Professor of Economics Emeritus
University of Utah



What is the Lake Powell Pipeline?

The Lake Powell Pipeline is a proposed

- 139-mile
- 69-inch diameter buried pipeline carrying water
- from Lake Powell (the reservoir formed by the Glen Canyon Dam on the Colorado River)
- to the southwest Utah counties of Washington and Kane.
- At full capacity, it will deliver
 - 82,249 acre-feet/year to Washington County and
 - 4,000 acre-feet/year to Kane County.
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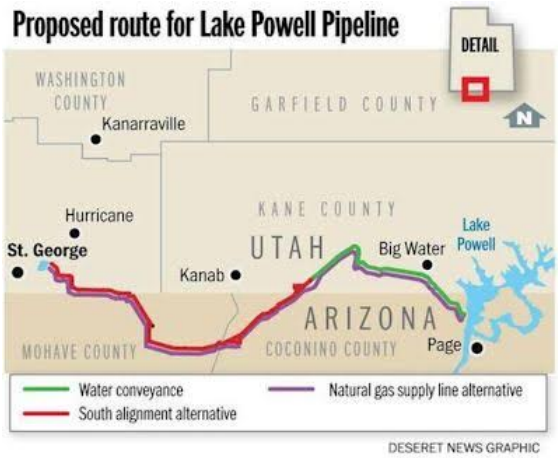
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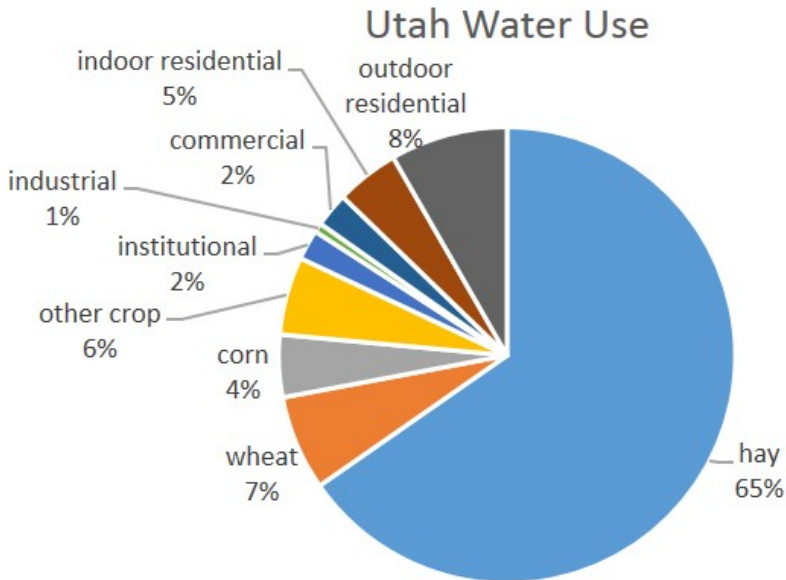


source: <http://www.wcwd.org/projects/lake-powell-pipeline/>



source: http://www.greatbasinwater.net/powell_pipeline.htm





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How affordable would this be?

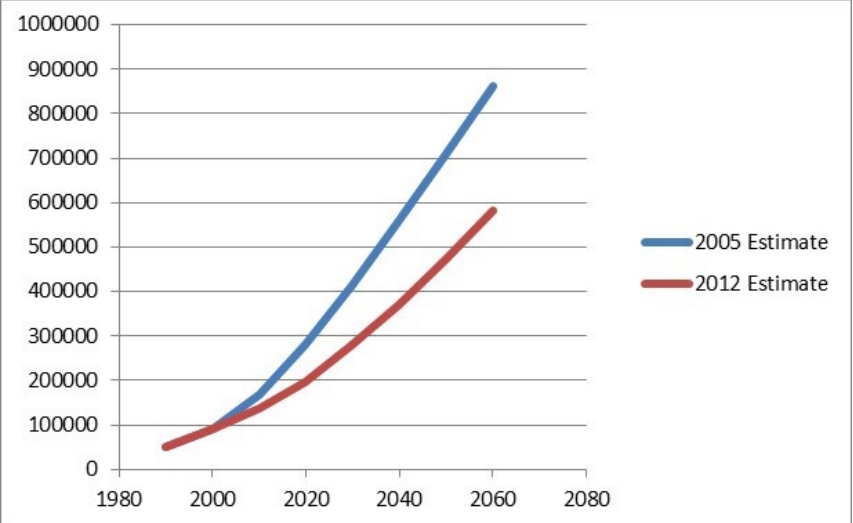
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How affordable would this be?

