



BIOFORCETECH

Nature is Awesome

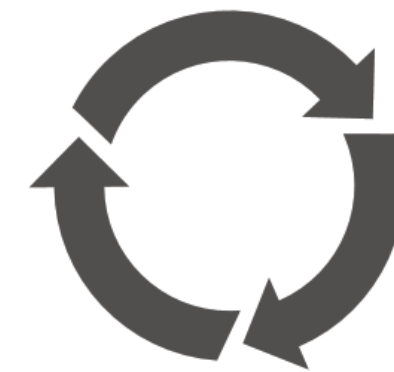


Bioforcetech Intro

Bioforcetech is committed to protecting nature and human health by providing technologies that deliver a zero waste future, transforming organic waste into sustainable products.



Affordable
waste management



Self sustained and
green process



Protect human health
from harmful disposal
practices

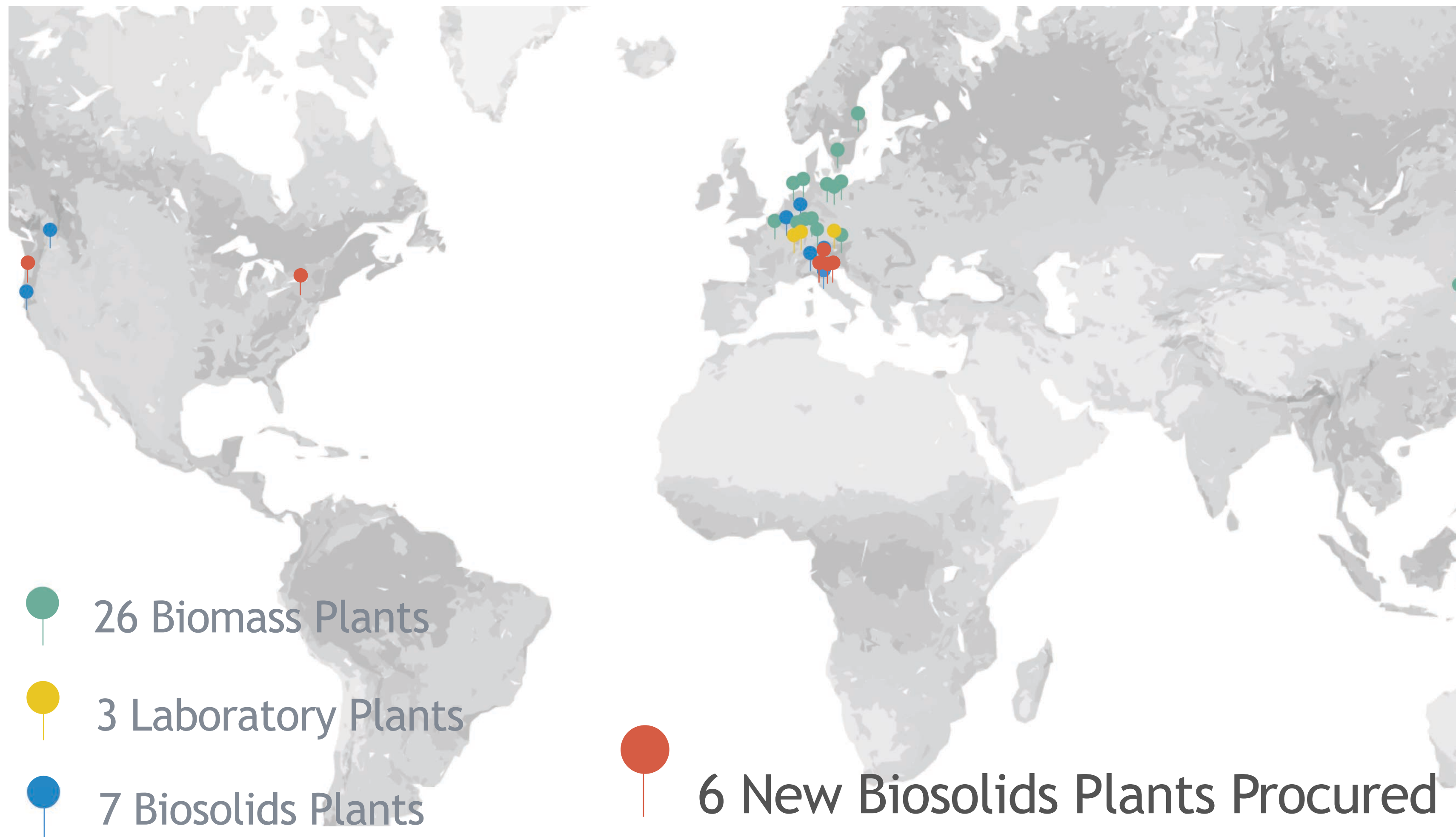


Valuable products
from waste



ORGANIC WASTE

2021 REFERENCES

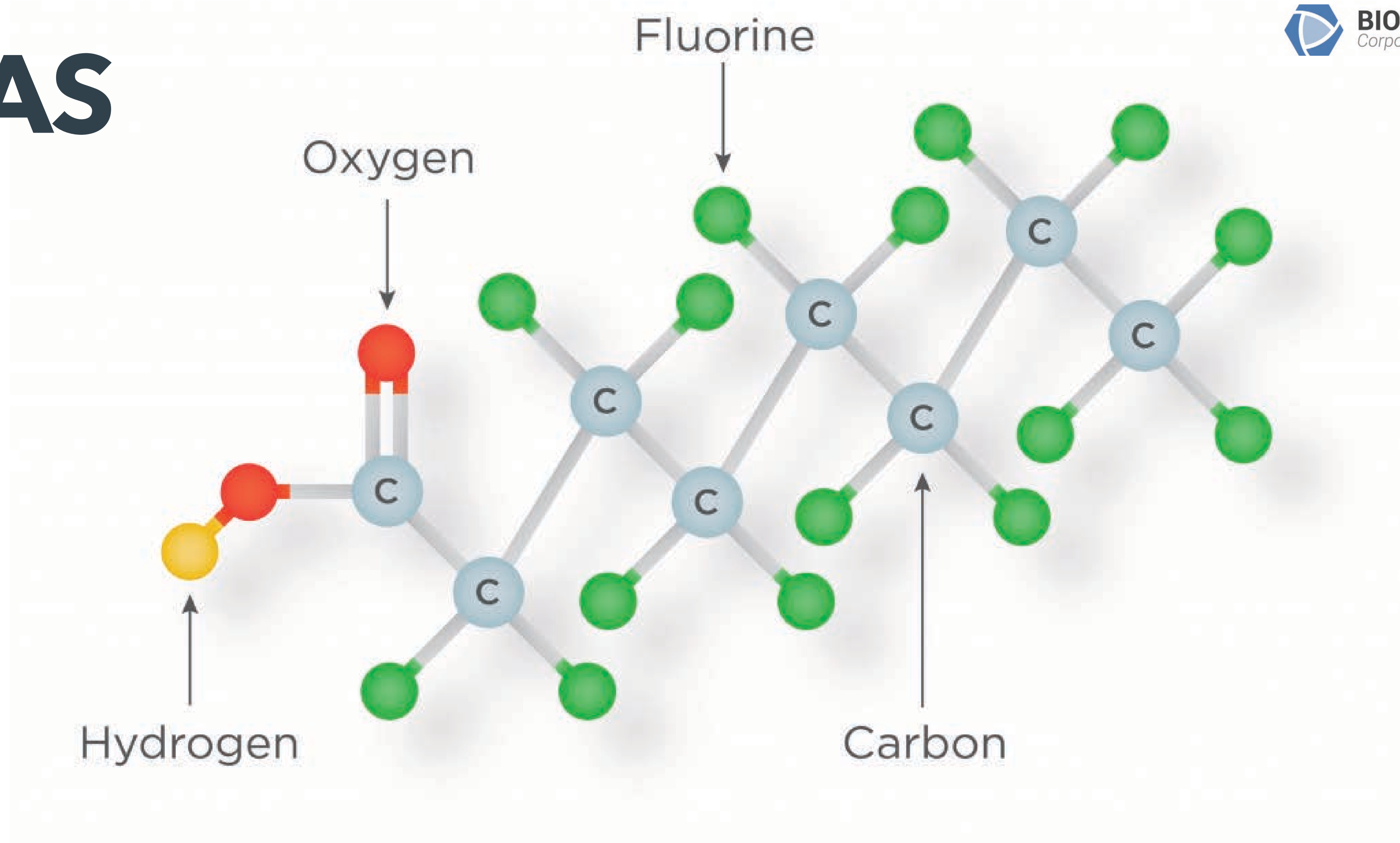




Sustainable PFAS Reduction/Elimination Through the BioforCETech System



PFAS



