



*We recycle water, reduce GHG emissions,  
capture nutrients and increase farm profitability*





## **THE CLEAN WAVE TEAM**

**TIM HEFFERNAN**  
**CHIEF TECHNOLOGY & OPERATING OFFICER**

Tim is an environmental scientist with a BS in Biological Sciences and an MS in Environmental Science from the Indiana University School of Public and Environmental Affairs. He has functioned in an engineering role for the past decade. He is a creative, career-long entrepreneur. Tim has founded and operated environmental consulting firms and managed environmental services for an engineering firm. He is responsible for Clean Wave's current technologies and those in the pipeline. Tim has a network of scientific and technical contacts that provide a resource for solving unique challenges.

**TROY FLOWERS**  
**CHIEF COMMERCIAL OFFICER**

Troy holds a BS in Bio-chemistry from Saint Joseph's College in Rensselaer Indiana. He did graduate study in Clinical microbiology at Indiana University School of Medicine. Troy is also a career-long entrepreneur, having been involved in several startups including one that earned him recognition as the Entrepreneur of the Year in Indiana. Troy's background is primarily in business development, sales and marketing with a strong science foundation. He and Tim Heffernan have collaborated on various projects over the last 20 years. Troy has worked to maintain commercial interest in the Clean Wave technology suite.

**MICHAEL GALLOWAY**  
**CHIEF FINANCIAL OFFICER**

With a law degree, MBA focused on finance, and a vast entrepreneurial background, Mike provides sound financial and business management to Clean Wave. Mr. Galloway has known Mr. Heffernan and Mr. Flowers for nearly twenty five years and is very familiar with their accomplishments. He has been involved with some of their previous employers and entrepreneurial endeavours. Mike is also an investor in Clean Wave Tech.



## OUR TECHNOLOGIES ADDRESS CURRENT DAIRY ISSUES

### DROUGHT



Droughts have created a huge demand for water recycling in the dairy industry. Some of the largest and most productive dairies in the country are located in areas of extreme drought.

ecoFloc separates the liquid component from the waste solids to make it immediately available for irrigation and cleaning. Further processing can make it potable for the dairy herd.

### RISING COSTS



Rising costs are cutting into dairy profits. ecoFloc will save an estimated one cent per gallon of treated wastewater.

Between liquid waste and wash water, each cow produces approximately 35 gallons of wastewater per day.

A 4,000 cow dairy produces about 140,000 gallons of wastewater per day. We project savings of \$1,000 per day or \$ 365,000 per year.

### ANIMAL HEALTH

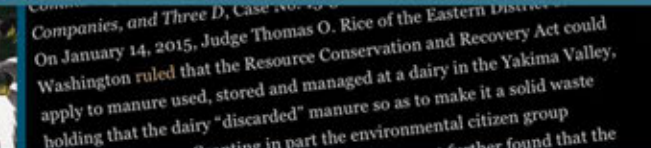


Environmental pathogens can trigger an inflammatory response in a cow's mammary glands known as mastitis.

This can then be passed from cow to cow potentially taking a large number of the herd out of production.

Dairy fiber dried with ecoFlash produces bedding with a much lower potential for pathogen growth resulting in a healthier herd.

### REGULATION



A 2015 judicial ruling sent shockwaves through the dairy industry by applying industrial waste regulations (RCRA) to dairy manure management.

In addition to higher insurance costs, the ruling created potential financial liabilities for farms if waste isn't handled properly.

Clean Wave's technologies eliminate this potential problem.



## **OUR TECHNOLOGIES ADDRESS GLOBAL ISSUES**

### **CLIMATE CHANGE**

The past several years have seen weather extremes around the world with records being set in many categories.

Dairies using conventional manure management methods produce large quantities of greenhouse gases which add to the growing problem. Clean Wave's technologies are expected to reduce overall farm CO<sub>2</sub>e emissions by more than 68%.



**68%  
CO<sub>2</sub>e  
REDUCTION**

### **NATURAL RESOURCE PROTECTION**



A bog wetland being stripped for peat.

The mining of peat moss is a destructive industry that harms sensitive habitats. Peat is the product of hundreds of years of a natural processes that occurs in bogs. Sphagnum moss, and other plants don't decompose in bogs. Instead they build up and compact to form what we know as peat moss.

The horticulture industry has been trying to find a viable sustainable replacement for years. Clean Wave has the answer.