The “Economists’ Model”



Population Projection for Washington County



source: Governor's Office of Planning and Budget, 2012

lozada@economics.utah.edu; www.economics.utah.edu/lozada

Is the LPP Affordable?



LPP Costs & Revenues

For Washington County only (approx. 94% of total):

	Low Cost	High Cost
Construction Costs	\$1,328,461,944	\$1,750,908,555
"O&M"	\$23,493,231	\$62,867,794
Power sale revenue	\$9,947,747	\$72,005,740

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Other WCWCD income & expenses

- Property Taxes (\$9,938,660 in 2013, rising with population)
- sale of Real Estate
- Debt Service on existing debt
- Impact Fees (\$6102/ERU in 2013, rising with population)
- Water Sales (\$7,013,377 in 2013, rising with population)



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Base Case: No Price or Fee Changes, Low-Cost Scenario

- Utah Code Title 73 Chapter 28 Part 4 Section 402 (4) (a portion of the Lake Powell Pipeline Development Act):
"The board shall establish and charge a reasonable interest rate for the unpaid balance of reimbursable preconstruction and construction costs."
- Assume the LPP is paid for with a 50-year "mortgage" at 4%.
- Annual debt payment: \$61,840,170.
- WCWCD capital account balance in the year 2064: -\$6,732,647,870.
- So price and/or fee changes are needed.



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Price and/or Fee Changes that pay off the LPP by 2064:

	Increase in Impact Fee Revenues (factor)	Increase in Water Sales Revenues (factor)
one option	0	4.18713
another option	3.45680	0
yet another option	$1 + \frac{1}{2} \times (3.45680 - 1)$ = 2.228	$1 + \frac{1}{2} \times (4.18713 - 1)$ = 2.594
in general	$1 + (1 - c) \times (3.45680 - 1)$	$1 + c \times (4.18713 - 1)$

for c between 0 and 1.

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Obtaining Increased Revenue

So:

- Impact Fee Revenue has to increase and
- Water Sales Revenue has to increase.



Obtaining Increased Impact Fee Revenue

- The impact fee with no fee changes was \$6,102.
- It has to increase to $2.228 \times \$6,102 = \$13,598$.
- The WCWCD can decree this change.
- This will result in the price of the average home site falling by the same amount, so the losers are current Washington County landowners, not newcomers.



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Obtaining Increased Water Sales Revenue: year 2050

Taking the year 2050 as an example, the water sales revenue with no price changes was \$22,644,522.

We need to increase it to $2.594 \times \$22,644,522 = \$58,730,040$.