Perfluoroalkyl substances (**PFAS**) are very stable manmade chemicals that have properties that allow them to repel both water and oil

PFAS

Produced for decades without considering the environmental or human health effect

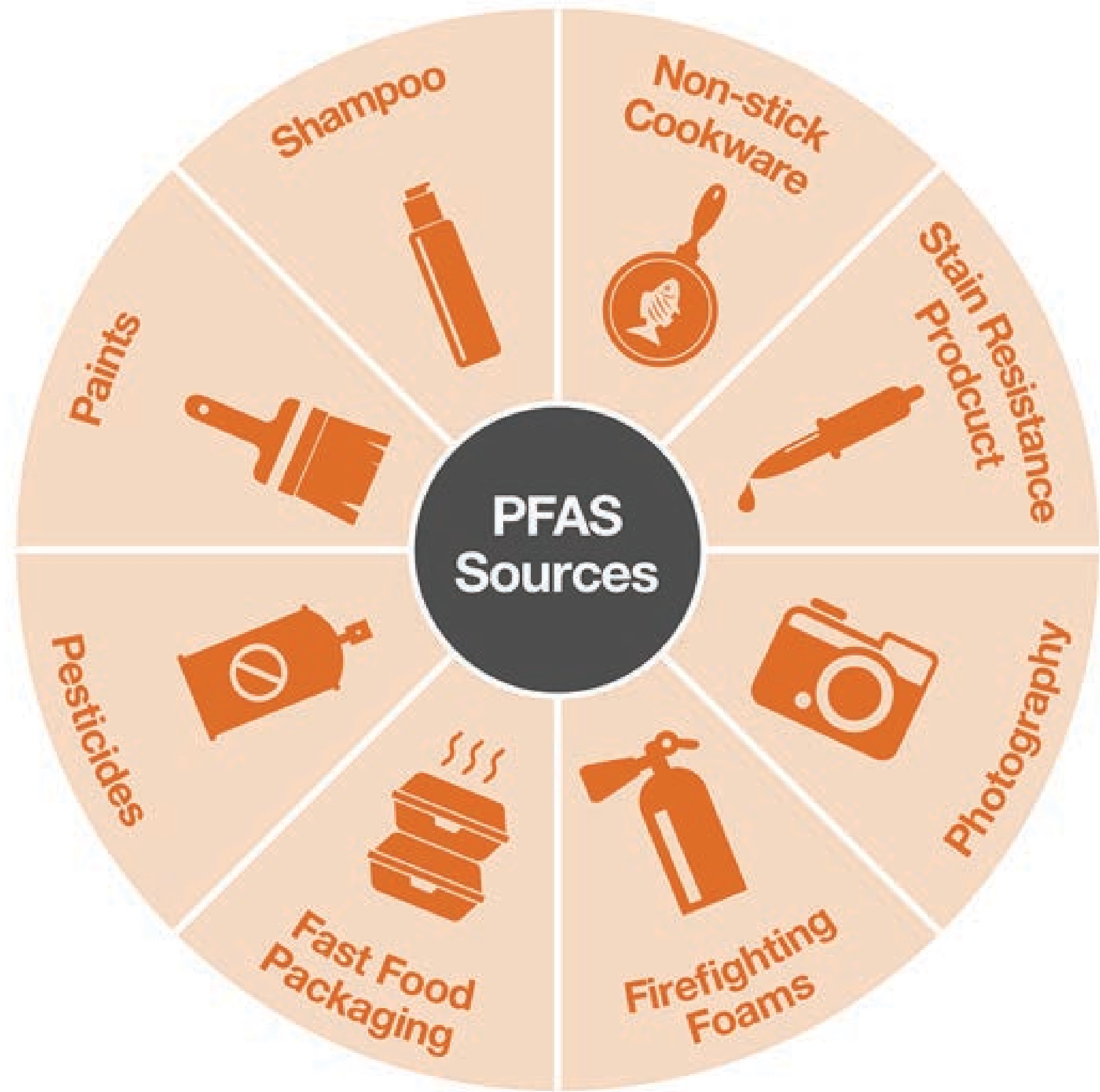
Now we know that the “forever chemicals” have devastating impacts on the environment

PFAS

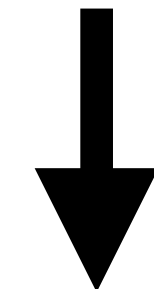
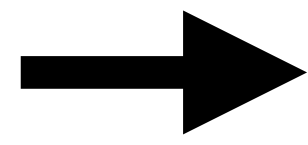


PFAS: Last Week Tonight with John Oliver (HBO) - YouTube

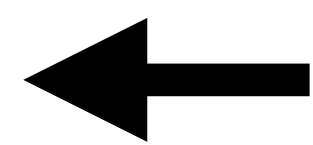




WWTP: Bottleneck of many pollutants



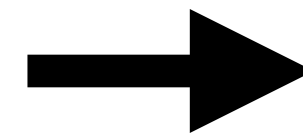
Opportunity?!



