BREWERS LECTURES

NEWCASTLE

Ensuring Dispense Gas Quality for Carbonated Beverages

sure purity Limited

Gary Robson
CEO
Sure Purity.

Bio – Gary Robson

- CEO & Founder of Sure Purity, award winning manufacturer of advanced filtration systems for the beverage industry, we are trusted by the most well-known beverage brand owners and sold in over 100 countries worldwide.
- Former President of International Society of Beverage Technologists (ISBT), board member and founder member of the Beverage Gases Technical Committee.
- Over 25 years' experience in the beverage gases industry with expertise in carbon dioxide for beverage applications.

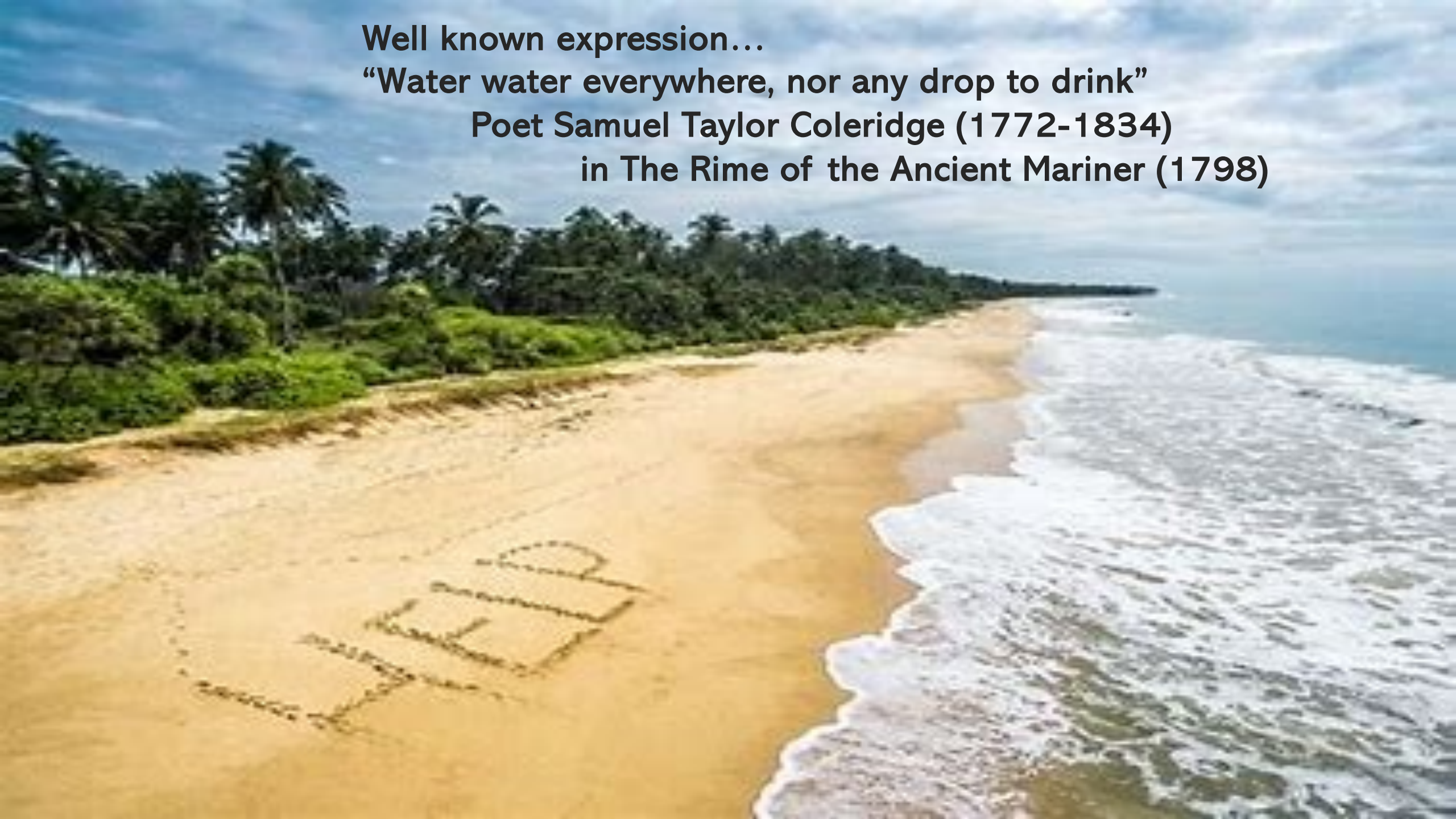
Content

- CO_2 Supply Chain
- Quality Issues
- Risk
- CO_2 Specifications Comparison
- New Sources
- Proven solutions