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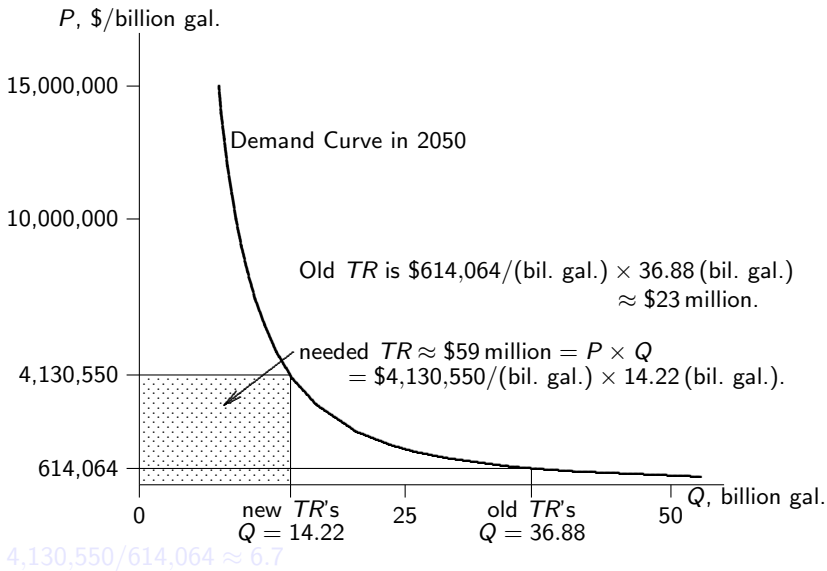
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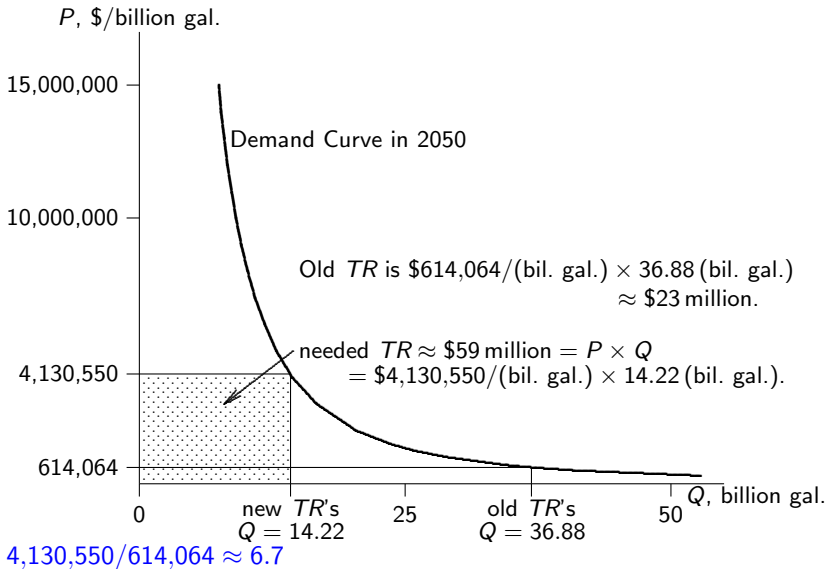
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TR is "total revenue," which is price times quantity.





Capacity in 2050 without LPP

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74,560 ac-ft/yr: p. ES-15 I.2

7,450 ac-ft/yr: p. ES-15 I.2 (secondary)

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Sum:130,840 ac-ft/yr. This equals **42.63** billion gallons, used in the graph.

The water district's model, sheet 'Dynamic Population'S56, "anticipated supply after evaporation": 70,773 ac-ft/yr. That is **23.06** billion gallons.



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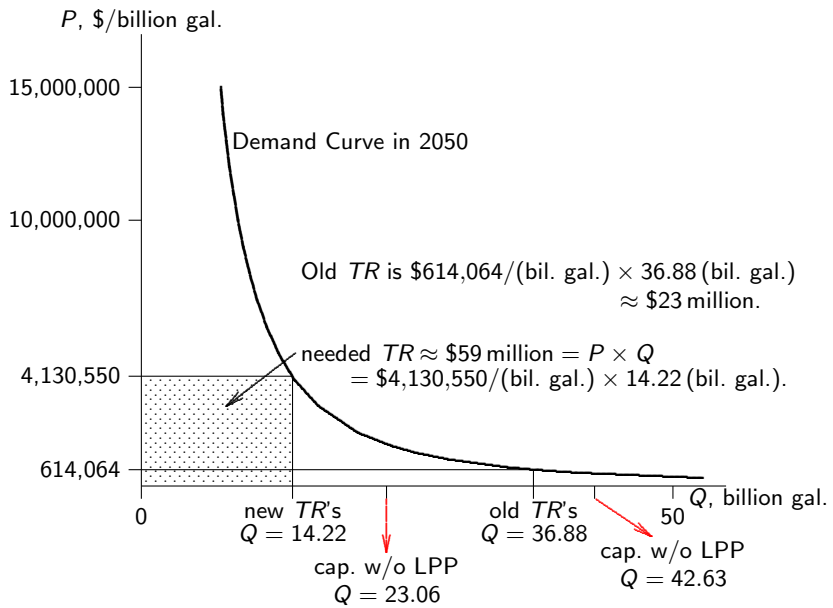
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Summary of Base Case for Economists' Model