Biosolids



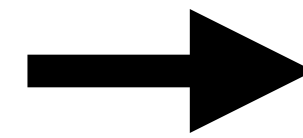
2020



BIOFORCETECH
Corporation

In search of technologies that could destroy PFAS

2020



Can we eliminate PFAS from Biosolids?

Where and how are they destroyed?

Test conducted on August 2020



+



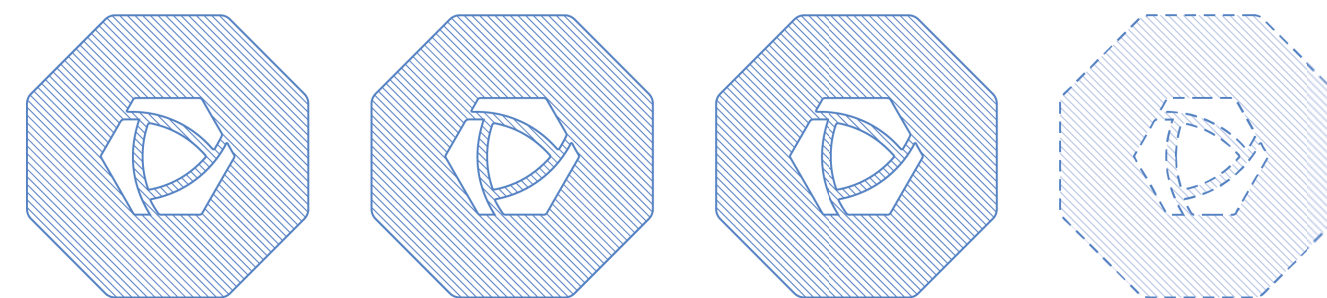
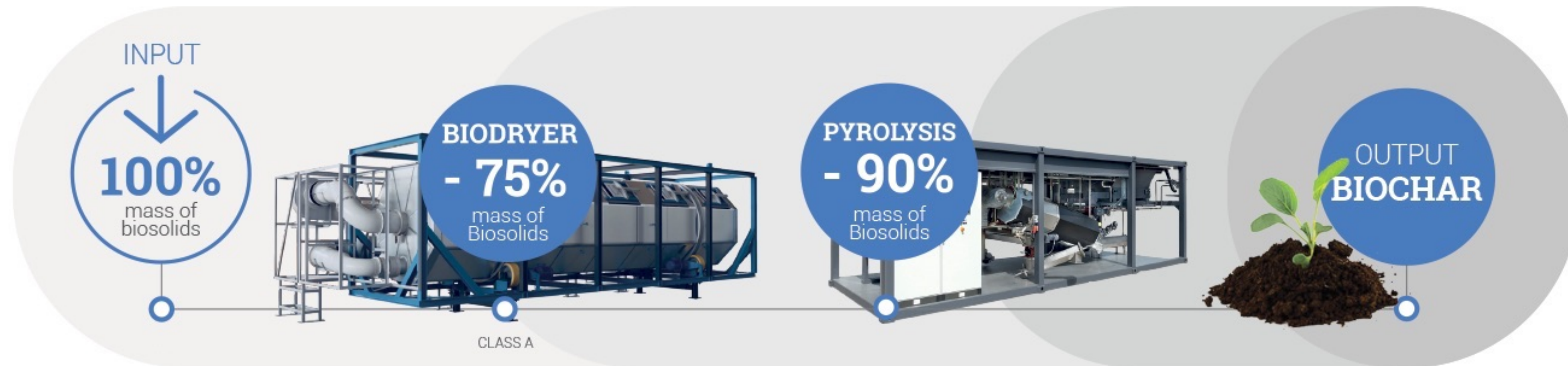
BIOFORCETECH
Corporation

