Building a Drought Resilient Economy Through Innovation

2012 CWCB STATEWIDE DROUGHT CONFERENCE

Est. 1958
COLORADO WATER CONGRESS
LEADERSHIP FOR COLORADO'S WATER COMMUNITY

"Drought Connections to our Larger Economies"

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Portfolio Manager & Principal
Summit Global Management
September 19, 2012

Today's Outline

- *Investment in the Water Sector*
  - *What are the trends & who is deploying capital*

- *Key Industry Sectors-Colorado Specific*
  - *Oil & Gas*
  - *Beverage*
  - *Agriculture*

- *What does this mean for Colorado?*

- *Q & A*

Top Growth Markets in Water-according to the industry research firm The McIlvaine Company.

1. Shale Gas. There is a very large continuing investment in extraction of gas from shale in the U.S. The requirement for hydraulic fracturing two miles underground greatly increases the investment in flow control and treatment products. The U.S. now has access to reserves which could make it a net exporter or at least self sufficient for thirty years. The big unknown is the potential in China and the rest of the world. China has bigger reserves but they are deeper. BIGGEST OBSTACLE…a lack of water in the areas where it will be required. Nevertheless, China plans 60 billion m3 of capacity by 2020. Colorado Impact

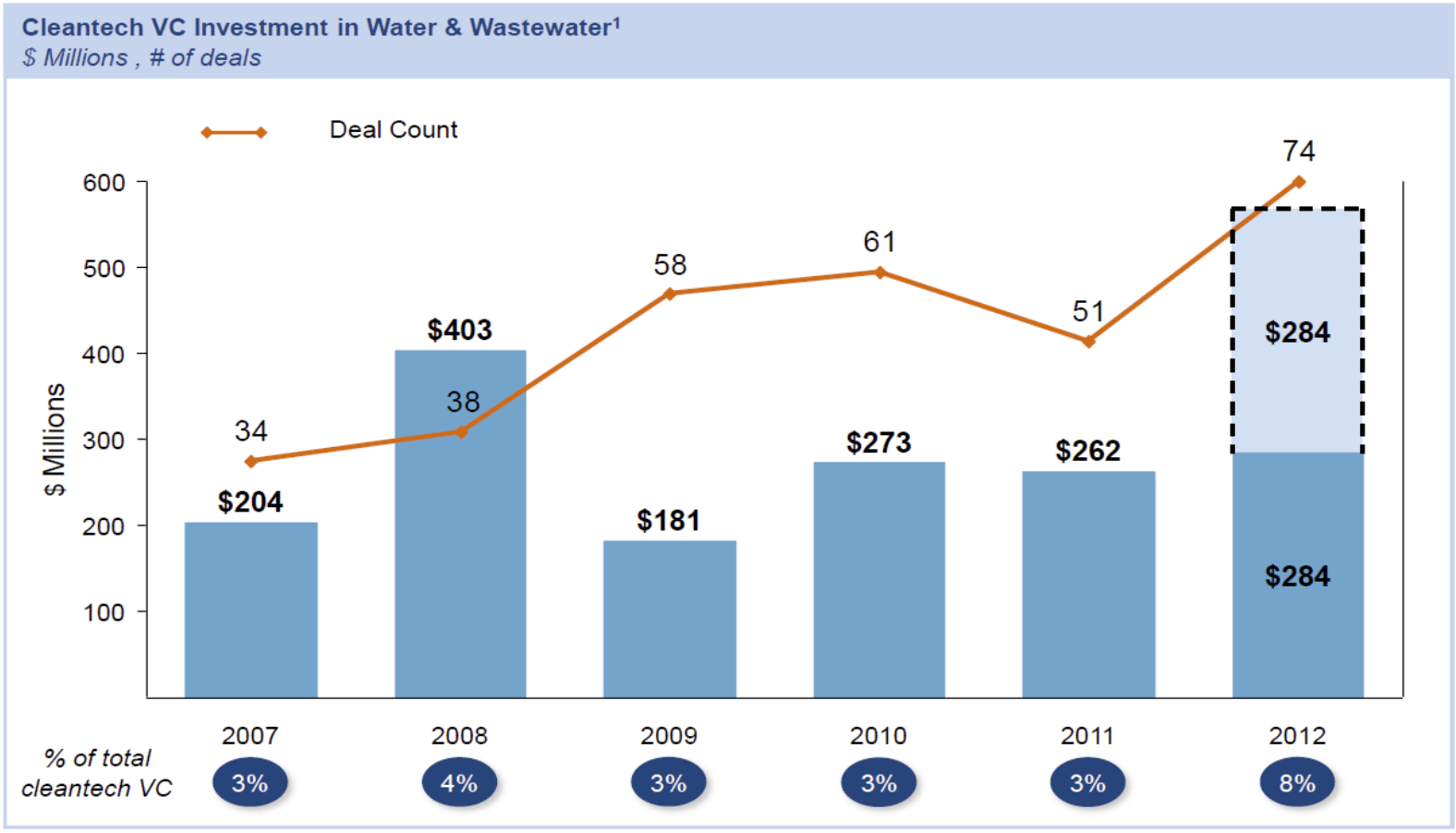
2. Vessel Water Treatment. $70 billion will be required to supply 70,000 ships with treatment systems to ensure that ballast water discharges be free of live invasive species.

