SHINCCI

Low-Temperature Sludge Dryer through Dehumidification

Game Changer for Biosolids Management

Town of Milton, VT
September 6, 2022

Charley Hanson, RMI Senior Project Manager
Steve Nurme, Sales Manager

RMI
BUILDING HEALTHY SOILS

Resource Management, Inc.

- RMI is a regional organic residuals recycling company based in Holderness, NH
- RMI employs 30 people including agronomists, compliance specialists, field technicians, truck drivers, operations, sales and project managers

Annually, RMI recycles over 350,000 cubic yards of organic residuals including biosolids, wood ash, short paper fiber, and hydrosolids as part of our Heart & Soil agricultural product line

A New Approach to Solids Management

- In April 2018, Sunstate Environmental Services, Inc. (SES) approached RMI about a low temperature belt drying and dehumidification technology.
- In August RMI traveled to China to see firsthand multiple installations.
- RMI was convinced this technology was a solution to the new direction solids management needed to head.

It was time to stop hauling water!

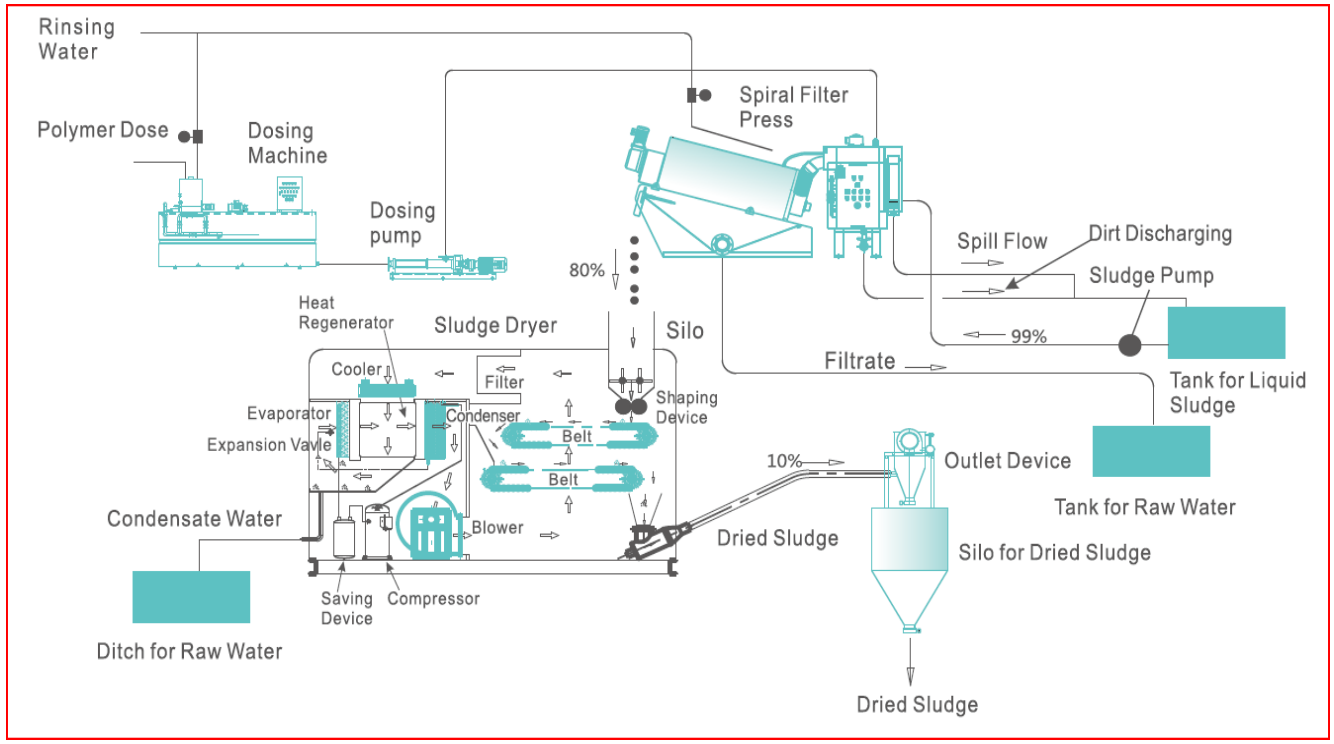
Shincci Installation Video

Shincci Dehumidification System

- The reasons quickly became obvious for RMI to become committed to this technology
- Number of truckloads leaving a WWTF drop from 100 to 25 ~ reducing impact to roads and bridges, air pollution, and carbon footprint
- Final product meets Class A requirements for pathogen and vector attraction reduction.
- WWTFs could make a readily marketable dried Class A biosolids fertilizer locally