THE BFT SYSTEM



BFT SYSTEM

THE SYSTEM



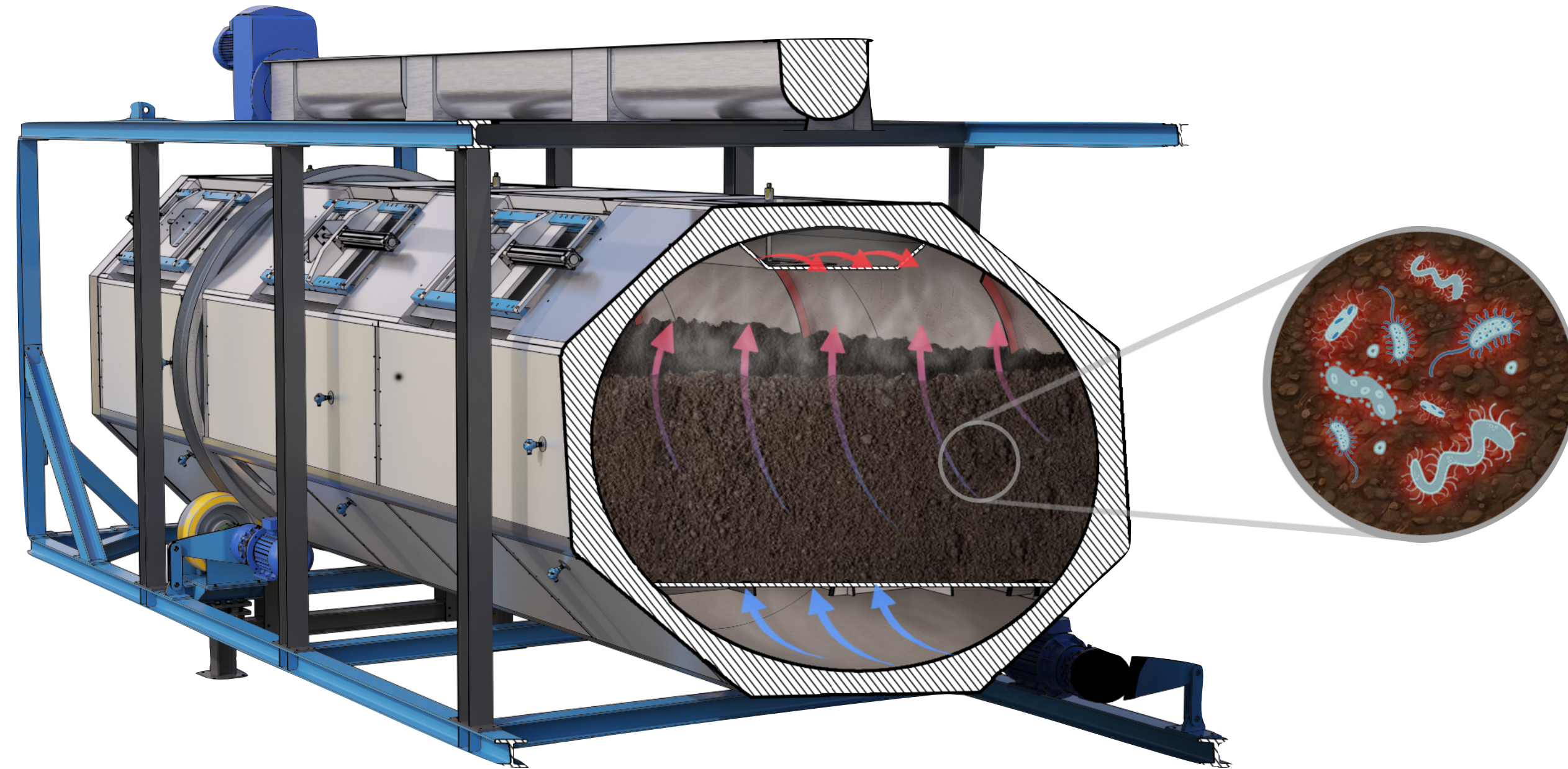
1,000 wet tons/year
15K Population

80%
Of US WWTP

50,000 wet tons/year
750k Population

STEP 1

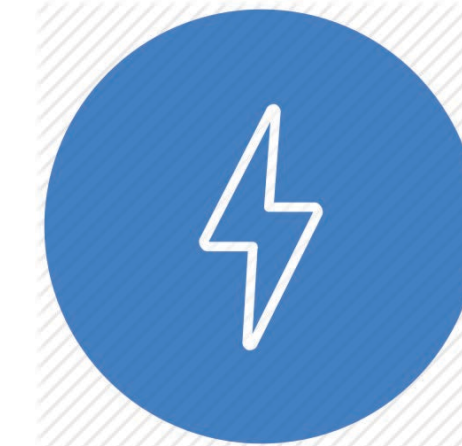
THE BIODRYER



● Digested/Undigested Biosolids

● Food Waste

● Yard Waste



60%
less energy



24/7 - 8,500 hours/year
Low and Simple Maintenance



Fully Automated
With IIOT 4.0

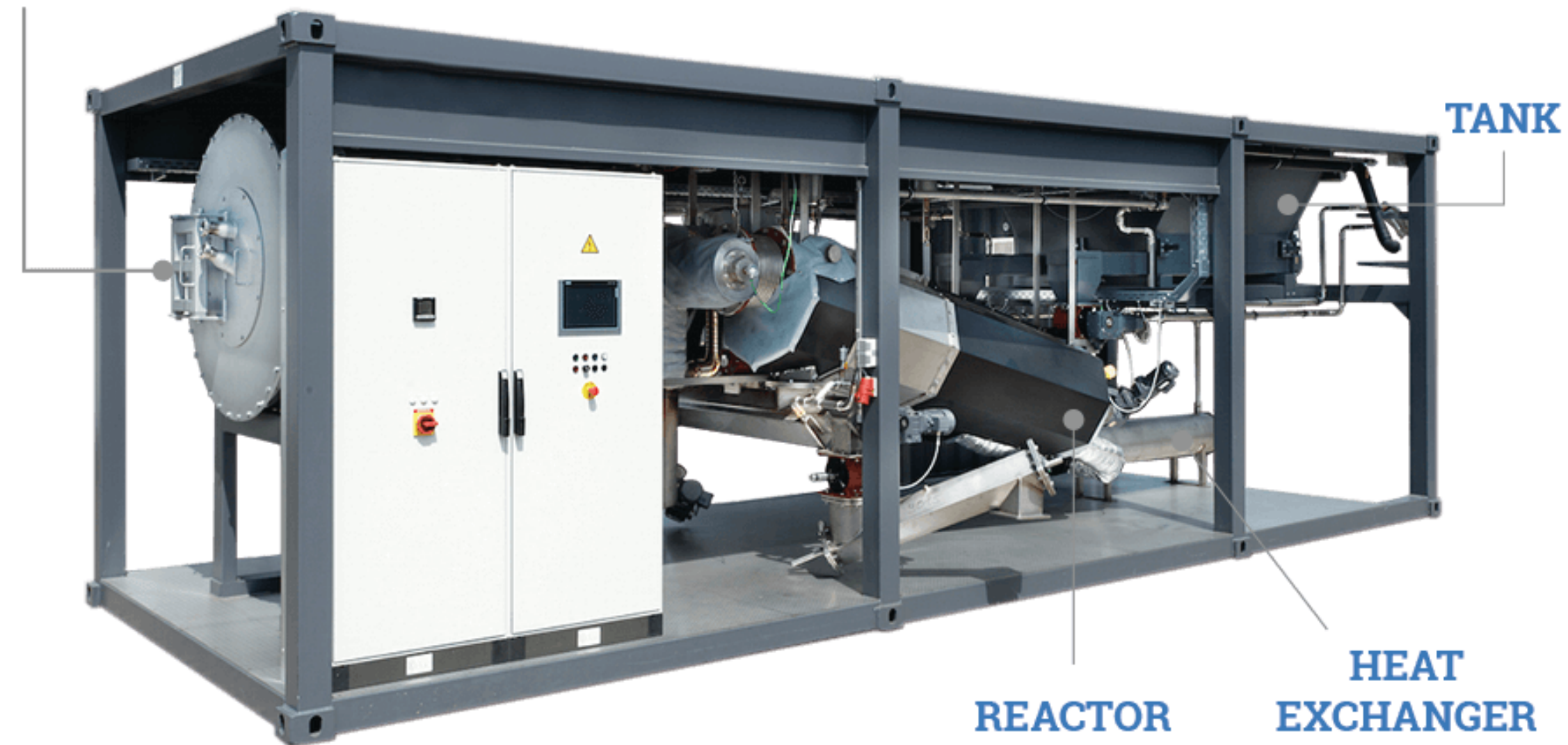


Class A Compliant Output Solids

STEP 2

THE P-SERIES PYROLYSIS

BURNER WITHOUT FLAME