3. Water Reuse. Power plants and other large water users will accelerate the treatment and use of wastewater. The co-location of municipal wastewater treatment plants and either combined cycle gas turbine or coal-fired power plants will be a popular option. Industrial facilities will increasingly opt to treat and reuse wastewater rather than discharge it. The investment in treatment systems and chemicals for this purpose will be substantial. Colorado Impact

4. Aquaculture. The new generation involving re circulating tanks and efficient filtration is changing the approach to fish farming. The continuing depletion of wild fish populations is also a driving factor. Colorado

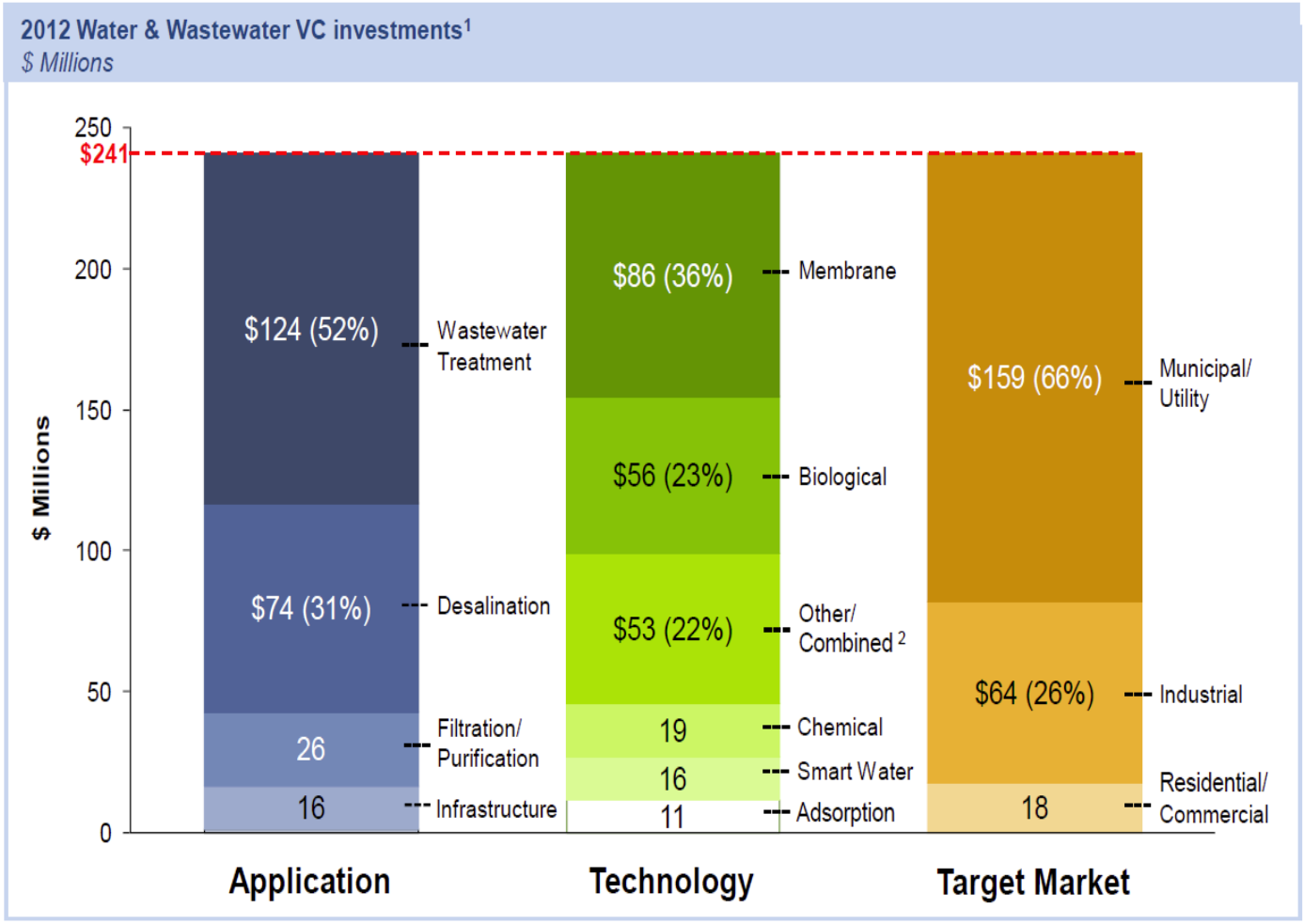
5. Remediation. The remediation of soil and groundwater is becoming a big business in developed & Emerging countries. It will generate $36 billion in revenue this year. Colorado Impact

What a difference a few a few years can make….2012 is the strongest VC water activity …EVER!