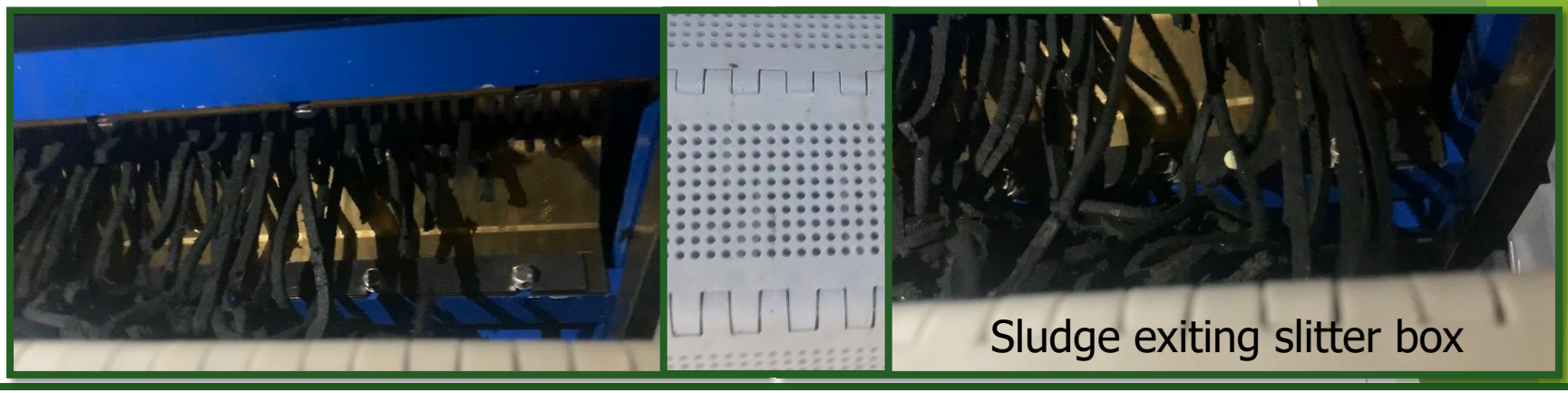
Shincci Schematic

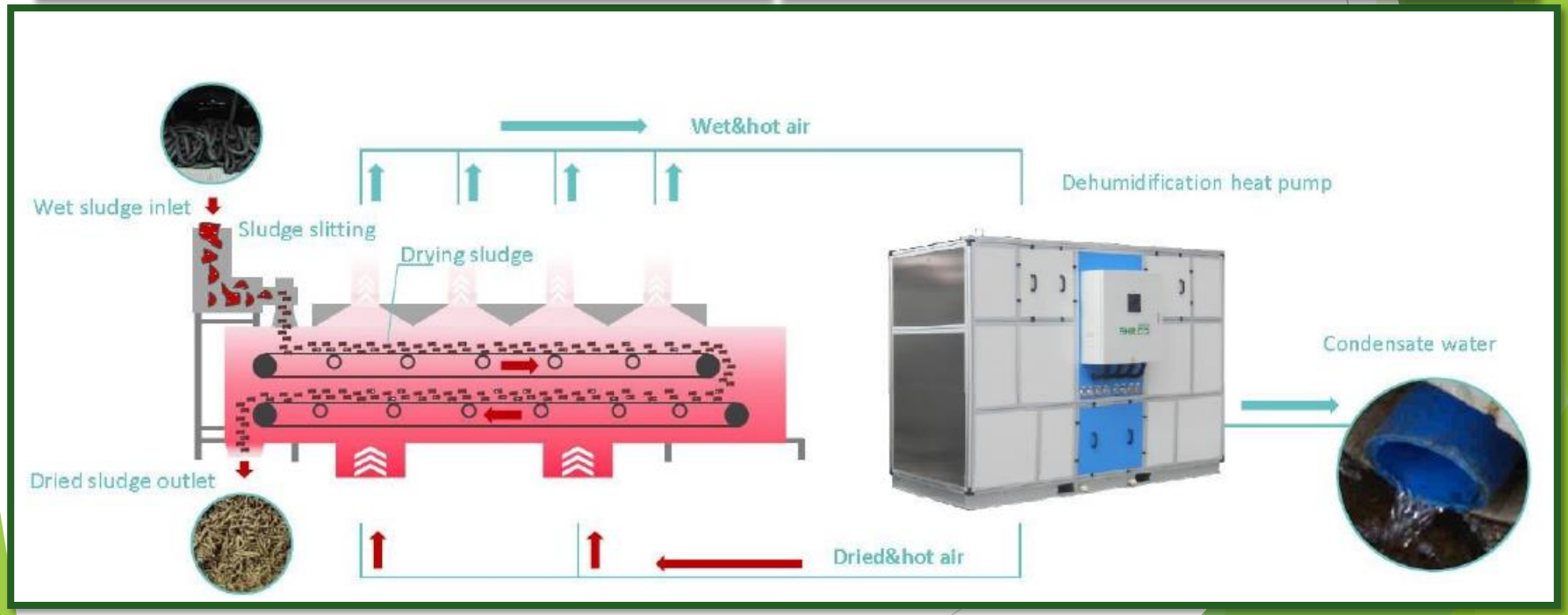
Dewatering Spiral Filter Press and Dehumidification System



