

INSTALLATION LIST

ULTRAWAVES Ultrasound Technology

Improvement of Anaerobic Sludge Digestion

Germany, STP Bamberg (230,000 PE or 23.0 MGD)

1) *Preliminary full-scale test, 4 months, 2002*

2) *Full-scale installation since June 2004*

- increase in VS destruction of 30%
- increase in biogas production of 30%
- avoided the construction of a new anaerobic digester (3,000 m³ vol.)
- first net energy producer on STP in Europe without co-substrate

Germany, STP Meldorf (72,000 PE or 7.2 MGD)

1) *Preliminary full-scale test, 3 months, 2004*

2) *Full-scale installation since May 2005*

- increase in VS destruction of 26%
- increase in biogas production
- no foam or filamentous organisms present in the anaerobic sludge digester

Germany, STP Hennef (55,000 PE or 5.5 MGD)

Full-scale installation since September 2006

Germany, STP Bünde (54,000 PE or 5.4 MGD)

1) *Preliminary full-scale test, 4 months, 2007*

2) *Full-scale installation since July 2007*

- increase in VS destruction of 15%
- increase in biogas production of 15%
- improved nitrogen removal of 3 mg/L

Germany, STP Ahrensburg (50,000 PE or 5.0 MGD)

1) *Preliminary test on pilot-scale by Technical University of Hamburg-Harburg 1999 and full-scale test 2007*

2) *Full-scale installation since June 2009*

- increase in VS destruction of 15%
- increase in biogas production of 15%

Germany, STP Eschwege (67,500 PE or 6.75 MGD)

Full-scale installation since October 2009

Germany, STP Kleinsteinbach (40,000 PE or 4.0 MGD)

Full-scale installation since June 2010

- increase in VS destruction of 25%
- increase in biogas production of 25%

Germany, STP Bad Bramstedt (85,000 PE or 8.5 MGD)

First fundamental study on pilot scale by Technical University of Hamburg-Harburg, 3 years, 1997 - 1999

- reduction in digestion time from 20 to 4 days without losses in degradation efficiency
- increase in biogas production by a factor of 4 (renewable energy!)
- reduction of digested sludge mass of 25%

Germany, STP Freising (130,000 PE or 13.0 MGD)

Fundamental full-scale study by University of Armed Forces, Munich, 4 months, 2003

- increase in biogas production of 15%
- improved sludge dewatering of 10%

Germany, STP Au, Illertissen/Ulm (70,000 PE or 7.0 MGD)

Full-scale test, 3 months, 2004/2005

- increase in VS destruction of 15%
- increase in biogas production of 25%

Germany, STP Beverungen (25,000 PE or 2.5 MGD)

Full-scale test, 3 months, 2004/2005

- increase in VS destruction of 30%
- increase in biogas production of 30%

Germany, STP Bad Liebenzell (25,000 PE or 2.5 MGD)

Full-scale test, 6 months, 2006

- increase in VS destruction of 35%
- increase in biogas production of 35%

Germany, STP Harsewinkel (57,500 PE or 5.75 MGD)

Full-scale test, 6 months, 2010

- increase in VS destruction of 15 %

Germany, STP Ellmendingen (28,000 PE or 2.8 MGD)

Full-scale test, 3 months, 2010

- increase in VS destruction of 15 %

Germany, STP Veitshöchheim (26,000 PE or 2.6 MGD)

Full-scale test, 4 months, 2010

- increase in VS destruction of 20 %

Germany, STP Jockgrim (21,000 PE or 2.1 MGD)

Preliminary Full-scale test, 3 month, 2011

- increase in VS destruction of 20 %
- increase in biogas production of 20 %
- increase in dewaterability of the digested sludge of 7 %

Germany, STP Schleswig (60,000 PE or 6.0 MGD)

Full-scale installation since March 2011

- increase in VS destruction of 25 %
- increase in biogas production of 23 %

Australia, STP West Camden (230,000 PE or 23.0 MGD)

Full-scale test since July 2010

- increase in VS destruction of 20 %
- increase in biogas production of 20 %

Brazil, STP Arrudas (2,000,000 PE or 200.0 MGD)

Full-scale installation for one Digester in preparation, commissioning December 2009

Denmark, STP Marselisborg-Arhus (220,000 PE or 22.0 MGD)

Full-scale installation since March 2006

- increase in sludge reduction of 15%
- increase in biogas production of 35%
- decrease in polymer consumption of 20%

Denmark, STP Frederikshavn (130,000 PE or 13.0 MGD)

Full-scale installation since March 2006

- increase in VS destruction of 20%
- increase in biogas production of 20%

Denmark, STP Sonderborg (80,000 PE or 8.0 MGD)

Full-scale installation since January 2012

France, STP Cherbourg (230,000 PE or 23.0 MGD)

Full-scale installation since June 2011

France, STP St. Nazaire (200,000 PE or 20.0 MGD)

Full-scale installation since September 2011

Hungary, STP Zalaegerszeg (60,000 PE or 6.0 MGD)