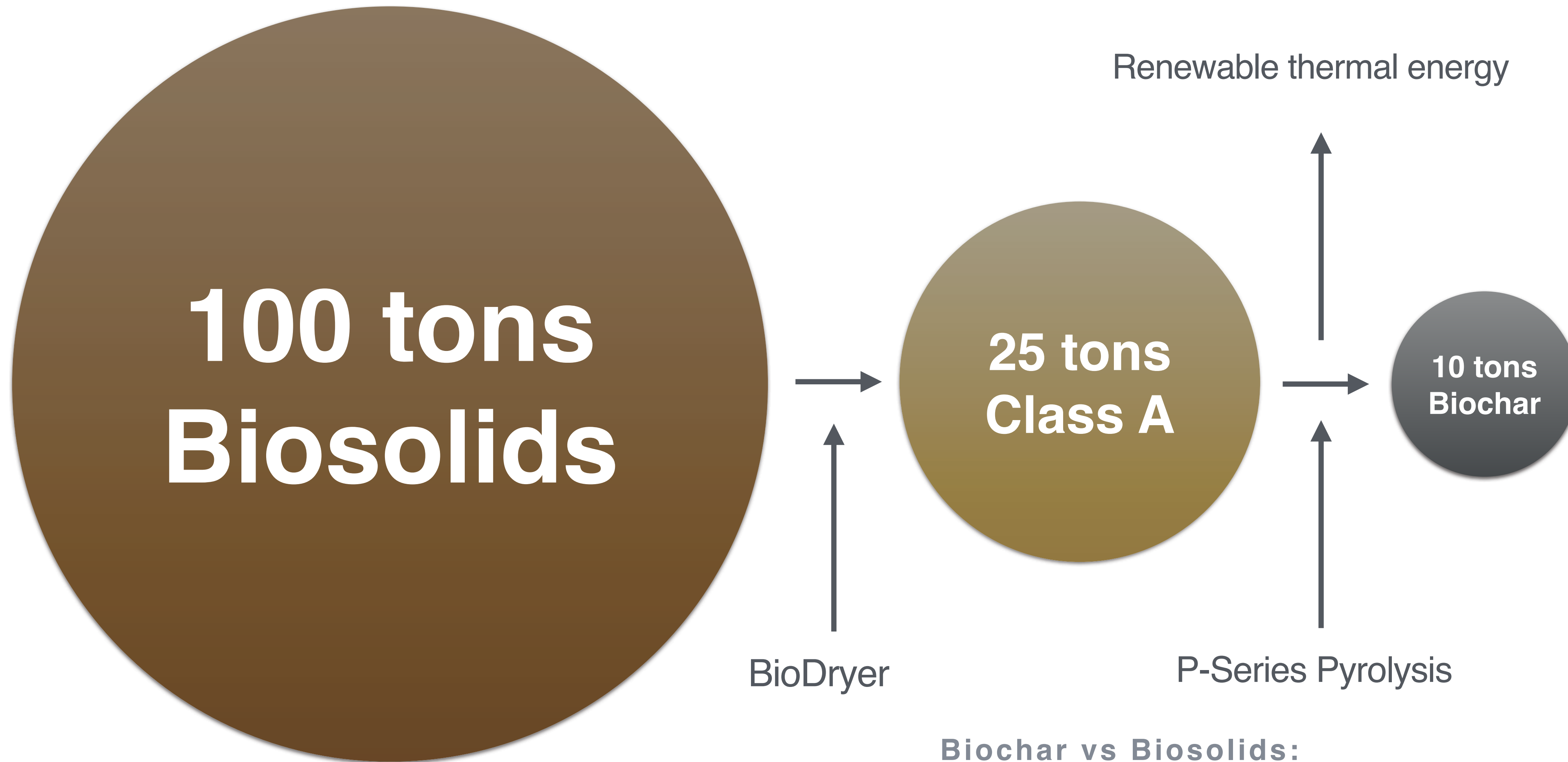


EPA approved as a
NON-Incineration thermal
process



Permitted to operate in the
toughest Air district in the
USA

TECHNOLOGY



Biochar vs Biosolids:

Most nutrients are preserved, Pathogens, Microplastics, PFAS are destroyed

A large, irregular pile of black, granular activated carbon is centered on a white background. The granules are small and porous, with some scattered around the main pile. Overlaid on the center of the pile is a white, rounded rectangular box containing the text "Made with OurCarbon™".