Shincci dewatering and dehumidification systems can operate as a complete system, or independently, to accommodate facility needs.

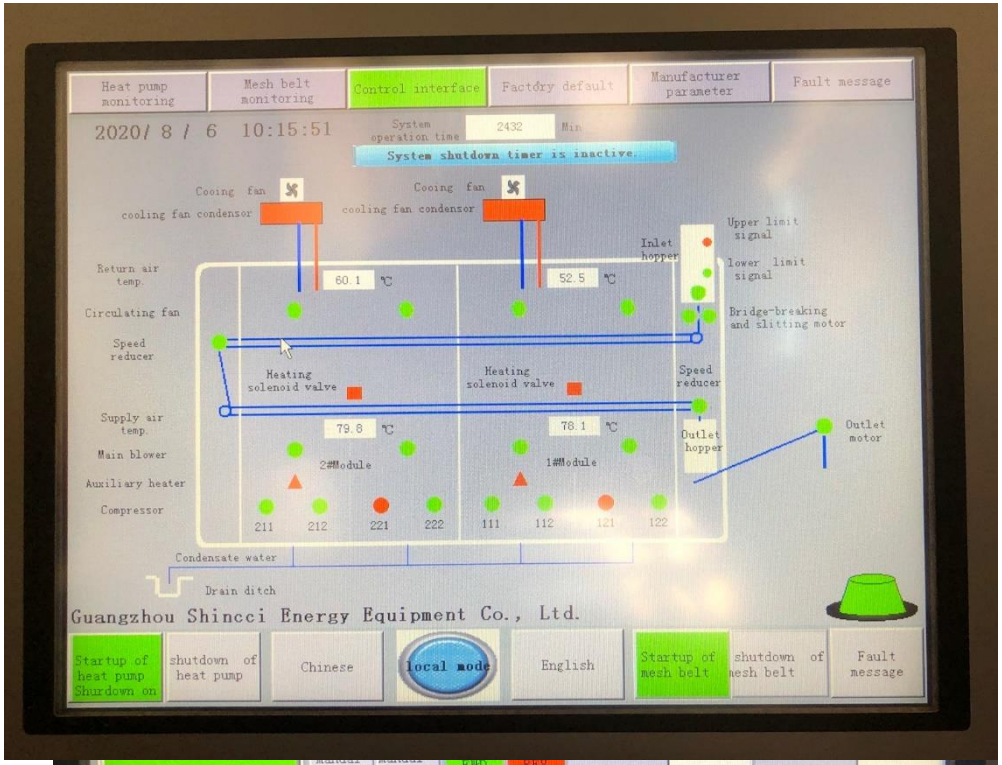
Shincci
Dehumidification System

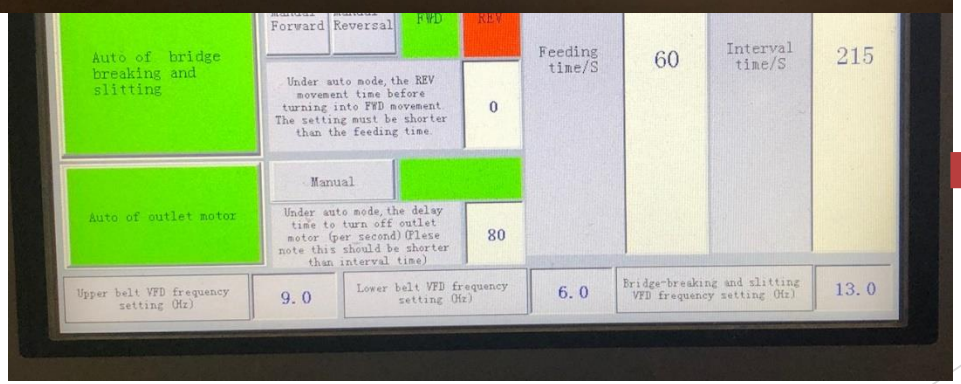


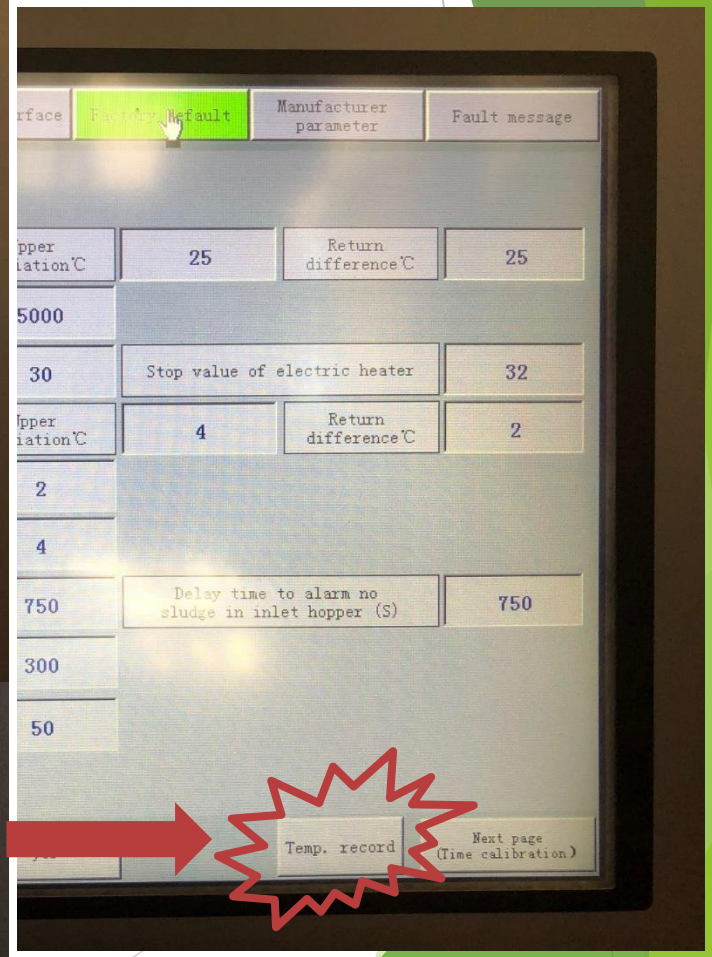


Operation / Time & Temp Monitoring

SCADA Compatible & Logs Data to Demonstrate Compliance with 503







Over 400 Installed Shincci Dryers Worldwide

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
1	Dongguan Chengyuen Tannery	SBDD4000	Leather	30.0%	6	75%	2012-8-1
2	Dongguan Liaoh... WWTP	SBDD10800	Municipal	40.0%	30	80%	2013-10-1
3	FoShan Xinlong...						
4	Taiwan Ping Ho... Technology						
5	Taiwan Shang...						
6	Foshan Gaomin...						
7	Taiwan Yiqin ...						
8	Taiwan Shangxi...						
9	Taiwan Yiqin ...						
10	Shanghai Tianm...						
11	Shanghai INES... materials Co.						
12	Taiwan Pingho Technology						
13	Henkel (Dongg...						
14	Taiwan Pingho Technology						
15	Suzhou Hongda						
16	Suzhou EMC Gr...						
17	Guangdong Tit...						
18	Taiwan Yiqin ...						
19	Yunnan Qingzh...						
20	Chongqing Daji						
21	Jiangsu Blue (...						
22	Performance Fi...						
23	Sembcorp WTTP						
24	Hunan province...						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
25	Meizhou city Sludge Treatment Center	SBDD9600FL	Municipal	20.0%		80%	2016-5-1
26	Shenzhen LuoFang WWT...						
27	Shanghai Lubrizol						
28	Shanghai MinXin Envi...						
29	Nanjing Runbu WWTP						
30	Foshan Xinlong WWTP						
31	Sighisora, Romania Mu...						