1) Preliminary full-scale test, 3 months, 2004/2005

2) Full-scale installation in September 2008

- increase in VS destruction of 20%
- increase in biogas production of 20%

Hungary, STP Szombathely (80,000 PE or 8.0 MGD)

Full-scale installation since February 2010

Ireland, STP Shanganagh (186,000 PE or 18.6 MGD)

Full-scale installation since February 2011

Netherlands, STP Zeist (75,000 PE or 7.5 MGD)

Full-scale installation since May 2005 – December 2007 (anaerobic sludge treatment was stopped on Zeist STP in December 2007)

- increase in biogas production of 20%

Netherlands, STP Willem-Annapolder (55,000 PE or 5.5 MGD)

Full-scale installation since September 2006

- increase in VS destruction of 15%

Netherlands, STP Nieuwgraaf (440,000 PE or 44.0 MGD)

Full-scale installation since September 2006

- increase in VS destruction of 10%
- increase in biogas production of 10%

Poland, STP Słupsk (250,000 PE or 25.0 MGD)

Full-scale installation since July 2008

Poland, STP Dąbrowa-Górnica (200,000 PE or 20.0 MGD)

Full-scale installation in October 2008

- increase in VS destruction of 25%
- increase in biogas production of 28%

Poland, STP Kielce (350,000 PE or 35.0 MGD)

Full-scale installation in preparation, commissioning August 2010

Switzerland, STP Glarnerland (70,000 PE or 7.0 MGD)

1) Preliminary full-scale test, 2007

2) Full-scale installation since December 2007

- increase in VS destruction of 20%
- increase in biogas production of 20%

Switzerland, STP Ergolz 2 (65,000 PE or 6.5 MGD)

Full-scale test, 3 months, 2004

- increase in VS destruction of 15%
- increase in biogas production of 25%

Spain, STP Lorquí (50,000 PE or 50 MGD)

Installation of one mobile unit specially designed for R&D since July 2007

- Demonstration and publication about ultrasound and dewatering
- Demonstration and publication about ultrasound and disinfection
- Demonstration and publication about ultrasound and nitrogen removal

Spain, STP La Llagosto (172,000 PE or 17.2 MGD)

Full-scale installation since July 2007

Spain, STP Galindo (1,200,000 PE or 120 MGD)

Full-scale installation since July 2007

Spain, STP Rubi Barcelona (155,000 PE or 15.5 MGD)

Full-scale installation since September 2007

Spain, STP Santander (220,000 PE or 22 MGD)

Full-scale installation since September 2007

Spain, STP San Jeronimo (275,000 PE or 27.5 MGD)

Full-scale installation since May 2008

- increase in VS destruction of 20%
- increase in biogas production of 20%

Spain, STP Mallorca (155,000 PE or 15.5 MGD)

Full-scale installation since July 2008

Spain, STP La Gavia (268,000 PE or 26.8 MGD)

Full-scale installation since July 2008

- increase in VS destruction of 17%
- increase in biogas production of 20%
- improved sludge dewatering of 17%

Spain, STP Son Servera (100,000 PE or 10 MGD)

Full-scale installation since July 2008

- increase in VS destruction of 24%
- increase in sludge reduction of 14%
- improved sludge dewatering of 13%

Spain, STP Tablada (200,000 PE or 20 MGD)

Installation test since July 2009 (WWTP works 50% less in digestion volume)

- increase in VS destruction of 14%
- increase in biogas production of 18%

Spain, STP Montornés (100,000 PE or 10.0 MGD)

Full-scale installation since August 2010

- increase in VS destruction of 20%
- increase in sludge reduction of 15%
- improved sludge dewatering of 12%

Spain, STP Tomelloso (200,000 PE or 20 MGD)

Full-scale installation since November 2011

- increase in VS destruction of 20%

Taiwan, STP Danshui (110,000 PE or 11 MGD)

Full-scale test in preparation since December 2011

Improvement of Aerobic Sludge Stabilization

Germany, STP Leinetal (55,000 PE or 5.5 MGD)

1) *Preliminary full-scale test, 3 months, 2002*

2) *Full-scale installation since July 2003*

- sonication of return sludge
- no foam and floating sludge in the aeration tank
- reduction of waste activated sludge production up to 20%

Germany, STP Ottweiler (7,000 PE or 0.7 MGD)

Preliminary full-scale test, 3 months, 2003

- sonication of return sludge
- reduction of waste activated sludge production of 20%

Germany, STP Ditzingen (13,000 PE or 1.3 MGD)

First fundamental study on pilot scale, 3 months, 2003

- reduction of waste activated sludge production up to 50%
- small improvement in denitrification by providing an internal carbon source.

