IEA Bioenergy
Technology Collaboration Programme

Status report on thermal gasification of biomass and waste 2021

Dr. Jitka Hrbek

Annex 2
Gasification facilities for CHP production – Non-operational, historical (project cancelled before 2012), cancelled, stopped while under construction, deconstructed, idle, on hold

Project name	CHP Pratteln
Project owner	Aerni Pratteln
Status	Non operational
Start up	2009
Country	Switzerland
City	Pratteln
Type	TRL 6-7 Demonstration
Technology	CHP
Raw Material	Wood chips dried
Input 1 Name	Wood chips dries
Output 1 Name	Power (electricity‘)
Output 1 Capacity	0,13
Output 1Unit	MWel
Output 2 Name	Heat
Output 2 Capacity	0,26
Output 2 Unit	MWth
Technology Brief	downdraft Kuntschar/Wegscheid/Aerni modificated
Additional Information	Closed down due of technical reasons. Operational 2009-2014.
Contact	non

Project name	IGCC ARBRE Energy Eggborough
Project owner	ARBRE Energy Limited (AEL)
Status	idle
Start up	2001
Country	UK
City	Eggborough, North Yorkshire
Type	TRL 9 Commercial Technology Raw Material Input 1 Output 1
Technology	Power / CHP
Raw Material	biomass / biomass coal blends
Input 1	many different wood species, (43,000 t/y)
Output 1	power (electricity) (9 MWel)
Partners	SEC; Kelda;
Technology Brief	The wood was to be delivered in chipped form to the plant by truck. The fuel supply, preparation and feeding system consisted of a weigh-bridge, a reception pit, an A-frame storage building (providing three days bulk storage), a dryer (which dried the fu
Additional Information	During the period September to November 2002, TPS had many contacts with companies showing interest in â€œbuyingâ€ Project ARBRE, most of which expressed the wish to see the project completed as originally intended. Several of these companies also held

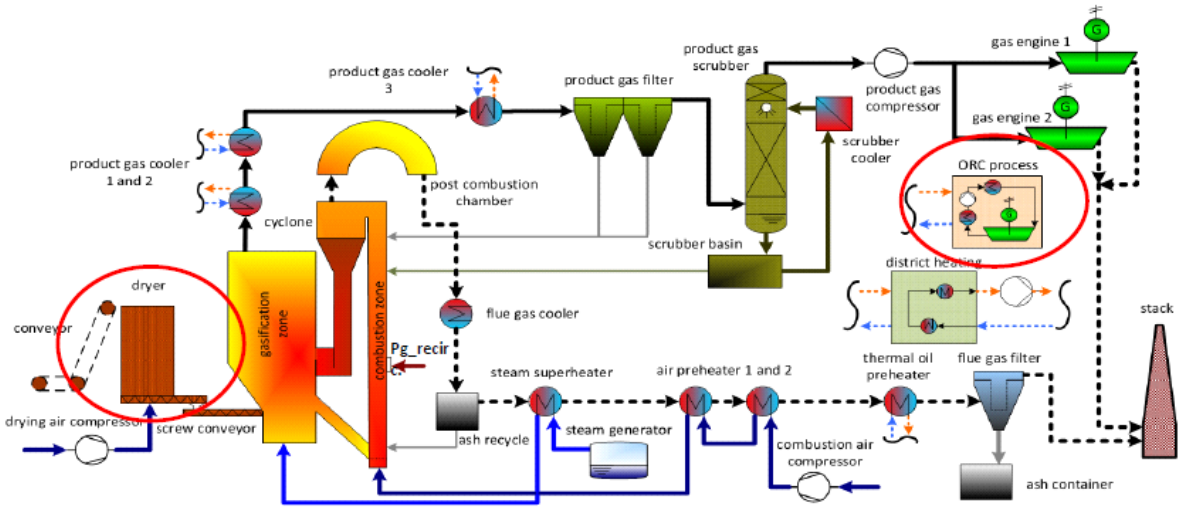
Project name	FICFB Villach
Project owner	Biomasse Energie GmbH
Status	Idle
Start up	
Country	Austria
City	Villach
Type	TRL 9 Commercial
Technology	CHP
Raw Material	Wood chips
Output 1 Name	Power (electricity)
Output 1 Capacity	3,7
Output 1Unit	MWel
Output 2 Name	Heat
Output 2 Capacity	6,7
Output 2 Unit	MWth
Technology Brief	FICFB gasifier
Contact	Not known

