

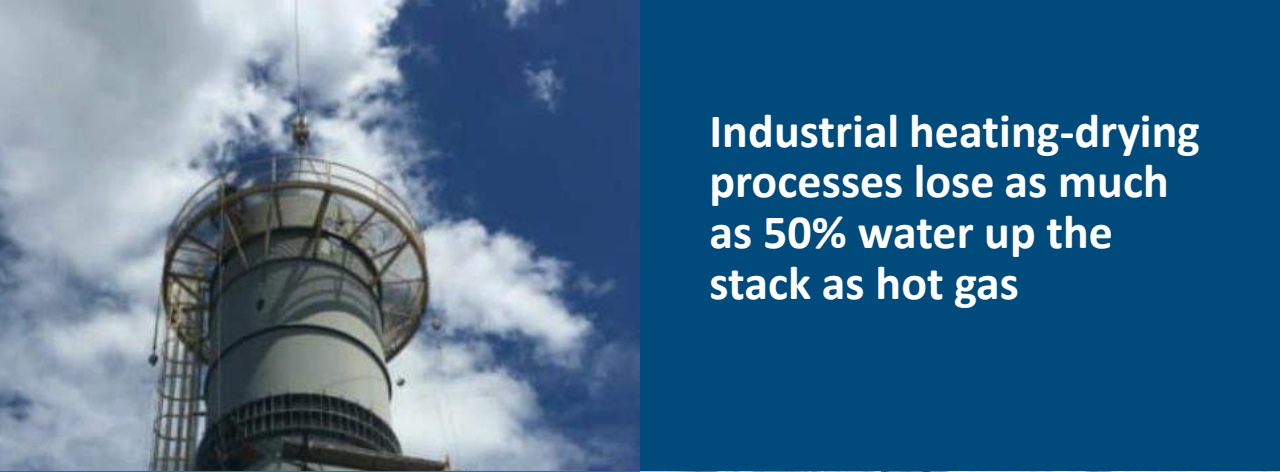


# Water-Energy Sustainability

TMCAqua technology delivers water and energy sustainability for gas combustion and process drying operations







**Industrial heating-drying processes lose as much as 50% water up the stack as hot gas**



**Most of the investment to-date has focused on recovering water going down the drain**



**One (1) lb of natural gas when burned produces 2.25 lbs of water that goes up the stack as hot gas**

# TMCAqua™

- **Patented technology to recover clean water and energy from hot humid waste exhaust stacks. Only technology of its kind in the industry.**
- Hot process and combustion stack gases represent an untapped source of clean water and energy efficiency improvement that can be achieved by recovering it as hot water!
- TMCAqua can recover 50-80% of the water and energy from these exhaust stacks

