

SECTION 4.

COMPETITIVE LANDSCAPE

UPGRADING MARKET

SUMMARY

In recent years, the biogas upgrading market has been in strong development phase with many companies on the market to offer their solutions. The figure below presents the major players (in alphabetical order).

Figure 13. Biogas upgrading suppliers

Water scrubbing	PSA	Membrane separation	Chemical scrubbing	Cryo
<ul style="list-style-type: none"> •Chaumeca •Econet •Greenlane •Malmberg 	<ul style="list-style-type: none"> •Air Liquide •Carbotech •ETW •Greenlane •Guild Associates •NeoZeo •Quadrogen •Sysadvance •Xebec 	<ul style="list-style-type: none"> •AgriKomp •Air Liquide •Arol Energy •Axiom •Bright Biomethane •DMT •Eisenmann •EnviTec Biogas •Hitachi Zosen INOVA •Honeywell •Pentair •Prodeval •Unison Solutions •Veolia •Weltec Biopower 	<ul style="list-style-type: none"> •Ammongas •Bilfinger •Carbonoro •Greenmac* •Hitachi Zosen INOVA •Honeywell •Morrow Renewables •Schwelm •Wartsila 	<ul style="list-style-type: none"> •CryoPur •FirmGreen •Waga Energy

*As of 2021, Greenmac is part of Bright Biomethane

It is important to note that due to limits in data acquisition, incomplete public information and some private data, the study may analyze fewer projects than are actually in operation in Europe and the North America. BiogasWorld conservatively estimates that only 65-70% of existing plants are analyzed in this section. To have a full picture of the European market, BiogasWorld suggests additional market study.

The current competitive analysis is based on information on more than 1 200 upgrading units:

- 197 plants in the North America
- 1,244 plants in Europe
- 34 in Asia, Africa, Oceania, and South America

The data for Asia, Africa and South America is mentioned with the sole aim to show the world presence of each upgrading technology supplier.

Graphs below represent the technology share based on the number of operational units (Figure 14) and installed capacity (Figure 15).

Figure 14. Share of analyzed upgrading technology suppliers, based on number of units