Germany, STP Bünde (54,000 PE or 5.4 MGD)

1) *Preliminary full-scale test, 5 months, 2006*

2) *Full-scale installation since September 2006*

- reduction of waste activated sludge production of 25%
- significant improvement in denitrification by providing an internal carbon source

Germany, STP Eilmendingen (28,000 PE or 2.8 MGD)

Full-scale test, 3 months, 2011

- sonication of return sludge
- reduction of nitrogen concentration in effluent

China, STP Datansha (550,000 PE or 55.0 MGD)

Full-scale installation since June 2006

- sonication of return sludge
- reduction of waste activated sludge production of 15%

China, STP Wuijang I (50,000 PE or 5.0 MGD)

Full-scale installation since March 2007

- sonication of return sludge
- reduction of waste activated sludge production of 25%

China, STP Wuijang II (125,000 PE or 12.5 MGD)

Full-scale installation in October 2008

China, STP Wuxi (500,000 PE or 50.0 MGD)

Full-scale installation since July 2007

- reduction of waste activated sludge production of 15%

Denmark, STP Horsholm (35,000 PE or 3.5 MGD)

Full-scale installation in March 2007

- sonication of return sludge
- reduction of waste activated sludge production of 15%

Denmark, STP Skagen (110,000 PE or 11.0 MGD)

Full-scale installation in March 2007

- sonication of return sludge
- reduction of waste activated sludge production of 20%

Japan, STP Hashimoto/ Yoshiwara

1) Preliminary full-scale test, 3 months, 2002

2) Full-scale installation since May 2003

- sonication of return sludge
- reduction of waste activated sludge production up to 61%

Japan, STP Matsue City

Full-scale installation since October 2004

- sonication of return sludge
- reduction of waste activated sludge production up to 61%

Japan, STP Tanba City/ Nogami

Full-scale installation since October 2004

- sonication of return sludge
- reduction of waste activated sludge production up to 74%

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Hungary, STP Pecs (200,000 PE or 20.0 MGD)

Full-scale installation since March 2006

- sonication of return sludge
- reduction of waste activated sludge production of 25%

Combating of bulking and foaming sludge

Germany, STP Reinfeld (13,000 PE or 1.3 MGD)

First fundamental study on pilot scale by Technical University of Hamburg-Harburg, 6 months, 2002

- reduction in sludge volume index (SVI) from 110 to 60 mL/g
- no more foam and no filamentous organisms in the sludge digester

Germany, STP Brunsbüttel (13,000 PE or 1.3 MGD)

Fundamental study on pilot scale by Technical University of Hamburg-Harburg, 6 months, 2002

- reduction in sludge volume index (SVI) from 140 to 55 mL/g
- no more foam and no filamentous organisms in the sludge digester

Germany, STP Winsen (50,000 PE or 5.0 MGD)

Fundamental study on pilot scale by Technical University of Hamburg-Harburg, 3 months, 2003

- reduction in sludge volume index (SVI) from 150 to 75 mL/g
- 30% reduction in foaming potential of digested sludge

Germany, STP Niefern (25,000 PE or 2.5 MGD)

Preliminary full-scale test, 5 months, 2003

- reduction in sludge volume index (SVI) from 120 to 80 mL/g
- no more floating sludge in the aeration tank

Germany, STP Rostock (300,000 PE or 30.0 MGD)

Fundamental study on pilot scale by University of Rostock, 3 months, 2003

- reduction in sludge volume index (SVI)
- 50% reduction in foaming potential of digested sludge

Germany, STP Reutlingen (245,000 PE or 24.5 MGD)

Preliminary full-scale test, 3 months, 2005

- reduction in sludge volume index (SVI) from 150 to 60 mL/g
- no more floating sludge in the aeration tank

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Germany, STP Schleswig (60,000 PE or 6.0 MGD)

Preliminary full-scale test, 3 months, 2010

- reduction in sludge volume index (SVI)
- no floating sludge in the aeration tank

Germany, STP Rendsburg (50,000 PE or 5.0 MGD)

Preliminary full-scale test, 4 months (2010) and 4 months (2011)

- reduction in sludge volume index (SVI)

Improvement of Digestion Process in Farmland Biogas Plants (FBP) and Food Waste Biogas Plant for Electrical Power Generation

Germany, FBP Wesel

Full-scale installation since 2007

- increase in biogas production of 19%
- increase in power generation of 19%

Germany, FBP Lindow

Full-scale installation since 2008

- increase in biogas production of 15%
- saving substrate costs of 13%

Germany, FBP Bispingen

Full-scale installation since 2008

- increase in biogas production of 12%
- Upgrade of the biogas plant with a second US-system in May 2011

Germany, FBP Ansbach

Full-scale installation since April 2010

- saving substrate costs of 15%

Germany, FBP Bordesholmerland

1) Full-scale test, 5 months, 2011

2) Full-scale installation since September 2011

- saving substrate costs of 12%
- increase in methane concentration of 4%
- Reduction of electricity consumption of FBP
- Upgrade of the biogas plant with a second US-system in 2012

Germany, FBP Hoheluft

Full-scale test since January 2012

Germany, Food waste Biogas Plant, Sibistin

Full-scale test, 6 months, 2011

- increase in VS destruction of 17%

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