**EXCLUSIVE GLOBAL LICENSE FROM:**

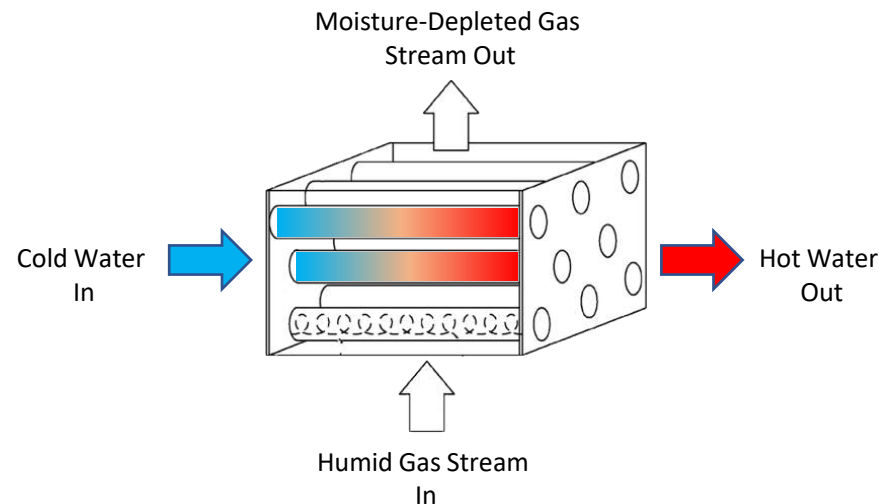
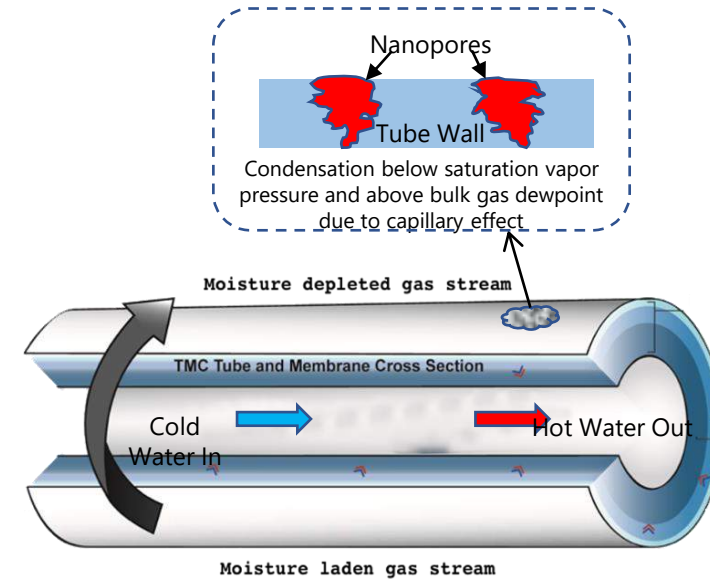


# TMCAqua™ – Technology

The TMC is a nano porous ceramic membrane tube that selectively removes clean water from hot, humid gas streams

Scalable modular design for small and large applications

Avoids corrosive condensation problem due to proprietary design utilizing ceramic tubes and phenomenon of capillary condensation



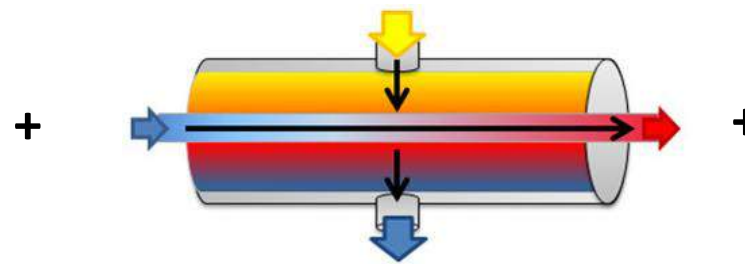
# TMCAqua™ – Single Device Performing 3 Functions

## Condenser



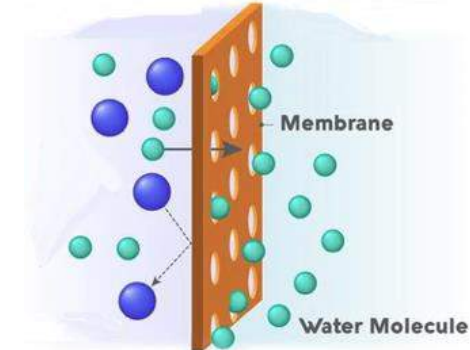
Condenses moisture  
out of waste gases

## Heat Exchanger



Recovers Hot Water  
thereby recovering  
enthalpy

## Membrane Filter



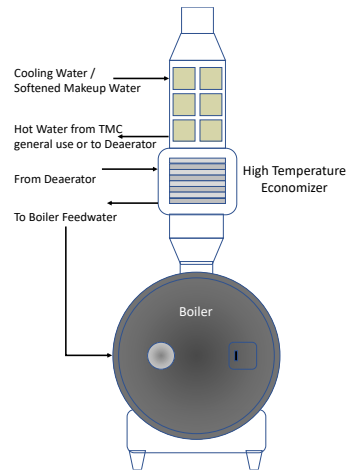
Filter water through  
the membrane filter  
wall and produces  
clean water