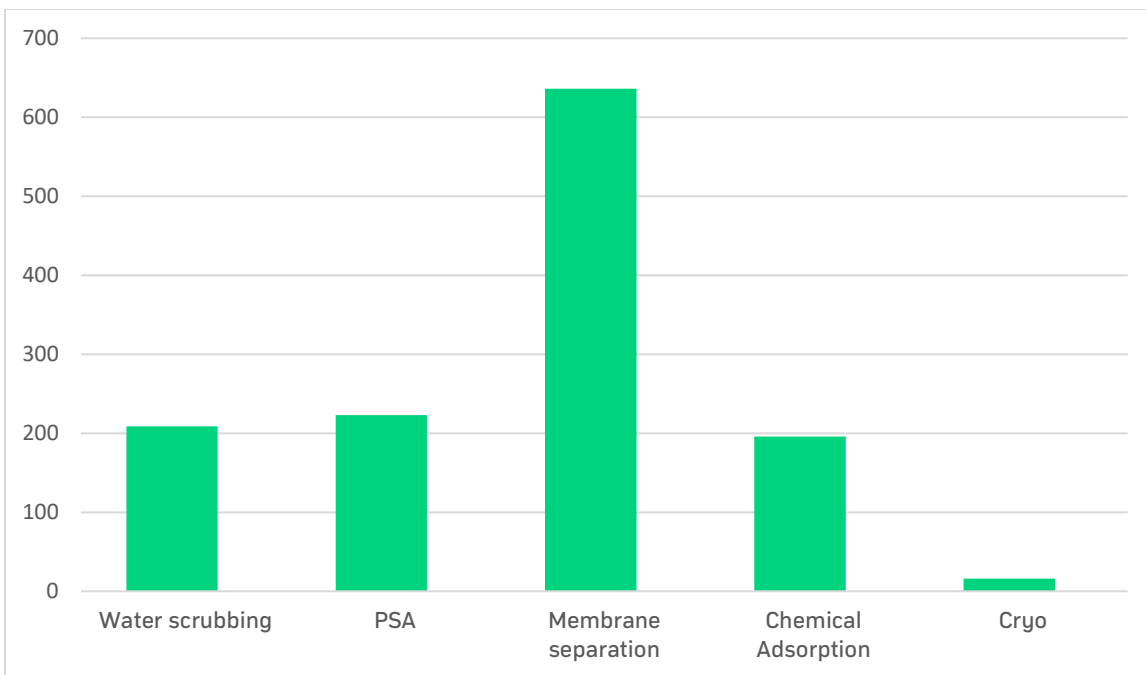
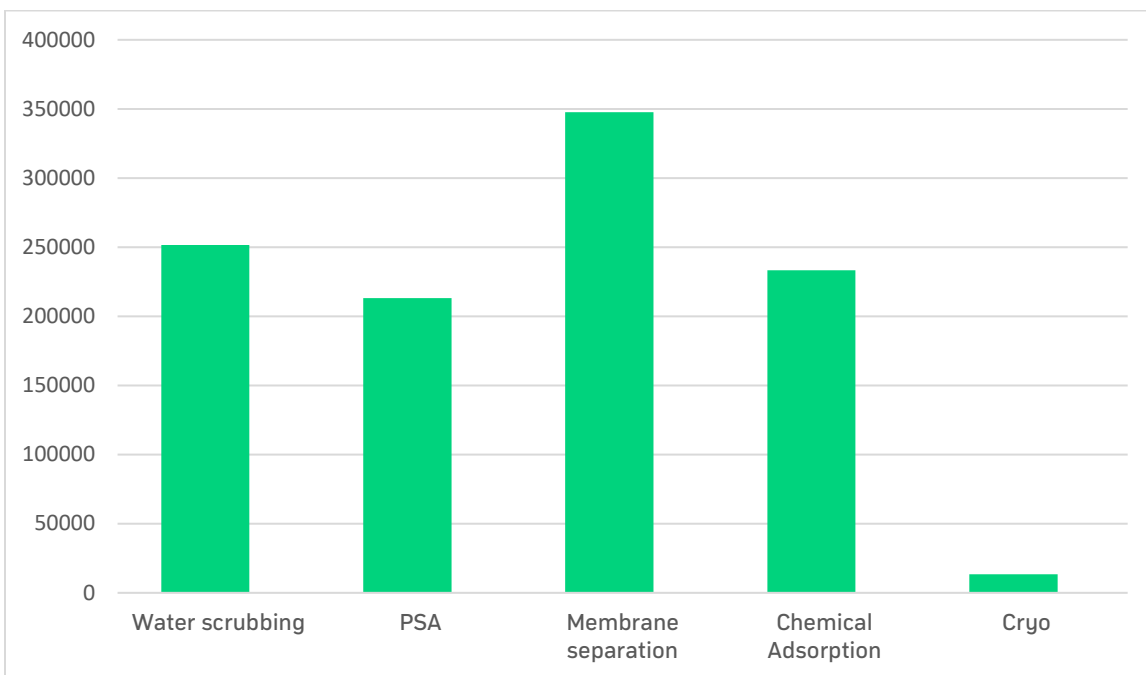


Figure 15. Share of analyzed upgrading technology suppliers, based on installed capacity, m3/hr