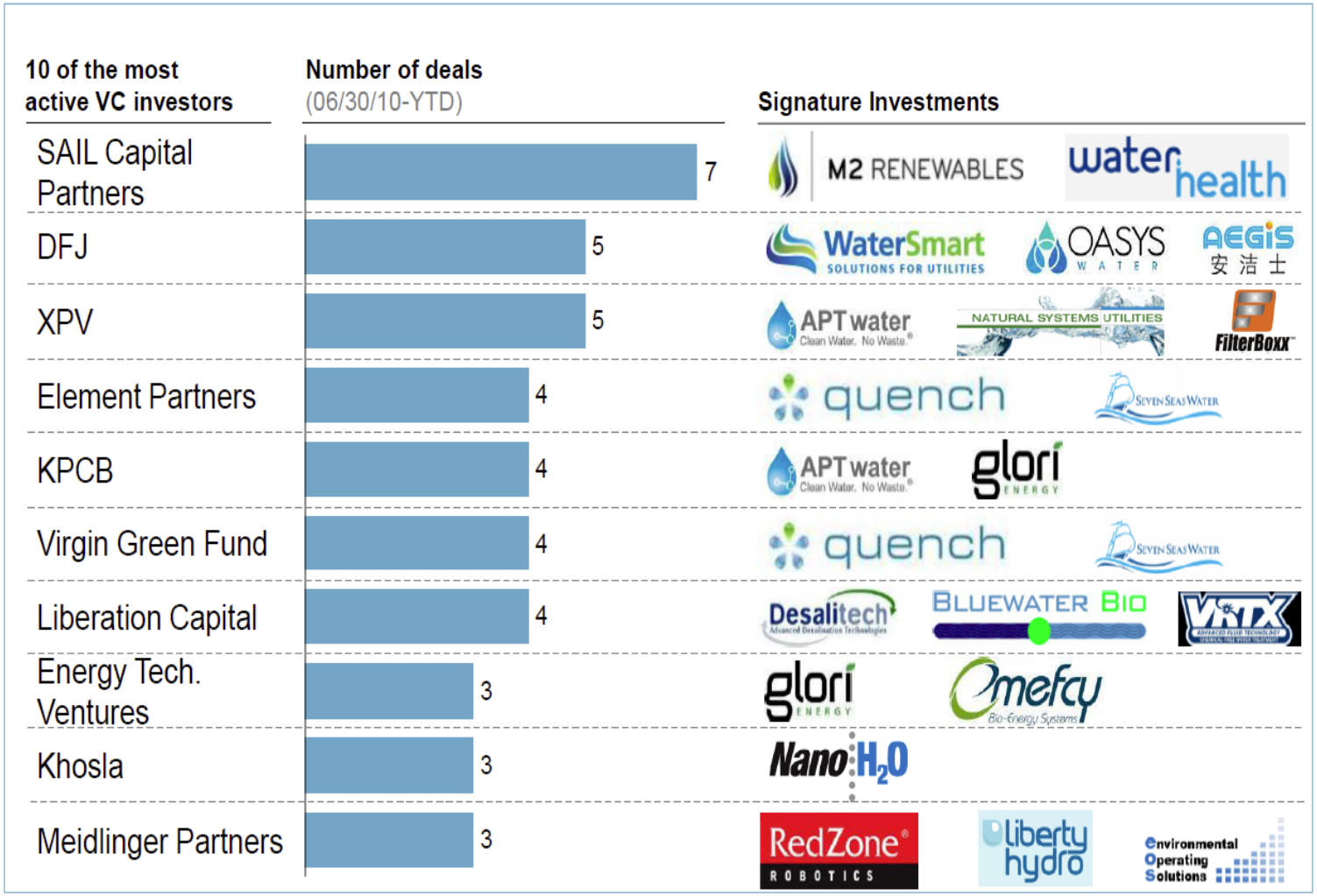
Source: Cleantech Group LLC

Where is the money being spent? Membrane & wastewater treatment



Source: Cleantech Group LLC

Who are the investors? Top 10 with more on the way…



Source: Cleantech Group LLC

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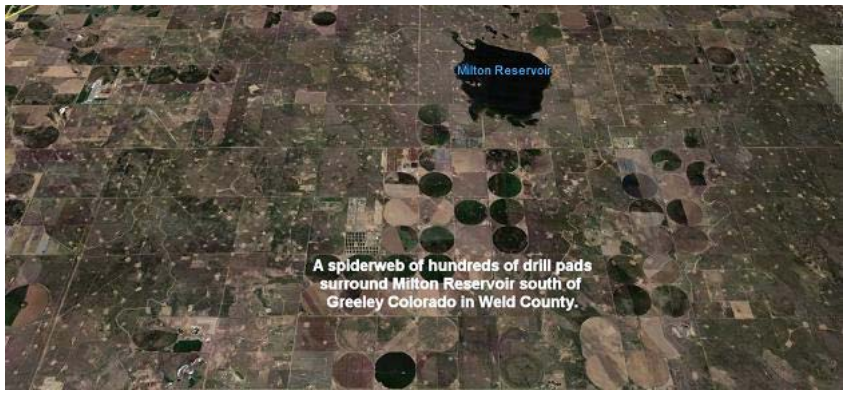
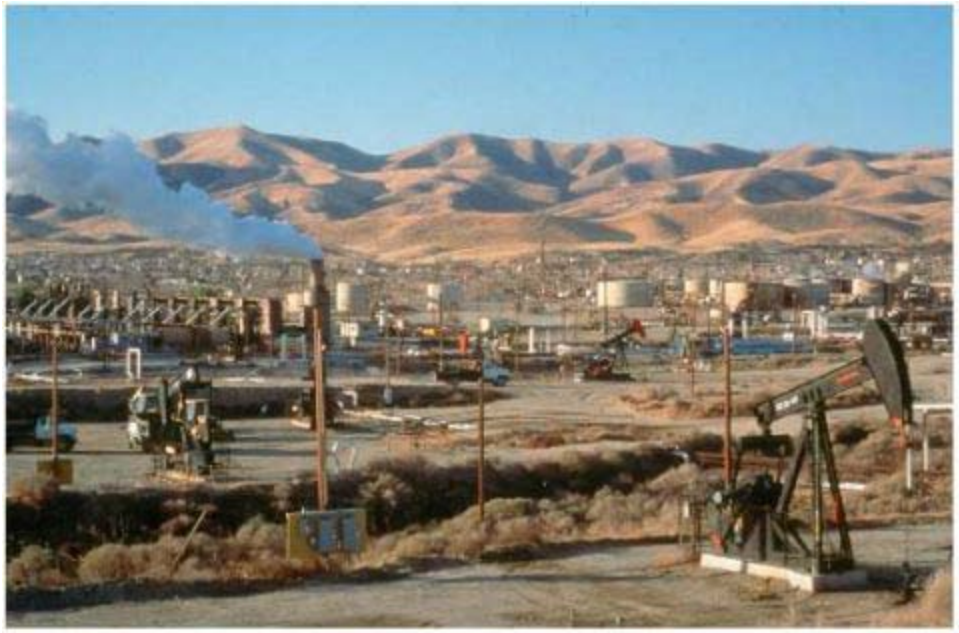


