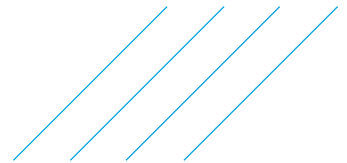


## Water Valuation: How to put a price on the priceless?



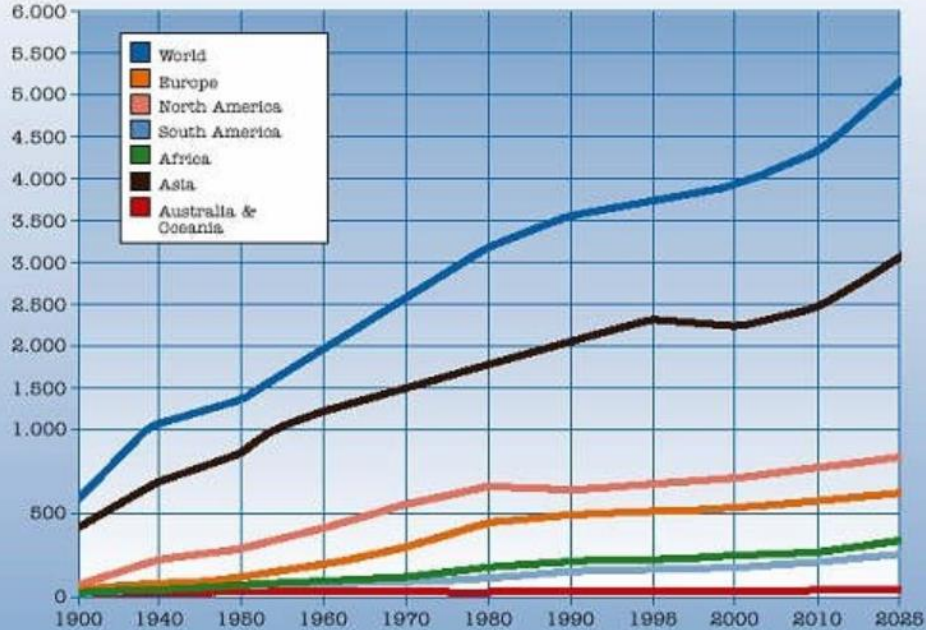
## Our vision

We strive to be the premier engineering solutions partner, committed to delivering complex projects from vision to reality for a sustainable lifespan.



## Global Water Consumption 1900 - 2025

(by region, in billion m<sup>3</sup> per year)



Water is being consumed at an ever-increasing rate...  
And, demand hasn't slowed down in the last 50 years

<https://www.dailyscandinavian.com/highest-water-prices-in-the-world/>



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# Outline

- › Why price water?
- › What do we pay for as utility water users?
- › What goes into water pricing inputs?
- › What are water rights? How are water rights enacted?
- › How to account for environmental and societal values of water?
- › Water pricing models: oil, real estate
- › Compensation for loss of use



Huge thanks to:

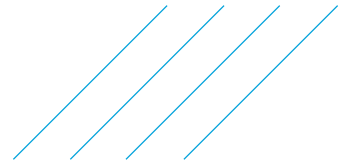
Dr. K.J. McKenzie, Professor, Faculty of Economics, U of C