# TMCAqua – Application Matrix

1

## Industries:

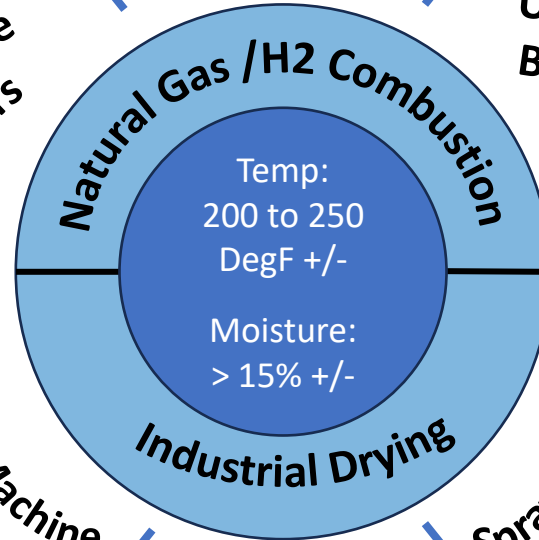
- Food/CPG
- Chemical
- Refining
- Metals
- Pharma
- Pulp & Paper
- Commercial
- District/University /Hospitals



Gas Package Boilers

Furnaces/Kilns /Ovens

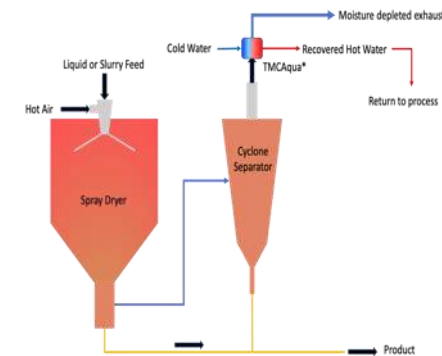
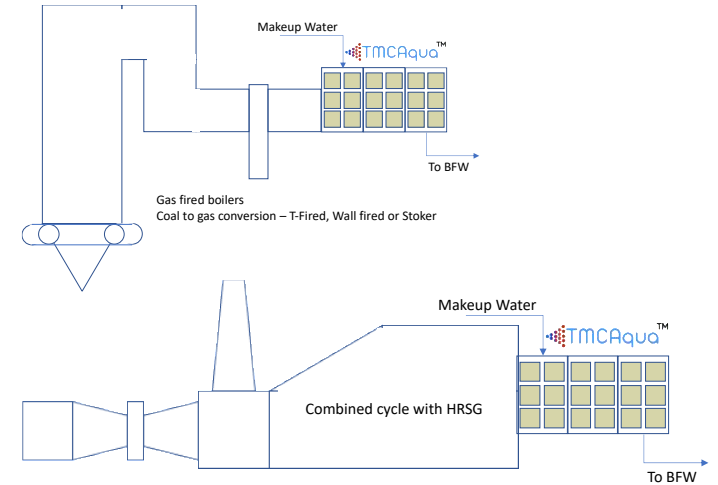
Utility Boilers / District