32	Sky						
33	Hunan province, Xian... WWTP						
34	Zhejiang Lily Group						
35	DYSTAR (Nanjing)						
36	Xiamen ReCulture Ren... Energy Co.						
37	Ningbo Zhengguang Re...						
38	Hebei Province, Langf...						
39	Hubei Xianlong Chemi... Engineering						
40	Chongzhou Jin Peng E... Tech						
41	Shenzhen Shekou WTTP						
42	Zhejiang Wansheng						
43	Shandong Qilu Pharma...						
44	Siemens (Wuxi) Switc...						
45	Jiangsu Skyray-Instr...						
46	Henan Prosper						
47	Sierra PCB						
48	Zhejiang Jiande WWTP						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
49	Shandong Yantai Refuse Dispo...						
50	Everbright Water Affairs						
51	Qingdao Shuiqingmuhua						
52	International Flavors & Fragrances (Zhejiang)						
53	Bekaert China						
54	Dali Fengyi Industry Park WW...						
55	Guangzhou Sino-Singapore-tow... WWTP						
56	Guanghan Sanxingdui WWTP						
57	Zhengzhou WWTP						
58	Hitachi Elevator China						
59	Guangzhou Midori automotive leather						
60	Yuma, Arizona WWTP						
61	Shaoyang Sludge Treatment Cen... -BOT						
62	Taiwan HannsTouch Solution						
63	Jiangsu Skyray Instrument						
64	Jiaozuo Joincare						
65	Citic Envirotech, Changyi Ci... WWTP						
66	Hunan Province, Yuanling WTTP						
67	Cosmax (China)						
68	Henkel (Shanghai Factory)						
69	Shanghai Sanjiu Mechanical						
70	Pingdong Zhupiter						
71	Hangzhou Electrochemical Gro...						
72	Zhengzhou City Second WWTP						
73	Fulong Fiberglass						
74	Yantai Runda Group						
75	OTAX Electronics (ShenZhen)						