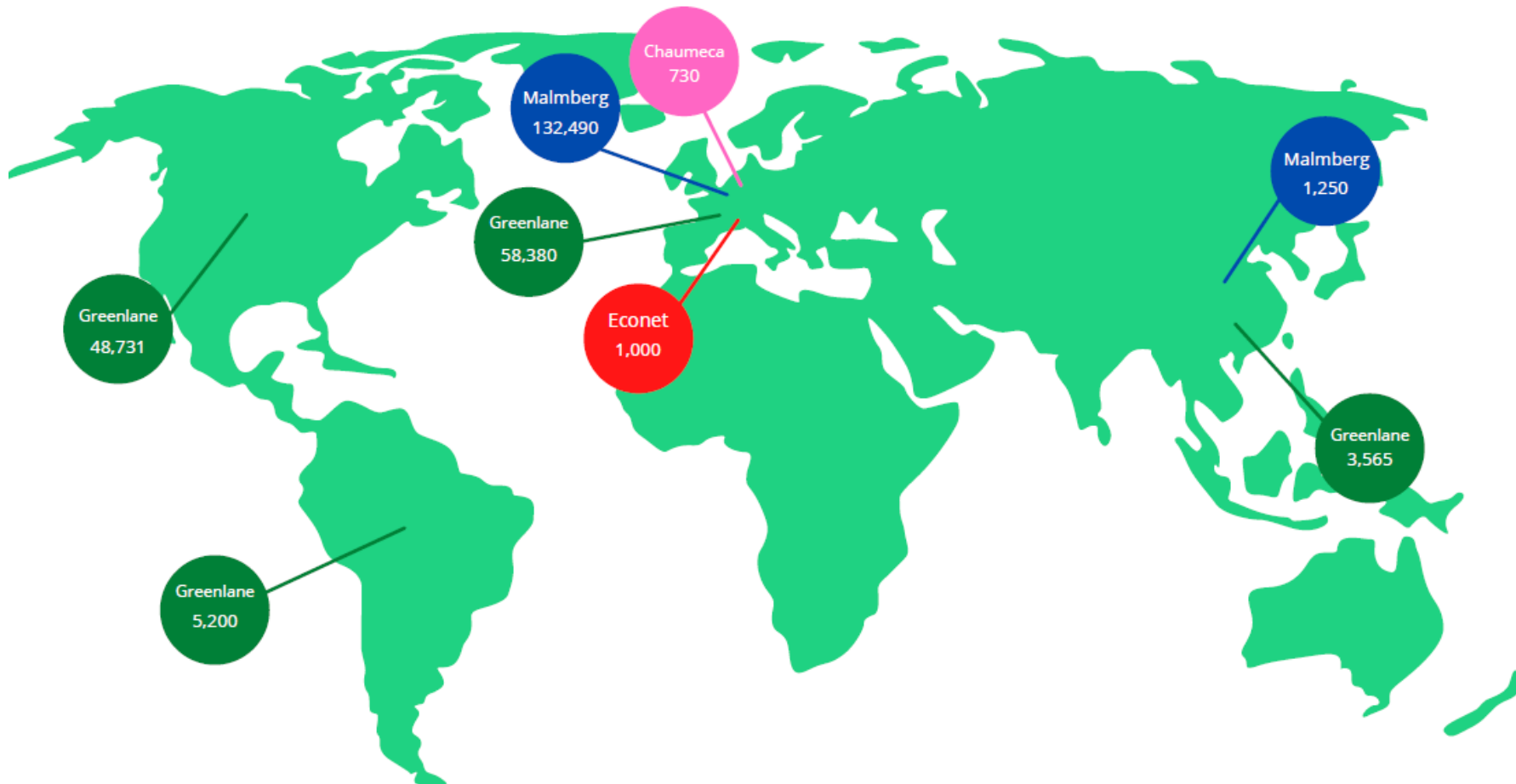


Water scrubbing

MAJOR SUPPLIERS – WATER SCRUBBING

COMPANY	Number of plants in operation	Capacity, plants in operation, m ³ /hr	Installed capacity during last 3 years (2019-2021), m ³ /hr	Number of plants under construction (2022-2023)	Capacity, under construction, m ³ /hr
CHAUMECA	5	730	Not available	Not available	Not available
ECONET	3	1,000	Not available	Not available	Not available
GREENLANE	83	115,956	4,531	1	410
MALMBERG	119	134,340	22,025	1	600

Figure 16. Presence of water scrubbing suppliers, installed capacity of units in operation, m3/hr