Paper Machine Dryer Hood

Evaporators/ Proprietary Dryers

Spray Dryers



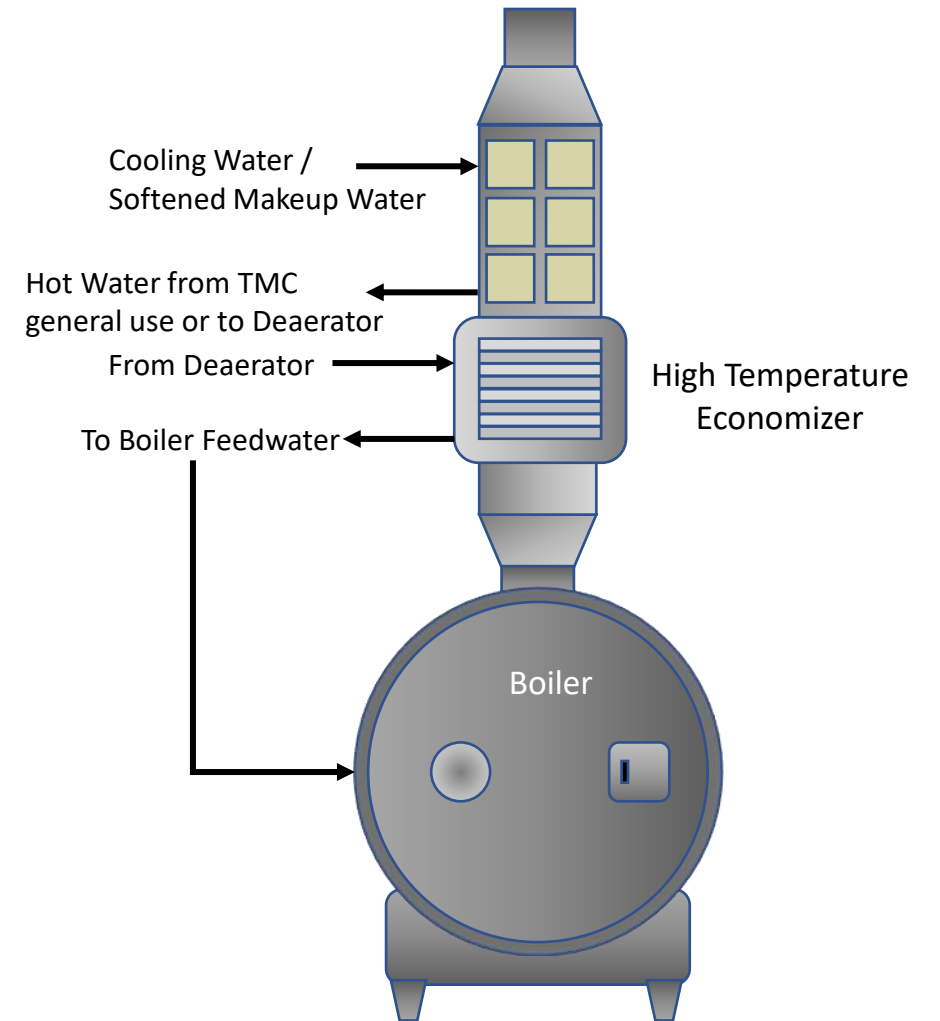
## Industries:

- Food/CPG
- Chemical
- Pharma
- Nutraceuticals

2

# Boiler Flow Diagram

- TMC Technology recovers Sensible and Latent Heat from flue gas stream
- Recovers clean water from natural gas burning combustion systems
- Boiler efficiencies of 95% are possible
- Reduction in emissions is equal to the reduction in fuel consumption
- Up to 50% recovery of water and enthalpy from waste exhaust gases