## OUR TECHNOLOGY SOLUTIONS

eco**FLOC**  
WASTE SEPARATOR

eco**FLASH**  
NON-THERMAL DRYER

Our ecoFloc Hybrid System separates dairy waste into 3 components: **LIQUID**, **FIBERS** and **SOLIDS**. The **LIQUID** component can be used directly for washwater, irrigation or further processed to make it potable for the dairy herd. ecoFloc can virtually eliminate solids discharge, erasing the need to ever clean out a waste water lagoon.

Our ecoFlash Non-Thermal Dryer removes water using roughly 1/4 of the energy required by current methods. ecoFlash dries **FIBERS** to a lower percentage of moisture than current methods greatly limiting pathogen growth. Dried **SOLIDS** are nutrient rich and valuable as a replacement for commercial fertilizer. This is a low heat drying method that virtually eliminates the possibility of fire, which is common in Rotary Drying Systems.



## TECHNOLOGY DEVELOPMENT

Our mobile ecoFloc and ecoFlash units have traveled to varied industries to demonstrate our capabilities for processing assorted materials. Valuable data has been gathered during these trips that has led to refinements to both systems.

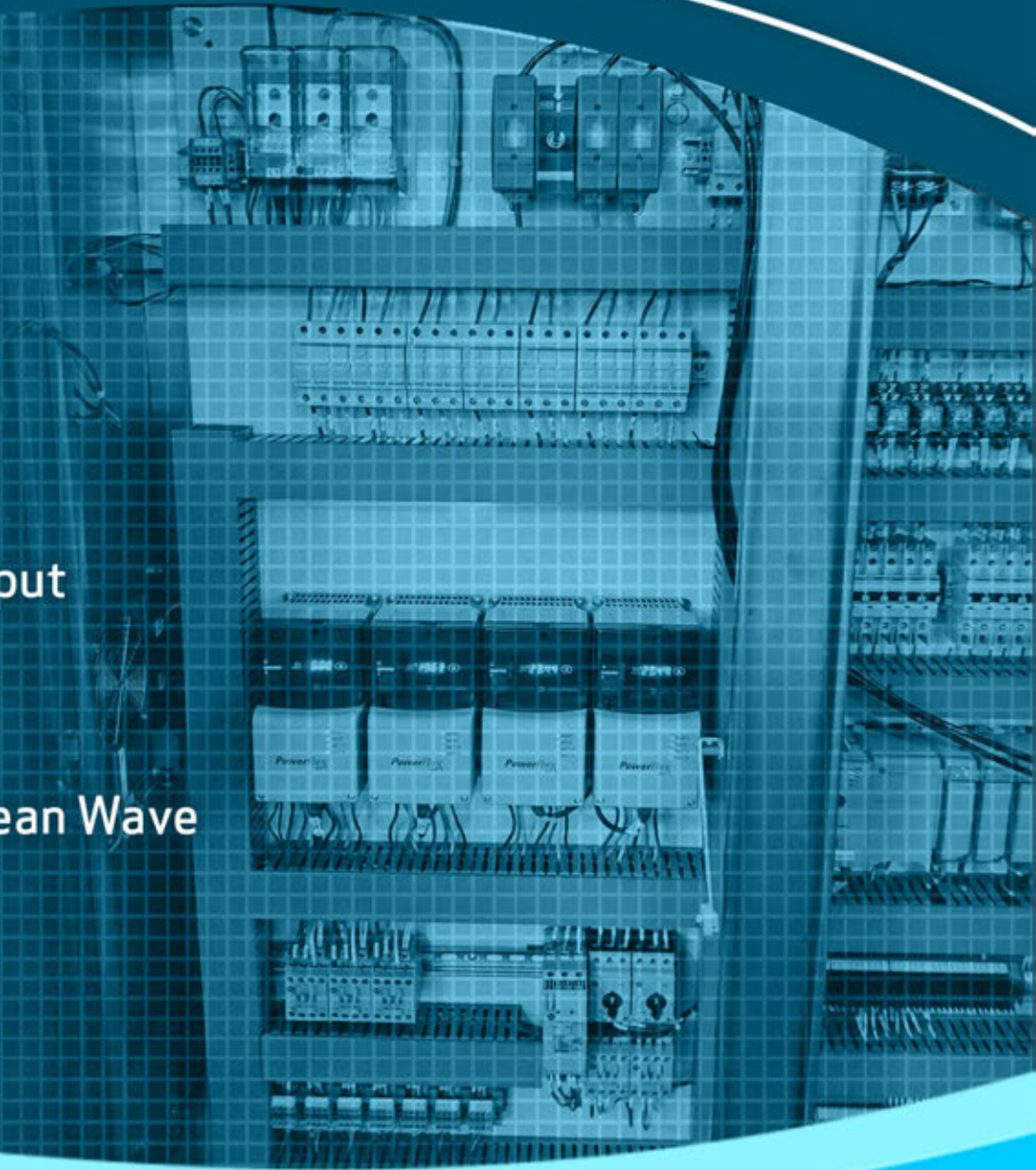
Shown below on the right are the results of an ecoFloc field test. The jars were sampled at various stages in the process and demonstrate the separation of the liquid component from the dairy waste solids.