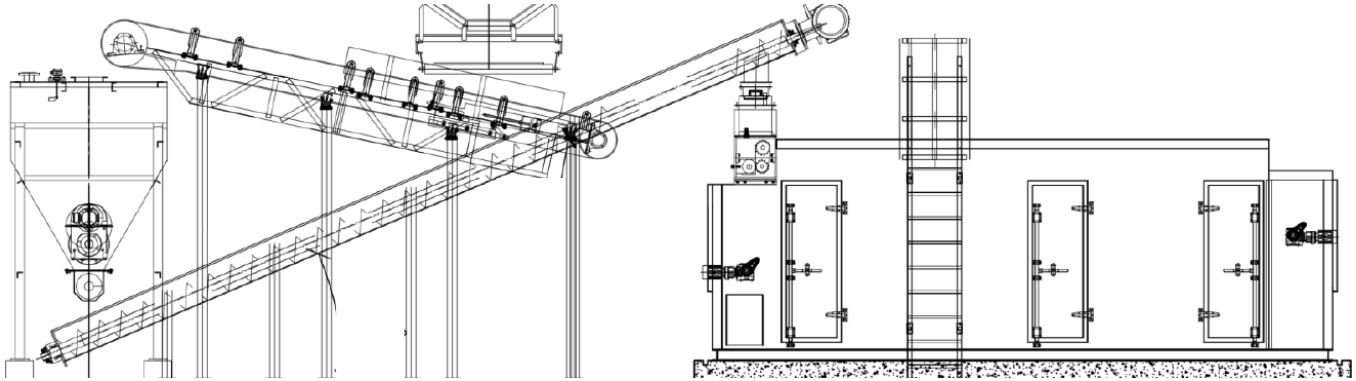
No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
76	Zhejiang Dibang Chemical	SBWHD20000	Chemical	55.0%	40	80%	2017-8-1
77	Chongqing Earthope	SBWHD15000	Chemical	20.0%	20	80%	2017-8-1
78	Huiyang Yuangao Electronics	SCODD800FL	Chemical	30.0%	1.2	70%	2017-8-1
79	Sino-American Silico...						
80	Jiangyin Xingiao Sew...						
81	Bicheng Glassfiber						
82	Huiyang Yuangao Elec... fan)						
83	Huiyang Yuyuan Indus...						
84	Shanghai Rongcheng P...						
85	Toyo Pack (Changshu)						
86	Shanghai Amkor OSAT T...						
87	Changan Auto						
88	VOSS (Hubei) Beverage						
89	Zhejiang Huangma Surf... Manufacturer						
90	Zhangyuan Tungsten						
91	Shenzhen, Futian WWTP						
92	Haojue Motorcycle						
93	Zhenjiang Jiangnan Ch...						
94	Shandong Lukang Pharm...						
95	Changde Huirui WWTP						
96	Jiangsu Minth						
97	Luxi Group						
98	Longxin Fine Chemical						
99	JAC Automobile (Phas...						
100	Dongyang Hengdian WWT...						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
101	Beijing BOE	SBDD2400FL	Electronics	20.0%	2	80%	2017-10-1
102	Lvliang Second WWTP	SBDD21600FSL	Municipal	15.0%	28	70%	2017-10-1
103	Suzhou L-Max Electronic	SCODD800FL	Industrial Sludge	21.0%	1	> 75%	2017-10-1
104	Gansu province, Subei WWTP	SBDD2400FL	domestic sludge	20.0%	3	80%	2007-11-1
105	Career PCB (Kunshan)	SBDD2400FL	Plating	30.0%	3	70%	2007-11-1
106	Yiyang New Material Industrial Park	SBDD7200FL	Industrial Sludge	20.0%	7	> 70%	2007-11-1
107	Hubei Province, Julu First WWTP	SBDD7200FL	Municipal	20.0%	12	50%	2007-11-1
108	Beijing BOE	SBDD16200FSL	Casting	30.0%	80	70%	2007-11-1
109	Hunan Pr...						
110	Texas In...						