Oil & Gas=Water



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Oil & Gas-Tight gas extraction's supply chain

UPSTREAM

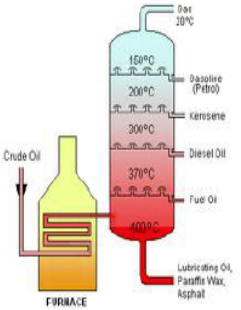
Exploration & Production

MIDSTREAM

Transportation & Storage

DOWNSTREAM

Refining & Distribution



Hydraulic fracturing

Water flooding

Oil separation

Fractional distillation

Chemical processing/ conversion

Source: Summit Global Management

Gas extraction is a by product of a comprehensive water management process

Innovation that allows for…

- Water reuse through treatment / reinjection
- Desalinization / desulfurization of water
- Reduced use of chemicals and softeners

…will eventually lead to:

- Maintenance / increase of oil recovery rate
- Reduced toxicity (and cost) of wastewater discharge
- Minimization of operating cost and footprint

Fresh water source as well as wastewater disposal concerns

The Oil & Gas (really water!) Innovators-Just the beginning…

glori ENERGY	FilterBoxx™	GASFRAC	WATER STANDARD
Developer of AERO (Activated Environment for the Recovery of Oil) System to increase oil recovery from water flooded oilfields	Supplier of containerized water treatment systems primarily for oil and gas business in Canada	Developer of waterless natural gas fracking fluid that eliminates water consumption in fracking, and enables 100% recovery of fracking fluid	Provider of mobile water treatment, desalination, enhanced oil recovery and produced water solutions for the water and oil and gas industries
• $46MM Total PIC • KPCB, Energy Technology Ventures, GTI Ventures, Advantage Capital Partners	• $9MM Total PIC • EnerTech Capital, XPV Capital, Walsingham Growth Partners	• Public company • 2011 revenue: C$160 million • 2012E revenue: C$220 million	• $250+MM Total PIC • Undisclosed investors • Mitsui – minority investment dated May 2012

IZZE BEVERAGE COMPANY
You'll Love What's Inside™

110 BREWS OLD CHICAGO PASTA & PIZZA

Coors

Pilgrim's™

Food & Beverage=Water

RED ROBIN GOURMET BURGERS

RESTAURANT ROCK·BOTTOM BREWERY

pepsi

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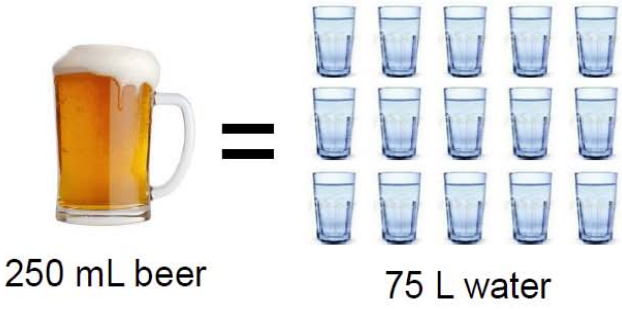
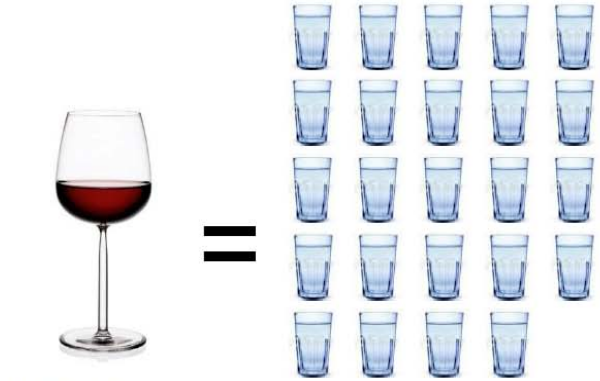
Who would have thought that we needed that much water just for….





Where does all that water go??

Food & Beverage- A bigger user than most are aware of…

The Food & Beverage industry spent nearly **$3.3 billion** on water technologies in 2011[1]…why?

1 Expansion into Emerging Markets

- Water-stressed areas
- Water consistency concerns

2 Cost Reduction

- Increasing cost of freshwater
- Increasing charges for wastewater disposal

3 Corporate Stewardship

- Water efficiency
- Endocrine disruptors

Source: Global Water Intelligence

Food & Beverage- A bigger user than most are aware of… (cont.)