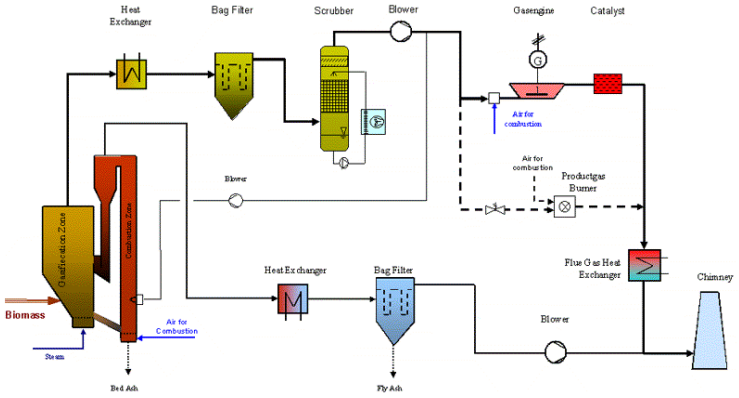
Project name	BioSynergi CHP demonstration plant
Project owner	BioSynergi Proces ApS
Status	deconstructed
Start up	2016
Country	Denmark
City	Hillerod
Type	TRL 6-7 Demonstration
Technology	Power / CHP
Raw Material	lignocellulosics
Input 1	Wood chips
Input additional information	fresh forest wood chips
Output 1	power (electricity) (0.3 MWel)
Output 2	heat (0.75 MWth)
Total Investment Explanation	The project supported by the Danish RD&D fund “EUDP” and the start-up fund ForskEl.
Partners	Hillerod Forsyning/Hillerod Varme A/S, BioSynergi Proces ApS
Technology Brief	Patented open core down draft gasifier set up with gas cooler and filtering systems to feed an ICE genset. Heat from the engine is used for the integrated drum dryer to dry fuel. The feedstock is forest wood chips with a typical moisture content of 40-55% of the total weight. Heat for district heating is produced at three points in the plant: - Cooling water from the gas engine - Cooling of product gas in heat exchangers - Heat from cooling and condensation of flue gas. The plant is designed for unmanned, automatic operation and has a nominal overall efficiency of 86%. An advantage of having a small CHP plant is that the production of electricity and heat can take place close to the forest areas where the wood for the chip production grows. It reduces the need for road transport of biomass - and thus the CO2 emissions of trucks. All parts of the plant have been in unmanned operation in 2017. Minor technical challenges in combination with lack of further funding forced the company to cease activities in the last part of 2017. The plant has been dismantled.
Contact	BioSynergi Proces ApS Industrivænget 4C, Meloese, 3320 Skævinge Mr. Henrik Houmann Jakobsen Email: hhj@biosynergi.dk Phone: +45 45 86 14 30

Project name	Holzheizkraftwerk Senden
Project owner	Blue Energy Syngas GmbH
Status	Non operational
Start up	2011
Country	Germany
City	Neu-Ulm
Type	TRL 9 Commercial
Technology	Power / CHP
Raw Material	lignocellulosics
Input 1	Waste Wood, Clean Wood (14.3 MW)
Output 1	power (electricity) (4.6 MWel)
Output 2	heat (15 MWth)
Partners	Repotec GmbH
Technology Brief	FICFB; allotherm; steam blown; gas engine, 4 MWel and ORC 0,6 MWel
Additional Information	www.blue-energy-europe.com
Contact	CHP Stadtwerke Ulm/Neu-Ulm

Project name	CHP Dübendorf
Project owner	EMPA Duebendorf
Status	Stopped while under construction
Country	Switzerland
City	Duebendorf
Type	TRL 9 Commercial
Technology	Power/CHP
Raw Material	Lignocellulosic crops
Input 1 Name	dried chips from waste wood
Output 1 Name	Power (electircity)
Output 1 Capacity	0,7
Output 1Unit	MWel
Partners	EKZ / Woodpower
Technology Brief	Downdraft Woodpower gasifier. After 2 Mio CHF investment project cancelled and abounded
Additional Information	project stopped
Contact	non

Project name	FICFB Oberwart
Project owner	Energie Oberwart
Status	On hold
Start up	2008
Country	Austria
City	Oberwart
Type	TRL 9 Commercial
Technology	CHP
Raw Material	Wood chips
Output 1 Name	Power (electricity)
Output 1 Capacity	2,8
Output 1Unit	Mwel
Output 2 Name	Heat
Output 2 Capacity	4,1
Output 2 Unit	MWth
Total Investment	16 Mio
Total Investment Currency	Euro
Partners	Ortner Anlagenbau
Technology Brief	FICFB, steam as oxidizing agent in gasification zone, air in combustion zone; the same technology as in Guessing, ORC added
Additional Information	
Contact	Ing. DI (FH) Dr. Klaus Bosch Tel.: +43 (0) 26829015-752