111	Shenzhen ...						
112	Sinopec ...						
113	Shandong ...						
114	Zhejiang ...						
115	Tianjin ...						
116	Kuangchua...						
117	Beijing ...						
118	JAC Auto...						
119	JAC Auto...						
120	Xichang ... - Jiongj...						
121	Xichang ... - Qionghu...						
122	Xichang ... - Xiaomi...						
123	Jiangsu ...						
124	SPRING Pl...						
125	Zhoushan ...						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
126	Harbin Institute of Technology	SBDD1200FL	laboratory Sludge	20.0%	1.5	88%	2018-3-1
127	Hongjiang Shuangxi WWTP	SBDD2400FL	Municipal	20.0%	2.1	50%	2018-3-1
128	Tangshan Kobelco	SCODD800FL	Surface finishing	30.0%	1.2	75%	2018-3-1
129	JAC (2 STATION)	SCODD800FL	Automotive making	30.0%	1.4	70%	2018-3-1
130	JAC (7 STATION)	SCODD800FL	Automotive making	30.0%	1.4	70%	2018-3-1
131	Jiangsu Jiannong ABA Agrochemical	SBDD2400FL	Industrial	22.0%	3	70%	2018-3-1
132	Nichicon (Suqian factory)	SCODD800FL	Industrial	20.0%	1	> 70%	2018-4-1
133	Nantong Changyou Pharmaceutical	SCODD800FL	Industrial	32.0%	1	> 70%	2018-4-1
134	Joincare Pharmaceutical Group Industry -BOT(Phase 3)	SBDD38400SL	Fungus Residue	35.0%	60	70%	2018-4-1
135	Yaan First Sewage Treatment Plant	SBDD14400SL	Municipal	20.0%	20	65%	2018-4-1
136	Qingdao Shuiqingmuhua Environment	SBDD2400FL X 2	Plating	20.0%	6	70%	2018-4-1
137	JAC Auto	SCODD800FL	Surface finishing	30.0%	1.4	70%	2018-4-1
138	Zhejiang Gaohe Wool	SBDD19200FL	unicipal&industria	37.0%	35	73%	2018-4-1
139	Guangdong Titan Pharmaceutical	SBDD4800FL	Medical	20.0%	6.9	> 80%	2018-5-1
140	Funing Industry Sewage Treatment	SBDD4800FL	Chemical	37.0%	5	78%	2018-5-1
141	Tianjin Kinport Plating	SBDD7200FL	Plating	35.0%	14	70%	2018-5-1