- *The biggest players — from Coca-Cola and PepsiCo to Miller and MolsonCoors — as well as smaller, regional beverage companies, list water as a risk in long-term plans. In 2006, 18 companies created an alliance called the Beverage Industry Environmental Roundtable to tackle water, energy and other issues that could affect the industry's growth.*

- *There is no total available for how much has been invested in water conservation projects in the past five years, but experts believe it's more than $500 million.*

- *By some estimates, 2.5 million plastic bottles are trashed every hour in the United States — and less than 30 percent is recycled.*

- *Between 2008 and 2010, 69 percent of the alliance's 1,600 manufacturing facilities decreased water use by 9 percent — or 10.3 billion gallons, enough to supply New York City for eight days.*

- *Dr Pepper cleaned bottles with air instead of water on 56 production lines in 2010, and by 2015, it hopes to cut water use and wastewater discharge by 10 percent for each gallon of finished product.*

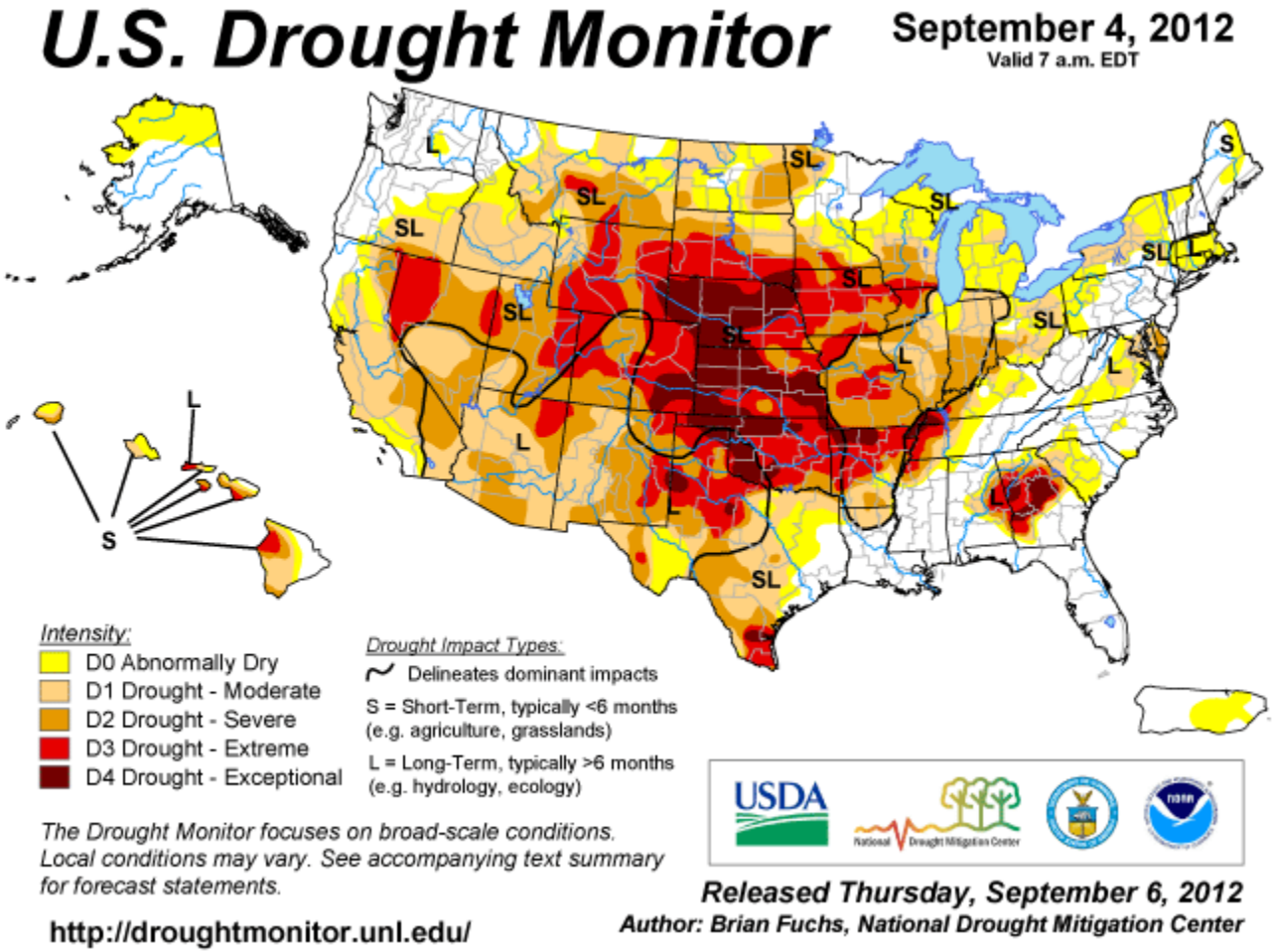
Food & Beverage Innovators…

FogBusters INC.	ALGAL SCIENTIFIC	PURESEP Purification Filtration Separation	water health
Developer of a system that removes fats, oil and grease (FOG) from wastewater without the need for chemicals or enzymes	Developer of advanced wastewater treatment systems using proprietary algal strains, which also produce biomass as a byproduct	Provider of water systems for the production of 'ultra pure' water and water softening	Provider of water purification and disinfection technology to underserved rural and peri-urban communities in developing countries
• Unknown Total PIC • 2011 1st Runner Up for Imagine H2O • Winner of Air/Water/ Waste Prize at Clean Tech Open 2010	• Unknown Total PIC • Michigan Pre-Seed Capital Fund, Invest Detroit	• Acquired by Amplio Filtration Group in July 2010 • Clients include: Heineken, Diageo and Britvic	• $62.9MM Total PIC • SAIL Capital Partners, Dow Venture Capital, Acumen Fund, Monsanto, J&J

Source: Summit Global Management

Agriculture-Water=

Agriculture…Colorado's Future?



Agriculture…Colorado's Future?