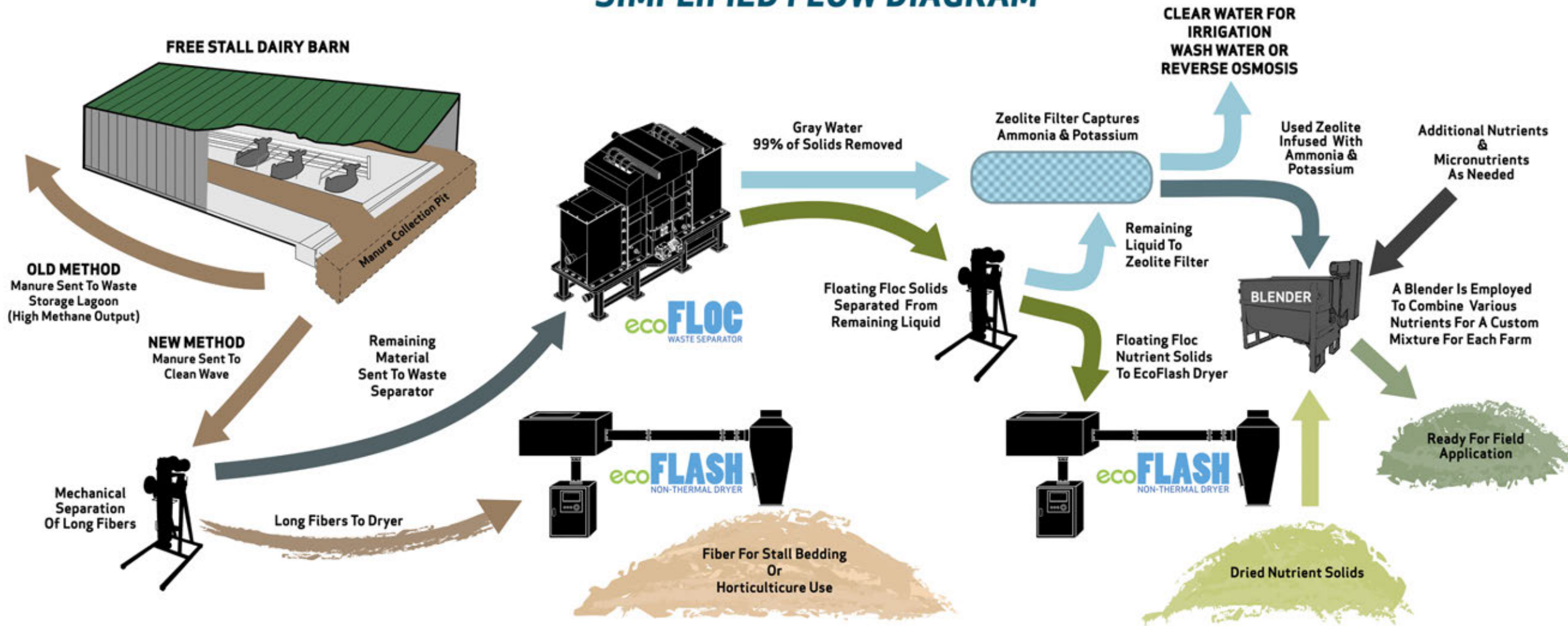
## **CONTROL SYSTEM**

- Advanced PLC Control System
- Integrated performance monitoring in real time
- Automated responses to changes in in-feed and or output
- Remote monitoring of performance and throughput
- Automated notification of required maintenance to Clean Wave
- Integration with invoicing system





## SIMPLIFIED FLOW DIAGRAM





## MARKET ANALYSIS

The excerpt from the Mordor Intelligence report estimates the agricultural wastewater treatment market at just over 2 billion dollars.