Shincci low-temperature dryers have been in operation since 2003

Hooksett, NH WWTF



- 0.7MGD - 1,600 wet tons cake/year
- RMI's 2nd pilot installation, a 4800 Model installed in the existing garage bay
- Wet Cake (~16.5%) conveyed from belt press to 5yd buffer hopper
- Slitter communicates to hopper to feed dryer automatically via scraper conveyor
- Reliably running 24/5
- Dryer residency time of ~3.5 hours
- 90% dried product discharged to self dumping hopper

Brattleboro, VT WWTF

Brattleboro, VT

- 1.3MGD / 1,500 wet tons cake per year
- RMI's 1st pilot installation, a 4800 Model installed in the existing solids loading bay
- Wet Cake (~23%) exits Fournier Presses and drops into slitter using existing conveyance
- 3 of 4 drops still available to bypass and load trailer with wet cake for redundancy
- System only operated during staffed hours (8 hours, 5 days/week)
- Dryer residency time less than 2 hours
- 90% dried product discharged to self dumping hopper

The move from Brattleboro…

Bellows Falls Overview

- 450 wet tons sludge/year
- Receives wastewater from VT & NH
- Treatment process includes RBC and anaerobic digestion
- Liquid sludge feed is 10 gallons per minute at an average of 4.25% solids
- Dewatering using a PWTech volute press
- 26% average solids dropping into the dryer
- Belt is moving 70 seconds then, rests 220
- Roughly 5 rpm at 76^{o}C (170^{o}F)
- Currently running only during staffed hours –
- 7 hours per day, 5 days a week
- Producing 2 cubic yards of finished product daily
- Product is in the dryer 2 hours and 35 minutes

Milton, VT Installation

Current bay is 44-feet long
Dryer with buffer tank is 55-feet long
3-4 feet service access needed

Height and width of current building looks to be sufficient.

Shincci System
Lower Electricity Costs

- The average use to dry 1 ton of cake from 20% total solids to 90%+ total solids is 200 kWh per wet ton
- Conventional dryers require 600-800 kWh to dry 1 ton of sludge cake
- Cost to dry 350 wet tons per year is estimated to be $8400 annually or $700 monthly