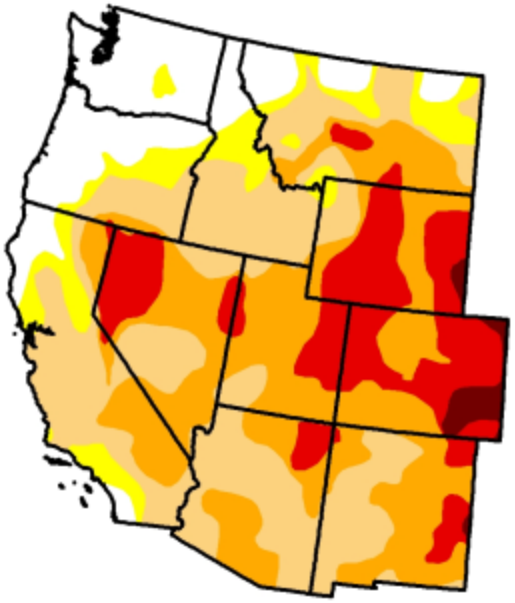
U.S. Drought Monitor

West

September 4, 2012
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	15.09	84.91	76.86	46.33	17.26	1.49
Last Week (08/28/2012 map)	15.07	84.93	74.27	44.37	15.89	1.15
3 Months Ago (06/05/2012 map)	29.60	70.40	53.30	31.03	4.95	0.00
Start of Calendar Year (12/27/2011 map)	48.49	51.51	20.05	12.22	2.67	0.78
Start of Water Year (09/27/2011 map)	66.72	33.28	19.04	14.99	9.30	3.81
One Year Ago (08/30/2011 map)	74.10	25.90	19.67	14.88	9.24	3.43



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

USDA National Drought Mitigation Center

Released Thursday, September 6, 2012
Brian Fuchs, National Drought Mitigation Center

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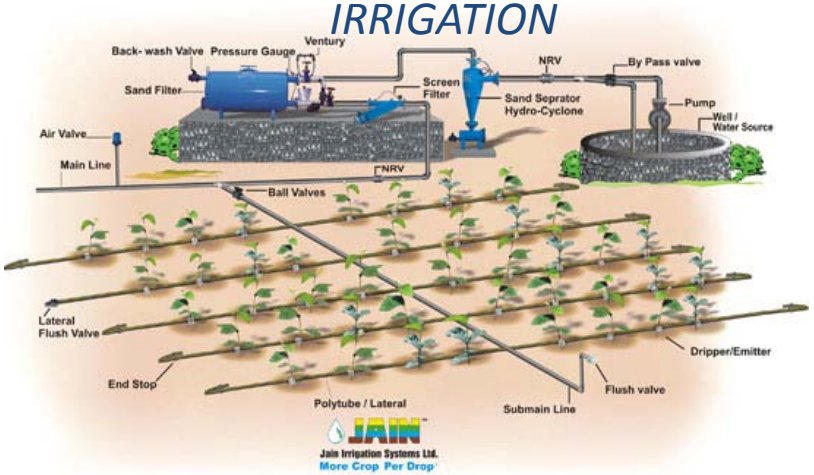
IRRIGATION



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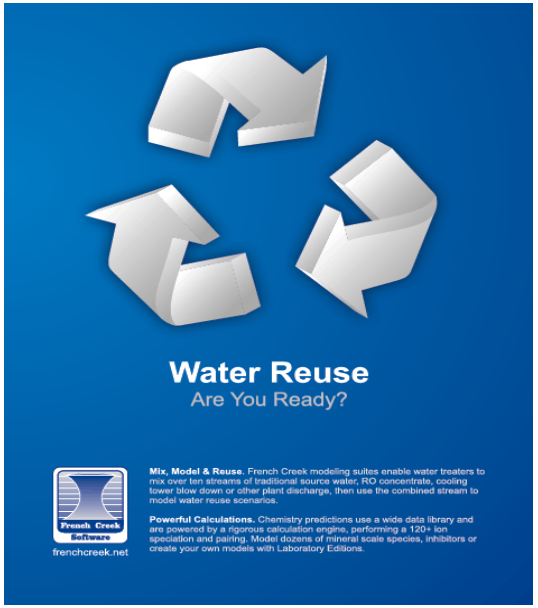
WATER REUSE



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EHANCED FERTILIZER/SOIL

=

INNOVATION/SMART FARMING
"INCREASE IN CROP YIELDS"

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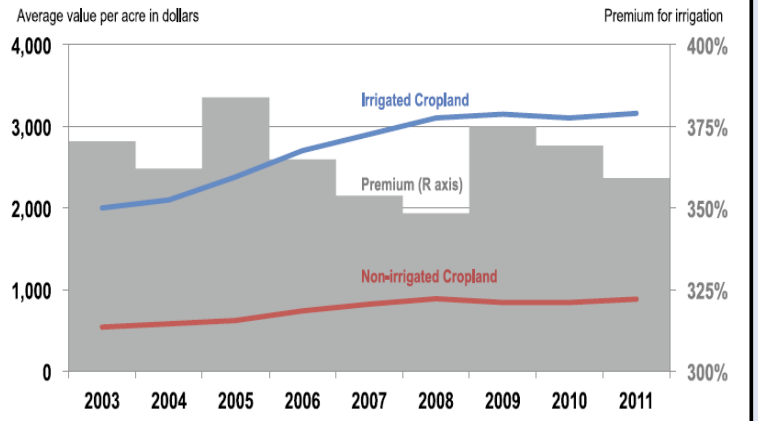
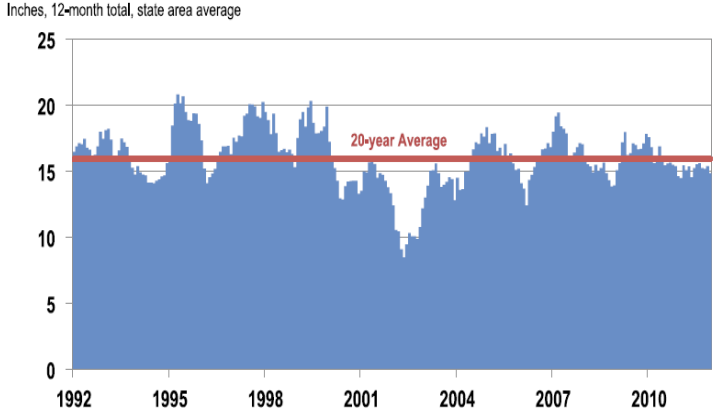
Data Related to Colorado Water Issues