Made with
OurCarbon™

BIOCHAR

APPLICATIONS



Colorant



Additive



Dye



Amendment



Filter



Made with
OurCarbonTM

Retain a high nutrient level and increase bioavailability of P,N

Free from 41 tested PFAS compounds

Free from micro plastics

Volume reduced by 90%



- Plastic Free
- Zero Synthetics
- PFAS free

- 6 Products
- In More Than 30 Stores
- 500 Mile Local



Made with
OurCarbon™



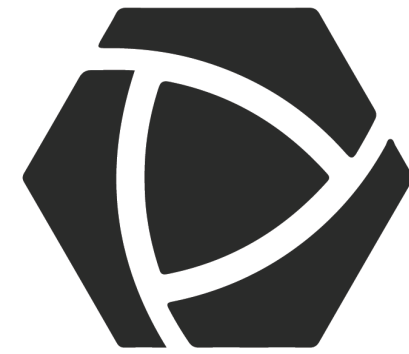
KEEP THE CYCLE GOING!
PLEASE RECYCLE THIS
PLASTIC FREE BAG

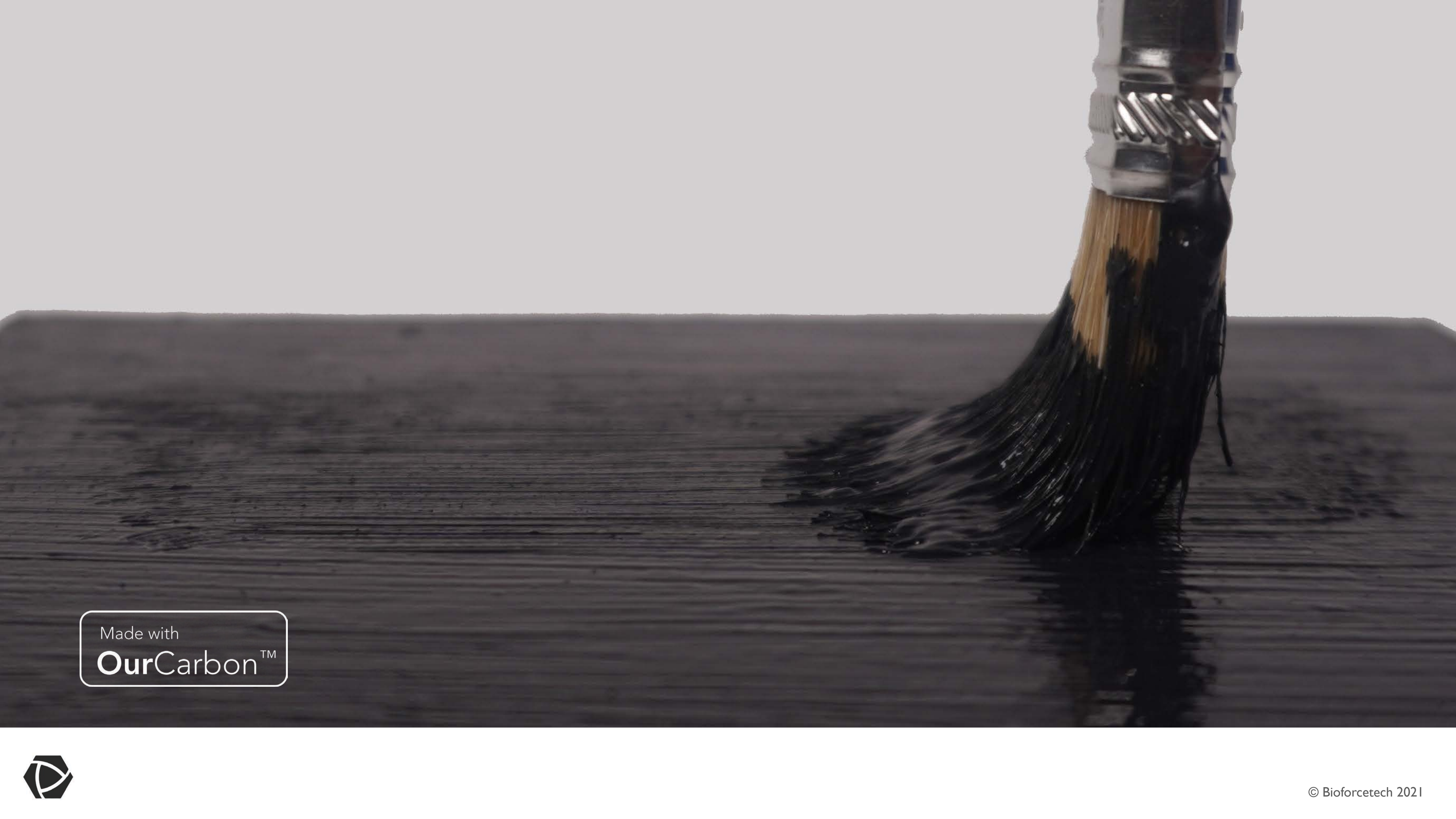




FIBERSHED







Made with
OurCarbon™



Made with
OurCarbon™



Made with
OurCarbon™





Made with
OurCarbon[™]





Made with
OurCarbon[™]



6 7 8 9 10

TestChart AdobeRGB1998 09-11-2015



Made with
OurCarbonTM

TestChart AdobeRGB1998 09-11-2015





Made with
OurCarbon™





Made with
OurCarbon™





Made with
OurCarbon™

This article is part of the following channel(s) SUSTAINABLE

A CERAMIC PLANTER MADE WITH BIOCHAR TO TRAP CARBON



Made with **OurCarbon™**

Design - Plants

New Potted Carbon planter captures CO2 with style

Written by Teresa Bergen on Jul 20, 2021

Lifestyle » Gardening » Plants

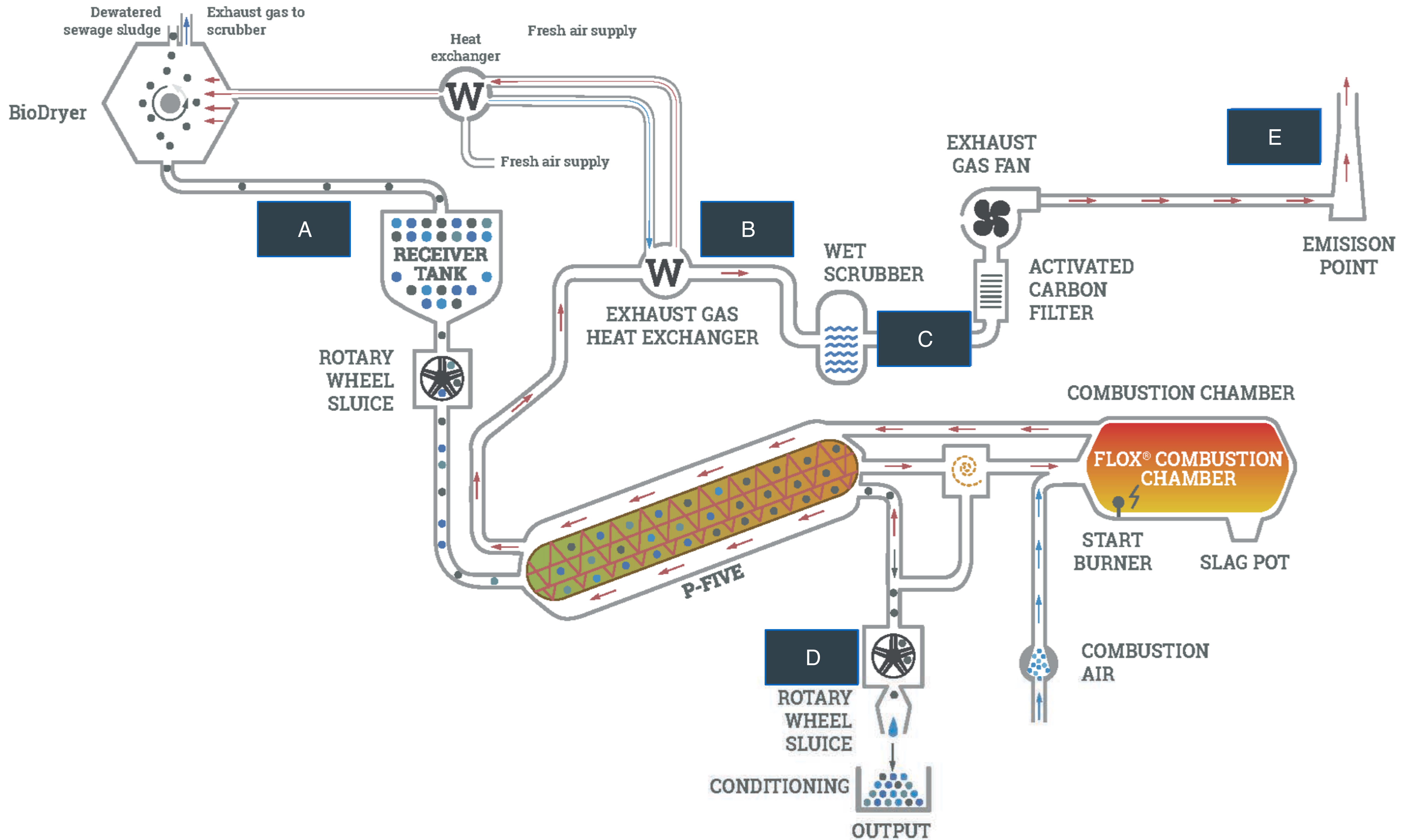


2020 PFAS TEST

- 41 targeted PFAS were analyzed
- Equipment used: BFT BioDryer and P-Five Pyrolysis
- Total of 6 , 1 hour tests
- Biosolids, Biochar, Tap Water and Scrubber water were analyzed with 24 samples each
- All sampling equipment was PFAS free guaranteed by the labs
- Exhaust gas was analyzed with a novel method for PFAS, using 3 extractive FTIR spectroscopy at 0.5 cm⁻¹ resolution and canisters

2020 PFAS TEST





2020 PFAS RESULTS

NOTE: the final article is currently under peer review. We expect it to be published by November 2021

2020 PFAS PRELIMINARY RESULTS

BIOSOLIDS, Vista Analytical Laboratory:

Analyte	CAS Number	Conc. (ng/g)	RL
PFBA	375-22-4	9.66	0.485
PFPrS	423-41-6	ND	1.46
3:3 FTCA	356-02-5	ND	3.88
PFPeA	2706-90-3	8.03	0.485
PFBS	375-73-5	3.24	0.485
4:2 FTS	757124-72-4	ND	0.485
PFHxA	307-24-4	44.3	0.485
PFPeS	2706-91-4	ND	0.970
HFPO-DA	13252-13-6	ND	1.46
5:3 FTCA	914637-49-3	53.1	3.88
PFHpA	375-85-9	9.95	0.485
ADONA	919005-14-4	ND	0.485
PFHxS	355-46-4	ND	0.485
6:2 FTS	27619-97-2	1.72	0.970
PFOA	335-67-1	98.2	0.485
PFecHS	646-83-3	ND	0.970
PFHpS	375-92-8	ND	0.970
7:3 FTCA	812-70-4	12.6	3.88
PFNA	375-95-1	5.62	0.485
PFOSA	754-91-6	ND	1.46
PFOS	1763-23-1	27.9	0.485
9Cl-PF3ONS	756426-58-1	ND	0.485
PFDA	335-76-2	13.1	0.485
8:2 FTS	39108-34-4	4.12	0.970
PFNS	68259-12-1	ND	1.46
MeFOSAA	2355-31-9	26.6	0.970
EtFOSAA	2991-50-6	19.2	0.970
PFUnA	2058-94-8	3.87	0.485
PFDS	335-77-3	ND	0.970
11Cl-PF3OUdS	763051-92-9	ND	0.970
10:2 FTS	120226-60-0	3.92	1.46
PFDoA	307-55-1	6.73	0.485
MeFOSA	31506-32-8	ND	9.70
PFTrDA	72629-94-8	ND	0.485
PFDoS	79780-39-5	ND	0.970
PFTeDA	376-06-7	2.10	0.485
EtFOSA	4151-50-2	ND	9.70
PFHxDA	67905-19-5	ND	0.485
PFODA	16517-11-6	ND	0.970
MeFOSE	24448-09-7	16.5	9.70
EtFOSE	1691-99-2	ND	9.70

Various concentrations of 20 detected PFAS compounds in the tested biosolids

2020 PFAS PRELIMINARY RESULTS

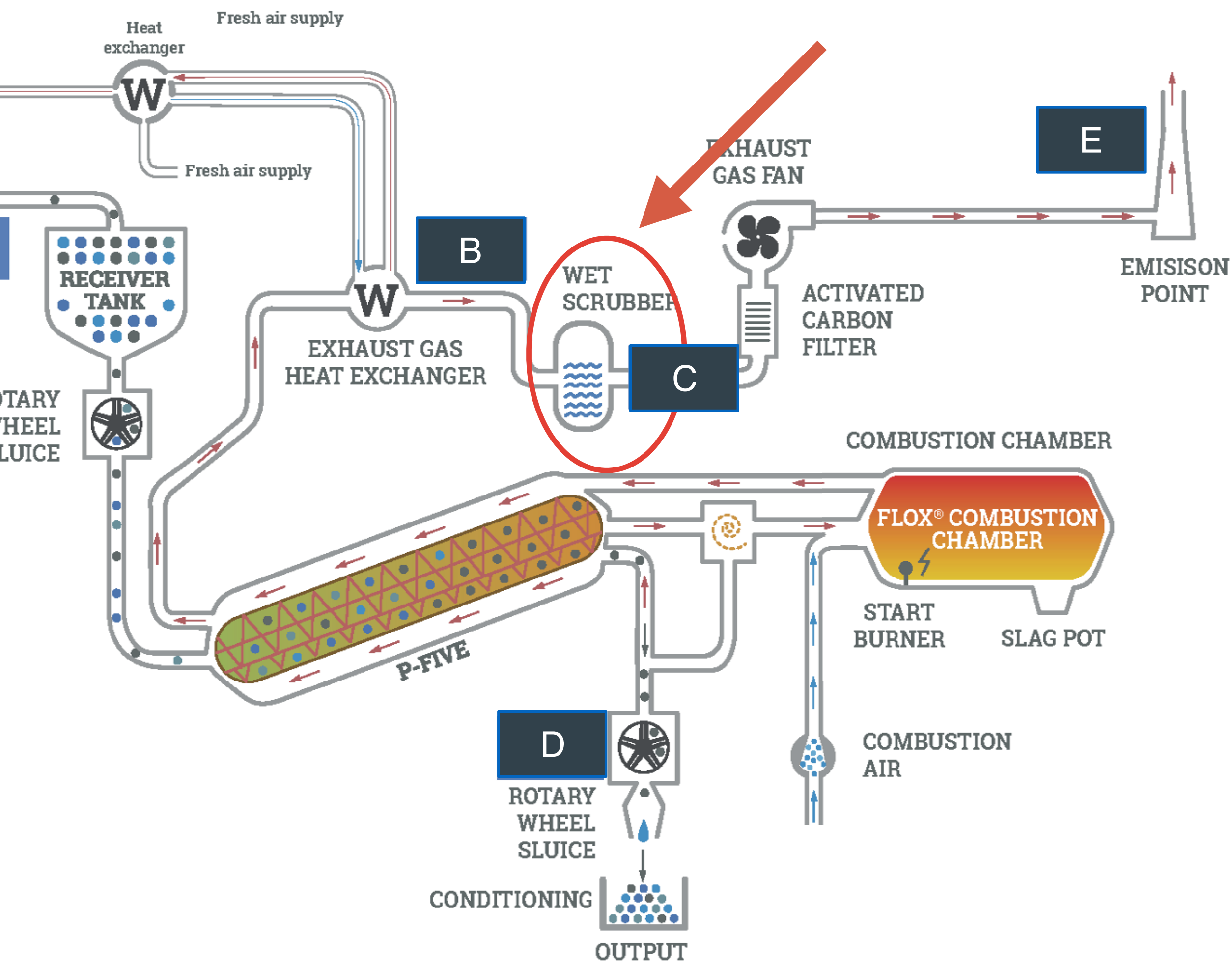
BIOCHAR, Vista Analytical Laboratory:

Analyte	CAS Number	Conc. (ng/g)	RL
PFBA	375-22-4	ND	0.495
PFPrS	423-41-6	ND	1.49
3:3 FTCA	356-02-5	ND	3.96
PFPeA	2706-90-3	ND	0.495
PFBS	375-73-5	ND	0.495
4:2 FTS	757124-72-4	ND	0.495
PFHxA	307-24-4	ND	0.495
PFPeS	2706-91-4	ND	0.990
HFPO-DA	13252-13-6	ND	1.49
5:3 FTCA	914637-49-3	ND	3.96
PFHpA	375-85-9	ND	0.495
ADONA	919005-14-4	ND	0.495
PFHxS	355-46-4	ND	0.495
6:2 FTS	27619-97-2	ND	0.990
PFOA	335-67-1	ND	0.495
PFecHS	646-83-3	ND	0.990
PFHpS	375-92-8	ND	0.990
7:3 FTCA	812-70-4	ND	3.96
PFNA	375-95-1	ND	0.495
PFOSA	754-91-6	ND	1.49
PFOS	1763-23-1	ND	0.495
9Cl-PF3ONS	756426-58-1	ND	0.495
PFDA	335-76-2	ND	0.495
8:2 FTS	39108-34-4	ND	0.990
PFNS	68259-12-1	ND	1.49
MeFOSAA	2355-31-9	ND	0.990
EtFOSAA	2991-50-6	ND	0.990
PFUnA	2058-94-8	ND	0.495
PFDS	335-77-3	ND	0.990
11Cl-PF3OUdS	763051-92-9	ND	0.990
10:2 FTS	120226-60-0	ND	1.49
PFDoA	307-55-1	ND	0.495
MeFOSA	31506-32-8	ND	9.90
PFTTrDA	72629-94-8	ND	0.495
PFDoS	79780-39-5	ND	0.990
PFTeDA	376-06-7	ND	0.495
EtFOSA	4151-50-2	ND	9.90
PFHxDA	67905-19-5	ND	0.495
PFODA	16517-11-6	ND	0.990
MeFOSE	24448-09-7	ND	9.90
EtFOSE	1691-99-2	ND	9.90