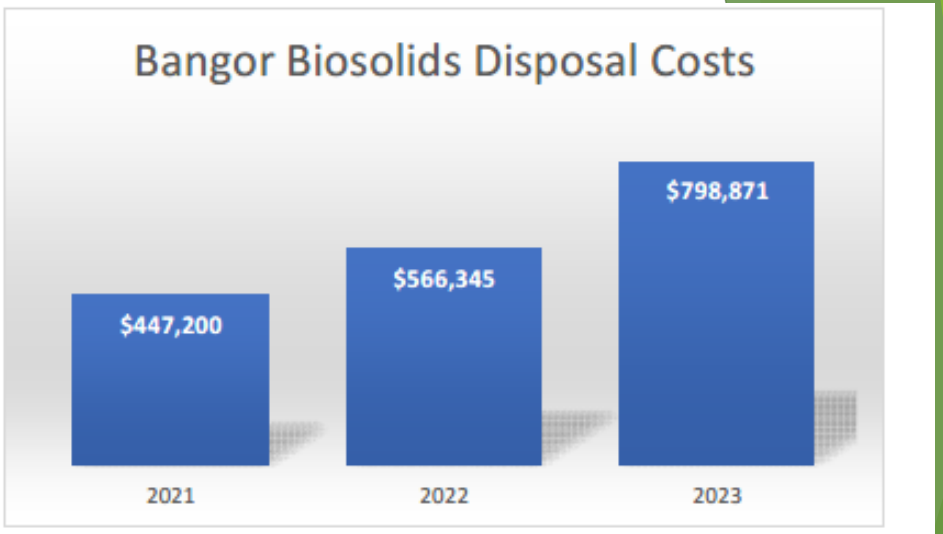
Benefits to Treatment Plants

- Decreases amount of solids to manage by a factor of 4 – 5 times
- Creates an on-site, valuable Class A fertilizer product, stable with negligible odor; more attractive to landfills, should that be necessary
- Lowers costs for solids management, regardless of outlet
- Less trucking across roads and bridges
- Is an effective **risk management tool** simply because it reduces the amount of solids to manage whether land application, incineration, or landfill are utilized
- Dried Class A Biosolids are approved for use in VT and NH

Bangor:
Amanda Smith, Wastewater Director
#207-992-4471

Year	Cost, average annual wet tons
2021	$447,200
2022	$566,345
2023	$798,871

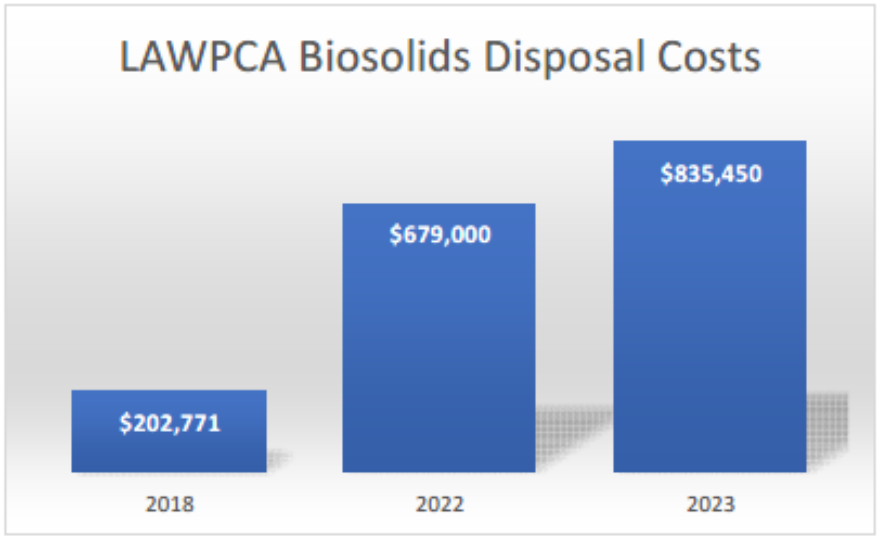
79% increase from 2021 to 2023



Lewiston-Auburn WPCA:
Travis Peaslee, LAWPCA General Manager
#207-450-3824

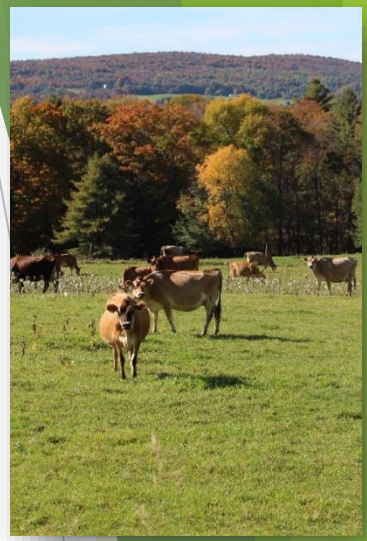
Year	Cost, average annual wet tons
2018	$202,771
2022	$679,000
2023	$835,450

312% increase from 2018 to 2022



* Data collected from MeWEA Government Affairs Committee February 18, 2022; revised June 8, 2022

Throughout the northeast biosolids have been very successfully recycled for the past 40+ years



RMI believes the Shincci technology is the solution for continued success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Thank you!
Any Questions?
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