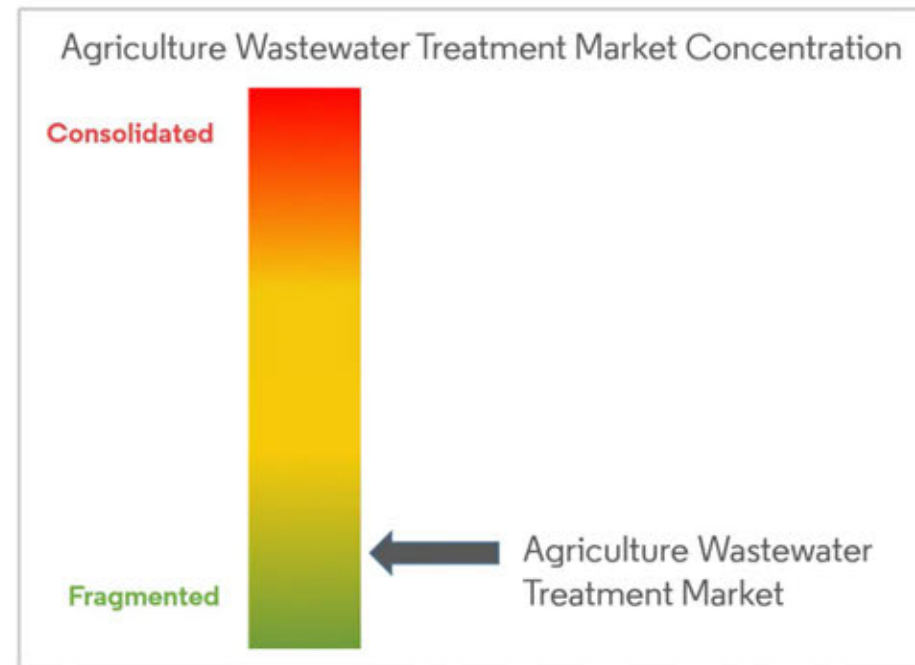
The total for all portions of agricultural manure management is greater than 3 billion.

Although there are some larger players in the market, the fact that it's fragmented allows an opening for Clean Wave's technologies to capture a significant percentage of the market.

### Mordor Intelligence

#### Agricultural Wastewater Treatment Market Analysis

The agricultural wastewater treatment market was estimated to be more than USD 2 billion in 2021, registering a CAGR of more than 4% during the forecast period (2022-2027).



#### Agricultural Wastewater Treatment Market Competitor Analysis

The agriculture wastewater treatment market is fragmented, with the presence of majorly multinational players. Some of the major players in the market include Veolia Environnement SA, Suez SA, Evoqua Water Technologies LLC, DuPont, and Jacobs.



## CLEAN WAVE COMPETITORS

	<i>Clean Wave</i>	<i>Digested Organics</i>	<i>Livestock Water</i>	<i>Trident</i>
<b>WATER RECYCLING</b>	★★★★★	★★★★★	★★★★☆	★★★★☆
<b>GHG REDUCTIONS</b>	★★★★★	★★★★☆	★★★★☆	★★★★☆
<b>NUTRIENT CAPTURE</b>	★★★★★	★★★★☆	★★★★☆	★★★★☆
<b>FIBER RECYCLING</b>	★★★★★	★★★☆☆	★★★☆☆	★★★★☆
<b>CAPITAL COST</b>		★★★★☆	★★★★☆	★★★★★

Although competitors can achieve similar results to Clean Wave, we excel in all listed categories. The main differentiator is the capital cost borne by the farm. Our technologies are provided as a toll-based service allowing farmers to get up and running without capital investment.

**Digested Organics** utilize a variety of filtration techniques to separate high solids wastewaters. They are less effective 68% solids recovery. They produce 85% of the liquid dairy wastewater as colored but transparent liquid and 15% as a concentrated slurry high in phosphorus.

**Livestock Water Recycling** generate a clean gray water, a concentrated liquid slurry and a wet solid. The concentrated liquid fraction contains Ammonia and Potash. Other than recycling 75% of the water, 17% liquid slurry and 8% moist solids, they don't report details of the nutrients.

**Trident Net-Zero** report 99.9% solids removal but 80% phosphorus removal, which appear inconsistent. They mention only reuse of the water for flushing or irrigation.



## **REVENUE GENERATION *ecoFLOC***

Clean Wave will employ a toll based model with clients. All revenue estimates are based on a dairy of 4000 cows.