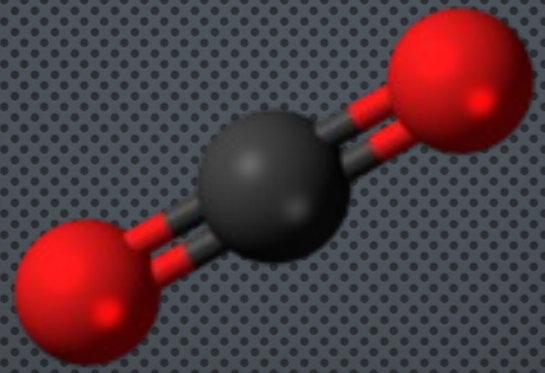
CURRENT STATE OF SUPPLY – UK

MAY 2021 VERSUS MAY 2023

- ADDITIONAL AMMONIA SURCHARGE OF £2500 PER TONNE ON ALL CONTRACTS FROM 1/9/22
- PRICE PER TONNE UP FROM £200 IN 9/2021 TO £500 IN 9/2022
- TOTAL PRICE PER TONNE FROM £200 TO £3000
- TOTAL PRICE FOR A ONE TRUCK DELIVERY NOW £75,000 INCL AM/SUR VERSUS £5000 BACK IN 2020-2021
- CURRENT SITIUATION IS NOT SUSTAINABLE OR FEASIBLE FOR ANY BUYER OF CO2
- AVAILABILITY PRIORITISED OVER SPECIFIC GRADE (FOOD FOR BEVERAGE)


Well known expression…
“Water water everywhere, nor any drop to drink”
Poet Samuel Taylor Coleridge (1772-1834)
in The Rime of the Ancient Mariner (1798)

O=C=O



- Carbon dioxide (chemical formula CO_2) is a chemical compound made up of molecules that each have one carbon atom covalently double bonded to two oxygen atoms. It is found in the gas state at room temperature, and as the source of available carbon in the carbon cycle, atmospheric CO_2 is the primary carbon source for life on Earth.

Fizzy carbonated beverages like soda, mixers, sparkling water, energy drinks, beer, cider, prosecco, can't be made without it.

TRADITIONAL CO_2 SOURCES

1. Fertiliser manufacturing
2. Fermentation
3. Fossil fuelled Hydrogen production
4. Petrochemical production
5. Natural Wells