- District's annual debt payment \$62 million for 50 years (\$3.1 billion in total).
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The Washington County Water Conservancy District's Model



Base Case of the WCWCD Model

Model by Applied Analysis, Inc., of Las Vegas, Nevada.

- Use the same projection of population (GOPB 2012)
- Take construction cost to be \$969 million (vs. \$1.3 billion or \$1.75 billion)
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Base Case

- The WCWCD model uses an interest rate of 4.5% for its base case.
- We'll change this to 4% so it matches our model. (This makes the LPP more affordable than 4.5%.)
- In our model, the cumulative payments over 50 years were \$3.1 billion.
- The WCWCD project cost is \$969 million/\$1.3 billion = 75% of the cost in our model.
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Debt & Payments in 2014 dollars

	LPP Cost	Sum of Payments in 2014 \$
Econ. Model	\$1.3 billion	\$1.3 billion
WCWCD Model	\$969 million	\$306 million

\$306 million/\$969 million = 32%.

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$\$306 \text{ million} / \$969 \text{ million} = 32\%$.

WCWCD Repayment Schedule

Date	% of 2014 LPP cost to be repaid	million \$ to be repaid	repayment in million 2014 \$
2014		50	50
2032	1.2%	10.8	5.3
2033	2.3%	20.7	9.8
2034	2.3%	21.3	9.7
⋮	⋮	⋮	⋮
2050	3.8%	35.3	8.6
⋮	⋮	⋮	⋮
2060	5.1%	46.8	7.7
sum	100%	969	306

Note: Year 2061 is actually the last year of payments; fixed in our version of the WCWCD spreadsheet.



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Date	% of 2014 LPP cost to be repaid	million \$ to be repaid	repayment in million 2014 \$
2014		50	50
2032	1.2%	10.8	5.3
2033	2.3%	20.7	9.8
2034	2.3%	21.3	9.7
⋮	⋮	⋮	⋮
2050	3.8%	35.3	8.6
⋮	⋮	⋮	⋮
2060	5.1%	46.8	7.7
sum	100%	969	306

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"Pay as you go" does not allow interest to be forgiven

Utah Code 73-28-402 (Lake Powell Pipeline Development Act):

- (2) If a contract was made before the project's completion, the district shall repay the preconstruction and construction costs within 50 years from the date of:
 - (a) the delivery of developed water to the district during the first ten years after the project is completed; or
 - (b) the project's completion for any developed water delivered to the district after the tenth anniversary date of the project's completion.

- (3) If a contract was made after the project's completion date, the district shall repay the preconstruction and construction costs within a period not to exceed 50 years from the date that the contract was made.



"Pay as you go": an example

Example: "Completion" in 2030.

If sign after 2030: due in full by 50 years after signing, in 2080.

If sign before 2030:

water delivered	payment due in full by	water delivered	payment due in full by
2030	2080	2036	2086
2031	2081	2037	2087
2032	2082	2038	2088
2033	2083	2039	2089
2034	2084	2040	2090
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"Pay as you go": an example

Example: "Completion" in 2030.