### **WASTEWATER PROCESSING**

Our cost to manufacture and install an ecoFloc 100 GPM system will cost approximately \$370,000. Projected maintenance costs are \$59,000 per year. Clean Wave will provide processing of dairy wastewater for \$0.007 per gallon. This will total \$1,440 per day or **\$466,377 per year.**

### **GREENHOUSE GAS REDUCTIONS**

Clean Wave's system will generate greenhouse gas reductions based primarily on methane avoided of about 5.6 metric tons of CO2 per cow.

At current pricing on the Voluntary Market these reductions are worth **\$78,480 per year.**

After an approved protocol is certified, we can trade on the California Quebec Cap & Trade Market. This boosts the value of the reductions to **\$1,080,000 per year.**





## REVENUE GENERATION *ecoFLASH*

Clean Wave will employ a toll based model with clients.  
All revenue estimates are based on a dairy of 4000 cows.

### RECYCLED FIBER DRYING

Our cost to manufacture and install an ecoFlash system with monitoring components is approximately \$225,000. Projected maintenance costs are \$12,000 per year. Expected revenue from drying recycled fibers for bedding is \$770 per day or **\$268,947 per year.**

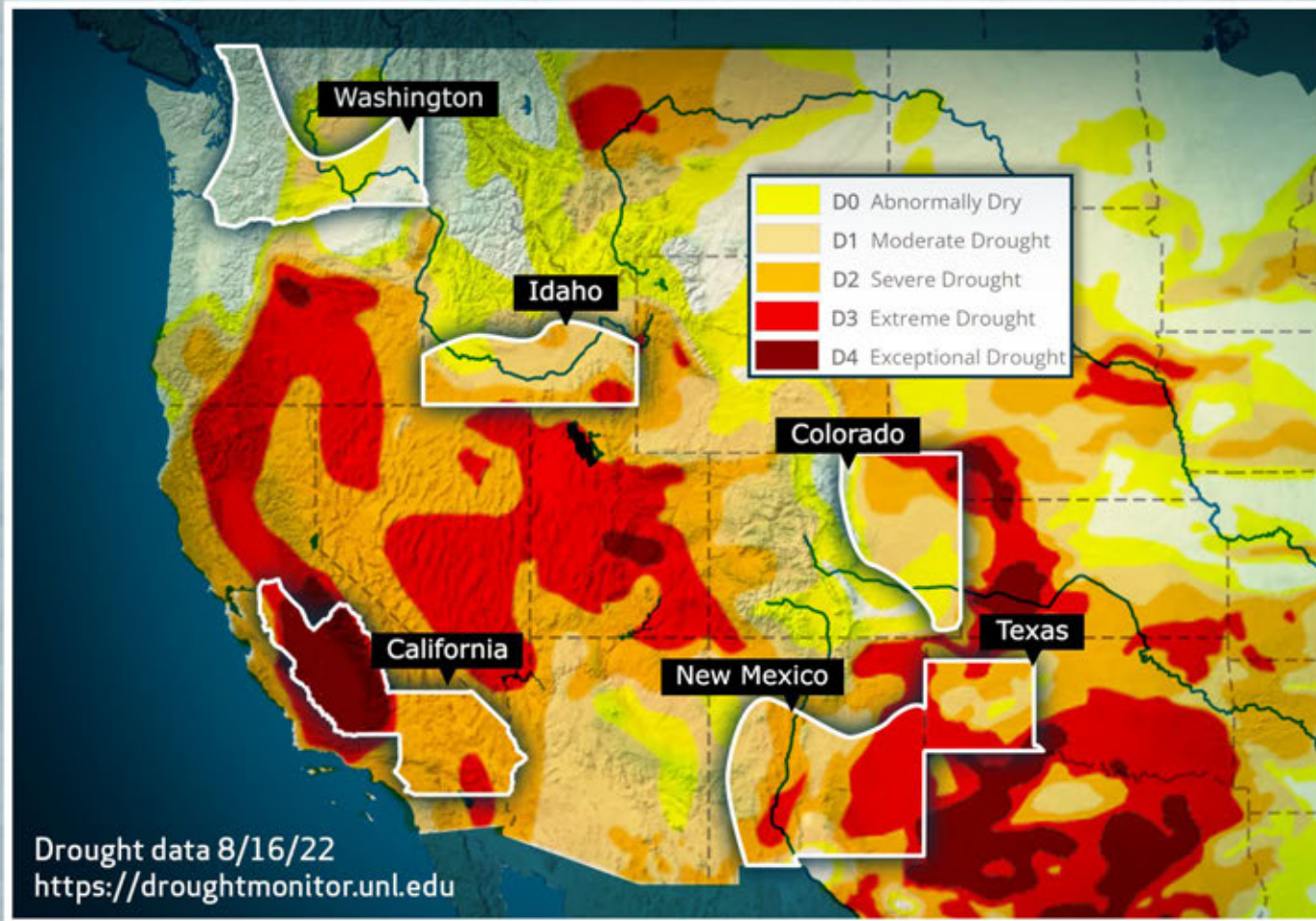
### SALE OF RECYCLED FIBER

This source of revenue will only be available to farms in certain geographic areas. Clean Wave will purchase excess dried fiber for \$3 per yard and sell it to an industry processor for \$15 per cubic yard. The total is \$3,420 per day or **\$1,248,300 per year.**





## PRIORITY TARGET MARKET



Dairies with the best possible conditions for a sale and the most upside earning potential have the attributes listed below. Those meeting our criteria are mainly located in the West. Our initial marketing efforts will focus on farms that tick these boxes.

-  **1500 PLUS MILKING COWS**
-  **LOCATED IN DROUGHT AREAS**
-  **EMPLOY FREE STALL BARNs**
-  **USE RECYCLED FIBER BEDDING**
-  **NEAR PROCESSING LOCATIONS**

The areas outlined in white are the primary dairy production regions in each state. Dairies in the majority of these states are in areas that range from Moderate to Exceptional Drought.





## **FARMS NEAR HORTICULTURE PROCESSORS**

Fibers dried with ecoFlash can be used as a replacement for peat moss. Clean Wave will purchase excess fiber and truck it to industry processors for finishing and distribution through their established retail markets.