Project name	FICFB Guessing
Project owner	Guessing Renewable Energy
Status	On hold
Start up	2002
Country	Austria
City	Guessing
Type	TRL 9 Commercial
Technology	CHP
Raw Material	Wood chips
Input 1 Capacity	3
Input 1Unit	t/h
Output 1 Name	Power (electricity)
Output 1 Capacity	2
Output 1Unit	MWel
Output 2 Name	Heat
Output 2 Capacity	4,5
Output 2 Unit	MWth
Partners	Austrian Energy
Technology Brief	The basic idea of the FICFB concept is to divide the fluidised bed into two zones, a gasification zone and a combustion zone. Due to the favourable characteristics of the product gas (low nitrogen, high hydrogen content) there are several research projects, which use slip streams of the product gas.
Contact	Ing. Reinhard Koch r.koch@eee-info.net
	

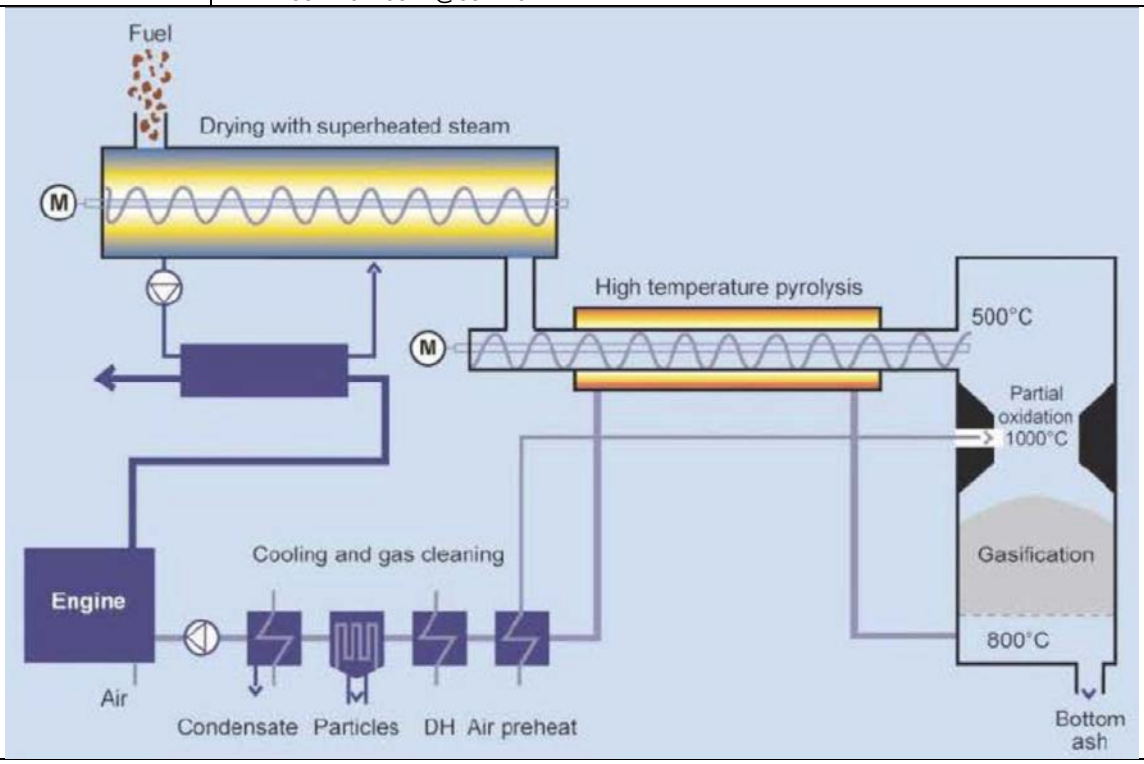
Project name	CFB Tzum
Project owner	HoSt
Status	idle
Start up	2006
Country	The Netherlands
City	Tzum
Type	TRL 6-7 Demonstration
Technology	CHP
Raw Material	Chicken manure
Output Name	Heat
Output Capacity	3
Output Unit	MWth
Technology Brief	HoSt constructed a 3 MWth chicken manure gasifier in Tzum in the Netherlands. The gasifier is a circulating fluidized bed (CFB). The gas is used in a low-NOx gas boiler to produce heat and electricity. The chicken farm uses the heat. Power is delivered to the grid. The plant has been successfully started spring 2006. During 2006 and 2007 several improvements have been made (new ash removal system, new fuel dryer, …). it has been operated 3500 h in 2007. Mein problem remains the supply of sufficiently dry fuel (chicken manure). HoSt constructed a second chicken manure gasifier in Portugal as part of a 1 MWe CHP plant in 2010.
Additional Information	http://www.host.nl
Contact	Not known
	