If sign after 2030: due in full by 50 years after signing, in 2080.

If sign before 2030:

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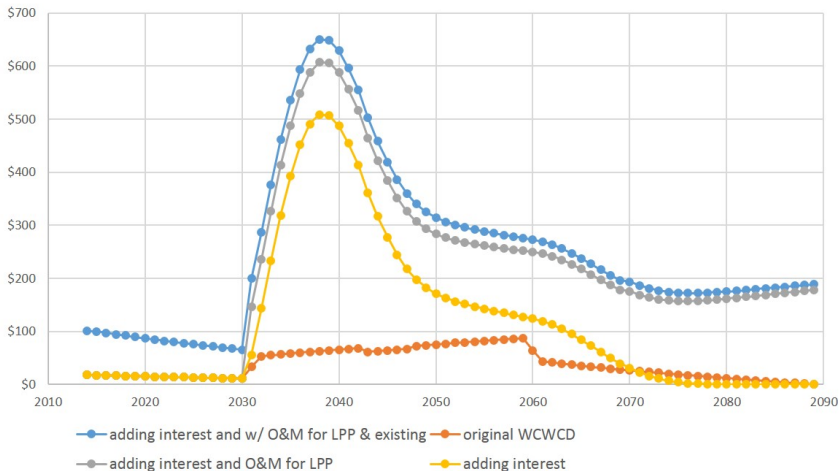
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Problems with the WCWCD model so far

Cost per person per year (current dollars, not 2014 dollars)



A More Serious Problem with the WCWCD Model

- Use the year 2050 as an example.
- In 2050, the WCWCD predicts an additional 3.8% of the LPP's capacity will be needed. This is **35.15 billion gallons**.
- According to the WCWCD, then, 3.8% of the LPP's construction cost would be due in 2050. This is \$35.3 million.
- Actually, though, the WCWCD model shows **\$71.9 million** owing (from water rates), not because it reimburses *the State* for interest, but because the District itself owes interest on bonds which *the District* issues.
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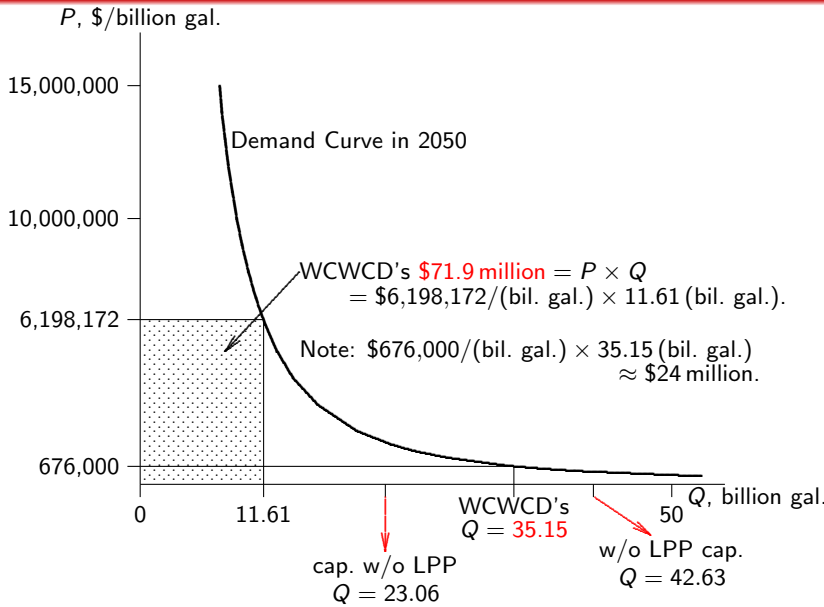


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Inconsistent: 35.15 billion gallons and \$71.9 million



(This graph differs from the one in the report because that used an interest rate of 4.5% and this is using 4%.)