Dr. A.M. Hubert, Assistant Professor, Faculty of Law, U of C

# Why Price Water?

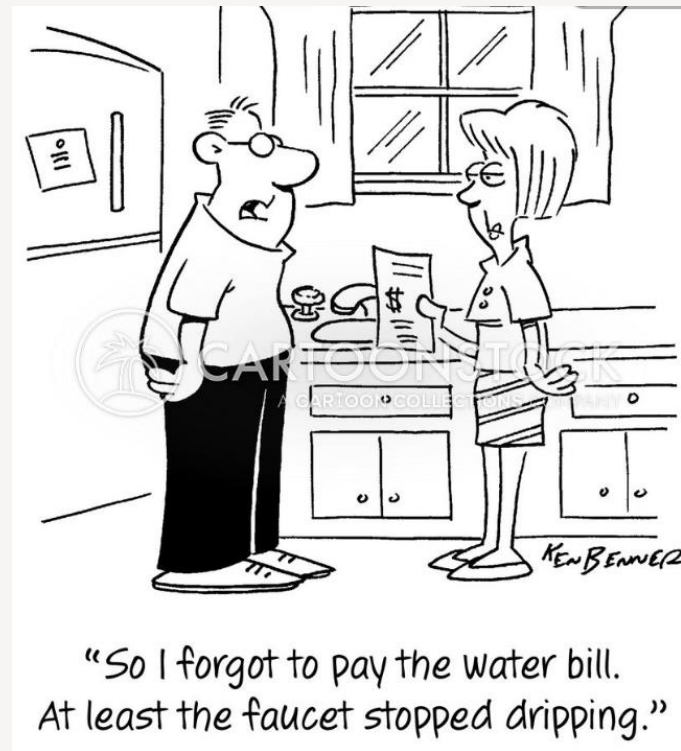
- › Water supplies are assumed, by the public, to be:
  - › Plentiful, infinite, clean, clear and of high quality
  - › Water has not been assigned a value because it has been readily available
- › Challenge: can we price water to reflect its value?
- › Can we assign a price to:
  - › Reduce water waste
  - › Promote equity and fair distribution
  - › Maintain water resources for society and environment

Garcia and Reynaud, 2003. Estimating the benefits of efficient water pricing in France.  
Resource and Energy Economics



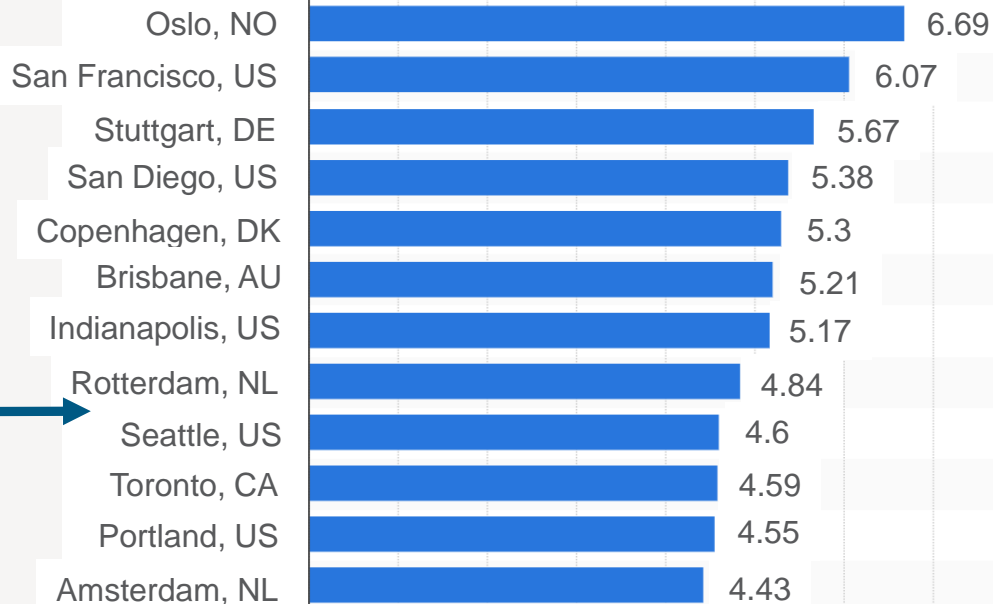
## Cost of Water as a Utility

- › Calgary Average = \$111.86 per month in 2022 for 19 m<sup>3</sup>
- › Costs include:
  - › Providing water, wastewater, and stormwater services
  - › Perform required maintenance and upgrades to the system