## **FARMS USING RECYCLED FIBER BEDDING**

Dairies have multiple options for animal bedding. Straw, saw dust, wood shavings, sand and rubber mattresses are used.

Recycled fibers extracted from manure are an economical choice for bedding. ecoFlash dries fibers to a lower percentage of moisture which limits pathogen growth resulting in a healthier herd and greater profits.



## **FARMS EMPLOYING FREE STALL BARN**

Free stall barns allow cows to move about at will. Manure is collected multiple times per day and directed to a central pit where it is then pumped to a lagoon. With Clean Wave, manure can be pumped from the pit to the ecoFloc for recycling.



# CLEAN WAVE VALUE PROPOSITION

The data on the right illustrates the value Clean Wave can bring to a typical 6000 cow dairy.

Even after our fees the dairy will realize a greater profit through savings in waste management, fewer cases of mastitis, higher milk prices due to lower Somatic Cell counts and sale of excess fiber.

Tim goes into greater detail on this subject in his blog post titled:

**“Addressing Dairy Sustainability through the Smart Application of Technologies”**

[READ TIM'S POST HERE](#)

	Current Methods	With Clean Wave
On Farm GHG Emissions CO2e	175,194	54,264
Total Milk Potential/Day	4200	4200
Quality Milk Premium Price	\$20.00	\$20.00
Potential Milk Revenue/Day	\$84,000	\$84,000
Somatic Cell Count	312,000	93,400
Mastitis Related Deficit In Milk Production	13%	2%
Actual Milk Price	\$19.43	\$20.00
Milk Sales per Day	\$ 70,997.22	\$82,320.00
* Added Expenses	\$1,600	\$ 200
Net Revenue After Mastitis Related Adjustments	\$ 69,397.22	\$ 82,120.00
Savings Per Day from Clean Wave Contract	\$0.00	\$ 12,722.78
Additional Revenue (Fiber Sales)	\$ 0.00	\$1,026.00
Additional Expenses from Clean Wave Equipment Operation and Tolling Fees	\$ 0.00	\$ 3650.00
Waste Management Savings	\$ 0.00	\$2,520.00
Net Revenue	\$ 69,397.22	\$ 82,016.00

\* Added Expenses assumes 8% Clinical Cases and the remaining production losses are from subclinical mastitis for the first column; Second column assumes 1% Clinical cases



**SALES AND SERVICE - ESTABLISHED DEALER NETWORKS**



Sales and service will be done in conjunction with established dairy dealer networks.

Trusted and highly regarded dairy equipment dealers already have relationships in our target markets. This will make the sales process smoother and provide a ready made work force of service technicians.