Minor Errors in the WCWCD Model

For example, counting 30 years bond repayments:

```
=IF('Incremental Repayments'!$R$22="Debt",
    IF(AND(W$4>=$D54,W$4<=$D54+' Incremental
        Repayments'!$I$31),
        -PMT('Interest Rate'!$J$16,
            'Incremental Repayments'!$I$31,
            (HLOOKUP($D54,$E$4:$CZ$32,28,FALSE))*
            'Incremental Repayments'!$I$22))
    ,0)
,0)
```

Summary of the WCWCD Model

- Uses low values for the LPP cost and for the non-LPP water system capacity.
- Omits operations and maintenance costs.
- Omits reimbursement for interest payments made by taxpayers of the State of Utah.
- Does not account for demand curves, invalidating its conclusions about prices.



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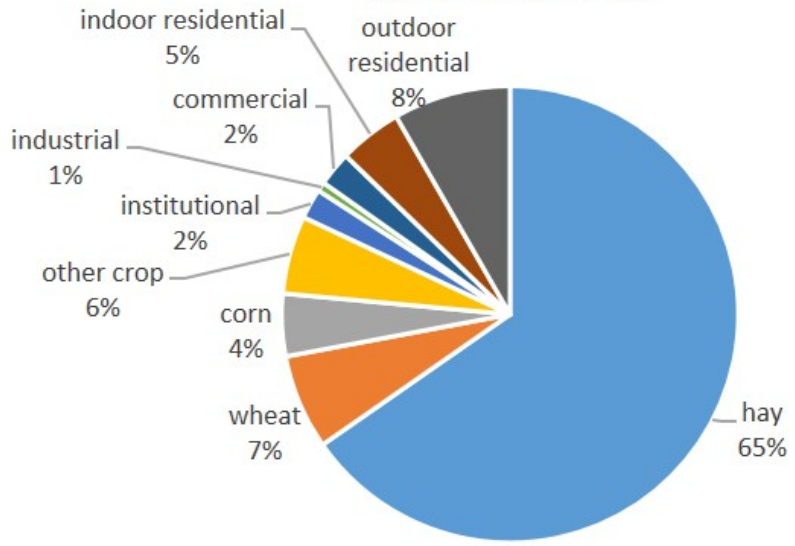
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Some Personal Research



Utah Water Use



Water use of Utah's Hay and Turf Grass

- Use 1,537,873 acre-feet of water per year.
- This is enough water to cover the entire area of Salt Lake County 2.98 feet deep.
- It is 16.5 times more water than Utah's indoor residential use.
- Hay contributes approximately \$258 million per year to Utah's economy, which represents approximately 1/2 of 1% of Utah's GDP.



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LPP vs. Hay as sources of water

	cost of water right	cost of "wet" water
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hay	\$285 mil./4% = \$7,125,000,000 \$285 mil./2% = 14,250,000,000	?

	cost/ac.-ft. of water right	cost/ac.-ft. of "wet" water
LPP	0	\$17,391
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Utah Water Strategy Advisory Team draft report

“Utahns value self-sufficiency and locally grown food and they prefer not to satisfy Utah’s water needs by shifting substantial quantities of water from agriculture.”

—quoted in the Salt Lake Tribune editorial, September 14, 2016



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Today Tooele Valley is known as Utah's dust bowl.

source: Eleventh Annual Frederick William Reynolds Lecture, University of Utah. Reprinted in *Bulletin of the University of Utah*, Vol. 37 No. 11.



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Let the market work

- Utah farmers cannot sell “wet” water, shackled by 19th century water law.
- In Australia, a farmer can, for example, sell a week’s unneeded water online, and it’s delivered the next day.

The water infrastructure we really do need:

- ① the legal infrastructure to allow farmers to sell & buy “wet” water; and
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For more information

Click on the "Miscellaneous Research Materials" at www.economics.utah.edu/lozada, then look under "Other Work."

e-mail: lozada@economics.utah.edu