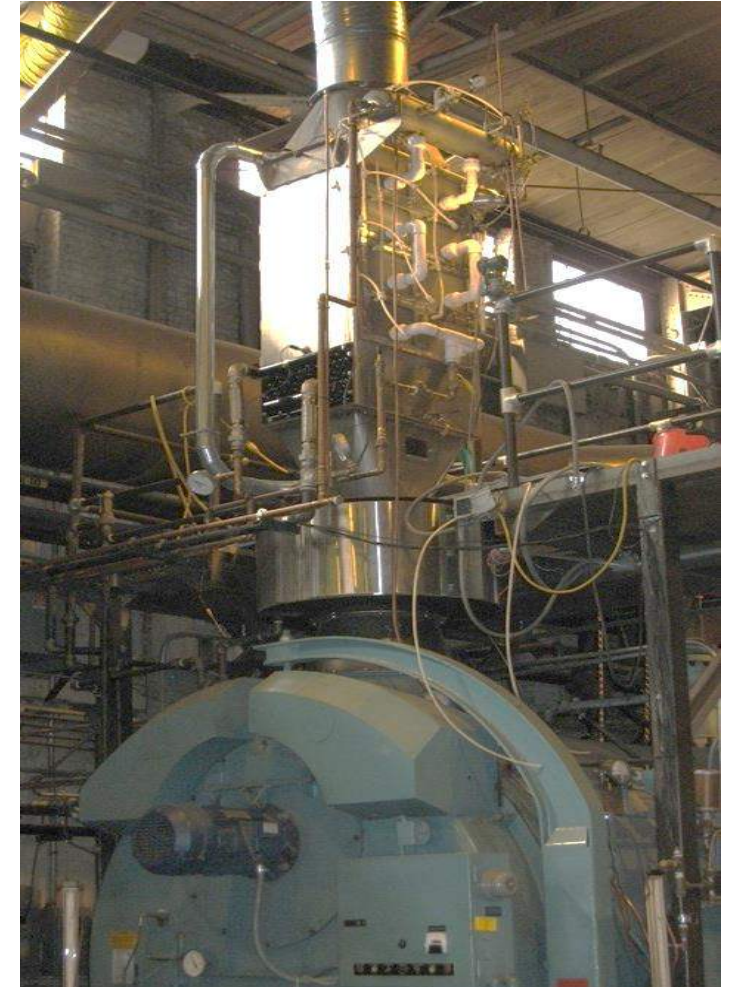




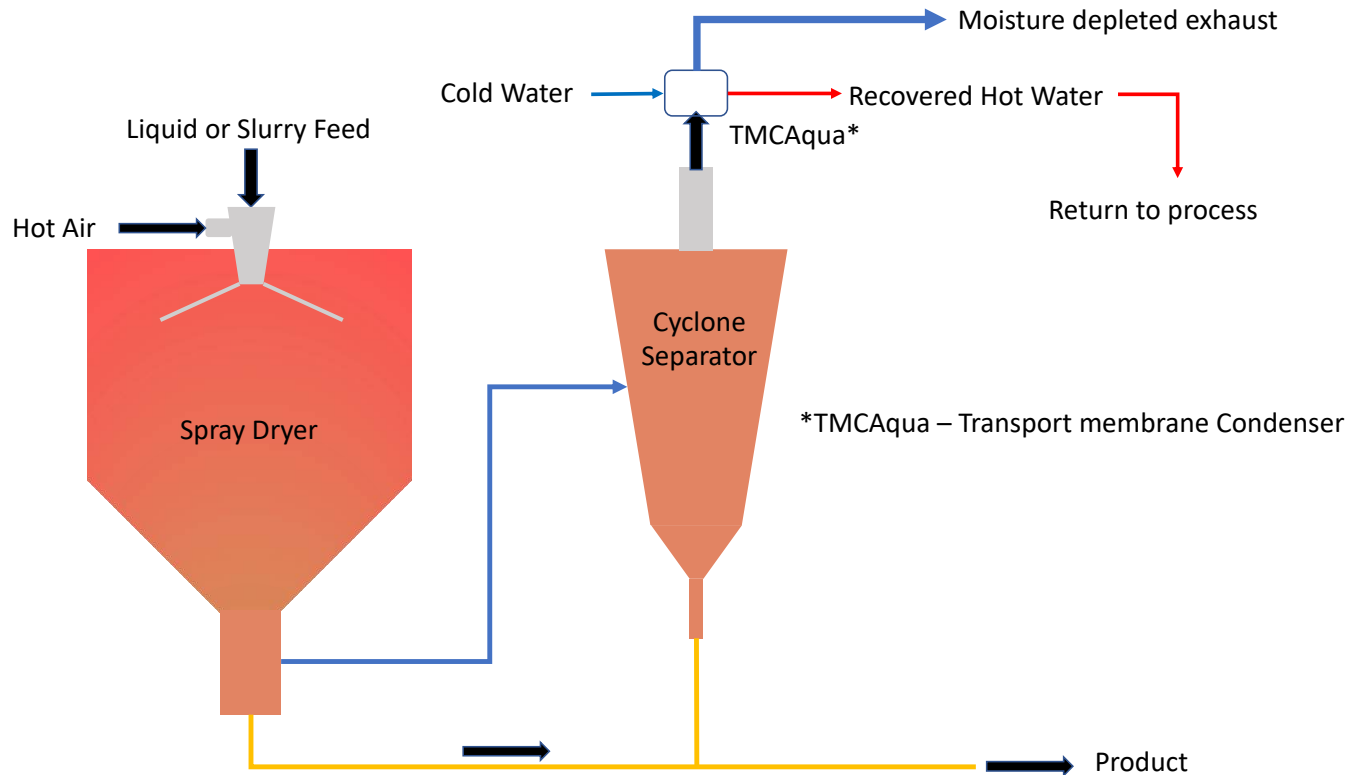
# Package Steam Boiler ROI

## Sample water and energy recovery for Gas Package Boilers

	Water Recovery	Natural Gas Savings	TMCAqua System Model
Boiler Horse Power (HP)	Gallons/year	MCF/year	
50	55,000	650	PB-13
100	109,000	1,300	PB-13
200	218,000	2,600	PB-31
300	410,000	4,855	PB-33
500	683,000	8,092	PB-36
600	820,000	9,714	PB-36
700	984,000	11,357	PB-38
1000	1,394,000	16,193	PB-38
1200	1,667,000	19,433	PB-39



# Spray Dryers



- Spray Drying is an industrial process where Liquid or Slurry is fed into a reactor where it is atomized and exposed to temperature whereby the water is evaporated and solids are collected as product. A spray dryer is typically connected to a particulate collection device downstream such as a cyclone separator or a bag-house.
- This is an ideal application for TMCAqua to recover water and energy from this stack. As much as 50 to 85% of the water and available enthalpy can be recovered by TMCAqua and can be re-used in the process as hot water.
- **Some examples include chemical processes, paints and pigments, food and nutrition and pharmaceutical.**



# TMCAqua - Competitive Matrix

	TMCAqua™	Heat Exchanger	Condensing Economizer	Filtration, R/O etc.
Gas Phase Recovery	✓	✓	✓	✗
Energy Recovery:				
Latent heat	✓	✗	✓	✗
Sensible heat	✓	✓	✓	✓
Water Recovery	✓	✗	✓	✓
Clean Water (does not require post treatment)	✓	✗	✗	✓

## TMCAqua™ INSTALLATION LIST

S. No:	Install Date	Customer	Application	Project Type	Current Status