ND in all Biochar samples



2020 PFAS PRELIMINARY RESULTS



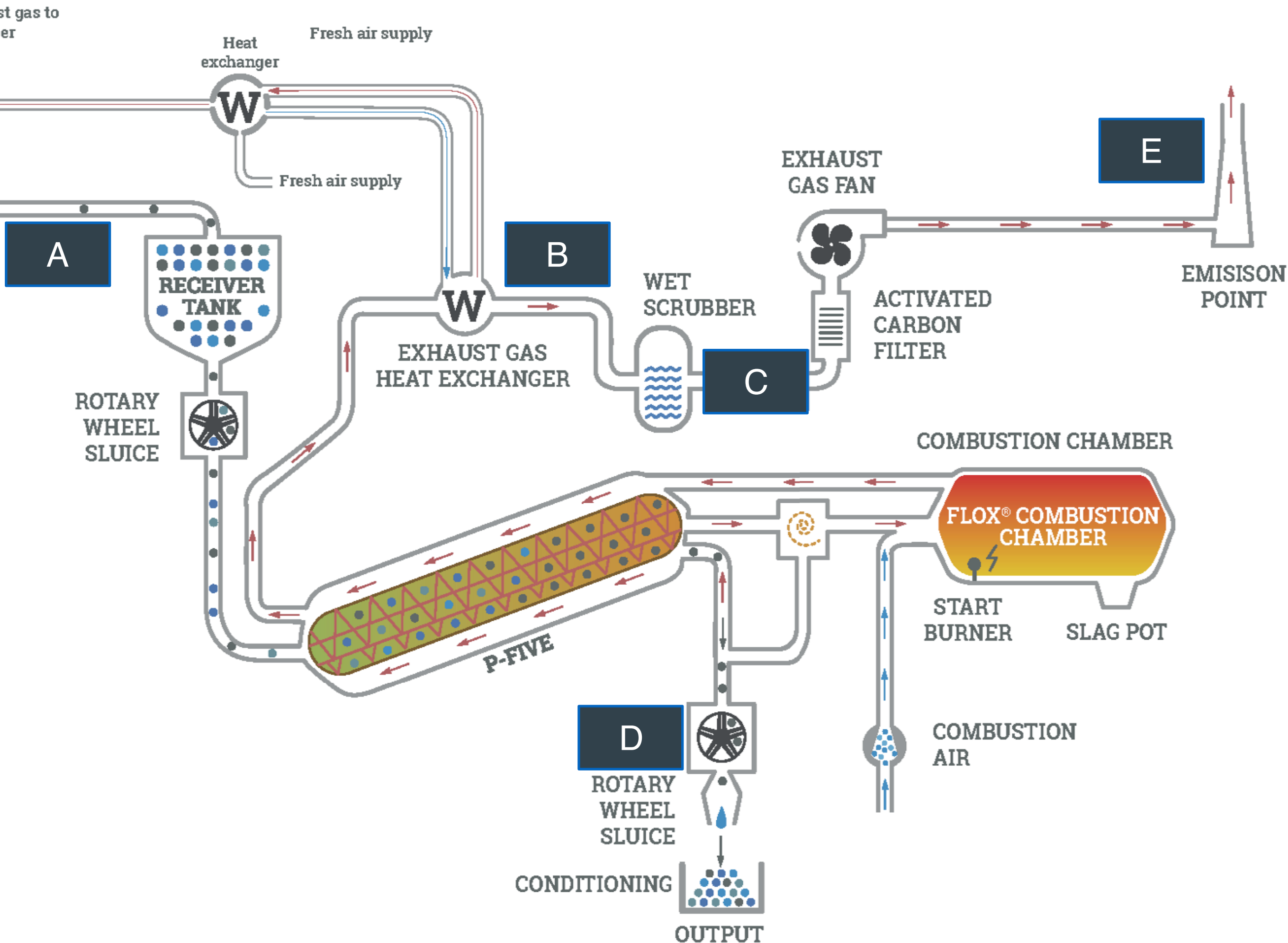
CITY WATER, Eurofins - Test America:

Analyte	Result	Qualifier	RL	MDL	Unit
Perfluorobutanoic acid (PFBA)	0.62	J	1.7	0.29	ng/L
Perfluoroheptanoic acid (PFHpA)	0.22	J	1.7	0.21	ng/L
Perfluorooctanoic acid (PFOA)	1.0	J	1.7	0.71	ng/L
Perfluorohexanesulfonic acid (PFHxS)	0.33	J B	1.7	0.14	ng/L
Perfluorooctanesulfonamide (FOSA)	4.2	B	1.7	0.29	ng/L

SCRUBBER WATER, Eurofins - Test America:

Analyte	Result	Qualifier	RL	MDL	Unit
Perfluorobutanoic acid (PFBA)	0.71	J	1.9	0.34	ng/L
Perfluoroheptanoic acid (PFHpA)	0.26	J	1.9	0.24	ng/L
Perfluorohexanesulfonic acid (PFHxS)	0.36	J B	1.9	0.16	ng/L
Perfluorooctanesulfonamide (FOSA)	4.6	B	1.9	0.34	ng/L

2020 PFAS PRELIMINARY RESULTS



Gas testing

Weak observance of CF₄, C₂F₆, and sulfur hexafluoride above MDC2s by FTIR may be related to residual concentrations of the dynamic spiking gases utilized. These results were not confirmed by canister measurements that showed none of the 17 analyzed fluorinated compounds above MDL.

2020 PFAS PRELIMINARY CONCLUSIONS

The Bioforcetech pyrolysis process is effective at eliminating PFAS from biosolids, leaving no trace of the tested PFAS compounds in the Biochar product

Small trace of PFAS compounds was found in the scrubber water but comparable with tap water

More exhaust testing should be performed to evaluate the effectiveness of the BFT P-Series Pyrolysis technology for the destruction of PFAS. Results were inconsistent to make a final statement and new testing methods should be implemented.



Contacts

Bioforcetech Corporation

Valentino Villa, COO

+1 650.906.0193 - v.villa@bioforcetech.com

938 Linden Ave, South San Francisco, CA 94080