## MARKETING AND SALES

### DAIRY FOCUSED MEDIA

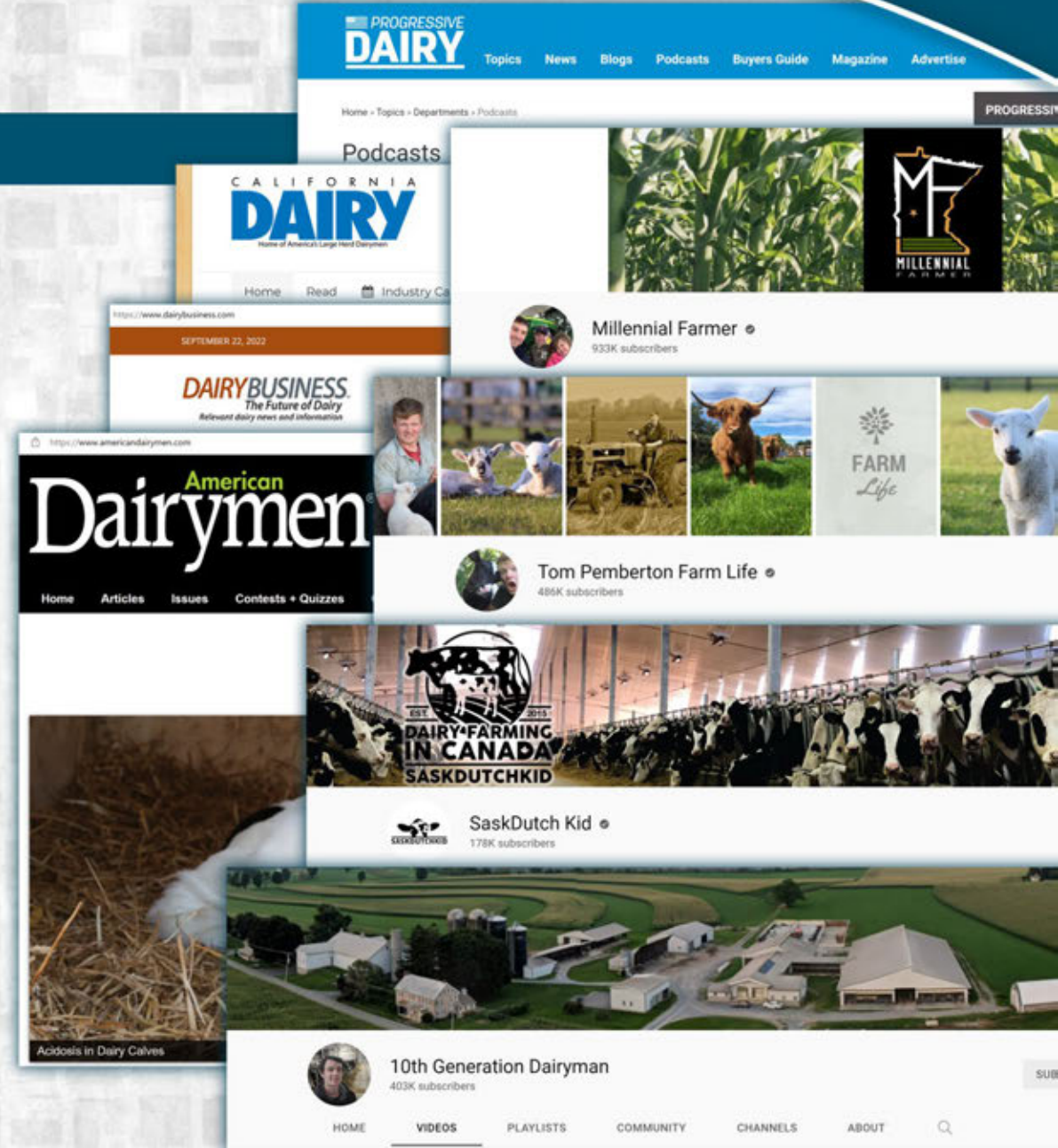
We will monitor and interact with dairy focused media. This will include magazines, podcasts, online learning sites and YouTube channels. There are some young dairy farmers that are very active on YouTube with large followings. The four shown on the right have 2 million combined followers. We will create our own social media content and endeavor to get coverage from the dairy media accounts we follow.

### MOBILE UNIT

Our mobile unit will demo Clean Wave's capabilities on selected farms in dairy heavy areas of the country. The unit will remain on site for several weeks. Local farmers will be invited to stop by to see our technologies in action.