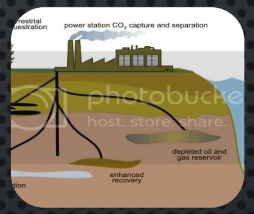
DISADVANTAGES OF TRADITIONAL SOURCES

By-Product e.g Fertiliser

Reliance on Fossil Fuel

Seasonal Manufacturing of Primary Product

Complex Supply Chain



Competition with Sequestration

Surcharges and contract breach by force majeure common place

Complex Supply Chain

1. Industrial Bulk Gas Producer
2. Distributor – Cylinder & Mini-Bulk Service Provider
3. Goods and Services Reseller

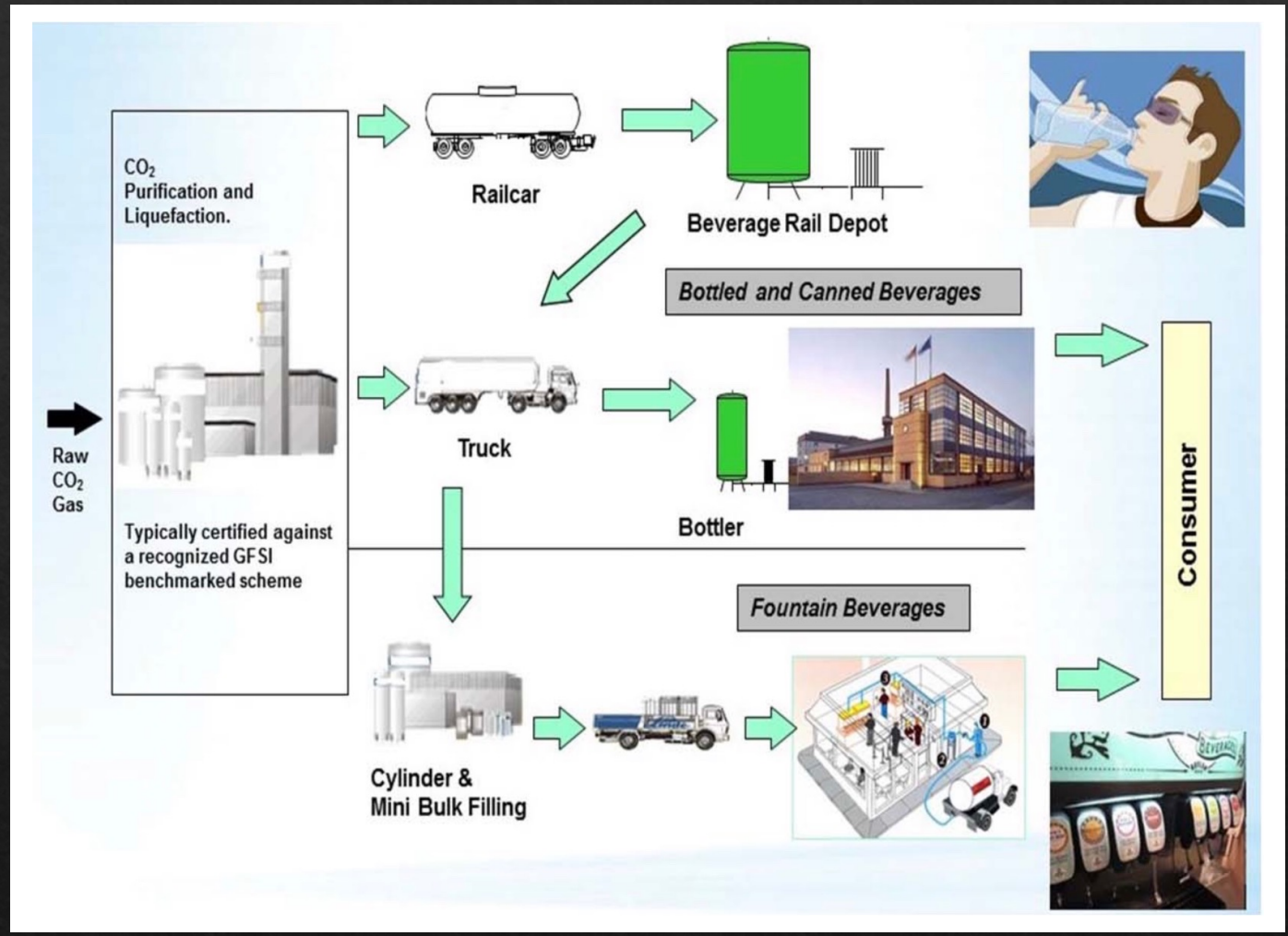


Image courtesy of International Society of Beverage Technologists

Quality Issues

Pressure Vessel Contamination

NEW CO_2 SOURCES

1. Biogas Upgrading (AD)
2. Direct Air Capture
3. Carbon Capture

WHY THERES URGENCY TO USE THE NEW SOURCES

- Climate Change:- Greenhouse Gas Reduction Goals - See COP27
- Tax Credits or Fee/Fine Avoidance for Emissions (NYCA Local Law 97 for Buildings Emissions)
- Waste to Energy/Circular Economy (Farm & Food Waste)
- Outages/Supply Chain Disruption with Traditional Sources SEE PREVIOUS COSTS
- Supply Chain Complexity Reduction

Challenges for the new sources

- Early Stage
- Investment in technology & infrastructure, location to grid
- Competition/Proprietary Info Restricting Mass Adoption
- Limited Capacity/Output Per Production Site
- Long Lead-times for Capital Equipment Restricting Growth
- Technical Challenges
- Limited Knowledge Base (Operator Level) Especially Around CO2 Quality Assurance
- Disjointed Silos = Limited Knowledge Sharing