PSA

MAJOR SUPPLIERS – PSA

COMPANY	Number of plants in operation	Capacity, plants in operation, m ³ /hr	Installed capacity during last 3 years (2019-2021), m ³ /hr	Number of plants under construction (2022-2023)	Capacity, under construction, m ³ /hr
AIR LIQUIDE	1	2,200	Not available	Not available	Not available
BIOFERM	8	8,731	2,277	Not available	Not available
CARBOTECH	76	70,644	Not available	Not available	Not available
ETW	12	7,461	3,750	1	2,700
GREENLANE	6	30,881	19,521	Not Available	Not available
GUILD ASSOCIATES	7	20,030	Not Available	1	570
SYSADVANCE	7	3,405	2,030	Not available	Not available
XEBEC	105	69,509	16,979	Not available	Not available

Figure 17. Presence of PSA suppliers, installed capacity of units in operation, m3/hr



Membrane Separation

MAJOR SUPPLIERS – MEMBRANE SEPARATION

COMPANY	Number of plants in operation	Capacity, plants in operation, m ³ /hr	Installed capacity during last 3 years (2019-2021), m ³ /hr	Number of plants under construction (2022-2023)	Capacity, under construction, m ³ /hr
AB ENERGY	1	1000	1000	Not available	Not available
AGRIKOMP	20	3,346	3,166	16	2,500
AIR LIQUIDE	33	101,406	Not Available	Not available	Not available
AROL ENERGY	27	5,125	5,065	48	9,605
AXIOM	12	2,220	558	Not available	Not available
BRIGHT BIOMETHANE	98	33,015	27,454	14	7,014
CLARKE ENERGY	2	330	250	1	2550
DMT	58	37,891	22,471	10	17,104
EISENMANN	3	425	Not available	Not available	Not available
ENVITEC	58	31,570	10,780	Not available	Not available
HITACHI	54	15,300	10,090	5	1,350
HONEYWELL	4	20,900	Not available	Not available	Not available
PENTAIR	43	33,147	5,860	Not available	Not available
PRODEVAL	203	49,171	42,866	72	15,880
UNISON/BIOCNG	9	1,700	Not available	Not available	Not available
VEOLIA BIOTHANE	7	1,875	1,875	9	1,122
WELTEC BIOPOWER	7	3,930	1,320	Not available	Not available

Figure 18. Presence of membrane separation suppliers, installed capacity of units in operation, m3/hr



Chemical Scrubbing

MAJOR SUPPLIERS – CHEMICAL SCRUBBING

COMPANY	Number of plants in operation	Capacity, plants in operation, m ³ /hr	Installed capacity during last 3 years (2019-2021), m ³ /hr	Number of plants under construction (2022-2023)	Capacity, under construction, m ³ /hr
AMMONGAS	27	41,660	15,210	Not available	Not available
AROL ENERGY	1	160	0	2	650
BRIGHT BIOMETHANE*	36	15,306	262	Not available	Not available
CARBONORO	2	240	240	Not available	Not available
EMS BILFINGER	2	3,750	Not available	Not available	Not available
HERA	4	195	Not available	Not available	Not available
HITACHI	40	17,270	930	1	700
HONEYWELL	2	22,400	Not available	Not available	Not available
MORROW	13	68,694	Not available	Not available	Not available
SCHWELM	23	7,404	2,160	Not available	Not available
WARTSILA	44	54,900	22,590	2	9132

*Please note that following Bright Biomethane's acquisition of Greenmac, Greenmac's chemical scrubbing facilities are now listed under Bright Biomethane

Figure 19. Presence of chemical scrubbing suppliers, installed capacity of units in operation, m3/hr



Cryo

MAJOR SUPPLIERS – Cryo

COMPANY*	Number of plants in operation	Capacity, plants in operation, m ³ /hr	Installed capacity during last 3 years (2019-2021), m ³ /hr	Number of plants under construction (2022-2023)	Capacity, under construction, m ³ /hr
CRYO PUR	2	900	900	6	2,784
FIRMGREEN	1	8 900	Not available	Not available	Not available
GASREC	1	Not available	Not available	Not available	Not available
WAGA ENERGY	12	3,640	2,190	7	2,000

Figure 20. Presence of cryo suppliers, installed capacity of units in operation, m3/hr