## Most Expensive Tap Water Prices in Select Cities (2021)

Calgary 2022:  
\$4.69

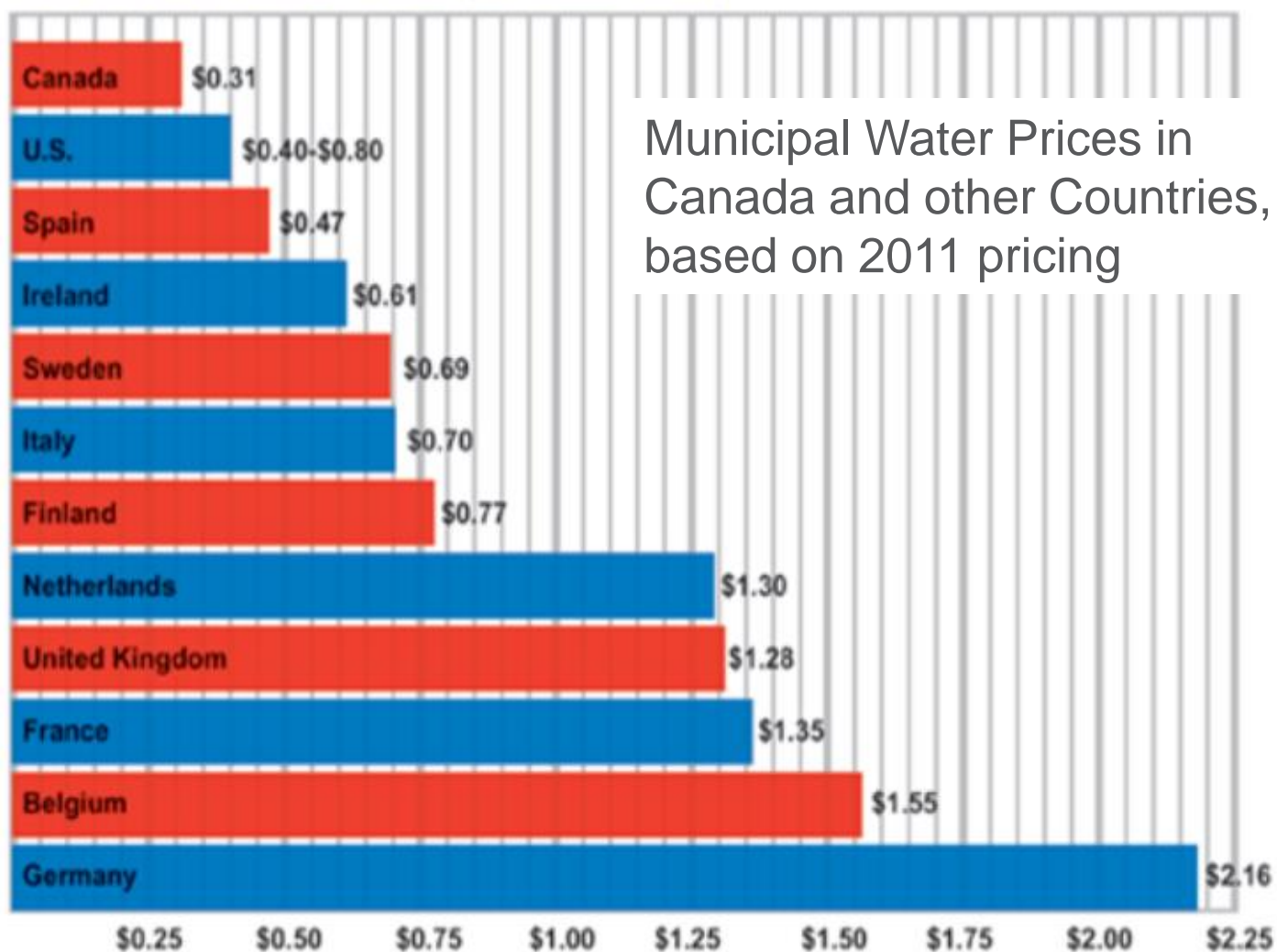


Prices in  
USD / m<sup>3</sup>



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## Municipal Water Prices in Canada and other Countries, based on 2011 pricing

<https://waterbc.ca/community/programs/long-term-financial-planning/water-pricing-plan/>



## Bulk Water Rates - Cities in Alberta

Municipality	Price Per Cubic Metre	Additional Fees
Calgary	\$1.73	\$27.64 per month \$25.00 admin fee for access card (refundable)
Airdrie	\$5.50	\$41.00 admin fee
Lethbridge	\$1.62	\$43.37 per month plus cubic m
Edmonton	\$0.94 - \$1.93	Price varies per volume
Grande Prairie	\$1.66 / \$1.83	Residential / Non-Residential

## Bulk Water Rates - Canada

Municipality	Price Per Cubic Metre	Additional Fees
Kelowna, BC	\$1.20	\$35.00 admin fee
Saskatoon, SK	\$1.71; \$1.93	First 17 m <sup>3</sup> , then next 17 m <sup>3</sup>
MD of Peace (Peace River)	\$2.90; \$2.00	Chlorinated; non-potable \$50 admin fee
County of Brant, ON	\$2.99	
Waterloo, ON	\$2.00	