Premium for Irrigated Cropland



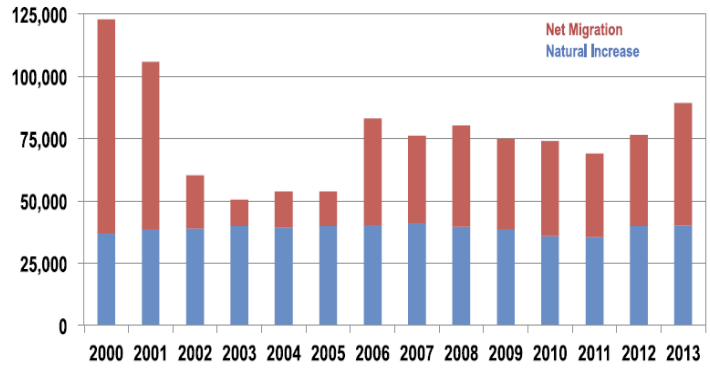
Source: USDA, National Agricultural Statistics Service.

Annual Precipitation in Colorado



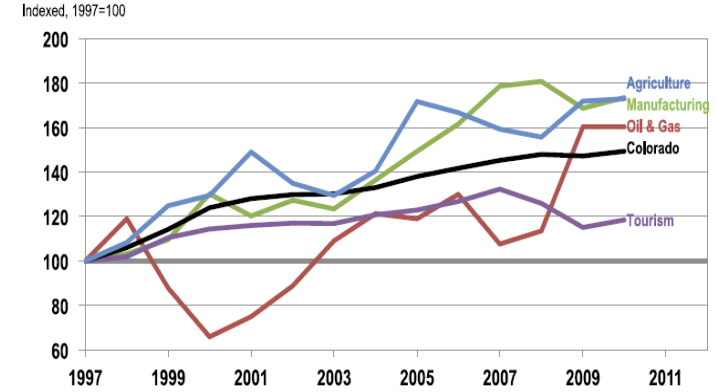
Source: NOAA, US Climate Division.

Population Changes in Colorado



Source: Colorado Department of Local Affairs.

Select Industries' Contributions to Real GDP



Source: Bureau of Economic Analysis.

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Climate Change & Colorado…

The agricultural sector is likely to experience uneven impacts throughout the country. Initial economic gains from altered growing conditions will likely be lost as temperatures continue to rise. Regional droughts, water shortages, as well as 4 excess precipitation, and spread of pest and diseases will negatively impact agriculture in most regions.

• Current energy supply and demand equilibria will be disrupted as electricity consumption climbs when demand grows in peak summer months. At the same time, delivering adequate supply of electricity may become more expensive because of extreme weather events.

• Increased incidence of asthma, heat-related diseases, and other respiratory ailments may result from climate change, affecting human health and well-being.

• More frequent and severe forest fires are expected, putting ecosystems and human settlements at peril.

• The reliability of water supply networks may be compromised, influencing agricultural production, as well as availability of water for household and industrial uses.

Climate Change & Colorado…

- *Abnormally dry and hot conditions this year have launched an extreme to exceptional drought across southern Colorado.*

- *According to the Colorado Water and Availability Task Force, 62 of the 64 counties in Colorado have received Primary Secretarial Disaster Designations for crop loss. The two counties not included in this statistic are Delta and San Juan Counties.*

- *Farmers and ranchers said they are feeling the impact, with one rancher comparing his land to a tinderbox.*

- *"In the 25 years I've been here, I've never seen it this dry, never seen it this bad," said Kevin Hylan, owner of a ranch in Peyton. Hylan said his neighbors have struggled with their livestock because of the heat and drought. Hylan said it is partly because there is not enough grass growing for the animals to graze on, and partly due to rising costs of feed and hay.*

MAJOR ECONOMIC IMPACTS - COLORADO

- *One of the largest economic impacts of climate change for Colorado will be on its tourism sector and in particular, skiing and related winter activities.*
- *Forests are probably the single most threatened natural resource, as foreign and native pests and diseases, as well as forest fires, will all thrive under a warmer climate.*
- Biodiversity in Colorado will come under threat as native species accustomed to Colorado's unique climate regions become ill suited to survive under warmer temperatures. For instance, Colorado's characteristically dense alpine forests could shift up in elevation by 350 feet for each degree Fahrenheit increase
- *Colorado's **agriculture sector is not forecasted to benefit from climate change.** The combination of more arid temperatures on both the Eastern plain and Western slope as well as the predicted water strain will cause a decrease in productivity for grains by 8-33percent; hay yields may increase*