Project name	KSV Mannheim
Project owner	Kopf Syngas GmbH and Co. KG
Status	On hold
Start up	2015
Country	Germany
City	Mannheim
Type	TRL 9 Commercial
Technology	Power / CHP
Raw Material	other
Input 1	sewage sludge (5,000 t/y)
Output 1	heat (1.5 MWth)
Partners	KOPF SynGas GmbH and Co. KG
Technology Brief	Fluidized bed gasification. At the moment stopped and redesigned.
Contact	info@kopf-syngas.de Tel.: +49 7071 54954 50 | Fax: +49 7071 54954 60

Project name	Tournai Swimming Pool (Xylowatt)
Project owner	Tournai city
Status	Non operational
Start up	2009
Country	Belgium
City	Tournai
Type	TRL 8 First-of-a-kind commercial
Technology	Power / CHP
Technology additional information	NOTAR® v.2 gasifier, Combined Heat & Power
Raw Material	lignocellulosics
Input 1	clean wood chips (class A) (240 kg/h)
Output 1	power (electricity) (0.26 MWel)
Output 2	heat (0.47 MWth)
Technology Brief	NOTAR® gasifier is a patented medium scale down-draft gasification technology. It is one of the few process which produces tar-free syngas from biomass. It is designed with a multi stage process and a splitting of the pyrolysis, combustion and reduction zones. This physical separation leads to a compact gasification unit producing a very high-quality syngas. The energy produced from solid biomass is then used as fuel to produce heat and power or for industrial applications.
Additional Information	https://www.xylowatt.com/
Contact	Poskin Pierre-David +32 472 52 96 24

Project name	Växjö Värnamo Biomass Gasification Center AB
Project owner	VVBGC AB
Status	Idle
Start up	1995
Country	Sweden
City	Värnamo
Type	TRL 6-7 Demonstration
Technology	Other gasification Technology CHP/Synthesis
Raw Material	Lignocellulosic crops
Input 1 Name	Woody biomass, agrowaste
Output 1 Name	Power (electricity)
Output 1 Capacity	6
Output 1Unit	MWel
Output 2 Name	Heat
Output 2 Capacity	8
Output 2 Unit	MWth
Output 3 Name	Clean syngas
Output 3 Capacity	1000
Output 3 Unit	m3/h
Partners	Foster Wheeler, E.ON for CHP
Technology Brief	The plant was originally built for CHP production based on an IGCC concept. Fuel was fed by means of a lock hopper system. The gasifier was an airblown CFB operating at approx 20 atm. Downstream of the gasifier and its associated cyclone, the gas was cooled to 400 C and then passed a hot gas filter in which particulateds were removed. The gas was then directly routed to either the flare or an SGT100 gas trubine. Bleed air from the gas turbione compressor was used in the gasifier after pressure boosting. The exhaust gas from the turbine passed a HRSG generating steam at 45 bar 450 C and also some district heating before being released to the stack. The steam was used in a steam turbine, after which there was a district heating condenser. The plant was operated in this way until 2000 when it was mothballed. There has been several attempts to revive the plant for use as a steam-oxygen blown unit for synthesis gas production. The last attempt failed in 2011 for lack of industrial financing.
Additional Information	www.vvbgc.se
Contact	Gunnar Crona email: info@vvbgc.se +46 370 69 41 00

Project name	Hillerod two stage gasifier
Project owner	Weiss
Status	Non operational
Country	Denmark
City	Hillerod
Type	TRL 6-7 Demonstration
Technology	CHP
Raw Material	Wet wood chips
Output 1 Name	Power (electricity)
Output 1 Capacity	0,5
Output 1Unit	MWel
Output 2 Name	Heat
Output 2 Capacity	1
Output 2 Unit	MWth
Partners	DTU, Weiss, COWI
Technology Brief	Staged down draft Gasifier Developed and patented by DTU, Scale-up by Weiss and DTU, Licensed by COWI
Additional Information	Plant has been dismantled, Weiss has filed bankruptcy and ceased operations
Contact	http://www.dtu.dk/english/service/phonebook/person?id=6144&tab=1 www.cowi.dk cowi@cowi.dk



Project name	CHP Wila
Project owner	Woodpower in Wila
Status	Non operational
Start up	2007
Country	Switzerland
City	Wila
Type	TRL 9 Commercial
Technology	Power/CHP
Raw Material	Lignocellulosic crops
Input 1 Name	dried chips from demolition wood
Output 1 Name	Power (electircity)
Output 1 Capacity	0,38
Output 1Unit	Mwel
Output 2 Name	Heat
Output 2 Capacity	0,425
Output 2 Unit	MWth
Partners	EKZ
Technology Brief	Downdraft Woodpower gasifier. oprational 2007-11; 2011 end of operation, 2012 dismantled