# Key Considerations for Administrators

- › Safe-guard current sources
- › Regulate and budget demand
- › Administrate and maintain infrastructure
- › Revamp and refine water policies
- › Strategize and protect sources long-term
- › Cultivate and collaborate community participation



## Pricing from Utility Provider Point of View

› Operating costs may include:

- › Power consumption
- › Wages
- › Chemicals
- › Insurance
- › Administration
- › Maintenance



- › Comprises costs mostly attributed to treatment, storage and delivery
- › Might (should) include reserve fund for future infrastructure upgrades



# What are Characteristics of Efficient Pricing?

## How can Water Pricing be Optimized?

- › Pricing must compensate for true costs; subsidizing devalues water
- › Pricing can incentivize efficient use and conservation
- › Increasing prices will force users to value their consumption and avert careless waste



Garcia and Reynaud, 2003. Estimating the benefits of efficient water pricing in France.  
Resource and Energy Economics



# Challenges to Optimal Pricing

- › Most jurisdictions assign value of physical water to zero
- › Estimating water demand requires much technical data
- › Very rarely: environmental social marginal damages incorporated in price
- › System water losses typical (Average 25%; to 80%); not input into price
- › Input prices and output levels are not fixed
- › With uncertainty, operators overestimate costs thereby inflating prices

Garcia and Reynaud, 2003. Estimating the benefits of efficient water pricing in France.  
Resource and Energy Economics



# Challenges to Pricing: Smaller Communities

- › Utility providers generally serve smaller populations (local monopolies)
- › Utilities are limited in resources and may lack technical knowledge
- › May lack expertise in contract negotiation when delegating services
- › Pricing may not consider treatment costs once consumption has taken place.
- › Especially if wastewater treatment is administered by a separate department



Garcia and Reynaud, 2003. Estimating the benefits of efficient water pricing in France.  
Resource and Energy Economics





# Challenges to Pricing: Larger Communities

- › The larger the utility provider, the further away from optimal pricing, as distance to customers increase
- › Tend toward more bureaucracy
- › Efficiencies found by supplying greater volumes are often countered by expensive monitoring, specialist wages, and more expensive infrastructure



Garcia and Reynaud, 2003. Estimating the benefits of efficient water pricing in France.  
Resource and Energy Economics



# Water Rights

- › The larger the utility provider, the further away from optimal pricing, as distance to customers increase
- › Laws vary by jurisdiction and country
- › Generally, there are 2 main types (and sometimes a mix of):
  - › **riparian rights:** a property owner has the right to use water that borders their property
  - › **prior-appropriation rights:** the government grants a party the right to use certain waters

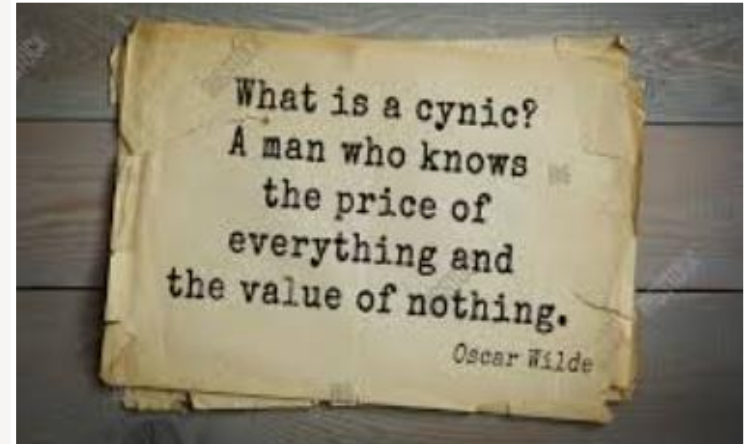


# Compensation for Loss of Use

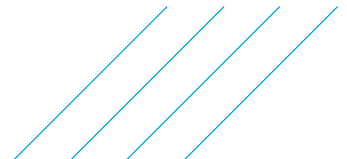
- › The general rule is that:
  - › *“a person whose property is taken, damaged, or destroyed by the negligent or wrongful act or omission of another is entitled to compensation for the damage sustained in such a sum as will restore him as nearly as possible to his former position.”*
  - › *“the proper measure of damages for permanent injury to real property is the lessor of the decline in market value and the cost of restoration.”*
- › In addition, permanent property damages can include loss due to stigma that remains even after a property is cleaned up