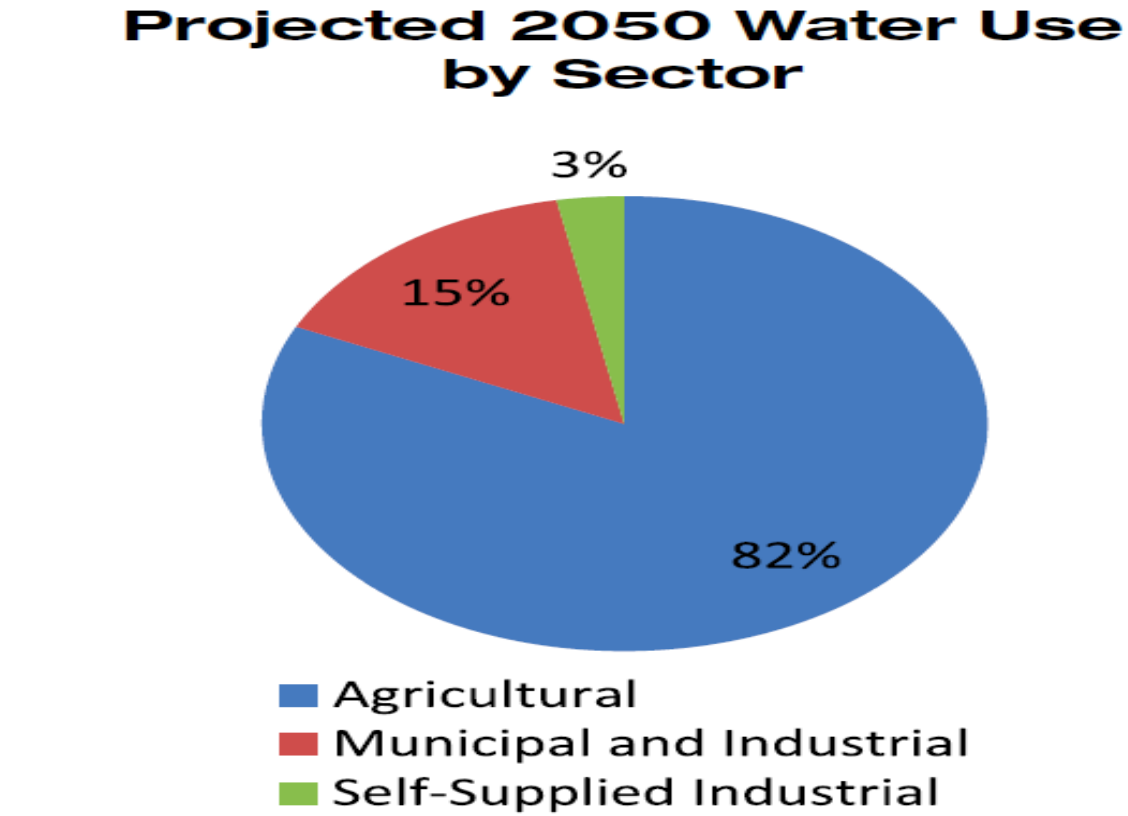
MAJOR ECONOMIC IMPACTS - COLORADO

•Just a year after record snowfall throughout much of the Rocky Mountain West, the region is locked in a snow drought not seen since Jimmy Carter surrendered the White House to Ronald Reagan in the early 1980s.

•"For the first time in 30 years, a lack of snow has not allowed us to open the back bowls in Vail as of January 6, 2012, and, for the first time since the late 1800s, it did not snow at all in Tahoe in December."

•The last time Colorado's high country was even close to this dry in mid-winter was during the 2001-02 ski season, which was followed by the worst wildfire season in the state's history. June of 2002 saw the massive Hayman Fire scorch nearly 138,000 acres of land in the mountains southwest of Denver, darkening Front Range skies and loading key water storage facilities with debris from subsequent erosion.

What does the future look like?



Source: Colorado Water Conservation Board.

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Manage your Risk!!!!
The risks fall into three major buckets:

Physical scarcity

- The potential scarcity of water has real implications for operational continuity.

- For example, discontinuous water availability for a beverage company can disrupt the manufacturing process and lead to revenue loss, lack of water for power plant cooling can disrupt energy generation, and inadequate access to water can preclude or delay the development of shale gas.

- CFOs need to ask, “Do I have enough water of the right quality and quantity when I need it and where I need it?

- In water scarce areas or areas that are being stressed, the lack of water has the ability to not only disrupt business, but to shut it down for some period until reliable, sustainable access to water can be restored.

Regulatory risks

•There has been an increase in water regulations globally due to the recognition that there really is no substitute for the resource.

•In Australia and South Africa, for example, changes in public policy and pricing have been implemented to address the need for water for agricultural, commercial, and domestic needs.

•For CFOs, the questions that should be asked include, "What water-related regulations are changing and/or becoming more stringent?"

•Certain regulations could increase operating costs and could trigger an allocation scheme that precludes the acquisition of water during periods of drought or decreased availability.

Reputational risk

- *Investors and other stakeholders care about water.*

- *There are a number of case studies where businesses were negatively impacted because stakeholders within a watershed believed that the company was not operating in a responsible manner with respect to water use.*

- *Even the perception of extracting water to the detriment of other stakeholders within the watershed is a problem in a world where almost anyone leveraging social media can impact your social license to operate.*

GO Rams!

http://watercenter.colostate.edu/mission.aspx

Colorado State University
WATER CENTER

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