Risk

- Traditional CO2 sources are diminishing
- Or suffering from overdraw and contamination
- New sources are emerging – incomplete or unproven quality history
- Freedom to substitute Food Grade for Beverage Grade
- Lack of sensory test (food v beverage)
- Lack of Traceability – no COA
- Permanently Installed mini-bulk – Concentrating impurities
- Cylinder Contamination

Beverage Grade (ISBT) v Food Grade (FCC/CFR)

Impurity	ISBT	FCC	
	Spec	Spec	
Assay	≥ 99.9%	≥ 99.5%	
Odor of Solid CO_2	None	None	
Odor & Taste in H_2O	None	None	
Identification	Positive	Positive	
Oxygen	< 30 ppm		
Carbon Monoxide	≤ 10 ppm		Regulatory
Ammonia	2.5 ppm max		
Nitric Oxide	≤ 2.5 ppm	≤ 5 ppm	
Nitrogen Dioxide	≤ 2.5 ppm		Regulatory
Non-Volatile Residue	10 ppm max	20 ppm	
NV Organic Residue	5 ppm max		
Phosphine*	≤ 0.3 ppm		
Benzene	0.02 ppm		Regulatory
Hydrocarbons as C_2H_2	≤ 50 ppm max	≤ 50 ppm	
Acetaldehyde	≤ 0.2 ppm		
Aromatic Hydrocarbons	20 ppb max		Regulatory
Total Sulfur Content	≤ 0.1 ppm		
Sulfur Dioxide	1 ppm max	5 ppm max	
Moisture	≤ 20 ppm	≤ 20 ppm	
Hydrogen Sulfide	≤ 0.1 ppm	≤ 0.5 ppm	
Carbonyl Sulfide	≤ 0.1 ppm	≤ 0.5 ppm	
Hydrogen Cyanide*	None		
Oil / Grease	5 ppm		
Methanol	10 ppm		

CO2 Use Reduction Plan

- Convert to Nitrogen Gas for all Non-Carbonation applications
  - Counter Pressure Gas
  - Under cover gas – can seamer
  - Blanketing
  - Purging
  - Sparging
  - Flush and Fill
  - Top Pressurization

Nitrogen
It is not a compound. Nitrogen gas is a diatomic element with the formula N2. Explanation: A compound is composed of two or more elements chemically bonded. Nitrogen is an element, not a compound. It is found in nature as nitrogen gas, also called dinitrogen, with the chemical formula N2,
At standard temperature and pressure, two atoms of the element bond to form N2, a colourless and odourless diatomic gas. N2 forms about 78% of Earth's atmosphere, making it the most abundant uncombined element in air.

- 5 stage CO2 Polishing Filtration
- Advanced adsorption technology.
- Physical and chemical removal in gas phase.
- Purification Plus range from 50ppm down to lowest ppb levels detected.
- Cartridge based design
- Snowstorm filled media
- Ultra-low pressure drop
- Modular construction