## Economist View

- › An economist will attach a price to encourage conservation, reduce waste, limit demand and more efficiently allocate water resources among sectors of the economy



<https://cwf.ca/research/publications/water-pricing/>



# Water as an Economic Good

- › Water is an economic good, as defined by:
  - › UN
  - › World Bank
  - › International Monetary Fund
- › Water has an economic value for all its competing uses
- › Managing water as an economic good can achieve efficient and equitable use and encourage conservation and protection of water resources



<https://cwf.ca/research/publications/water-pricing/>



## Water as a Social Good

- › Water pricing is contentious. Water is essential to life with cultural, social, and environmental significance
- › Access to water is a basic human right to some
- › Many nations have enshrined water as a right in their constitutions (Colombia, Congo, Ecuador, Ethiopia, Gambia, Guatemala, Venezuela and parts of Spain)



Zetland 2010



# Water as an Economic and Social Good

- › Is there a middle ground between protection through economic mechanisms and ensuring social equity and sustainability of the environment?
- › South Africa Water Management Strategy – once social needs are met, water becomes as an economic good, as appropriate for a scarce natural resource



Segefeldt 2006



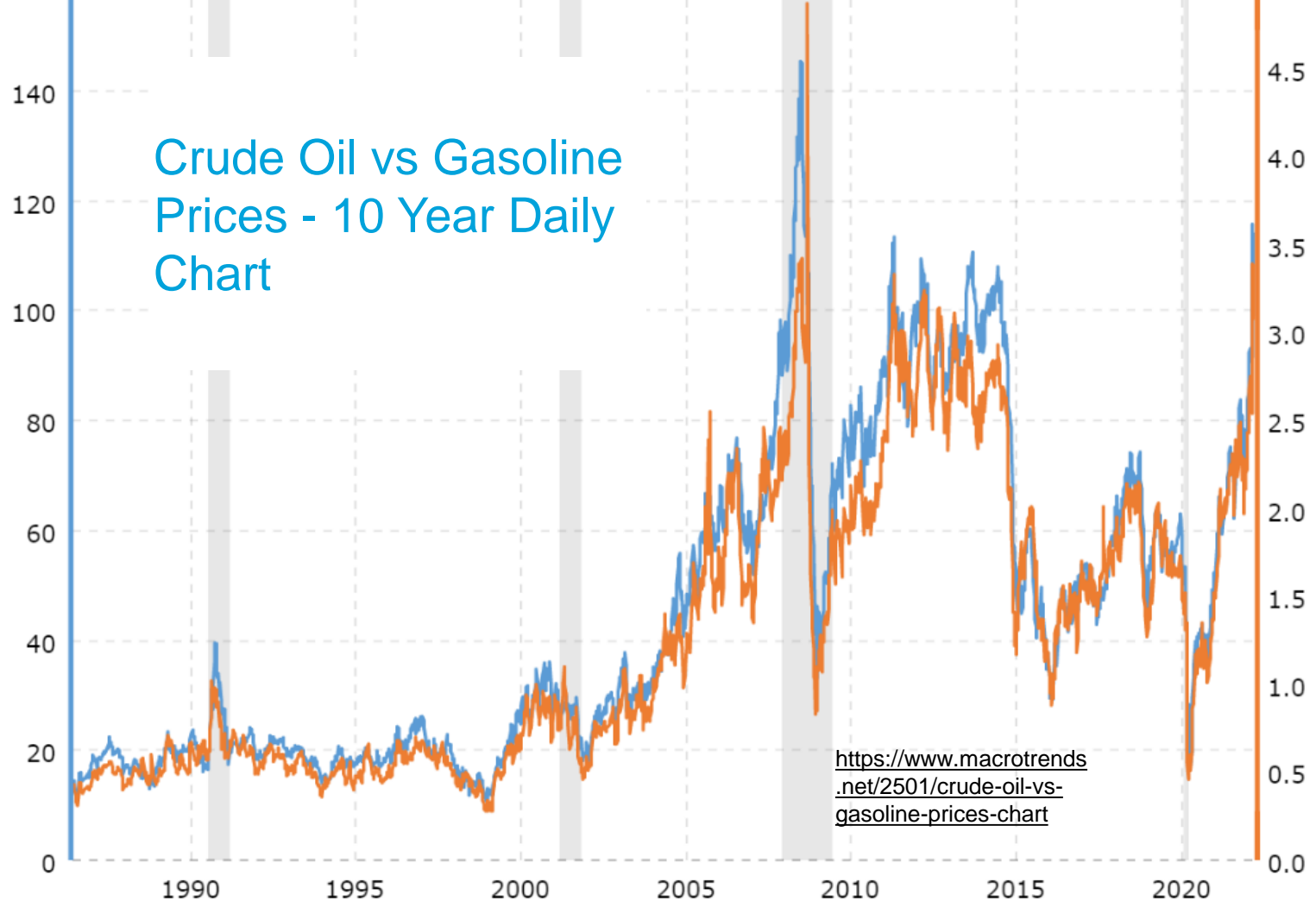
## Is Water the New Oil?