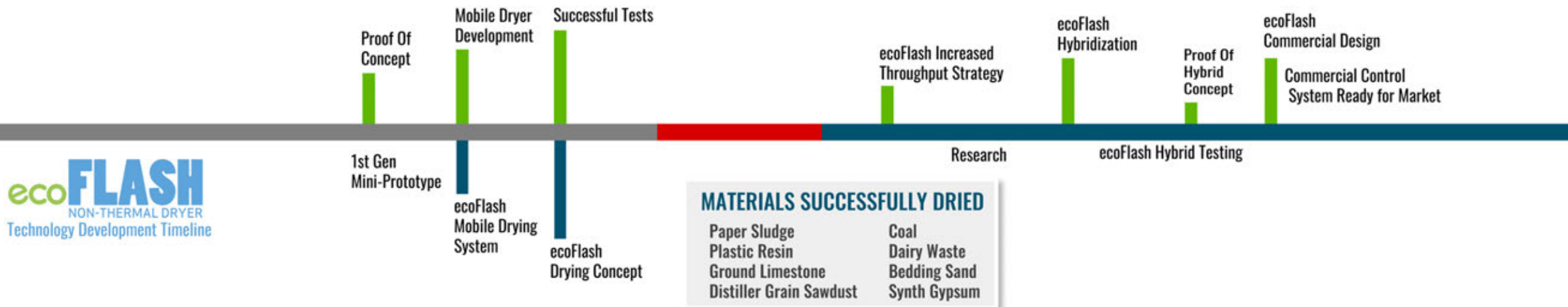
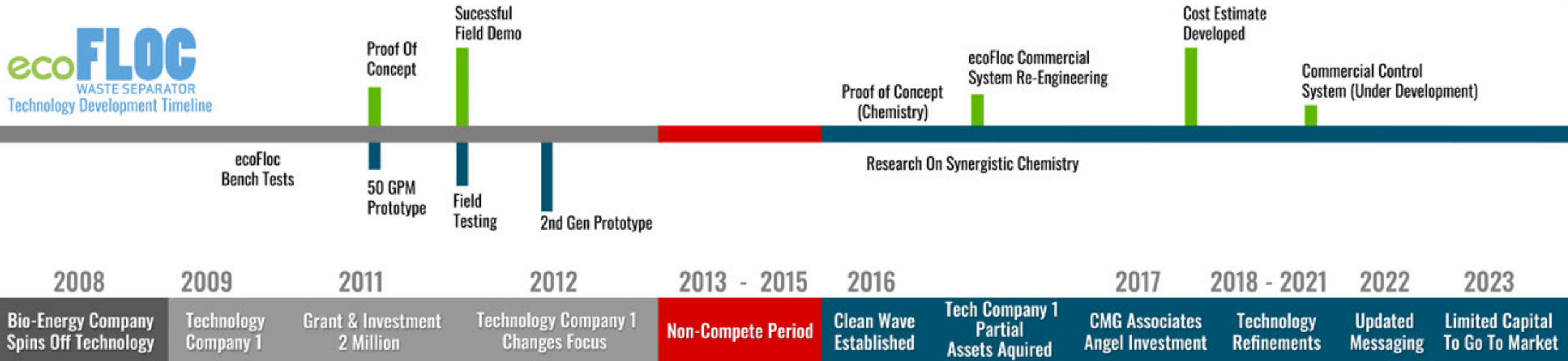
### TRADE SHOWS

Clean Wave will be represented at major agricultural shows. The mobile unit will appear at selected events.





# DEVELOPMENTAL TIMELINE



- MATERIALS SUCCESSFULLY DRIED**
- Paper Sludge
  - Plastic Resin
  - Ground Limestone
  - Distiller Grain Sawdust
  - Coal
  - Dairy Waste
  - Bedding Sand
  - Synth Gypsum





**DAIRY INSIDERS COMMENTS**

**TROY HARTZELL - FORMER DAIRY EQUIPMENT DEALER**

I've seen some of the early prototypes in action and I've seen them work. I believe Clean Wave will change the way dairy manure is managed at many farms and like most things, once it's proven at one dairy, other dairies will want the same benefits. I also know that Clean Wave intends to work with the local dairy equipment dealers to maintain their equipment and this will be critical to get the support of those dealers.

**CALIFORNIA DAIRY CONSULTANT**

The second generation of technologies that Troy and his team are bringing to the dairy industry through Clean Wave Technologies is even more exciting, especially for a waterstarved state such as CA. I still hold close ties with the dairy industry and have introduced these concepts to dairymen who represent well over 30,000 cows in California.





For further information, contact Troy Flowers.  
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