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Benefits

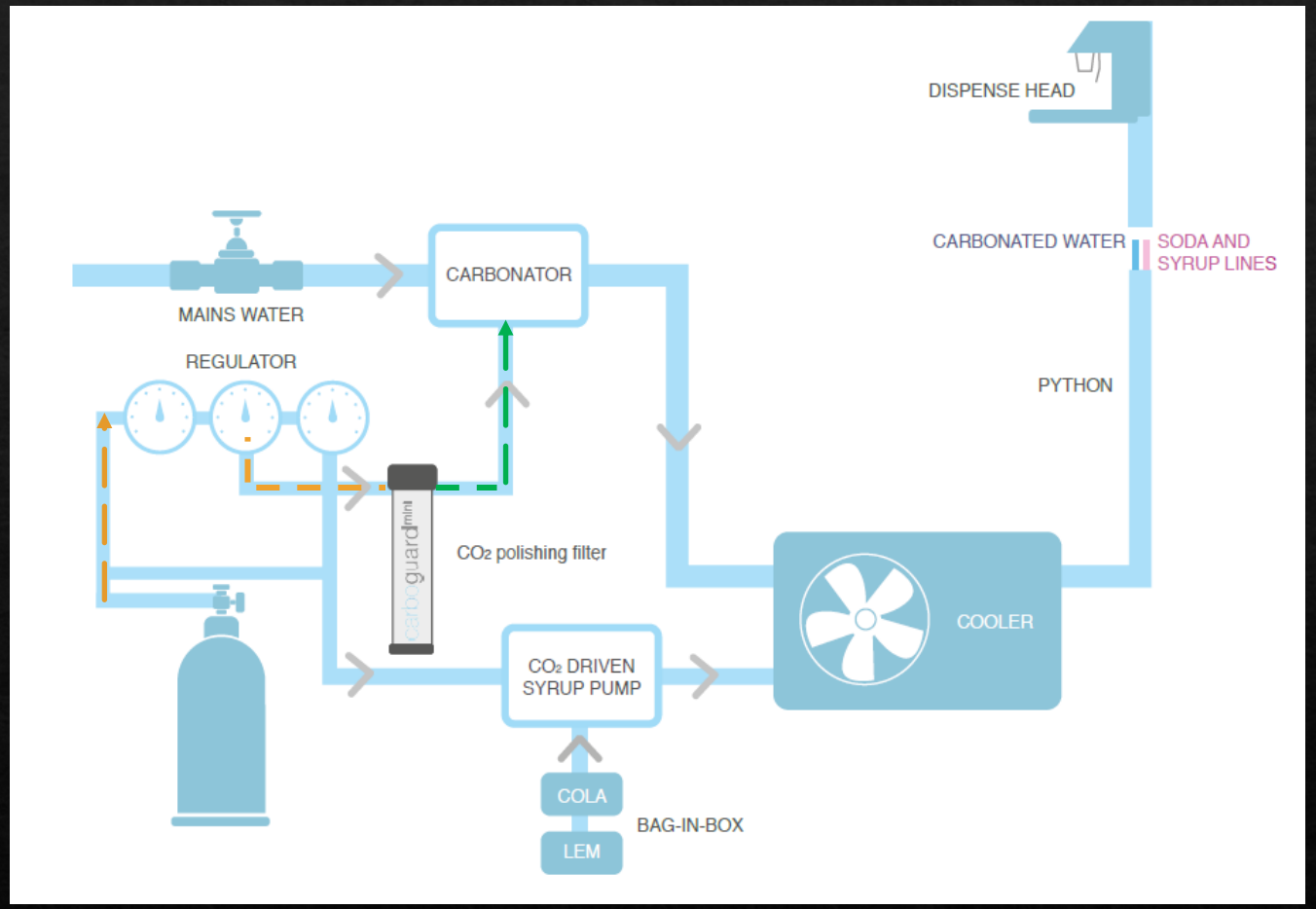
1. Prevention of CO2 Quality related incidents
2. Continuous Polishing – Improving CO2 Quality
3. Improve cold drink dispense equipment reliability
4. Maintain/improve Beverage Quality Standards
5. Reduce Wasted Beverages
6. Improve Profits from Beverage Sales
7. On average 7-10% less CO_2 is required due to more effective carbonation
8. Drink stays fizzier for longer due to less breakout/surging

Proven Solution

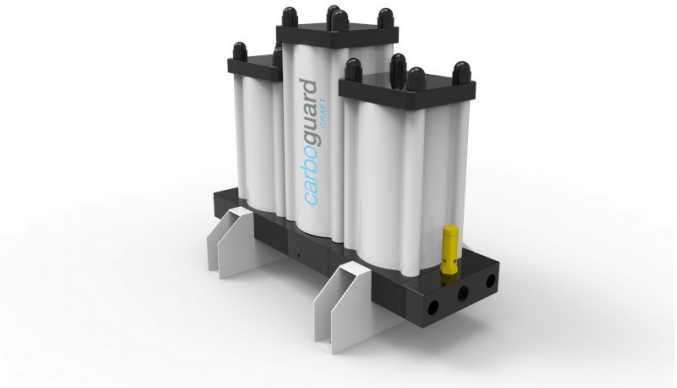
- 5 Stage Multi-Barrier Carboguard mini
- Physical and Chemical Impurity Protection
- 6 months continuous polishing and incident protection up to 10x ISBT
- Quick Installation and Maintenance

Carboguard mini Location

Install after the gas pressure regulator before the carbonator/ beer pressure regulator



carboguard
CRAFT



Benefits for Brewers

- Smaller capacity 150kg/hr
- Compact size 300x220mm footprint
- 12 months cartridge lifetime
- Continuous purification
- Security from incidents up to 10x ISBT
- Better quality beer foam
- Longer lasting beer foam retention, no CO_2 quality related gas surging

Thank You!

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