12	2021-2022	Fortune 500 CPG	Spray Dyer	Pilot	In discussions for commercial installation
			Proprietary Dryer	Pilot	In discussions for commercial installation
			Proprietary Dryer	Pilot	In discussions for commercial installation
11	2016	Michael Foods Potato Plant, Chaska, MN	Package Boiler	Pilot	Pilot
10	~2012	Unspecified Coal Power Plant	Coal Power Plant	Pilot	Pilot
9	~2011	Rock Island Arsenal	Package Boiler - Army base	Commercial Installation	Unknown. No current contacts available at facility.
8	~2011	City Brewing, Latrobe, PA	Package Boiler - brewery	Commercial Installation	System in place but not being operated. Facility has gone through multiple ownership changes.
7	~2010	L&N Costume Service	Steam Tunnel - commercial laundry	Commercial Installation	System was in service until 2020/Covid. Currently laundry is not running at full capacity and system is turned off.
6	Before 2010	Latrobe Brewing	300 HP Package Boiler	Commercial Installation	Ownership of facility has changed several times and system not in use.
5	Before 2010	China Lake, CA	300 HP Package Boiler	Pilot/Commercial	Unknown. No current contacts available at facility.
4	Before 2010	Celment Papas & Co., CA	Package Boiler	Pilot	Pilot
3	Before 2010	Specification Rubber, AL	Package Boiler	Pilot	Pilot
2	Before 2010	Richardson Candies, NY	Package Boiler	Pilot/Commercial	Unknown. No current contacts available at facility.
1	Before 2010	Baxter Healthcare, CA	Package Boiler	Pilot/Commercial	Unknown. No current contacts available at facility.