- › Oil markets are globally connected. Prices are set on exchanges. There is a pipeline distribution system moving supply to global distribution
- › If water prices were set like oil prices, water prices would be set on global exchanges
- › The primary driver for oil prices: supply and demand, complicated by the oil futures market and market sentiment
- › Changes in water prices only result in small modifications of water consumption

<https://watermarkets.us/water-and-oil-markets-dont-mix/>

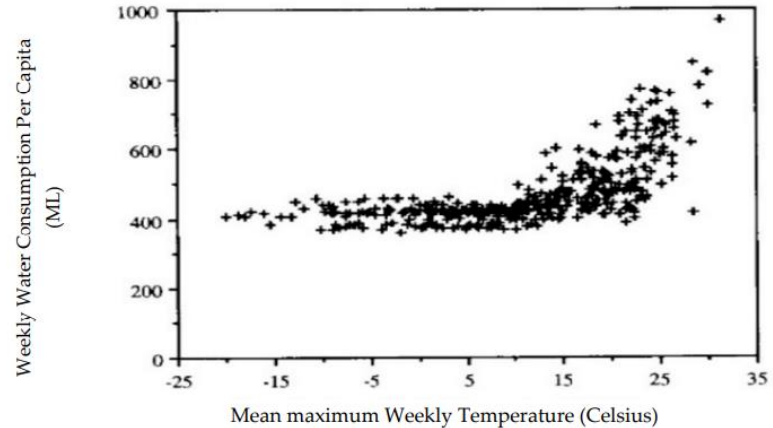


## Crude Oil vs Gasoline Prices - 10 Year Daily Chart



# Temperature Impact on Drinking Water Consumption

- › Water use is influenced by a diverse set of climatic, socioeconomic, demographic, policy and landscape factors
- › A threshold of 14 °C ( $\pm 2$  °C), is where water use is almost independent of ambient temperature



**Figure 4.** Weekly water consumption per capita and mean maximum T, January 1982–December 1989, for Calgary.

Dimkić, Dejan. Jaroslav Černi Water Institute, Presented at the 4th EWaS International Conference: Valuing the Water, Carbon, Ecological Footprints of Human Activities, Online, 24–27 June 2020.



# Water Prices and Real Estate

- › Real Estate has been tackling water pricing considerations:
  - › Cities leasing water rights to secure water permits
  - › Developers secure water rights before building permits
  - › Investors buying farmland to secure future water supply
  - › Corporate acquisitions and mergers may come with water rights, which are considered in purchase value
- › House construction labour and materials are easily quantifiable, but a home's value will fluctuate depending on the land value assessment

<https://watermarkets.us/the-value-of-water/>



## Location! Location! Location!

- › Water Markets are very personal, hyper-localized
  - › Water matters to its local users. The further the source, the more apathy
- › Quantifying pricing input can be:
  - › EASY to compile, such as: utility providers costs (i.e., administration, infrastructure, maintenance, power, chemicals)
  - › DIFFICULT to appraise, such as assigning value to social and environmental values and historical data not always reliable

<https://watermarkets.us/the-value-of-water/>



- › Prices determined by negotiation: the lowest price a seller will accept is negotiated against the highest price a buyer is willing to pay
- › When negotiating for water, weather can impact price. Market perception is also key in real estate pricing
- › Water rights not always transactable - possessing water rights highly valued



# Real Estate Pricing Analogy

- › Research comparable sales pricing
  - › Keep search period to most current prices
  - › Keep search area within reasonable distance
- › Compare fine details
  - › Infrastructure age, proximity to users, quality, permitting conditions
- › Perceptions of desirability have value
- › The water market within real estate affects pricing of commercial, industrial, farm and ranch, residential, and undeveloped land. Ownership and control of groundwater is an emerging hot spot in real estate



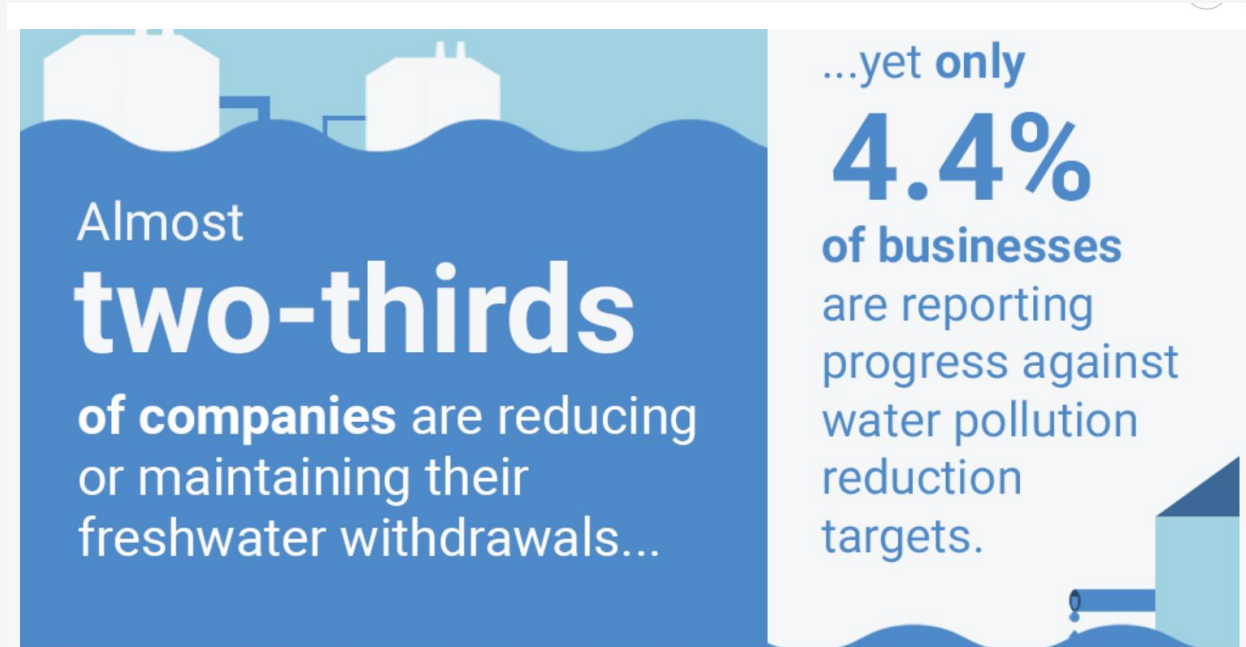


## Summary

- › Most people and experts agree efficient water pricing is a key element to any efficient water resource policy
- › Water prices generally reflects input costs from treatment, storage, delivery, with the assumption that procuring the water is free
- › There are environmental and social aspects to water pricing that are difficult to quantify
- › Different price policies have not resulted in dramatically reducing water consumption and creating a social surplus



## Progress on Water Use Reduction



<https://www.cdp.net/en/research/global-reports/global-water-report-2020>

*Our values are the essence of our company's identity.  
They represent how we act, speak and behave together,  
and how we engage with our clients and stakeholders.*

*SAFETY*

*We put safety at the heart of everything we do, to safeguard people, assets and the environment.*

*INTEGRITY*

*We do the right thing, no matter what, and are accountable for our actions.*

*COLLABORATION*

*We work together and embrace each other's unique contribution to deliver amazing results for all.*

*INNOVATION*

*We redefine engineering by thinking boldly, proudly and differently.*

